Questionnaire

Summary of the main activities of the Biomedical Research Center of the Slovak Academy of Sciences

Period: January 1, 2016 - December 31, 2021

Bratislava, June 2022

CONTENTS

1. Basic information on the institute:

1.1. Legal name and address

Biomedical Research Center of the Slovak Academy of Sciences,
(Biomedicínske centrum Slovenskej akadémie vied, BMC SAV)
Dúbravská cesta 9, 845 05 Bratislava

Main organizational units – Institutes of the BMC SAS:

Cancer Research Institute (CRI BMC SAS), *Dúbravská cesta 9, 845 05 Bratislava*
Institute of Experimental Endocrinology (IEE BMC SAS), *Dúbravská cesta 9, 845 05 Bratislava*
Institute of Clinical and Translational Research (ICTR BMC SAS), *Dúbravská cesta 9, Bratislava*
Institute of Virology (IV BMC SAS), *Dúbravská cesta 9, 845 05 Bratislava*
Institute of Neurobiology (INb BMC SAS), *Šoltésovej 4-6, 040 01 Košice*

1.2. URL of the institute web site

www.bmc.sav.sk

1.3. Executive body of the institute and its composition

Directoriat	Name	Age	Years in the position from-to
Director of the BMC SAS	Silvia Pastoreková, prof. DSc.	61	2016-
Deputy director of the BMC SAS	Juraj Kopáček, MVD., DSc.	59	2016-2017 2021-
	Miroslav Vlček, MD., PhD.	43	2017-2018
	Daniela Gašperíková, DSc.	54	2018-2019 2020-2021
	Miroslav Chovanec, PhD.	53	2019-2020
Scientific director of the IEE BMC SAS	Štefan Zórad, PhD.	66	2016-2017
	Daniela Gašperíková, DSc.	54	2017-
Scientific director of the CRI BMC SAS	Lucia Kučerová, DSc.	49	2016-2017
	Miroslav Chovanec, PhD.	53	2017-
Scientific director of the ICTR BMC SAS	Miroslav Vlček, MD., PhD.	43	2016-
Scientific director of the IV BMC SAS	Juraj Kopáček, MVD., DSc.	59	2016-
Scientific director of the INb BMC SAS	Ján Gálik, PhD.	62	2018-
Scientific secretary of the BMC SAS	Jozef Ukropec, DSc.	48	2016-2020
	Miroslav Chovanec, PhD.	53	2016-2017
	Marián Grman, PhD.	37	2017-
	Silvia Schmidtová, PhD.	31	2021-

Head of the Legal Department	Iveta Šárniková, JUDr.	63	2016-
Head of the Economic Dept	Hana Krasoňová, MSc.	51	2016-
Head of the Project Dept	Jana Blahová, PhD.	60	2016-
Head of the Dept for Public Procurement	Tatiana Elanová, Ing.		2021-
Head of the Technical & Operations Dept	Kornel Dobročka	60	2016-

1.4. Head of the Scientific Board

Name	Age	Years in the position from-to
Richard Imrich, MD., DSc.	48	2016-2017
Ján Sedlák, DSc.	65	2017-2020
Boris Klempa, DSc.	46	2020-

1.4.1 Composition of the International Advisory Board

prof. Seppo Parkkila, Universita of Tampere, Finland (Head),
prof. Christian Drosten, Charité-Berlin, Institute of Virology, Germany
Dr. Mária Dušinská, Norwegian Institute for Air Research, Kjeller, Norway
prof. Peter Kovacs, University of Leipzig Medical Center, Germany
prof. Jan Motlik, Institute of Animal Physiology and Genetics, Czech Academy of Sciences, Czech Republic

1.5. Basic information on the research personnel

1.5.1. Fulltime equivalent work capacity of all employees (FTE all), FTE of employees with university degrees engaged in research projects (FTE researchers)

2016		2017		2018		2019		2020		2021		2016-2021	
FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	average FTE all per year	average FTE researchers per year
277,76	160,89	289,67	171,30	286,00	168,04	283,26	171,31	296,08	182,54	312,21	197,43	290,83	175,25

Note please, that the difference between „FTE all“ and „FTE researchers“ is related to the following facts:

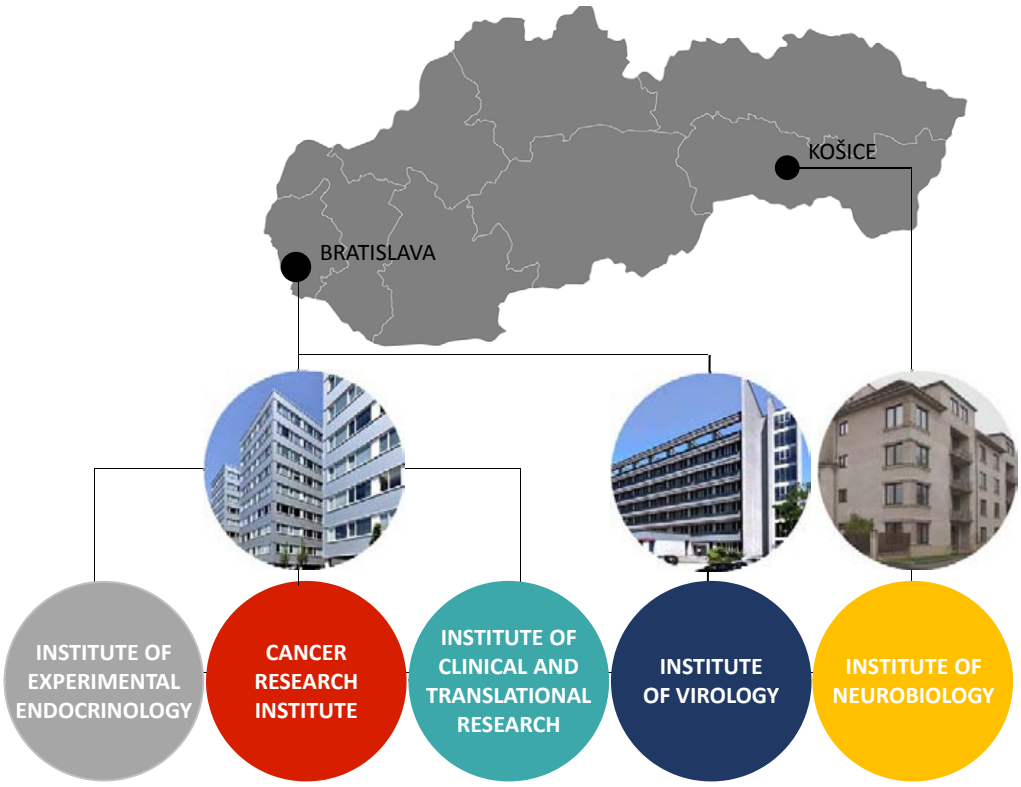
(1) BMC SAS operates several specialized infrastructures that require special supporting staff, such as three animal facilities (animal house for immunocompetent animals for in vivo experiments in virology, animal house for immunodeficient mice for experiments in oncology and animal house with traumatology unit for experiments in neurobiology), high-tech facility for analytics and R&D of bioactive substances, BSL3 laboratories, Research clinic and Centre for Physical Activity

(2) BMC SAS technical support personnel takes a complex care of buildings and general operations (care for basic technological equipment, routine repairs and revisions, transportation of samples, cleaning services, etc.)

(3) BMC SAS administration personnel also performs complete economic operations, legal and personalistic operations, and provides support to researchers in public procurement, project management and PR.

1.5.2. If applicable, add also a short information on the merger of the BMC SAS in the evaluation period. You can also add rows in the above table corresponding to the founding institutes

Biomedical Research Center of the Slovak Academy of Sciences (BMC SAS) was established on January 1st, 2016 through merge of four previously independent institutes of the SAS located in Bratislava, namely the Institute of Virology, the Institute of Experimental Endocrinology, the Cancer Research Institute and the Institute of Clinical and Translation Research (former Center for Molecular Medicine), that were from January 1st, 2018 joined by the Institute of Neurobiology located in Košice.

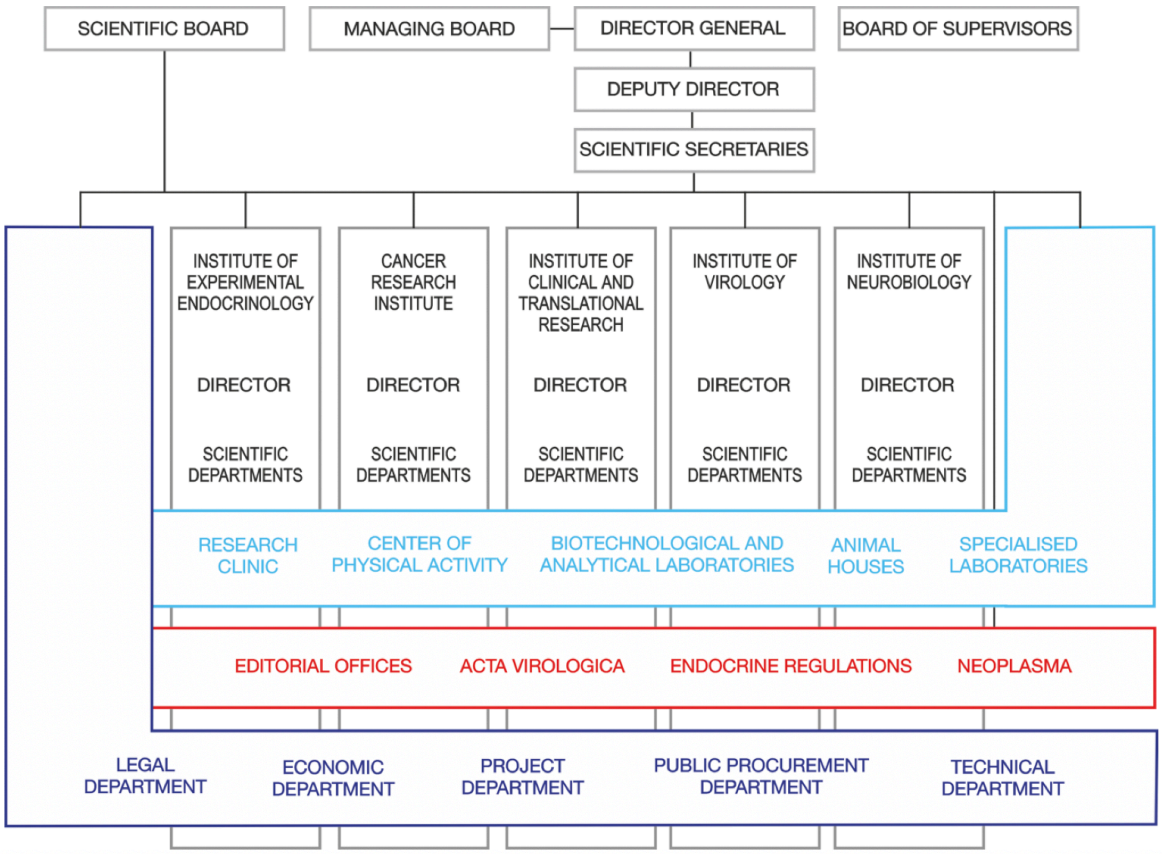


The establishment of the Biomedical Center of the Slovak Academy of Sciences was initiated by both external societal factors reflecting the trend towards larger and more efficient institutions, and internal factors including efforts to better exploit existing research capacity, strengthen cooperation and connect with scientifically and humanly congruent partners.

The goal of the merger was to bring together and integrate a critical mass of researchers and infrastructure in order to foster research excellence, develop interdisciplinary approaches, and stimulate innovative potential for the improvement of the knowledge on human diseases, its better translation to clinic and more effective practical use for the benefit of patients and the entire society.

The merger was initiated by the founding institutes themselves and was based on their compatibility of research topics, complementarity of equipment and methodologies, concentration of excellent research teams and experts, and common interests that are now being translated into new collaborations and cross-cutting projects as well as into new institutional culture and research governance leading to improved research outputs and increased societal impact as described further below.

The Institutes as the main BMC SAS organization units are horizontally integrated at the operational level through the unified rules, joint budget, shared special infrastructures and common administration and technical units, as illustrated on the scheme of the organization structure (see the next page). The integration is supported by shared specialised premises, including the Research Clinic and animal facilities.



Organisation structure of the BMC SAS illustrates integration of research institutes via shared facilities and common supporting administrative and technical departments.

1.6. Basic information on the BMC SAS funding

1.6.1. Institutional salary budget, other salary budget[1], non-salary budget[2]

Salary budget	2016	2017	2018	2019	2020	2021	average
Institutional salary budget *(millions of EUR)*	4,228	4,495	4,735	5,338	6,045	6,102	5,157
Other salary budget *(millions of EUR)*	0,758	0,815	0,923	0,795	0,726	1,310	0,888
Total salary budget *(millions of EUR)*	4,986	5,31	5,658	6,133	6,771	7,412	6,045
Non-salary budget *(millions of EUR)*	3,524	3,318	3,528	5,579	3,909	4,418	4,046

[1]The increase in the Institutional and Other salary budgets in 2020 and 2021 was partly associated with the income from services provided by the BMC SAS to the SAS and to the Slovak Republic within COVID-19 pandemics-related activities. These included routine PCR and serological testing of SAS employees as well as selected activities provided by the BMC SAS to the state (testing of hospital personnel and patients, testing participants of different cultural, sports and policy events, developing new diagnostic tests, sequencing of SARS-CoV-2 variants etc).
[2]The Non-salary budget consisted of about 12-13% of PhD fellowships and 87-88% of costs of goods, services and building / facility maintenance and operations (of which 32-35% were from the institutional budget).

[1] Salary budget originating outside the regular budgetary resources of the organization, e.g. from the project funding.
[2] Includes Goods and Services and PhD fellowships

1.7. Mission Statement of the BMC SAS as presented in the Foundation Charter indicating the years when it was adopted and revised

Biomedical Research Center SAS is a multidisciplinary research institution devoted to basic, translational and clinical research in biomedicine, particularly in the areas of endocrinology, oncology, virology and microbiology, neurobiology, physiology, genetics, immunology, molecular biology, biochemistry and biophysics. According to the Foundation Charter issued by the Presidium of the Slovak Academy of Sciences on December 1, 2015 and annexed on November 30, 2017, BMC SAS was established as a research organization with the contributory form of economy and a legal successor of the merging institutes.

Principal research activities of BMC SAS involve:

Molecular mechanisms and biological principles of replication and spread of viruses and microorganisms, relationships of viruses and microorganisms with infected cells, vectors and hosts, mechanisms of pathogenesis of diseases caused by viruses and microorganisms, functions of viral and microbial components, immune responses to infections, ecology of viruses and microorganisms, development of detection tests suitable for rapid and sensitive diagnosis of viral and microbial infections, development of strategies for prevention and treatment of infections caused by viruses and microorganisms.

Normal and pathological physiology of the endocrine system with regard to its role in control of various physiological functions of the organism using model situations in development, stress and etiopathogenesis of diseases, with special emphasis on the origin and development of metabolic disorders, cardiovascular and nervous system diseases, cancer as well as other metabolic and/or endocrine diseases.

Etiopathogenetic factors of cancer and mechanisms of transformation of normal cells into malignant tumor cell population, phenotypic traits and genetic, epigenetic, proteomic, biochemical, molecular-biological, metabolic and immunological properties of tumor cells and components of tumor microenvironment, biomarkers for early and rapid diagnostics of cancer, for predicting the effectiveness of treatment and stratification of cancer patients, as well as for the use of knowledge in prevention and anticancer treatment strategies.

Molecular mechanisms of pathogenesis of human diseases, signaling pathways controlled by low molecular weight substances and endogenous production of these substances, as well as possibilities of their exogenous application, transfer of basic research knowledge to clinical practice to influence the origin, course and prognosis of selected civilization diseases and improve translation of human health research to newly emerging diagnostic, therapeutic and preventive methodologies and procedures.

Central nervous system phenomena occurring under normal and pathological conditions, basic principles of the relationship between the circulatory system and the nerve substrate, especially under conditions of circulatory and metabolic disorders, neurological disorders that occur in the brain, spinal cord and circulatory system.

BMC SAS also carries out additional activities, including doctoral education, consulting and expert activities, outpatient healthcare, publishing, editorial and dissemination activities, educating university students, popularization, cooperation with domestic and foreign research institutes, universities as well as private/commercial sector, and other activities in accordance with the applicable legislation.

1.8. Summary of R&D activity pursued by the BMC SAS during the evaluation period in both national and international contexts.

Describe the scientific importance and societal impact of each important result/discovery. Explain on general level – the information should be understandable for a non-specialist (max. 10 pages for larger institutes with more than 50 FTE researchers as per Table 1.5.1.)

Since the establishment in 2016, the Biomedical Research Center SAS has built its R&D activities on the background of strong topics traditionally associated with the founding institutes. This was combined with incorporation of new topics brought by the newly acquired or reintegrated excellent young researchers. The main vision was to join forces in order to elevate research quality and take a complex interdisciplinary approach to better understand the causes and consequences of human pathologies. To bring this vision to reality, we pursued research activities focused on non-communicable diseases that account for almost three quarters of deaths worldwide, such as cancer, obesity, metabolic disorders, neurological and neuroendocrine disorders. At the same time, we investigated viruses and rickettsia as etiologic agents of infectious diseases. The R&D activities in the area of virology were strongly intensified during COVID-19 pandemics. Both major arms of the BMC SAS activities resulted in publications as well as in outputs with societal impact as described in more detail on pages 21-35, 37-40 and 167-175.

Institute of Virology BMC SAS

Scientific Director: Juraj KOPÁČEK

Throughout its history dated from 1953, the Institute of Virology has been consistently dedicated to investigation of principal problems of the contemporary virology such as composition and functional properties of the virus particles, mechanisms of virus replication, virus-(vector)-host relationships, genetic variability of viruses, pathogenic mechanisms, anti-viral immune responses and virus epidemiology. The traditional topics have been the structure/function and ecology/epidemiology of *Rickettsiae* and *Chlamydiae*. The Institute has also become strongly involved in cancer research with the focus on the role of hypoxia and acidosis in cancer progression. The expertise developed at the Institute of Virology was fully utilized in the fight against COVID-19 pandemics for the clear benefit of the entire society.
The R&D activities at the Institute of Virology were performed within four research departments that were created by restructuring of the original seven departments in 2017. Part of the activities was also accomplished in the detached Biotechnological and analytical laboratories located in the Eastern Slovakia (described on page 11). For the brief overview of the staff and projects of the Institute of Virology in the context of the BMC SAS, see the scheme on page 20.

Department of Virus Ecology

Head: Boris KLEMPA
Department of Virus Ecology covers three research topics: zoonotic viruses, influenza virus and plant viruses. Infections caused by these viruses are of serious public health and economic concerns and the research outputs have shown direct implications for epidemiological measures as well as for agricultural practice. Due to the recent COVID-19 pandemic, traditional investigations of molecular evolution, epidemiology and pathogenesis of tick-born and small mammals-transmitted viruses were recently broadened towards SARS-CoV-2 virus. The research of zoonotic viruses involved maintenance and development of the European Virus Archive with global reach (supported by the chain of three large EU projects), including biological and molecular characterizations of the deposited viruses, collection and identification of new viruses belonging mainly to Hantavirus genus, isolation, characterization and deposition of SARS-CoV-2 virus from Slovak patients, development and validation of the diagnostic tests, sequencing and genomic analyses of the SARS-CoV-2 variants. Moreover, understanding the virus-host interaction was addressed via analysis of the LCM virus impact on the proteome of infected cells. The influenza A virus research was mainly dedicated to elucidating the role of PB1-F2 virus protein in virulence and pathogenesis, and HA2 protein in induction of the protective antibody-mediated immune responses. The plant virus research was focused on understanding diversity and evolution of economically important viruses of the stone fruit trees, grapevine and cucurbit mainly through functional genomics and proteomics. The most important publication outputs of the department are listed in Section 2.1.2. on pages 21-22 (papers 1-12), in Section 2.1.5 on page 37 (papers 1-4).

Department of Virus Immunology

Head: Ivana NEMČOVIČOVÁ
The Department of Virus Immunology has investigated innate immune responses to infections caused by herpesviruses and influenza viruses as well as the effects of interferons and cytokines on virus multiplication. As a matter of tradition, transmission and molecular mechanisms of latency-reactivation of the Murine herpesvirus 68 (MHV-68) isolated from wild rodents in Slovakia was studies. Furthermore, effects of hypoxia and/or immune-signalling on influenza A virus infection was analysed. Moreover, non-viremic transmission of tick-borne infectious agents (both viruses and microorganisms) via the tick saliva was investigated through study of their biological activities suppressing innate immune responses of the host. Special attention has been paid to the detailed structural and functional analysis of the human cytomegalovirus (HCMV) immunomodulatory UL141 protein that mediates virus evasion and inhibition of immune effector pathways. Knowledge derived from these studies has potential applications in antiviral strategies. The most important publication outputs of the department are listed in Section 2.1.2. on pages 22-23 (papers 13-19) and in Section 2.1.5 on pages 37-38 (papers 5-6).

Department of Rickettsiology

Head: Ľudovít ŠKULTÉTY
Rickettsiae and rickettsia-like organisms (Coxiella burnetii) are microorganisms phylogenetically situated between bacteria and viruses. They are usually transmitted from infected animals to humans by aerosol or ingestion of raw milk. Research activities of the department have been continuously focused on (1) prediction and systematic identification of protein biomarkers for diagnostics of Q fever, (2) elucidation of their role in virulence, pathogenesis and immunity, and (3) monitoring of C. burnetii, rickettsiae, chlamydiae and related microorganisms in their reservoirs and in natural foci associated with the prevalence of human diseases. The aim of these activities has been to elucidate their molecular and biological properties and contribute to surveillance of these infectious pathogens. Moreover, the research staff of the department operates the specialized laboratory of proteomics, the BSL3 laboratory for production of vaccination strain of C. burnetii and participates in national reference laboratory for public health control of rickettsioses. The department also provides a service to the public in the form of tick testing for the presence of several types of pathogens. The most important publication outputs of the department are listed in Section 2.1.2. on pages 23-24 (papers 20-30) and in Section 2.1.5 on page 38 (papers 7-8).

Department of Tumour Biology

Head: ELiška ŠVASTOVÁ
The department has been focused on understanding the role of hypoxia and acidosis in cancer progression. This topic emerged in early 90-ties following the identification and cloning of the cancer-associated, hypoxia-induced carbonic anhydrase IX (CA IX) at the department. CA IX then has become well-known as a clinically relevant biomarker of hypoxia. The department researchers also provided primary evidences on CA IX role in acidosis and in processes linked to metastatic dissemination using molecular approaches and unique CA IX specific mouse monoclonal antibodies. During the evaluation period, CA IX was demonstrated to play a role in glycolytic metabolism, in formation and dynamics of invadopodia and in cancer signalling mediated by the ADAM-17-cleaved soluble CA IX ectodomain. The department also contributed to characterization of the humanised forms of CA IX antibodies that are now under development for cancer therapy. Additional topics of research were related to understating the cAMP signalling in hypoxia and in functional regulation of CA IX, and to the role of pyruvate dehydrogenase kinase 1 in cancer. During the COVID-19 pandemic, members of the department used their expertise in ELISA methodology to accomplish several cross-sectional studies that brought important data on seroprevalence of SARS-CoV-2 antibodies in Slovakia. The most important publication outputs of the department are listed in Section 2.1.2. on page 24 (papers 31-42) and in Section 2.1.5 on page 38 (papers 9-10).

Biotechnological and Analytical Laboratories of the BMC SAS

Head: Vladimír ZELNÍK
Biotechnological and analytical laboratories (BTL) were built in 2015 as a result of the EU Structural Funds project “Centre for research and development of imunologically active substances” coordinated by the Office of the Slovak Academy of Sciences. BTL are localized in Šarišské Michaľany, Eastern Slovakia, in the area of ImmunaPharm, a.s. Since the establishment, BTL have been operated by the specialized staff of the Institute

of Virology BMC SAS. The BTL infrastructure includes unique high-tech / clean-room laboratory premises for development, preparation and characterization of biologicals under aseptic conditions according to GMP requirements. Currently, they serve mainly for the development and validation of GMP certified analytical methods for the quality control of efficacy, composition, identity, safety and purity of medicinal products for human use. In addition, BTL infrastructure can be used for R&D and semiproduction of test batches of biologicals, including antibodies, and products of viral and bacterial origin. During the COVID-19 pandemic, the BTL personel performed routine testing for detection of SARS-CoV-2 virus RNA in swab and gargle samples collected in regions of Eastern Slovakia. They also tested antiviral properties of different types of materials (i.e. masks), produced and distributed disinfections and executed surveillance of rail transport through PCR monitoring of train spaces.

Institute of Experimental Endocrinology

Scientific Director: Daniela GAŠPERÍKOVÁ

Importance of the society-oriented state-of-the-art research performed at the Institute of Experimental Endocrinology could be documented throughout its history. Clinically relevant scientific questions have been examined at molecular, cellular and whole body levels in both animal models and humans. Continuity of this research strategy persisted, while new challenges are being pursued with innovative tools in both the national and international context. The most important research focus during the evaluation period has been oriented on non-communicable disorders (obesity, diabetes, cardiovascular and neurological disorders and cancer). Institute of Experimental Endocrinology consists of four research departments. Three of them were created by restructuring the six research laboratories creating thus viable, inclusive but competitive research environment driven by young generation of researchers and the fourth was established by delimitation from the Center of Biosciences SAS in 2018 and extended the methodological and thematical portfolio of research in our Institute. More recently, new research team was created by reintegrating two excellent early carrier scientists. For the brief overview of the research staff and running projects of the Institute of Experimental Endocrinology BMC SAS, please see the scheme on page 20.

Department of Metabolic Disorders Research

Head: Jozef UKROPEC

Collaborative effort between the research team of Integrative Pathophysiology, Center for Physical Activity Research and Research Clinic provides the capacity to study complex molecular aspects of cellular and whole body metabolic integration in humans subjected to metabolically challenging situations such as: (i) obesity (weight loss) and type 2. diabetes, as well as acute or regular (ii) exercise or (iii) exposure to cold. Acquired knowledge is being used to develop strategies for individualized lifestyle interventions for the elderly or for patients in the early stages of chronic metabolic (obesity, type 2 diabetes mellitus), neurodegenerative (Parkinson`s, Alzheimer`s disease), cancer (testicular germ cell tumour) and inflammatory diseases (idiopathic inflammatory myopathy). The ultimate goal is to identify the mechanisms supporting functional capacity - „health“ - at a cellular and whole body level, and support healthy ageing and quality of life. One of the recent outstanding results stems from the integration of metabolomic changes elicited by the acute bout of intensive exercise in blood and cerebrospinal fluid of young healthy individuals. It is also important to note, that research team is involved in implementing “exercise is medicine” principles into the Innovative Preventive Health Care Guidelines of the Ministry of Health SR for patients with obesity and chronic non-communicable diseases (2021), dementia (2020), Parkinson`s diseases (2020).

Research team of Genetics of rare diseases is focused on the genetics of monogenic diabetes, congenital hyperinsulinism, monogenic obesity, primary mitochondriopathies and sensorineural hearing loss. The key objectives of the research include: (i) DNA analysis; (ii) investigation of phenotype-genotype relationships including functional studies of newly identified gene variants; (iii) employing pharmacogenetic principles to transfer the obtained knowledge into clinical practice, which often leads to treatment modification and better quality of life for patients. In the evaluation period, the most important results encompasses the uncovering the molecular mechanisms by which mutations in the *EIF2S3* gene lead to MEHMO syndrome, the identification of novel phenotypic expression in *HNF4A* gene and the assessment of genetic ethiology of mid-frequency sensorineural hearing loss. We have participated in an international study showing that long term follow-up of sulfonylurea treatment of patients with permanent diabetes mellitus results in excellent glycemic control. More than 1 500 diagnostics reports for patients analyzed in our research team during the evaluation period were provided to the clinical partners. Very recently, Section of Cellular and molecular metabolism was established to create a research environment for two excellent early carrier scientist reintegrated after

successful postdoctoral stay at ETH Zurich. The most important publication outputs of the department are listed in Section 2.1.2. on pages 25-26 (papers 43-59) and in Section 2.1.5 on pages 38-39 (papers 11-17)

Department of Endocrine Regulations and Psychopharmacology

Head: Nataša HLAVÁČOVÁ
R&D activities of the department focus on unravelling mechanisms involved in the pathogenesis of psychiatric disorders, cancer, cardiovascular diseases as well as metabolic disorders, and reproductive dysfunctions. Research is aimed at obtaining new knowledge in the field of neuroendocrine regulations, chronic stress, and mental health in both humans and animals. The main goal is to reveal the negative consequences of stress, new markers of major depression and schizophrenia as well as to study specific actions of new psychotropic drugs. Attention is given to the atypical effects of hormones and endocrine regulations. Mechanisms of insulin action along with angiotensin II and oxytocin roles in adipogenesis and tissue insulin sensitivity are investigated. Further topics of research are related to the role of nuclear receptors and their cognate ligands in the therapy of tumors and to the effects of endocrine disruptors, including nanoparticles in the regulation of reproductive processes. The most important publication outputs of the department are listed in Section 2.1.2. on pages 26-27 (papers 60-73) and in Section 2.1.5 on page 39 (paper 18).

Department of Neurosciences

Head: Ján BAKOŠ
The department focused on deepening the knowledge of changes in the interactions of the nervous, endocrine, and immune systems in the pathogenesis of neurodevelopmental, neuropsychiatric diseases as well as tumorigenesis. The department has improved understanding of neuro-developmental brain alterations related to autism spectrum disorder. The department obtained evidence on abnormalities in neurite outgrowth, neuronal morphology and synaptic proteins, which are a prerequisite for excitatory-inhibitory imbalance in the pathogenesis of autism in the early stages of development. The compensatory effects of oxytocin on postsynaptic protein alterations were clarified pointing to the fact, that specific manipulation of the oxytocin system may have the therapeutic potential. The department researchers also obtained new information about the neuroendocrine mechanisms of the stress response, especially with emphasis on the role of the neuropeptide urocortin. The department described the selective effect of atypical antipsychotics on the activity of brain areas related to the regulation of the stress response. New studies on the description of complex changes in the brain caused by cancer-related signals mediated by pro-inflammatory cytokines can also be considered significant. Results concerning the modulation of the sympathetic nervous system in the processes of tumorigenesis also have a potential clinical application. The most important publication outputs of the department are listed in Section 2.1.2. on pages 27-28 (papers 74-82).

Department of Cellular Cardiology

Head: Michal CAGALINEC
Research of the Department of Cellular Cardiology joined the BMC SAS in 2018. It focuses on the interactions between structure and function of cardiac muscle cells in health and myocardial pathologies. Recently the team provided evidence of correlation between impairment of calcium signalling and structural changes of the calcium release sites in the early stages of myocardial diseases. They used advanced methods of confocal and electron microscopy, single-cell electrophysiology, and tools of molecular biology. The emerging hypotheses on excitation-contraction coupling, explored in silico with a complex experimental data-based mathematical model, revealed a direct relationship between the structure of calcium release sites and the kinetics of calcium signals. The team revealed mechanisms of cardiac dysfunction caused by reorganization of myocyte cytoarchitecture that impair cell energetics. In intramural and international collaborations, the team participated with the expertise in cell morphology, electron microscopic techniques, and confocal microscopy. The most important publication outputs of the department are listed in Section 2.1.2. on page 28 (papers 83-85) and in Section 2.1.5 on page 39 (papers 19-20).

Laboratory of Developmental Genetics

Head: Róbert FARKAŠ
The Laboratory is dealing with hormonal control of postembryonic morphogenesis in *Drosophila melanogaster*, notably its metamorphosis and associated signaling pathways using molecular and genetic tools. Research is

aimed at molecular and genetic characterization of group of hormonally responsive malate dehydrogenases (MDHs) of *Drosophila* and their role in larval development. Allele-specific phenotype were characterized which disclosed unique interactions between individual *MDH* loci that affect length of instars and temporal control of moulting proces. Moreover, in the course of the study of metamorphic program cell death in *Drosophila* salivary glands we discovered process of massive secretion several hours prior to execution of apoptosis. Using panel of microscopic and analytical methods our laboratory identified this type of massive release as apocrine secretion and we are performing screen to uncover genes controlling this novel non-vesicular traffick and secretory mechanism. The most important publication outputs of the laboratory are listed in Section 2.1.2. on page 28 (papers 86-88).

Cancer Research Institute BMC SAS

Scientific Director: Miroslav CHOVANEC

History of the Cancer Research Institute of the Slovak Academy of Sciences (CRI SAS) dates back to 1946 when the Institute for Cancer Research and Therapy had been established. After several changes of its name, the Institute detached the research section, creating the CRI SAS in 1969. Since 2016, the Institute has been a part of the BMC SAS. Throughout its whole history, the CRI SAS has been an experimental workplace conducting cancer research in a complex and multidisciplinary way. Over past decade, traditional research directions of the Institute have been replaced by research fields that reflect the need to (i) personalize the treatment of the cancer patients and (ii) turn cancer into a fully curable disease. These mainly include cancer risk assessment, cancer prevention and diagnosis, cancer treatment, genetic and epigenetic signatures in cancer, tumour microenvironment and heterogeneity, and cancer cell phenotypes and stem cells. Modern approaches and state-of-the-art methodologies of the cancer research are well-established and routinely used at the Institute. The CRI BMC SAS consists of five research departments, each having an expertise in the particular field of cancer research, supported by the corresponding infrastructure.

Department of Molecular Oncology

Head: Miroslava MATÚŠKOVÁ
Research of the Department has been oriented on cancer biology, tumour microenvironment and cancer gene therapy of solid tumours. The majority of the research topics are investigated in close cooperation with clinicians. The research has been focused on the role of the tumour microenvironment in the progression, metastasis and therapy resistance with the aim to identify novel biomarkers which could serve as therapeutic targets in chemoresistant colorectal, breast, melanoma, uveal melanoma and germ cell tumours. Several projects are focused on epigenetic (DNA methylation) changes associated with metastasis. The members of the Department have a long-term experience in cancer gene therapy. They significantly contributed to the development of gene-directed enzyme/prodrug therapy targeted by mesenchymal stromal cells and recently focus on treatment mediated by extracellular vehicles. In cooperation with international partners, they develop combination therapies targeted by nanocarriers to improve therapeutic effect and avoid adverse side effects. The study of chemoresistance of germ cells tumours resulted in the initiation of a clinical study. The up-to-date preclinical models such as organoids and patient-derived xenografts were established during the evaluation period. The most important publication outputs of the Department are listed in Section 2.1.2. on pages 28-29 (papers 89-102) and in Section 2.1.5 on page 39 (paper 25).

Department of Genetics

Head: Miroslav CHOVANEC
The Department of Genetics studies mechanisms that play a crucial role in cancer development and progression, as well as in cancer treatment response. Urogenital cancers, particularly testicular germ cell tumours (TGCTs), are of the primary interest because this malignity is highly curable by cisplatin (CDDP), and hence represents excellent model system for understanding the CDDP response mechanisms. Nevertheless, a proportion of TGCT patients that does not respond to CDDP-based therapy or relapse has an unfavourable prognosis. Therefore, we preferably focus on seeking for molecular biomarkers capable of predicting poor prognosis in TGCTs aiming at turning this malignity into a fully curable disease. OMICS data are generated to seek for the biomarkers that are able to stratify patients in terms of their prognosis. Cell lines derived from urogenital cancers with a wide range of sensitivity to chemotherapeutics are used to identify and verify these

biomarkers, and clinical samples are utilized to validate their clinical applicability. In addition to urogenital cancers, other cancer types are also studied at the Department. In endometrial cancer, a contribution of selected miRNAs to advanced stage of disease is investigated. In invasive ductal breast cancer, characterization of circulating tumour cells in terms of expression change of selected miRNAs and their targets is examined. Furthermore, microbiome composition is compared between colorectal adenomas and carcinomas or between healthy persons and breast cancer patients. Finally, the Department is expanding its efforts in the areas of cohesin biology, RNA processing and DNA damage response and repair pathways by focusing on a detailed understanding of the molecular mechanisms regulating the processes that play essential role in protecting the integrity of the genome. The most important publication outputs of the Department are listed in Section 2.1.2. on pages 29-30 (papers 103-116, 128) and in Section 2.1.5 on page 39 (papers 21-24).

Department of Nanobiology

Head: Andrea BÁBELOVÁ
Progress in biomedical nanotechnologies in recent years has led to increased interest in applications of nanomaterials in clinical practice. In a spotlight of research of the Department is therefore to characterize behaviour of nanomaterials in biological environment as well as nano:bio interactions with cells, tissues and organs for estimation of their nanotoxicity and their potential use in nanomedicine. Given the lack of information about the fate of nanomaterials following their therapeutic or diagnostic application, the aim is to understand their impact on living organisms and investigate potential harmful acute as well as long-term effects of inorganic nanomaterials. Nevertheless, due to known anti-oxidative activity of herbs the research is also aimed at their potential protective effects that can be used as supportive therapy in the treatment of cancer. Moreover, nanomaterials combined with herbal extracts like acids represent attractive treatment strategy and are also in focus of our research interest. The most important publication outputs of the Department are listed in Section 2.1.2. on pages 30-31 (papers 117-120) and in Section 2.1.5 on page 40 (papers 26-29).

Department of Radiobiology

Head: Igor BELYAEV
The Department of Radiobiology investigates the role of ionizing and non-ionizing radiations in genetic instability in human cells with focus on hematological stem cells. An effect of radiations on origination of leukemia and molecular mechanisms in etiology of leukemia have been studied at the Department. DNA damage response, gene and chromosome rearrangements, and apoptosis are the main endpoints detected by state-of-the-art techniques. New emerging possibilities of using non-ionizing radiation in medicine, on one side, and increasing health risks from exposures to low doses of ionizing radiation and low intensity non-ionizing radiation, on another side, are in focus of research projects at the Department. The Department has contributed to development of new approaches for inhibition of cancer cell growth with extremely low frequency magnetic fields. Special efforts are given to establishing biomarkers for assessment of individual radiosensitivity of breast cancer patients and health risks from exposure to radiofrequency radiation of mobile communication. The Department has also contributed to biological dosimetry in medical radiologists. The most important publication outputs of the Department are listed in Section 2.1.2. on page 31 (papers 121-124) and in Section 2.1.5 on page 40 (paper 30).

Department of Tumour Immunology

Head: Jana JAKUBÍKOVÁ
The Department is devoted to multiple aspects of translational research to study the mechanisms of development and progression of hematological malignancies, especially multiple myeloma (MM), lymphoma and leukemia. OUr emphasis is given on evaluation of inter- and intra-clonal heterogeneity of tumour cells during the evolution of MM: from premalignant precursor conditions (MGUS and smoldering MM) without clinical manifestations to active myeloma disease stages. The tumour microenvironment (TME) is considered essential to maintain tumour cell survival and growth, sub-clonal evolution, and stage of the disease. By mapping TME in myeloma and lymphoma, we evaluate immune modulations, immunological mechanisms and immune checkpoint molecules within the immunosuppressive bone marrow niche that will provide the framework to better understand the pathophysiology of MM and lymphoma. We also aim to develop novel personalized diagnostic and predictive approach with complex multi-dimensional immunophenotyping and overall immune cell profiling to diagnose, classify, stage and monitor the therapy response in patients with leukemia, lymphoma and MM. The most important publication outputs of the Department are listed in Section 2.1.2. on page 31 (entries 125-127) and in Section 2.1.5 on page 40 (paper 30).

Institute of Clinical and Translational Research BMC SAS

Scientific Director: Miroslav VLČEK

The Institute of Clinical and Translational Research was founded in 2007 as the Center for Molecular Medicine (CMM) - a specialised organisation of SAS dedicated to translational research. The CMM establishment was based on shared initiative by the Institute of Virology SAS, the Cancer Research Institute SAS, the Institute of Experimental Endocrinology SAS, the Institute of Molecular Physiology and Genetics SAS and the Institute of Neurobiology SAS with a view to transferring knowledge originating from basic research to clinical practice. During the first years of the independent functioning of the Institute there was a gradual change of focus and organizational structure, which in 2014 led to the change of the institute to the regular scientific-research institute of SAS. In 2016, the Center for Molecular Medicine SAS has become a part of the Biomedical Research Center of the Slovak Academy of Sciences (BMC SAS), where it has been transformed into an organizational unit called the Institute of Clinical and Translation Research.
The Institute is focused on the research of molecular and pathogenetic mechanisms of human diseases, including low molecular weight signaling pathways. The main goal is to transfer the results of basic research to clinical practice to influence the onset, course and prognosis as well as diagnosis of selected civilization diseases and improve human health. The aim is to transfer the needs of clinical practice to research with the potential to develop new diagnostic, therapeutic and preventive methodologies and procedures. Current research activities of the ICTR BMC SAS are performed within three research departments:

Department of Clinical Research

Head: Richard IMRICH
The research activities of the department are focused mainly on autoimmune diseases and obesity. In the field of autoimmune diseases, the department has been focusing on rheumatoid arthritis (RA) and multiple sclerosis (MS). The genetic factors contributing to the RA onset and course showed T cell signalling as well as endocrine changes seen in the RA are affected by several single nucleotide polymorphisms. The research of MS is focused on metabolic disarrangements and autonomic dysfunction in the MS pathophysiology. The results showed impairment in glucose and lipids metabolism contributing to the disease progression via mitochondrial dysfunction and/or central insulin resistance mechanisms. The observed metabolic impairment led to an ongoing clinical trial testing the effect of glucagon like peptide 1 (GLP-1) agonist on the MS progression.
Research in obesity has been focusing on non-pharmacological interventions e.g. nutritional intervention and physical activity, in obese and morbidly obese patients. During the intervention, changes in the lipid metabolism and liver functions have been studied. Effects of the interventions have been also analysed in the context of gut microbiota since a composition of the gut microbiota appears to be strongly related to nutrition and obesity development.
The most important publication outputs of the department are listed in Section 2.1.2. on pages 31-32 (entries 129-135) and in Section 2.1.5 on pages 40-41 (papers 31-32, 34).

Department of Human Genetics

Head: Ľudevít KÁDAŠI
The Department of human genetics focuses its work on the study of the human genome and its variability in different monogenic and polygenic (complex) diseases. We have contributed to the understanding of the natural history of several diseases, including mutational profiling, genotype-phenotype correlations and identification of disease modifying factors. Such knowledge can usually be directly implemented in the field of clinical genetics, thanks to the collaboration with clinical genetic departments. Among the disorders of interest we could mention metabolic diseases, neuromuscular disorders, epilepsy, cardiomyopathies, syndromes, inborn errors of immunity, autoimmune disorders, cancer etc. The main objectives of our work is to implement modern technologies to characterise the molecular background of these diseases using genomic, transcriptomic and methylome techniques. To enhance the informativeness of our genomic analyses, we also work on the more in depth characterisation of identified genomic variants, especially of those with yet uncertain clinical significance. Translational efforts of our department, as part of a close international cooperation, have led to a development of nitisinone as a therapeutic drug for a severe metabolic disorder called alkaptonuria.
The most important publication outputs of the department are listed in Section 2.1.2. on pages 32-33 (entries 136-143) and in Section 2.1.5 on pages 40-41 (papers 31-33, 35).

Department of Molecular Physiology

Head: Oľga KRIŽANOVÁ
The department has been focused on two major topics – calcium signalling and sulphide signalling in tumours and cardiac tissue. Specifically, department is interested in two important calcium transport systems – inositol 1,4,5-trisphosphate receptors (IP_3Rs) and sodium/calcium exchangers (NCX) in cancer progression and/or cancer elimination. Several types of these transport systems were identified and characterized. During the evaluation period it was observed that IP_3R type 3 has, anti-apoptotic effect in tumours, on contrary to IP_3Rs type 1 and 2 that have opposite, pro-apoptotic effect. Also, NCX1 together with other proteins helps to protect cells from acidosis. Function of other types of these transport systems in cancer progression, migration and metastasis formation, but also death induction of cancer cells is studied. Other part of departmental research interests cover interactions of H_2S with biologically relevant redox compounds and determination of antioxidant properties of formed products. Potential antioxidant properties of newly formed products are tested on hemodynamic parameters of rats. Finally, functional effect of exogenously donated H_2S on tumour growth and/or is determined. The most important publication outputs of the department are listed in Section 2.1.2. on page 33 (entries 144-153).

Institute of Neurobiology BMC SAS

Scientific Director: Ján GÁLIK

The Institute of Neurobiology of the Slovak Academy of Sciences was created through the transformation of the former Institute of Experimental Biology of the Slovak Academy of Sciences (founded 1964), it was officially registered on January 1st, 1977 and on January 1st 2018 the Institute became part of the Biomedical Research Center. The main areas of research are socially relevant acute injuries of the nervous system caused by insufficient blood supply (ischemia) and direct insult (trauma), and their treatment on the principles of regenerative medicine. In the past six years 2016 – 2021, the research was organized in three partially overlapping directions: 1) spinal and nerve trauma therapy - pharmacological and physical approach, 2) ischemic tolerance, pre- and post-conditioning of injured CNS tissue, and 3) postnatal neurogenesis and neural progenitor production. The scientific program of the Institute is directed towards clinical research promoting integrative studies based on a multidisciplinary approach. The research was carried out in six laboratories, organized within two departments.

Department of Regenerative Medicine and Cell Therapy

Head: Ivo VANICKÝ
The research at the department is focused on studying the possibilities of regeneration of damaged tissues of the central and peripheral nervous system. We apply new findings about the process of development, regeneration and plasticity of nerve tissues in experimental therapies in order to stimulate the restoration of functions of the nervous system injured by trauma or neurodegenerative diseases. We study and use adult stem cells obtained from adult tissues, umbilical cords and umbilical cord blood, but also from neural progenitor cells isolated from the brain and spinal cord (rat, mouse) within the existing legislative rules of stem cell research in Slovakia. We investigate the regularities of postnatal neurogenesis with a focus on understanding the molecular mechanisms governing the development and integration of newly formed neurons, including their differentiation, growth, migration, transport and the formation of new connections. We want to use these findings in the experimental therapies of major neurodegenerative diseases. The most important publication outputs of the department are listed in Section 2.1.2. on page 34 (entries 154-160) and in Section 2.1.5 on page 41 (papers 36-38).

Department of Neurodegeneration, Plasticity and Repair

Head: Jaroslav PAVEL
The research activities of Department of Neurodegeneration, plasticity and repair have been continuously focused on two major topics: (1) traumatic spinal cord injury (SCI), and (2) cerebral ischemia and stroke, particularly on the phenomena of ischemic tolerance. The main aim of research activities was a better understanding of the physiological as well as pathological mechanisms, the therapeutic control of pathological processes, and the stimulation of protective and regenerative endogenous mechanisms in order to limit or to prevent a neurological dysfunction resulting from these acute CNS injuries.

The SCI research was dedicated to the regulation of inflammatory response as well as to the suppression of apoptosis and promotion of axonal outgrowth and underlined the importance of activation of neuroprotective microglia and astrocytes in locomotor recovery. Furthermore, the important role of Angiotensin II receptors, predominantly type 2, in the initiation of regenerative processes was suggested. In cerebral ischemia research was demonstrated that blood cells serve as source of factor inducing rapid ischemic tolerance in the brain. Accelerated capacity of glutamate uptake via blood elements has been demonstrated as a possible tool of rapid remote conditioning mediated brain tissue protection.
Due to the complexity of secondary damage and a limited ability of endogenous regenerative processes, our research emphasized the necessity of appropriate combination of experimentally promising individual treatments as an effective therapeutic approach. Epidural oscillating field stimulation has been proven to be the effective supportive tool in combined therapy. The most important publication outputs of the department are listed in Section 2.1.2. on pages 34-35 (entries 161-175) and in Section 2.1.5 on page 41 (papers 39-40).

BMC SAS cross-cutting activities

Since its foundation, BMC SAS has benefited from the Concentration of excellent researchers, Compatibility of topics, Complementarity of infrastructure, Critical mass of capacities and Coordinated approaches to challenges of our sustainability and development. These “five C” have facilitated our efforts to work on building cooperative environment and initiate inter-institutional investigations resulting in mutual learning, sharing expertise and creating collaborative projects. Among them, the major cross-cutting activity has become the research focused on understanding molecular and physiological mechanisms of obesity and its co-morbidities, leading towards development of prevention and intervention strategies and enabling establishment of the first in Slovakia Center for management of obesity. This interdisciplinary research has engaged all BMC SAS institutes and generated added value that would never be possible in such an extent without our integration under the common “umbrella”. The BMC SAS institutes have also cooperated in activities covered by the important international projects including EU projects related to science and healthcare policy as well as to transfer of knowledge and networking as described in more detail further below.

Schematic summary of R&D activities of the BMC SAS is illustrated through staff composition and research projects implemented at the departments and in the entire institution. Affiliation of the department to the BMC SAS institutes is indicated by different colours of the letters and outlines: Institute of Virology (dark blue), Institute of Experimental Endocrinology (dark grey), Cancer Research Institute (red), Institute of Clinical and Translationa Researck (turquoise) and Institute of Neurobiology (yellow). The research staff includes researchers (R), postdocs (P), PhD students (S) and technicians (T). The staff numbers are only indicative as it is imposible to reflect all changes that occurred during the evalution period due to mobility, PhD graduation, qualification degrees, generation exchange etc.

2. Partial indicators of main activities:

2.1. Research output

2.1.1. Principal types of research output of the institute: basic research/applied research, international/regional (in percentage)

Our research principally generates internationally relevant outputs (100%), which can be exploited also for the regional development strategies. This is due to the global significance of both infectious and non-communicable diseases that we investigate with respect to molecular mechanisms and potential preventive, diagnostic and/or therapeutic interventions. On the other hand, our studies of the regional distribution of pathogens and/or prevalence of particular disorders can impact on understanding the international epidemiological situation and contribute to exchange of knowlegde. The international relevance of the research performed at the BMC SAS is also reflected by our collaboration with foreign institutions, including strong international players. About 50% of our reserach outputs were produced in direct cooperation with the international partners.

In addition to our efforts towards the broadening basic knowledge in the area of biomedicine, our research interests have been focused on translational and application activities, particularly related to the development and practical use of specialized diagnostic approaches that are not available in the routine clinical practice. To this end, we have been developing reagents and assays for detection and functional characterization of disease biomarkers, infectious pathogens, monogenic mutations etc. We have also developed and used certified analytical methods allowing for validation of medicinal products. In several cases, these translational and application activities have had direct impact on clinical decisions leading to personalized treatments / interventions and/or to selection of epidemiological measures and public health strategies, especially during the COVID-19 pandemics.

The ratio between the basic and applied research at the BMC SAS can be only roughly estimated to be around **80% vs 20%** based on the share of funding from the research agencies vs commercial sources. However, many basic research activities overlap or infuse into potential applications. Therefore, it is actually impossible to make a clear-cut border between these types of research.

2.1.2 List of selected publications documenting the most important results of basic research.

The total number of publications listed for the assessment period should not exceed the number of average FTE researchers per year. The principal research outputs (max. 10%, including Digital Object Identifier – DOI if available) should be underlined. Authors from the evaluated organizations should be underlined.

The list includes selection of 175 publications with key contributions of the BMC SAS researchers.
It is ordered around the research topics in order to facilitate their association with the BMC SAS institutes and departments. Principal research outputs are indicated by the blue colour. Papers with participation of more than one BMC SAS institute are indicated by #.

Institute of Virology BMC SAS

1) ČABANOVÁ, Viktória** - BORŠOVÁ, Kristína - SVITOK, Marek - OBOŇA, Jozef - SVITKOVÁ, Ivana - BARBUŠINOVÁ, Eva - DERKA, Tomáš - SLÁVIKOVÁ, Monika - KLEMPA, Boris. An unwanted companion reaches the country: the first record of the alien mosquito Aedes japonicus japonicus (Theobald, 1901) in Slovakia. In *Parasites & Vectors*, 2021, vol. 14, art. no. 572. (2020: 3.876 - IF, Q1 - JCR, 1.404 - SJR, Q1 - SJR). ISSN 1756-3305. https://doi.org/10.1186/s13071-021-05062-0

2) BORŠOVÁ, Kristína - PAUL, D. - KOVÁČOVÁ, Viera - RADVÁNSZKA, Monika - HAJDU, Roman - ČABANOVÁ, Viktória - SLÁVIKOVÁ, Monika - LIČKOVÁ, Martina - LUKÁČIKOVÁ, Ľubomíra - BELÁK, Andrej - ROUSSIER, Lucia - KOSTIČOVÁ, Michaela - LÍŠKOVÁ, A. - MAĎAROVÁ, L. - ŠTEFKOVIČOVÁ, Mária - REIZIGOVÁ, Lenka - NOVÁKOVÁ, Elena - SABAKA, P. - KOŠČÁLOVÁ, Alena - BREJOVÁ, Broňa - STAROŇOVÁ, Edita - MIŠÍK, Matej - VINAŘ, Tomáš - NOSEK, Jozef - ČEKAN, Pavol - KLEMPA, Boris**. Surveillance of SARS-CoV-2 lineage B.1.1.7 in Slovakia using a novel, multiplexed RT-qPCR assay. In *Scientific Reports*, 2021, vol. 11, no. 1, art. no. 20494. (2020: 4.380 - IF, Q1 - JCR, 1.240 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 2045-2322. https://doi.org/10.1038/s41598-021-99661-7

3) LIČKOVÁ, Martina - FUMAČOVÁ, Sabina - SLÁVIKOVÁ, Monika - SLOVÁK, Mirko - DREXLER, J.F. - KLEMPA, Boris**. Dermacentor reticulatus is a vector of tick-borne encephalitis virus. In *Ticks and Tick-Borne Diseases*, 2020, vol. 11, no. 4, art. no. 1414. (2019: 2.749 - IF, Q2 - JCR, 1.182 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1877-959X. https://doi.org/10.1016/j.ttbdis.2020.101414

4) KLEMPA, Boris**. Reassortment events in the evolution of hantaviruses. In *Virus Genes*, 2018, vol. 54, no. 5, p. 638-646. (2017: 1.542 - IF, Q4 - JCR, 0.711 - SJR, Q2 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 0920-8569. https://doi.org/10.1007/s11262-018-1590-z

5) SZABÓ, Róbert - RADOSA, Lukáš - LIČKOVÁ, Martina - SLÁVIKOVÁ, Monika - HEROLDOVÁ, M. - STANKO, Michal - PEJČOCH, M. - OSTERBERG, A. - LAENEN, Lies - SCHEX, Susanne - ULRICH, Rainer G. - ESSBAUER, S. - MAES, P. - KLEMPA, Boris**. Phylogenetic analysis of Puumala virus strains from Central Europe highlights the need for a full-genome perspective on hantavirus evolution. In *Virus Genes*, 2017, vol. 53, p. 913-917. (2016: 1.431 - IF, Q4 - JCR, 0.653 - SJR, Q2 - SJR, Current Contents - CCC). (2017 - Current Contents). ISSN 0920-8569. https://doi.org/10.1007/s11262-017-1484-5

6) GLASA, Miroslav** - ŠOLTYS, Katarína - PREDAJŇA, Lukáš - SIHELSKÁ, Nina - NOVÁKOVÁ, Slavomíra - ŠUBR, Zdeno W. - KRAIC, Ján - MIHÁLIK, Daniel. Molecular and biological characterisation of Turnip mosaic virus isolates infecting poppy (Papaver somniferum and P.rhoeas) in Slovakia. In *Viruses*, 2018, vol. 10, no. 8, art. no. 430. (2017: 3.761 - IF, Q2 - JCR, 1.805 - SJR, Q1 - SJR). ISSN 1999-4915. https://doi.org/10.3390/v10080430

7) GLASA, Miroslav - PREDAJŇA, Lukáš - ŠOLTYS, Katarína - SIHELSKÁ, Nina - NAGYOVÁ, Alžbeta - WETZEL, T. - SABANADZOVIČ, S. Analysis of grapevine rupestris stem pitting-associated virus in Slovakia reveals differences in intra-host population diversity and naturally occurring recombination events. In *Plant Pathology Journal*, 2017, vol. 33, no. 1, p. 34-42. (2016: 1.255 - IF, Q2 - JCR, 0.543 - SJR, Q2 - SJR). ISSN 1598-2254. https://doi.org/10.5423/PPJ.OA.07.2016.0158

8) NOVÁKOVÁ, Slavomíra** - DANCHENKO, Maksym - ŠKULTÉTY, Ľudovít** - FIALOVÁ, Ivana - LEŠKOVÁ, Alexandra - BEKE, Gábor - FLORES - RAMÍREZ, Gabriela - GLASA, Miroslav. Photosynthetic and stress responsive proteins are altered more effectively in Nicotiana benthamiana infected with Plum pox virus aggressive PPV-CR versus mild PPV-C cherry-adapted isolates. In *Journal of Proteome Research*, 2018, vol. 17, no. 9, p. 3114-3127. (2017: 3.950 - IF, Q1 - JCR, 1.818 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1535-3893. https://doi.org/10.1021/acs.jproteome.8b00230

9) PREDAJŇA, Lukáš - SIHELSKÁ, Nina - BENEDIKOVÁ, D. - ŠOLTYS, Katarína - CANDRESSE, Thierry - GLASA, Miroslav. Molecular characterization of Prune dwarf virus cherry isolates from Slovakia shows their substantial variability and reveals recombination events in PDV RNA3. In *European Journal of Plant Pathology*, 2017, vol. 147, p. 877-885. (2016: 1.478 - IF, Q2 - JCR, 0.676 - SJR, Q1 - SJR, Current Contents - CCC). (2017 - Current Contents). ISSN 0929-1873. https://doi.org/10.1007/s10658-016-1055-y

10) BENEJ, Martin - DANCHENKO, Maksym - OVEČKOVÁ, Ingrid - ČERVENÁK, Filip - TOMAŠKA, Ľubomír - GROSSMANNOVÁ, Katarína - POLČICOVÁ, Katarína - GOLIAŠ, Tereza - TOMÁŠKOVÁ, Jana**. Quantitative proteomics reveal peroxiredoxin perturbation upon persistent lymphocytic choriomeningitis virus infection in human cells. In *Frontiers in Microbiology*, 2019, vol. 10, art. no. 2438. (2018: 4.259 - IF, Q1 - JCR, 1.633 - SJR, Q1 - SJR). ISSN 1664-302X. https://doi.org/10.3389/fmicb.2019.02438

11) JAKUBCOVÁ, Lucia - VOZÁROVÁ, Mária - HOLLÝ, Jaroslav - TOMČÍKOVÁ, Karolína - FOGELOVÁ, Margaréta - POLČICOVÁ, Katarína - KOSTOLANSKÝ, František - FODOR, Ervín - VAREČKOVÁ, Eva**. Biological properties of influenza A virus mutants with amino acid substitutions in the HA2 glycoprotein of the HA1/HA2 interaction region. In *Journal of General Virology*, 2019, vol. 100, no. 9, p. 1282-1292. (2018: 2.809 - IF, Q2 - JCR, 1.318 - SJR, Q2 - SJR, Current Contents - CCC). (ISSN 0022-1317. https://doi.org/10.1099/jgv.0.001305

12) HOLLÝ, Jaroslav - TOMČÍKOVÁ, Karolína - VOZÁROVÁ, Mária - FOGELOVÁ, Margaréta - JAKUBCOVÁ, Lucia - VAREČKOVÁ, Eva - KOSTOLANSKÝ, František**. DNA vaccine targeting the ectodomain of influenza M2 protein to endolysosome pathway enhances anti-M2e protective antibody response in mice. In *Acta Virologica*, 2021, vol. 65, no. 2, p. 181-191. (2020: 1.162 - IF, Q4 - JCR, 0.412 - SJR, Q3 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 0001-723X. https://doi.org/10.4149/av_2021_207

13) BETÁKOVÁ, Tatiana - KOSTRÁBOVÁ, A. - LACHOVÁ, Veronika - TURIANOVÁ, Lucia. Cytokines induced during influenza virus infection. In *Current Pharmaceutical Design*, 2017, vol. 23, no. 18, p. 2616-2622. (2016: 2.611 - IF, Q2 - JCR, 1.069 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1381-6128. https://doi.org/10.2174/1381612823666170316123736.

14) LOPUŠNÁ, Katarína - BENKÓCZKA, Tímea - LUPTÁK, J. - MATÚŠKOVÁ, Radka - LUKÁČIKOVÁ, Ľubomíra - OVEČKOVÁ, Ingrid - REŽUCHOVÁ, Ingeborg. Murine gammaherpesvirus targets type I IFN receptor but not type III IFN receptor early in infection. In *Cytokine*, 2016, vol. 83, p. 158-170. (2015: 2.940 - IF, Q2 - JCR, 1.356 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1043-4666. https://doi.org/10.1016/j.cyto.2016.04.013.

15) KÚDELOVÁ, Marcela** - JÁNOŠOVÁ, M. - BELVONČÍKOVÁ, Petra. First detection of murine herpesvirus 68 in adult Ixodes ricinus ticks. In *Folia Microbiologica*, 2018, vol. 63, no. 4, p. 511-515. (2017: 1.311 - IF, Q4 - JCR, 0.502 - SJR, Q2 - SJR, Current Contents - CCC). ISSN 0015-5632. https://doi.org/10.1007/s12223-018-0586-3.

16) KABÁT, Peter - BRIESTENSKÁ, Katarína** - IVANČOVÁ, Miroslava - TRNKA, Alfréd - ŠPITÁLSKA, Eva - MISTRÍKOVÁ, Jela**. Birds Belonging to the Family Paridae as Another Potential Reservoir of Murine Gammaherpesvirus. In *Vector-Borne and Zoonotic Diseases*, 2021, vol. 21, no. 10, p. 822-826. (2020: 2.133 - IF,

Q3 - JCR, 0.839 - SJR, Q2 - SJR, Current Contents - CCC). ISSN 1530-3667. Dostupné na: https://doi.org/10.1089/vbz.2021.0022

17) HAJNICKÁ, Valéria - KÚDELOVÁ, Marcela - ŠTIBRÁNIOVÁ, Iveta - SLOVÁK, Mirko - BARTÍKOVÁ, Pavlína - HALÁSOVÁ, Zuzana - PANČÍK, Peter - BELVONČÍKOVÁ, Petra - VRBOVÁ, Michaela - HOLÍKOVÁ, Viera - HAILS, R.S. - NUTTALL, Patricia A. Tick-borne transmission of murine gammaherpesvirus 68. In *Frontiers in Cellular and Infection Microbiology: Specialty Journal of Frontiers in Microbiology.*, 2017, vol. 7, art. no. 458. (2016: 4.300 - IF, Q1 - JCR, 2.311 - SJR, Q1 - SJR). ISSN 2235-2988. https://doi.org/10.3389/fcimb.2017.00458.

18) ŠTIBRÁNIOVÁ, Iveta - BARTÍKOVÁ, Pavlína** - HOLÍKOVÁ, Viera - KAZIMÍROVÁ, Mária. Deciphering biological processes at the tick-host interface opens new strategies for treatment of human diseases. In *Frontiers in Physiology*, 2019, vol. 10, art. 830. (2018: 3.201 - IF, Q2 - JCR, 1.153 - SJR, Q2 - SJR). ISSN 1664-042X. https://doi.org/10.3389/fphys.2019.00830.

19) LENHARTOVÁ, Simona - NEMČOVIČ, Marek - ŠEBOVÁ, Radka - BENKO, Mário - ZAJONC, Dirk M. - NEMČOVIČOVÁ, Ivana**. Molecular characterization of the native (non-linked) CD160–HVEM protein complex revealed by initial crystallographic analysis. In *Crystals*, 2021, vol. 11, no. 7, art. no. 820 [14] p. (2020: 2.589 - IF, Q2 - JCR, 0.538 - SJR, Q2 - SJR, Current Contents - CCC). ISSN 2073-4352. https://doi.org/10.3390/cryst11070820.

20) ZUNIGA-NAVARRETE, Fernando* - FLORES - RAMÍREZ, Gabriela** - DANCHENKO, Maksym - BENADA, Oldřich - SKRIBA, Anton - ŠKULTÉTY, Ľudovít. Proteomic analysis revealed the survival strategy of Coxiella burnetii to doxycycline exposure. In *Journal of Proteomics*, 2019, vol. 208, art. no. 103479. (2018: 3.537 - IF, Q1 - JCR, 1.150 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1874-3919. https://doi.org/10.1016/j.jprot.2019.103479

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2.1.3 List of monographs/books published abroad

Monographs

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3) MEGO, Michal - ČIERNIKOVÁ, Soňa - RAZUS, Martin - DRGONA, Luboš - ZAJAC, Vladimír. Probiotic bacteria in patients treated with chemotherapy and radiation therapy. In Critical dietary factors in cancer chemoprevention. Springer International Publishing, 2016, p. 353-373. ISBN 978-3-319-21460-3.

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13) MAKINISTIAN, Leonardo - BELYAEV, Igor. Toward ELF magnetic fields for the treatment of cancer. In Pulsed electromagnetic fields for clinical applications. - Boca Raton: CRC Press Taylor & Francis Group, 2020, p. 137-157. ISBN 978-0-367-17971-7.

14) TAKÁČOVÁ, Martina - PASTOREKOVÁ, Silvia**. An Overview of Carbonic Anhydrase-Related Neoplasms. In The Carbonic Anhydrases: Current and Emerging Therapeutic Targets : Progress in Drug Research. Vol. 75. - Switzerland: Springer, 2021, chapter 7, p. 147-178. ISBN 978-3-030-79510-8. Dostupné na: https://doi.org/10.1007/978-3-030-79511-5_7

2.1.4. List of monographs/books published in Slovakia

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1) MITRO, Alexander - PALKOVITS, M. - KISS, Alexander. Ependyma of the rat CNS : structural variability and labeling. Recenzenti: Viera Cigánková, Darina Kluchová. 1. vyd. Bratislava : Institute of experimantal endocrinology, Biomedical research center Slovak academy of sciences, 2018. 213 s. ISBN 978-80-973179-0-4.

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2) ROZÁK, J. - GÁLOVÁ, Zdenka - GLASA, Miroslav. Molekulárna a biologická diagnostika vybraných vírusových fytopatogénov ovocných drevín. *(Molecular and biological diagnostics of selected virus phytopathogens of fruit trees)*. Nitra: Slovenská poľnohospodárska univerzita v Nitre, 2019. 95 s. ISBN 978-80-552-2002-4.

3) BREZINA, Igor - SOLÁRIKOVÁ, Petra - JEŽOVÁ, Daniela - OSTATNÍKOVÁ, Daniela - HLAVÁČOVÁ, Nataša. Biopsychológia. Biopsychology. Nové Zámky : PSYCHOPROF, spol. s r.o., 2019. 176 s. ISBN 978-80-89322-30-5

2.1.5. List of other scientific outputs specifically important for the BMC SAS, max. 10 items for institute with less than 50 FTE researchers, 20 for institutes with 50 – 100 FTE researchers and so on

The list includes selection of publications to which BMC SAS researchers contributed in the frame of international projects or through other types of collaboration.

Institute of Virology BMC SAS

1) REGO, Ryan OM** - TRENTELMAN, J. - ANGUITA, Juan - NIJHOF, Ard M. - SPRONG, Hein - KLEMPA, Boris - HAJDUŠEK, Ondřej - TOMÁS-CORTÁZAR, Julen - AZAGI, Tal - STRNAD, M. - KNORR, Sarah - SIMA, Radek - JALOVECKÁ, Marie - FUMAČOVÁ, Sabina - LIČKOVÁ, Martina - SLÁVIKOVÁ, Monika - KOPÁČEK, Petr - GRUBHOFFER, Libor - HOVIUS, Joppe WR. Counterattacking the tick bite: towards a rational design of anti-tick vaccines targeting pathogen transmission. In *Parasites & vectors*, 2019, vol. 12, no. 1, art. 229. (2018: 3.031 - IF, Q1 - JCR, 1.565 - SJR, Q1 - SJR). ISSN 1756-3305. https://doi.org/10.1186/s13071-019-3468-x

2) TKACHENKO, E.A.** - ISHMUKHAMETOV, Aydar A. - DZAGUROVA, Tamara K. - BERNSHTEIN, A. - MOROZOV, V.G. - SINIUGINA, Alexandra A. - KURASHOVA, Svetlana S. - BALKINA, Alexandra S. - TKACHENKO, Petr E. - KRUGER, D.H. - KLEMPA, Boris. Hemorrhagic fever with renal syndrome, Russia. In *Emerging Infectious Diseases*, 2019, vol. 25, no. 12, p. 2325-2328. (2018: 7.185 - IF, Q1 - JCR, 3.140 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1080-6040. https://doi.org/10.3201/eid2512.181649

3) LAENEN, Lies** - VERGOTE, V. - KAFETZOPOULOU, L.E. - WAWINA, Tony Bokalanga - VASSOU, Despoina - COOK, Joseph A. - HUGOT, Jean-Pierre - DEBOUTTE, Ward - KANG, Hae Ji - WITKOWSKI, P.T. - KOPPENRUNG, P. - KRUGER, D.H. - LIČKOVÁ, Martina - STANG, A. - STRIEŠKOVÁ, Lucia - SZEMEŠ, T. - MARKOWSKI, Janusz - HEJDUK, Janusz - KAFETZOPOULOS, Dimitris - RANST, M. Van - YANAGIHARA, R. - KLEMPA, Boris - MAES, P.**. A Novel Hantavirus of the European Mole, Bruges Virus, Is Involved in Frequent Nova Virus Coinfections. In *Genome Biology and Evolution*, 2018, vol. 10, no. 1, p. 45-55. (2017: 3.940 - IF, Q1 - JCR, 2.578 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1759-6653. https://doi.org/10.1093/gbe/evx268

4) HAJIZADEH, Mohammad** - GIBBS, Adrian J. - AMIRNIA, Fahimeh - GLASA, Miroslav. The global phylogeny of Plum pox virus is emerging. In *Journal of General Virology*, 2019, vol. 100, no. 10, p. 1457-1468. (2018: 2.809 - IF, Q2 - JCR, 1.318 - SJR, Q2 - SJR, Current Contents - CCC). ISSN 0022-1317. https://doi.org/10.1099/jgv.0.001308

5) BITRA, Aruna - NEMČOVIČOVÁ, Ivana - PICARDA, Gaelle - DOUKOV, Tzanko - WANG, J. - BENEDICT, C.A. - ZAJONC, Dirk**. Structure of human cytomegalovirus UL144, an HVEM orthologue, bound to the B and T cell lymphocyte attenuator. In *Journal of Biological Chemistry*, 2019, vol. 294, no. 27, p. 10519-10529. (2018: 4.106 - IF, Q2 - JCR, 2.403 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 0021-9258. https://doi.org/10.1074/jbc.RA119.009199.

6) REINERT, L.S. - LOPUŠNÁ, Katarína - WINTHER, H. - SUN, Ch. - THOMSEN, M.K. - NANDAKUMAR, R. - MOGENSEN, T.H. - MEYER, Morten - VAEGTER, Ch. - NYENGAARD, J.R. - FITZGERALD, K.A. - PALUDAN, S.R. Sensing of HSV-1 by the cGAS-STING pathway in microglia orchestrates antiviral defence in the CNS. In *Nature Communications*, 2016, vol. 7, p. 13348-13348. (2015: 11.329 - IF, Q1 - JCR, 6.287 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 2041-1723. https://doi.org/10.1038/ncomms13348.

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11) BALÁŽ, Miroslav - BECKER, A. - BALÁŽOVÁ, Lucia - STRAUB, Leon G. - MULLER, J. - GASHI, Gani - MAUSHART, Claudia Irene - SUN, Wenfei - DONG, Hua - MOSER, J. C. - HORVATH, Carla - EFTHYMIOU, Vissarion - RACHAMIN, Yael - MODICA, Salvatore - ZELLWEGER, Caroline - BACANOVIC, Sara - ŠTEFANIČKA, Patrik - VARGA, Lukáš - UKROPCOVÁ, Barbara - PROFANT, Milan - OPITZ, Lennart - AMRI, Ez-Zoubir - AKULA, Murali K. - BERGO, Martin - UKROPEC, Jozef - FALK, Christian - ZAMBONI, Nicola - BETZ, Matthias Johannes** - BURGER, I.** - WOLFRUM, Christian**. Inhibition of mevalonate pathway prevents adipocyte browning in mice and men by affecting protein prenylation. In *Cell Metabolism*, 2019, vol. 29, no. 4, p. 901-916.e8. (2018: 22.415 - IF, Q1 - JCR, 10.692 - SJR, Q1 - SJR, Current Contents - CCC). ISSN 1550-4131. https://doi.org/10.1016/j.cmet.2018.11.017

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2.1.6. List of patents, patent applications, and other intellectual property rights registered abroad, incl. revenues

No patents, patent applications or other IP rights were registered abroad during the evaluation period.

2.1.7. List of patents, patent applications, and other intellectual property rights registered in Slovakia, incl. revenues

Patent application registered during the evaluation period:
Mode of chromatographic purification of recombinant human erythropoietin
(Spôsob chromatografickej purifikácie rekombinantného ľudského erytropoetínu)
Patent application number: 60-2020, Slovak Patent Office
Patent assignee: Slovak technical University (70%), BMC SAS (30%)
Inventors: POLAKOVIČ, M. – MOLNÁR, T. – ADAMÍKOVÁ, J. – ANTOŠOVÁ, M. – BARTOŠOVÁ, Mária – ŠKULTÉTY, Ľudovít
https://wbr.indprop.gov.sk/WebRegistre/Patent/Detail/69-2020

2.1.8. Narrative on the most important research outputs of the institute – especially focused on their importance for society (3-5 pages)

Here we describe the most important contributions of the BMC SAS researchers to the particular research topics in the context of the current state-of-the-art. The narrative is not limited to individual papers, but rather reflects principal findings that advance the knowledge in the respective research fields.

Novel insights into the role of hypoxia-induced carbonic anhydrase IX in cancer progression

This research topic has emerged at the Department of Tumour Biology, Institute of Virology as a result of discovery and cloning of the carbonic anhydrase IX (CA IX/CA9), which is now known as a clinically relevant cancer biomarker and target expressed mainly in hypoxic tumours with aggressive phenotype. CA IX is a highly active cell surface enzyme involved in control of slightly alkaline intracellular pH vital for cancer cell survival and in acidification of extracellular pH needed for penetration of cancer cells into the normal tissue. At the same time, CA IX contributes to metastatic dissemination as an adhesion molecule supporting migration-invasion. We were the first to show that CA IX is cancrer-associated and implicated in acidosis and invasiveness. We have also generated specific monoclonal antibodies that are globally used for experimental and clinical detection of CA IX and are now under development for cancer therapy. In the evaluation period, we brought original data extending the knowledge on the CA IX role in cancer progression. We demonstrated for the first time that CA IX maximises glycolytic flux via increasing level and activity of lactate dehydrogenase, and facilitates metabolic adaptation to hypoxia through supporting glycolysis and cellular proliferation. This suggested that highly glycolytic tumours might be particularly vulnerable to CA IX-directed agents. (Benej et al, Front Oncol, 2020; Gibadulinova et al, IJMS, 2020). We also brought the evidence that CA IX regulates invadopodia formation through both pH-dependent mechanism and interplay with actin regulatory proteins (Debreova et al, IJMS, 2019). Additionally, we showed that CA IX ectodomain cleavage is activated in response to chemotherapy and affects tumorigenic and metastatic phenotype of cancer cells (Vidlickova et al, BMC Cancer, 2016; Kajanová et al, Br J Cancer, 2020). All these findings are important for rational design and development of anticancer strategies targeted to CA IX-expressing tumour cells that are resistant to conventional therapies.

Identification of Dermacentor reticulatus as a vector of tick-borne encephalitis virus

Tick-borne encephalitis virus (TBEV) is the most medically important tick-borne virus in Europe and Asia. Ixodes ricinus and I. persulcatus ticks are considered to be the main vector ticks of TBEV in nature due to their specific ecological associations with the vertebrate hosts. Nevertheless, recent TBEV prevalence studies in ticks suggest that Dermacentor reticulatus ticks might play a relevant role in the maintenance of TBEV in nature. Therefore, we have investigated the vector competency of D. reticulatus for TBEV through experimental tick infections and comparative in vivo transmission studies involving D. reticulatus and I. ricinus ticks. We observed that after inoculation, adult female D. reticulatus ticks efficiently replicated TBEV during the observed period of 21 days. The infected D. reticulatus ticks were able to transmit the virus to mice. The course of infection in mice was comparable to the infection after a tick bite by I. ricinus while the virus spread and clearance was slightly faster. Moreover, D. reticulatus ticks were capable of tick-to-tick non-viraemic transmission of TBEV during co-feeding on the same animal. The co-feeding transmission efficiency was overall slightly lower in comparison with I. ricinus. In conclusion, our study demonstrated that D. reticulatus is a biologically effective vector of TBEV. In line with the recent reports of its high TBEV prevalence in nature, our data indicate that in some endemic foci, D. reticulatus might be an underrecognized TBEV vector which contributes to the expansion of the TBEV endemic areas (Ličková et al, Ticks Tick Borne Dis. 2020)

Exploring the survival strategy of Coxiella burnetii to antibiotic exposure

Antibiotic resistance is a global threat with a top concern in healthcare. Doxycycline is an antibiotic highly permeable to cell membrane used for treating a broad variety of bacteria, including Coxiella burnetii. This intracellular pathogen is the causative agent of Q fever, a re-emerging zoonosis found worldwide. As C. burnetii has a considerable impact on public health and farming industry, it is essential to explore its antibiotic adaptation/tolerance strategy to ensure effective therapy. We tracked changes in the bacterium induced by doxycycline exposure by proteomic analysis and detected fifteen significantly altered proteins. Adjustments of some key proteins were verified by gene expression analysis. Increase in hydrogen peroxide was observed as a consequence of treatment, indicating deregulation of redox balance. Thus, our data suggests the reduction of protein synthesis to minimal levels, activation of the defense mechanism against oxidative stress and maintenance of cell envelope integrity as the key processes ensuring C. burnetii survival under doxycycline exposure. Because infection by intracellular microorganisms like C. burnetii requires long periods of treatment, development of antibiotic resistance is a risk. The identification of pathways impacted by antibiotics could be a helpful approach to understanding mechanism of how C. burnetii deals with antibiotic stress (Zuniga-Navarette et al, J Proteomics, 2019).

Integrative biology of exercise: slowing down progression of aging-related chronic diseases in humans

Department of Metabolic Disorders focuses on the adaptive response to exercise at the molecular, cellular, tissue and systemic level, as well as on the mechanisms supporting the maintenance of functional capacity - "health" - of cells, organs and the whole body. The translational dimension stems from the capacity of regular exercise to (i) to slow down processes associated with aging and accelerated by obesity and sedentary lifestyle, and to (ii) maintain or improve health and quality of life in aging and chronic non-communicable diseases. We showed that regular exercise can improve clinical status and glucose metabolism in patients with early-stage Parkinson's disease (Krumpolec et al., Front Neurol, 2017) and in seniors (Máderová, et al, 2019; Tsai et al, J Alzneimer's Dis, 2018 & Front Ageing Neurosci, 2019). We described changes in lipid metabolism of skeletal muscle cells from patients with idiopathic inflammatory myopathy (Nemec et al., J Physiol, 2021). Our results showed that carnosine, dipeptide found in muscle and brain, has a potential to improve muscle performance by regulating intracellular pH and eliminating harmful metabolic intermediates (Kukurová et al., 2016; Regazzoni et al., 2016). In a pilot intervention study, we demonstrated positive effects of carnosine supplementation on glucose metabolism in patients with prediabetes (DeCourten et al., Obesity, 2016). We have also pointed to the existence of epigenetic regulatory mechanisms that modulate lipid metabolism and muscle secretome in muscle cells in vitro (Nemec et al., J Physiol, 2021).
The long-term sustainability, effectiveness and importance of the training intervention for the health and quality of life in seniors are supported by the results of the 21-month training intervention (Slobodová, et al., 2021). Our results also support the neuroprotective potential of adiponectin, hormone from adipose tissue that may be involved in the exercise-induced cognitive improvement in humans (Schön et al., Sci Rep 2019).

Identification of genetic aetiology in patients with monogenic diabetes and its pharmacogenetic consequences

The research topic originated at the Department of Metabolic Disorders. For a long period, we focused on monogenic diabetes where the DNA diagnostics has strong therapy consequences. During the evaluation period we have focused on permanent neonatal diabetes (PNDM), where we have brought evidence that a) sulfonylurea treatment of ABCC8-PNDM results in excellent long-term glycemic control (as partners of the international study Bowman et al, Lancet Diabetes Endocrinol, 2018), b) KCNJ11-PNDM treatment during pregnancy should be managed individually and should take into account the diabetes control, prior-pregnancy treatment, sulfonylurea dose, adherence of the mother, and the genotype of the fetus (Stanik et al, Diabet Med, 2020), c) sulfonylurea monotherapy might be preferable to insulin in people with permanent neonatal diabetes mellitus sensitive to sulfonylurea even when HbA1c is above target (Stanik et al, Diabet Med, 2018). In the field of monogenic diabetes with extrapancreatic features the most important achievement was our study, where we have linked mutations in the *EIF2S3* gene with the MEHMO syndrome, whose genetic cause had formerly been unknown. The MEHMO syndrome is an extremely rare disorder characterized by X chromosome-linked inheritance, where diabetes is associated with microcephaly, epilepsy, hypogenitalism, intellectual disability and several other endocrine disorders (hypopituitarism, diabetes). Using whole exome sequencing, we have found a frameshift variant in the gene *EIF2S3*. We have also contributed to unravelling the molecular mechanisms by which mutations in the *EIF2S3* gene lead to MEHMO syndrome. Missense variants in this gene have also been reported in further patients, but with milder phenotype, and with lower impact when functionally tested. These results were published in Skopkova et al., Hum Mutat, 2017. We continued to follow-up the patient and we further provided more details on the endocrine (Stanik et al., Phys Res, 2018) and immune phenotype (Trochanova et al., Phys Res, 2020). Based on our discovery of EIF2S3

as the causative gene, 8 different pathogenic variants have been reported to date in together 23 patients from 11 families with MEHMO syndrome in various parts of the word.

Significance of changes in neuritogenesis and synaptogenesis in the etiology of autism

This research topic is part of the long-term focus of the Department of Neuroscience targeting postnatal developmental changes in the brain, especially in the context of neurite outgrowth regulation, which involves the effects of neuropeptides (Bakos et al., Neural Plasticity, 2018). As changes in the production, secretion, and signaling of the neuropeptide oxytocin through its receptor are increasingly associated with neurodevelopmental diseases, especially autism spectrum disorders, it is very important to understand the nature of oxytocin's effect on the cytoskeleton, neuritogenesis, and morphology of neurons (Bakos et al., Neural Plasticity, 2016). During the evaluation period, we found that oxytocin-stimulated neurite outgrowth depends on the activation of voltage-gated calcium channels and is accompanied by an increase in the expression of some scaffolding and synaptic proteins (Lestanova et al., J Mol Neurosci, 2016; Zatkova et al., 2018; Reichova et al., 2018). The role of the oxytocin receptor in the growth of neuronal cell projections, neuronal differentiation, and the synthesis of cytoskeletal proteins is also confirmed by the fact that their changes occur even after downregulation of the oxytocin receptor (Lestanova et al., 2017). In our most recent studies, we have also shown that oxytocin compensates for some postnatal morphological and synaptic deficits in autism-like conditions (Reichova et al., Mol Cell Endicrinol, 2020, Reichova et al., Dev Neurobiol, 2021). Our data, therefore, suggest that autism-relevant synaptic pathologies could be reversed by oxytocin treatment. Postnatal oxytocin administration strongly affects development and should be considered for certain neuropsychiatric conditions in infancy.

Elucidation of the atypical effects of hormone aldosterone on mental functions

This research topic originated at the Department of Endocrine Regulation and Psychopharmacology. For a long time, the mineralocorticoid hormone aldosterone has been investigated almost exclusively with respect to cardiovascular function. Preclinical studies by our research group brought the first evidence on causal relationships between aldosterone and anxiety as well as aldosterone and depression-like behavior. We have brought evidence that aldosterone may be an early marker of depression onset (Hlavacova et al. 2018). Aldosterone is known to be an important component of the stress response, and we have shown that its role is particularly important during the early postnatal period in pups (Varga et al. 2016). We were the first to show that patients with allergic diseases exhibit an insufficient neuroendocrine response during stress manifested by decreased cortisol and aldosterone secretion (Hlavacova et al. 2017). Studies in patients with major depressive disorder revealed that an unfavorable therapy outcome is predicted by a higher salivary aldosterone/cortisol ratio (Murck et al. 2019). Our clinical studies showed that salivary aldosterone concentrations reflect the severity, duration of the depressive episode, and treatment outcome in patients with major depressive disorder (Segeda et al. 2017, Izakova et al. 2020). We have also demonstrated that a rise in evening aldosterone concentration in the early luteal phase precedes the symptoms of premenstrual syndrome (Izakova et al. 2021). Our findings suggest that aldosterone may represent an important target for future antidepressant and anxiolytic drug development.

Novel cancer biomarkers in endometrial and breast cancers

This research output was mainly created at the Department of Genetics. In addition to several other scientific activities, the Department seeks for novel biomarkers of various processes/stages of breast and endometrial cancers. In the primary breast cancer (BC), we found that expression of SOCS1 and CXCL12 is associated with the presence of circulating tumour cells (CTCs) in peripheral blood, suggesting that aberrant signalling cross-talk between the cytokine and chemokine responses could have an important role in hematogenous dissemination of tumour cells in this malignity (Smolková *et al*., Transl Oncol, 2016). We also showed that ADAM23 is involved in disease progression and dissemination of mesenchymal CTCs in BC, indicating that the level of ADAM23 expression has the potential to function as a novel prognostic marker and therapeutic target (Zmetáková *et al*., Cancer Sci, 2019). miRNA work revealed that (i) miR-20a and miR-27a are down-regulated in invasive BC compared to controls, (ii) miR-17 and miR-20a are down-regulated in advanced BC compared to controls, (iii) miR-17 and miR-19a are down-regulated when compared BC patients with early and advanced stage of disease, (iv) miR-17 expression levels are decreased from low to high grade of BC, and (v) down-regulated miR-27a expression levels in all clinical categories regardless of tumour progression, suggesting indicator role of miR-17 for advanced BC and potential diagnostic role of miR-27a in BC (Jurkovičová *et al*., Oncotarget, 2017). In endometrial cancer (EC), we revealed that miRNAs discriminating grade 1 from grade 3 mainly target the genes involved in PI3K-AKT signalling, whereas those discriminating endometrioid endometrial carcinoma (EEC) from serous endometrial carcinoma (SEC) target the genes involved in MAPK signalling, indicating that activation of certain signalling pathways can be useful in the molecular characterization of EEC and SEC (Kalinková *et al*., IJMS, 2020). Furthermore, we reported that consideration of miR-497-5p expression might improve the prediction accuracy of EC diagnosis (Fridrichová

et al., IJMS, 2021). All above findings bring novel biomarkers potentially valuable in diagnosis and managements of endometrial and breast cancers.

Genetic instability in hematopoietic stem cells in diagnostics, risk assessment and prevention of pediatric leukemia

A chromosomal translocation resulting in an in-frame preleukemic gene fusion (PGF) is the primary genetic abnormality observed in acute childhood lymphoblastic/myeloid leukemia (ALL/AML). PGFs arise in hematopoietic stem/progenitor cells (HSPC). Additional mutations in HSPC are needed for overt leukaemia. We screened umbilical cord blood (UCB) from newborns for the presence of the most frequent PFG associated with pediatric ALL/AML to provide a better understanding of a prenatal origin of leukemia. This screen also revealed relatively high incidence of certain pre-leukemic gene fusions (Košík *et al*., Oncotarget, 2017, Košík *et al*., Antioxidants, 2021). We found no effect of low-copy PFG on radiation-induced DNA damage response, accumulation of endogenous DNA double-stranded breaks, and apoptosis in either lymphocytes or HSPC, suggesting that higher PFG copy numbers may define a better prognostic tool for the assessment of leukemogenic potential. These data have also suggested that only PGF aroused relatively early during embryonic/fetal development in specific HSPC populations may facilitate overt leukemia. We have also contributed to methodology for assessment of DNA damage by co-localized γH2AX/53BP1DNA repair foci (Zastko *et al*., IJMS, 2021). As confusing data have been published on a link between exposure to radiofrequency radiation (RF) from mobile communications and induction of reactive oxygen species (ROS) and DNA damage, we comparatively analyzed genotoxic effects of RF signals at different frequency channels used by 3G mobile phones (Gulati *et al*., Environ Pollution, 2020). We found statistically significant induction of DNA damage in dependence on UMTS frequency channel with maximal effect at 1977 MHz. Our data support a notion that each specific signal used in mobile communication should be tested in specially designed experiments to rule out that prolonged exposure would induce genotoxic effects.

Tumour–stroma interactions in breast cancer

The Department of Molecular Oncology has a long-term experience in breast cancer microenvironment research. Studies are focused on interactions between the malignant cells and mesenchymal stromal cells (MSCs) in the context of chemotherapy, that remains a cornerstone in the treatment of the majority of malignancies. MSCs are key contributors of the breast tumour microenvironment. They can home and engraft in tumour tissue and acquire the phenotype of cancer-associated fibroblasts, but their role is not fully understood. Antineoplastic drugs impact not only tumour cells, but also tumour stroma. We have shown that neo-adjuvant chemotherapy could alter ‘healthy‘ stroma into a hostile tumour-promoting and metastasis favouring niche. Factors produced by chemotherapy-affected stromal cells affect the response to chemotherapy enabling the escape and survival of malignant cell populations (Plavá *et al*., J Exp Cancer Res, 2021). Tumour cells as such influence behaviour of the stromal compartment. In breast cancer, tumour microenvironment (TME) is considered as a key component contributing to breast cancer progression. We demonstrated permanent changes in tumour-adjacent adipose tissue-derived MSCs. Tumour-exposed MSCs differed in doubling-time, expression profile, cytokine production and tumour-promoting ability. They have the potential to increase tumour cell invasiveness by the activation of epithelial-to-mesenchymal transition (Plavá *et al*., Cells, 2020). Research focused on pathways responsible for the activation and re-programming of MSCs should reveal novel therapeutic strategies.

Nanomedicine - biological safety, opportunities, and perspectives

Nanomedicine is the fastest-growing branch of human healthcare, aiming at developing nanodrugs with increased efficacy and safety. The research activities of the Department of Nanobiology of the CRI are dedicated to deepening the understanding of the nano-bio interactions and evaluating the biosafety of inorganic nanoparticles (INPs) for biomedical applications. The INPs´ unique physicochemical properties, not available in organic- or polymer-based counterparts, make them promising tools for more accurate imaging, diagnosis, and innovative therapeutic approaches. Despite the apparent benefits, INPs´ accumulation in tissues upon therapeutic/diagnostic use due to poor biodegradation and excretion is a cause for concern. Therefore, a comprehensive investigation of their potential unintended adverse effects is essential. In the evaluation period, we demonstrated that iron oxide nanoparticles (MNPs) act as aneugen-like spindle poison, causing mitotic slippage. Although the microtubule-destroying capacity might increase the therapeutic effects of the MNPs-based anti-cancer drugs, MNPs can also impact the proliferating normal human cells (Buliaková *et al*., Nanomedicine, 2017). Residual gold nanoparticles accumulated in the liver for seven days induced cytoplasmic vacuolation and changes in serum biochemical parameters indicating hepatic toxicity (Kozics *et al*., Nanomaterials-Basel, 2021). INPs may also cause changes in epigenetic regulatory mechanisms involved in the pathogenesis of various complex human diseases, including cancer (Smolková *et al*., Food Chem Toxicol, 2017). The risk assessment of nanoparticles requires using a sensitive, robust, and reliable method allowing detection of a broad spectrum of direct and indirect DNA lesions. Our group has contributed to the

validation and standardization of protocol for the comet assay to characterize the potential toxicity of chemicals and nanoparticles (Moller *et al*., Nature protocols, 2019; Gajski *et al*., Mut Res, 2019). Nanotechnology provides new approaches for *in vivo*-like and animal-free testing of the potential health hazard of chemicals and nanoparticles. The development of microfluidic cell-based devices allows for high-throughput screening and flexible automation while lowering costs and reagent consumption due to their miniaturization (Kohl *et al*., Small, 2021). All our research and results contributed to understanding the nano-bio interactions and the development of safer nanoparticles for biomedical applications.

Functional aspects of selected calcium transport systems in altered calcium signalling in cancer cells

Part of the research at the Department of Molecular Physiology of the Institute of Clinical and Translational Research is dedicated to a role of calcium signalling in tumours. In tumours, calcium levels are altered compared to normal cells, which result in special metabolic response of these cells. Intracellular calcium levels are secured by calcium transport systems, not only those localized on plasma membrane, but also those localized on intracellular stores, e.g. endoplasmic reticulum. Although research in this field is rapidly evolving, it still provides opportunities for novel results. Our focus on inositol 1,4,5-trisphosphate receptors (IP_3Rs) confirmed the proapototic role of type 1 and 2 of these receptors in tumour cells (Chovancova et al., Cell Physiol Biochem, 2017), but clearly show the opposite – antiapoptotic role of type 3 IP_3Rs. By microarray assays on samples of clear cell renal cell carcinoma compared to samples of healthy renal tissue from the same patients we have shown that while expression of the IP_3R1 and IP_3R2 was decreased in tumour cells, expression of the IP_3R3 was increased. Antiapoptotic effect of the IP_3R3 was confirmed *in vivo* on immunodeficient mice, where tumours induced with colorectal cancer cells with knockouted IP_3R3 were significantly smaller than those from wild type cells (Rezuchova et al., Cell Death Dis, 2019). Another calcium transport system localized on plasma membrane – sodium calcium exchanger of type 1 (NCX1) - plays an important role in hypoxic tumors. We have clearly shown that in hypoxic conditions NCX1 forms a complex with sodium/proton exchanger 1 and carbonic anhydrase IX and functions against intracellular acidification (Liskova et al., Cancers, 2019; Szadvari et al., Nitric Oxide, 2019). All our findings strengthen the importance of calcium signalling in tumour biology and forms baseline for involvement of calcium blockers in anticancer strategies.

Novel possibilities in the treatment of multiple sclerosis

The research of multiple sclerosis (MS) at the Department of Clinical Research, Institute of Clinical and Translational Medicine showed that impairment in glucose and lipids metabolism (Rádiková et al., *Lipids in Health and Disease*, 2020) could contribute to the disease progression as well as to occurrence of complications connected to MS. One of the possible factors behind those metabolic changes contributing to the pathogenesis of MS is mitochondrial dysfunction. The role of autonomic nervous system is also important in the course of the MS, but the changes seen are probably secondary, caused by the MS itself (Vlcek et al., *Cellular and Molecular Neurobiology*, 2018, Imrich et al., *Clinical autonomic research*, 2021). The observed metabolic impairment together with the fact that similar changes are present in diseases like diabetes or Alzheimer's disease, where treatment by glucagon like peptide 1 (GLP-1) agonist showed beneficial effect, led us to design clinical trial to test the effect of GLP-1 agonist on the MS progression. GLP-1 is an incretin, controlling insulin secretion and glucose metabolism, cognitive functions, emotional and stress responses, as well as acting as neurotransmitter on central level. In 2019 we initiated an exploratory, unblinded, randomized, single center clinical trial in relapsing-remitting MS patients (EudraCT 2019-003001-94) aimed to evaluate effects of one-year treatment with a low dose of GLP-1 analog dulaglutide on chronic axonal damage and neurodegeneration, and on insulin resistance, and cognitive function in patients with MS. Preliminary results show that this treatment tends to improve (or at least slower down the impairment of) cognitive and motor measures in relapse-remitting MS patients.

Blood as a source, mediator and effector of neuroprotection in ischemia-reperfusion brain injury

The research performed at the Institute of Neurobiology BMC SAS brought several new findings elucidating the remote ischemic conditioning-induced increased resistance of brain tissue to ischemic conditions. The results show that ischemic tolerance is a phenomenon arising from the interaction of several mechanisms at the system-wide level. Restriction of a blood supply has been shown to result in the increased efflux of excitotoxic glutamate from the brain to the blood and a significant decrease of brain tissue glutamate concentration within the monitored brain regions in tolerance-induced individuals. The shortened exposure of neurons to a toxic dose of glutamate is probably also the reason for the reduced neurodegeneration. At the level of the bloodstream, remote ischemic conditioning significantly affects the cellular compartments and oxidative stress of the body. Particularly noteworthy is the significant systemic reduction of oxidative damage without the involvement of the basic enzymes of antioxidant protection (Jachová et al., 2019, 2020). Blood elements, or their paracrine activity, are largely responsible for inducing and transmitting information about the

tolerant phenotype. The secretion of conditioned stimulated blood elements had a markedly altered protein profile. In addition to unique proteins thought to have a neuroprotective effect, it has manifested itself in the presence of proteins responsible for activating several reaction pathways involved in processes classified as "stimulus responses." Given that such altered blood cell secretion can elicit a tolerant phenotype after intravenous administration to the recipient before and after induction of brain ischemia, this result was evaluated as highly topical, especially for the field of regenerative medicine (Bonová et al., 2020). However, in addition to paracrine activity, their ability to sequester and metabolize free glutamate is also affected by remote conditioning. Stimulated blood elements sequester extracellular glutamate more rapidly due to both their increased activity and abundance. In erythrocytes and monocytes, conditioning affected their activity, which is probably related to membrane translocation of the protein structure of the transporter essentially dependent on protein synthesis. Quantitative changes were recorded only at the level of the EAAT1 form of the glutamate transporter, on the surface of the platelet cytoplasmic membrane. These results suggest that increased glutamate sequestration by quantitative or qualitative alteration of EAATs transporters in individual blood cell populations is one of the neuroprotective mechanisms mediated by remote ischemic conditioning (Bonová et al., 2021).

Combinatorial approach in the treatment of acute CNS injuries

The pathological mechanisms of acute central nervous system (CNS) injuries involving traumatic spinal cord injury (SCI) are so complex that the combinatorial strategies are essential for effective clinical treatments. The research activities of Department of neurodegeneration, plasticity and repair has been dedicated to regulation of pathological mechanisms, and to potentiation of protective and regenerative endogenous mechanisms. Since the inflammatory response and astrogliosis play critical roles in the SCI pathogenesis, the beneficial effects of neurotoxic environment inhibition on SCI may come from the microglia/macrophages and astrocytes reactive polarization states. The results by Bimbova and co-workers (2018) strongly support the use of Atorvastatin as one of the first-line therapeutic drugs to treat an acute traumatic SCI. This statin significantly reduced macrophage infiltration, resident cell activation, and caspase-3 expression one day post-SCI and promoted axon outgrowth in the whole cranio-caudal extent after six weeks of survival. The mitigation of the strong inflammatory response soon after the SCI promoted regeneration at the lesion site and cranially and caudally from the epicenter and significantly improved the neurological outcome during long-term survival. To detect environmental cues associated with the transformation of reactive microglia (M1) and astrocytes (A1) into their polarization states (anti-inflammatory M2 and A2 phenotypes), Kisucka and co-workers (2021) studied time-dependent gene expression in naive and injured spinal cord. The results show that the first week after injury is critical for the modulation of reactive microglia/astrocytes into their neuroprotective phenotypes, and that this transformation is essential for spontaneous functional recovery. Inhibiting M1/A1 and/or promoting M2 and A2 polarization could be a very effective treatment strategy to improve functional recovery after SCI. Markedly reduced the expression of inflammatory response and suppressed activation of astrocyte formation demonstrated that epidural oscillating field stimulation can be considered as the effective supportive tool in combined therapy (Bačova et al. 2019).

Postnatal neurogenesis in the rat olfactory system from a morphological and functional point of view

The long-term focus of the Department of Regenerative Medicine and Cell Therapy is on the study of postnatal neurogenesis in the olfactory system under physiological and pathological conditions. Based on our previous findings about specific arrangement of blood vessels in the rostral migratory stream (RMS) of adult rat we examined the development of the blood vessels arrangement in individual age stages of the first postnatal month. We have found that during this period the blood vessels of the RMS rearrange and their characteristic arrangement is acquired approximately at 3rd to 4th postnatal week. Administration of endostatin – endogenous inhibitor of angiogenesis resulted in significant changes in the arrangement of blood vessels 10 days after the inhibitor. Disruption of the reorganization of blood vessels to the migration-promoting scaffold (as a consequence of angiogenesis inhibition) resulted in disruption of the mode and direction of neuroblast migration as well as their proliferation and these consequences persisted into adulthood (Angelidis et al., 2018). We have also investigated the function of newly generated olfactory bulb neurons in relation to activities related to smell. Our results showed that single maternal separation is a stressful event that in age-dependent manner stimulates cellular activity in the main and accessory olfactory bulb – the structures dedicated to odor information processing. The low level of Fos expression in newborn neurons of the main and accessory bulb indicates that postnatally generated cells are less sensitive to neonatal stress than preexisting neurons (Závodská et al., 2020).

2.1.9. Table of research outputs

Scientific publications	2016			2017			2018			2019			2020			2021			total			
	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. /1 million total salary budget	number	averaged number per year	av. No. / FTE researches	av. No. / one million total salary budget
Scientific monographs and monographic studies in journals and proceedings published abroad *(AAA, ABA)*	0	0,000	0,000	0	0,000	0,000	1	0,006	0,177	0	0,000	0,000	0	0,000	0,000	0	0,000	0,000	**1**	**0,167**	**0,001**	**0,028**
Scientific monographs and monographic studies in journals and proceedings published in Slovakia *(AAB, ABB)*	0	0,000	0,000	0	0,000	0,000	1	0,006	0,177	1	0,006	0,163	0	0,000	0,000	0	0,000	0,000	**2**	**0,333**	**0,002**	**0,055**
Chapters in scientific monographs published abroad *(ABC)*	4	0,025	0,802	3	0,018	0,565	**2**	0,012	0,353	2	0,012	0,326	2	0,011	0,295	1	0,005	0,135	**14**	**2,333**	**0,013**	**0,386**
Chapters in scientific monographs published in Slovakia *(ABD)*	0	0,000	0,000	0	0,000	0,000	0	0,000	0,000	1	0,006	0,163	1	0,005	0,148	0	0,000	0,000	**2**	**0,333**	**0,002**	**0,055**
Scientific papers published in journals registered in Current Contents Connect *(ADCA, ADCB, ADDA, ADDB)*	117	0,727	23,466	102	0,595	19,209	117	0,696	20,679	138	0,806	22,501	128	0,701	18,904	128	0,648	17,269	**730**	**121,667**	**0,694**	**20,127**
Scientific papers published in journals registered in Web of Science Core Collection and SCOPUS not listed above *(ADMA, ADMB, ADNA, ADNB)*	55	0,342	11,031	42	0,245	7,910	35	0,208	6,186	49	0,286	7,990	62	0,340	9,157	54	0,274	7,285	**297**	**49,500**	**0,282**	**8,189**
Scientific papers published in other foreign journals (not listed above) *(ADEA, ADEB)*	3	0,019	0,602	5	0,029	0,942	5	0,030	0,884	5	0,029	0,815	2	0,011	0,295	3	0,015	0,405	**23**	**3,833**	**0,022**	**0,634**
Scientific papers published in other domestic journals (not listed above) *(ADFA, ADFB)*	4	0,025	0,802	10	0,058	1,883	4	0,024	0,707	11	0,064	1,794	12	0,066	1,772	11	0,056	1,484	**52**	**8,667**	**0,049**	**1,434**
Scientific papers published in foreign peer-reviewed proceedings *(AECA)*	0	0,000	0,000	0	0,000	0,000	0	0,000	0,000	3	0,018	0,489	2	0,011	0,295	1	0,005	0,135	**6**	**1,000**	**0,006**	**0,165**
Scientific papers published in domestic peer-reviewed proceedings *(AEDA)*	0	0,000	0,000	0	0,000	0,000	7	0,042	1,237	2	0,012	0,326	5	0,027	0,738	0	0,000	0,000	**14**	**2,333**	**0,013**	**0,386**
Published papers (full text) from foreign scientific conferences *(AFA, AFC)*	2	0,012	0,401	4	0,023	0,753	3	0,018	0,530	11	0,064	1,794	2	0,011	0,295	3	0,015	0,405	**25**	**4,167**	**0,024**	**0,689**
Published papers (full text) from domestic scientific conferences *(AFB, AFD)*	42	0,261	8,424	30	0,175	5,650	33	0,196	5,832	47	0,274	7,663	34	0,186	5,021	26	0,132	3,508	**212**	**35,333**	**0,202**	**5,845**

*Due to the merger of BMC SAS institutes into a new legal entity and due to movement of three BMC SAS institutes to a new building in January 2016, new approvals for work with chemicals, biologicals and animals had to be issued by state authorities. Lengthy administrative procedures caused that the experimental research at the BMC SAS was disabled until August 2016. This translated into the decrease in number of publications in 2017.

**The part of the salary budget received in 2020 and 2021 was associated with the services provided by the BMC SAS to the SAS and the state during the COVID-19 pandemics. Thus, portion of human capacities and salary resources were not used for research activities. Regular research was even partially hampered by the strong engagement in anti-pandemic activities.

2.2. Measures of research outputs (citations, etc.)

2.2.1. Table with citations per annum (without self-citations)

Citations, reviews	2016		2017		2018		2019		2020		2021		total		
	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	averaged number per year	av. No. / FTE researchers
Citations in Web of Science Core Collection (1.1, 2.1)	3 756	23,35	4 000	23,35	4 528	26,95	4 793	27,98	4 948	27,11	5 028	25,47	**27 053**	**4 508,83**	**25,73**
Citations in SCOPUS (1.2, 2.2) if not listed above	594	3,69	830	4,85	730	4,34	573	3,34	584	3,20	281	1,42	**3 592**	**598,67**	**3,42**
Citations in other citation indexes and databases (not listed above) (3.2,4.2)	2	0,01	0	0,00	17	0,10	80	0,47	43	0,24	7	0,04	**149**	**24,83**	**0,14**
Other citations (not listed above) (3.1, 4.1)	42	0,26	28	0,16	31	0,18	29	0,17	41	0,22	38	0,19	**209**	**34,83**	**0,20**
Reviews (5,6)	0	0,00	0	0,00	0	0,00	0	0,00	0	0,00	0	0,00	**0**	**0,00**	**0,00**

2.2.2. List of 10 most-cited publications published any time with the address of the institute, with number of citations in the assessment period (2015 – 2020)

The list involves selected papers generated primarily at the BMC SAS institutes, with key authors from the BMC SAS institutes. The papers are ordered according to the total number of citations without self-citations (as registered in Web of Science or SCOPUS during 2015-2020).

1) GÖRLACH, A. - BERTRAM, K. - HUDECOVÁ, Soňa - KRIŽANOVÁ, Oľga**. Calcium and ROS: A mutual interplay. In *Redox Biology*, 2015, vol. 6, p. 260-271. (2014: 1.584 - SJR, Q1 - SJR). ISSN 2213-2317. https://doi.org/10.1016/j.redox.2015.08.010, *436 citations*

2) KURDIOVÁ, Timea - BALÁŽ, Miroslav - VICIAN, Marek - PALOVÁ, Denisa - VLČEK, Miroslav - VALKOVIČ, Ladislav - SRBECKÝ, Miroslav - IMRICH, Richard - KYSELOVIČOVÁ, Oľga - BELAN, Víťazoslav - JELOK, Ivan - WOLFRUM, Christian - KLIMEŠ, Iwar - KRŠŠÁK, Martin - ZEMKOVÁ, Erika - GAŠPERÍKOVÁ, Daniela - UKROPEC, Jozef - UKROPCOVÁ, Barbara**. Effects of obesity, diabetes and exercise on Fndc5 gene expression and irisin release in human skeletal muscle and adipose tissue: in vivo and in vitro studies. In *Journal of Physiology*, 2014, vol. 592, no. 5, p. 1091-1107. (2013: 4.544 - IF, Q1 - JCR, 2.717 - SJR, CCC). ISSN 0022-3751. https://doi.org/10.1113/jphysiol.2013.264655, *221 citations*

3) ŠVASTOVÁ, Eliška - HULÍKOVÁ, Alžbeta - RAFAJOVÁ, Monika - ZAŤOVIČOVÁ, Miriam - GIBADULINOVÁ, Adriana - CASINI, A. - CECCHI, A. - SCOZZAFAVA, Andrea - SUPURAN, Claudiu T. - PASTOREK, Jaromír - PASTOREKOVÁ, Silvia**. Hypoxia activates the capacity of tumor-associated carbonic anhydrase IX to acidify extracellular pH. In *FEBS Letters*, 2004, vol. 577, no. 3, p. 439-445. ISSN 1873-3468. https://doi.org/10.1016/j.febslet.2004.10.043, *181 citations*

4) PASTOREK, Jaromír - PASTOREKOVÁ, Silvia**. Hypoxia-induced carbonic anhydrase IX as a target for cancer therapy: From biology to clinical use. In *Seminars in Cancer Biology*, 2015, vol.31, p. 52-64. (2014: 9.330 - IF, Q1 - JCR, 4.937 - SJR, Q1 - SJR, CCC). ISSN 1044-579X. https://doi.org/10.1016/j.semcancer.2014.08.002, *157 citations*

5) BROZMANOVÁ, Jela - MÁNIKOVÁ, Dominika - VLČKOVÁ, Viera - CHOVANEC, Miroslav**. Selenium: a double-edged sword for defense and offence in cancer. In *Archives of Toxicology*, 2010, vol. 84, no. 12, p. 919-938. (2009: 3.312 - IF, 0.892 - SJR, Q1 - SJR, CCC). ISSN 0340-5761. https://doi.org/10.1007/s00204-010-0595-8, *135 citations*

6) KUČEROVÁ, Lucia - ALTANEROVÁ, Veronika - MATÚŠKOVÁ, Miroslava - TYČIAKOVÁ, Silvia - ALTANER, Čestmír. Adipose tissue-derived human mesenchymal stem cells mediated prodrug cancer gene therapy. In *Cancer Research*, 2007, vol. 67, no. 13, p. 6304-6313. (2006: 7.656 - IF, Q1 - JCR, 4.517 - SJR, Q1 - SJR, CCC). ISSN 0008-5472. https://doi.org/10.1158/0008-5472.CAN-06-4024, *134 citations*

7) KOZOVSKÁ, Zuzana - GABRISOVA, Veronika - KUČEROVÁ, Lucia**. Colon cancer: Cancer stem cells markers, drug resistance and treatment. In *Biomedicine & Pharmacotherapy*, 2014, vol. 68, no. 8, p. 911-916. (2013: 2.108 - IF, Q3 - JCR, 0.763 - SJR, CCC). ISSN 0753-3322. https://doi.org/10.1016/j.biopha.2014.10.019, *107 citations*

8) SEDLÁKOVÁ, Oľga - ŠVASTOVÁ, Eliška - TAKÁČOVÁ, Martina - KOPÁČEK, Juraj - PASTOREK, Jaromír - PASTOREKOVÁ, Silvia**. Carbonic anhydrase IX, a hypoxia-induced catalytic component of the pH regulating machinery in tumors. In *Frontiers in Physiology*, 2014, vol. 4, no. 400, p. 1-14. (2013: 1.227 - SJR). ISSN 1664-042X. https://doi.org/10.3389/fphys.2013.00400, *99 citations*

9) OVESNÁ, Zdenka - VACHÁLKOVÁ, Anna - KOZICS, Katarína - TÓTHOVÁ, Darina. Pentacyclic triterpenoic acids: new chemoprotective compounds. In *Neoplasma*, 2004, vol. 51, no. 5, p. 327-333. (2003: 0.482 - IF, CCC). ISSN 0028-2685, *84 citations*

10) ŠVASTOVÁ, Eliška - WITARSKI, Wojciech - CSÁDEROVÁ, Lucia - KOŠÍK, Ivan - ŠKVARKOVÁ, Lucia - HULÍKOVÁ, Alžbeta - ZAŤOVIČOVÁ, Miriam - BARÁTHOVÁ, Monika - KOPÁČEK, Juraj - PASTOREK, Jaromír - PASTOREKOVÁ, Silvia**. Carbonic anhydrase IX interacts with bicarbonate transporters in lamellipodia and increases cell migration via its catalytic domain. In *Journal of Biological Chemistry*, 2012, vol. 287, no. 5, p. 3392-3402. (2011: 4.773 - IF, Q1 - JCR, 3.544 - SJR, Q1 - SJR, CCC). ISSN 0021-9258. https://doi.org/10.1074/jbc.M111.286062, 77 citations

2.2.3. List of 10 most-cited publications published any time with the address of the institute, with number of citations obtained until 2020

To present our genuine research outputs, this selection contains the papers generated primarily at the BMC SAS institutes, with key authors from the BMC SAS institutes. The papers are ordered according to the average number of citations per year calculated as total number of citations (according to Web of Science on June 3, 2022, without self-citations) divided by the number of years elapsed until the end of 2020, including the year of publication (irrespective of the month of publishing).

Where available, we included the values of baseline citation rates, i.e. expected total citation numbers for papers in a research field published in a given year, as determined by InCites Essential Science Indicators (Clarivate 2022). For all selected papers, the total numbers of citations (without self-citations) is markedly above the baseline citation rates.

1) GÖRLACH, A. - BERTRAM, K. - HUDECOVÁ, Soňa - KRIŽANOVÁ, Oľga**. Calcium and ROS: A mutual interplay. In *Redox Biology*, 2015, vol. 6, p. 260-271. (2014: 1.584 - SJR, Q1 - SJR). ISSN 2213-2317. https://doi.org/10.1016/j.redox.2015.08.010

Total citations until 2020: 436, Average per year: 72,7
InCites ESI Baseline citation rate is 32,53 for Molecular Biology and Genetics (2015) and 23,99 for Biology & Biochemistry (2015)

2) KURDIOVÁ, Timea - BALÁŽ, Miroslav - VICIAN, Marek - PALOVÁ, Denisa - VLČEK, Miroslav - VALKOVIČ, Ladislav - SRBECKÝ, Miroslav - IMRICH, Richard - KYSELOVIČOVÁ, Oľga - BELAN, Víťazoslav - JELOK, Ivan - WOLFRUM, Christian - KLIMEŠ, Iwar - KRŠŠÁK, Martin - ZEMKOVÁ, Erika - GAŠPERÍKOVÁ, Daniela - UKROPEC, Jozef - UKROPCOVÁ, Barbara**. Effects of obesity, diabetes and exercise on Fndc5 gene expression and irisin release in human skeletal muscle and adipose tissue: in vivo and in vitro studies. In *Journal of Physiology*, 2014, vol. 592, no. 5, p. 1091-1107. (2013: 4.544 - IF, Q1 - JCR, 2.717 - SJR, Current Contents - CCC). ISSN 0022-3751. https://doi.org/10.1113/jphysiol.2013.264655
Total citations until 2020: 234, Average per year: 33,4.
InCites ESI Baseline citation rate is 37,41 for Molecular Biology and Genetics (2014) and 27,78 for Biology & Biochemistry (2014)

3) ŠVASTOVÁ, Eliška - HULÍKOVÁ, Alžbeta - RAFAJOVÁ, Monika - ZAŤOVIČOVÁ, Miriam - GIBADULINOVÁ, Adriana - CASINI, A. - CECCHI, A. - SCOZZAFAVA, Andrea - SUPURAN, Claudiu T. - PASTOREK, Jaromír - PASTOREKOVÁ, Silvia**. Hypoxia activates the capacity of tumor-associated carbonic anhydrase IX to acidify extracellular pH. In *FEBS Letters*, 2004, vol. 577, no. 3, p. 439-445. (2003: 3.99 - IF). ISSN 1873-3468. https://doi.org/10.1016/j.febslet.2004.10.043
Total citations until 2020: 540, Average per year: 31,8

4) PASTOREKOVÁ, Silvia - PARKKILA, S. - PASTOREK, Jaromír - SUPURAN, C.T. Carbonic anhydrases: Current state of the art, therapeutic applications and future prospects. In *Journal of Enzyme Inhibition and Medicinal Chemistry*, 2004, vol. 19, no. 3, p. 199 - 229. (2003: 0.775 - IF, Current Contents - CCC). https://doi.org/10.1080/14756360410001689540
Total citations until 2020: 541, Average per year: 31,8

5) PASTOREK, Jaromír - PASTOREKOVÁ, Silvia**. Hypoxia-induced carbonic anhydrase IX as a target for cancer therapy: From biology to clinical use. In *Seminars in Cancer Biology*, 2015, vol.31, p. 52-64. (2014: 9.330 - IF, Q1 - JCR, 4.937 - SJR, Q1 - SJR, Current Contents - CCC). (2015 - Current Contents). ISSN 1044-579X. https://doi.org/10.1016/j.semcancer.2014.08.002

Total citations until 2020: 157, Average per year: 28,2
InCites ESI Baseline citation rate is 32,53 for Molecular Biology and Genetics (2015) and 19,48 for Clinical Medicine (2015)

6) KUČEROVÁ, Lucia - ALTANEROVÁ, Veronika - MATÚŠKOVÁ, Miroslava - TYČIAKOVÁ, Silvia - ALTANER, Čestmír**. Adipose tissue-derived human mesenchymal stem cells mediated prodrug cancer gene therapy. In *Cancer Research*, 2007, vol. 67, no. 13, p. 6304-6313. (2006: 7.656 - IF, Q1 - JCR, 4.517 - SJR, Q1 - SJR, Current Contents - CCC). (2007 - Current Contents). ISSN 0008-5472. https://doi.org/10.1158/0008-5472.CAN-06-4024
Total citations until 2020: 292, Average per year: 20,9

7) BROZMANOVÁ, Jela - MÁNIKOVÁ, Dominika - VLČKOVÁ, Viera - CHOVANEC, Miroslav**. Selenium: a double-edged sword for defense and offence in cancer. In *Archives of Toxicology*, 2010, vol. 84, no. 12, p. 919-938. (2009: 3.312 - IF, 0.892 - SJR, Q1 - SJR, CCC). ISSN 0340-5761. https://doi.org/10.1007/s00204-010-0595-8,
Total citations until 2020: 224, Average per year: 20,4

8) KRISHNAN, J. - DANZER, C. - SIMKA, T. - UKROPEC, Jozef - WALTER, K.M. - KUMPF, S. - MIRTSCHINK, P. - UKROPCOVÁ, Barbara - GAŠPERÍKOVÁ, Daniela - PEDRAZZINI, T. - KREK, W. Dietary obesity-associated Hif1α activation in adipocytes restricts fatty acid oxidation and energy expenditure via suppression of the Sirt2-NAD+ system. In *Genes & Development*, 2012, vol. 26, no. 3, p. 259-270. (2011: 11.659 - IF, Q1 - JCR, 13.725 - SJR, Q1 - SJR, Current Contents - CCC). (2012 - Current Contents). ISSN 0890-9369. https://doi.org/10.1101/gad.180406.111
Total citations until 2020: 177, Average per year: 19,7
InCites ESI Baseline citation rate is 46,35 for Molecular Biology and Genetics (2012) and 25,49 for Clinical Medicine (2012)

9) LETAVAYOVÁ, Lucia - VLČKOVÁ, Viera - BROZMANOVÁ, Jela**. Selenium: From cancer prevention to DNA damage : review. In *Toxicology*. - Amsterdam : Elsevier, 2006, vol. 227, no. 1-2, p. 1-14. (2005: 2.584 - IF, Q1 - JCR, 1.018 - SJR, Q1 - SJR). ISSN 0300-483X. https://doi.org/10.1016/j.tox.2006.07.017
Total citations until 2020: 261, Average per year: 17,4

10) PASTOREK, Jaromír - PASTOREKOVÁ, Silvia - CALLEBAUT, I. - MORNON, J.P. - ZELNÍK, Vladimír - OPAVSKÝ, René - ZAŤOVIČOVÁ, Miriam - LIAO, S. - PORTETELLE, D. - STANBRIDGE, E.J. - ZÁVADA, Ján - BURNY, A. - KETTMAN, R. Cloning and characterization of MN, a human tumor-associated protein with a domain homologous to carbonic anhydrase and a putative helix-loop-helix DNA binding segment. In *Oncogene*, 1994, vol. 9, no. 10, p. 2877 - 2888. (1993: 6.991 - IF). ISSN 0950-9232.
Total citations until 2020: 417, Average per year: 15,4

2.2.4. List of 10 most-cited publications published during the evaluation period (2016-2021) with the address of the Institute, with number of citations obtained until 2021

The list involves selected papers generated primarily at the BMC SAS, with the corresponding authors from the BMC SAS. The papers are ordered according to the average number of citations per year, calculated as total number of citations (according to Web of Science on June 3, 2022), divided by the number of years elapsed until the end of 2021, including the year of publication (irrespective of the month of publishing).

For all selected papers, total numbers of citations (without self-citations related to all authors) is above the baseline citation rates, i.e. expected number of citations for papers in a research field published in given years, as determined by InCites Essential Science Indicators (Clarivate 2022).

1) PASTOREKOVÁ, Silvia** - GILLIES, Robert J. The role of carbonic anhydrase IX in cancer development: links to hypoxia, acidosis, and beyond. In *Cancer and Metastasis Reviews*, 2019, vol. 38, no. 1-2, p. 65-77. (2018: 6.667 - IF, Q1 - JCR, 2.427 - SJR, Q1 - SJR). ISSN 0167-7659. https://doi.org/10.1007/s10555-019-09799-0

Citations: 99, Average per year: 33
InCites ESI Baseline citation rate is 7,17 for Clinical Medicine (2019) and 12,07 for Molecular Biology and Genetics (2019)

2) PLAVÁ, Jana - CIHOVÁ, Marína - BURÍKOVÁ, Monika - MATÚŠKOVÁ, Miroslava - KUČEROVÁ, Lucia - MIKLÍKOVÁ, Svetlana**. Recent advances in understanding tumor stroma-mediated chemoresistance in breast cancer. In *Molecular Cancer*, 2019, vol. 18, p. 67. (2018: 10.679 - IF, Q1 - JCR, 3.274 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 1476-4598. https://doi.org/10.1186/s12943-019-0960-z
Citations: 62, Average per year: 20,7
InCites ESI Baseline citation rate is 12,07 for Molecular Biology and Genetics (2019)

3) LIČKOVÁ, Martina - FUMAČOVÁ, Sabina - SLÁVIKOVÁ, Monika - SLOVÁK, Mirko - DREXLER, J.F. - KLEMPA, Boris**. Dermacentor reticulatus is a vector of tick-borne encephalitis virus. In *Ticks and Tick-*

Borne Diseases, 2020, vol. 11, no. 4, art. no. 1414. (2019: 2.749 - IF, Q2 - JCR, 1.182 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 1877-959X. https://doi.org/10.1016/j.ttbdis.2020.101414
Citations: 23, Average per year: 11,5
InCites ESI Baseline citation rate is 6,66 for Microbiology (2020)

4) LALKOVIČOVÁ, Mária - DANIELISOVÁ, Viera**. Neuroprotection and antioxidants. In *NEW SZP IF 2010: NEURAL REGEN RES*, 2016, vol. 1, no. 6, p. 865-874. (2015: 0.968 - IF, Q4 - JCR, 0.340 - SJR, Q4 - SJR). ISSN 1673-5374. https://doi.org/10.4103/1673-5374.184447
Citations: 68, Average per year: 11,3
InCites ESI Baseline citation rate is 21,24 for Neuroscience & Behavior (2016)

5) REŽUCHOVÁ, Ingeborg - HUDECOVÁ, Soňa - ŠOLTÝSOVÁ, Andrea - MATÚŠKOVÁ, Miroslava - ĎURINÍKOVÁ, Erika - CHOVANCOVÁ, Barbora - ZUZCAK, M. - CIHOVÁ, Marína - BURÍKOVÁ, Monika - PENESOVÁ, Adela - LENČEŠOVÁ, Ľubomíra - KRIŽANOVÁ, Oľga**. Type 3 inositol 1,4,5-trisphosphate receptor has antiapoptotic and proliferative role in cancer cells. In *Cell Death & Disease*, 2019, vol. 10, no. 3, art. 186. (2018: 5.959 - IF, Q1 - JCR, 2.310 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 2041-4889. https://doi.org/10.1038/s41419-019-1433-4
Citations: 31, Average per year: 10,3
InCites ESI Baseline citation rate is 9,82 for Biology & Biochemistry (2019)

6) DE COURTEN, B. - JAKUBOVÁ, Michaela - DE COURTEN, M. P. J. - KUKUROVÁ, I.J. - VALLOVÁ, Silvia - KRUMPOLEC, Patrik - VALKOVIČ, L. - KURDIOVÁ, Timea - GARZON, D. - BARBARESI, S. - TEEDE, H. - DERAVE, W. - KRŠŠÁK, M. - ALDINI, G. - UKROPEC, Jozef - UKROPCOVÁ, Barbara**. Effects of Carnosine Supplementation on Glucose Metabolism : Pilot Clinical Trial. In *Obesity*, 2016, vol. 24, no. 5, p. 1027-1034. (2015: 3.614 - IF, Q1 - JCR, 2.185 - SJR, Q1 - SJR, Current Contents - CCC). (2016 - Current Contents). ISSN 1930-7381. https://doi.org/10.1002/oby.21434
Citations: 61, Average per year: 10,1
InCites ESI Baseline citation rate is 16,17 for Pharmacology & Toxicology (2016) and 16,57 for Clinical Medicine (2016)

7) DEBREOVÁ, Michaela - CSÁDEROVÁ, Lucia - BURÍKOVÁ, Monika - LUKÁČIKOVÁ, Ľubomíra - KAJANOVÁ, Ivana - SEDLÁKOVÁ, Oľga - KÉRY, Martin - KOPÁČEK, Juraj - ZAŤOVIČOVÁ, Miriam - BIZIK, Jozef - PASTOREKOVÁ, Silvia - ŠVASTOVÁ, Eliška**. CAIX regulates invadopodia formation through both a pH-dependent mechanism and interplay with actin regulatory proteins. In *International Journal of Molecular Sciences*, 2019, vol. 20, no. 11, art. no. 2745. (2018: 4.183 - IF, Q2 - JCR, 1.312 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 1422-0067. https://doi.org/10.3390/ijms20112745
Citations: 27, Average per year: 9
InCites ESI Baseline citation rate is 9,82 for Biology & Biochemistry (2019)

8) DEMKOVÁ, Lucia - KUČEROVÁ, Lucia**. Role of the HGF/c-MET tyrosine kinase inhibitors in metastasic melanoma. In *Molecular Cancer*, 2018, vol. 17, no. 1, p. 26. (2017: 7.776 - IF, Q1 - JCR, 2.778 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1476-4598. https://doi.org/10.1186/s12943-018-0795-z
Citations: 28, Average per year: 7
InCites ESI Baseline citation rate is 18,80 for Molecular Biology and Genetics (2018)

9) MIKOLÁŠKOVÁ, Barbora - JURČÍK, Matúš - ČIPÁKOVÁ, Ingrid - KRETOVÁ, Miroslava - CHOVANEC, Miroslav - ČIPÁK, Ľuboš**. Maintenance of genome stability: the unifying role of interconnections between the DNA damage response and RNA-processing pathways. In *Current genetics*, 2018, vol. 64, no. 5, p. 971-983. (2017: 3.574 - IF, Q2 - JCR, 1.555 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 0172-8083. https://doi.org/10.1007/s00294-018-0819-7
Citations: 31, Average per year: 7,8
InCites ESI Baseline citation rate is 18,80 for Molecular Biology and Genetics (2018)

10) VALKOVIČOVÁ, Terézia - ŠKOPKOVÁ, Martina - STANÍK, Juraj - GAŠPERÍKOVÁ, Daniela**. Novel insights into genetics and clinics of the HNF1A-MODY. In *Endocrine Regulations*, 2019, vol. 53, no. 2, p. 110-134. (2018: 0.411 - SJR, Q3 - SJR). ISSN 1210-0668. Available at: https://doi.org/10.2478/enr-2019-0013
Citations: 18, Average per year: 6
InCites ESI Baseline citation rate is 12,07 for Molecular Biology and Genetics (2019) and 7,17 for Clinical Medicine (2019)

2.2.5. List of most-cited authors from the Institute (at most 10 % FTE of the research employees with university degree engaged in research projects) and their number of citations in the assessment period (2015–2020).

The cited papers bear the address of the BMC SAS or one of its Institutes.

	Name	Times cited* (2015-2020)
1.	Silvia PASTOREKOVÁ	4135
2.	Jaromír PASTOREK	3761
3.	Daniela JEŽOVÁ	1786
4.	Boris KLEMPA	1377
5.	Lucia KUČEROVÁ	1016
6.	Jozef UKROPEC	1256
7.	Oľga KRIŽANOVÁ**	1273
8.	Karol ONDRIAŠ**	1194
9.	Čestmír ALTANER	1105
10.	Daniela GAŠPERÍKOVÁ	1057
11.	Barbara UKROPCOVÁ	959
12.	Ján SEDLÁK	857
13.	Eliška ŠVASTOVÁ	694
14.	Miriam ZAŤOVIČOVÁ	643
15.	Boris MRAVEC	640
16.	Miroslava MATÚŠKOVÁ	576
17.	Richard IMRICH	574

**without self-citations, Web of Science (All databases) on June 3, 2022*
***until 2015, O. Križanová and K. Ondriaš performed their research at the Institute of Molecular Physiology and Genetics (now Centre of BioSciences SAS) and then temporarily at the Centre of Molecular Medicine. Thus, the citations include papers with the affiliation to either of the SAS workplaces.*

2.2.6. List of most-cited authors from the Institute (at most 10 % FTE of the research employees with university degree engaged in research projects) and their number of citations obtained until 2020.

The cited papers bear the address of the BMC SAS or one of its Institutes. The H-index relates to papers with affiliation of the BMC SAS or one of its Institutes.

	Name	Total No.* of citations until 2020	H-index
1.	Jaromír PASTOREK	10620	57
2.	Silvia PASTOREKOVÁ	9171	57
3.	Daniela JEŽOVÁ	5122	45
4.	Karol ONDRIAŠ**	3591	30
5.	Čestmír ALTANER	2386	27
6.	Oľga KRIŽANOVÁ**	2256	27
7.	Ján SEDLÁK	2147	28
8.	Boris KLEMPA	1990	30
9.	Daniela GAŠPERÍKOVÁ	1709	23
10.	Alexander KISS	1549	22
11.	Jozef UKROPEC	1515	26
12.	Ľudevít KÁDAŠI	1355	21

13.	Lucia KUČEROVÁ	1334	21
14.	Eliška ŠVASTOVÁ	1279	16
15.	Miriam ZAŤOVIČOVÁ	1270	18
16.	Richard IMRICH	1218	21
17.	Miroslava MATÚŠKOVÁ	1196	18

**without self-citations, WoS (All databases) on June 3, 2022*
***until 2015, O. Križanová and K. Ondriaš performed their research at the Institute of Molecular Physiology and Genetics (now Centre of BioSciences SAS) and then temporarily at the Centre of Molecular Medicine. Thus, the citations include papers with the affiliation to either of the SAS workplaces.*

2.2.7. List of most-cited authors from the Institute (at most 10 % FTE of the research employees with university degree engaged in research projects) and their number of citations obtained until 2021 of their papers published during the evaluation period (2016–2021). The cited papers must bear the address of the Institute

The cited papers bear the address of the BMC SAS or one of its Institutes. The H-index relates to papers with affiliation of the BMC SAS or one of its Institutes.

	Name	Times cited* (2016-2021)	H-index** (2016-2021)
1.	Jozef UKROPEC	823	15
2.	Boris KLEMPA	596	12
3.	Silvia PASTOREKOVÁ	572	15
4.	Barbara UKROPCOVÁ	545	13
5.	Lucia KUČEROVÁ	376	11
6.	Oľga KRIŽANOVÁ	312	10
7.	Božena SMOLKOVÁ	298	9
8.	Miroslava MATÚŠKOVÁ	292	9
9.	Ľudovít ŠKULTÉTY	275	10
10.	Boris MRAVEC	240	10
11.	Daniela JEŽOVÁ	236	10
12.	Richard IMRICH	231	8
13.	Miroslav GLASA	221	9
14.	Nataša HLAVÁČOVÁ	220	9
15.	Jana JAKUBÍKOVÁ	219	6
16.	Karol ONDRIAŠ	212	9
17.	Daniela GAŠPERÍKOVÁ	203	7

**without self-citations, WoS (All databases) on June 3, 2022*
***H index corresponds only to papers published in 2016-2021*

2.3. Research status of the BMC SAS in international and national context

- **International/European position of the BMC SAS**

2.3.1. List of the most important research activities demonstrating the international relevance of the research performed by the BMC SAS, incl. major projects (details of projects should be supplied under Indicator 2.4). Max. 10 items for institute with less than 50 FTE researchers, max. 20 for institutes with 50 – 100 FTE researchers and so on

Major international research activities of the BMC SAS have been connected with the participation of its leading researchers in European consortia of the 7th Framework Programme, Horizon 2020, and Health programme projects supported by the European Commission. These include the projects dedicated to specific research topics of European and global importance as well as the projects impacting on knowledge transfer, healthcare strategies and research governance.

In addition, international relevance of the BMC SAS research can be demonstrated by the long-lasting cooperation with the respected foreign research teams, resulting in a number of collaborative research papers (see the section 2.1.5. on pages 37-40).

The list of international research activities is ordered and clustered according to particular research topics in order to provide their concise thematic overview.

Ecology and molecular evolution of zoonotic viruses

This research topic has been successfully developed in the Department of Virus Ecology, by the team of Boris Klempa. During the assessment period, the team has been involved in several important international projects described below and has played a key role in the national response to COVID-19 pandemics. In addition to project activities, Boris Klempa has been also acting as a member of the expert group on taxonomy of the family *Hantaviridae*. His nomination to the ICTV study group can be seen as an acknowledgement of his achievements in the field of discovery and molecular evolution of hantaviruses which are fruits of the long-term collaboration of his team with the Institute of Virology of the Charité, Universitätsmedizin Berlin, Germany. This collaboration led also to discovery of several new hantaviruses in unexpected mammalian hosts in Africa and Europe not only in the evaluated period but also previously. The outputs of the international activities of this team were published in Virus genes, Parasit Vectors, Genome Biology and Evolution, J Clin Virol, Emerg Infect Dis, Antiviral Res, Genome Biol Evol, J Infect Dis, BMC Infect Dis etc.

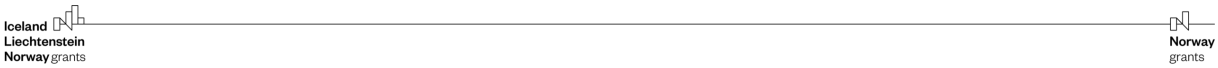
European Virus Archive Goes Global (EVAg)
H2020-INFRAIA-2015-653316 (04/2015-07/2020)
Global Virus Archive (EVA GLOBAL)
H2020-INFRAIA-2019-871029 (01/2020-12/2023)
https://www.european-virus-archive.com

The H2020-funded EVAg and EVA-GLOBAL projects are successors of the FP7-supported European Virus Archive that was founded in 2009 with the objective to create network of high calibre centres possessing the expertise to collect, amplify, characterize, standardize, authenticate, distribute and track mammalian and other exotic viruses. The Institute of Virology, Department of Virus Ecology, was one of 9 founding members. The network has grown to global dimension and recently gathers 43 laboratories associated with key Non-Governmental Organizations including WHO and OIE. EVA-GLOBAL network is reinforced by 12 Associate Partners and 5 Associate international networks. This unique advanced international community (12 EU and 17 non-EU) aims at becoming the most responsive network to improve the control of emerging or re-emerging virus outbreaks at the global level. The past EVAg, has already been able to play a key role for the control of major virus outbreaks such as MERS, Zika, Ebola, Dengue, and COVID-19 viruses, by the supply of unique reagents for the detection of viruses in infected patients. EVA-GLOBAL thus represents the largest virus collection for human, animal and plant viruses. It develops a huge number of innovations from joint research activities that enhance virus diagnostics and surveillance and promote the prospects of creating antiviral approaches. The participation in Emerging Viral Diseases-Expert Laboratory Network (EVD-LabNet) and WHO Global Alert and Response Network relates EVA-GLOBAL to the international Public Health laboratory society during outbreaks and in times when novel diagnostic recommendations are needed due to (re-)emergence of viruses. Recently, EVA-GLOBAL has played a key role in COVID-19 pandemics via not only biobanking and distributing SARS-CoV-2 virus isolates and variants to the academic and industrial R&D community, but also wolrd-wide distribution of specific diagnostic reagents in the very early stage of the pandemics when no commercial products were available.
The Department of Virus Ecology led by Boris Klempa has contributed to the archive by a collection of tick-,

mosquito-, and rodent-borne viruses, including Slovak isolates of the SARS-CoV-2 and the virus-derived products. The collection has been recently expanded with a number of plant viruses provided by the laboratory of Miroslav Glasa. Besides maintenance, characterization and distribution of the viruses, the department is involved in joint-research activities, particularly in animal models for viral infections and in novel virus production techniques. Boris Klempa is leading the EVA activities focused on viruses of the family *Hantaviridae*.

Anti-tick Vaccines to Prevent Tick-borne Diseases in Europe (ANTIDotE)
FP7-HEALTH-2013-INNOVATION-602272 (12/2013-01/2018)

Ixodes ricinus transmit bacterial, protozoal and viral pathogens that cause Lyme borreliosis, babesiosis and tick-borne encephalitis, respectively and exceedingly affect Central and Eastern Europe. During feeding, ticks introduce salivary proteins into the skin that interfere with host defense mechanisms. However, in animals, repeated tick infestations as well as vaccination against selected tick proteins can lead to decreased pathogen transmission by inhibiting tick feeding - known as 'tick immunity' - or by neutralizing tick proteins that facilitate the transmission of tick-borne pathogens. Also humans with hypersensitivity to tick-bites have a lower risk of contracting tick-borne diseases. Therefore, anti-tick vaccines encompass an innovative strategy to prevent tick-borne diseases in humans, or animals and wildlife to indirectly reduce the risk of contracting tick-borne diseases for humans.
The ANTIDotE project delivered 1) essential knowledge on the biological mechanisms involved in the pathogenesis of tick-borne diseases, 2) experimental proof of concept of an anti-tick vaccine protecting against multiple human tick-borne pathogens and 3) a road map for the development, exploitation and implementation of anti-tick vaccines. Collectively, the output of the ANTIDotE project could significantly contribute to downscale the severe medical and economic burden that tick-borne diseases have on societies in Europe and other parts of the world where Ixodes ticks are endemic.
As the main task within the ANTIDotE project, the group led by Boris Klempa, performed mouse experiments with tick-borne encephalitis virus (TBEV) transmitted by tick-bite of experimentally infected ticks to first perform transcriptiomics analyses of the infected ticks and to later test newly identified anti-tick vaccine candidates.



TBFVnet: surveillance and research on tick-borne flaviviruses
EEA and Norway Grants Fund for Regional Cooperation-2018-1-0659 (07/2020-01/2024)

Funded Research within TBFVnet is at the clinical and veterinary level aiming to (1) share expertise protocols, and tools for the diagnosis and surveillance of tick-borne flaviviruses (TBFVs), (2) investigate the molecular correlates pf pathogenesis of TBFVs, and (3) develop new antivirals. The project focuses on four TBFVs: tick-borne encephalitic virus (TBEV), Powassan virus, Louping-ill virus and Omsk hemorragic fever virus that are a health problem in Central and Eastern Europe as well as in other countries. There are currently no antivirals for the treatment of TBFV infections and the only vaccine available is for TBEV. Within the network, the researchers study the biology and pathogenesis of TBFV disease to develop new tools and procedures to increase prevention and treatment capacities. The integration of research and surveillance will create an international alliance to tackle TBFVs. Based on the long-standing expertise in TBEV-tick-mouse animal model, the role of Boris Klempa group is to contribute to characterization of new virus isolates in terms of their tick replication and transmission efficiency.

Tick-Virus Interactions Shape persistence and Transmission OF Flavivirus pathogen in tick vector (TVISTOFF)
H2020-MSCA-IF-2020-101030179 (09/2021-08/2023)

Funded by the Marie Skłodowska-Curie Actions programme, the TVISTOFF project supports reintegration of the young researcher Juraj Koči and enable him to develop his independent research activities within the department. The project is aimed to investigate the role of molecular factors in TBEV virulence and the impact of tick neurosecretory compounds on the adaptation and transmission of the virus. The interdisciplinary approach includes the development of innovative fluorescently labelled TBEV mutants, the implementation of a host-free tick feeding system using an artificial membrane, and the characterisation of tick neuroendocrine system components. The obtained results and novel tools will provide a research basis for other diseases associated with tick-borne viruses.

VACCELERATE - European Corona Vaccine Trial Accelerator Platform
H2020-IBA-SC1-CORONAVIRUS-2020-101037867

The COVID-19 pandemic has underscored the need for concerted efforts towards vaccine development in Europe. The EU-funded VACCELERATE project creates a platform connecting all European vaccine development stakeholders. VACCELERATE maps clinical trial and laboratory sites across Europe and identifies the best locations for conducting Phase 2 and 3 vaccine trials. A Volunteer Registry provides access to trial participants. The network coordinates laboratory support and provides standardised assays and trial protocols. VACCELERATE identifies and shares emerging public health questions, provides answers through its own clinical trials, and lends expertise and tangible support to vaccine developers from industry and academia. With these efforts, VACCELERATE partners are creating a network ready to face emerging pandemics and enhance vaccine development capacity in Europe. The BMC SAS represents Slovakia in the consortium and the researchers of the Institute of Virology, Silvia Pastoreková and Boris Klempa have been involved in the workpackages related to laboratory diagnostics based on molecular and serological approaches.

Nanobiology, nanotoxicology and nanosafety

The Department of Nanobiology represented by the team of Alena Gábelová has developed special expertise in testing DNA damage using comet assay. This expertise facilitated the involvement of the team in several EU projects including large research project and several ERA-NET and COST projects and the outputs were published in in Nature Protocols, Small, Nanomaterials, Cell Biology and Toxicology, Mutation Research.

High level Integrated SEnsor for NanoToxicity Screening (HISENTS)
H2020-NMP-2015-685817 (04/2016-03/2019

The HISENTS's objective was to address the problem of the dearth of high-quality tools for nano-safety assessment by introducing an innovative multimodular high throughput screening (HTP) platform including a set of individual modules, each representing a critical physiological function connected and integrated in a hierarchical vectorial manner by a microfluidic network. The increase of the capacity to perform nano-safety assessment was realised by innovative instrumentation developments for HTP, and high content analysis (HCA) approaches. Toxicogenomics on chip was also one embedded objective. The main goal was thus to establish individual chip-based microfluidic tools as devices for (nano)toxicity screening which could be combined as an online HTP platform. Parallel to the screening, the pathway and interaction of NM in biological organisms were simulated using the physiologically based pharmacokinetic (PBPK) model. Using the different sensor modules from the molecular to cell to organ level, HISENTS could input quantitative parameters into the PBPK model resulting in an effective pathway analysis for NM and other critical compounds. The specific objective was the development of a multimodular HTP platform as a new screening tool for enhancing the efficiency of hazard profiling. The major contribution of the BMC SAS Cancer Research Institute team led by Alena Gábelová was the development of the kidney-on-a-chip model and *in vivo* experiments essential for assembling a physiologically-based pharmacokinetic (PBPK) model. The *in vivo* pharmacokinetic parameters were then correlated with those *in vitro* to verify the relevance of extrapolating the results of *in vitro* studies for risk assessment of nanoparticles *in vivo*.

TEmperature-responsive Nanogels for TArgeted delivery of miCroRNAs in wound heaLing and tissue rEgeneration applicationS (TENTACLES)
ERA-NET EURONANOMED2019-124 (01/2020-12/2022)

The aim of the TENTACLES project is to develop an innovative multifunctional nanogel that integrates the protective (polymer-based nanohydrogel) and healing functions (iron oxide nanoparticles and targeted miRNA) within one nanocomposite smart structure. The heating-mediated stress stimuli via magnetic iron oxide nanoparticles mild fluid hyperthermia (MFH) promote heat shock protein (HSP) induction involved in fibrogenesis, extracellular matrix (ECM) production and transforming growth factor-ß1 (TGF-ß1) activation, which is essential to fibrosis. Additionally, miRNA molecules, the key players in the wound repair and regeneration processes, contribute to promotion of the wound healing process via expression modulation of particular genes. The proposed innovative nanocomposite smart nanohydrogel provides revolutionized wound healing therapeutic strategy particularly for diabetic or long stay recovered patients. No evidence has been reported so far about the use of mild hyperthermia and miRNAs in promotion of skin repair and regeneration. Moreover, the coupling of different techniques to wound healing, could pave the way to novel industrial opportunities and lead to the realization of patient-oriented devices, aimed at improving the general health status of patients.

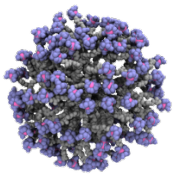
The role of the Department of Nanobiology represented by Monika Šramková is to perform the *in vitro* characterization of the prepared nanogels in order to assess the nanosafety of hydrogels.

The Comet assay as a human biomonitoring tool (hCOMET)
COST ACTION - CA15132 (04/2016-03/2020)

The main aim of hCOMET COST Action was to collect the results of individual human population studies creating a unified database of comet assay data relating to human health and disease, promoting the consolidation of a network of researchers actively involved in collecting comet assay data on DNA damage (and DNA repair) in human populations. National Representatives and Management Committee (MC) members were Monika Šramková, and Alena Gábelová from the BMC SAS. The outputs of the projects included publications, training materials and guidelines & recommendations.

In vitro 3-D total cell guidance and fitness (CellFit)
COST ACTION – CA16119 (03/2017-09/2021

CellFit sought to translate knowledge in cell control, cell repair and regeneration from the laboratory bench to clinical application. CellFit set out to refine our understanding of the "in vivo" microenvironment, reduce the differences when translating it "in vitro" and to create 3-dimensional (3D) total guidance ex vivo culture systems for the replacement of animal use. This was to be achieved by bringing together researchers and biotechnology companies from different European countries, who are currently working on various aspects of these models. Responsible persons on behalf of the BMC SAS were Monika Šramková and Andrea Bábelová, both members of the managing committee. Thanks to this COST action, several training schools, workshops, and short-term scientific missions were organized.



Cancer Nanomedicine - from the bench to the bedside (NANO2CLINIC)
COST ACTION – CA17140 (09/2018-09/2022)

COST Action CA17140 is the first, pan-European interdisciplinary network of representatives from academic institutions and small and medium enterprises including clinical research organizations (CROs) devoted to the development of nanosystems carrying anticancer drugs from their initial design, pre-clinical testing of efficacy, pharmacokinetics and toxicity to the preparation of detailed protocols needed for the first phase of their clinical studies. By promoting scientific exchanges, technological implementation and innovative solutions, the Action will provide a timely instrument to rationalize and focus research efforts at the EU level in dealing with the grand challenge of nanomedicine translation in cancer, one of the major and societal-burdening human pathologies. The BMC SAS is represented by Monika Šramková and Katarína Kozics from the Department of Nanobiology (both members of the managing committee) and their role is to actively participate on action events and establish new project partners for joint grant proposals.

Novel approaches to cancer diagnosis and targeting

Research in this topic has been performed by the Department of Molecular Oncology in cooperation with the Department of Nanobiology and the Department of Genetics of the Cancer Research Institute BMC SAS. The activities have been covered by the Twinning project and several ERA-NET and COST projects dedicated to research with great impact on transfer of knowledge and translation to clinic. The outputs of the related international activities were published in International Journal of Molecular Sciences., Cellular Signalling, Cancers, Biomedicine & Pharmacotherapy, BMC Cancer.

Strategies to strengthen scientific excellence and innoVation capaclty for early diagnoSIs of gastrOintestinal caNcers
H2020-WIDESPREAD-2018-857381 (10/2019-06/2023)

Despite progress in diagnosis and treatment, cancer is the second leading cause of death globally and cancers of the digestive system are particularly prevalent. Slovakia ranks third for the incidence of colorectal cancer and is the sixth highest in the incidence of pancreatic cancer. An early cancer diagnosis is key to improve patient outcomes, and quality of life, while in long term it can economize resources within healthcare systems. Strategic partnerships between Slovakia and European experts, allowing the

transfer of knowledge and research ideas, sharing of know-how, expertise, and best practices, together with the implementation of cutting-edge technologies, is expected to contribute to the enhancement of high-quality translational cancer research in Slovakia, with a focus on gastrointestinal cancers.
The VISION project is the only Twinning project in the area of biomedical research in Slovakia. It is coordinated by Alena Gábelová with the support of Božena Smolková (Scientific Manager) and colleagues from the BMC SAS Cancer Research Institute. The project activities accomplished so far have included various specialized courses for Ph.D. students and early-stage researchers (14), webinars (1), short-term stays of Ph.D. students in reputable institutes (8), invited lectures (8), Joint Summer School, preparation of various tutorial videos (8), leaflet, flyers and co-organizing the events Scientific Workshop Oncology and Young Oncologist Workshop/Award.

Innovative Nanopharmaceuticals: Targeting Breast Cancer Stem Cells by a Novel Combination of Epigenetic and Anticancer Drugs with Gene Therapy (INNOCENT)
ERA-NET-EURONANOMED-2017 (01/2017-06/2021)

The main objective of the INNOCENT project was to develop a novel nanoparticle-based therapeutic strategy to overcome low efficacy and frequent relapses in breast cancer treatment with particular emphasis on cancer stem cells. Using the multifunctional nanostructure, the partners investigated whether the co-encapsulation of multiple therapeutic agents along with gene therapy and inorganic nanocrystals into one nanostructure, was able to reduce the proportion of cancer stem cells and inhibit cancer cell growth. In vivo testing was used to determine whether encapsulating increased efficacy and specificity against cancer cells, especially cancer stem cells, preventing unwanted side effects.
Project coordinator: Božena Smolková. The team demonstrated that decitabine improves doxorubicin treatment efficacy and inhibits DNA methyltransferase 1. Molecular analysis of treated cells contributed to the understanding of mechanism underlying the effect of breast cancer combination treatment and its functional impact on transcriptome and methylome. Scientific findings achieved during the project implementation were published in 24 peer-reviewed papers (12 of which involve at least one co-author from BMC SAS), and 3 book chapters. Moreover, 1 dissertation and 4 diploma theses were completed within the scope of the project.

Establishing an algorithm for the early diagnosis and follow-up of patients with pancreatic neuroendocrine tumours (NExT)
ERA-NET TRANSCAN-2-2019 (09/2019-03/2023)

By building up a tissue bank of genetically characterized tumours, development of patient-derived xenografts (PDXs) and organoids, we aim to identify PNET-specific biomarkers urgently needed to design a NExT generation nanotechnology based microfluidic device and integrate the technology of minimally invasive liquid biopsy in the early detection of PNETs. Serum and tissue samples will be collected from PNET patients and their clinical and lab records will be recorded. In clinical samples an expression study and genomic analysis will be performed by different molecular techniques whereas, in parallel organoids, PDX and CTC-derived xenografts will be established. Based on the acquired data a NExT generation microfluidic device will be developed for PNET-detection and follow-up.
The role of the BMC SAS Cancer Research Institute represented by Božena Smolková who is WP2 leader. This WP focuses on the development of innovative *in vitro* and *in vivo* models. Up to now 3 peer review papers were published, two having the corresponding author from BMC SAS. Furthermore, five early-stage researcher exchanges were realized between partners, three students from BMC SAS visited partner's laboratories and one was trained at the Department of molecular oncology BMC SAS. Moreover, one Bachelor thesis, one Diploma thesis were completed and one Dissertation is ongoing at BMC SAS within the scope of the project.

Resistance under treatment in breast cancer (RESCUER)
ERA-NET-ERACoSysMed-2020 (08/2020-05/2024)

This project seeks to develop new approaches and identify mechanisms of treatment resistance at systems level, exploring how the effectiveness of specific targeted therapies applied in different clinical trials is affected by patient- and tumour-specific conditions. For this purpose, the project will gather and integrate longitudinal multidimensional data from ongoing clinical trials and newly generated -omics using systems approaches, which combine sub-cellular/cellular and/or organ level in silico models and network analysis to build computational frameworks able to discover molecular signatures of resistance and predict patient response to combinatorial therapies. We aim to identify the physiological characteristics of non-responders vs. responders from existing and newly generated multi-omic data and biological samples from in vivo and ex vivo clinical studies of specific subtypes of BC patients treated with combination therapy. This new knowledge will be used to investigate the curative potential of new personalized

drugs combinations. The overreaching goal is to develop computer "xenograft model" as a cost-efficient and better alternative in terms of ethics, availability to everyone, and animal use. The framework will include optimization algorithms to identify combinations of approved drugs with a high probability to work on individual or thin strata of patients.
The BMC SAS Cancer Research Institute is represented by Marína Cihová, whose main role is to develop PDX (patient-derived xenograft) models in immunodeficient mice and patient breast tumour tissue-derived organoids that will be used for testing of new therapeutic strategies based on the proposed mathematical models.

New diagnostic and therapeutic tools against multidrug resistant tumours (STRATAGEM)
COST ACTION - CA17104 (09/2018-09/2022)

STRATAGEM is the first multidisciplinary network of academic laboratories, research institutes, and small and medium enterprises (SMEs) with a wide range of high-level and non-overlapping expertise that aim to improve both the diagnosis and therapy of multidrug resistant (MDR) solid tumours. The scientific community currently only has limited knowledge about the biomarkers and therapeutic tools that can be used against MDR tumours; there are no predictive/diagnostic algorithms for MDR tumours *ex ante* and all previous therapies against MDR tumours have failed. The key challenge of STRATAGEM is to fill these gaps by producing a comprehensive, open and user-friendly platform of knowledge on MDR tumours, by identifying new diagnostic/predictive biomarkers, and producing new, safe compounds that can be used for the personalised treatment of MDR tumours. The BMC SAS is represented by Dana Jurkovičová the representative of Slovakia as COST Member Country and member of The Management Committee - the main decision body of a COST Action STARTAGEM. Within activities of the Action, she participated on identification of new biomarkers predictive/diagnostic of the MDR phenotype and new therapeutic targets in MDR tumours. Her participation on Action outputs is documented by co-authorship of publication Assaraf *et al*. 2019, classified as Highly Cited Publication. In addition, the Action enabled participation of the BMC SAS young investigators on Training schools and gaining new contacts for the future collaborations of the BMC SAS researchers.

Innovative Partnership for Action Against Cancer (iPAAC)
Third Health Programme Joint Action-801520 (04/2018-12/2021)

The Innovative Partnership for Action Against Cancer Joint Action, funded under the Third Health Programme, brought together 44 partners from 24 European countries. It aimed to build upon the outcomes of previous EPAAC and CANCON Joint Actions.
The general objective of the iPAAC Joint Action (JA) was to develop innovative approaches to advances in cancer control, namely in development of cancer prevention, comprehensive approaches to the use of genomics in cancer control, cancer information and registries, improvements and challenges in cancer care, mapping of innovative cancer treatments and governance of integrated cancer control, including a new analysis of National Cancer Control Plans. The key focus of the Joint Action was on implementation, reflected in the key deliverable: the Roadmap on Implementation and Sustainability of Cancer Control Actions, which will support Member States in implementation of iPAAC and CANCON recommendations.
The role of the BMC SAS, represented by Silvia Pastoreková, Lucia Kučerová, Božena Smolková, Jana Jakubíková and Dana Jurkovičová was to act on behalf of Slovakia in selected iPAAC activities, and transfer the relevant information on best practices in cancer care from consortium to the Slovak authorities. The BMC SAS hosted the meeting of EU experts from European medical societies, patients' associations, cancer plan organisations and other relevant European healthcare stakeholders. A consensus process based on the results of different studies, discussion of research outcomes, and development and endorsement of draft statements resulted in 22 consensus recommendations, the Bratislava Statement (DOI: 10.1136/esmoopen-2020-001051). The statement argues that substantial improvements can be achieved in patient outcomes by centralising pancreatic cancer care around state-of-the-art reference centres, staffed by expert multidisciplinary teams capable of providing a high-quality care. In addition to the expected impact of the project on healthcare policy, it has enabled to gain or strengthen the contacts for the future collaborations of the BMC SAS researchers.

Clinical research of novel drug against alkaptonuria

The BMC SAS Institute of Clinical and Translational Research, represented by Andrea Zaťková and Richard Imrich participated in the large project consortium that brought first clinical evidence for the novel drug effective against alkaptonuria. The outputs of the project were published in Ann Rheum Dis., Lancet Diabetes Endocrinol, Eur J Hum Genet., BMC Medical Informatics and Decision Making, Comput Biol Med., The Application of Clinical Genetics, J Inherit Metab Dis etc.

Clinical Development of Nitisinone for Alkaptonuria (DEVELOPAKURE)
FP7-HEALTH-2012-304985 (01/2012-01/2019)

AKU, also known as Black Bone Disease, is caused by the genetic deficiency of the enzyme homogentisate 1,2-dioxygenase (HGD), leading to the accumulation of a substance called homogentisic acid (HGA). A black pigment formed from HGA is deposited in body tissues, particularly cartilage, leading to early onset, severe arthritis, heart disease and disability. The disease has unexpectedly high incidence in Slovakia. The DevelopAKUre project was established to improve the understanding of Alkaptonuria, especially in patients of younger age (AKU) and to develop an orphan designated drug nitisinone, an enzyme inhibitor that reduces the accumulation of HGA, for the treatment of patients with AKU. To this end a group of clinical and basic scientists in addition to clinical trial experts came together to carry out the clinical development of nitisinone for AKU. The programme involved a dose-response and efficacy studies which for the first time clearly identified that nisitosine could decrease HGA in AKU. The results provided bassis for the analysis of the application of the drug for marketing authorisation by EMA on October 2020. The project was complex and required co-operation of a large consortium of clinical centres and laboratories. The BMC SAS researcher Andrea Zaťková was involved in the genomic analysis of patients' DNA and in interpretation of data and Richard Imrich was a coordinator of the clinical trial center.

Research of metabolic aspects of chronic diseases and impact of nonpharmacological interventions

This topic has been the primary focus of research in Section of Integrative Physiology & Pathophysiology, Department of Metabolic Disorders, led by Jozef Ukropec and Center of Physical Activity Research, led by Barbara Ukropcova. Within the assessment period, the team has finalized two bilateral international research projects aimed at examining whole-body, cellular and molecular effects of regular exercise in patients with Parkinson disease (partnership with Taiwan, two consequent SAS-MOST projects) and in patients with Idiopathic Inflammatory Myopathy (partnership with Rheumathology institute in Prague, two consequent projects supported by the Agency for Medical Research of Czech Republic).
Members of the research team have also been active in standardisation and validation of the innovative protocols for respirometric measurements in human permeabilised muscle fibres and thrombocytes, as a part of the COST Action CA15203 MitoEAGLE. Direct translational component of this research is represented by their activities within COST Action CA19101, aimed at creating the toolbox for implementation of the physical activity promoting policies into society. Generated knowledge contributed to the creation of Guidelines for nonpharmacological prevention and treatment of patients with obesity, Parkinson disease and dementia (approved by the Ministry of Health SR in 2021 and 2022).

Skeletal muscle as a mediator of beneficial effects of regular exercise on cognitive functions and metabolism in patients with Alzheimer disease: the role of muscle myokines and microRNAs.
SAS-NSC JRP 2013/17 (01/2014-12/2016)
Novel strategies aimed to improve the physical fitness, clinical symptoms and quality of life in the early-stage Parkinson disease patients: Regular exercise training and carnosine. (
SAS-MOST JRP 2018/10 (01/2019-12/2021)

The projects coordinated by Barbara Ukropcová and Jozef Ukropec were implemented through strong international and national collaborations with the 2nd Department of Neurology, University Hospital Bratislava, Faculty of Medicine, Comenius University in Bratislava, the Faculty of Physical Education and Sports (FPES), Comenius University, Bratislava, the High Field Magnetic Resonance Centre at the Medical University of Vienna as well as with the Institute of Physical Education, Health and Leisure Studies, National Cheng Kung University, Tainan, Taiwan, ROC. We conducted (i) aerobic-strength training intervention study in seniors with (prodromal or early stage of Alzheimer disease) or without (age and gender-matched healthy controls) cognitive deficit, (ii) pilot training intervention study in patients with early Parkinson disease (PD) as well as (iii) randomized, double-blind, placebo-controlled clinical trial in patients with early and moderately advanced PD (stage I-III according to the Hoehn-Yahr scale) and in healthy controls (ongoing). In the last intervention study, supervised aerobic-strength training was combined with carnosine supplementation (at a dose of 2 g / day) or placebo. The training is performed at the FPES and in our newly established Center for Physical Activity Research (CPA), founded in 2017 at the BMC SAV. We observed the improvement of metabolism and patients' clinical state as well as changes in skeletal muscle phenotypes following the intervention. Furthemore, after completing the short-term study, many patients took the opportunity to participate in a long-term training program and follow up at CPA BMC SAS. In the frame of the projects, we created BioBank of skeletal muscle, human primary skeletal muscle cell cultures, plasma, serum and cerebrospinal fluid samples. We introduced an *in vitro* electrical pulse stimulation methodology (Ionoptix), which represents a model of muscle contraction

/ in vitro exercise. The model of muscle cell cultures allows us to examine the epi/genetic mechanisms, energy metabolism and secretory capacity of muscle cells in vitro and to look at their changes in relation to disease or exercise in individuals with different clinical phenotypes. Skeletal muscle, serum, plasma, cerebrospinal fluid have been used to identify specific molecular patterns that may be involved in mediating the positive effects of exercise on brain plasticity. Results were published in several papers (Krumpolec et al, Front Neurol, 2017, Maderova et al, Neuropeptides, 2019, Schon et al, Sci Rep, 2019, Slobodova et al, Gerontology 2021).

Metabolic abnormalities of skeletal muscle in patients with idiopatic inflammatory myopathy
AZV-CR 16-33746A (1/2016-12/2019), NU 21-05-0322 (01/2021-12/2024)

This project has been implemented in collaboration with the Institute of Rheumatology in Prague (PI prof. Vencovsky). The aim of the experimental work performed at Biomedical Research Center SAS in Bratislava in the frame of this project was to assess the impact of idiopathic inflammatory myopathy (IIM) and the 6-month training intervention on (i) lipid metabolism, (ii) mitochondrial respiration parameters, and (iii) specific epigenetic mechanisms that are likely to be involved in metabolic imprinting and functional characteristics of skeletal muscle cells in primary cultures *in vitro* in association with the disease stage and with the exercise intervention-induced changes in physical fitness and muscle strength of the patients with IIM. The capacity of muscle cells to oxidize lipids was determined with the aid of radiolabelled saturated fatty acid ([^{14}C]-palmitate). This allowed us to measure level of complete ($^{14}CO_2$ production) and incomplete fatty acid oxidation (accumulation of intermediate oxidation metabolites soluble in acid (ASP-Acid Soluble Metabolites). The magnitude of de novo synthesis of triglycerides, diglycerides, phospholipids was determined by thin layer chromatography. Chronic and acute metabolic overload of muscle cells with 100 µM palmitate was used as a metabolic challenge. Results clearly showed the presence of metabolic dysfunction in muscle cells derived from patients with IIM, which is characterized by specific changes in lipid metabolism and mitochondrial parameters. A six-month training intervention attenuated a disease-associated effects, suggesting that regular exercise can – likely via specific epigenetic mechanisms – modulate muscle metabolic phenotype that may at least to some extent contribute to the improvement of clinical state in patients with IIM. Moreover, presence of inflammation, skeletal muscle atrophy and adaptive response to 6-month exercise training were associated with changes in the expression of muscle-specific microRNAs, which are important for skeletal muscle regeneration and hypertrophy. Results were published in several research papers (Nemec et al, J Physiol, 2021, Vernerová et al, Rheumatology, 2020, Kropáčková et al, Clin Exp Rheumatol, 2021, Leiferova et al, Clin Exp Rheumatol, 2022).

Mitochondrial mapping: Evolution – Age – Gender – Lifestyle – Environment (MitoEAGLE)
COST ACTION CA15203 (01/2017-02/2021)

The objective of the MitoEAGLE network is to improve our knowledge on mitochondrial function in health and disease related to Evolution, Age, Gender, Lifestyle and. Every study of mitochondrial (mt) function and disease is faced with EAGLE as the essential background conditions characterizing the individual patient, subject, study group, species, tissue or even cell line. To address the complex interrelationships of EAGLE with an initial focus on humans and rodent models, the network aimed to enhance the value of each individual study by starting to analyse and catalog data beyond the published record. Highlighting the topic of gender and mitochondrial function, unique new information emerged on human biology from the development of a European reference database. Protocols, technologies and standard procedures were compared and strategies defined for improvement of quality control. An inter-laboratory ring test was established as a world-wide innovation in the field of mitochondrial respiratory physiology. The expertise gained and new standards developed were integrated into a strategic dissemination and education programme for mitochondrial phenotyping, aiming at an expanding European and MitoGlobal EAGLE network where researchers collaborate on mapping mitochondrial physiology and medicine, complementary to established mtDNA databases. The BMC SAS was represented by Jozef Ukropec, Michal nemec and colleagues. BMC SAS contributed to standardisation and validation of the innovated protocols for respirometric measurements in human permeabilised muscle fibres and thrombocytes obtained from individuals of various ages both, before and after exercise intervention program. Results were published as a technological paper by (Gnaiger et al, 2020) and Gnaiger E. et al. MitoEAGLE Task Group* (including Nemec M). Mitochondrial physiology Bioenerg Commun 2020.1 https://doi:10.26124/bec:2020-0001.v1.

Determinants of Physical activities in settings (DE-PASS)
COST ACTION CA19101 (07/2020-04/2024)

DE-PASS consortium focuses on identifying, understanding and measuring the determinants which promote, maintain or inhibit Physical Activity Behaviours (PABs) across the lifespan and in different settings and translating this knowledge to assist policy-makers to achieve greater health impact. European and global society is now largely physically inactive. The health, economic and social benefits of a more active society are enormous. DE-PASS aims to illuminate why individuals and/or societies adopt a physically active or inactive lifestyle. To date enormous energy has been invested by researchers in answering this question, however, the knowledge gained and the impact achieved through this investment is fragmented, not readily translatable and rarely transcends the state of the art. DE-PASS expects to achieve the following: 1) Use a settings approach (home, school, work etc.) to bridge the knowledge and translation gap; 2) enact a multi-disciplinary, Pan-European, international network of established, young and Early Career Investigators (ECIs) and policy-makers; 3) exploit, consolidate and further integrate existing relevant expertise, evidence, resources and influence; 4) develop capacities and careers for ECIs; 5) provide a new European PABs conceptual framework, a best evidence statement and implementation guidelines for policy-makers; 6) define and standardise European measurement protocols; 7) establish a new, high functioning, open access European database of determinants of PABs with a cohort extension and 8) define an evidenced-based and aspirational Pan-European research harmonisation and implementation strategy. The BMC SAS was represented by Barbara Ukropcová, national delegate and MC member. Our role is to contribute with our own data on physical activity level in different populations, including seniors, patients with obesity, Parkinson disease and cancer survivors, and help to create the toolbox enabling implementation of the physical activity promoting policies. Our participation in the project contributed to the creation of the guidelines on exercise recommendations in the frame of complex lifestyle modification in patients with obesity, Parkinson disease and dementia (approved by the Ministry of Health SR in 2021 and 2022).

Additional international research activities supported by the ERA-NET, COST, EAIA and INTERREG projects

Multiple myeloma intra-clonal heterogeneity: evolution and implications of targeted therapy (IntraMMclo)
ERA-NET-TRANSCAN-2 (07/2016-07/2020)

The project was coordinated by Jana Jakubíková from the Department of Tumour Immunology, Cancer Research Institute BMC SAS.

Intra-clonal heterogeneity is likely to be the essential feature of clonal evolution, disease progression and relapse. Multiple myeloma (MM), incurable B cell malignancy characterized by clonal proliferation of malignant plasma cells in the bone marrow, represents prototypical disease model to study tumor heterogeneity due to high frequency of intra-clonal diversity within malignant clone. The overall objective of this project was to investigate evolution of intra-clonal heterogeneity during the development and progression of MM by combining cellular, molecular, and genetic approaches. We focused on the process of clonal evolution during the development of MM: from premalignant precursor conditions known as MGUS and smoldering MM without clinical manifestations of diseases but with present cytogenetic and/or gene-expression abnormalities to active disease stages. Moreover, defining the impact of chemotherapy and/or immunotherapy on intra-clonal selection, together with the role of the tumor microenvironment on clonal dynamics in MM patients on the level of genetic and cellular complexity, will provide the framework for development of novel personalized diagnostic criteria that will lead to more effective therapeutic strategies.

MEchanisms of Lymphocytes TRansmigration Across the Blood Brain Barrier (MELTRA-BBB)
ERA-NET NEURON II-2015 (06/2015-05/2018)

The mission of MELTRA-BBB was to investigate the early steps of CNS infiltration by immune cells, and understand what allows B and T cells to pass the BBB and initiate the inflammatory process. The consortium was composed of members working for many years in the field of multiple sclerosis and its mouse model experimental autoimmune encephalomyelitis with a rare combination of expertise in mouse genetics, the biology of endothelial cells, immunology, neuropathology and intravital imaging. The combination of studies in

experimental models and human disease brought the data of broad relevance for understanding inflammatory diseases of the CNS for design of better therapies for the patients suffering from these diseases.
The BMC SAS was represented by Adela Penesová (MC members) and the role of the BMC SAS team was to investigate nutritional intervention as an essential part of multiple sclerosis treartment. The results were published in Physiol Res.

UNveiling the MEchanism(s) underlying the switch to mania during antidepressant treatment: The role of glutamate (UNMET)

ERA-NET NEURON II (07/2019-01/2024)

The project has addressed in both animal and humans the neurobiological mechanisms underlying antidepressant-induced mania, focusing on the role played by glutamatergic transmission in the prefrontal cortex-striatum-lateral habenula pathway, taking advantage of the availability of two animal models, the serotonin transporter knockout (KO) and the dopamine transporter KO rats. The main hypothesis is that serotonin and dopamine modulate the glutamate system thus altering the top-down control exerted by prefrontal cortex over the striatum and lateral habenula contributing to mania. The consortium has, by integrating molecular, electrophysiological and neurochemical approaches in rats together with neuroimaging techniques in rats and humans, provided a proof-of-principle of the glutamatergic mechanisms underlying mania and test an antidepressant adjunctive preventing mania. The BMC SAS is represented by Daniela Ježová and the role of the team is to conduct in-vivo electrorecordings to assess how stimulation of the prefrontal cortex affects habenula neuronal firing directly. The team has so studied whether stress, which increases glutamate levels, facilitates the switch to mania during antidepressant treatment.

Metabolic therapy of heart failure: which role for B vitamins (HF-MetaB)

ERA-NET ERA-CVD (04/2020-03/2023)

Heart failure (HF) is a major cause of death worldwide. Profound modulations of energy metabolism are involved in the development of HF, such as a drop in the cardiac levels of energy carrier compounds (ATP, Phosphocreatine (PCr)) and nicotinamide adenine dinucleotide (NAD+), a major coenzyme in energy generation. In a previous mouse model of cardiac pressure overload, we were able to show the protective effect of diet supplementation of two vitamins, B12 and B9, stimulating the mitochondrial biogenesis pathways, or with nicotinamide riboside (NR), a recently characterized vitamin B3 which is a NAD+ precursor. Inasmuch as these treatments were given before the appearance of the first symptoms of HF in previous studies, the project aim is to test the curative effect of a cocktail of these 3 B vitamins in symptomatic HF in mice. In a translational perspective toward clinics, it will also assess the impact of this vitamins cocktail in the context of standard medical HF care (β-blocker, ACE inhibitor). Finally, it is critically important to consider the sex differences in treatment of HF. Therefore the project second aim is to compare the effect of the treatment between males and females that may differ according to the mitochondrial alterations in HF. The BMC SAS is represented by Alexandra Zahradníková from the Department of Cell Cardiology and the role of the team is to elucidate the relationship between AMPK kinase and mitochondrial function of the cardiomyocytes and understand its possible implication for clinical use of AMPK activators in treatment of hear failure.

Sustainable production of high-quality cherries for the European market

COST ACTION FA1104 (04/2013-04/2016)

The Action aimed at creating a dynamic network of scientists and other professionals conducting research to improve sweet or sour cherry production in Europe, the main cherry producer. Cherries are highly appreciated fruits for their taste and nutritional properties. Their production is economically important for many fruit growers in almost every European region but there is a need for coordinated research. Therefore, this network addressed all research aspects related to cherry production, commercialisation, and consumption and involved scientists working in the fields of plant breeding, genetics, genomics, agronomy, physiology, phytopathology, entomology, microbiology, post-harvest technology, and socio-economics. A special emphasis was placed on key EU priorities such as the promotion of sustainable agriculture and adaptation to climate change. The deliverables were the exchange of data between research teams, the adoption of common experimental protocols, the implementation of predictive models in the fields of epidemiology and tree phenology, and the establishment of coordinated European marker-assisted selection strategies, including multi-location field trials. The BMC SAS was represented by Miroslav Glasa, national delegate and MC member. His group investigated intra-host cherry virus heterogeneity in cherry trees in Slovakia. The outputs of the project were published in J Plant Pathology (2017).

Application of next generation sequencing for the study and diagnosis of plant viral diseases in agriculture

COST ACTION FA1407 (03/2015-03/2019)

The objective of the Action was to coordinate and raise the European capacity to apply Next Generation Sequencing (NGS) technologies for the study and diagnosis of viral diseases in crop plants. Such a highly timely Action was needed because viral diseases are currently a major economic problem in agriculture throughout the world. The increasing importance of vegetative propagation in plant production and the intensified global plant trade are further increasing the risk posed by viral diseases in European agriculture, including new and emerging pathogens. NGS enables rapid and reliable holistic virus identification (indexing), which is needed for the development of innovative, knowledge-based solutions for plant production. By bringing together a multidisciplinary and multi-actor consortium, the proposed action ensured cost-effective research and built up a strong Pan-European knowledge-base network for better control of established, emerging and exotic viral plant diseases. The action delivered new scientific knowledge about viral plant diseases that are currently poorly understood, and contributed to the development of more effective surveillance of stock material health and to the improvement of quarantine procedures. The action thus implemented the EU strategy of integrated pest management and protection against harmful plant pathogens and contributed to the securement of food production. The BMC SAS was represented by Miroslav Glasa, national delegate and MC member. The outputs of the project were published in Frontiers in Microbiology and Viruses.

Aldosterone and Mineralocorticoid Receptor (ADMIRE)

COST ACTION BM1301 (03/2015-03/2019)

The aim of the project was to create an integrated network of excellence and build research capacity through collaboration and knowledge-sharing between experts in multi-disciplinary fields related to aldosterone/mineralocorticoid receptor (MR) research for the understanding of the physiopathology of the hormone aldosterone and its receptor MR, the genetics of aldosterone/MR related diseases; the identification of novel clinical indications of MR antagonists; the development of novel diagnostic tools for selecting patients for personalised MR antagonist treatment; and the discovery of novel therapeutic targets related to aldosterone/MR involvement in diseases. The BMC SAS was represented by Daniela Ježová and the role of the team was to facilitate the translation of animal findings into clinical research. We have developed methodology for measurement of salivary aldosterone and obtained first data on a relationship between the salivary aldosterone and the treatment outcome in patients with depression. As one of the outputs of the project, Open Access Intech ADMIRE book presented the latest reviews of all project partners was published.

Aedes Invasive Mosquitoes (AIM)

COST ACTION CA17108 (01/2020-03/2023)

The Aedes Invasive Mosquito (AIM) COST Action aimed to establish a transboundary network of partners and institutions across Europe to cost effectively address the management of the risk of introduction and spread of Exotic Invasive Aedes Mosquito Borne Viruses such as dengue, yellow fever, chikungunya, Japanese encephalitis, and zika. The AIM Cost action focused to bring multidisciplinary research, cost-effective conventional/innovative methods, strong linkage between academics, public health (PH) professionals and policy-makers at the national and international level, as well as more a integrated private sector and a better informed and a more aware society. These activities require an effective transboundary network of partners integrating all these stakeholder groups in Europe and beyond to identify and fill knowledge gaps, enhance research effectiveness, standardise, optimise and promote new country-taylored surveillance and control procedures, and improve dissemination. The BMC SAS was represented by Viktória Čabanová as the management committee member. Thanks to collaboration on AIM Cost, an invasive species *Aedes japonicus japonicus* was recorded for the first time in Slovakia. Afterwards, the Slovak stakeholders were aware of the risk connected by introduction of invasive species to the country and we collaborate on establishment of national control programme of invasive species.

Molecular Markers for Biological Dosimetry in Radiation Oncology, Cancer Risk, Assesment and Optimizing Cancer Therapy

International Atomic Energy Agency IAEA-CRP-E35010 (09/2017-07/2023)

The project is a part of the IAEA Coordinated Research Project (CRP) E35010 „Applications of Biological Dosimetry Methods in Radiation Oncology, Nuclear Medicine, and Diagnostic and Interventional Radiology

(MEDBIODOSE)". This CRP project brings together institutions from 28 countries over the world to progress toward the common goal of improving the quality of health care using radiation technologies. The aim of this CRP is to sustain and enhance the scope of biodosimetry services to radiation oncology, nuclear medicine, diagnostic and interventional radiology and develop new approaches to assist with the transition to personalized medicine. The BMC SAS is represented by Igor Beliaev/Belyaev from the Department of Radiobiology. The role of the BMC SAS team is to collect biodosimetry data on radiologists chronically exposed to low dose radiation for medical purposes, to develop molecular biological markers for assessment of radiosensitivity of human cells and cancer patients, and to test a novel method of detection and quantification of SARS-CoV2 viral infection in human cells and tissues with RNA-FISH (Fluorescence In Situ Hybridization) technique and biodosimetric platform. The results were published in several publications.

Scientific Capacity Building in Biomedical Research Through Scientific Exchange and Co-Development of Research Services (CAPSID)
ERDF INTERREG V-A SK-AT NFP305010V235 (07/2018-12/2021)
Priority axes P1 - Contributing to the smart cross-border region

With the successful completion of the EU-funded CAPSID project, the foundation for closer collaboration among biomedical research centers in the Slovak-Austrian border region has been laid over the past three years, despite constraints due to the coronal pandemic. Specifically, the VBCF in Vienna and the BMC SAV in Bratislava represented by Ivana Nemcčovičová had joined forces with 12 project partners to enhance scientific collaboration in the region and the international visibility of the cross-border virological and biomedical research community.
Periodical seminars devoted to cutting-edge biomedical research raised attention of actively participating young scientists and students. Bringing together the renowned scientists all over the world has become an important part of SK-AT scientific biomedical community, an inspiring place for discussions, and thus CAPSID seminars became Thursday's tradition in our cross-bordes region.
A joint expert conference on virology research in Bratislava in February 2019 brought together international scientists from all disciplines of virology research. The conference raised international awareness of cutting-edge virology research in the border region and enabled participants to exchange scientific ideas and establish new collaborations. The next event, the protein production workshop brought young scientist and student together again in 2020 with a success, while raised awareness of potential services being available for scientific community in our SK-AT cross-border region.
A state-of-the-art scientific virology database provides information and protocols for viral protein production. The platform has been made available free of charge to universities, research institutes, biotech companies and start-ups for research activities in a first open access phase starting at the end of 2020. All interested parties are encouraged to use the protocols of the database for their research, which can be accessed on the project website (https://capsid.vbcf.ac.at/wiki/). Improvements and extensions of the existing protocols can be entered via the comment function.
On the occasion of the successful completion of the CAPSID project, the VBCF and the BMC SAV signed a final declaration. In it, both project partners committed, through joint seminars, research exchanges and work, and coordinated third-party funding proposals, to establish a sustainable cooperation in the cross-border region beyond the project duration.

Danube meets omics (DANOMICS)
DS-2016-0052 (01/2017-12/2018)

The identification of new biomarkers is vital to the development of personalised medicine. Omics platforms are designed to power discovery across multiple levels of biology. This technology provides holistic views of the biological system. The project Danube meets omics (DANOMICS) was designed to solve the problems related to the low level of cooperation between the scientific institutions in the Danube region, to facilitate the information exchange and to increase the application of omics approach in the research. Scientific institutions from Austria, Slovakia, Serbia and Czech Republic created an open laboratory concept and organized a series of training courses from various omics approaches for young researchers. The partners in this project also have designed the online platform to better exploit the existing research infrastructure for common research projects. The BMC SAS was represented by Ľudovít Škultéty and results of the project were published in J Cell Mol Med and Acta Physiol Plantarum.

Q fever biomarker discovery using innovative immunoproteomic and metabolomic approaches

IVF-21610493 (01/2016-08/2018)

The project of the International Visegrad was aimed to initiate collaboration of V4 research teams with the purpose to discover clinically relevant molecules of *C. burnetii*, the causative agent of Q fever, using innovative immunoproteomic and metabolomic approaches. During the implementation of the project, hundreds of animals were tested. The obtained positive sera were employed for discovery of 130 immunoreactive proteins using biofunctionalized magnetic microsphere and advanced mass spectrometry detection technologies developed by Flores Ramirez et al.. Furthermore, the 169 previously described specific antigens/biomarkers were evaluated. Among them, 20 immunodominant proteins of *C. burnetii* were identified. Various, mainly serological or molecular biology methods are currently used for diagnosis of the disease, but in numerous cases, they lead to ambiguous results. Thus, the development of an alternative analytical approach for an accurate identification of the bacterium is essential. For a more complex understanding of pathological processes at the cellular and molecular levels, the importance of multimodal approach was shown. These methodological approaches indicate the emerging analytical portfolio which soon can also be applied in *Coxiella* research and diagnosis. The BMC SAS was represented by PI Ľudovít Škultéry, the results of the project were published in 9 papers in J Chromatography and Acta Virol.

Major international research activities not covered by international projects during the evaluation period

Below described research activities have been largely built on long-lasting collaborations growing (1) from the past international project activities, (2) from individual relationships of key researchers developed through common research interests, (3) from personal trust based on experience during research stays of our scientists abroad, or (4) from contacts formed through the participation in international scientific societies. Although these activities did not receive direct financial support through international project in the evaluation period, they continue to evolve and generate excellent outputs and have potential to get funding in the future.

Identification of novel molecular mechanisms driving thermogenic activity of brown adipose tissue

This research topic was investigated as part of an ongoing collaboration between the Department of Metabolic Disease Research, Institute of Experimental Endocrinology, and the Department of Health Sciences and Technology, ETH Zurich, Switzerland. We were the first to characterize human brown adipose tissue at the level of proteome and transcriptome, both at whole tissue and single cell resolution. Brown adipose tissue research attracted our attention as its activation is considered one of the most promising strategies to fight obesity and the associated metabolic disease. Active brown adipose tissue acts as a sink for calories thereby protecting muscle, liver and pancreas from ectopic fat deposition and lipotoxicity. Even though physiologically relevant amount of brown fat is present in almost all healthy adults, it is mostly inactive as we live in thermoneutral conditions and do not utilize its original function - thermogenesis. By performing an in-depth proteomic and transcriptomic analysis of human brown and white adipose tissue samples collected from patients undergoing thyroid surgery, we identified 98 brown and 21 white adipocyte marker genes. We utilized this list of 119 marker genes to develop a machine learning-based cell deconvolution algorithm, which can very precisely and reliably quantify brown adipocyte content in complex tissue biopsies (Perdikari, Leparc and Balaz et al, Cell Reports, 2018). Based on this algorithm, we generated an online tool, which we termed BATLAS, and which is widely used by the scientific community. By uncovering transcriptional and proteomic differences between brown and white adipose tissue, we identified hundreds of interesting candidates, which might be responsible for the functional and morphological differences between these two tissues. We have shown the importance of Bone morphogenic protein 4 (BMP4) in regulation of brown adipocyte formation (Modica et al, Cell Reports, 2016) and the essential role of Glycerol kinase (GYK) in the control of mature brown adipocyte thermogenic function (Lasar et al, Cell Reports, 2018). Moreover, we uncovered GPR180 receptor and its ligand CTHRC1 as new components of TGFβ signaling pathway which play an important role in the control of thermogenesis (Balazova et al, Nature Communications, 2021). Additionally, we have shown that mevalonate pathway, which produces cholesterol and isoprenoids in our body, is essential for activation of brown adipose tissue both in mouse and man (Balaz et al, Cell Metabolism, 2019). By utilising single-cell transcriptomic analysis, we could not only reveal the cellular composition of brown adipose tissue, but we also identified a completely new brown adipocyte subpopulation, which controls metabolic activity and heat production in the tissue by local production of acetate (Sun et al, Nature, 2020). All these findings are important for identification of new therapeutic strategies for treatment of obesity and associated metabolic disease.

Hypoxia and acidosis in tumor microenvironment

Hypoxia and acidosis are important hallmarks of tumor development. One of the key molecules in the adaptation of tumor cells to these physiological stresses is carbonic anhydrase IX that has been identified and studied in the Department of Tumor Biology, Institute of Virology BMC SAS. Original findings related to CA IX were made in the past also thanks to international collaboration with many world-renowned partners from the University of Oxford, Karolinska Institutet, University of Nice etc. developed within EU consortia of the large-scale projects EUROXY (FP6) and METOXIA (FP7) and a COST project-based HypoxiaNet network. More recently, the international activities of the Department have been built in the frame of the International Society of Cancer Metabolism (ISCAM). These activities have been mainly focused on the role of CA IX in cancer metabolism and resulted in a number of collaborative papers with the collegues from the Free University of Brussels, Ohio University, University of Copenhagen and University of Florida. In addition, they facilitated exchanges of knowledge and scientific material as well as short-term visits of young researches and students in the collaborating laboratories thereby creating opprotunities for new joint projects planned for the near future.

Virus tricks-inspired biotherapeutics

The main research activities of the Department of Viral Immunology, headed by PI Ivana Nemčovičová are devoted to development of bioimmunotherapeutics inspired by viral tricks. The project itself has the basis in PI's previous postdoctoral work at the prominent La Jolla Institute (TOP five - worldwide rank based in scientific impact in the field of immunology) and therefore is the logical continuation of our joint collaborative initiative also with other related US and EU institutions. We jointly work on immunotherapy that set out in novel direction – by tricking the body's own defenses inspired by viral tricks into fighting the enemy within. Our input simply resides in studying viral infections, because the viruses always find natural ways – the 'tricks' – of turning OFF immune responses so they can avoid being recognized and attacked. It has been difficult to design a molecule that turns a checkpoint receptor ON, so we sidestep that hurdle by taking inspiration from biology. Our main goal is therefore to look at the proteins that viruses use to turn down the immune system to figure out how to develop a new biotherapeutic drug to treat both viral and autoimmune diseases. The initiative is well-documented by several joint publications that raised from collaborative work with La Jolla Institute (USA), Sanford Burnham Prebys Institute (USA), and Institute of Biochemistry, BOKU (AT) as well as our joint cross-border activities (conferences and seminars) with Vienna Biocenter (AT) and University of Vienna (AT).
The personal interest and willingness of our collaborators in this growing joint scientific initiative advances our studies and bringing the excellence to this yet uncovered research field of viral immunology.

Long-term sulfonylurea-treatment in patients with neonatal diabetes

Department of Metabolic Disorders (D. Gasperikova and J. Stanik), Institute of Experimental Endocrinology collaborates with Institute of Biomedical and Clinical Science, University of Exeter Medical School, Exeter, UK (prof. A. Hattersley) on the subject „Long-term Follow-up of Glycemic and Neurological Outcomes in an International Series of Patients With Sulfonylurea-Treated ABCC8 Permanent Neonatal Diabetes" (Bowman et al. Diabetes Care 2021 Jan;44(1):35-42 an on „Effectiveness and safety of long-term treatment with sulfonylureas in patients with neonatal diabetes due to KCNJ11 mutations: an international cohort study". (Bowman P et al. Lancet Diabetes Endocrinol. 2018 Aug;6(8):637-646.).

International activities related to science policy, research governance and institutional culture

H2020-SC1-HCO-2017-779303 (01/2018-12/2019)
Life Science Alliance: Closing Research and Innovation Divide in the EU
H2020-SC1-HCO-2020-964997 (05/2021-04/2024)
Alliance for Life Sciences: From Strategies to Actions in Central and Eastern Europe

The BMC SAS is a founding member of the Alliance4Life consortium, which is a bottom-up initiative of twelve leading life science institutions from eleven EU-13 countries that aims at closing the divide in European health research and innovation. Members of the Alliance are **progressive research institutions** that have the necessary strength to **stimulate institutional change**.
Large-scale ESIF investments into the life science infrastructure alone could not close the R&I gap in Europe so far, as financial support needs to be complemented by **measures on research and innovation strategy at institutional and national levels**. Institutions gathered in this Alliance believe that improving governance and managerial practices as well as **transforming institutional culture** will enhance efficiency and increase return on investment.

Alliance members joined forces to share good practices in 2017 and successfully implemented their first Horizon2020 action during 2018-2019. Public outcomes of this project included Statement on the Future of ERA, Statement on Horizon Europe, WIDENING Position Paper, White paper on key factors for closing the R&I gap in Europe, and Inventory of Best Practice.
Currently the Alliance4Life implements its second project that focuses on raising the institutional profiles of Alliance4Life´s members to attract and retain international talents and to provide the right operational framework conditions including **improved research management**. Moreover, the goal is to help overcoming traditional national conditions inherited from the communist era that were neglected during the political transformation in the CEE region. Alliance4Life intends to become a **role model** for institutions in less performing regions and to serve as a **hub of excellence** through close collaboration with renowned European networks established in high performing countries. The alliance contributes also to **science policy and to shaping priorities at national and EU levels**, especially with insight suggestions on how to increase participation in the Framework Programme, by providing recommendations and feedback on **the new ERA and WIDENING** programme.
The BMC SAS representation in the current project includes members of the institutional managing board Silvia Pastoreková, Daniela Gašperíková, Juraj Kopáček, Miroslav Vlček, head of the scientific board Boris Klempa, scientific secretary Marian Grman, project manager Tatiana Šípošová, PR manager Zuzana Vetrecin Čeplíková, and member of legal unit Dávid Melichar.
The role of the BMC SAS is to actively participate in activities of all Focus groups dedicated to different aspects of institutional research and management practice and to stimulate cooperation with the partner institutions. The BMC SAS is also responsible for leading the WP1: Research Culture, to which the main contribution was recently made through elaboration of the important deliverable D1.2: Self-assessment Report, a comprehensive self-assessment study of the current research and innovation performance of its members, as well as of the progress in the implementation of their research management strategies. The report is publicly available at: https://alliance4life.ceitec.cz/public-version-of-self-assessment-report/.

Map of the BMC SAS partners involved in active collaboration within international projects.

2.3.2. List of international conferences (co)organised by the institute

2016

Title: The 7th DNA Repair Workshop
Held in: Smolenice Congress Centre SAS
Date: May 22-26, 2016
Number of participants: 42
Role: Main organizer
The conference is organised in 4-years' intervals to bring together research community engaged in DNA repair. Conference hosted renowned experts in the field. In addition to being main organizers, BMC SAS researchers also contribute to the scientific program.
http://www.exon.sk/smolenice2016/

2017

Title: 8th International Symposium of Experimental and Clinical Neurobiology
Held in: Košice
Date: June 18-21, 2017
Number of participants: 100
Role: Main organizer
The symposium was attended by experts from 11 countries (Belgium, Czechia, Hungary, Poland, Slovakia, Slovenia, Spain, Italy, Ukraine, USA, Great Britain, etc). The main topics of the symposium included research on the nervous system and various forms of stroke, mechanical damage (injuries, spinal cord injury, paraplegia, etc.) or neurodegenerative diseases (Alzheimer's disease, Huntington's disease, ALS, etc.). The symposium is one of the most important events in the field of neuroscience in Slovakia. It is a platform not only for the presentation of the latest results of science and research in the field of neuroscience, but also for personal meetings of researchers working on similar issues, as well as motivating and inspiring meetings of young researchers with the greats of European and world science. The keynote speakers were Professor James Fawcett of the University of Cambridge (UK) and Professor Martin Maršala of the University of California, San Diego (USA). The invitation was also accepted by prof. Carlos Matute from Spain, prof. Charles Nicaise from Belgium, prof. Jan Motlík and prof. Jaroslav Pokorný from Bohemia, prof. Nana Voitenko from Ukraine and others. The event was sponsored by the Košice self-governing region and the City of Košice.

Title: FEBS Workshop, Nucleotide excision repair and crosslink repair – from molecules to mankind
Held in: Smolenice Congress Centre SAS
Date: May 7-11, 2017
Number of participants: 64
Role: Main organizer
This forum allowed scientists in the local region to meet and engage with EU and US scientists driving the field.
http://www.exon.sk/smolenice2017/committee.html

Title: Q fever biomarker discovery using innovative immunoproteomic and metabolomic approaches
Held in: The main hall of the Institute of Virology, Biomedical Research Center, Dubravska c.9, Bratislava, Slovakia
Date: May 18-19, 2017
Number of participants: 44
Role: Main organizer
Meeting of the researchers involved in the project supported by the Visegrad Funds and representatives from the regional public health authorities. Experts from the V4 countries as well as from Austria and Germany discussed the current knowledge on this re-emerging pathogen in Europe. The workshop has ended with roundtable discussion. During the meetings, a booklet "Q fever: Disease Prevention and Control Guidelines" was disseminated to the participants. Topics of the booklet include (i) basic information about Q fever, (ii) spreading of the disease, (iii) symptoms, (iv) testing, (v) recommended treatment, (vi) epidemiological status, and (vii) prevention strategies.
http://www.virology.sav.sk/rickettsiology/visegrad/home

Title: Genetic toxicology and cancer prevention
Held in: Smolenice Congress Centre SAS
Date: June 12-15, 2017
Number of participants: 51
Role: Co-organizer

The 40th working days of the Czech and Slovak Society of Environmental Mutagenesis and the Czechoslovak Biological Society were organized by the Cancer Research Institute BMC SAS and the Cancer Research Foundation. The conference was attended by 31 participants from the Slovak Republic and 20 participants from abroad, including 3 invited speakers from Norway and UK.
http://www.icsbs.cz

Title: **6th CECON (Central European Congress on Obesity and 15th Slovak Congress of Obesity)**
Held in: Bratislava
Date: October 5-7, 2017
Number of participants: 211
Role: Co-organizer
The main topics of the congress were: physical activity in the prevention and treatment of obesity, type 2 diabetes and other comorbidities; bariatric surgery; childhood obesity; adipose tissue as a metabolically and thermogenically important organ; obesity genetics; nutrition in obesity and recent trends in obesity pharmacotherapy. The congress was attended by 211 experts from 25 countries, 20 top experts gave plenary lectures on key topics and 134 abstracts were presented in either E-poster (112) or panel (26) presentations, BMC SAS was the official co-organizer and the partner of the congress.
https://www.cecon2017.org

Title: **Current biomedicine: from basic research to clinical application**
Held in: Smolenice Congress Centre SAS
Date: October 23-26, 2017
Number of participants: 71
Role: Main organizer
The conference was attended by domestic and foreign experts in the field of molecular biology, oncology, endocrinology, virology, medicine and genetics. The event covered a wide range of life sciences topics in order to provide the professional public with an overview of the latest knowledge on the causes, treatment and prevention of infectious and non-infectious chronic diseases, such as cardiovascular, oncological, chronic respiratory and metabolic diseases.

2018

Title: **The 5th Labuda days**
Held in: Smolenice Congress Centre SAS
Date: September 12-14, 2018
Number of participants: 60
Role: Main organizer
The conference was organized in honour of the distinguished Slovak virologist and zoologist Milan Labuda and was aimed at vectors and vector-transmitted pathogens.

Title: **5th Annual Meeting of the International Society of Cancer Metabolism: Metabolic adaptations and targets in cancer**
Held in: Bratislava
Date: October 23-26, 2017
Number of participants: 80
Role: Main organizer
The meeting was focused on mechanistic, translational and clinical aspects of metabolism and pH control in cancer and on metabolic disorders contributing to cancer and opportunities of their intervention. The meeting brought together internationally renowned researchers and clinicians as well as young investigators and communicated the most recent advances in the field of cancer metabolism from the multidisciplinary perspective.
https://iscam.net/iscam2018-5th-annual-meeting-metabolic-adaptations-and-targets-in-cancer-bratislava/
https://www.frontiersin.org/articles/10.3389/fonc.2019.01332/full

2019

Title: **Joint Czechoslovak Virology Conference and 1st SK-AT Structural Virology Meeting 2019**
Held in: SAS Campus, Bratislava
Date: February 13-15, 2019
Number of participants: 131
Role: Main organizer
Meeting topics: Virus ecology, evolution, epidemiology, plant virology, clinical virology, antiviral compounds, virus-host interactions, antiviral immunity, molecular and structural virology, biochemistry of viral proteins, and

many more. Supported by the project CAPSID co-financed by the European Regional Development Fund. https://www.cssm.info/sites/default/files/csvc2019_-_flyer.pdf

Title: CAPSID Workshop – An Introduction to Recombinant Protein Production, Purification, and Quality Assessment
Held in: VBCF Campus, Vienna
Date: December 03-04, 2019
Number of participants: 78
Role: joint organization of BMC and VBCF
Workshop topics: This workshop provides a basic introduction into recombinant protein production in eukaryotic expression systems, protein purification, including protein complexes, secreted proteins and viruses and also discusses important aspects of protein quality assessment. The workshop is intended for Masters' and PhD students, postdocs and other researchers in the Vienna-Bratislava cross-border region.
Supported by the project CAPSID co-financed by the European Regional Development Fund.
http://www.biomedcentrum.sav.sk/workshop-an-introduction-to-recombinant-protein-production-purification-and-quality-assessment/?lang=en

Title: Endocrine disruptors
Held in: Bratislava
Date: May 29, 2019
Number of participants: 75
Role: Joint organization of the Ministry of Agriculture and Rural Development of the Slovak Republic and BMC SAS
The conference was the third continuation of international meetings on the topic of endocrine disrupting chemicals organized by the Ministry of Agriculture and Rural Development of the Slovak Republic and BMC SAS

Title: Genetic toxicology and prevention of cancer
Held in: Smolenice Congress Centre SAS
Date: June 10-13, 2019
Number of participants: 55
Role: Main organizer

Title: 12th Symposium on catecholamines and other neurotransmitters in stress
Held in: Smolenice Congress Centre SAS
Date: June 15-19, 2019
Number of participants: 75
Role: Main organizer
The symposium was a continuation of the strong tradition of international Smolenice meetings. The historical topics of the past meetings, such as catecholamines, other neurotransmitters and neuroendocrine factors were not forgotten, but the program was shifted toward the evaluation of pathophysiological mechanisms of stress-related disease states. The symposium had nine oral sessions and five of them were directly devoted to stress-related pathologies, namely to Stress, Catecholamines and Cardiovascular Diseases; Stress and Cancer; Stress and Mental Health; Catecholamines and Cognitive Impairment; Stress and Metabolic Diseases. As highlighted by the speaker of the Introductory Kvetnansky Lecture, James P. Herman, and other international experts, the symposium series on Catecholamines and Other Neurotransmitters in Stress continues to provide for high-level high scientific, educational and social interaction for its participants, from students to senior reseachers. https://www.tandfonline.com/doi/full/10.1080/10253890.2020.1853400

Title: Meeting of iPAAC WP8 Challenges in cancer care
Held in: Bratislava, BMC SAS
Date: September 16-17, 2019
Number of participants: 30
Role: Main organizer
International meeting of the working group of the European project "Innovative Partnership for Action against Cancer" was focused on the issue of care for patients with pancreatic cancer, which belongs to the so-called "neglected" late-onset cancers with a high mortality rate and the shortest survival time of all cancers. The meeting was attended by representatives of Spain, France, Italy, Germany, Belgium and Slovakia, who are involved in the implementation of national cancer programs and cancer care organizations, as well as leading representatives of major European and global patient organizations. Main output of the meeting was formulated in the Bratislava Statement: consensus recommendations for improving pancreatic cancer care: https://pubmed.ncbi.nlm.nih.gov/33188052/

2020

Title: The first informal meeting on biomarkers of infectious, oncological and neurodegenerative diseases
Held in: Hotel Academia, Stará Lesná, Slovakia
Date: September 1-3, 2020
Number of participants: 19
Role: Main organizer
The meeting was focused on diagnostic and prognostic biomarkers of Rickettsia species and Coxiella burnetii as well as oncological and neurodegenerative diseases. The meeting brought together internationally renowned researchers as well as young investigators and communicated the most recent advances in the field from the multidisciplinary perspective. The invitation to this meeting was accepted by important experts from the Czech Republic and Sweden.

2021

Title: The 2nd Informal workshop on biomarkers of infectious and malignant diseases
Held in: Hotel Academia, Stará Lesná, Slovakia
Date: September 6-8, 2021
Number of participants: 20
Role: Main organizer
The meeting was focused **on biomarkers of infectious and malignant diseases**. The meeting brought together internationally renowned researchers as well as young investigators. They evaluated the potential of new diagnostic markers, and highlighted the benefits of omics methods, which are essential for comprehensive understanding of pathological processes at the cellular and molecular level. The invitation to this meeting was accepted by important experts from the Czech Republic.

2.3.3. List of edited proceedings from international scientific conferences

Genetic toxicology and cancer prevention: book of abstracts. Bratislava. GÁBELOVÁ, Alena - ŠRAMKOVÁ Monika: Cancer research institute, Biomedical research center, 2017. pp. 102. ISBN 978-80-972247-2-1

FEBS DNA REPAIR WORKSHOP: FEBS workshop Nucleotide excision repair and crosslink repair - from molecules to mankind: book of abstracts. GOFFA Eduard. Smolenice : Biomedical research center SAS - University of Oxford - University of Pittsburgh - University of Wuerzburg, 2017. pp. 102. ISBN 978-80-972247-3-8

8th International Symposium of Experimental and Clinical Neurobiology: Program and Abstract Book, Eds. GALIK Jan - SLOVINSKA Lucia - LUKACOVA Nadezda. Kosice: Institute of Neurobiology, Slovak Academy of Sciences, Jun 18.-21. 2017,pp.91, ISBN 978-80-972729-0-6

"V. Labuda´s days". Abstract book. Eds.: ŠPITÁLSKA, Eva – ŠPITALSKÝ, Zdenko - ŠTEFANIDESOVÁ Katarína – KAZIMÍROVÁ, Mária. Bratislava: Institute of Virology, Biomedical Research Center, Slovak Academy of Sciences, 2018. pp. 78. ISBN 978-80-972111-3-4

Metabolic adaptations and targets in cancer. 5th Annual Meeting of the International Society of Cancer metabolism. Book of abstracts. TAKÁČOVÁ, Martina - KAJANOVÁ, Ivana - PASTOREKOVÁ Silvia. October 17-20, 2018, Bratislava, pp. 150.

Endocrine Disruptors. BRTKO, Július. Program and Abstracts in Endocrine Regulations from the 3rd Bilateral Scientific Symposium. Vol. 53, Supplement 1, May 2019. ISSN 1210-0668.

Genetic toxicology and cancer prevention: Bilateral Czech and Slovak Workshop: book of abstracts. Editors: GÁBELOVÁ, Alena - ŠRAMKOVÁ Monika. Bratislava, Cancer Research Institute, Biomedical Research Center of the Slovak Academy of Sciences, 2019. pp. 89. ISBN 978-80-972247-4-5.

Joint Czechoslovak Virology Conference 2019 and 1st SK-AT Structural Virology Meeting: book of abstracts. KLEMPA, Boris - NEMČOVIČOVÁ, Ivana - ČERNÝ, Jiří - TOMÁŠKOVÁ, Jana - STOLT-BERGNER, Peggy. České Budějovice : Biologické centrum AV ČR, v.v.i., 2019. pp. 117 p. ISBN 978-80-8666

Stress and stress-related disease states as topics of multi-approach research. JEŽOVÁ Daniela, HERMAN, J.P. (Eds.) Proceedings of the 12th International Symposium of Catecholamines and Other Neurotransmitters in Stress. In: The International Journal on the Biology of Stress, Volume 23, Issue 6, 2020.

2.3.4. List of journals edited/published by the institute and information on their indexing in WOS, SCOPUS, other database or no database, incl. impact factor and other metrics of journals in each year of the assessment period

NEOPLASMA, established in 1954, is an international journal publishing research articles on experimental and clinical oncology and cancer epidemiology.

Published 6-times a year in English language by the Academic Electronic Press, Ltd. Slovakia.

ISSN 0028-2685 (print)
ISSN 1338-4317 (online)

Edited by the Cancer Research Institute BMC SAS.

Indexed in: Web of Science,PubMed, Current Contents (Life Sciences), Excerpta Medica database (EMBASE), Google Scholar (Index Copernicus), CrossRef (Digital Object Identifiers: DOI)

Chief Editor: Jela Brozmanová, DSc.

Impact factor (Web of Science)

IF 2016: 1,871

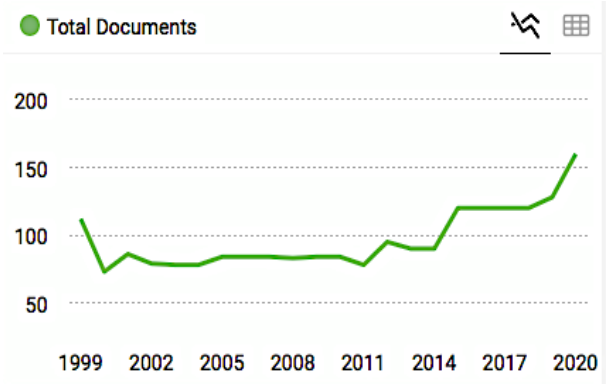
IF 2017: 1,696

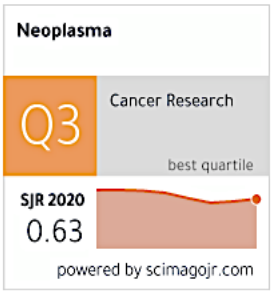
IF 2018: 1,771

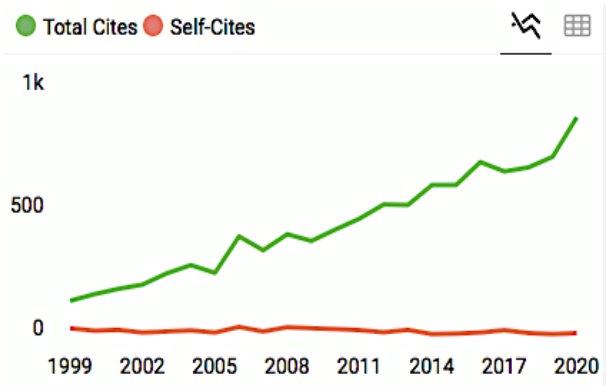
IF 2019: 1,721

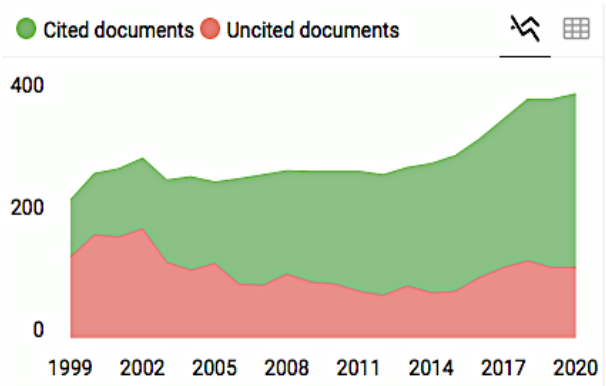
IF 2020: 2,575

SJR H-index 50[3]









[3] https://www.scimagojr.com/journalsearch.php?q=12498&tip=sid&clean=0

ACTA VIROLOGICA (established in 1957) is an international journal of predominantly molecular and cellular virology. It provides means for rapid publication of original papers dealing with fundamental research mainly on human, animal and plant viruses. As a matter of tradition also rickettsiae are included. Published 4-times a year in English language by the Academic Electronic Press, Ltd. Slovakia

ISSN 0001-723X (print)

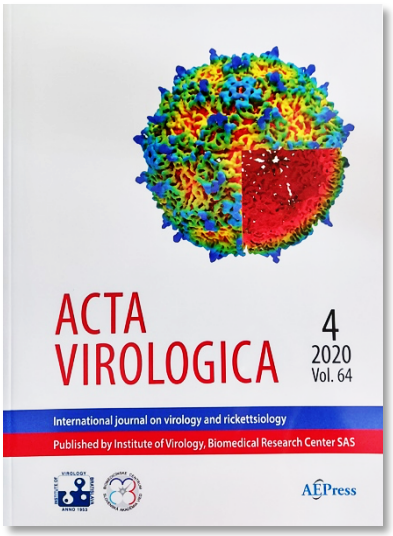
ISSN 1336-2305 (online)

Edited by the Institute of Virology BMC SAS.

Abstracted and Indexed in: Web of Science, PubMed, Current Contents, Excerpta Medica database (EMBASE), Google Scholar (Index Copernicus), CrossRef (DOI), Current Awareness in Biological Sciences (CABS), Chemical Abstracts

Chief Editor: Gustáv Russ, DSc. (until 2017), Katarína Polčicová, PhD. (since 2018)

The Editorial office of Acta Virologica has been recently addressed by the Frontiers Open Access Publisher that expressed an interest to acquire Acta Virologica into its portfolio. The contract negotiations are in process.



Impact factor (Web of Science)

IF 2016: 0,673

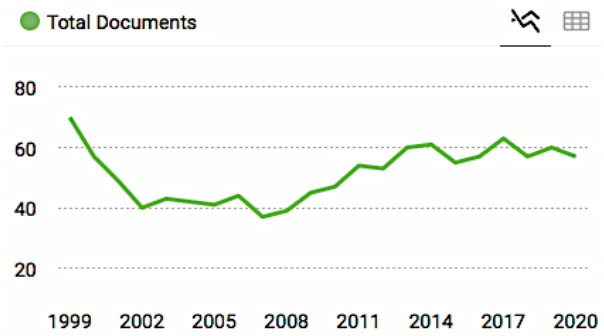
IF 2017: 0,696

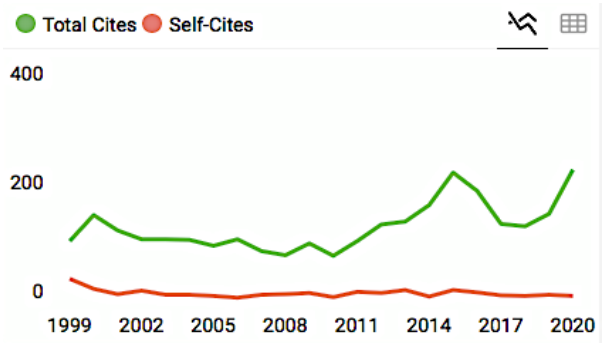
IF 2018: 0,554

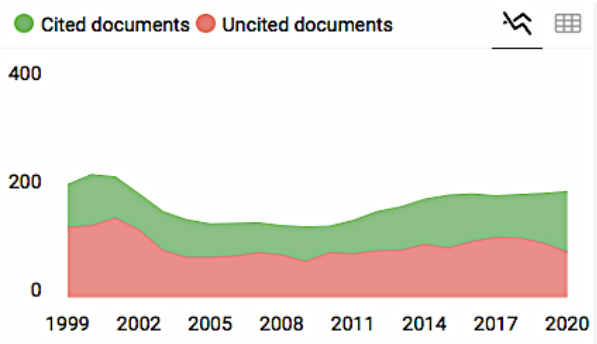
IF 2019: 0,793

IF 2020: 1,162

SJR H-index 33[4]







[4] https://www.scimagojr.com/journalsearch.php?q=19094&tip=sid&clean=0

ENDOCRINE REGULATIONS (since 1967 to 1990 Endocrinologia Experimentalis) is an international journal on experimental and clinical endocrinology and diabetes. Published 4-times a year in English language by De Gruyter Open Ltd., Germany.

ISSN 1210 0668 (print)

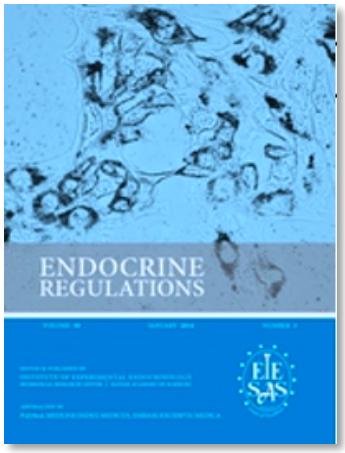
ISSN 1336 0329 (online)

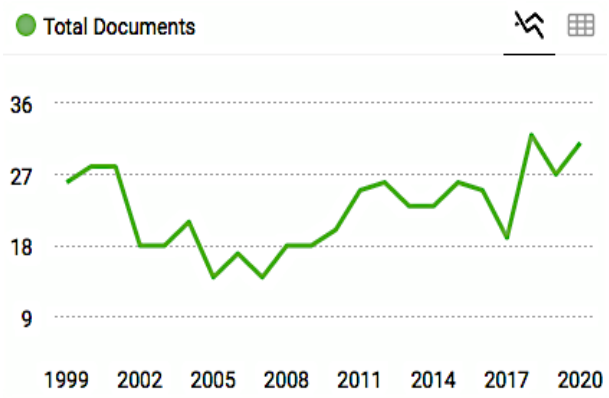
Edited by the Institute of Experimental Endocrinology BMC SAS.

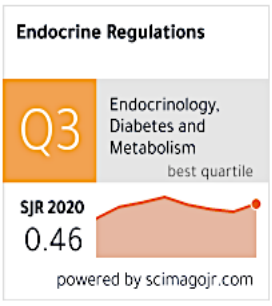
Indexed in: SCImago (SJR), SCOPUS, PubMed, Semantic Scholar, Medline, ENSCO etc.

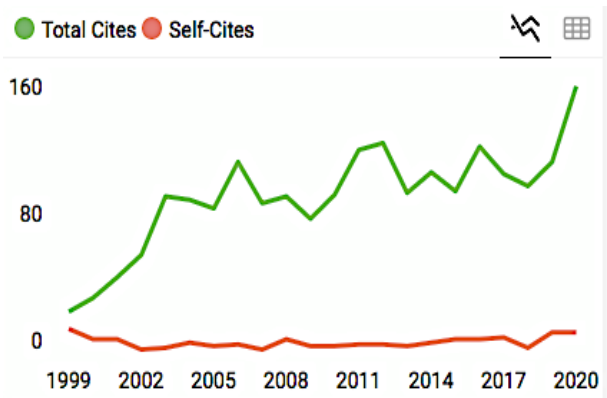
Chief Editor: Alexander Kiss

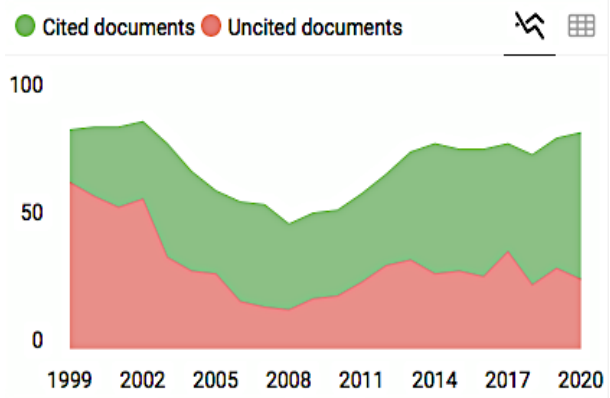
SJR H-index 32[5]











[5] https://www.scimagojr.com/journalsearch.php?q=26034&tip=sid&clean=0

National position of the BMC SAS

2.3.5. List of selected activities of national importance

Activities funded by the European Regional Development Fund, Operational program Integrated Infrastructure 2014-2020

Long-term strategic research of prevention, intervention and mechanisms of obesity and its comorbidities (OBEZITA-SK)
ITMS: 313011V344

This is a cross-cutting activity of the BMC SAS with the participation of all its institutes. BMC SAS coordinates the project implementation in collaboration with six external partners – three academic institutions (Comenius University, University of ss. Cyril and Metod, Slovak University of Agronomy) and the SMEs (Biomin a.s., MABPRO, a.s. and AP2, s.r.o.). The aim of the project is to contribute to an improvement of health and quality of life of the Slovak inhabitants suffering from obesity, through engagement of top experts and up-to-date approaches into complex progressive research of obesity and its co-morbidities.

Obesity is a global civilization phenomenon with highly negative health, social and economic impacts on increasing number of individuals, their families and the entire society. It belongs to key risk factors of chronic diseases (including metabolic, oncological and neurological disorders). Research and management of obesity is of strategic importance and attracts a lot of attention and resources worldwide. Situation in Slovakia is alarming (with >60% overweighed people). In contrast to the majority of EU countries, the National program against obesity has not been implemented into the practical life. Slovakia is the only country in the Central Europe that does not have a Centre of obesity management (COM) with complex, long-term healthcare based on the understanding of obesity derived from current research and also does not have any official state strategy of the fight against chronic accompanying diseases.

The project (abbreviated “OBESITY-SK”) is based on interdisciplinary approaches of a broad spectrum of top specialist in diverse aspects of obesity and comorbidities (mechanisms & markers – food supplements – physical activity and nutrition). We aim at setting up a basis for the sustainable strategic research of obesity and in line with clinical experts from the BMC SAS we are putting together functional prerequisites for founding of the first Center for Obesity Management (COM) in Slovakia that will provide improved follow-up of obese patients via a complex research-based and knowledge-driven attitude of experts in gastroenterology, cardiology, psychology, physiotherapy etc.

The overall goal of the OBESITY-SK project is to achieve a long-term positive impact on health of the Slovak population by mitigation of the current increase in the prevalence of obesity and its comorbidities through activities of primary and secondary prevention, research of individualized programs and products of nutrition and physical activity, research of mechanisms and risk factors of obesity, research of its relationships with associated disorders and transfer of new knowledge into clinical and societal practice.

Improvement of the biotechnological research potential of the BMC SAS to combat the COVID-19 pandemic in synergy with the European Virus Archive of Global importance supported by the H2020 program (EVAgoEAST)
ITMS: 313011ASU8

The project is implemented in the Biotechnological and analytical laboratories BMC SAS in Šarišské Michaľany. It aims to improve our pandemic preparedness through providing support to the part of the European Virus Archive GLOBAL, which facilitiates asccess to viruses and derived products to the world-wide scientific community and thereby accelerates global virological research. The role of BMC SAS within EVA GLOBAL is to archive and characterise hantaviruses, tick-borne virus and currently SARS-CoV-2 variant isolates. The EVAgoEAST project allows for creating a backup virus depository with modern storage and registration system and preparation of virus-derived products for preventive, diagnostic, and therapeutic purposes under stardardised conditions. The extension of the virus archive to the BTAL BMC SAS will strengthen the quality and security of biobanking of viruses. It will also support the quality of human resources and enforce added-value research with direct international impact.

Integrative strategy in the development of personaliyed medicine of selected malignant cancer diseases and its effect on the qulity of life (LISPER)
ITMS: 313011V446

The aim of the project is to improve the health of the population through innovative diagnostic and therapeutic procedures for three serious cancers (breast cancer, lung cancer and colorectal cancer) and their comparative verification of medical applicability and economic suitability with innovative use of IHC potential, molecular genetic analysis of tissue and liquid biopsies, biopsies, biopsies, health and information technologies.
The project is coordinated by Jessenius medical Faculty, Comenius University in Martin its imlementation is accomplshed by ten partners, including two SAS institutes (BMC and Center of Social and Psychological Sciences), two universities (University of Pavel Jozef Šafárik and University of Žilina), and six industrial partners (Anima Group, a.s., BIOHEM s.r.o., IPESOFT. S.r.o., LambdaLife, a.s., MABPRO, a.s., Bioptic Centre in Martin, s.r.o.).

Centre of excellence for advanced materials application (CEMEA)
ITMS: 313021T081

The project is complementary to the project proposed within the program H2020 WIDESPREAD-1-2014-Teaming - Building-up Center of Excellence for advancedmaterials application CEMEA, No. 664337, which received the Seal of Excellence and the Recommendation for National Funding. The aim of the project was to establish in SAS the Center for the Use of Advanced Materials SAS (CEMEA SAS), a center of top independent research focusing on surface and interface modification for new functionalities of structures and elements in the field of advanced (nano) materials, sustainable energy and biomedicine.

BMC SAS is one of the founding members of CEMEA SAS that integrates the best research teams from six SAS Institutes: Institute of Physics (IP SAS), Institute of Electrical Engineering (IEE SAS), Institute of Inorganic Chemistry (IIC SAS), Polymer Institute (PI SAS), Institute of Materials and Machine Mechanics and Biomedical research center (BMC SAS). Cooperation between CEMEA and the founding institutes is based on Memorandum of understanding, which defines CEMEA SAS as an institutional platform for cooperation according to agreed competencies and rules.

The role of BMC SAS in CEMEA project activities is focused on three sub-activities: (1) development and preparation of *in vitro* 2D and 3D cell models suitable for testing compatible materials, (2) testing advanced materials on *in vivo* and *ex vivo* models and (3) performing research focused on use of advanced materials in the diagnostics of clinical patient samples. All these activities take place in close cooperation with the CEMEA partners, whichhas resukted in new interdisciplinary projects, and joint publications.

MEDIPARK University Science Park in Kosice, Phase II.
ITMS: 313011D103

The strategic goal of the project was to build University Science Park (USP) MEDIPARK, Kosice as a top national center for research and development and transfer of knowledge into practice in the field of medicine. MEDIPARK was created by integrating human potential with expertise in biomedical sciences, research infrastructure and industrial (commercial) partners at the project implementation site, the building of P.J.Safarik University in Kosice. The academic institutions participating in the project are: P.J.Safarik University in Kosice (Faculty of Medicine and Science), University of Veterinary Medicine and Pharmacy, Institute of Neurobiology of Biomedical Research center Slovak Academy of Sciences and Technical University in Kosice and several commercial partners. The effort in the implementation of USP MEDIPARK was: (a) concentration of scientific potential and experimental infrastructure on the intersection of medicine, biology, biochemistry, biophysics, informatics and bioengineering; (b) integration of biomedical research and the transfer of research results into medical practice in the fields of prevention, diagnosis and treatment; (c) application of scientific knowledge in clinical practice, public health, education and biotechnology. As a part of the project a comprehensive system for the protection of intellectual property and the transfer of knowledge and technology into practice has been created.

Open Scientific Community for Modern Interdisciplinary Research in Medicine (OPENMED)
ITMS: 313011V455

Biomedical research is currently a rapidly evolving field of science, mainly due to the use of interdisciplinary approaches in solving medical problems, and is globally considered a priority research direction. OPENMED Consortium - P.J. Safarik University in Kosice (UPJS), Technical University in Kosice (TUKE), University of Veterinary Medicine and Pharmacy (UVLaF), Institute of Neurobiology of Biomedical Research Center Slovak Academy of Sciences (NbU BMC SAV) and two partners from the industrial sector, MM Medical s.r.o. and

JUHAPHARM s.r.o. - has set as its priority objectives to solve selected problems of diagnosis and treatment of oncological, cardiovascular and viral diseases, CNS diseases and diseases of the musculoskeletal system, with a unique use of the potential of the partners in the project. The uniqueness and originality of the OPENMED project lies in the meaningful use of the multidisciplinary environment of Kosice's university and research institutes, which are connected by complementary expertise in the field of medicine, natural and technical sciences and veterinary medicine. This connection, combined with an ambitious goal for technology transfer, represents a unique ecosystem of biomedical research in Slovakia. Interdisciplinary cooperation between the project partners was reflected in the creation of modern areas of research connecting individual new biomedical disciplines, namely: i) nanomedicine and targeted therapy, ii) personalized medicine and iii) regenerative medicine and cell therapy. The focus of the OPENMED project fully respects European priorities for biomedical research: 1) Understanding the mechanisms of the origin and development of diseases, 2) Improving the ability to diagnose, treat and manage diseases and 3) Ensuring healthy aging and promoting active aging.

Activities funded by other national projects and accomplished in collaboration with national partners

Immune response to SARS-CoV-2 infection and development of clinically relevant virological tests to improve the management of the COVID-19 pandemic

PP-COVID-20-0017, PP-COVID-20-0116, PP-COVID-20-0019

COVID-19 pandemic represents an unprecedented burden for public health systems worldwide including Slovakia. The goal of the project was to deduce the negative impact of the pandemic through the improvement of our understanding of SARS-CoV-2 immune response and the development of effective diagnostic approaches to improving patient management and infection control. Measurable outcomes of the project exceeded the declared goals. Obtained results were the basis for 5 publications in recognized scientific journals (Sci Rep, Virus Genes, PLoS One 2x, Acta Virol). Expected outcomes were exceeded also in other important aspects of the project such as research training of students, application of the results in clinical and epidemiological practice, or popularization activities. Several important results were obtained in the field of diagnostics. Our clinical studies were the basis for the inclusion of gargling as an alternative sampling mode into the standard operational procedure for SARS-CoV-2 diagnostics in Slovakia. Systematic testing, isolation experiments, and sequencing of clinical samples allowed us to contribute to the development and clinical validation of innovative diagnostic tests. These were then used to describe the spread of new SARS-CoV-2 variants in Slovakia including the alpha variant of the B.1.258 lineage which was responsible for the abrupt worsening of the epidemiological situation in Slovakia in the fall of 2020. An important aspect of the project was also the evaluation of saliva for virus diagnostics in combination with LAMP methodology and for detection of salivary IgA antibodies as an indirect indicator of infection and infectivity protection. One of the main objectives of the project was to improve our understanding of the immune response to SARS-CoV-2 infection. Cross-section seroprevalence study performed on 1928 Slovak Academy of Sciences employees in the period before the onset of the second pandemic wave revealed that (1) mRNA vaccines produce higher antibody response than the adenovirus-based vector vaccines, (2) antibody levels reflect the clinical course in COVID-19 patients, (3) vaccination significantly improves antibody levels in patients with asymptomatic or mild clinical course, (4) antibody levels decrease with increasing time since vaccination or infection. Long-term analyses confirmed that antibody levels are significantly increased by vaccination also in the patients with moderate and severe disease and that the second vaccine dose is crucial for the improvement of antibody level longevity. In the field of T-cell immunity, we evaluated the use of whole blood samples and CXCL10 and CXCL9 chemokine-specific RT-qPCR assays as putative markers of T-cell immunity activation.Altogether, our activities performed within the project proved to be highly useful in several aspects of the pandemic management in Slovakia including routine SARS-CoV-2 testing, sequencing, infectivity testing for the needs of clinical facilities, and extensive seroprevalence studies helping to estimate the actual epidemiological situations in specific regions of Slovakia. We have also contributed to additional research projects focused on mitigation of COVID-19 pandemics. IN these research activities, we collaborated with several national partners: MuptiplexDX, a.s., Comeniu University (Faculty of Mathematics, Physics and Informatics, Faculty of Medicine, Faculty of Natural Sciences) and Slovak Technical University (Faculty of Chemical and Food Technology).

New antiviral drugs: design, synthesis and activity evaluation of specific inhibitors of Viral Proteases of Coronavirus SARS-CoV-2

PP-COVID-20-0010

This research was performed within a multi-disciplinary project PP-COVID-20-0010 that combines competencies of five experienced groups from national universities (UCM, FaF and PriF UK) and Academy of

Sciences (VÚ BMV SAS and CHÚ SAS). The BMC SAV plays the key role in biological testing of bioavailability and cytotoxicity of novel anti-viral compounds.
The pandemic of the new coronavirus SARS-CoV-2, which causes serious diseases of the respiratory tract (COVID-19), poses a long-term threat to the health of the population. In addition to development of vaccines, a key task worldwide is to find new specific antivirals against SARS-CoV-2. Our team, based on previous experience in designing new antiviral agents (e.g. against HIV- 1, HCV, Dengue, influenza A virus), began immediately after the COVID-19 outbreak intensive research into inhibitors effective against viral proteases - main protease Mpro and papain-like protease PLpro of SARS-CoV-2 virus, which are among the key targets for inhibition of viral replication. The project strategy is based on an integrated approach of whole research team. In the proposed project we focus on: (1) Computer-assisted design and optimization of new specific peptidomimetic α-ketoamides that inhibit the proteolytic activity of Mpro and of a series of bis-benzylidene cyclohexanones that inhibit the deubiquitination activity of PLpro of the coronavirus SARS-CoV-2. (2) Development of synthetic routes and synthesis of peptidomimetic α-ketoamides and bis- benzylidene-cyclohexanones. (3) Testing of inhibition of enzymatic activity of both groups of substances on recombinantly prepared enzymes Mpro and PLpro and development of new methods for testing for inhibitory activity on viral enzymes. (4) Testing the antiviral activity of both groups of substances at the level of inhibition of human cell lines infected with SARS-CoV-2 virus. (5) Research into the interactions of new inhibitors with biological membranes and optimization of absorption in the respiratory tract. The overall goal of the CoViDRUGS project was to achieve a detailed therapeutic profile of these novel compounds in both *in vivo* and *in silico* conditions. The COVID-19 research is further supported by continuing project funded from national sources (APVV-21-0108, CoViD).

Development of bioimmunotherapeutics inspired by viral tricks
APVV-14-0839, APVV-20-0243

This APVV-19-0376 project is the logical continuation of our previous work and an existing joint collaborative initiative in dealing with development of bioimmunotherapeutics. The part of this research project is focused on glyco-profiling of viral proteins at the Institute of Chemistry SAS (APVV-20-0243 GLYCO4BIO, coordinated by CHÚ SAS, BMC SAS is partner) and production of viral and endogenous proteins at the Institute of Molecular Biology SAS (APVV-14-0839 IMMUNOMOD, coordinated by BMC SAS, ÚMB SASB was partner). The main research devoted to the development of immunotherapeutics based on viral 'tricks' is implemented at the BMC SAS and continuously supported by several APVV and VEGA project.
The main focus is on immunotherapy as this is now one of the hottest areas in research. However, our aim in this project is to work on immunotherapy that set out in novel direction – by tricking the body's own defenses inspired by viral tricks into fighting the enemy within. Our main goal is to look at the molecules that cytomegalovirus uses to turn down the immune system to figure out how to develop a new biotherapeutic drug to treat both viral and autoimmune diseases. Within the project, we will investigate two important viral proteins (UL141 and UL144) that function on NK and T cells and how they act in both healthy and disease states. The aim is to produce a detailed picture of their molecular architecture and function and therefore to serve as a molecular-level blueprint for rationalized design of bioimmunotherapeutics and this will be tested by computational methods in parallel to in vitro biological testing on both normal and tumor cells. The determination of such factors regulating receptor and ligand expression on the cell surface and to identify a potentially inhibitable interaction between these cellular restriction factors and a viral antagonist will allow for a better understanding of the role of these viral proteins in immune responses and how these pathways can be manipulated for therapeutic intervention.

Pathogenic microorganisms in ticks removed from Slovak residents
APVV-19-0066, APVV -19-0519, APVV -0280-12

Ixodes ricinus, Dermacentor reticulatus, and Dermacentor marginatus are epidemiologically essential ticks in Central Europe, vectors of various viral, bacterial, and protozoan agents of tick-borne encephalitis, Lyme borreliosis, rickettsiosis, anaplasmosis, and babesiosis. Knowledge of the presence and identification of tick-borne pathogens in ticks fed on humans is crucial to estimating the potential risk to humans from tick-borne diseases. BMC SAS**,** in cooperation with the Institute of Zoology and Institute of Parasitology of SAS, monitored tick-borne pathogens in ticks feeding on humans. Our result showed that the majority of the analysed ticks were Ixodes ricinus species (94.3 %). The nymph was the most frequently found stage of I. ricinus (69.9 %). Pathogenic species Rickettsia raoultii, R. helvetica, R. monacensis (25% prevalence of rickettsiae), Anaplasma phagocytophilum (13.5%), Borrelia garinii, B. afzelii, B. valaisiana (prevalence was 20.5%), Babesia microti, B. divergens (5.2%), Neoehrlichia mikurensis (4.4 %) and Coxiella burnetii (3%), were identified during all seasons. The presence of these pathogens in human-parasitizing or free-living ticks is confirmed yearly. Knowledge of the prevalence and dynamics of pathogens in ticks is a vital prerequisite for risk assessment regarding human health and public health-related measures. Human infections caused by

Borrelia are diagnosed regularly, but those caused by Rickettsia, C. burnetii, A. phagocytophilum, N. mikurensis, and Babesia spp. are rarely diagnosed in Slovakia, indicating that they are neglected diseases in our region. Rickettsioses, anaplasmosis, and babesiosis should be considered among patients who had a tick bite. The risk of contracting infections is particularly significant for at-risk populations, including seniors, children, pregnant women, and immunocompromised individuals. The results of our studies were published in Bethová et al, Experimental & Applied Acarology, 2016, Kocianová et al, Ticks and Tick-Borne Diseases, 2017, Špitalská et al, Parasitology Research, 2017, Minichová et al, Parasites & vectors, 2017)

Preparation of erythropoietin, a therapeutic hormone affecting the production of red blood cells
APVV-14-0474

Human erythropoietin (hEPO) is an essential therapeutic hormone with an anti-apoptotic effect, which is responsible for controlling the production of red blood cells (erythrocytes). It is mainly used to treat anemia in chronic kidney disease, AIDS, or cancer patients. BMC SAS coordinated the APVV-14-0474 project implementation in collaboration with the Slovak Technical University. The research team has designed a new, highly efficient eukaryotic expression system producing native hEPO and developed a purification procedure as a sequence of several separation steps based mainly on chromatography and membrane separation techniques. Although the production method was known in principle, the whole technology has several critical points that had to be optimized, e.g., preparation of high-yielding cells expressing recombinant hEPO (rhEPO), defining the most suitable culture conditions, as well as optimizing purification processes. The project's originality, therefore, consisted of introducing state-of-the-art molecular biological and separation methods for the production of rhEPO.

The hEPO gene was first cloned into a eukaryotic expression vector, which was used to transfect (insert gene) HEK 293 cells. Subsequently, a stable rhEPO-producing cell line (recombinant hEPO) was obtained in a serum-free culture medium by geneticin selection pressure. This system was chosen mainly to ensure proper post-translational protein modifications, similar to the native state. The proportion of rhEPO in the medium was about 2-2.2%, depending on the culture conditions. Next, a purification procedure has been developed based on separation processes using a multimodal cation exchanger, phenyl-functional adsorbent chromatography, and a strong cation exchanger. The correct choice of multimodal adsorbent ensured the removal of major contaminating proteins in the first step. In addition, the proper arrangement of further purification steps allowed the direct use of the product from the previous separation in the subsequent purification steps. Using this procedure, we achieved 90 to 95% purity of rhEPO with an overall yield of 13 to 26% (depending on the specific separation conditions). The result of our research was patented (application number: 69-2020) and can be used in industrial production. In addition the details of the process were published in Adamíková et al, Separation and Purification Technology, 2019, and Molnár te al, Separation and Purification Technology, 2021.

The role of adipose tissue in regulation of energy metabolism
VEGA 2/0096/17, SASPRO 1148/01/02

Adipose tissue is actively involved in the regulation of energy metabolism. Besides long-term energy storage, adipose tissue is specialized for rapid mobilization of energy needed to support energetically demanding processes, i.e. thermogenesis or exercise (brown or beige adipose tissue). Understanding the molecular mechanisms of brown/beige adipose tissue activation could provide the tools to alleviate the burden of chronic metabolic diseases. Collaboration with Department of Otorhinolaryngology - Head and Neck Surgery of the Faculty of Medicine and University Hospital of Comenius University in Bratislava provide us with the capacity to study molecular and cellular characteristics of human brown adipose tissue (obtained during elective neck surgery) and combine this knowledge with specific regulation of energy metabolism and systemic hormonal changes related to cold exposure in individuals acclimated to cold by regular ice water swimming. Molecular markers of the brown fat “thermogenic” activity were correlated to the systemic hormonal and metabolomic changes. One of the most significant results was an increase in parathyroid hormone which was proportional to the whole-body cold-induced preference for metabolic use of fatty acids, as well as to the ^{18}F-deoxyglucose uptake in brown adipose tissue and the presence of the molecular markers of brown fat metabolic activation (UCP1, PGC1α and DIO2). It also allows us to study specific cellular composition of different types of adipose tissue, determining their metabolic state and potential capacity in fast energy turnover (collaboration with the laboratory of prof. Ch. Wolfrum, ETH Zurich, Switzerland). Single nucleotide RNA sequencing was used to identify a unique, as yet undescribed cellular populations, one of which was shown to reduce the heat-producing capacity of the surrounding adipose tissue cells in paracrine manner.

Exercise in prevention & treatment of chemotherapy-related late toxicity in testicular germ cell cancer survivors: the role of skeletal muscle

VEGA 2/0164/20, APVV (SRDA) 15-0086 and APVV 19-0411

In collaboration with National Cancer Institute and Medical Faculty Comenius University in Bratislava we study effects of regular exercise in testicular germ cell cancer (TGCT) survivors. We first examined habitual physical activity and metabolic health in 195 of middle aged TGCT-survivors post-therapy and compared them to appropriate healthy control male population. Stratification based on the physical activity level into populations with low & high habitual physical activity and further categorization based on the number of chemotherapy cycles revealed that (i) TGCT-survivors had higher metabolic syndrome prevalence compared to controls; (ii) patients with higher physical activity had lower waist circumference and systemic immune inflammation index; (iii) habitual physical activity correlated positively with HDL-cholesterol and testosterone and negatively with waist circumference and atherogenic risk. Moreover, the highest metabolic syndrome prevalence was found in patients treated with >3 chemotherapy cycles and examined 15-30 yrs. post-treatment and higher habitual physical activity was paralleled by lower metabolic syndrome prevalence in TGCT survivors, highlighting the importance of regular exercise aimed at increasing level of physical fitness in this cancer patient population as a viable strategy to improve their cardio-metabolic health and quality of life. The training intervention study in the TGCT cancer survivors population is currently ongoing, 18 patients already completed the 6-month supervised aerobic-strength intervention in the Center of Physical Activity BMC SAS.

Integrative biology of exercise: slowing down progression of aging-related chronic diseases in humans

VEGA 2/0191/15; 2/0107/18; 2/0076/22 APVV (SRDA) 15-0253, 20-0466

Collaborative research of Department of Metabolic Disease Research BMC SAS and the 1st and 2nd Neurology department of the University Hospital Bratislava and Medical faculty Comenius University in Bratislava allows us to study adaptive response to exercise at the molecular, cellular, tissue and systemic levels, in populations of seniors, patients with mild cognitive impairment, and patients at early stage of Parkinson disease. The translational dimension stems from the capacity of regular exercise to (i) to slow down processes associated with aging and accelerated by obesity and sedentary lifestyle, and to (ii) maintain or improve health and quality of life in aging populations. We showed that regular exercise can improve clinical status and glucose metabolism and quality of life in patients with early-stage Parkinson's disease (Krumpolec, et al., 2017) and in seniors with mild cognitive impairment (Máderová, et al, 2019; Tsai at al, 2018 & 2019). The long-term sustainability, effectiveness, and importance of the training intervention for the health and quality of life in seniors are supported by the results of the 21-month supervised training intervention (Slobodová, et al., 2021). Our results also support the neuroprotective potential of adiponectin, hormone from adipose tissue that may be involved in the exercise-induced cognitive improvement in humans (Schön et al., 2019).

Identification of novel gene variants of bilateral sensorineural hereditary hearing loss

APVV-15-0067, APVV-20-0236, VEGA 1/0214/16, VEGA 1/0572/21

The cooperation of the Department of Metabolic Diseases with the Department of Otorhinolaryngology - Head and Neck Surgery of the Faculty of Medicine and University Hospital of Comenius University in Bratislava, which started in 2008, resulted in four successfully awarded scientific projects during the evaluated period. The overall aim of the projects was the identification of the novel genetics variants in both syndromic and non-syndromic bilateral sensorineural hearing loss (SNHL). Due to the extensive patient recruitment from clinical departments and selected Roma communities we collected biological material of more than 1 800 patients from 707 families with SNHL. Approximately one third of the patients suffers from *GJB2* related hearing loss. The genetic heterogeneity is underlined by the fact that in the 79 families 27 genes with 46 causal variants of which 30 were novel has been identified in patients with SNHL. In selected cases, the pathogenic effect of the variants was confirmed by *in vitro* functional studies. Our findings have further shown a high proportion of genetic causes in the rare and audiologically distinct mid-frequency SNHL and we also characterized the genes involved in its etiology. We have uncovered the genetic etiology of Wardenburg syndrome with atypical phenotype. In collaboration with foreign partner laboratories we investigated the genetic spectrum of Usher syndrome in the Slovak population and identified pathogenic variants in six genes. Moreover, we have shown that aberrant *CDH23* gene is the main cause of Usher syndrome in the Roma population. We have identified a different ethnic-specific mutation in the Roma population in the *MANBA* gene (a gene for beta mannosidase), which is, apart from hearing loss, also associated with intellectual disability and increased sensitivity to respiratory and skin infections. As a pilot research in Slovakia, we also focused on several other syndromic SNHL including branchio-oto-renal syndrome and Pendred syndrome. We found out that a significant number of monoallelic heterozygotes for recessive *GJB2* mutations (a genotype that does not explain the hearing loss in a patient) may suffer from previously unrecognized syndromic SNHL. Most of the project outcomes are novel and original, relevant at the international level which is supported by their publication in international peer

reviewed scientific journals and several invited lectures given at the renowned scientific meetings abroad. BMC SAS is responsible for DNA biobanking, genetics analysis and all molecular-biology and biochemistry methods.

Genetics of rare forms of insulin secretion with pharmacogenetic consequences

APVV-0107-12, APVV-0187-12, VEGA 1/0211/18, VEGA 2/0131/21

The long-term cooperation with Children Diabetes Centre of the Slovak Republic at the Department of Paediatrics, Medical Faculty of Comenius University and National Institute for Children's Diseases, Bratislava, Slovakia successfully continued also during the evaluation period. Over the course of the several project we were able to establish an effective up-to-date approach for the diagnostics of monogenic diabetes in Slovakia. The DNA biobank including clinical phenotypes includes more than 1500 patients from 801 families. In the evaluation period we identified 106 individuals with monogenic diabetes caused by mutations in one of the 13 known genes. Moreover, we elaborated the pharmacogenetic recommendations for all monogenic diabetes individuals. The recommendations were based also on the internationals studies including Slovakia where the long-term treatment of patients with sulfonylurea-treated ABCC8 permanent neonatal diabetes instead of insulin treatment was approved. Moreover, using the NGS approach, we identified also the genetic cause of syndromic forms of diabetes. We have determined the diagnosis of Mitchell-Riley syndrome (diabetes and gastrointestinal malformations) with unusual onset of diabetes outside the neonatal period. Moreover, we have identified the genetic cause of MEHMO syndrome (intellectual disability, epilepsy, hypogonadism, hypogenitalism, microcephaly, diabetes and obesity). The pathogenicity of the identified frameshift mutation was confirmed by the comprehensive *in vitro* functional studies. Over the course of the evaluated period we continued with the cooperation on the assessment of genetic etiology of patients with persistent hypoglycemia due to insulin overproduction. We identified more than 130 children with this condition. We have introduced DNA analysis techniques of hyperinsulinemic hypoglycemia which have enabled us to identify genetic cause of the disease in 28 probands and their family relatives. The most common genetic causes of hyperinsulinemic hypoglycemia were mutations in the genes *ABCC8*, *KCNJ11* and *HNF4A*, which are involved in the insulin secretion in pancreatic B cells. We found also a novel mutation in the *HNF4A* gene in a patient with very atypical clinical course of hyperinsulinemic hypoglycemia that imitated glycogenosis. In several children and their parents, their treatment was adjusted according to the principles of pharmacogenetics, that not only improved disease compensation and reduced the risk of serious acute and chronic complications, but also improved quality of life and had a positive pharmacoeconomic effect. The results of the projects have been published in several CC journals and have enabled the development of diagnostic and therapeutic standards for monogenic diabetes and hyperinsulinemic hypoglycemia in children in Slovakia. BMC SAS is responsible for DNA biobanking, genetics analysis and all molecular-biology and biochemistry methods.

Genetics of rare forms of metabolic disorders and mitochondriopathies

APVV-17-0296, VEGA 2/0083/17

The new cooperation activities dated from 2017 with Department of Pediatric Neurology and Department of Paediatrics, Medical Faculty of Comenius University and National Institute for Children's Diseases, Bratislava, Slovakia led to establishment of two novel biobanks 1) patients with primary mitochondriophaties (90 probands and 100 family members) and 2) metabolic diseases (40 probands and 80 family members). Using the NGS approach the genetics diagnosis was confirmed in 33 probands. The genetic heterogeneity is underlined by the fact that the variants were found in 26 different genes. Several functional studies of newly diagnosed genes/variants are in the progress. Some of the rare diseases case reports have already been published. BMC SAS is responsible for DNA and fibroblast biobanking, genetics analysis and all molecular-biology and biochemistry methods.

Study of hormones and stress as pathogenetic factors of depressive disorders with a focus on women and developmental aspects

APVV-0496-12; APVV-15-0063; APVV-17-0451; APVV-18-0283; VEGA 2/0057/15; VEGA 2/0022/19

BMC SAS has been the main partner of two projects (APVV-0496-12; APVV-17-0451) coordinated by the Faculty of Arts, Comenius University with the focus on the analysis of relevant psychological and psychophysiological markers in individuals with high trait anxiety and allergic diseases. One of the goals is to reveal optimal assessment of the cumulative risk of allostatic overload by evaluating biomarkers (metabolic, cardiovascular, neuroendocrine, inflammatory) and psychological parameters (emotional, personal, cognitive). We have discovered that patients with allergies show an insufficient neuroendocrine response during psychosocial stress. The study samples included adult volunteers of both sexes. One trial using a newly developed model of psychosocial stress was performed in women only. We have demonstrated that the phase of the menstrual cycle has an influence on neuroendocrine changes under stress situations. The goals of other projects (VEGA 2/0057/15; VEGA 2/0022/19) investigated in collaboration with the Department of Psychiatry,

Faculty of Medicine of the Comenius University, are/were to reveal neuroendocrine mechanisms involved in the development of mood disbalance occurring at the time of demanding events related to women reproduction, namely premenstrual syndrome, postpartum depression and preterm termination of pregnancy.

The developmental aspects related to stress and depression were fully included in the project (APVV-15-0063) coordinated by the Faculty of Medicine, Comenius University, which was based on a clinical study in children and adolescents with depression. The main aim was to assess the effectiveness of omega-3 fatty acids-rich fish oil in the treatment of depression symptoms in adolescent children on antidepressant therapy and to evaluate the potential role of stress hormones in relation to other biochemical parameters. We have shown that long-term (12 weeks) food supplementation with omega-3 fatty acids in adolescent children leads to attenuation of morning salivary cortisol concentrations. A combined research approach, namely a focus on both women as mothers and on children is being used in an ongoing project coordinated by the BMC SAS (APVV-18-0283) and implemented in collaboration with the Department of Psychiatry and 1st Department of Gynaecology and Obstetrics, Faculty of Medicine of the Comenius University, University Hospital. The main aim is to investigate a potential “bridge” between the mental state of the mother and her child with a focus on the postpartum blues. We have shown that chronic testosterone secretion, as measured in hair, reflects the association between the neuroendocrine function of the mother and her child under real-life stress conditions during the pandemic of COVID-19.

Effect of flavonoids and mycotoxins on adipose tissue
APVV-15-0229

The Department of neuroendocrine regulation and psychopharmacology BMC SAS coordinated the project implementation in collaboration with the National Agricultural and Food Centre in Nitra and the Slovak University of Agriculture in Nitra. The aim of the APVV-15-0229 project was to study the effects of plant antioxidants – flavonoids, and mycotoxins on the function of regulatory mechanisms of metabolism: adipose tissue expansion, insulin pathway, inflammatory processes, and oxidative stress parameters. We studied the effects of quercetin, resveratrol, and epicatechin and from mycotoxins mainly ochratoxin - individually as well as in combination – on adipogenesis and regulation of tissue insulin sensitivity, systemic metabolic functions, morphology and metabolism of adipose tissue. Our results show a strong inhibitory effect of mycotoxin ochratoxin on adipogenesis. It is therefore important to have food in the diet without mycotoxin contamination. In the case of flavonoids, mainly quercetin showed a two-phase concentration-dependent effect on adipogenesis. For these reasons, caution should be taken when using quercetin as a nutritional supplement, especially in diabetics. We recommend testing the dosage to avoid worsening of the effect of insulin.

Potential risk of metal and metal oxide nanoparticles used for biomedical applications: focus on reproductive and immune systems and brain
APVV-15-0296

The Department of neuroendocrine regulation and psychopharmacology BMC SAS coordinated the project implementation with two external academic partners (Comenius University Bratislava, Constantine the Philosopher University in Nitra) and one research institution (Polymer Institute of the SAS). The aim of the project was to assess potential adverse effects of selected medically relevant metal (silver, gold) and metal oxide (titanium and silicon dioxides) nanoparticles with different physicochemical properties (size, surface modification) on selected parameters of neuroendocrine, reproductive, and immune systems, and oxidative status by series of *in vitro* and *in vivo* tests. The role of BMC SAS in the project implementation was to monitor reproductive toxicity and neurotoxicity of selected nanoparticles using selected *in vitro* and *in vivo* model systems as well as based on the obtained results to propose useful biological/biochemical parameters that could be used for screening purposes of. Early identification of potential negative features of nanoparticles using interdisciplinary research approaches (biological, toxicological, clinical, engineering) could minimize the risk of newly designed/developed nanomaterials for biomedical applications.

Long-term research of innovative antisense concept and its preclinical validation
APVV-15-0215, APVV-19-0070, APVV-20-0494, PP-COVID-20-0007, APVV-21-0220

This interdisciplinary research activity of the Department of nanobiology BMC SAS rely on a unique interaction between molecular biology, organic and macromolecular chemistry, and medicine, and is based on collaboration with external partners – the SME (Selecta Biotech SE), academic institution (Medical Faculty of Comenius University) and hospitals (National Cancer Institute, University Hospital Antolska, and Urology clinic with the Center for Kidney Transplantation LF UK, SZU and UNB). The aim of this research is to bring new generation antisense therapeutics for translation into clinical practice.

Oligonucleotide-based antisense strategies represent the most powerful approach to regulate (suppress or eliminate) the expression of target proteins. Antisense effect based on RNA interference allows for precise and effective protein suppression thanks to sequence-mediated binding of antisense therapeutics. Despite evident therapeutic potential of these strategies, only minimal number reaches the stage of clinical trials due to insufficient performance as for example cell membrane penetration, off-target effects and biodegradation. Original structural design of ESiNAR-X® platform should overcome these issues and in frames of this cooperation is being preclinically validated. The targets for therapeutic solutions were identified as priorities based on demand for tailor-made therapeutic solutions in the clinical practice of Slovak hospitals and so far, comprise chronic myeloid leukemia, chronic kidney disease, and SARS-CoV-2.
The multidisciplinary character of projects falling within the established cooperation between academia, industry and clinics provide a collaborative pipeline of integrated knowledge including design and synthesis of novel RNA inhibitors, their functional validation in the preclinical animal models and ability of chosen candidates for utilization in clinical practice. Cooperation partners were selected considering their complementarity and high-level professional experience in the required fields of expertise in order to solve the particular tasks defined within projects purposefully bridging state sector (BMC SAS and hospitals) with the private sector (Selecta Biotech SE) combining the company´s proprietary know-how with the strong background and experience of BMC SAS in basic research.
The long-term cooperation oriented at the needs of Slovak clinicians has been developing in a sustainable manner as the concept of selectively acting RNA inhibitors has the potential to provide specific therapeutic solutions not only for chosen diagnosis so far, but also for other diseases of known molecular background, where a particular RNA plays a causal role in the pathophysiology. If the concept proves successful, it will provide a universal platform for accurate silencing of causal nucleic acids, with versatile use across a range of biomedical applications in regenerative medicine.

DNA damage response and preleukemic clones in hematopoietic stem cells in diagnostics, risk estimation and treatment of pediatric leukemia

APVV-15-0250, VEGA 2/0109/15, VEGA 2/0106/15, VEGA 2/0087/18

This is a collaborative project of the BMC SAS, Cancer Research Institute, Department of Radiobiology in cooperation with The Comenius University of Bratislava, Faculty of Medicine, University Children's Hospital, Department of Pediatric Hematology and Oncology. Acute leukemia is the most common malignancy in childhood. A chromosomal translocation resulting in an in-frame preleukemic gene fusion (PGF) is often a primary genetic abnormality in the origination of acute childhood lymphoblastic/myeloid leukemia (ALL/AML). Umbilical cord blood (UCB) from newborns was screened for the presence of the most frequent PFG associated with pediatric ALL/AML. This screening revealed relatively high incidence of PFG, which exceeded incidence of overt leukemia. We found no effect of PFG on radiation-induced DNA damage response, accumulation of endogenous DNA double-stranded breaks, and apoptosis in either lymphocytes or hematopoietic stem/progenitor cells (HSPC). The results of the project suggest that specific HSPC subpopulations represent a cellular target in leukemogenesis after the primary event such as formation of PFG is induced. We have developed the assay with sorting of these subpopulations, expansion and subsequent analysis of expanded cells, which may serve as a prognostic test for assessment the risk of leukemia development. Diagnostically relevant PFG were found in minor HSPC populations of patients at remission. These results suggest that even after remission, the bone marrow of these patients still contains preleukemic stem/progenitor cells that have survived chemotherapy and represent a potential for relapses. We were the first to identify the presence of PFG in individual subpopulations of the hematopoietic system, which could help to utilize immunotherapy for maintaining a state of remission. Backtracked analysis of UCB cells from the ALL patients confirmed the presence of PFG in HSPC. FISH analysis revealed genomic instability in the form of individual gene gains and translocations in almost all UCB cell subpopulations of ALL patients, whereas we did not observe such genomic instability in UCB cells from healthy donors. The presence of genomic instability in UCB cells of patients at birth could potentially be used as a prognostic marker of the risk of leukemia and exclusion of the affected UCB samples from transplantation. Besides that, we developed a unique exposure system for validation of the extremely low frequency electromagnetic field parameters that can inhibit cancer cell growth.

Cancer resistance, metastasis, innovative treatment and personalised diagnostics

APVV-16-0010; APVV-16-0178; APVV-20-0158; VEGA 1/0395/21

The issue of cancer resistance and metastasizing in solid tumours has been investigated within several national projects () in close cooperation with Faculty of Medicine and Jessenius Faculty of Medicine in Martin, Comenius University, National Cancer Institute (NCI) and University Hospital in Bratislava (UHB). Cooperation with NCI and UHB enabled implementation of up-to date preclinical models based on patient tumour tissues such as patient-derived xenografts (PDX) and organoids. Experiments performed at BMC were focused on

development of spontaneously metastasizing models producing circulating tumour cells. We identified soluble factors released by tumour microenvironment associated with breast cancer chemoresistance. Cooperation focused on germ cells tumours identified Disulfiram as agent that can sensitize refractory tumour cells to chemotherapy, and a clinical study was initiated (2018/39-LFUK-13). Thanks to cooperation with NCI and UHB we can test the efficacy of exosome-mediated suicide gene therapy on xenografts derived from uveal melanoma (UM) or pancreatic cancer (APVV-17-0369; APVV-20-0143). Within the project focused on epigenetic alterations associated with uveal melanoma metastasizing (APVV-17-0369) the biobank containing 147 patient and control samples was created. Our findings showing epigenetic deregulation of tyrozine protein kinase KIT expression may contribute to understanding the past failure to target KIT by tyrosine kinase inhibitors in poor prognosis uveal melanoma. Native biobank comprising more than 300 specimens of colorectal cancer tissue was established in cooperation with NCI (2019/60-BMCSAV-4). Based on this cooperation we can prove our findings on clinically relevant models and contribute to understanding the role of Aldehyde dehydrigebase in cancer biology. Cooperation with Faculty of Mathematics Physics and Informatics, Comenius University (APVV-14-0267) led to development of sensitive aptamers that could serve as a potential diagnostic tools for leukaemia.

Application of advanced genomic technologies to study the genetic background of monogenic disorders and identify clinically relevant mutations and/or microsatellite loci

APVV-0240-12, MZSR-2018/46-SAV-5, APVV-18-0319

The Department of Human Genetics of the Institute of Clinical and Translational Research has developed national collaborative activities mainly with the Faculty of Natural Sciences of the Comenius University, with the Science Park of the Comenius University and with a private company Geneton Ltd. During the evaluation period there were three nationally funded joint projects of these institutes, which were focused on the preparation of implementation of modern genomic technologies into clinical use in Slovakia. In this cooperation the mentioned institutes complemented each other not only in critical infrastructure required for genomic sequencing, data processing and analyses, but also in required interdisciplinary personal prerequisites.
Cooperation with the Faculty of Natural Sciences of the Comenius University was supported by two national grants. The project CFTRaPAH (APVV-0240-12) was aimed to characterise the mutational status of the *CFTR* and *PAH* genes, both in the general population of Slovakia and among patients suffering from cystic fibrosis and phenylketonuria, respectively. In case of newly identified variants with unknown clinical significance, further analyses were optimised to measure the functionality and activity of mutated proteins, with an aim to evaluate potential pathogenicity of sequence variants. The second project, ImmunoGen (MZSR-2018/46-SAV-5), was aimed at the implementation of whole-exome (WES) and whole genome sequencing (WGS) to study the genetic background of different immune related disorders. WES was exploited to characterise sequence changes in the protein coding part of the genome of paediatric patients having primary immunodeficiencies (monogenic disorders), while WGS was used in controls and patients suffering from inflammatory bowel diseases (IBD) with subsequent calculations of polygenic risk scores (PRSs) for these complex multifactorial conditions.
Cooperation with the Science Park of the Comenius University and with Geneton Ltd. was supported by a national project GenoMicrosat (APVV-18-0319). This was aimed to enhance the possibilities of the analyses of human microsatellite loci from WGS data, with a specific aim to develop a bioinformatic tool that would allow thorough characterisation of the sequence and structure of clinically relevant microsatellite loci, including those pathologically expanded in dozens of severe human diseases, as well as to detect microsatellite instability (MSI) more effectively, a hallmark of several human cancers.

Novel possibilities of multiple sclerosis treatment

APVV-15-0228, 2018/37-LFUK-11

The Institute of Clinical and Translational Research in co-operation with 1st Department of Neurology, Faculty of Medicine, Comenius University in Bratislava are collaborating in the research of multiple sclerosis (MS) with the aim to improve the current therapy of this disease.
MS is a chronic immune-mediated inflammatory disease leading to demyelination and neuro-degeneration. The symptoms include motor impairment, visual disturbances, sensory problems, fatigue and cognitive impairment. Recently, our group found signs of insulin resistance, decreased antioxidant capacity possibly linked with ongoing systemic inflammation, and changes in lipid metabolism in the early stages of MS, suggesting mitochondrial dysfunction may represent a common underlying mechanism for neurodegeneration and insulin resistance. Glucagon-like peptide 1 (GLP-1) is an incretin, controlling insulin secretion and glucose metabolism, cognitive functions, emotional and stress responses, as well as acting as neurotransmitter on central level. GLP-1 analogs have been successfully used for treatment of type 2 diabetes; their neuroprotective, neurotrophic, and anti-inflammatory properties were observed in experimental autoimmune encephalomyelitis, a model of MS. In 2019 we initiated an exploratory, unblinded, randomized, single center

clinical trial in relapsing-remitting MS patients (EudraCT 2019-003001-94) aimed to evaluate effects of one year treatment with a low dose of GLP-1 analog dulaglutide on chronic axonal damage and neurodegeneration, and on insulin resistance, and cognitive function in patients with MS. Preliminary promising results show that this treatment tends to improve (or at least slower down the impairment of) cognitive and motor measures in relapse-remitting MS patients (n=7) along with expected effects on glucose metabolism. The results of the research led to continuation of clinical trial with novel oral GLP-1 analog (semaglutid) as an adjuvant therapy to the standard MS therapy.

Obesity, physical activity and nutrition in relation to gut microbiota
APVV-17-0099

This research is result of co-operation between Institute of Clinical and Translational Research and Faculty of Physical Education and Sport, Comenius University in Bratislava. Gut microbiota harbors a complex and dynamic population of microorganisms of human gastrointestinal tract. Based on fact that gut microbiota is a relative new and attractive topic; we see high scientific interest to study microorganisms in different field of human physiology, patophysiology, medicine and prevention. However, evidence surrounding the existence of gut microbiota and gastrointestinal tract illness is more accompanied by another cardiovascular diseases, obesity, autism, diabetes, cancer and complex metabolic syndrome. The aim is to characterize the diversity of human gut microbiota by taxonomic classification in healthy controls, senior groups, athletes and patients with a non-communicable disease. Research is oriented on modification of gut microbiota by physical activity and nutrition and to find the effects of gut microbiota changes on patient's health and active aging of seniors.

2.3.6. List of journals (published only in the Slovak language) edited/published by the institute and information on their indexing in WOS, SCOPUS, other database or no database, incl. impact factor and other metrics of journals in each year of the assessment period

None during the evaluation period.

Position of individual researchers in the international context

2.3.7. List of invited/keynote presentations at international conferences, as documented by programme or invitation letter

Invited lectures at international conferences organized outside of Slovakia and Czechia

BAKOŠ, Ján. Autism - the failure of axon growth. Zoom meeting NOVA Southeastern University. 11. 9. 2020. NSU, Florida, USA

BELYAEV Igor. New paradigm in assessing biological effects of low intensity electromagnetic fields. In van Rhoon GC, Šarolić A, editors. COST EMF-MED Workshop on Non-Thermal EMF Cancer Treatment 14.-16.2. 2017. Warsaw, Poland

BELYAEV Igor. Key factors to be focused in assessing health risks from low intensity electromagnetic fields. EMF & health symposium. 14.-15. 9. 2018. Athens, Greece

BELYAEV Igor. Proton radiotherapy, testing at cellular level. International Atomic Energy Agency (IAEA), Regional Training Course on Radiobiology for Radiation Oncologists and Medical Physicists.1.-2. 10. 2018. Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency, Moscow, Russia

BELYAEV Igor. Radiation-induced DNA repair foci: spatio-temporal aspects of formation, application for assessment of radiosensitivity and biological dosimetry. International Atomic Energy Agency (IAEA), Regional Training Course on Radiobiology for Radiation Oncologists and Medical Physicists. 1.-2. 10. 2018. Burnasyan Federal Medical Biophysical Center of Federal Medical Biological Agency, Moscow, Russia

BELYAEV Igor. Towards ELF magnetic fields for the treatment of cancer. 10.-14. 06. 2019. The Seventh International Conference on Radiation in Various Fields of Research (RAD 2021), Herceg Novi, Montenegro

BELYAEV Igor. Main regularities and health risks from exposure to non-thermal microwaves of mobile communication. 23.-25. 10. 2019. 14th IEEE International Conference meeting on Advanced Technologies, Systems and Services in Telecommunications - TELSIKS 2019, Nis, Serbia

BELYAEV Igor. Biological effects of non-ionizing radiation – microwaves focusing on millimeter waves that will be used by 5G.12.10. 2019. 5G Seminarium, Ytterjärna, Sweden

BELYAEV Igor. Molecular markers for biological dosimetry in radiation oncology, cancer risk assessment and diagnostics.8.-12. 02. 2021. Third Research Coordination Meeting on Applications of Biological Dosimetry Methods in Radiation Oncology, Nuclear Medicine, and Diagnostic and Interventional Radiology (MEDIBIODOSE). International Atomic Energy Agency (IAEA), Vienna, Austria

BELYAEV Igor. Biological and health effects of non-ionizing radiation that is used by 5G 14.-18. 06. 2021. The Ninth International Conference on Radiation in Various Fields of Research (RAD 2021), Herceg Novi, Montenegro

BRTKO, Július - TOPOROVÁ, Lucia - MACEJOVÁ, Dana. Nuclear retinoid X receptors - ligand inducible transcription factors and their role in physiological processes and therapy of selected oncological diseases. HDBMB 2019 : crossroads in life sciences. 25.-28. 9. 2019. Lovran, Croatia

CAGALINEC, Michal. Mitochondrial dynamics and calcium homeostasis in experimental models of Wolfram syndrome. Physiopathological Consequences of MAM Alterations in Diseases. 24. 9. 2021. UM, Montpellier, France

FRIDRICHOVÁ Ivana - KALINKOVÁ Lenka - SMOLKOVÁ Božena - ZMETÁKOVÁ Iveta - HORVÁTHOVÁ KAJABOVÁ Viera - KRIVULČÍK Tomáš - MINÁRIK Gabriel - SEDLÁČKOVÁ Tatiana - ČIERNA Zuzana - MEGO, Michal. DNA methylation changes in patients with invasive breast cancer. 3rd Global insight conference on breast cancer. 16.-18. 7. 2018. Valencia, Spain

GAŠPERÍKOVÁ Daniela - ŠKOPKOVÁ Martina - Slovak Monogenic Diabetes Working Group - KLIMEŠ Iwar - STANÍK Juraj. Whole exome sequencing for identification of rare monogenic forms of diabetes. 13th Congress of the Central European Diabetes Association/33rd International Danube Symposium. 14.-16. 6. 2018. Krakow, Poland

IMRICH Richard. Rare Diseases: The wait for new alkaptonuria treatment may soon be over. Permanent Representation of the Slovak Republic to the EU. 12. 12. 2018. Brussels, Belgium

JEZOVA, Daniela, PROKOPOVA, Barbora, HLAVACOVA Natasa: Initial stages obesity are associated with increased cardiovascular activation under stress. 21th World Congress on Heart Diseases, 30.7. – 1.8.2016, Boston, USA.

JEZOVA, Daniela: Aldosterone as trigger for depression. Academy Colloquium, Co-morbidity of Affective, Metabolic and Cardiovascular Disease: a crucial role of the Mineralocorticoid Receptor, 5.10 – 6.10.2016, Amsterdam, Netherlands.

JEŽOVÁ Daniela. Catecholamine responses to acute and stress-related disease states in humans.Catecholamine Research: The Enduring Impact of Irv Kopin. 26. 7. 2018. Bethesda, USA

JEŽOVÁ Daniela. Classical steroid hormones in a new fashion. 9th Chemistry towards biology: biomolecules as potential drugs. 25.-27. 9. 2018. Budapest, Hungary

JEŽOVÁ Daniela - BUZGÓOVÁ Katarína - BALAGOVÁ Lucia - KAPSDORFER Daniela - MARKO Martin -RIEČANSKÝ Igor. Cardiovascular activation during socially evaluated cold-pressor test is associated with changes in immune function but not with activation of steroid stress hormones. 23rd World Congress on Heart Disease. 27.-29. 7. 2018. Boston, USA

JEŽOVÁ Daniela. Classical steroid hormones in a new fashion. 9th Chemistry towards biology: biomolecules as potential drugs. 25.-27. 9. 2018. Budapest, Hungary

JEŽOVÁ, Daniela, HLAVÁČOVÁ, Nataša - SEGEDA, Viktor - IZÁKOVÁ, Ľubomíra: Sympathetic activation and catecholamines in relation to stress and Development. Stress: physiological effects, pathological consequences and approaches to their prevention. St. Petersburg, Russia, 10-13.10.2017.

JEŽOVÁ, Daniela. Sympathetic activation and catecholamines in relation to stress and Development. UPSBRICS CONFERENCE "STRESS IN HEALTH AND DISEASE", St. Petersburg, Russia, 17.12.2021.

KLEMPA Boris. New old-world hantaviruses. The 7th Wuhan International Symposium on Modern Virology. 18.-20.10.2017. Wuhan, China

KLEMPA Boris. New hantaviruses emerging in new hosts. XXXIX Meeting of the Chilean Society for Microbiology. 14.-17.11. 2017. La Serena, Chile

KLEMPA, Boris. Hantaviruses. ESCV Workshop on emerging virus infections. 23. - 24. 1. 2020. Vienna, Austria

KRIŽANOVÁ Oľga. Sulfide signaling is involved in apoptosis induction in solid tumor cells. 4th World Congress on Cancer Research & Therapy-2018. 13.-15. 8. 2018. Roma, Italy

NEMČOVIČOVÁ, Ivana. Human cytomegalovirus, strategies to evade the immune system by modulating multiple effector pathways. So Flacs : South Florida Section American Chemical Society. 12.-13. 4. 2019. Miami, Florida, USA

KERY M, PANISOVA E, BENEJ M, ZAMBRANO N, DENKO N, SONVEAUX P, KOPACEK J, SVASTOVA E, **PASTOREKOVA S**. CA IX as a coordinator of metabolic adaptation of cancer cells to tumor microenvironment. In 2nd ISCaM meeting "Metabolic networks in cancer", Brussels, 2016, Belgium

PASTOREKOVÁ, Silvia. Hypoxia-induced carbonic anhydrase IX: contribution to cancer hallmarks and clinical prospects. Keystone Symposia on Molecular and Cellular Biology, Hypoxia: Molecules, Mechanisms and Disease. 19. - 23. 1. 2020. Keystone, Colorado, USA

SMOLKOVÁ, Božena. DNA methylation in epithelial-to-mesenchymal transition. In The controlling cancer summit 2016 : abstracts. London, 2016, p. 10. (The controlling cancer summit 2016)

ŠTRBÁK Vladimír. Conventional and regulatory secretory pathway of insulin, possible role in diabetes mellitus. 4th Congress of Physiological Sciences of Serbia with International Participation. 19.-23. 9. 2018. University of Nis, Serbia

UKROPCOVÁ Barbara. Individualized prescription of physical activity: prevention to treatment. Special age groups (aging population). 25th European Congress on Obesity. 23.-26. 5. 2018. Vienna, Austria

UKROPCOVÁ Barbara – UKROPEC Jozef. Evidence based physical activity prescriptions. OMTF teaching course at 17th European Congress of Internal Medicine. 30. 8. 2018. Wiesbaden, Germany

UKROPCOVÁ Barbara – UKROPEC Jozef. Benefits of Exercise: Mechanisms, Preventative and Therapeutic Implication. International Conference on Adaptations and Nutrition in Sports (ICANS).18.-20. 7. 2018. Chonburi, Thajsko

UKROPCOVÁ, Barbara. Exercise prescription for better health: improving fitness, metabolism, motor functions & cognition by regular exercise. International Seminar for Sports Nutrition. March 28-30. 2019. Taipei, Taiwan

UKROPCOVÁ Barbara, Keynote Title: Exercise is medicine: Can we increase physical activity in patients' everyday life? The challanges of exercise prescription. 24th. WONCA Europe, Conference 26-29 June, 2019 Bratislava, Slovakia

UKROPEC Jozef – KRSSAK M. – SEDLIAK M – VALKOVIC P. - UKROPCOVÁ Barbara. Carnosine, the putative enhancer of exercise-induced health benefits. International Conference on Adaptations and Nutrition in Sports (ICANS). 18.-20. 7. 2018. Chonburi, Thajsko

UKROPEC, Jozef - KRUMPOLEC, Patrik - SLOBODOVÁ Lucia - KRŠŠÁK, M. - TURČÁNI, Peter - SEDLIAK, M. - VALKOVIČ, Peter - UKROPCOVÁ, Barbara. Does carnosine supplementation enhance the exercise-induced benefits? International Seminar for Sports Nutrition. March 28-30. 2019. Taipei, Taiwan

UKROPEC, Jozef – NEMEC, Michal – MADEROVA, Denisa – TIRPAKOVA, V. – KRUMPOLEC, Patrik SLOBODOVÁ, Lucia - VAJDA, M. – SCHÖN, Martin – CVECKA, J. – SUMBALOVA, Z. – SEDLIAK, M. –UKROPCOVA, Barbara. Exercise-induced changes in insulin sensitivity and cognitive performance are linked to improvements in muscle functional and metabolic state in the elderly. Symposium & Workshop "Skeletal Muscle Research - from cell to human 2019. 26th -28th May 2019. Ljubljana, Slovenia.

ZAJAC, Vladimír - ČIERNIKOVÁ, Soňa - WACHSMANNOVÁ, Lenka - ŠTEVURKOVÁ, Viola - MEGO, Michal. The evolutionary view of the role of bacteria and yeasts in the process of AIDS. In Journal of AIDS & clinical research, 2016, vol. 7, suppl. 9, p. ISSN 2155-6113. (International Conference on HIV/AIDS, STDs and STIs). Orlando, Florida, USA

ZAŤKOVÁ, Andrea. How the first human genetic disease may show the way toward Precision Medicine: the case of the ultra-rare disease alkaptonuria and ApreciseKUre digital ecosystem. Siena Workshop – ApreciseKUre digital ecosystem: la prima malattia genetica indica la via verso la medicina di precisione. Siena, Italy, 16. 12. 2021.

Invited lectures at conferences with international participation organized in Slovakia and Czechia

BELYAEV Igor, Marková E, Škorvaga M, Vasilyev S, Košík P, Durdík M, et al. Radiation-induced DNA damage response and preleukemic gene fusions in human hematopoietic stem cells. In: Chovanec M, editor. 7th DNA Repair Workshop; 2016 May 22-26, 2016; Smolenice Castle, Slovak Republic: Cancer Research Institute MBC SAS, Bratislava, Slovak Republic; 2016. p. 17.

JEŽOVÁ, Daniela. Between the sky and ground: Processes targetd by psychopharmacological therapy (Medzi nebom a zemou: Procesy, ktoré sú terčom psychofarmakologickej liečby). 62. Czechoslovak conference on psychopharmacology. 15. - 19. 1. 2020. Lázně-Jeseník, Czech Republic

JEŽOVÁ, Daniela. Glycyrrhizín can improve therapy of depression as well as COVID-19. Glycyrrhizín môže zlepšiť liečbu depresie aj COVIDU-19). 62. Czechoslovak conference on psychopharmacology. Jeseník, Czech Republic 15. - 16.1.2021.

JEŽOVÁ, Daniela. Is there any other meaning for animal models except testing psychopharmacologic drugs? – clinical-experimental approach (Majú animálne modely psychických porúch iný význam než len testovanie účinkov psychofarmák? - klinicko-experimentálny prístup). 19. conference of biological psychiatry with international participation, Luhačovice, Czech Republic, 9.-30.6.2021.

NEMČOVIČOVÁ Ivana. Crystallization of macromolecular complexes while studying host-virus systems. Advanced methods in macromolecular crystallization VIII: FEBS practical course. 10.-16. 6.

2018. Nové hrady, Czech Republic

ONDRISKOVA E, KERY M, SEDLAKOVA O, PORPORATO PE, BRISSON L, SBOARINA M, KOPACEK J, PASTOREKOVA S, SONVEAUX P, SVASTOVA E: Effect of hypoxia-induced carbonic anhydrase IX on oxidative metabolism of cancer cells. In XXV. Biochemical congress, Zborník prednášok a posterov CSBMB 2016, 13.-16.9.2016, Prague, Czech Republic

ZAŤOVIČOVÁ M, VIDLIČKOVÁ I, JELENSKÁ L, SEDLÁKOVÁ O, LABUDOVÁ M, CSÁDEROVÁ L, ŠVASTOVÁ E, KOPÁČEK J, PASTOREK J, **PASTOREKOVÁ S.** Hapoxia-induced carbonic anhydrase IX as a key component of pH regulation and signaling in tumor microenvironment. In XXV. Biochemical congress, Zborník prednášok a posterov CSBMB 2016, 13.-16.9.2016, Prague, Czech Republic

PASTOREKOVÁ Silvia. Key research programs and international cooperation of the Biomedical Research Center of the Slovak Academy of Sciences, JRC-EC - CEI – ICGEB European Workshop on "Smart Specialization Strategy in the Field of Biotechnologies in Europe: A Challenge for CEE Region", Bratislava, September 4.-6. 9. 2017

RAČEKOVÁ Enikö. Connectivity of neurons developed in adult age (Zapojení neuronů tvořených v dospělém mozku). 60. Česko-slovenská psycho-farmakologická konferencia. 10.-14. 1. 2018. Jeseník, Czech Republic

RAČEKOVÁ, Enikö - MARTONČÍKOVÁ, Marcela. Stressful effect of microwave radiation on olfactory neurogenesis and behavior of rats irradiated as juvenile or during intrauterine development, 18th Czech-German ENT days, 19 - 21.9.2019, Pardubice, Czech Republic

RAČEKOVÁ, Enikö. About relationships between olfactory and cognitive abilities (O súvislostiach medzi čuchovými a kognitívnymi schopnosťami). 61. Czechoslovak conference on psychopharmacology., 16.-20.1. 2019, Jesníky, Czech Republic

UKROPCOVÁ, B. Physical activity in the management of obese patients. European Assoaciation to Study Obesity /Obesity Management Task Force Teaching Course at XIV. Slovak Obesitology Days with international participation, Trnava, Slovakia, 4.-5. november 2016, p 25.

UKROPCOVÁ Barbara, Obesity Management Task Force meeting - OMTF- of EASO. The challanges of exercise prescription to patients with obesity. 24th. WONCA Europe, Conference 26-29 June, 2019 Bratislava, Slovakia

UKROPCOVÁ, Barbara. In Search of Eustressors: Molecular Mediators of Exercise Benefits. 12th Symposium on Catecholamines and Other Neurotransmitters in Stress. 15-19 June 2019. Smolenice Castle, Slovakia

UKROPEC, J - BALÁŽ, M - KURDIOVÁ, T - JANÁKOVÁ, Z - ŠTEFANIČKA, P - KRŠŠÁK, M - KIEFER, F - VARGA, L - WOLFRUM, C – UKROPCOVÁ, B. Brown adipose tissue and chronic metabolic diseases in human. Conference with international participation. Obezitologie A Bariatrie, 13-15-10 2016 Tábor, Czech Republic p.21-22

UKROPEC Jozef - CHOVANEC M. - SEDLIAK, M. – MEGO M. - UKROPCOVA Barbara. Regular exerciseas a powerful tool to improve metabolism and modulate trajectories of chronic diseases including cancer. 5th Annual Meeting of the International Society of Cancer Metabolism. 17.-20. 10. 2018. Bratislava

UKROPEC Jozef – NEMEC Michal – SLOBODOVÁ Lucia - SCHÖN Martin - SUMBÁLOVÁ Z. – SEDLIAK M. -UKROPCOVÁ Barbara. Functional status of mitochondria in skeletal muscle reflects the training-induced changes of insulin sensitivity, fitness and cognitive abilities of seniors with memory deficiency (Funkčný stav mitochondrií kostrového svalu odráža cvičením navodené zmeny inzulínovej senzitivity, zdatnosti a kognitívnych schopností u seniorov s poruchami pamäte). Obezitologie a Bariatrie 2018. Conference with international participation. 15.-17. 11. 2018. Plzeň, Czech Republic

UKROPEC, Jozef - SLOBODOVÁ, Lucia - SCHON, Martin – UKROPCOVÁ Barbara. Walking speed, a significant predictor of morbidity and mortality in the elderly population: how can it be affected by aerobic-strength training? (Rýchlosť chôdze, významný prediktor morbiditya mortality staršej populácie: ako ju možno ovplyvniť aeróbne-silovým tréningom?) OBEZITOLOGIE BARIATRIE 2020, 13.11.2020, online www.obesitas.cz

KOVANIČOVÁ, Zuzana - KURDIOVÁ, Timea - BALÁŽ, Miroslav - ŠTEFANIČKA, P.- VARGA, L. – KULTERER, O.C. – BETZ, M.J.- HAUG, A.R.- BURGER, I.A.- KIEFER, F.W. – WOLFRUM, C.- UKROPCOVÁ Barbara - **UKROPEC, Jozef**. Roke of parathormone and hormones of thyroid gland in response to cold and their relationship to brown adipose tissue in human. (Úloha parathormónu a hormónov štítnej žľazy v odpovedi na chlad a ich vzťah k aktivite hnedého tuku u človeka). Obezitologie a bariatrie 2019. Conference with international participation. 7.- 9.11.2019. Brno, Czech Republic

ZÁVODSKÁ,Monika. Are postnatally-born neurons in the rat olfactory system less sensitive to neonatal stress than preexisting cells? 12th SYMPOSIUM ON CATECHOLAMINES AND OTHER NEUROSTRANSMITTERS IN STRESS, 15. - 19.6.2019, Smolenice, Slovenská republika

2.3.8. List of researchers who served as members of the organising and/or programme committees of international conferences

The 7th DNA Repair Workshop, Smolenice, Slovakia, May 22-26, 2016
Program Committee Members: CHOVANEC Miroslav
Organisation Committee Members: CHOVANEC Miroslav, MÁNIKOVÁ Dominika, ŠESTÁKOVÁ Zuzana, GOFFA Eduard

FEBS Workshop, Nucleotide excision repair and crosslink repair – from molecules to mankind, Smolenice, Slovakia, May 7-11, 2017
Program Committee Members: CHOVANEC Miroslav
Organisation Committee Members: CHOVANEC Miroslav, MÁNIKOVÁ Dominika, ŠESTÁKOVÁ Zuzana, GOFFA Eduard, JURKOVIČOVÁ Dana

Genetic toxicology and cancer prevention, Smolenice, Slovakia, June 12-15, 2017
Program Committee Members: GÁBELOVÁ Alena
Organisation Committee Members: GÁBELOVÁ Alena

Q fever biomarker discovery using innovative immunoproteomic and metabolomic approaches, Bratislava, Slovakia, May 18-19, 2017
Program Committee Members: ŠKULTÉTY Ľudovít
Organisation Committee Members: ŠKULTÉTY Ľudovít,
8th International Symposium of Experimental and Clinical Neurobiology, Košice, Slovakia, June 18-21, 2017
Program Committee Members: BONOVÁ Petra, GÁLIK Ján, LUKÁČOVÁ Nadežga, MARŠALA Martin, PAVEL Jarosla, RAČEKOVÁ Enikö, SLOVINSKÁ Lucia, VANICKÝ Ivo
Organisation Committee Members: ANGELIDIS Andreas, ARNOUL Petra, BAČOVÁ Mária, BAGI Jozef, BARKÁCS Zuzana, BIMBOVÁ Katarína, BLAŠKO Juraj, FEDOROVÁ Jana, JACHOVÁ Jana, JURUŠOVÁ Dana, KALINČÁKOVÁ Jolana, KOŠOVÁ Annamária, KOVÁČOVÁ Ivona, MARTONČÍKOVÁ Marcela, NÉMETHOVÁ Miroslava, STROPKOVSKÁ Andrea, SZÉKIOVÁ Eva, ZÁVODSKÁ Monika

6th CECON (Central European Congress on Obesity and 15th Slovak Congress of Obesity), Bratislava, Slovakia, October 5-7, 2017
Program Committee Members: FÁBRYOVÁ Ľubomíra, UKROPEC Jozef, chair
Organisation Committee Members: GAŠPERÍKOVÁ Daniela, UKROPCOVÁ Barbara, UKROPEC Jozef

Current biomedicine: from basic research to clinical application, Smolenice, Slovakia, October 23-26, 2017
Program Committee Members: KUČEROVÁ Lucia
Organisation Committee Members: BÁBELOVÁ Andrea, KUČEROVÁ Lucia, PATOREKOVÁ Silvia, PENESOVÁ Adela, UKROPEC Jozef

The 5th Labuda days, Smolenice, Slovakia, September 12-14, 2018
Program Committee Members: ŠPITALSKÁ Eva
Organisation Committee Members: ŠPITALSKÁ Eva, ŠTIBRÁNIOVÁ Iveta, SEKEYOVÁ Zuzana
4th Annual Meeting of the International Society of Cancer Metabolism: Cancer Metabolism, October 19-21, Bertinoro, Italy, 2017
Program Committee Member: PASTOREKOVÁ Silvia

5th Annual Meeting of the International Society of Cancer Metabolism: Metabolic adaptations and targets in cancer, Bratislava, Slovakia, October 23-26, 2018
Program Committee Members: PASTOREKOVÁ Silvia
Organisation Committee Members: PASTOREKOVÁ Silvia, TAKÁČOVÁ Martina, ŠÁRNIKOVÁ Iveta, KAJANOVÁ Ivana, URBANČÍK Boris, FIALOVÁ Zuzana, LACKOVIČOVÁ Zuzana

6th Annual Meeting of the International Society of Cancer Metabolism: Cancer Metabolic Rewiring: Mapping the Road to Clinical Translation, Braga, Protugal, October 17-19, 2019
Program Committee Members: PASTOREKOVÁ Silvia

Joint Czechoslovak Virology Conference and 1st SK-AT Structural Virology Meeting 2019, Bratislava, Slovakia, February 13-15, 2019
Program Committee Members: KLEMPA Boris, NEMČOVIČOVÁ Ivana
Organisation Committee Members: KLEMPA Boris, NEMČOVIČOVÁ Ivana, TOMÁŠKOVÁ Jana, SLÁVIKOVÁ Monika, LIČKOVÁ Martina

CAPSID Workshop – An Introduction to Recombinant Protein Production, Purification, and Quality Assessment, Vienna, Austria, December 03-04, 2019
Program Committee Members: NEMČOVIČOVÁ Ivana
Organisation Committee Members: NEMČOVIČOVÁ Ivana

Endocrine disruptors, Bratislava, Slovakia, May 29, 2019
Program Committee Members: BRTKO Július
Organisation Committee Members: BRTKO Július

Genetic toxicology and prevention of cancer, Smolenice, Slovakia, June 10-13, 2019
Program Committee Members: GÁBELOVÁ Alena
Organisation Committee Members: GÁBELOVÁ Alena

Challenges in cancer care, Meeting of iPAAC WP8, Bratislava, Slovakia, September 16-17, 2019
Program Committee Members: PASTOREKOVÁ Silvia, SMOLKOVÁ Božena
Organisation Committee Members: PASTOREKOVÁ Silvia, SMOLKOVÁ Božena, ŠÁRNIKOVÁ Iveta, LACKOVIČOVÁ Zuzana

The first informal meeting on biomarkers of infectious, oncological and neurodegenerative diseases, Stará Lesná, Slovakia, September 1-3, 2020
Program Committee Members:
Organisation Committee Members:

12th Symposium on catecholamines and other neurotransmitters in stress, Smolenice, Slovakia, June 15-19, 2019
Program Committee Members: JEŽOVÁ Daniela
Organisation Committee Members: HLAVÁČOVÁ Nataša, KRIŽANOVÁ Oľga, BALAGOVÁ Lucia, KARAILIEV Peter, BUZGÓOVÁ Katarína

2.3.9. List of researchers who received an international scientific award

BELYAEV, Igor,
Certificate of excellence award of Spandidos Publications for reviewer activities in the International Journal of Oncology (2016, 2017)

CIHOVÁ, Marína, Short-stay scientific award for early stage researcher in Ramón y Cajal Health reseach Institute in Madrid awarded by the Pancreatic Cancer Europe in the competition of young researchers (2019)

HLAVÁČOVÁ, Nataša
Best poster award of the Czech Society of Neuropsychopharmacology at the 60th Czechoslovak conference of psychopharmacology (2018)
Best publication award of the Czech Society of Neuropsychopharmacology (Hlaváčová et al., Progress in Neuro-Psychopharmacology and Biological Psychiatry, 2018)
Best poster award of the Czech Society of psychiatry at the 18th Czechoslovak conferencs of psychiatry (2019)

KÁDAŠI Ľudevít
János Arany award of the Hungarian Academy of Sciences for outstanding research results (2020)

KARAILIEVOVÁ, Lucia
Best poster award of the Czech Society of Neuropsychopharmacology at the 63th Czechoslovak conference of psychopharmacology (2021)

KELLEROVÁ Erika
Waived registration grant for the Virtual 12th FENS Forum 2020

KLEMPA Boris
Joel M. Dalyrymple Memorial Lecturship Award of the International Society on Hantaviruses, awarded at the 9th International Conference on Hantaviruses for innovative contribution to research of hantaviruses (2019)

PUHOVÁ Agneša
Best poster awards of the Czech Society of Neuropsychopharmacology at the 59th and 60th Czechoslovak conference of psychopharmacology (2017, 2018)

SCHMIDTOVÁ, Silvia
Best poster awards of European Academy of Andrology at the 9th Copenhagen Workshop on Testicular Germ Cell Cancer (2018)

ZÁVODSKÁ Monika
Irvin J. Kopin Travel Fellowship award to cover participation and presentation at the 12th Catecholamines and Other Transmitters in Stress (2019)

Position of individual researchers in the national context

2.3.10. List of invited/keynote presentations at national conferences, as documented by programme or invitation letter

BRTKO Július. Character, function and role of nuclear receptors in molecular mechanisms of thyroid hormone action (Charakter, funkcia a úloha nukleárnych receptorov v molekulárnom mechanizme účinku hormónov štítnej žľazy). Interná medicína, **20:** 442, 2020. Podobova prednáška v rámci 73. Endokrinologických dní (ONLINE)

ČIERNIKOVÁ Soňa, MEGO M., WACHSMANNOVÁ L., ŠTEVURKOVÁ V., DRGOŇA Ľ., MÁJEK J., ZAJAC V. Role of human microbiome in colorectal carcinomgenesis (*Úloha ľudského mikrobiómu v kolorektálnej tumorigenéze*). LIII. Bratislavské onkological days 29-30.9.2016, Bratislava

ĎURINÍKOVÁ, Erika. Angiogenesis and ovarial carcinoma (*Angiogenéza a karcinóm ovária*). XII. Days of young oncologists; Tále, SR, september 2016

HLAVÁČOVÁ, Nataša. Modulation of mineralocorticoid receptors as potencial taget of psychopharmaco-logical therapy (Modulácia mineralokortikoidných receptorov ako možný cieľ psychofarmakologickej liečby). XVI. Psychofarmakologické sympózium s medzinárodnou účasťou. 17.-19.10.2019, Tatranská Lomnica.

KLEMPA, Boris. Chellenges of virology brought by COVID-19 pandemics (Virologické výzvy, ktoré priniesla pandémia COVID-19). XLVI. Lekárnické dni Milana Lehkého Slovenskej farmaceutickej spoločnosti „Život s Covid-19“, 24.-25.6.2021

KURDIOVÁ, Timea - UKROPCOVÁ, Barbara - UKROPEC, Jozef. The role of physical activity for metabolic health (Význam pohybovej aktivity pre metabolické zdravie: vieme ako je zabezpečená adaptačná odpoveď organizmu na pravidelné cvičenie?) Kongres Laboratórna medicína 2019. 29. 11. 2019 - 30. 11. 2019. Bratislava

MARTONČÍKOVÁ, Marcela. Distance olfactory testing in patients with persistent olfactory disorders after COVID-19. (Dištančné testovanie čuchu u pacientov s pretrvávajúcou poruchou čuchu po COVID-19). 24. Košický morfologický deň: "Enviromentálna záťaž a jej vplyv na zdravie ľudí a zvierat", Košice, Slovensko, 4.6.2021.

MATÚŠKOVÁ, Miroslava. Mesenchymal stromal cells in gene therapy of oncological diseases. (Mezenchýmové stromálne bunky v génovej terapii onkologických ochorení). In Biologická liečba v teórii a praxi. Milan Buc, Peter, Filipčík. - Bratislava, Dunajská Lužná : AHO5 Neuroimunologický ústav SAV, 2016, s. 25-26. ISBN 978-80-971357-2-0

MESÁROŠOVÁ, Monika. Interaction of magnetite nanoparticles with lung cells (Interakcia magnetitových nanočastíc s pľúcnymi bunkami). Science Day VC ABT 2016, Výskumné centrum AgroBioTech SPU v Nitre; 8. 11. 2016.

PASTOREKOVÁ Silvia. Biomedical Research Center of the Slovak Academy of Sciences: research and development for the benefit of the population health in the Slovak Republic (Biomedicínske centrum SAV: výskum a vývoj v prospech zdravia obyvateľstva SR). National workshop Population health and health technologies - the future of biomedical research and development in the Slovak Republic (Zdravie obyvateľstva a zdravotnícke technológie – budúcnosť biomedicínskeho výskumu a vývoja v SR, predstavenie Domény č. 4 „Zdravie obyvateľstva azdravotnícke technológie“ a súvisiacich aktivít a príležitostí, Martin, 16. 11. 2017

PASTOREKOVÁ, Silvia. Dynamics of antibody production and persistence after COVID-19 disease and vaccination (Dynamika tvorby a perzistencia protilátkovej odpovede po prekonaní ochorenia COVID-19 a vakcinácii). Workshop: Ako interpretovať výsledky laboratórnych vyšetrení na COVID. Webinár Slovenskej lekárskej komory, Slovenskej komory zdravotníckych pracovníkov, Lekár, a. s. a Slovenskejspoločnosti klinickej biochémie, 3.6.2021.

PASTOREKOVÁ, Silvia. Immune response to SARS-CoV-2: infection versus vaccination (Imunitná odpoveď na SARS-CoV-2: infekcia versus vakcinácia). XLVI. Pharmacéutical days of Milana Lehký, Slovak Pharmaceutical Society, Life with COVID-19 (Život s Covid-19), 24.-25.6.2021

PENESOVÁ, Adela - VLČEK Miroslav - HAVRANOVÁ Andrea - BAJER Boris - IMRICH Richard. How is clinical research done? Proposal for lifestyle change in the prevention and treatment of non-communicable chronic diseases. (Ako sa robí klinický výskum? Návrh zmeny životného štýlu v prevencii a liečbe neprenosných chronických ochorení). Biological days. 24. 10. 2017. Smolenice

PENESOVÁ, Adela. A scientific view of rational nutrition.
Vedecký pohľad na racionálnu výživu. Laboratórna medicína 2017. 25. 11. 2017. SZU, Bratislava

SCHON Martin, UKROPEC Jozef, UKROPCOVÁ Barbara. Movement as a medicine: physical activity in the prevention and treatment of chronic diseases.(Pohyb ako liek: fyzická aktivita v prevencii a liečbe chronických ochorení). Kongres všeobecných lekárov Slovenska. Šamorín, 18.5.2017

SLOBODOVÁ, Lucia - SCHÖN, Martin - KRUMPOLEC, Patrik - LAUROVIČ, Jakub – SEDLIAK, M. – UKROPEC, Jozef - UKROPCOVÁ, Barbara. Exercises in the prevention and treatment of chronic complications of obesity: the importance of physical fitness (Cvičenie v prevencii a liečbe chronických komplikácií obezity: význam fyzickej zdatnosti). Pediatria pre prax, 59. pediatrické dni. 25.4.2019 - 26.4.2019. Hotel Saffron, Bratislava

TYČIAKOVÁ, Silvia - BÁNOVÁ, Radivojka - ZDURIENČÍKOVÁ, Martina - DUBROVČÁKOVÁ, Mária - ŠKULTÉTY, Ľudovít - LAKOTA, Ján. Carbonic anhydrase I gene expression affects extracellular matrix formation, cytoskeleton, exosome formation, and is probably associated with a (favorable) prognosis in cancer patients (Expresia génu karbonickej anhydrázy I ovplyvňuje tvorbu extracelulárnej matrix, cytoskeletu, formovanie exozómov a pravdepodobne je spojená s (priaznivou) prognózou u pacientov s nádorovým ochorením). Konferencia Biologická liečba v teórii a praxi V. 25. 9. 2019. Bratislava

UKROPCOVÁ, Barbara. Movement as a medicine: physical activity in the prevention and treatment of chronic diseases Preventive medicine in the context of the present (Pohyb ako liek: pohybová aktivita v prevencii a liečbe chronických ochorení). Preventívna medicína v kontexte súčasnosti. Bratislava , 26.5.2016

UKROPCOVÁ, Barbara - TIRPÁKOVÁ, V - SEDLIAK, M – UKROPEC, J. Physical activity - an important part of prevention and treatment of obesity and type 2 diabetes (Pohybová aktivita – dôležitá súčasť prevencie a liečby obezity a diabetu 2. Typu). 26. Diabetologické dni Košice 25-27.5.2016, OBEZITOLOGICKÁ SEKCIA: GLOBEZITA – CHLIEB NÁŠ KAŽDODENNÝ“ p. 15

UKROPCOVÁ, Barbara, UKROPEC, J., TIRPÁKOVÁ, V., SEDLIAK, M. Exercise - the elixir of health: the importance of physical fitness in the prevention and treatment of chronic diseases
Pohyb - elixír zdravia: význam fyzickej zdatnosti v prevencii a liečbe chronických ochorení XXXIII. Zoborský deň a XIV. Západoslovenský deň o osteoporóze 21-22.4.2016 Nitra,

UKROPCOVÁ, Barbara, Sleep and obesity: Benefits of regular physical activity. (Spánok a obezita: Benefity pravidelnej fyzickej activity). XIII. Slovensko-Český a XVIII. Český kongres spánkovej medicíny, 29-30.9.2016 Nitra. Zbornik abstraktov p. 29.

UKROPCOVÁ Barbara, MEGO Michal, UKROPEC Jozef. Physical activity in the prevention and treatment of oncological diseases - from theory to practical use. (Pohybová aktivita v prevencii a liečbe onkologických ochorení – od teórie k praktickému využitiu). In Zborník abstraktov OKTÓBER 2017, p. 16-17, ISBN 978-80-972285-3-8. (XXXVIII. Výročná konferencia SSVPL- Na pacienta zameraná starostlivosť. Vysoké Tatry - Starý Smokovec)

UKROPCOVÁ Barbara. Physical activity, effective physiological prevention and treatment of chronic diseases: benefits, availability and prescription in clinical practice. (Fyzická aktivita, efektívna fyziologická prevencia a liečba chronických ochorení: benefity, dostupnosť a preskripcia v klinickej praxi.) XXII. Slovenská konferencia revízneho lekárstva a XVIII. Slovensko-česká konferencia revízneho lekárstva 18. – 20. október 2017, Piešťany, Hotel Park)

UKROPCOVÁ, Barbara. Prescription exercise: the role of physical activity in the pathogenesis, prevention and treatment of obesity. (Cvičenie na predpis: úloha fyzickej in/aktivity v patogenéze, prevencii a liečbe obesity). In- Zborník Abstraktov, p.91-92, ISBN 978-80-971-460-2-3. (Dni praktickej obezitológie a metabolického syndrómu, 15. – 16. jún 2017 Hotel Alexander Bardejovské Kúpele)

UKROPCOVA, Barbara. Pathophysiology of obesity and its consequences: the influence of physical (in) activity on arterial hypertension. (Patofyziológia obezity a jej dôsledky: vplyv fyzickej (in)aktivity na artériovú hypertenzi. In Cardiology Letters suppl. 1/2017, s 31S. (XXXII. Kongres slovenskej hypertenziologickej spoločnosti SLS a Konferencia pracovnej skupiny preventívnej kardiológie SKS 30marec-1 april 2017 Nízke Tatry Tále). ISSN 1338-3760

UKROPCOVA Barbara, UKROPEC Jozef. Exercines - mediators of the effects of physical activity on health. (Exerkíny - mediátory účinkov fyzickej aktivity na zdravie). Slovenská spoločnosť telovýchovného lekárstva, Národný kongres telovýchovného lekárstva „Aktuálne problémy telovýchovného lekárstva“. Bratislava 30.11-1.12.2017, Abstract Book s. 5

UKROPCOVÁ Barbara. Physical activity in the prevention and treatment of colorectal cancer: effects, mechanisms, prescription. (Pohybová aktivita v prevencii a liečbe kolorektálneho karcinómu: účinky, mechanizmy, preskripcia). Dni praktickej obezitológie, Hotel Chopok, jún 2018

UKROPCOVÁ Barbara. - CHOVANEC M. - MEGO M. - UKROPEC J. Physical in/activity and breast cancer. Pohybová in/aktivita a karcinóm prsníka. Obezitologické dni, Žilina, október 2018

UKROPCOVÁ, Barbara. Exercise is medicine: the challenges of exercise prescription. 24th WONCA EuropeConference. June 26 – 29, 2019. Bratislava, Slovak Republic

UKROPCOVA, Barbara. Evidence based physical activity prescriptions. EASO-OMTF - Obesity Teaching Course” 24th WONCA Europe Conference. June 26-29, 2019. Bratislava, Slovak Republic

UKROPCOVÁ, Barbara. Prescription of physical activity - a challenge for clinical practice (Preskripcia pohybovej aktivity – výzva pre klinickú prax). XVI. slovensko-český a XXI. český kongres spánkovej medicíny. 10. – 12. október 2019. Hotel Senec, Senec

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UKROPCOVÁ, Barbara. Prescription of physical activity in clinical practice (Preskripcia pohybovej aktivity v klinickej praxi.) XXXX. Výročná konferencia SSVPL.10. – 12. október 2019. Horný Smokovec

UKROPCOVA, Barbara - UKROPEC, Jozef. Sedentary behavior in type 2 diabetics: effects, pathomechanisms and interventions (Sedavé správanie u diabetikov 2. typu: účinky, patomechanizmy a intervencie). XXIX. diabetologické dni s medzinárodnou účasťou. 31.5. – 1.6.2019. Štrbské Pleso, Hotel Patria

UKROPCOVA, Barbara. Practical Approach to he Management Obesity in Adults 2019 (Praktický prístup k manažmentu obezity u dospelých 2019). 1. Kongres Slovenskej obezitologickej asociácie a 17. Slovenské obezitologické dni s medzinárodnou účasťou. 24.10. – 26.10.2019. Holliday Inn, Trnava

UKROPCOVA Barbara. Cognitive dysfunction as a complication of diabesity. Kognitívna dysfunkcia ako komplikácia DIABEZITY. Zborník abstraktov 30. Diabetologické dni z medzinárodnou účasťou, 2020. 10-12.9.2020 s. 44-45.

UKROPCOVA Barbara. How Regular Physical Activity and Physical Fitness Affect the Course Of COVID-19: The Importance of Exercise Training in Times of Crisis. (Ako pravidelná pohybová aktivita a fyzická zdatnosť ovplyvňujú). 2. Kongres Slovenskej obezitologickej asociácie a 18. Slovenské obezitologické dni, ZBORNÍK ABSTRAKTOV, s. 58-59 (vitrual meeting – webinar series) 14 a 21.10.2020

UKROPCOVA Barbara. Brain and metabolism: systemic effects of physical activity and their mechanisms. (Mozog a metabolizmus: systémové účinky pohybovej aktivity a ich mechanizmy). 7. Slovenský neuropsychiatrický kongres 10. - 12. jún 2021, Grandhotel Praha, Tatranská Lomnica.

UKROPEC, Jozef - BALÁŽ, M - VARGA, L - KRŠŠÁK, M - ŠTEFANIČKA, P - KIEFER, F - WOLFRUM, C - UKROPCOVÁ, B. Metabolic and thermogenic activity of brown adipose tissue and chronic metabolic diseases in humans. (Metabolická a termogénna aktivita hnedého tukového tkaniva a chronické metabolické ochorenia u človeka). XXXIX. Endokrinologické dni, 29.9. – 1.10.2016, Hotel DoubleTree by Hilton Košice, sekcia -Diabetes metabolizmus.

UKROPEC Jozef, SEDLIAK Milan, TURČANI Peter, VALKOVIČ Peter, KRŠŠÁK Martin, UKROPCOVA Barbara. Molecular exercise physiology against chronic diseases and for healthy ageing. In Book of Abstracts, p. 11, 2017. (Workshop of the Slovak Academy of Sciences with the national university of Singapore, the Nanyang national technological university and the agency for science, technology and research (Singapore) 13-17.3 Smolenice Castle, Slovakia).

UKROPCOVA Barbara, **UKROPEC Jozef**. Patophysiology of obesity and its consequences: impact of physical (in)activity on arterial hypertension. (Patofyziológia obezity a jej dôsledky: vplyv fyzickej (in)activity na artériovú hypertenziu). XXXII. Kongres slovenskej hypertenziologickej spoločnosti SLS 30. marec – 1. apríl 2017. Nízke Tatry, Tále, Hotel Partizán www.hypertenzia.org

UKROPEC, Jozef - TOMKOVÁ, Mária - SCHON, Martin - SLOBODOVÁ, Lucia - NEMEC, Michal - TIRPÁKOVÁ, Veronika – SUTOVSKÝ, Stanislav - TURČÁNI, Peter CVEČKA, J. - VALKOVIČ, Peter - SEDLIAK, M. – UKROPCOVÁ, Barbara. The effects of strength-aerobic training on the metabolic and endocrine properties of skeletal muscle in relation to the metabolic and cognitive health of the elderly.
(Účinky silovo-aeróbneho tréningu na metabolické a endokrinné vlastnosti kostrového svalu vo vzťahu k metabolickému a kognitívnemu zdraviu seniorov). Národný kongres telovýchovného lekárstva - Aktuálne problémy telovýchovného lekárstva - 6. 6. - 7. 6. 2019. Bratislava

2.3.11. List of researchers who served as members of organising and programme committees of national conferences

Competition of young neuroscientists dedicated to the memory of Prof. MUDr. Jozef Maršala, DrSc., February 3, 2017, Košice
Main organizer
Program and Organisation: GÁLIK Ján

Competition of young neuroscientists dedicated to the memory of Prof. MUDr. Jozef Maršala, DrSc., February 4, 2019, Košice
Main organizer
Program and Organisation: GÁLIK Ján
The competition is dedicated to the memory of a prominent scientist and university teacher, Professor Jozef Marsala, MD, DSc., who was one of the founders of neuroscience research in Slovakia, the founder and long-term director of the Institute of Neurobiology of the Slovak Academy of Sciences in Kosice and the founder of the Slovak Society for Neurosciences at the Slovak Academy of Sciences. The competition is organized by the Institute of Neurobiology at least once every 3 years. It takes place on February, which is the anniversary of the birth of Prof. Jozef Marsala, MD, DSc.

Competition of young oncologists 2016, March 9. 2016 Košice.
co-organised with Cancer Research Foundation
Organisation Committee Members: KLOBUŠICKÁ Margita, ČIERNIKOVÁ Soňa, BOHOVIČ Roman, BÍZIK Jozef, SEDLÁK Ján, SEDLÁKOVÁ Katarína

Competition of young oncologists 2018, March 7. 2018 Martin
co-organised with Cancer Research Foundation
Organisation Committee Members: KLOBUŠICKÁ Margita, ČIERNIKOVÁ Soňa, BOHOVIČ Roman, BÍZIK Jozef, BROZMANOVÁ Jela, SEDLÁK Ján, SEDLÁKOVÁ Katarína
The aim of the competition is to enable young enthusiasts in the field of cancer research to meet and provide them with the opportunity to present their interest, knowledge, ideas, but also the results of their work to a professional evaluation committee. In this way, the foundation provides young people interested in solving oncological problems with the opportunity to gain new knowledge, experience, confront the results of their experimental work with the results of others and the opportunity to establish new contacts and cooperation with more experienced colleagues. The competition of young oncologists is teaching them to appear before experts and defend the results of their work. The foundation rewards the best 3 works in each of four categories: High School Student, University Student, University Student-Doctoral Student and in the category Young Researcher under 35 with a PhD. study.

16th Slovak Congress on Obesity with international participation
Held in:Žilina, Holliday Inn
Date: October 26-27, 2018
Number of participants: 90
Role: Co-organizeed with Obesitology section of Slovak Diabetes Society
Program Committee Members: FÁBRYOVÁ Ľubomíra (congress prezident), UKROPCOVÁ Barbara, UKROPEC Jozef (scientific secretary)
Organisation Committee Members:FÁBRYOVÁ Ľubomíra, MINÁRIK Peter, SCHONMartin UKROPCOVÁ Barbara, UKROPEC Jozef

1st Congress of Slovak Obesity Association and 17th Slovak Congress of Obesity
Held in: Trnava, Holliday Inn
Date: October 25-26, 2019
Number of participants: 90
Role: Co-organizeed with Slovak Obesity Association
Program Committee Members: FÁBRYOVÁ Ľubomíra (congress prezident), GAŠPERÍKOVÁ Daniela, MINÁRIK Peter, PENESOVÁ Adela, UKROPCOVÁ Barbara, UKROPEC Jozef (scientific secretary)
Organisation Committee Members: FÁBRYOVÁ Ľubomíra, MINÁRIK Peter, UKROPCOVÁ Barbara, UKROPEC Jozef

2nd Congress of Slovak Obesity Association and 18th Slovak Congress of Obesity
Held in: Bratislava, online
Date: October 14 and 21, 2020
Number of participants: 700
Role: Co-organizeed with Slovak Obesity Association
Program Committee Members: FÁBRYOVÁ Ľubomíra (congress prezident), GAŠPERÍKOVÁ Daniela, MINÁRIK Peter, PENESOVÁ Adela, UKROPCOVÁ Barbara, UKROPEC Jozef (scientific secretary)
Organisation Committee Members: FÁBRYOVÁ Ľubomíra, MINÁRIK Peter, UKROPCOVÁ Barbara, UKROPEC Jozef

3rd Congress of Slovak Obesity Association and 19th Slovak Congress of Obesity
Held in: Bratislava, online
Date: October 21-23, 2021
Number of participants: 800
Role: Co-organizeed with Slovak Obesity Association
Program Committee Members: FÁBRYOVÁ Ľubomíra (congress prezident), GAŠPERÍKOVÁ Daniela, MINÁRIK Peter, PENESOVÁ Adela, UKROPCOVÁ Barbara, UKROPEC Jozef (scientific secretary)
Organisation Committee Members: FÁBRYOVÁ Ľubomíra, MINÁRIK Peter, UKROPCOVÁ Barbara, UKROPEC Jozef

2.3.12. List of researchers who received a national scientific award

The awards from non-professional bodies with reflection in general public are denoted in blue.

BÁNOVÁ, Radivojka
Student personality of Slovakia in the academic year 2017/2018 awarded by Junior Chamber International – Slovakia, for the best potential societal impact of research

BETÁKOVÁ, Tatiana
Award of SAS for popularisation and societal impact of research during COVID-19 pandemics (2021)

BRTKO, Július
Premium award by thy Slovak Literary Fund for the life-long contribution to research
Silver medal of the Slovak Medical Society for the life-long contribution to the Society

ČABANOVÁ, Viktória
Young personality in science and technology award by the Ministry of Education, Sciences, Research and Sport for the outstanding research in ecology of mosquito-borne flaviviruses, namely West Nile and Usutu viruses, causing serious human diseases (2020)

GÁBELOVÁ, Alena
Award of SAS for the international research collaboration in nanomedicine (2021)

GAŠPERÍKOVÁ, Daniela
Best publication award of the Slovak Society of Diabetology (2016, 2018)
Best team in Science and Technology award by the Ministry of Education, Sciences, Research and Sport for identification of new genetic causes of metabolic diseases (2018)
Nomination for the Slovak Women of the year 2020 in Science and research category

GROSSMANNOVÁ, Katarína
Best presentation award by the Slovak Society of Angiology (2021)

CHOVANCOVÁ, Barbora
Excellent PhD student award by the Dean of thin Brre Faculty of Natural Sciences, Comenius University in Bratislava (2018)

JEŽOVÁ, Daniela
Medal of the Faculty of Pharmacology, Comenius University in Bratislava (2017)
Medal of the Slovak Society of Pharmacology for the long-life contribution to Slovak pharmacology (2019)
Medal of the Rector of the Comenius University in Bratislava at the occasion of 100th anniversary of the University (2019)
Premium award by thy Slovak Literary Fund for the development of Slovak science (2020)

KÁDAŠI, Ľudevít
Gold Medal of the Slovak Medical Society (2017)

KAJANOVÁ, Ivana
Special award of Ludmila Sedlárová-Rabanová awarded ny OZ Natura for the excellent publication (2020)
Honorable mention in the SAS competition of young researchers in Life Sciences section of the SAS (2021)

KLEMPA, Boris
Personality in science and technology award by the Ministry of Education, Sciences, Research and Sport for the outstanding research in molecular epidemiology of viruses causing serious infections in humans and for development of global virology (2017)
ESET Science Award finalist in category Outstanding personality of Slovak Science (2020)
ESET Science Award of public (2020)
Crystal Wing award in Medicine and research category for outstanding contribution to fight against COVID-19 pandemics (2021)
Honorable citizenship of Old Town Bratislava for outstanding contribution to fight against COVID-19 pandemics (2021)
Award of SAS for popularisation and societal impact of research during COVID-19 pandemics (2021)

KLIMEŠ, Iwar
Imrich Sečanský award of the Obesitology Secsion of the Slovak Society of Diabetology for contribution to the field of obesitology (2017)

KONČEKOVÁ, Jana
2nd place for presentation at the "Young Neuroscientists and Cutting-Edge Research" conference

KOPÁČEK, Juraj
Award of SAS for popularisation and societal impact of research during COVID-19 pandemics (2021)

KOVANIČOVÁ, Zuzana
Award of SAS for top publication in Nature (2021)

KRIŽANOVÁ, Oľga
Premium award by thy Slovak Literary Fund for the 3-years citation impact in category of natural and medical sciences (2019)
Award of SAS for high citation impact (2021)

KUBIRITOVÁ-PÖS, Zuzana
1st place for best contribution of young researcher awarded by the Slovak Society of Medical genetics at the XXX. Izakovič memorial 2019
Honorable mention of the Dean of the Faculty of Natural Sciences, Comenius University in Bratislava for the results in genetic diagnostics (2019)
Student personality of Slovakia in the academic year 2020/2021 awarded by Junior Chamber International – Slovakia, in category Natural sciences and chemistry

KUČEROVÁ, Lucia
LÓreal UNESCO for Women in Science award for research dedicated to isolation and analysis of cells with metastatic propensity in breast carcinoma (2017)

KURDIOVÁ Timea
Premium award by thy Slovak Literary Fund for the outstanding citation impact of the publication in natural and medical sciences (2019)

MARŠALA Martin
Medal of SAS for the outstanding research outputs contributing to credit of SAS (2017)

MIKLÍKOVÁ, Svetlana
ESET Science Award finalist in category Outstanding young personality of Slovak Science (2020)
L'Óreal UNESCO for Women in Science award (2020)

PASTOREKOVÁ, Silvia
State decoration Rad Ľudovíta Štúra of the II. Class for outstanding contribution to development of science awarded by the President of the Slovak Republic Zuzana Čaputová
Award of SAS for popularisation and societal impact of research during COVID-19 pandemics (2021)

PENESOVÁ, Adela
Nomination for the Slovak Women of the year 2018 in Science and research category

PLAVÁ, Jana
3rd place in XIII. Scientific conference of PhD students, Faculty of Medicine, Comenius University in Bratislava (2018)
2nd place in XIV. Scientific conference of PhD students, Faculty of Medicine, Comenius University in Bratislava (2019)
1st place in XV. Scientific conference of PhD students, Faculty of Medicine, Comenius University in Bratislava (2020y)
Student personality of Slovakia in the academic year 2018/2019 awarded by Junior Chamber International – Slovakia, in category Medical sciences and pharmacology
Travel fellowship awards of SAIA, Ministry of Education, Sciences, Research and Sport and Tatra bank foundation
AXA Innovator 2019 grant awarded by AXA Slovakia and Czech Republic, and Pontis Foundation
1st place in the SAS competition of young researchers in Life Sciences section of the SAS (2021)

REICHOVÁ, Alexandra
2nd place in the SAS competition of young researchers in Life Sciences section of the SAS (2021)

ROŠKA, Ján
Čestné uznanie for publication output awarded by SAS in the competition of PhD students (2021)

SCHMIDTOVÁ, Silvia
3rd place in the Competition of young oncologists awarded by the Cancer Research Foundation (2018)
Student personality of Slovakia in the academic year 2017/2018 awarded by Junior Chamber International – Slovakia, in category Medical sciences and pharmacology
Top student personality of Slovakia in the academic year 2017/2018 awarded by Junior Chamber International – Slovakia, absolute winner
Travel fellowship awards of SAIA for 6 moths research stay in Princess Maxima Center, Utrecht, Netherlands (2019)
L'Óreal UNESCO for Women in Science award (2020)

SEDLÁK, Ján
Honourable medal of Dionyz Blaškovič for contribution to biological sciences (2021)

ŠKOPKOVÁ, Martina
Best publication award of the Slovak Society of Diabetology (2017)

UKROPCOVÁ, Barbora
Slovak woman of the year 2017 in Science and Education category and Absolute winner of the Slovak woman of the year 2017 for the research on obesity and the role of skeletal muscle as a mediator of adaptive response to physical activity
Senior Friendly Award 2021 for outstanding activities for seniors in form of training programs in the Centre of Physical Activity BMC SAS

UKROPEC, Jozef
Premium award by thy Slovak Literary Fund for the outstanding publication (2019)
Award of SAS for the teamwork on outstanding research results presented in collection of publications (2021)
Award of SAS for top publication in Nature (2021)
ESET Science Award finalist in category Outstanding personality of Slovak Science (2021)

VAREČKOVÁ, Eva
Patočka medal awarded by the Czechoslovak Society of Microbiology (2017)

ZAHRADNÍK, Ivan
Silver medal of the Slovak Medical Society for the contribution to medical sciences (2021)

ZAHRADNÍKOVÁ, Alexandra
Silver medal of the Slovak Medical Society for the contribution to the field of physiology (2019)

2.4. Research grants and other funding resources

List includes information on type of project, title, grant number, duration, total funding and funding for the institute, responsible person in the institute and his/her status in the project, e.g. coordinator "C", work package leader "W", task leader „T", investigator "I", national contact „NC", Management Committee member „MC".

International projects and funding

2.4.1 List of major projects of Framework Programmes of the EU (which pillar), NATO, COST, etc.

EU Framework, Horizon and Health projects

1. Title: **Anti-tick Vaccines to Prevent Tick-borne Diseases in Europe**
Pillar: Cooperation: Health
Grant scheme: CP-FP, Small or medium-scale focused research project
Programme: FP7-HEALTH.2013.2.3.4-1 Neglected infectious diseases of Central and Eastern Europe
Grant Agreement ID: 602272
Acronym: ANTIDotE
Start: 1 December 2013
End: 30 November 2018
Coordinated by: Academic Medical Center at the University of Amsterdam, The Netherlands
Number of partners: 6
Total funding: 2 999 785 €
Funding for the BMC SAS: 255 920 €
Responsible person on behalf of the BMC SAS: Boris Klempa (I)
https://cordis.europa.eu/project/id/602272

2. Title: **Clinical Development of Nitisinone for Alkaptonuria**
Pillar: Cooperation: Health
Grant scheme: CP-FP, Small or medium-scale focused research project
Programme: HEALTH.2012.2.4.4-1 Preclinical and/or clinical development of substances with a clear potential as orphan drugs
Grant Agreement ID: 304985
Acronym: DevelopAKUre
Start: 1 November 2012
End: 31 January 2019
Coordinated by: Royal Liverpool University Hospital Trust, The United Kingdom
Number of partners: 9
Total funding: 5 999 999 €
Funding for the BMC SAS: 41 695 €
Responsible person on behalf of the BMC SAS: Andrea Zaťková (I)
https://cordis.europa.eu/project/id/304985

3. Title: **Building-up Centre of Excellence for advanced materials application**
Pillar: WIDESPREAD-1-2014-Teaming
Grant scheme: SGA-CSA, Specific Grant agreement and Coordination and Support Action
Programme: H2020-EU.4.a. Teaming of excellent research institutions and low performing RDI regions
Grant Agreement ID: 664337
Acronym: CEMEA
Start: 1 June 2015
End: 31 May 2016
Coordinated by: Slovak Academy of Sciences, Slovakia
Number of partners: 3
Total funding: 390 300 €
Funding for the BMC SAS: no direct funding for BMC SAS
Responsible person on behalf of the BMC SAS: Silvia Pastoreková (I)
https://cordis.europa.eu/project/id/664337

4. Title: **High level Integrated SEnsor for Nano Toxicity Screening**
Pillar: Industrial Leadership
Grant scheme: RIA, Research and Innovation action
Programme: H2020-EU.2.1.2.2. Ensuring the safe and sustainable development and application of nanotechnologies, NMP-29-2015 Increasing the capacity to perform nanosafety assessment
Grant Agreement ID: 685817
Acronym: HISENTS
Start: 1 April 2016
End: 31 March 2019
Coordinated by: University of Leeds, The United Kingdom
Number of partners: 10
Total funding: 6 332 825 €
Funding for the BMC SAS: 300 000 €
Responsible person on behalf of the BMC SAS: Alena Gábelová (T)
https://cordis.europa.eu/project/id/685817

5. Title: **European virus archive goes global**
Pillar: Excellent Science
Grant scheme: RIA, Research and Innovation action
Programme: H2020-EU.1.4.1.2. Integrating and opening existing national and regional research infrastructures of European interest, INFRAIA-1-2014-2015 Integrating and opening existing national and regional research infrastructures of European interest
Grant Agreement ID: 653316
Acronym: EVAg
Start: 1 April 2015
End: 31 July 2020
Coordinated by: Aix-Marseille University, France
Number of partners: 25
Total funding: 10 792 868 €
Funding for the BMC SAS: 323 785,61 €
Responsible person on behalf of the BMC SAS: Boris Klempa (I)
https://cordis.europa.eu/project/id/653316 , https://www.european-virus-archive.com/

6. Title: **Life Science Alliance: Closing Research and Innovation Divide in the EU**
Pillar: Societal challenges
Grant scheme: CSA - Coordination and support action
Programme: H2020-EU.3.1.6. Health care provision and integrated care,
SC1-HCO-08-2017 Actions to bridge the divide in European health research and innovation

Grant agreement ID: 779303
Acronym: Alliance4Life
Start: 1 January 2018
End: 31 December 2019
Coordinated by: CEITEC, Masaryk University, Czechia
Number of partners: 9
Total funding: 944 652,50 €
Funding for the BMC SAS: 68 750 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková (I)
https://alliance4life.ceitec.cz, https://cordis.europa.eu/project/id/779303

7. Title: **Innovative Partnership for Action Against Cancer**
Pillar: HEALTH
Programme: Third Health Programme Joint Action
Grant agreement ID: 801520
Acronym: iPAAC
Start: 1 April 2018
End: 31 December 2021
Coordinated by: National Institute of Public Health of the Republic of Slovenia
Number of partners: 23
Total funding: 4 500 000 €
Funding for the BMC SAS: 34 737,62 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková (I)
https://www.ipaac.eu

8. Title: **Strategies to strengthen scientific excellence and innoVation capaclty for early diagnoSIs of gastrOintestinal caNcers**
Pillar: Spreading Excellence and Widening Participation
Grant scheme: CSA, Coordination and support action
Programme: H2020-EU.4.b. Twinning of research institutions, WIDESPREAD-03-2018 Twinning
Grant Agreement ID: 857381
Acronym: VISION
Start: 1 October 2019
End: 30 June 2023
Coordinated by: BMC SAS
Number of partners: 4
Total funding: 787 465 €
Funding for the BMC SAS: 270 000 €
Responsible person on behalf of the BMC SAS: Alena Gábelová (C)
https://cordis.europa.eu/project/id/857381 , http://vision.sav.sk/

9. Title: **European virus archive GLOBAL**
Pillar: Excellent Science
Grant scheme: RIA, Research and Innovation action
Programme: H2020-EU.1.4.1.2. Integrating and opening existing national and regional research infrastructures of European interest, INFRAIA-01-2018-2019 Integrating Activities for Advanced Communities
Grant Agreement ID: 871029
Acronym: EVA-GLOBAL
Start: 1 January 2020
End: 31 December 2023
Coordinated by: Aix-Marseille University, France
Number of partners: 34
Total funding: 13 902 748,75 €
Funding for the BMC SAS: 354 517,49 €
Responsible person on behalf of the BMC SAS: Boris Klempa (I)
https://cordis.europa.eu/project/id/871029 , https://www.european-virus-archive.com/

10. Title: **Alliance for Life Sciences: From Strategies to Actions in Central and Eastern Europe**
Pillar: Societal challenges
Grant scheme: CSA, Coordination and support action
Program: H2020-EU.3.1. SOCIETAL CHALLENGES - Health, demographic change and well-being, SC1-HCO-03-2020 - Bridging the divide in health research and innovation – boosting return on investment
Grant agreement ID: 964997
Acronym: A4L_ACTIONS
Start: 1 May 2021
End: 30 April 2024
Coordinated by: CEITEC, Masaryk University, Czechia
Number of partners: 11
Total funding: 1 999 932,50 €

Funding for the BMC SAS: 149 537,50 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková (W)
https://alliance4life.ceitec.cz, https://cordis.europa.eu/project/id/964997

11. Title: **Tick-Virus Interactions Shape persistence and Transmission OF Flavivirus pathogen in tick vector**
Pillar: Excellent Science
Grant scheme: MSCA-IF-EF-RI, Reintegration panel
Programme: H2020-EU.1.3.2. Nurturing excellence by means of cross-border and cross-sector mobility, MSCA-IF-2020 Individual Fellowships
Grant Agreement ID: 101030179
Acronym: TVISTOFF
Start: 1 September 2021
End: 31 August 2023
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 155 364,48 €
Funding for the BMC SAS: 155 364,48 €
Responsible person on behalf of the BMC SAS: Juraj Koči
https://cordis.europa.eu/project/id/101030179

12. Title: **VACCELERATE - European Corona Vaccine Trial Accelerator Platform**
Pillar: Societal challenges
Grant scheme: RIA, Research and Innovation action
Programme: H2020-EU.3.1.3. Treating and managing disease, IBA-SC1-CORONAVIRUS-2020-4 EU-wide Covid-19 vaccine trial network
Grant Agreement ID: 101037867
Acronym: VACCELERATE
Start: 28 January 2021
End: 27 January 2024
Coordinated by: University Hospital Cologne, Germany
Number of partners: 28
Total funding: 26 499 804,49 €
Funding for the BMC SAS: 92 361,25 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková (I)
https://cordis.europa.eu/project/id/101037867 , https://vaccelerate.eu/

COST projects

1. Title: **Sustainable production of high-quality cherries for the European market**
Grant Agreement ID: FA1104
Start: 15 April 2013
End: 15 April 2016
Coordinated by: National Research Institute for Agriculture, France
Number of partners: 18
Funding for the BMC SAS: 8 332 €
Responsible person on behalf of the BMC SAS: Miroslav Glasa (MC)
https://www.bordeaux.inra.fr/cherry/ , https://www.cost.eu/actions/FA1104/

2. Title: **The Comet assay as a human biomonitoring tool**
Grant Agreement ID: CA15132
Acronym: hCOMET
Start: 1 April 2016
End: 31 March 2020
Coordinated by: University of Oslo, Norway
Number of partners: 14
Funding for the BMC SAS: 12 500 €
Responsible person on behalf of the BMC SAS: Alena Gábelová (MC)
https://www.hcomet.eu/ , https://www.cost.eu/actions/CA15132/

3. Title: **Application of next generation sequencing for the study and diagnosis of plant viral diseases in agriculture**
Grant Agreement ID: FA1407
Start: 9 March 2015
End: 8 March 2019
Coordinated by: Gembloux Agro-Bio Tech, University of Liège, France
Number of partners: 29
Funding for the BMC SAS: 16 000 €
Responsible person on behalf of the BMC SAS: Miroslav Glasa (MC)

https://www.cost.eu/actions/FA1407/

4. Title: **European Network of Bioadhesion Expertise: Fundamental Knowledge to Inspire Advanced Bonding Technologies**
Grant Agreement ID: CA15216
Acronym: ENBA
Start: 1 January 2017
End: 20 April 2021
Coordinated by: Kiel University, Germany
Number of partners: 14
Funding for the BMC SAS: 11 200 €
Responsible person on behalf of the BMC SAS**:** Robert Farkaš (MC)
http://www.enba4.eu/ , https://www.cost.eu/actions/CA15216/

5. Title: **Aldosterone and Mineralocorticoid Receptor**
Grant Agreement ID: BM1301
Acronym: ADMIRE
Start: 23 November 2016
End: 30 November 2017
Coordinated by: INSERM, Paris Sud University, France
Number of partners: 19
Funding for the BMC SAS: 2 709 €
Responsible person on behalf of the BMC SAS: Daniela Ježová (MC)
https://www.cost.eu/actions/BM1301/

6. Title: **In vitro 3-D total cell guidance and fitness**
Grant Agreement ID: CA16119
Acronym: CellFit
Start: 16 March 2017
End: 15 September 2021
Coordinated by: School of Veterinary Medicine, Italy
Number of partners: 32
Funding for the BMC SAS: 12 500 €
Responsible person on behalf of the BMC SAS: Monika Šramková (MC), Andrea Bábelová (MC)
https://cellfit.sites.sheffield.ac.uk/ , https://www.cost.eu/actions/CA16119/

7. Title: **Mitochondrial mapping: Evolution - Age - Gender - Lifestyle – Environment**
Grant Agreement ID: CA15203
Acronym: MITO-EAGLE
Start: 1 January 2017
End: 28 February 2021
Coordinated by: Medical University of Innsbruck, Austria
Number of partners: 30
Funding for the BMC SAS: 10 417 €
Responsible person on behalf of the BMC SAS**:** Jozef Ukropec (MC)
https://www.mitoglobal.org/index.php/MitoEAGLE , https://www.cost.eu/actions/CA15203/

8. Title: **New diagnostic and therapeutic tools against multidrug resistant tumors**
Grant Agreement ID: CA17104
Acronym: STRATAGEM
Start: 11 September 2018
End: 10 September 2022
Coordinated by: University of Torino, Italy
Number of partners: 34
Funding for the BMC SAS: 13 475 €
Responsible person on behalf of the BMC SAS**:** Dana Jurkovičová (MC)
https://stratagem-cost.eu/ , https://www.cost.eu/actions/CA17104/

9. Title: **Cancer Nanomedicine - from the bench to the bedside**
Grant Agreement ID: CA17140
Acronym: NANO2CLINIC
Start: 28 September 2018
End: 27 March 2023
Coordinated by: University of Lodz, Poland
Number of partners: 40
Funding for the BMC SAS: 12 500 €
Responsible person on behalf of the BMC SAS**:** Monika Šramková (MC), Katarína Kozics (MC)
https://www.nano2clinic.eu/ , https://www.cost.eu/actions/CA17140/

10. Title: **Aedes Invasive Mosquitoes**
Grant Agreement ID: CA17108
Acronym: AIM
Start: 29 January 2020
End: 5 March 2023
Coordinated by: Sapienza University of Rome, Italy
Number of partners: 32
Funding for the BMC SAS: 8 125 €
Responsible person on behalf of the BMC SAS: Viktória Čabanová (MC)
https://www.aedescost.eu/ , https://www.cost.eu/actions/CA17108/

11. Title: **Determinants of Physical Activities in Settings**
Grant Agreement ID:
Acronym: DE-PASS (CA19101)
Start: 22 July 2020
End: 21 April 2024
Coordinated by: University of Limerick, Ireland
Number of partners: 35
Funding for the BMC SAS: 10 000 €
Responsible person on behalf of the BMC SAS: Barbara Ukropcová (MC)
https://depass.eu/ , https://www.cost.eu/actions/CA19101/

Project funded by the International Atomic Energy Agency

Title: **Molecular Markers for Biological Dosimetry in Radiation Oncology, Cancer Risk, Assesment and Optimizing Cancer Therapy**
Programme: Coordinated Research Project (CRP) E35010 “Applications of Biological Dosimetry Methods in Radiation Oncology, Nuclear Medicine, and Diagnostic and Interventional Radiology” (MEDBIODOSE)
Start: 19 September 2017
End: 9 July 2023
Coordinated by: International Atomic Energy Agency (IAEA), Austria
Number of partners: 28
Funding for the BMC SAS: 8 000 €
Responsible person on behalf of the BMC SAS: Igor Beliaev (I)
https://www.iaea.org/projects/crp/e35010

Project funded by EEA and Norway Grants

Title: **TBFVnet: surveillance and research on tick-borne flaviviruses**
Grant scheme: EEA and Norway Grants Fund for Regional Cooperation
Programme: Common Challenges – Shared Solutions, Innovation, Research, Education and Competitiveness
Grant Agreement ID: 2018-1-0659
Acronym: TBFV
Start: 1 July 2020
End: 31 January 2024
Coordinated by: Veterinary Research Institute, Czechia
Number of partners: 5
Total funding: 1 195 517 €
Funding for the BMC SAS: 218 250 €
Responsible person on behalf of the BMC SAS: Boris Klempa (I)
https://www.tbfvnet.eu/

Project funded by the International Visegrad Fund

Title: **Q fever biomarker discovery using innovative immunoproteomic and metabolomic approaches**
Grant agreement ID: 21610493
Funding body: International Visegrad Fund
Start: 1.9.2016
End: 31.8.2017
Coordinated by: BMC SAS
Number of partners: 3
Total funding: 25 000 €
Funding for the BMC SAS: 19 997 €
Responsible person on behalf of the BMC SAS: Ľudovít Škultéty

National projects and their funding, incl. international projects with only national funding

2.4.2. List of ERA-NET projects funded from SAS budget

1. Title: **Multiple myeloma intra-clonal heterogeneity: evolution and implications of targeted therapy**
Grant scheme: ERA-NET
Programme: TRANSCAN-2
Acronym: intraMMclo
Start: 1 July 2016
End: 31 July 2020
Coordinated by: BMC SAS
Number of partners: 4
Funding for the BMC SAS: 105 000 €
Responsible person on behalf of the BMC SAS: Jana Jakubíková (C)
https://www.transcanfp7.eu/index.php/abstract/intrammclo.html

2. Title: **MEchanisms of Lymphocytes TRansmigration Across the Blood Brain Barrier**
Grant scheme: ERA-NET
Programme: NEURON II
Acronym: MELTRA – BBB
Start: 1 August 2015
End: 31 July 2018
Coordinated by: Institute for Molecular Medicine University Medical Center, Mainz, Germany
Number of partners: 5
Funding for the BMC SAS: 105 000 €
Responsible person on behalf of the BMC SAS: Adela Penesová (I)
https://www.era-learn.eu/network-information/networks/era-net-neuron-ii/european-research-projects-on-neuroinflammation/mechanisms-of-lymphocytes-transmigration-across-the-blood-brain-barrier

3. Title: **Innovative Nanopharmaceuticals: Targeting Breast Cancer Stem Cells by a Novel Combination of Epigenetic and Anticancer Drugs with Gene Therapy**
Grant scheme: ERA-NET
Programme: EuroNanoMed II
Acronym: INNOCENT
Start: 1 January 2017
End: 30 June 2021
Coordinated by: BMC SAS
Number of partners: 5
Funding for the BMC SAS: 120 000 € (of which 45 000 € co-funded by BMC SAS)
Responsible person on behalf of the BMC SAS: Božena Smolková (C)
http://www.innocent.sav.sk/index.html

4. Title: **UNveiling the MEchanism(s) underlying the switch to mania during antidepressant treatment: The role of glutamate**
Grant scheme: ERA-NET
Programme: NEURON II
Acronym: UNMET
Start: 1 July 2019
End: 31 January 2024
Coordinated by: Radboud University Medical Centre, Donders Institute for Brain, Cognition, and Behaviour, The Netherlands
Number of partners: 4
Funding for the BMC SAS: 120 000 € (of which 45 000 € co-funded by BMC SAS)
Responsible person on behalf of the BMC SAS: Daniela Ježová (I)
https://www.neuron-eranet.eu/projects/UNMET/

5. Title: **Establishing an algorithm for the early diagnosis and follow-up of patients with pancreatic neuroendocrine tumors**
Grant scheme: ERA-NET
Programme: TRANSCAN-2
Acronym: NExT
Start: 1 September 2019
End: 31 March 2023
Coordinated by: Fraunhofer Institute for Biomedical Engineering IBMT, Germany
Number of partners: 5
Funding for the BMC SAS: 105 000 €
Responsible person on behalf of the BMC SAS: Božena Smolková (W)

https://www.next-project.eu/

6. Title: **Resistance under treatment in breast cancer**
Grant scheme: ERA-NET
Programme: ERACoSysMed
Acronym: RESCUER
Start: 1 August 2020
End: 31 May 2024
Coordinated by: University of Oslo, Institute of Basic Medical Sciences, Norway
Number of partners: 5
Funding for the BMC SAS: 120 000 € (of which 45 000 € co-funded by BMC SAS)
Responsible person on behalf of the BMC SAS: Marína Cihová (I)
https://www.era-learn.eu/network-information/networks/eracosysmed/3rd-joint-transnational-call-for-european-research-projects-on-systems-medicine/resistance-under-treatment-in-breast-cancer

7. Title: **TEmperature-responsive Nanogels for TArgeted delivery of miCroRNAs in wound heaLing and tissue rEgeneration applicationS**
Grant scheme: ERA-NET
Programme: EuroNanoMed III
Acronym: TENTACLES
Start: 1 February 2020
End: 31 January 2024
Coordinated by: Bambino Gesù Children's Hospital, Italy
Number of partners: 4
Funding for the BMC SAS: 120 000 € (of which 45 000 € co-funded by BMC SAS)
Responsible person on behalf of the BMC SAS: Monika Šramková (W)
https://www.era-learn.eu/network-information/networks/euronanomed-iii/joint-transnational-call-2019/temperature-responsive-nanogels-for-targeted-delivery-of-micrornas-in-wound-healing-and-tissue-regeneration-applications

8. Title: **Metabolic therapy of heart failure: which role for B vitamins**
Grant scheme: ERA-NET
Programme: ERA-CVD
Acronym: HF-MetaB
Start: 1 April 2020
End: 31 March 2023
Coordinated by: INSERM, Paris Sud University, France
Number of partners: 3
Funding for the BMC SAS: 120 000 € (of which 45 000 € co-funded by BMC SAS)
Responsible person on behalf of the BMC SAS: Alexandra Zahradníková (I)
https://www.era-learn.eu/network-information/networks/era-cvd/era-cvd-joint-transnational-call-2019/201cmetabolic-therapy-of-heart-failure-which-role-for-b-vitamins201d

2.4.3. List of projects of the Slovak Research and Development Agency (APVV)

	Number of APVV projects with BMC SAS as main beneficiary	Number of APVV projects with BMC SAS as partner	Funding (Euro)
2016	34	21	1 406 518
2017	40	25	1 870 082
2018	33	28	1 845 092
2019	36	30	1 913 116
2020	36	34	1 773 861
2021	37	29	1 990 283

Institute of Virology BMC SAS

1. Title: **Usage of next-generation sequencing for virome analysis of medically and economically relevant organisms**
Grant agreement ID: APVV-15-0232
Acronym: NEXVIR
Start: 01.07.2016 End: 30.06.2019

Coordinated by: BMC SAS
Number of partners: 2
Total funding: 248 561 €
Funding for the BMC SAS: 92 990 €
Responsible person on behalf of the BMC SAS: Boris Klempa

2. Title: **Immune response to SARS-CoV-2 infection and development of clinically relevant virological tests to improve the management of the COVID-19 pandemic**
Grant agreement ID: PP-COVID-20-0017
Acronym: IMPROVE
Start: 16.09.2020 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 399 953 €
Funding for the BMC SAS: 270 728 €
Responsible person on behalf of the BMC SAS: Boris Klempa

3. Title: **Developing a high-throughput, sensitive RT-qPCR test and rapid, point-of-care RT-LAMP test for the differentiation of SARS-Cov-2 and influenza**
Grant agreement ID: PP-COVID-20-0116
Acronym: CoV-INFect
Start: 16.09.2020 End: 31.12.2021
Coordinated by: MultiplexDX, Ltd.
Number of partners: 2
Total funding: 396 273 €
Funding for the BMC SAS: 58 584 €
Responsible person on behalf of the BMC SAS: Boris Klempa

4. Title: **Of Sheep, Goats and Tick-borne Encephalitis virus**
Grant agreement ID: APVV-16-0518
Acronym: SGT
Start: 01.07.2017 End: 30.06.2021
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 250 000 €
Funding for the BMC SAS: 100 000 €
Responsible person on behalf of the BMC SAS: Martina Ličková

5. Title: **Functional analysis and production of bioactive substances in insects and ticks**
Grant agreement ID: APVV-18-0201
Start: 1.7.2019 End: 30.6.2023
Coordinated by: Institute of Zoology SAS
Number of partners: 2
Total funding: 230 000 €
Funding for the BMC SAS: 31 700 €
Responsible person on behalf of the BMC SAS: Juraj Koči

6. Title: **Development of innovative approaches to characterise and control the economically important and emerging virus pathogens of cherry crops in Slovakia**
Grant agreement ID: APVV-0174-12
Acronym: CHERVIR
Start: 1.10.2013 End: 30.9.2017
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 242 053 €
Funding for the BMC SAS: 146 350 €
Responsible person on behalf of the BMC SAS: Miroslav Glasa

7. Title**: Effective diagnostics of viruses threatening the production of tomato in Slovakia,** selected among the outstanding APVV projects
Grant agreement ID: APVV-14-0055
Acronym: EDIAVITOS
Start: 01.07.2015 End: 30.06.2019
Coordinated by: National Agricultural and Food Centre, Research Institute of Plant Production
Number of partners: 2
Total funding: 249 936 €
Funding for the BMC SAS: 99 290 €
Responsible person on behalf of the BMC SAS: Miroslav Glasa

8. Title: **Metagenomic approach for the identification and characterization of viral diseases in selected medicinal plant species**
Grant agreement ID: APVV-16-0026
Acronym: METVIDIS
Start: 01.07.2017 End: 30.06.2021
Coordinated by: University of Žilina, Institute of High Mountain Biology
Number of partners: 1
Total funding: 249 161 €
Funding for the BMC SAS: 123 984 €
Responsible person on behalf of the BMC SAS: Miroslav Glasa

9. Title: **Analysis of factors affecting a crop response to the potyvirus infection at the molecular and cellular level**
Grant Agreement ID: APVV-18-0005
Acronym: POTYPLANT
Start: 1.7.2019 End: 30.6.2023
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 230 000 €
Funding for the BMC SAS: 120 608 €
Responsible person on behalf of the BMC SAS: Miroslav Glasa

10. Title: **Modern "omics" approaches as effective tools for identification and characterization of leguminous viral pathogens**
Grant agreement ID: APVV-20-0015
Acronym: LEGOMICS
Start: 01.07.2021 End: 30.06.2025
Coordinated by: University of SS. Cyril and Methodius in Trnava, Faculty of Natural Sciences of UCM
Number of partners: 1
Total funding: 249 925 €
Funding for the BMC SAS: 120 000 €
Responsible person on behalf of the BMC SAS: Miroslav Glasa

11. Title: **Prevention and mechanism of synergy of influenza and bacterial coinfection**
Grant agreement ID: APVV-17-0445
Acronym: FLUBAC SYNERGY
Start: 01.08.2018 End: 30.06.2022
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 247 000 €
Funding for the BMC SAS: 247 000 €
Responsible person on behalf of the BMC SAS: Eva Varečková

12. Title: **Immune modulation by cytomegalovirus and its immunotherapeutic potential**
Grant agreement ID: APVV-14-0839
Acronym: IMMUNOMOD
Start: 1.07.2015 End: 30.06.2019
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 187 684 €
Funding for the BMC SAS: 131 405 €
Responsible person on behalf of the BMC SAS: Ivana Nemčovičová

13. Title: **Development of bioimmunotherapeutics inspired by viral tricks: TREATing despite the TRICKs**
Grant agreement ID: APVV-19-0376
Acronym: BIOTREAT
Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 140 000 €
Funding for the BMC SAS: 110 000 €
Responsible person on behalf of the BMC SAS: Ivana Nemčovičová

14. Title: **Biochip systems for targeted glycan analysis of biomarkers for biomedical and biotechnological applications**
Grant agreement ID: APVV-20-0243
Acronym: GLYCO4BIO
Start: 01.07.2021 End: 30.06.2025
Coordinated by: Institute of Chemistry SAS
Number of partners: 2

Total funding: 220 000 €
Funding for the BMC SAS: 24 000 €
Responsible person on behalf of the BMC SAS: Ivana Nemčovičová

15. Title: **New Antiviral Drugs: Design, Synthesis and Activity Evaluation of Specific Inhibitors of Viral Proteases of Coronavirus SARS-CoV-2**
Grant agreement ID: PP-COVID-20-0010
Acronym: CoViDrugs
Start: 16.09.2020 End: 31.12.2021
Coordinated by: University of Ss. Cyril and Methodius in Trnava
Number of partners: 1
Total funding: 370 421 €
Funding for the BMC SAS: 56 006 €
Responsible person on behalf of the BMC SAS: Ivana Nemčovičová

16. Title: **Biological significance and pharmacological features of bioactive proteins in tick saliva**
Grant agreement ID: APVV-0737-12
Acronym: BIOFARTIS
Start: 1.10.2013 End: 30.9.2017
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 164 295 €
Funding for the BMC SAS: 137 347 €
Responsible person on behalf of the BMC SAS: Iveta Štibrániová

17. Title: **Murine gammaherpesvirus, a producent of substances exhibiting immunomodulatory and antiproliferative properties**
Grant agreement ID: APVV-0621-12
Acronym: MUHESIA
Start: 1.10.2013 End: 30.9.2017
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 165 513 €
Funding for the BMC SAS: 114 265 €
Responsible person on behalf of the BMC SAS: Marcela Kúdelová

18. Title: **The identification of EBHS virus and selected pathogens as possible cause of the European brown hare (Lepus europaeus) population decline in Slovakia**
Grant agreement ID: APVV-15-0474
Acronym: IPABH
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Research Institute for Animal Production Nitra, National Agricultural and Food Centre
Number of partners: 1
Total funding: 249 962 €
Funding for the BMC SAS: 100 000 €
Responsible person on behalf of the BMC SAS: Marcela Kúdelová

19. Title: **Research of a barrier fabric for a community face half mask and protective clothing**
Grant agreement ID: APVV-20-0234
Acronym: OCHRANA COVID-19
Start: 01.07.2021 End: 30.06.2023
Coordinated by: VUCHT-CHEMITEX, Ltd.
Number of partners: 1
Total funding: 250 000 €
Funding for the BMC SAS: 50 000 €
Responsible person on behalf of the BMC SAS: Vladimír Zelník

20. Title: **Characterization of novel motif in M1 protein of influenza A virus and using NS1 deletion mutants in tumor therapy**
Grant agreement ID: APVV-0676-12
Acronym: NOMODENS
Start: 1.10.2013 End: 30.9.2017
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 200 000 €
Funding for the BMC SAS: 200 000 €
Responsible person on behalf of the BMC SAS: Tatiana Betáková

21. Title: **The role of neuropeptides and receptors in regulation of pathogen transfer from ticks to their hosts**
Grant agreement ID: APVV-14-0556
Acronym: Tick
Start: 01.07.2015 End: 30.06.2019
Coordinated by: Institute of Zoology SAS
Number of partners: 1
Total funding: 211 985 €
Funding for the BMC SAS: 34 307 €
Responsible person on behalf of the BMC SAS: Eva Špitálska

22. Title: **Ecology of host specificity in vector-borne parasites**
Grant agreement ID: APVV-16-0463
Acronym: MALBOR-ECO
Start: 01.07.2017 End: 30.06.2021
Coordinated by: Institute of Zoology SAS
Number of partners: 1
Total funding:223 369
Funding for the BMC SAS: 57 288
Responsible person on behalf of the BMC SAS: Eva Špitálska

23. Title: **Host cell interaction with Coxiella burnetii: identification and utilization of novel therapeutic and diagnostic targets**
Grant agreement ID: APVV-19-0519
Acronym: COXHOST
Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 249 977 €
Funding for the BMC SAS: 249 977 €
Responsible person on behalf of the BMC SAS: Ľudovít Škultéty

24. Title: **Preparation of erythropoietin a therapeutic hormone affecting the production of red blood cells by expression in eukaryotic cell system and its further purification,** selected among the outstanding APVV projects
Grant agreement ID: APVV-14-0474
Acronym: PEEECS
Start: 01.07.2015 End: 30.06.2019
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 998 €
Funding for the BMC SAS: 144 998 €
Responsible person on behalf of the BMC SAS: Ľudovít Škultéty

25. Title: **Research of biomarkers for diagnosis of rickettsiae, coxiella burnetii and related organisms by state-of-art immunoproteomic and molecular biologic methods**
Grant agreement ID: APVV-0280-12
Acronym: BIOMARIK
Duration: 1.10.2013 End: 30.9.2017
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 198 502 €
Funding for the BMC SAS: 198 502 €
Responsible person on behalf of the BMC SAS: Zuzana Sekeyová

26. Title: **Investigation of the Host – Parasite, Cell - Rickettsia Relationship, Monitored by Transcriptomic and Proteome Studies**
Grant agreement ID: APVV-19-0066
Acronym: RICTRANSPROT
Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 239 971 €
Funding for the BMC SAS: 239 971 €
Responsible person on behalf of the BMC SAS: Zuzana Sekeyová

27. Title: **Role of microenvironment and B-cell immunity in the spontaneous regression of MM patients undergoing high dose therapy and autologous stem cell transplantation**
Grant agreement ID: APVV-0854-12
Acronym: AALS-CAI
Start: 01.10.2013 End: 30.6.2017

Coordinated by: BMC SAS
Number of partners: 0
Total funding: 199 714 €
Funding for the BMC SAS: 199 714 €
Responsible person on behalf of the BMC SAS: Ján Lakota

28. Title: **Disclosure of the molecular mechanism of spontaneous tumor regression followed by the development of novel prognostic tool**
Grant agreement ID: APVV-18-0340
Acronym: NMSR
Start: 1.7.2019 End: 30.6.2023
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 249 977 €
Funding for the BMC SAS: 249 977 €
Responsible person on behalf of the BMC SAS: Lenka Minichová

29. Title: **The role of CA IX in adaptation to tumor microenvironment and in resistance to anticancer therapy: molecular mechanisms and clinical implications,** selected among the outstanding APVV projects
Grant agreement ID: APVV-15-0697
Acronym: TUMICAR
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 249 938 €
Funding for the BMC SAS: 249 938 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

30. Title: **Cell-in-cell phenomena as microevolutionary processes in cancer progression: a role for hypoxia-induced carbonic anhydrase IX**
Grant agreement ID: APVV-19-0098
Acronym: CA(9)NNIBAL
Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 243 968 €
Funding for the BMC SAS: 243 968 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

31. Title: **Elucidation of novel pro-metastatic functions of tumor-associated carbonic anhydrase IX and its cross-talk with pro-inflammatory response**
Grant agreement ID: APVV-14-0816
Acronym: METSCA(IX)
Start: 01.07.2015 End: 30.6.2019
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 245 320 €
Funding for the BMC SAS: 245 320 €
Responsible person on behalf of the BMC SAS: Eliška Švastová

32. Title: **Cytokine profiling together with carbonic anhydrase IX immunotargeting as a promising tool in diagnostics and treatment of pancreatic cancer**
Grant agreement ID: APVV-20-0480
Acronym: CYTPROCA(IX)
Start: 1.7.2021 End: 30.6.2025
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 701 €
Funding for the BMC SAS: 199 698 €
Responsible person on behalf of the BMC SAS: Eliška Švastová

33. Title: **Impact of comorbidity therapy on tumorigenesis and a role of the tumor microenvironment in this process**
Grant agreement ID: APVV-16-0343
Acronym: COMTUMI
Start: 01.07.2017 End: 30.06.2021
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 055 €

Funding for the BMC SAS: 209 055 €
Responsible person on behalf of the BMC SAS: Monika Baráthová

34. Title: **Biochips and biosensors for glycorecognition, their development, preparation and application in cancer research**
Grant agreement ID: APVV-14-0753
Acronym: BIOGLYCO
Start: 01.07.2015 End: 30.06.2019
Coordinated by: Institute of Chemistry SAS
Number of partners: 1
Total funding: 250 000 €
Funding for the BMC SAS: 28 000 €
Responsible person on behalf of the BMC SAS: Eliška Švastová

35. Title: **Graphene-based nanoplatform for detection of cancer**
Grant agreement ID: APVV-14-0120
Acronym: GONanoplatform
Start: 01.07.2015 End: 30.06.2019
Coordinated by: Polymer Institute SAS
Number of partners: 1
Total funding: 246 332 €
Funding for the BMC SAS: 59 802 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

36. Title: **Nanomedical approach to fight pancreatic cancer via targeting tumor-associated carbonic anhydrase IX**
Grant agreement ID: APVV-20-0485
Acronym: NanoCAre
Start: 1.7.2021 End: 30.6.2025
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 226 000 €
Funding for the BMC SAS: 127 018 €
Responsible person on behalf of the BMC SAS: Lucia Csáderová

37. Title: **Development of unique TiMg composite dental implant**
Grant agreement ID: APVV-20-0417
Acronym: DITIMA
Start: 1.7.2021 End: 30.6.2025
Coordinated by: Institute of materials and machine mechanics SAS
Number of partners: 1
Total funding: 249 908 €
Funding for the BMC SAS: 19 846 €
Responsible person on behalf of the BMC SAS: Martina Takáčová

38. Title: **Activity assay of transfer factor, immunostimulatory drug from extract of Leukocytes and standardization of its preparation**
Grant agreement ID: APVV-15-0720
Acronym: IMUTRAFAK
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 249 800 €
Funding for the BMC SAS: 249 800 €
Responsible person on behalf of the BMC SAS: Juraj Kopáček

39. Title: **Intelligent monitoring of wastewater in order to create a system of early warning of the population of the Slovak Republic against the spread of COVID-19**
Grant agreement ID: PP-COVID-20-0019
Acronym: RaDeSARS
Start: 16.09.2020 End: 31.12.2021
Coordinated by: The Slovak University of Technology in Bratislava
Number of partners: 2
Total funding: 399 661 €
Funding for the BMC SAS: 35 000 €
Responsible person on behalf of the BMC SAS: Juraj Kopáček

40. Title: **Large-capacity cleaning of airborne pathogens**
Grant agreement ID: PP-COVID-20-0098
Acronym: SARSkill

Start: 16.09.2020 End: 31.12.2021
Coordinated by: The Institute of Materials and Machine Mechanics SAS
Number of partners: 2
Total funding: 241 741 €
Funding for the BMC SAS: 82 235 €
Responsible person on behalf of the BMC SAS: Juraj Kopáček

Institute of Experimental Endocrinology BMC SAS

41. Title: **Molecular mediators of physical exercise and carnosine induced effects in patients with preclinical and early stage neurodegenerative disease**
Grant agreement ID: APVV-15-0253
Acronym: EMBRACE- Exercising Muscle
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 2
Total funding: 249 180 €
Funding for the BMC SAS: 170 175 €
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

42. Title: **Identification of biomarkers associated with late toxicity of chemotherapy in testicular germ cell tumors**
Grant agreement ID: APVV-15-0086
Acronym: IBANTOXCGNT
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1
Total funding: 236 789 €
Funding for the BMC SAS: 121 566 €
Responsible person on behalf of the BMC SAS: Jozef Ukropec

43. Title: **Identification and validation of biomarkers and underlying molecular pathways of late toxicity of curative treatment in testicular germ cell tumors**
Grant agreement ID: APVV-19-0411
Acronym: TESTOX
Start: 1.7.2020 End: 30.6.2024
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 249 122 €
Funding for the BMC SAS: 136 556 €
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

44. Title: **Ameliorating Effects of Aging by Physical Exercise: Molecular, Metabolic and Structural Adaptations, Multi-Organ Integrative Approach**
Grant agreement ID: APVV-20-0466
Acronym: AMETHYST
Start: 1.7.2021 End: 30.6.2025
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 249 992 €
Funding for the BMC SAS: 249 992 €
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

45. Title: **Molecular-genetic research with pharmacogenetic consequences in children with hyperinsulinemic hypoglycemia**
Grant agreement ID: APVV-0107-12
Acronym: HH-GÉN
Start: 1.10.2013 End: 30.9.2017
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1
Total funding: 193 423 €
Funding for the BMC SAS: 139 021 €
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

46. Title: **Identification of new genetic aspects of monogenic endocrinopathies by next generation sequencing**
Grant agreement ID: APVV-0187-12
Acronym: ENDONEXT
Start: 1.10.2013
End: 30.9.2017

Coordinated by: BMC SAS
Number of partners: 1
Total funding: 199 971 €
Funding for the BMC SAS: 173 305 €
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

47. Title: **Identification of novel gene variants of hereditary hearing loss based on nationwide screening**
Grant agreement ID: APVV-15-0067
Acronym: DEAFGEN
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1
Total funding: 249 983 €
Funding for the BMC SAS: 171 522 €
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

48. Title: **Genetic causes of rare diseases with emphasis on metabolic disorders associated with hypoglycemia and mitochondiopathies**
Grant agreement ID: APVV-17-0296
Acronym: HYPOMITGEN
Start: 01.08.2018 End: 31.07.2022
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 985 €
Funding for the BMC SAS: 200 000 €
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

49. Title: **Identification of novel genetic variants in syndromic hearing loss by whole exome sequencing**
Grant agreement ID: APVV-20-0236
Acronym: SYNDEAF
Start: 01.07.2021 End: 30.06.2025
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1
Total funding: 249 748 €
Funding for the BMC SAS: 139 408 €
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

50. Title: **Cognitive, personal and psychophysiological factors of the stress in thecontext of the relationship between anxiety and allergies and their optimalisation**
Grant agreement ID: APVV-0496-12
Acronym: COGPSYCHSTRESS
Start: 1.10.2013 End: 30.9.2017
Coordinated by: Faculty of Arts, Comenius University Bratislava
Number of partners: 2
Total funding: 245 943 €
Funding for the BMC SAS: 94 585 €
Responsible person on behalf of the BMC SAS: Daniela Ježová

51. Title: **Interaction of nitrergic, neurotrophic and endocrine signaling in the etiopathogenesis of schizophrenia**
Grant agreement ID: APVV-14-0840
Acronym: NOSCHIZ
Start: 01.07.2015 End: 30.06.2019
Coordinated by: Centre of Experimental Medicine SAS
Number of partners: 1
Total funding: 248 970 €
Funding for the BMC SAS: 123 475 €
Responsible person on behalf of the BMC SAS: Daniela Ježová

52. Title: **Molecular bases of depressive disorders in children and adolescents, effect of omega-3 fatty acids and oxidative stress**
Grant agreement ID: APVV-15-0063
Acronym: DEPOXIN
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1
Total funding: 250 000 €
Funding for the BMC SAS: 40 650 €
Responsible person on behalf of the BMC SAS: Daniela Ježová

53. Title: **Identification of psychological and somatic markers in relation to vulnerability to stress and analysis of the effectiveness of psychological interventions**
Grant agreement ID: APVV-17-0451
Acronym: PSYSOMSTRESS
Start: 01.08.2018 End: 31.07.2022
Coordinated by: Comenius University in Bratislava, Faculty of Philosophy
Number of partners: 1
Total funding: 210 000 €
Funding for the BMC SAS: 86 802 €
Responsible person on behalf of the BMC SAS: Daniela Ježová

54. Title: **Bridge between the mental state and neuroendocrine function of mother and her child: the mechanisms involved**
Grant agreement ID: APVV-18-0283
Acronym: BRIDGE
Start: 1.7.2019 End: 30.6.2023
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 279 533 €
Funding for the BMC SAS: 249 035 €
Responsible person on behalf of the BMC SAS: Daniela Ježová

55. Title: **Activation of the VGF/BDNF/TrkB pathway by synthetic mRNA encapsulated in polyplex nanoparticles: effects on neural excitability, neuroplasticity and animal behavior**
Grant agreement ID: APVV-20-0202
Acronym: Nano-Neuro-Plast
Start: 01.07.2021 End: 30.06.2025
Coordinated by: Centre of Biosciences SAS
Number of partners: 1
Total funding: 250 000 €
Funding for the BMC SAS: 60 120 €
Responsible person on behalf of the BMC SAS: Daniela Ježová

56. Title: **Prenatal and postnatal effects of delta and mu opioid receptor ligands on the hippocampal development and function**
Grant agreement ID: APVV-15-0388
Acronym: HippoOR
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Centre of Experimental Medicine SAS
Number of partners: 1
Total funding: 249 991 €
Funding for the BMC SAS: 75 680 €
Responsible person on behalf of the BMC SAS: Nataša Hlaváčová

57. Title: **Effect of flavonoids and mycotoxins on adipose tissue. The influence of metabolic status, inflammation and oxidative stress,** selected among the outstanding APVV projects
Grant agreement ID: APVV-15-0229
Acronym: FLAMADIP
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 249 852 €
Funding for the BMC SAS: 112 490 €
Responsible person on behalf of the BMC SAS: Štefan Zorad

58. Title: **Experimental approaches in vitro and in vivo to innovative therapy of rheumatoid arthritis based on molecular-pharmacological principles**
Grant agreement ID: APVV-15-0308
Acronym: MOFAREX
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Centre of Experimental Medicine SAS
Number of partners: 1
Total funding: 247 526 €
Funding for the BMC SAS: 9 900 €
Responsible person on behalf of the BMC SAS: Štefan Zorad

59. Title: **New regulatory effects of nitric oxide and their role in the development of essential hypertension**
Grant agreement ID: APVV-15-0565
Acronym: NO-NEW-REG
Start: 01.07.0216 End: 30.06.2020
Coordinated by: Centre of Experimental Medicine SAS
Number of partners: 1
Total funding: 248 000 €
Funding for the BMC SAS: 48 000 €
Responsible person on behalf of the BMC SAS: Štefan Zorad

60. Title: **Cardiometabolic effects of Mas receptor stimulation by modulation of the renin-angiotensin system - the key role of angiotensin-converting enzyme**
Grant agreement ID: APVV-20-0421
Acronym: ACE2MAS
Start: 1.7.2021 End: 30.6.2025
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 248 771 €
Funding for the BMC SAS: 174 482 €
Responsible person on behalf of the BMC SAS: Štefan Zorad

61. Title: **New perspectives in the treatment of cardiovascular complications associated with COVID-19**
Grant agreement ID: PP-COVID-20-0043
Acronym: ACE2-TX-TXZF
Start: 16.09.2020 End: 31.12.2021
Coordinated by: The Centre of Experimental Medicine SAS
Number of partners: 2
Total funding: 399 787 €
Funding for the BMC SAS: 20 406 €
Responsible person on behalf of the BMC SAS: Štefan Zorad

62. Title: **Potential risk of use of analogs of endocrine disruptor Bisphenol A: determination of cellular and molecular effects in a spectrum of in vitro gonadal cell cultures**
Grant agreement ID: APVV-18-0150
Acronym: BISRISK
Start: 1.7.2019 End: 30.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 149 367 €
Funding for the BMC SAS: 149 367 €
Responsible person on behalf of the BMC SAS: Alžbeta Bujňáková Mlynarčíková

63. Title: **Possible dual function of P-glycoprotein in leukemia cells: efflux pump and regulatory protein**
Grant agreement ID: APVV-14-0334
Acronym: PEGREG
Start: 01.07.2015 End: 31.10.2018
Coordinated by: Centre of Biosciences SAS
Number of partners: 4
Total funding: 250 000 €
Funding for the BMC SAS: 9 000 €
Responsible person on behalf of the BMC SAS: Július Brtko

64. Title: **Novel synergistic antitumour properties of nuclear retinoid X receptor (RXR) agonists as a consequence of the conditional RXR-RAR heterodimer formation in human breast cancer cells**
Grant agreement ID: APVV-15-0372
Acronym: SYNEREX
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 814 €
Funding for the BMC SAS: 169 168 €
Responsible person on behalf of the BMC SAS: Július Brtko

65. Title: **Multidrug resistance of leukemia cells - Phenotype caused by interference of multimodal molecular reasons**
Grant agreement ID: APVV-19-0093
Acronym: LEBRE
Start: 1.7.2020 End: 30.5.2024

Coordinated by: Centre of Biosciences SAS
Number of partners: 3
Total funding: 230 000 €
Funding for the BMC SAS: 10 172 €
Responsible person on behalf of the BMC SAS: Július Brtko

66. Title: **Molecular mechanisms of trialkyl-/triaryltin isothiocyanates' and carboxylates' antitumour properties - novel ligands of nuclear retinoid X receptors in rat mammary gland carcinomas and human tumour cell lines**
Grant Agreement ID: APVV-20-0314
Acronym: IZITIOVIVO
Start: 1.7.2021 End: 30.6.2025
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 180 000 €
Funding for the BMC SAS: 150 912 €
Responsible person on behalf of the BMC SAS: Dana Macejová

67. Title: **Potential risk of metal and metal oxide nanoparticles used for biomedical applications: focus on reproductive and immune systems and brain**
Grant agreement ID: APVV-15-0296
Acronym: ENDONANOSAFE
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 248 000 €
Funding for the BMC SAS: 90 500 €
Responsible person on behalf of the BMC SAS: Soňa Scsuková

68. Title: **Alterations in neuritogenesis related to neurodevelopment**
Grant agreement ID: APVV-15-0205
Acronym: neuritogenéza
Start: 01.07.2016 End: 30.06.2019
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 185 725 €
Funding for the BMC SAS: 131 443 €
Responsible person on behalf of the BMC SAS: Ján Bakoš

69. Title: **Investigation of anatomical-functional differences between the effects of aripiprazole and quetiapine, atypical antipsychotics with similar therapeutic indications, but different impact on brain dopaminergic receptors, in experimental animals**
Grant agreement ID: APVV-15-0037
Acronym: ARIQUET
Start: 01.07.2016
End: 30.6.2020
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 240 000 €
Funding for the BMC SAS: 160 000 €
Responsible person on behalf of the BMC SAS: Alexander Kiss

70. Title: **Neurobiological research of cancer: Investigation of bi-directional interactions between the nervous system and the tumor**
Grant agreement ID: APVV-17-0090
Acronym: NeuroOnco
Start: 01.08.2018 End: 31.07.2022
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1
Total funding: 241 569 €
Funding for the BMC SAS: 122 249 €
Responsible person on behalf of the BMC SAS: Andrej Tillinger

71. Title: **Cytoarchitecture of calcium signaling in cardiac myocytes in the development of myocardial hypertrophy**
Grant agreement ID: APVV-15-0302
Acronym: CAMYS
Start: 01.07.2016 End: 30.06.2019

Coordinated by: Centre of Biosciences (to 05/2018) and BMC SAS (from 06/2018)
Number of partners: 1
Total funding: 250 000 €
Funding for the BMC SAS: 109 310 €
Responsible person on behalf of the BMC SAS: Alexandra Zahradníková

72. Title: **Regulation of Pericellular Proteolysis: From Molecular Mechanisms To Novel Immune Cell Subsets and Therapeutic Tools**
Grant agreement ID: APVV-16-0452
Acronym: PPIS
Start: 01.07.2017 End: 30.06.2021
Coordinated by: Institute of Molecular Biology SAS
Number of partners: 0
Total funding: 193 000 €
Funding for the BMC SAS: 18 031 €
Responsible person on behalf of the BMC SAS: Alexandra Zahradníková, jr.

73. Title: **Identification of molecular-genetic determinants of apocrine secretion**
Grant Agreement ID: APVV-16-0219
Acronym: APPOCRIGEN
Start: 01.07.2017 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 190 000 €
Funding for the BMC SAS: 178 230 €
Responsible person on behalf of the BMC SAS: Robert Farkaš

Cancer Research Institute BMC SAS

74. Title: **Identification and validation of signalling pathways associated with circulating tumor cells in breast cancer**
Grant Agreement ID: APVV-16-0010
Acronym: CTC
Start: 01.07.2017 End: 30.06.2021
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1
Total funding: 249 624 €
Funding for the BMC SAS: 59 964 €
Responsible person on behalf of the BMC SAS: Lucia Kučerová

75. Title: **Mechanisms of interactions and bystander effect mediated by mesenchymal stromal cells expressing prodrug-converting genes on tumour stem cells**
Grant Agreement ID: APVV-0052-12
Acronym: IMpETUS
Start: 1.10.2013 End: 30.9.2017
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 170 000 €
Funding for the BMC SAS: 170 000 €
Responsible person on behalf of the BMC SAS: Miroslava Matúšková

76. Title: **Mechanism of the mesenchymal stromal cell-induced tolerance to antitumor treatment and targeted therapeutic intervention in the breast cancer cells**
Grant agreement ID: APVV-16-0178
Acronym: Tolerance
Start: 01.07.2017 End: 30.06.2021
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 185 280 €
Funding for the BMC SAS: 231 600 €
Responsible person on behalf of the BMC SAS: Svetlana Miklíková

77. Title: **Identification of new treatment options in refractory testicular germ cell tumors**
Grant agreement ID: APVV-20-0158
Acronym: REZTEST
Start: 01.07.2021 End: 30.06.2025
Coordinated by: Comenius University in Bratislava, Faculty of Medicine in Bratislava
Number of partners: 1

Total funding: 249 772 €
Funding for the BMC SAS: 62 023 €
Responsible person on behalf of the BMC SAS: Silvia Schmidtová

78. Title: **Suicide gene therapy mediated by mesenchymal stromal and pancreatic tumor cell-excreted extracellular vesicles in the treatment of pancreatic ductal adenocarcinoma**
Grant agreement ID: APVV-20-0143
Acronym: ExoTREAT
Start: 01.07.2021 End: 30.06.2025
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 250 000 €
Funding for the BMC SAS: 164 000 €
Responsible person on behalf of the BMC SAS: Marína Cihová

79. Title: **TArgetiNg Dna mEthylation by epigenetic editing and its implementation into personalised diagnostics and therapy of uveal Melanoma**
Grant agreement ID: APVV-17-0369
Acronym: TANDEM
Start: 01.08.2018 End: 30.06.2022
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 000 €
Funding for the BMC SAS: 164 000 €
Responsible person on behalf of the BMC SAS: Božena Smolková

80. Title: **Development of novel diagnostic method for clinical oncology based on the interaction of DNA aptamers with proteins**
Grant agreement ID: APVV-14-0267
Acronym: APTADIAG
Start: 01.07.2015 End: 30.06.2019
Coordinated by: Comenius University in Bratislava, Faculty of Mathematics Physics and Informatics
Number of partners: 1
Total funding: 216 541 €
Funding for the BMC SAS: 40 103 €
Responsible person on behalf of the BMC SAS: Jozef Bizík

81. Title: **Study of repair of chemotherapy-induced DNA damage using Saccharomyces cerevisiae as a model system**
Grant agreement ID: APVV-14-0783
Acronym: Oncologyeast
Start: 01.07.2015 End: 30.06.2018
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 178 671 €
Funding for the BMC SAS: 178 671 €
Responsible person on behalf of the BMC SAS: Miroslav Chovanec

82. Title: **Turning cisplatin-resistant testicular germ cell tumors into a curable disease**
Grant agreement ID: APVV-17-0384
Acronym: TestCure
Start: 01.08.2018 End: 30.06.2021
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 250 000 €
Funding for the BMC SAS: 250 000 €
Responsible person on behalf of the BMC SAS: Miroslav Chovanec

83. Title: **Is HIF-1a a master regulator of DNA repiar capacity and chemotherapy response in testicular germ cell tumors?**
Grant agreement ID: APVV-19-0286
Acronym: MiReCheT
Start: 1.7.2020 End: 30.6.2023
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 190 000 €
Funding for the BMC SAS: 190 000 €
Responsible person on behalf of the BMC SAS: Dana Jurkovičová

84. Title: **Role of essential protein kinases in regulation of meiotic chromosome segregation**
Grant agreement ID: APVV-0111-12
Acronym: KINSEG
Start: 1.10.2013 End: 30.9.2016
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 136 625
Funding for the BMC SAS: 114 750
Responsible person on behalf of the BMC SAS: Ľuboš Čipák

85. Title: **Unravelling the mechanisms of post-translational regulation of RNA splicing factors in maintenance of genome integrity**
Grant Agreement ID: APVV-16-0120
Acronym: SPLICONC
Start: 01.07.2017 End: 30.06.2021
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 210 000 €
Funding for the BMC SAS: 158 671 €
Responsible person on behalf of the BMC SAS: Ľuboš Čipák

86. Title: **Post-translational regulation of pre-mRNA splicing factors**
Grant agreement ID: APVV-20-0141
Acronym: KINSPL
Start: 01.07.2021 End: 30.06.2024
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 180 000 €
Funding for the BMC SAS: 145 000 €
Responsible person on behalf of the BMC SAS: Ľuboš Čipák

87. Title: **Dbl2 protein as a novel regulator of genome stability and dynamics in fission yeast**
Grant agreement ID: APVV-18-0219
Acronym: Dbl2
Start: 1.7.2019 End: 30.6.2022
Coordinated by: Centre of Biosciences SAS
Number of partners: 1
Total funding: 230 000 €
Funding for the BMC SAS: 50 199 €
Responsible person on behalf of the BMC SAS: Ľuboš Čipák

88. Title: **Regulation of the Swi5-Sfr1 complex by protein phosphorylation**
Grant agreement ID: APVV-17-0130
Acronym: SWIREG
Start: 01.08.2018 End: 30.06.2022
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 249 552 €
Funding for the BMC SAS: 40 727 €
Responsible person on behalf of the BMC SAS: Ingrid Čipáková

89. Title: **Chemoenzymatic synthesis and evaluation of biological activities of natural glycophenolics and their analogues**
Grant agreement ID: APVV-0846-12
Acronym: GLYCOPHEN
Start: 01.10.2013 End: 30.09.2017
Coordinated by: Institute of Chemistry SAS
Number of partners: 1
Total funding: 173 500 €
Funding for the BMC SAS: 56 150 €
Responsible person on behalf of the BMC SAS: Eva Horváthová

90. Title: **Multivalent morpholino-based antisense system for CML**
Grant agreement ID: APVV-15-0215
Acronym: MOR4CML
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Polymer Institute SAS (until 12/2017), Comenius University in Bratislava, Faculty of Medicine in Bratislava (from 2018)
Number of partners: 1

Total funding: 249 999 €
Funding for the BMC SAS: 75 927 €
Responsible person on behalf of the BMC SAS: Alena Gábelová

91. Title: **Preclinical validation of an innovative antisense platform for CML**
Grant agreement ID: APVV-19-0070
Acronym: PRO4CML
Start: 1.7.2020 End: 30.6.2024
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 250 000 €
Funding for the BMC SAS: 75 867 €
Responsible person on behalf of the BMC SAS: Andrea Bábelová

92. Title: **Gold nanoparticles: impact of physicochemical properties on distribution, accumulation, and biological response in vivo**
Grant agreement ID: APVV-16-0579
Acronym: BIONANOGOLD
Start: 01.07.2017 End: 30.6.2021
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 170 000 €
Funding for the BMC SAS: 153 006 €
Responsible person on behalf of the BMC SAS: Andrea Bábelová

93. Title: **Novel renal antisense therapy platform for CKD**
Grant agreement ID: APVV-20-0494
Acronym: RENASTHERA
Start: 1.7.2021 End: 30.6.2025
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 230 570 €
Funding for the BMC SAS: 132 570 €
Responsible person on behalf of the BMC SAS: Andrea Bábelová

94. Title: **Targeted inhibition of SARS-CoV-2 by a new generation RNA inhibitor**
Grant agreement ID: PP-COVID-20-0007
Acronym: ASCOVIDA
Start: 16.09.2020 End: 31.12.2021
Coordinated by: SELECTA BIOTECH SE
Number of partners: 1
Total funding: 399 736 €
Funding for the BMC SAS: 50 181 €
Responsible person on behalf of the BMC SAS: Andrea Bábelová

95. Title: **DNA damage REsponse and preleukemic Clones in hematopoietic stem cells in diagnOstics, Risk estimation and treatment of peDiatric leukemia**
Grant agreement ID: APVV-15-0250
Acronym: RECORD
Start: 01.07.2016 End: 30.06.2019
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 972 €
Funding for the BMC SAS: 225 984 €
Responsible person on behalf of the BMC SAS: Igor Beliaev

96. Title: **Tumor heterogeneity in multiple myeloma: evolution and clinical relevance**
Grant agreement ID: APVV-16-0484
Acronym: MMclo
Start: 01.07.2017 End: 30.6.2021
Coordinated by: BMC SAS
Number of partners: 3
Total funding: 249 989 €
Funding for the BMC SAS: 206 310 €
Responsible person on behalf of the BMC SAS: Jana Jakubíková

97. Title: **Preparation of new antibiotics and antitumor agents by manipulations of secondary metabolite genes and synthetic biology methods**
Grant agreement ID: APVV-19-0009

Start: 1.7.2020 End: 30.6.2024
Coordinated by: Institute of Molecular Biology SAS
Number of partners: 1
Total funding: 200 000 €
Funding for the BMC SAS: 22 160 €
Responsible person on behalf of the BMC SAS: Jana Jakubíková

98. Title: **Cancer immunoediting in multiple myeloma: immune checkpoints and clinical significance**
Grant agreement ID: APVV-20-0183
Acronym: iMMunoedit
Start: 01.08.2021 End: 30.06.2025
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 229 931 €
Funding for the BMC SAS: 185 487 €
Responsible person on behalf of the BMC SAS: Jana Jakubíková

99. Title: **Harnessing the immunological mechanisms in various subtypes of B cell lymphoma**
Grant agreement ID: APVV-19-0212
Acronym: IMUNOCHECK
Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 424 €
Funding for the BMC SAS: 202 355 €
Responsible person on behalf of the BMC SAS: Dana Cholujová

100. Title: **Prognostic biomarker for colorectal carcinoma based on miRNA analysis and characterization of selected proteins in the circadian context**
Grant agreement ID: APVV-14-0318
Acronym: AMICIS
Start: 01.07.2015 End: 30.06.2019
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 248 986 €
Funding for the BMC SAS: 97 190 €
Responsible person on behalf of the BMC SAS: Ján Sedlák

101. Title: **The application of myrosinase for sulforaphane activation in development of a novel product exhibiting cancer prevention effects**
Grant agreement ID: APVV-16-0439
Acronym: MASnPNO
Start: 01.07.2017 End: 30.06.2021
Coordinated by: Slovak University of Technology in Bratislava, Faculty of Chemical and Food Technology
Number of partners: 1
Total funding: 248 739 €
Funding for the BMC SAS: 34 346 €
Responsible person on behalf of the BMC SAS: Ján Sedlák

Institute of Clinical and Translational Research BMC SAS

102. Title: **Multiple sclerosis -The role of mitochondrial dysfunction in insulin resistance**
Grant agreement ID: APVV-15-0228
Acronym: (MS-MIDI)
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 249 697 €
Funding for the BMC SAS: 190 265 €
Responsible person on behalf of the BMC SAS: Richard Imrich

103. Title: **Effect of physical activity and nutrition on gut microbiota modification in healthy subjects and patients with a non - communicable diseases**
Grant agreement ID: APVV-17-0099
Acronym: MICROBIOM
Start: 01.08.2018 End: 30.06.2022
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 210 000 €

Funding for the BMC SAS: 30 080 €
Responsible person on behalf of the BMC SAS: Adela Penesová

104. Title: **Functional analysis of newly identified DNA variants in genes responsible for cystic fibrosis and fenylketonuria**
Grant agreement ID: APVV-0240-12
Acronym: CFTRaPAH
Start: 1.10.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 143 950 €
Funding for the BMC SAS: 41 978 €
Responsible person on behalf of the BMC SAS: Ľudevít Kadáši

105. Title: **Development and testing of molecular and informatic tools for effective characterisation and interpretation of clinically relevant microsatellite repetitive motifs from genomic data**
Grant agreement ID: APVV-18-0319
Acronym: GenoMicsat
Start: 1.7.2019 End: 30.6.2023
Coordinated by: GENETON s.r.o.
Number of partners: 2
Total funding: 240 000 €
Funding for the BMC SAS: 78 002 €
Responsible person on behalf of the BMC SAS: Ján Radvánszky

106. Title: **Utilization of the calcium transport blockers as potential chemotherapeutics in a treatment of solid tumors**
Grant agreement ID: APVV-16-0246
Acronym: CATS
Start: 01.07.2017 End: 30.06.2021
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 229 500 €
Funding for the BMC SAS: 229 500 €
Responsible person on behalf of the BMC SAS: Oľga Križanová

107. Title: **Interactions of calcium transport systems in carcinogenesis**
Grant agreement ID: APVV-20-0176
Acronym: CATCA
Start: 01.07.2021 End: 30.06.2025
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 249 210 €
Funding for the BMC SAS: 249 210 €
Responsible person on behalf of the BMC SAS: Oľga Križanová

108. Title: **Sulfide signaling as a potential mechanism in tumor´s treatment**
Grant agreement ID: APVV-14-0351
Acronym: SULCANC
Start: 01.07.2015 End: 30.06.2019
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 245 872 €
Funding for the BMC SAS: 245 872 €
Responsible person on behalf of the BMC SAS: Soňa Hudecová

109. Title: **Study of biological effects of H2S/NO products and molecular mechanism of their actions**
Grant agreement ID: APVV-15-0371
Acronym: H2S-NO
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 200 000 €
Funding for the BMC SAS: 168 831 €
Responsible person on behalf of the BMC SAS: Karol Ondriaš

110. Title: **Study of biological effects of H2S/NO/selenium products and molecular mechanisms of their actions**
Grant agreement ID: APVV-19-0154
Acronym: HNOSES

Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 2
Total funding: 160 000 €
Funding for the BMC SAS: 136 800 €
Responsible person on behalf of the BMC SAS: Karol Ondriaš

Institute of Neurobiology BMC SAS

111. Title: **Axonal regeneration in biosynthetic nerve guide conduits**
Grant agreement ID: APVV-14-0847
Acronym: REGENER
Start: 01.07.2015 End: 30.06.2019
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 240 718 €
Funding for the BMC SAS: 88 127 €
Responsible person on behalf of the BMC SAS: Ivo Vanický

112. Title: **Investigation of potential and role of the central canal lining in regeneration of the spinal cord**
Grant agreement ID: APVV-15-0239
Acronym: STEMCELL
Start: 01.07.2016 End: 30.06.2020
Coordinated by: Pavol Jozef Šafárik University in Košice, Faculty of Science
Number of partners: 1
Total funding: 150 000 €
Funding for the BMC SAS: 27 005 €
Responsible person on behalf of the BMC SAS: Enikó Račeková

113. Title: **Neurotransmitter-mediated regulation of postnatal neurogenesis in the rat olfactory system under physiological and pathological conditions**
Grant agreement ID: APVV-19-0279
Acronym: IMUNOCHECK
Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 120 000 €
Funding for the BMC SAS: 72 000 €
Responsible person on behalf of the BMC SAS: Enikó Račeková

114. Title: **The application of combined therapy to suppress secondary damage after spinal cord trauma**
Grant agreement ID: APVV-15-0766
Start: 01.07.2016 End: 30.06.2020
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 245 278 €
Funding for the BMC SAS: 146 155 €
Responsible person on behalf of the BMC SAS: Nadežda Lukáčová

115. Title: **The development of translationally relevant regenerative and reparative strategies after spinal cord trauma**
Grant agreement ID: APVV-19-0324
Acronym: Regenerácia poranenej miechy
Start: 1.7.2020 End: 30.6.2024
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 220 000 €
Funding for the BMC SAS: 176 000 €
Responsible person on behalf of the BMC SAS: Nadežda Lukáčová

116. Title: **The neuroprotection of synergic effect of the AT1 receptor blockade and AT2 receptor stimulation after traumatic spinal cord injury**
Grant agreement ID: APVV-18-0163
Acronym: SCIATR
Start: 1.7.2019 End: 30.6.2023
Coordinated by: BMC SAS
Total funding: 225 372 €
Funding for the BMC SAS: 225 372 €
Responsible person on behalf of the BMC SAS: Jaroslav Pavel

2.4.4. List of projects of the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA)

	Number of VEGA projects with BMC SAS as main beneficiary	Number of VEGA projects with BMC SAS as partner	Funding (Euro)
2016	81	6	562 162
2017	82	4	612 434
2018	76	7	613 096
2019	77	8	600 222
2020	74	11	586 441
2021	72	14	583 038

Institute of Virology BMC SAS

1. Title: **Hantaviruses and crossing of the species barriers**
Grant agreement ID: VEGA 2/0174/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Boris Klemp

2. Title: **The virus, the tick, and blood: gene expression analysis of the tick Ixodes ricinus in the context of tick-borne encephalitis virus infection and feeding**
Grant agreement ID: VEGA 2/0191/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Sabína Fumačová Havlíková

3. Title: **Virulence factors of tickborne encephalitis virus and their role in transmission via tick vector**
Grant agreement ID: VEGA 2/0138/19
Start: 1.1.2019
End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Juraj Koči

4. Title: **Ecology of West Nile virus in globally changing environment**
Grant agreement ID: VEGA 2/0140/21
Start: 1.1.2021
End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 2
Responsible person on behalf of the BMC SAS: Viktória Čabanová

5. Title: **Directed modification of a potyviral protein for analysis of molecular interactions with the host plant**
Grant agreement ID: VEGA 2/0001/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zdeno Šubr

6. Title: **Molecular epidemiology of viruses of fruit trees and grapevines across the agroecological interface**
Grant agreement ID: VEGA 2/0036/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miroslav Glasa

7. Title: **Analysis of the virome complexity and intra-species diversity from agricultural and wild plants in various agroecological contexts**
Grant agreement ID: VEGA 2/0030/20

Start: 1.1.2020
End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miroslav Glasa

8. Title: **Proteomic analysis of the plum pox virus (PPV) / Prunus avium (cherry) interaction and factors of the virus adaptation to the host**
Grant agreement ID: VEGA 2/0124/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Slavomíra Nováková

9. Title: **Occurrence and variability of economically important crop viruses under greenhouse conditions in Slovakia and analysis of epidemiological factors affecting their virulence and spread**
Grant agreement ID: VEGA 2/0032/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Lukáš Predajňa

10. Title: **Structural and functional studies of conservative proteins of influenza viruses in host's environment**
Grant agreement ID: VEGA 2/0100/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: František Kostolanský

11. Title: **Posttranslational modifications of the influenza A virus proteins and its role during the infection cycle**
Grant agreement ID: VEGA 2/0152/14
Start: 1.1.2014 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ivan Košík

12. Title: **Modulation of immunogenicity of HA2 immunogen as potential candidate for preparation of cross-protective influenza vaccine**
Grant agreement ID: VEGA 2/0153/14
Start: 1.1.2014 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Bobišová

13. Title: **Impact of LCMV infection on the activity of HIF-regulated signal transduction pathways**
Grant agreement ID: VEGA 2/0053/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jana Tomášková

14. Title: **Fusion activity of influenza A haemagglutinin as a factor of virulence and pathogenicity**
Grant agreement ID: VEGA 2/0146/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Varečková

15. Title: **Induction of antiviral immunity with recombinant influenza virus on mouse model**
Grant agreement ID: VEGA 2/0106/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: František Kostolanský

16. Title: **Impact of infection with avian influenza virus on secondary bacterial infection**
Grant agreement ID: VEGA 2/0055/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS

Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Bobišová

17. Title: **Antiviral therapy and vaccination as tools for lowering the course of influenza and bacterial coinfection**
Grant agreement ID: VEGA 2/0048/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Varečková

18. Title: **The mechanism of action of virus-specific cross-reactive antibodies on dual infection with influenza virus and bacteria**
Grant agreement ID: VEGA 2/0090/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Karolína Tomčíková

19. Title: **Reprogramming of host cell metabolism induced by lymphocytic choriomeningitis virus infection**
Grant agreement ID: VEGA 2/0030/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jana Tomášková

20. Title: **Immunological and immunomodulatory abilities of murine herpes virus with regard to the production of the growth factors**
Grant agreement ID: VEGA 1/0262/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: Faculty of Natural Sciences, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Iveta Štibrániová

21. Title: **Bioactive molecules in tick saliva and their exploitation in the regulation of cell processes in physiological and physiological conditions**
Grant agreement ID: VEGA 2/0089/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Iveta Štibrániová

22. Title: **Monitoring of tick saliva immunomodulators effects on innate antiviral responses of skin**
Grant agreement ID: VEGA 2/0047/18
Start: 1.1.20218
End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Iveta Štibrániová

23. Title: **Effect of salivary gland extracts derived from different tick species on induction and biological activity of interferon-lambda 1**
Grant agreement ID: VEGA 2/0199/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Pavlína Bartíková

24. Title: **Isolation, identification and characterization of transforming growth factor-beta 1 binding molecule(s) in tick salivary gland extracts**
Grant agreement ID: VEGA 2/0172/19
Start: 1.1.2019
End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Pavlína Bartíková

25. Title: **Murine herpesvirus, a model to study human oncogenic herpesviruses: viral imunomodulatory M3 protein and factors important for virus spread among hosts**
Grant agreement ID: VEGA 2/0091/13

Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marcela Kúdelová

26. Title: **Imunomodulatory properties of the murine herpesvirus M3 protein and the role of ticks in herpesvirus circulation in nature**
Grant agreement ID: VEGA 2/0087/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marcela Kúdelová

27. Title: **Herpesviral immunomodulators as novel candidates in therapy of cancer and inflammatory diseases**
Grant agreement ID: VEGA 2/0063/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marcela Kúdelová

28. Title: **The analysis of bioactive substances associated with Murine herpesvirus with antiproliferative and immunomodulatory properties in vitro and in vivo**
Grant agreement ID: VEGA 1/0061/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: Faculty of Natural Sciences, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Martina Labudová

29. Title: **The role of vitamin D and interferons type III in gammaherpesvirus oncogenesis**
Grant agreement ID: VEGA 2/0144/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ingeborg Režuchová

30. Title: **Factors effecting production of cell-free Marek's disease virus particles in vivo in chicken and in vitro in cell culture**
Grant agreement ID: VEGA 2/0005/14
Start: 1.1.2014 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Vladimír Zelník

31. Title: **Biological and binding properties of clinically significant viral immunomodulators and their immunotherapeutic potential**
Grant agreement ID: VEGA 2/0103/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ivana Nemčovičová

32. Title: **Molecular immunerecognition of viral UL144 glycoprotein by endogenous signaling molecules and their clinical potential**
Grant agreement ID: VEGA 2/0020/18
Start: 1.1.2018 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ivana Nemčovičová

33. Title: **The role of cytokines/chemokines in the immune response to influenza A infection**
Grant agreement ID: VEGA 2/0014/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Tatiana Betáková

34. Title: **Influence of NS1 protein and influenza virus load on the pathogenesis and innate immune response in brains, hearts and spleens of infected mice**
Grant agreement ID: VEGA 2/0031/20

Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Tatiana Betáková

35. Title: **Proteomic analyses of the interaction of host with pathogenic bacterium Coxiella burnetii**
Grant agreement ID: VEGA 2/0144/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ľudovít Škultéty

36. Title: **New insight into the phase variation phenomenon of Coxiella burnetii**
Grant agreement ID: VEGA 2/0052/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ľudovít Škultéty

37. Title: **Evaluation of the protein expression of Coxiella burnetii in response to antibiotic resistance**
Grant agreement ID: VEGA 2/0173/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Gabriela Flores-Ramírez

38. Title: **Discovery of clinically relevant proteins and their application in more reliable diagnostics of Q fever**
Grant agreement ID: VEGA 2/0068/18
Start: 1.1.20218 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Gabriela Flores-Ramírez

39. Title: **Development of a lateral flow assay for the diagnosis of zoonotic disease: Q fever**
Grant agreement ID: VEGA 2/0023/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Gabriela Flores-Ramírez

40. Title: **Development of Rickettsia antibodies detection system using an enzyme immunological assay**
Grant agreement ID: VEGA 2/0139/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marco Quevedo Diaz

41. Title: **Development of Monoclonal antibodies of Rickettsiae and their employment in diagnosis assay**
Grant agreement ID: VEGA 2/0057/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marco Quevedo Diaz

42. Title: **Polyphasic analysis of molecular data obtained by examining of the Rickettsiae, Coxiella burnetii and similar microorganisms**
Grant agreement ID: VEGA 2/0005/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Sekeyová

43. Title: **Rickettsiae and Coxiella burnetii, bacterial triggers of the “mysterious“ diseases**
Grant agreement ID: VEGA 2/0010/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Sekeyová

44. Title: **The effect of selected natural compounds of plant origin (essential oils) on rickettsiae and ticks**
Grant agreement ID: VEGA 2/0106/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Katarína Štefanidesová

45. Title: **Pathogens and endosymbionts as components of the natural environment of the bloodsucking ectoparasites**
Grant agreement ID: VEGA 2/0068/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Špitalská

46. Title: **The role of birds and mammals in the circulation of vector-borne bacteria and blood parasites in urban and sylvatic foci**
Grant agreement ID: VEGA 2/0061/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Špitalská

47. Title: **Diversity of vector-borne pathogenic and non-pathogenic microorganisms and potential therapy of zoonotic diseases caused by them**
Grant agreement ID: VEGA 2/0021/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Špitalská

48. Title: **Physical properties of confined water in the environment of lipid bilayers and the influence of cryoprotectants**
Grant agreement ID: VEGA 2/0134/21
Start: 1.1.2021 End: 31.12.2021
Coordinated by: Institute of Physics SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ján Lakota

49. Title: **Characterization of transport pathways of CA IX in tumor cells via real-time analysis**
Grant agreement ID: VEGA 2/0081/14
Start: 1.1.2014 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Lucia Csáderová

50. Title: **Development of 3D co-culture systems integrating several components of tumor microenvironment and study of their influence on the course of anti-tumor therapy**
Grant agreement ID: VEGA 2/0064/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Lucia Csáderová

51. Title: **The role of hypoxia-induced carbonic anhydrase IX in invasion of tumor cells**
Grant agreement ID: VEGA 2/0139/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eliška Švastová

52. Title: **Study of pro-metastatic functions of carbonic anhydrase IX, relationship between CA IX and mucins and hypoxic microenvironment in pancreatic cancer**
Grant agreement ID: VEGA 2/0105/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eliška Švastová

53. Title: **Molecular pathways affected by CA IX in hypoxic cancer cell lines**
Grant agreement ID: VEGA 2/0147/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Juraj Kopáček

54. Title: **The role of carbonic anhydrase IX in tumor metabolism: regulation, function and clinical significance**
Grant agreement ID: VEGA 2/0155/15
Start: 1.1.2015End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Adriana Gibadulinová

55. Title: **Soluble and/or exosome-associated Carbonic anhydrase IX as a biologically active molecule**
Grant agreement ID: VEGA 2/0108/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miriam Zaťovičová

56. Title: **Carbonic anhydrase IX: one of the key components of exosomes secreted from cancer cells**
Grant agreement ID: VEGA 2/0074/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miriam Zaťovičová

57. Title: **Interaction of hypoxia with the signaling pathways implicated in differentiation, tumor progression and metastasis**
Grant agreement ID: VEGA 2/0122/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Martina Takáčová

58. Title: **Unraveling the mechanisms linking obesity and cancer progression: the interplay between adipocytes and cancer cells**
Grant agreement ID: VEGA 2/0076/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Martina Takáčová

59. Title: **Drug repurposing as a novel approach to therapy of colorectal carcinoma: molecular mechanisms and potential applications**
Grant agreement ID: VEGA 2/0133/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Monika Baráthová

60. Title: **Effect of combination therapy with carnosine on tumorigenesis in colorectal carcinoma models**
Grant agreement ID: VEGA 2/0090/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Monika Baráthová

61. Title: **Regulation of pyruvate dehydrogenase kinase 1 activity in the control of glycolytic metabolism in hypoxic tumors**
Grant agreement ID: VEGA 2/0078/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Tereza Goliaš

62. Title: **Effects of natural polyphenol and nonsteroidal anti-inflammatory drug combination therapy on the tumor microenvironment**

Grant agreement ID: VEGA 2/0061/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Katarína Grossmannová

Institute of Experimental Endocrinology BMC SAS

63. Title: **The role of Carnosine and Vitamin D in the Prevention of Type 2 Diabetes: molecular mechanisms of action**
Grant agreement ID: VEGA 2/0192/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jozef Ukropec

64. Title: **Molecular mechanisms of thermogenesis in brown fat in humans in relationship to obesity, physical activity and hardening**
Grant agreement ID: VEGA 2/0096/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jozef Ukropec

65. Title: **Exercise in prevention & treatment of chemotherapy-related late toxicity in testicular germ cell cancer survivors: the role of skeletal muscle**
Grant agreement ID: VEGA 2/0164/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jozef Ukropec

66. Title: **Effects of acute and regular exercise on myokines and microRNAs in circulation and cerebrospinal fluid in relation to cognitive functions and metabolism of patients with neurodegenerative disease**
Grant agreement ID: VEGA 2/0191/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

67. Title: **Synergistic effects of exercise and carnosine supplementation on motor functions, metabolism and skeletal muscle phenotypes in patients with early stage Parkinson's disease**
Grant agreement ID: VEGA 2/0107/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

68. Title: **Effects of physical activity on psychological state of obese adolescents**
Grant agreement ID: VEGA 1/0308/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

69. Title: **Studies on molecular mechanisms of cold and exercise-induced metabolic activation of brown and beige adipose tissue in humans with respect to obesity and type 2. diabetes**
Grant agreement ID: VEGA 2/0180/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Timea Kurdiová

70. Title: **Prevalence and mutation spectrum of the most common forms of monogenic obesity**
Grant agreement ID: VEGA 2/0166/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

71. Title: **Whole exome sequencing in multiplex families with hereditary hearing loss in Slovakia: identification of novel gene variants**
Grant agreement ID: VEGA 1/0214/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

72. Title: **Whole exome sequencing in patients with primary mitochondriopathies**
Grant agreement ID: VEGA 2/0083/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

73. Title: **Diagnostic and pharmacogenetic aspects of monogenic diabetes type MODY**
Grant agreement ID: VEGA 1/0211/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

74. Title: **Identification of etiology in sporadic forms of hereditary hearing loss by whole exome sequencing**
Grant agreement ID: VEGA 1/0572/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

75. Title: **Genetics of rare forms of diabetes with focus on functional characterization of new variants**
Grant agreement ID: VEGA 2/0131/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Martina Škopková

76. Title: **Mechanisms of atypical effects of hormones**
Grant agreement ID: VEGA 2/0128/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Nataša Hlaváčová

77. Title: **Mineralocorticoid receptors in novel target tissues – pathophysiological relevance and underlying mechanisms**
Grant agreement ID: VEGA 2/0042/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Nataša Hlaváčová

78. Title: **The clinical significance of the relationship between aldosterone and depression and the regulatory mechanisms involved**
Grant agreement ID: VEGA 2/0057/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Daniela Ježová

79. Title: **Interrelationships between endocrine and mental characteristics of women in reproductive age**
Grant agreement ID: VEGA 2/0022/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Daniela Ježová

80. Title: **Regulation of preadipocyte differentiation and adipocyte metabolism by oxidative stress in rat and human tissue culture**
Grant agreement ID: VEGA 2/0160/20

Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Štefan Zorad

81. Title: **New approaches in identification of individual RAS components and function of ACE2/Ang-(1-7)/MasR and (pro)renin receptor pathways in development of adipose tissue hypertrophy**
Grant agreement ID: VEGA 2/0174/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Katarína Kršková

82. Title: **The effect of IRAP (insulin-regulated aminopeptidase) aminopeptidase activity inhibition on metabolism of adipose tissue in obesity and insulin resistance**
Grant agreement ID: VEGA 2/0174/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Katarína Kršková

83. Title: **Study of selected endocrine disruptors with phytochemicals on in vitro models of ovarian intrafollicular processess and hormone-sensitive cancer cell lines**
Grant agreement ID: VEGA 2/0198/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Alžbeta Bujňáková Mlynarčíková

84. Title: **The safety of use of analogs of the endocrine disruptor Bisphenol A: evaluation of effects on in vitro models of ovarian intrafollicular processes and ovarian cancer cell lines**
Grant agreement ID: VEGA 2/0074/18
Start: 1.1.20218 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Alžbeta Bujňáková Mlynarčíková

85. Title: **Antitumour versus disruption effects of biologically active triaryl-/trialkyl-organometal ligands of retinoid X receptors in tissue cultures of tumour cells**
Grant agreement ID: VEGA 2/0171/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Macejová

86. Title: **Novel additive antitumour effects of nuclear retinoid X receptor (RXR) ligands of natural and synthetic character in human breast and renal carcinoma cells**
Grant agreement ID: VEGA 2/0171/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Macejová

87. Title: **Molecular regulatory mechanisms and therapeutic potential of retinoid X receptor activation by triorganotin compounds in relation to breast cancer treatment**
Grant agreement ID: VEGA 2/0116/21
Start: 1.1.2021 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Macejová

88. Title: **Acute and reproductive toxicity of selected types of nanoparticles: an in vitro model**
Grant agreement ID: VEGA 2/0172/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Soňa Scsuková

89. Title: **Characterization of effects of neonatal exposure to nanoparticles in selected brain structures and reproductive organs in adult and infantile female rats**
Grant agreement ID: VEGA 2/0187/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Soňa Scsuková

90. Title: **Impact of selected metal nanoparticles on steroidogenesis: comparison of in vitro cell models**
Grant agreement ID: VEGA 2/0162/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Soňa Scsuková

91. Title: **Neuroendocrine effects on synaptogenesis during the brain development**
Grant agreement ID: VEGA 2/0116/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ján Bakoš

92. Title: **The significance of the interaction between scaffolding proteins and subcellular organelles in neuronal cells: the role of oxytocin**
Grant agreement ID: VEGA 2/0155/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ján Bakoš

93. Title: **Effects of oxytocin receptor ligands on differentiation of neuronal cells**
Grant agreement ID: VEGA 2/0119/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Bačová

94. Title: **Signaling pathways of morphological changes in neuronal cells**
Grant agreement ID: VEGA 2/0038/18
Start: 1.1.20218
End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Bačová

95. Title: **The effect of neuropeptides involved in food intake regulation on neuritogenesis and synaptogenesis**
Grant agreement ID: VEGA 2/0148/21
Start: 1.1.2021 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Bačová

96. Title: **The effect of signal transmission from internal organs on the extent of neuroendocrine stress response in rat**
Grant agreement ID: VEGA 2/0028/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Andrej Tillinger

97. Title: **The role of urocortin 2 in the regulation of the stress response**
Grant agreement ID: VEGA 2/0015/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Andrej Tillinger

98. Title: **The role of endogenous catecholamines in modulation of neuro-immuno-endocrine response to stress in mesenteric adipose tissue**
Grant agreement ID: VEGA 2/0067/14
Start: 1.1.2014 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Peter Vargovič

99. Title: **The role of neuroendocrine factors of stress response in the regulation of immune system activity in mammals**
Grant agreement ID: VEGA 2/0069/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Peter Vargovič

100. Title: **Investigation of effect of acute and repeated asenapine (ASE) treatment on activity of neurons in extrastriatal brain, identification of activated neurons phenotype, and revealing whether chronic mild stress preconditioning may alter the effect of ASE**
Grant agreement ID: VEGA 2/0031/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Alexander Kiss

101. Title: **Effect of haloperidol and olanzapine on the neurogenesis and apoptosis in schizophrenic model**
Grant agreement ID: VEGA 2/0037/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jana Osacká

102. Title: **The role of the nervous system in etiopathogenesis of experimental melanoma**
Grant agreement ID: VEGA 2/0028/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ľubica Horváthová

103. Title: **Diastolic function of the ryanodine receptor and generation of arrhythmogenic calcium waves**
Grant agreement ID: VEGA 2/0143/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Alexandra Zahradníková

104. Title: **Dyad remodelling in cardiomyocytes in experimental therapy of failing heart**
Grant agreement ID: VEGA 2/0182/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Alexandra Zahradníková

105. Title: **Mechanisms of skeletal muscle adaptation to regular exercise in patients with chronic metabolic and inflammatory disease**
Grant agreement ID: VEGA 2/0091/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marta Novotová

106. Title: **Dominant mutations in Wolfram syndrome: different mechanism to the recessive ones?**
Grant agreement ID: VEGA 2/0121/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Michal Cagalinec

107. Title: **Mitochondrial dynamics and morphology in transgenic model of Wolfram syndrome: emerging role for heart protection**
Grant agreement ID: VEGA 2/0169/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Michal Cagalinec

108. Title: **Molecular-genetic and proteomic analysis of developmentally-linked metabolic function of hormonally responsive and obligatory malate dehydrogenases complex in Drosophila melanogaster**
Grant agreement ID: VEGA 2/0109/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Robert Farkaš

109. Title: **Molecular-mechanistic aspects of functioning of the developmentally-linked malate dehydrogenases complex in Drosophila melanogaster**
Grant agreement ID: VEGA 2/0103/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Robert Farkaš

Cancer Research Institute BMC SAS

110. Title: **Cytotoxic Effect of Engineered Mesenchymal Stromal Cells on Human Chemoresistant Tumour Cells and Cancer Stem Cells**
Grant agreement ID: VEGA 2/0171/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miroslava Matúšková

111. Title: **Identification of chemoresistant cell populations with metastatic potential in colorectal carcinoma**
Grant agreement ID: VEGA 2/0050/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miroslava Matúšková

112. Title: **Reversion of chemoresistance of human cancer stem cells**
Grant agreement ID: VEGA 2/0130/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Kozovská

113. Title: **The role of ALDH1 in chemoresistance of cancer cells**
Grant agreement ID: VEGA 2/0124/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Kozovská

114. Title: **Exosomes secreted by cancer cells of digestive organs, their characterization and modification by the CRISPR/Cas9 system for the aim of use in therapy**
Grant agreement ID: VEGA 2/0178/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Kozovská

115. Title: **Implementation of methods for analysis of epigenetic changes in genes involved in epithelial-mesenchymal transition in breast cancer**
Grant agreement ID: VEGA 2/0169/14
Start: 1.1.2014 End: 31.12.2016
Coordinated by: BMC SAS
Responsible person on behalf of the BMC SAS: Božena Smolková

116. Title: **The dynamics of inflammation-induced epigenetic changes during epithelial-to-mesenchymal transition and their role in human pancreatic ductal adenocarcinoma progression**
Grant agreement ID: VEGA 2/0052/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Božena Smolková / Soňa Čierniková

117. Title: **Role of Stress Response Induced in Mesenchymal Stromal Cells in Extrinsic Drug Resistance of Human Tumor Cells**
Grant agreement ID: VEGA 2/0087/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Lucia Kučerová

118. Title: **Identification of a molecular mechanism inducing appearance of dormant cell population in multiple myeloma**
Grant agreement ID: VEGA 2/0083/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jozef Bízik

119. Title: **Monitoring of ibrutinib effectivity applied in B-cell type malignancies depending on inflammatory status**
Grant agreement ID: VEGA 1/0057/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Jozef Bízik

120. Title: **Comparison of functional characteristics of adipose tissue-derived mesenchymal stromal cells isolated isolated from healthy donors and oncological patients**
Grant agreement ID: VEGA 1/0271/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Svetlana Miklíková-Školeková

121. Title: **Cellular and molecular traits of human metastasis-initiating cells at different stages of metastasis development**
Grant agreement ID: VEGA 2/0128/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Martina Poturnajová

122. Title: **Study of the mechanisms blocking tumorigenicity of cancer cells overexpressing human tumor necrosis factor alpha**
Grant agreement ID: VEGA 2/0178/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Silvia Tyčiaková

123. Title: **The role of mitochondria in progression of colorectal cancer**
Grant agreement ID: VEGA 2/0185/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Silvia Tyčiaková

124. Title: **Study of Exosome Nanoparticle Properties Secreted by Mesenchymal Stromal Cells Transduced by the HerpesSimplex Virus Thymidine Kinase (TK/HSV) Suicide Gene to Be Used for Innovative Glioblastoma Therapy**
Grant agreement ID: VEGA 1/0489/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: Faculty of Medicine, Comenius University Bratislava

Number of partners: 0
Responsible person on behalf of the BMC SAS: Čestmír Altaner

125. Title: **Unraveling the role of genetic predispositions in the context of breast cancer tumor microenvironment**
Grant agreement ID: VEGA 2/0138/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Marína Cihová

126. Title: **Inhibition of Carbonic Anhydrase IX (CA IX) Circumventing Cisplatin Resistance in Refractory Testicular Germ Cell Tumours**
Grant agreement ID: VEGA 1/0349/21
Start: 1.1.2021 End: 31.12.2023
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Silvia Schmidtová

127. Title: **Identification of Potential Therapeutic Targets Associated with Cisplatin Resistance in Yolk Sac Tumors**
Grant agreement ID: VEGA 2/0124/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Silvia Schmidtová

128. Title: **Development of patients derived xenografts models and their utilization for personalized treatment of uveal melanoma**
Grant agreement ID: VEGA 1/0395/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Lucia Demková

129. Title: **Regulation of the ligation step of non-homologous end-joining**
Grant agreement ID: VEGA 2/0056/14
Start: 1.1.2014 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 7
Responsible person on behalf of the BMC SAS: Miroslav Chovanec

130. Title: **Identification of biomarkers of resistance to cisplatin-based chemotherapy in urogenital cancer**
Grant agreement ID: VEGA 2/0053/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miroslav Chovanec

131. Title: **Is DNA repair beyond good curability in testicular germ cell tumours?**
Grant agreement ID: VEGA 2/0108/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Jurkovičová

132. Title: **Is hypoxia a master modulator of DNA repair capacity and mitochondrial dynamics in chemotherapy response in urogenital malignancies?**
Grant agreement ID: VEGA 2/0056/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Jurkovičová

133. Title: **Role of protein kinases in regulation of chromosome segregation**
Grant agreement ID: VEGA 2/0014/14
Start: 1.1.2014 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ľuboš Čipák

134. Title: **Role of protein kinases in processes involved in maintenance of genome stability**
Grant agreement ID: VEGA 2/0026/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Ľuboš Čipák

135. Title: **Detailed characterization and further improvement of system for induction of synchronous meiosis at optimal temperature**
Grant agreement ID: VEGA 2/0070/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miroslava Kretová

136: Title: **Functional analysis of regulation of DEAH/RHA helicases**
Grant agreement ID: VEGA 2/0039/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ingrid Čipáková

137. Title: **Histone modification and DNA methylation relationship in transcription silencing of cancer associated genes**
Grant agreement ID: VEGA 2/0120/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Tomáš Krivulčík

138. Title: **The study of APC gene and its expression in vitro**
Grant agreement ID: VEGA 2/ 0170/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Soňa Čierniková

139. Title: **Monitoring of the APC gene and its product functions in familial adenomatous polyposis (FAP) patients**
Grant agreement ID: VEGA 2/0029/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Zuzana Adamčíková

140. Title: **DNA methylation profiles in genes associated with breast cancer metastasis**
Grant agreement ID: VEGA 2/0092/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ivana Fridrichová

141. Title: **Regulation of epithelial-mesenchymal transition by microRNA and promoter methylation in invasive breast cancer**
Grant agreement ID: VEGA 2/0036/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ivana Fridrichová

142. Title: **The study of gut microbiome in patients with colorectal cancer**
Grant agreement ID: VEGA 2/0099/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Lenka Wachsmannová

143. Title: **Expression analysis of miRNA genes regulating the biology of cancer stem cells in breast cancer patients**
Grant agreement ID: VEGA 2/0102/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Iveta Zmetáková / Lenka Kalinková

144. Title: **Study of protective potential of synthesized phenylethanoid glycosides in the systems of mammalian cells and plasmid DNA**
Grant agreement ID: VEGA 2/0084/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Horváthová

145. Title: **Diglycosidases in biocatalysis**
Grant agreement ID: VEGA 2/0126/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: Institute of Chemistry SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Horváthová

146. Title: **The yeast Saccharomyces cerevisiae as a model to study the repair of clinically relevant DNA damage**
Grant agreement ID: VEGA 2/0146/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eduard Goffa

147. Title: **Interaction of bioactive compounds and nonthermal plasma**
Grant agreement ID: VEGA 1/0460/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: Faculty of Natural Sciences, Comenius University Bratislava
Number of partners: 8
Responsible person on behalf of the BMC SAS: Eva Horváthová

148. Title: **Mechanism of uptake and trafficking of magnetic iron oxide nanoparticles into human tumor and normal (diploid) cells**
Grant agreement ID: VEGA 2/0143/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Alena Gábelová

149. Title: **Development of SQUID Gradiometric and Susceptometric Methods for Iron Homeostasis Related Bio-Applications**
Grant agreement ID: VEGA 2/0152/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: Institute of Measurement Science SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Alena Gábelová

150. Title: **New glucoconjugate-based precursors of pharmaceuticals: structure-activity relationship analysis**
Grant agreement ID: VEGA 2/0022/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: Institute of Chemistry SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Alena Gábelová

151. Title: **Mechanisms of gold and magnetic nanoparticle effects on renal cells**
Grant agreement ID: VEGA 2/0113/15
Start: 1.1.2015 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Andrea Bábelová

152. Title: **Diagnostic of oncological diseases using aptasensors: development and validation**
Grant agreement ID: VEGA 2/0160/21

Start: 1.1.2021 End: 31.12.2024
Coordinated by: Centre of Biosciences SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Andrea Bábelová

153. Title: **Induction of apoptosis by betulinic acid coupled to magnetite nanoparticles in human colorectal cell lines**
Grant agreement ID: VEGA 2/0056/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Monika Šramková

154. Title: **Use of microfluidic systems for risk assessment of xenobiotics**
Grant agreement ID: VEGA 2/0121/21
Start: 1.1.2021 End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Monika Šramková

155. Title: **Antioxidative, anticarcinogen and photoprotective effects of the essential oil from lavender in vitro**
Grant agreement ID: VEGA 2/0027/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Katarína Kozics

156. Title: **Newly synthetised thymol derivatives: relationship between structure and biological activity in colorectal in vitro model**
Grant agreement ID: VEGA 2/0055/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Katarína Kozics

157. Title: **A pilot study of the selective effects of a new generation of RNA interfering agents at the cellular level**
Grant agreement ID: VEGA 1/0069/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Michal Šelc

158. Title: **Constitutive and induced DNA damage in hematopoietic cells for assessment of risk and optimizing treatment of childhood leukemia**
Grant agreement ID: VEGA 2/0109/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Igor Beliaev

159. Title: **Mechanisms of impact of low intensity electromagnetic radiation on course of cancer disease**
Grant agreement ID: VEGA 2/0089/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Igor Beliaev

160. Title: **Biomarkers for assessment of individual radiosensitivity in breast cancer therapy**
Grant agreement ID: VEGA 2/0147/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Eva Marková

161. Title: **Preleukemic gene fusions and DNA repair in umbilical cord blood cells**
Grant agreement ID: VEGA 2/0106/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0

Responsible person on behalf of the BMC SAS: Milan Škorvaga

162. Title: **Radiation-induced preleukemic fusion genes in proliferating hematopoietic stem/progenitor cells of umbilical cord blood**
Grant agreement ID: VEGA 2/0087/18
Start: 1.1.20218 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Milan Škorvaga

163. Title: **Mechanism of anti-tumor activity of realgar nanoparticles and its synergism with anti-myeloma agents**
Grant agreement ID: VEGA 2/0100/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jana Jakubíková

164. Title: **Anti-myeloma activity by composite realgar nanomaterials and its mechanism in vitro and in vivo**
Grant agreement ID: VEGA 2/0144/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jana Jakubíková

165. Title: **Study of exosome production and the impact of chemotherapeutics on their properties**
Grant agreement ID: VEGA 2/0189/13
Start: 1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Cholujová

166. Title: **The impact of tumor microenvironment and therapy on subclonal diversity in MM and WM**
Grant agreement ID: VEGA 2/0076/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Cholujová

167. Title: **Assessment of immune checkpoints in B cell malignancies**
Grant agreement ID: VEGA 2/0147/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Dana Cholujová

168. Title: **The role of exosomes in the process of chemoresistence of ovarian carcinoma**
Grant agreement ID: VEGA 1/0445/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: Faculty of Medicine, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Ján Sedlák

169. Title: **Analysis of matrix metalloproteinase induction in association with expression of HLA-G molecules**
Grant agreement ID: VEGA 2/0080/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Katarína Poláková

170. Title: **The biological effects of the environment with reduced deuterium (D) content or increased pH and physical exercise in relation to cancer: implications for tertiary prevention**
Grant agreement ID: VEGA 2/0092/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ľubica Hunáková

171. Title: **Diagnostic potential of body fluid fluorescent characteristics and extracellular microvesicles analyses in urogenital malignancies**
Grant agreement ID: VEGA 1/0136/18
Start: 1.1.20218
End: 31.12.2021
Coordinated by: Faculty of mathematics, physics and informatics, Comenius University Bratislava
Number of partners: 1
Responsible person on behalf of the BMC SAS: Ľuba Hunáková

Institute of Clinical and Translational Research BMC SAS

172. Title: **The effect of chronic inflammation on cardiometabolic parameters**
Grant agreement ID: VEGA 2/0161/16
Start: 1.1.2016 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Adela Penesová

173. Title: **Hepatic, lipid and cardiometabolic parameters changes in obese patients**
Grant agreement ID: VEGA 2/0129/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Adela Penesová

174. Title: **Early molecular markers of myocardial infarction**
Grant agreement ID: VEGA 2/0105/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Július Hodosy

175. Title: **The role of myokines and adipokines in improvement of the cardiometabolic parameters following lifestyle changes in sedentary subjects**
Grant agreement ID: VEGA 2/0072/18
Start: 1.1.20218 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Žofia Rádiková

176. Title: **Study of the potential role of selected genes in molecular pathogenesis of myotonic dystrophy**
Grant agreement ID: VEGA 2/0115/15
Start: 1.1.2015 End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ján Radvánszky

177. Title: **Study of alternative ways of genome-wide polygenic risk score calculations for the estimation of individual genetic predispositions to complex multifactorial diseases**
Grant agreement ID: VEGA 2/0167/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ján Radvánszky

178. Title: **Study of the genetic background of variable severity of Alkaptonuria using genomic approach**
Grant agreement ID: VEGA 2/0040/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Andrea Zaťková

179. Title: **Role of calcium signalling mediated by IP3 receptors in cancer cells derived from clear-cell carcinoma**
Grant agreement ID: VEGA 2/0082/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Oľga Križanová

180. Title: **Role of the calcium and calcium transport in tumorigenesis and tumor's treatment**
Grant agreement ID: VEGA 2/0038/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Oľga Križanová

181. Title: **Physiological relevance of intracellukar H2S in cancer cells**
Grant agreement ID: VEGA 2/0011/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Soňa Hudecová

182. Title: **Importance of the Na/Ca exchanger in ovarian tumor cells, its modulation and a role in inducing apoptosis**
Grant agreement ID: VEGA 2/0073/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ľubomíra Lenčešová

183. Title: **Influence of products of H2S-NO interaction on membrane channels**
Grant agreement ID: 2/0050/13
Start:1.1.2013 End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Karol Ondriaš

184. Title: **Study of products of H2S/oxidized glutathione interaction on membrane channels and molecular mechanism of their actions**
Grant agreement ID: VEGA 2/0014/17
Start: 1.1.2017 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Karol Ondriaš

185. Title: **Role of polysulfides in regulation of chloride channels and respiration of mitochondria**
Grant agreement ID: VEGA 2/0146/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marián Grman

186. Title: **Biological effects of nitrosopersulfide and reactive sulfur species on mitochondria**
Grant agreement ID: VEGA 2/0079/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Marián Grman

187. Title: **The importance of interaction products of H2S with S-nitrosoglutathione/selenium derivatives in the regulation of cardiovascular hemodynamics and cardiac mitochondrial functions**
Grant agreement ID: VEGA 2/0091/21
Start: 1.1.2021
End: 31.12.2024
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Anton Mišák

Institute of Neurobiology BMC SAS

188. Title: **Regeneration of axons of the damaged peripheral nerve in tubular conductors**
Grant agreement ID: VEGA 2/0123/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ivo Vanický

189. Title: **The therapeutic effects of stem cells conditioned medium on the repair of the spinal cord damaged tissue: a comparative ex vivo study**
Grant agreement ID: VEGA 2/0145/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Lucia Slovinská

190. Title: **Alternative sources of stem cells for regeneration of damaged CNS tissue**
Grant agreement ID: VEGA 2/0040/19
Start: 1.1.2019 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Lucia Slovinská

191. Title: **The Effect of Electromagnetic Radiation During Prenatal Development of Rats on Some Tissues and Organs From a Morphological Aspect**
Grant agreement ID: VEGA 1/0060/18
Start: 1.1.20218 End: 31.12.2020
Coordinated by: University of Veterinary Medicine and Pharmacy in Košice
Number of partners: 0
Responsible person on behalf of the BMC SAS: Enikö Račeková

192. Title: **Neuronal regulation of postnatal neurogenesis: a morphological study**
Grant agreement ID: VEGA 2/0005/19
Start: 1.1.2019 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Enikö Račeková

193. Title: **Localization and role of endothelial nitric oxide synthase in the neurogenic region of the rat during postnatal period**
Grant agreement ID: VEGA 2/0159/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Marcela Martončíková

194. Title: **Analysis of peripheral nerve regeneration after transection on the model of rat caudal nerve using tubulisation and mesenchymal stem cells**
Grant agreement ID: VEGA 2/0109/21
Start: 1.1.2021 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Juraj Blaško

195. Title: **The effect of GDNF vector and block of inhibition molecules on interneuronal connections and axonal outgrowth after cervical and thoracic spinal cord injury**
Grant agreement ID: VEGA 2/0168/17
Start: 1.1.2017 End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Nadežda Lukáčová

196. Title: **Regulation of M1/M2 polarization: the effect on neuron survival, axonal growth and functional recovery after spinal cord trauma**
Grant agreement ID: VEGA 2/0145/21
Start: 1.1.2021 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Nadežda Lukáčová

197. Title: **Neuroprotective mechanisms of the AT2 receptor stimulation after traumatic spinal cord injury**
Grant agreement ID: VEGA 2/0160/16
Start: 1.1.2016 End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jaroslav Pavel

198. Title: **Regulation of Angiotensin II receptors in neuroprotection after traumatic spinal cord injury**
Grant agreement ID: VEGA 2/0049/19
Start: 1.1.2019 End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Jaroslav Pavel

199. Title: **The role of glutamate transporters in blood cells in ischemic tolerance**
Grant agreement ID: VEGA 2/0029/18
Start: 1.1.20218 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Petra Bonová

200. Title: **Mechanisms of glutamate metabolism as a tool of ischemic tolerance**
Grant agreement ID: VEGA 2/0073/21
Start: 1.1.2021 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Petra Bonová

201. Title: **Neuroprotection in the process of ischemic tolerance acquisition from the perspective of rat brain pathways monitoring (proteomic MALDI-TOF/TOF study**
Grant agreement ID: VEGA 2/0094/18
Start: 1.1.20218 End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Miroslava Némethová

202. Title: **Identification of the protein markers activated in the process of induction of the ischemic tolerance**
Grant agreement ID: VEGA 2/0054/20
Start: 1.1.2020 End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Responsible person on behalf of the BMC SAS: Rastislav Mucha

203. Title: **Effect of electrical stimulation on regeneration of injured neural pathways**
Grant agreement ID: VEGA 2/0098/20
Start: 1.1.2020 End: 31.12.2023
Coordinated by: BMC SAS
Number of partners: 0
Responsible person on behalf of the BMC SAS: Ján Gálik

2.4.5. List of projects supported by EU Structural Funds

1. Title: **Preclinical Research of Selected Aspects of Human Diseases**
Grant agreement ID: 313011T444
Acronym: VaV_KAPACITY_BMC
Start: 1.1.2017
End: 31.12.2019
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 318 768,94 €
Funding for the BMC SAS: 318 768,94 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

2. Title: **Medical University Science Park in Košice, phase II.**
Grant agreement ID: 313011D103
Acronym: MEDIPARK II
Start: 11.3.2017
End: 30.6.2018
Coordinated by: Pavol Jozef Šafárik University in Košice
Number of partners: 3
Total funding: 9 675 121,72 €
Funding for the BMC SAS (Institute of Neurobiology): 1 226 608,21 €
Responsible person on behalf of the BMC SAS: Ján Gálik

3. Title: **Capacity Building in Biomedical Research through Scientific Exchange and Co-Development of Research Services (INTERREG)**
Grant agreement ID: 305011V235
Acronym: CAPSID
Start: 1.7.2018
End: 30.6.2021
Coordinated by: Vienna Biocenter Core Facilities, GmbH
Number of partners: 2
Total funding: 571 016,72 €
Funding for the BMC SAS: 233 568,00 €
Responsible person on behalf of the BMC SAS: Ivana Nemčovičová

4. Title: **Building-up Centre of Excellence for Advanced Materials Application**
Grant agreement ID: 313021T081
Acronym: CEMEA
Start: 1.7.2019
End: 30.6.2023
Coordinated by: Centre for advanced materials application SAS (CEMEA)
Number of partners: 7
Total funding: 29 998 684,09 €
Funding for the BMC SAS: 172 513,80 €
Spent budget: 81 535,00 €
Responsible person on behalf of the BMC SAS: Lucia Csáderová

5. Title: **Long-Term Strategic Research of Prevention, Intervention and Mechanisms of Obesity and Its Comorbidities**
Grant agreement ID: 313011V344
Acronym: OBEZITA
Start: 1.9.2019
End: 28.2.2023
Coordinated by: BMC SAS
Number of partners: 6
Total funding: 7 534 385,86 €
Funding for the BMC SAS: 3 401 495,50 €
Budget spent till 1.6.2022[6]: 752 867 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

6. Title: **Integrative Strategy in Development of Personalized Medicine of Selected Malignant Tumours and Its Impact On Quality of Life**
Grant agreement ID: 313011V446
Acronym: LISPER
Start: 1.9.2019
End: 30.6.2023
Coordinated by: Comenius University in Bratislava
Number of partners: 10
Total funding: 12 771 690,66 €
Funding for the BMC SAS: 594 116,15 €
Budget spent till 1.6.2022: 132 779,00 €
Responsible person on behalf of the BMC SAS: Miroslav Chovanec

7. Title: **Open Scientific Community for Modern Interdisciplinary Research in Medicine**
Grant agreement ID: 313011V455
Acronym: OPENMED
Start: 1.11.2019
End: 30.6.2023
Coordinated by: Pavol Jozef Šafárik University in Košice
Number of partners: 5
Total funding: 9 800 370,32 €
Funding for the BMC SAS: 343 751,90 €
Spent budget: 106 974 €
Responsible person on behalf of the BMC SAS: Ján Gálik

[6] *Spending of the project budget has been seriously hampered by one year delay in the project contract approval, then more than one year lasting control of agreement for public procurement for reagents and plastics, more than a year lasting approval of public procurement of research equipment and recently half a year delay of annexing the contract due to transformation to public research institution. Similar problems accompany also other projects of this type.*

8. Title: **Development of The Biotechnological Research Potential of the Biomedical Research Center of the Slovak Academy of Sciences to Combat the COVID-19 Pandemic in Synergy with the European Virus Archive of Global Importance Supported by the H2020 Program**
Grant agreement ID: 313011ASU8
Acronym: EVAgoEAST
Start: 1.4.2020
End: 30.6.2023
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 1 999 645,01 €
Funding for the BMC SAS: 1 999 645,01 €
Spent budget: 142 711,00 €
Responsible person on behalf of the BMC SAS: Vladimír Zelník

9. Title: **Systemic Public Research Infrastructure in the Field of Biobanking**
Grant agreement ID: 313011AFG5
Acronym: BIOFORD
Start: 1.7.2020
End: 30.12.2023
Coordinated by: Comenius University in Bratislava
Number of partners: 6
Total funding: 18 734 882,45 €
Funding for the BMC SAS: 597 000,00 €
Spent budget: 58 596,00 €
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

2.4.6. List of other projects funded from national resources

1. Title: **Micro-RNA Expression Profiles for Discrimination of Endometrioid and Serous Types of Endometrial Cancer**
Grant agreement ID: 2018/45-SAV-4
Funding body: Ministry of Health
Acronym: MIR-ENDOM
Start: 1.12.2018
End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 88 260 €
Funding for the BMC SAS: 88 260 €
Responsible person on behalf of the BMC SAS: Ivana Fridrichová

2. Title: **Implementation of Modern Genomic Analyzes to Improve Clinical Diagnostic and Therapeutic Procedures of Immune Disorders**
Grant agreement ID: 2018/46-SAV-5
Funding body: Ministry of Health
Acronym: ImmunoGEN
Start: 1.12.2018
End: 31.12.2020
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 118 260 €
Funding for the BMC SAS: 73 000 €
Responsible person on behalf of the BMC SAS: Ľudevít Kádaši

3. Title: **Therapeutic Targeting of Cancer Stem Cell Markers Circumventing Cisplatin Resistance in Testicular Germ Cell Tumors**
Grant agreement ID: 2018/39-LFUK-13
Funding body: Ministry of Health
Acronym: SMaRT
Start: 1.12.2018
End: 31.12.2020
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 102 525,96 €
Funding for the BMC SAS: 41 170 €
Responsible person on behalf of the BMC SAS: Zuzana Kozovská

4. Title: **Use of GLP-1 Analogues in the Treatment of Multiple Sclerosis**
Grant agreement ID: 2018/37-LFUK-11
Funding body: Ministry of Health
Acronym: MSGLP
Start: 1.12.2018
End: 31.3.2021
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 297 900 €
Funding for the BMC SAS: 128 200 €
Responsible person on behalf of the BMC SAS: Richard Imrich

5. Title: **Research of Humanized Antibodies in Targeted Treatment of Hypoxic Tumors**
Grant agreement ID: 2018/14554:4-26C0
Funding body: Ministry of Education
Program: Stimuli for R&D
Acronym: HUMABCAIX
Start: 1.12.2018
End: 1.12.2021
Coordinated by: MABPRO, a.s.
Number of partners: 2
Total funding: 1 334 000,00 €
Funding for the BMC SAS: 316 950,00 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

6. Title: **Molecular Biomarkers of Relapse in Seminoma Clinical Stage I Patients**
Grant agreement ID: 2019/57-BMCSAV-1
Funding body: Ministry of Health
Acronym: MolBioSem
Start: 1.10.2019
End: 21.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 142 598 €
Funding for the BMC SAS: 83 429 €
Responsible person on behalf of the BMC SAS: Miroslav Chovanec

7. Title: **Role of the Hydrogen Sulfide in Remodelation of the Cytoskeleton in Colorectal Carcinoma Cells; Impact on Activity of Taxanes**
Grant agreement ID: 2019/58-BMCSAV-2
Funding body: Ministry of Health
Acronym: Sirokolo
Start: 1.10.2019
End: 21.12.2022
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 247 427 €
Funding for the BMC SAS: 247 427 €
Responsible person on behalf of the BMC SAS: Oľga Križanová

8. Title: **Markers Overlapping Chemoresistance and Metastatic Potential in Colorectal Cancer - Alhedyde Dehydrogenase and Its Clinical Relevance**
Grant agreement ID: 2019/60-BMCSAV-4
Funding body: Ministry of Health
Acronym: CAScADE
Start: 1.11.2019
End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 98 013 €
Funding for the BMC SAS: 98 013 €
Responsible person on behalf of the BMC SAS: Miroslava Matúšková

9. Title: **Development of Novel Diagnostic and Predictive High-Dimensional Immunophenotyping Tool for Hematological Malignancies**
Grant agreement ID: 2019/14-BMCSAV-9
Funding body: Ministry of Health
Acronym: PhenoTOOL
Start: 1.11.2019

End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1
Total funding: 235 750 €
Funding for the BMC SAS: 235 750 €
Responsible person on behalf of the BMC SAS: Jana Jakubíková

10. Title: **Glycoprofiling of Proteins Present in Serum and Exosomes for Early Prostate Cancer Diagnostics**
Grant agreement ID: 2019/68-CHÚSAV-1
Funding body: Ministry of Health
Acronym: GlycoPro
Start: 1.11.2019
End: 31.12.2022
Coordinated by: Institute of Chemistry SAS
Number of partners: 1
Total funding: 251 552 €
Funding for the BMC SAS: 41 936,30 €
Responsible person on behalf of the BMC SAS: Alena Gábelová

11. Title: **Clinical Evaluation of Prognostic and Predictive Value of Tissue and Serum Carbonic Anhydrase IX in Breast Cancer**
Grant agreement ID: 2019/26- LFUK-14
Funding body: Ministry of Health
Acronym: MAHYCAMA
Start: 1.11.2019
End: 31.12.2022
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 100 000 €
Funding for the BMC SAS: 60 000 €
Responsible person on behalf of the BMC SAS: Ingeborg Režuchová

12. Title: **Comprehensive Innovative Diagnostics and Personalized Treatment of Diabetes Mellitus in Children**
Grant agreement ID: 2019/20-LFUK-8
Funding body: Ministry of Health
Acronym: DIAPED
Start: 1.10.2019
End: 31.12.2022
Coordinated by: Comenius University in Bratislava
Number of partners: 1
Total funding: 259 000 €
Funding for the BMC SAS: 136 000 €
Responsible person on behalf of the BMC SAS: Daniela Gašperíková

13. Title: **Skeletal muscle as a mediator of beneficial effects of regular exercise on cognitive functions and metabolism in patients with Alzheimer's disease: the role of muscle myokines and microRNAs**
Grant agreement ID: SAS/NSC JRP 2013/17
Funding body: Slovak Academy of Sciences
Start: 1.1.2014
End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 1 (Taiwan)
Total funding: 75 000 €
Funding for the BMC SAS: 75 000 €
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

14. Title: **Novel strategies aimed to improve the physical fitness, clinical symptoms and quality of life in the early-stage Parkinson's disease patients: Regular exercise training and carnosine**
Grant agreement ID: SAS-MOST JRP 2018/10
Funding body: Slovak Academy of Sciences
Start: 1.1.2019
End: 31.12.2021
Coordinated by: BMC SAS
Number of partners: 1 (Taiwan)
Total funding: 75 000 €
Funding for the BMC SAS: 75 000 €
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

15. Title: **Association of the hypoxia-induced carbonic anhydrase IX with drug response, miRNA profile and oncogenic pathways: from integrative analysis of the NCI60 cancer cell panel to cancer patients**
Grant agreement ID: SAS-MOST-JRP-2014/10
Funding body: Slovak Academy of Sciences
Start: 1.1.2015
End: 31.12.2017
Coordinated by: BMC SAS
Number of partners: 1 (Taiwan)
Total funding: 75 000 €
Funding for the BMC SAS: 75 000 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

16. Title: **Targeted combination therapy of colon cancer with therapeutic gene/drug loaded novel dendritic nanocarriers**
Grant agreement ID: SAS-TUBITAK 398784
Funding body: Slovak Academy of Sciences
Start: 3.9.2018
End: 30.9.2021
Coordinated by: BMC SAS
Number of partners: 1 (Turkey)
Total funding: 000 €
Funding for the BMC SAS: 000 €
Responsible person on behalf of the BMC SAS: Miroslava Matúšková

17. Title: **Targeting molecular pathways of glycolipotoxicity by a novel carboxymethylated mercaptotriazinoindole inhibitor of aldo-keto reductase AKR1B1 in diabetes, inflammation and age-related neurodegeneration**
Grant agreement ID: SAS-TUBITAK JRP 2015/7
Funding body: Slovak Academy of Sciences
Start: 15.4.2016
End: 15.4.2019
Coordinated by: Department of Medical Pharmacology, Faculty of Medicine, Gazi University
Number of partners: 1 (Turkey)
Total funding: 12 000 €
Funding for the BMC SAS: 12 000 €
Responsible person on behalf of the BMC SAS: Enikö Račeková

18. Title: **RyRinHeart - Discovery of Ryanodine Receptor Inhibitors for Heart Diseases**
Grant agreement ID: JRP/2019/836/RyRinHeart
Funding body: Slovak Academy of Sciences
Start: 1.1.2020
End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 1 (Taiwan)
Total funding: 75 000 €
Funding for the BMC SAS: 75 000 €
Responsible person on behalf of the BMC SAS: Alexandra Zahradníková

2.4.7. List of projects funded from private funds

1. Title: **Effects of vortioxetine in the tryptophan-depletion model of SSRI-resistant depression in female rats**
Funding body: Lundbeck A/S, UK
Start: 1.7.2014
End: 31.12.2018
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 51 807 €
Funding for the BMC SAS: 19 112 €
Responsible person on behalf of the BMC SAS: Daniela Ježová

2. Title: **Role of the CA IX ectodomain in tumor growth and metastasis**
Funding body: The George Schwab and Leona Lauder Foundation, USA
Acronym:
Start: 11.11.2014
End: 31.12.2022
Coordinated by: BMC SAS
Number of partners: 0

Total funding: 185 000 €
Funding for the BMC SAS: 185 000 €
Responsible person on behalf of the BMC SAS: Silvia Pastoreková

2.4.8. List of projects funded from other competitive funds

Title: **Skeletal muscle metabolic abnormalities in patients with idiopathic inflammatory myopathies)**
Grant agreement ID: 16-33746A
Funding body: Ministry of Health of the Czech Republic
Start: 1.4.2016
End: 31.12.2020
Coordinated by: Institute of Rheumatology, Prague
Number of partners: 1
Total funding: 135 860 €
Funding for the BMC SAS: 135 860 €
Responsible person on behalf of the BMC SAS: Barbara Ukropcová

Title: **Structural characterisation and anotation of gene cluster of C. burnetii lippoplysaccharide**
Grant agreement ID: 2014-04-24-095424
Funding body: Nationale Forschungsplattform fur Zoonosen
Start: 1.9.2015
End: 31.12.2016
Coordinated by: BMC SAS
Number of partners: 0
Total funding: 25 000 €
Funding for the BMC SAS: 25 000 €
Responsible person on behalf of the BMC SAS: Ľudovít Škultéty

Project of Danube region strategy funded by SDGA

Title: **Danube meets omics**
Grant scheme: Danube region strategy
Grant Agreement ID: DS-2016-0052
Acronym: DANOMICS
Start: 1 January 2017
End: 31 December 2018
Coordinated by: "Vinča" Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia
Number of partners: 4
Total funding: 95 000 €
Funding for the BMC SAS: 12 455 €
Co-Aplicant and Primary investigator from Slovakia: Ludovit Skultety

2.5. PhD studies and educational activities

2.5.1. List of accredited programmes of doctoral studies, period of validity, source of funding

Field of study: **Biology**
Guarantor at BMC SAS: Oľga Križanová, prof., DSc.

Programme: **Animal Physiology**
Faculty, University: Faculty of Natural Sciences, Comenius University in Bratislava
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Programme: **Genetics**
Faculty, University: Faculty of Natural Sciences, Comenius University in Bratislava
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Programme: **Molecular Biology**
Faculty, University: Faculty of Natural Sciences, Comenius University in Bratislava
Period of validity: indefinite

Funding from: Slovak Academy of Sciences

Programme: **Microbiology and Virology** (until 09/2021), Microbiology (after 09/2021)
Faculty, University: Faculty of Natural Sciences, Comenius University in Bratislava
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Programme: **Animal Physiology**
Faculty, University: Faculty of Science, Pavol Jozef Šafárik University in Košice
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Programme: **Microbiology**
Faculty, University: University of Veterinary Medicine and Pharmacy in Košice
Period of validity: terminated in 2020
Funding from**:** Slovak Academy of Sciences

Programme: **Virology**
Faculty, University: University of Veterinary Medicine and Pharmacy in Košice
Period of validity: terminated in 2020
Funding from: Slovak Academy of Sciences

Field of study: **General Medicine**
Guarantor at BMC SAS: Jozef Ukropec, DSc.

Programme: **Normal and Pathological Physiology**
Faculty, University: Faculty of Medicine, Comenius University in Bratislava
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Programme: **Oncology**
Faculty, University: Faculty of Medicine, Comenius University in Bratislava
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Field of study: **Chemistry**
Guarantor at BMC SAS: Ľudovít Škultéty, DSc.

Programme: **Biochemistry**
Faculty, University: Faculty of Natural Sciences, Comenius University in Bratislava
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Programme: **Biochemistry**
Faculty, University: Faculty of Chemical and Food Technology, Slovak University of Technology in Bratislava
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

Field of study: **Physics**
Guarantor at BMC SAS: Alexandra Zahradníková, DSc.

Programme: **Biophysics**
Faculty, University: Faculty of Science, Pavol Jozef Šafárik University in Košice
Period of validity: indefinite
Funding from: Slovak Academy of Sciences

2.5.2. Summary table on doctoral studies (number of internal/external PhD students at the end of the year; number of foreign PhD students, number of students who successfully completed their theses during the year, number of PhD students who quit the programme during the year)

PhD study	2016			2017			2018			2019			2020			2021		
Number of potential PhD supervisors	123			132			132			117			131			141		
PhD students	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted	unumber, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted
Internal total	46	19	1	54	11	0	54	12	0	54	13	0	54	9	0	54	8	0
from which foreign citizens	1	1	0	0	0	0	2	0	0	3	0	0	3	0	0	8	0	2
External	6	0	2	5	0	0	4	0	0	4	1	0	6	1	0	5	1	0
Other supervised by the research employees of the institute	9	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Number of potential PhD supervisors given in this table is only theoretical, as is it subject to the internal SAS regulation that includes limits for PhD positions based on the ranges of potential supervisor numbers in the founding institutes, as follows:

Institute of Experimental Endocrinology
Number of researchers qualified for PhD supervision: 41 (to the end of 2021)
Theoretical limit of allocated PhD positions: 3 per year, totally max. 15

Cancer Research Institute
Number of researchers qualified for PhD supervision: 37 (to the end of 2021)
Theoretical limit of allocated PhD positions: 3 per year, totally max. 15

Institute of Virology
Number of researchers qualified for PhD supervision: 39 (to the end of 2021)
Theoretical limit of allocated PhD positions: 3 per year, totally max. 15

Institute of Clinical and Translational Research
Number of researchers qualified for PhD supervision: 13 (to the end of 2021)
Theoretical limit of allocated PhD positions: 2 per year, totally max. 10

Institute of Neurobiology
Number of researchers qualified for PhD supervision: 11 (to the end of 2021)
Theoretical limit of allocated PhD positions: 2 per year, totally max. 10

Thus, the maximum of total PhD fellowships at BMC SAS per academic year is 65, which is much below the number of potential supervisors.

2.5.3. PhD carrier path – Information on the next career steps of the PhD graduates who received their degree from the BMC SAS

Postdoctoral positions at the research institutions abroad

1. Name: **Monika Bohácsová**
Year of graduation: 2016
Title of thesis: Comparison of specific markers suitable for detection of rickettsiae and related intracellular bacteria
Supervisor: Zuzana Sekeyová
Next career position and workplace: Postdoctoral Fellow, Laboratory of Infectious Diseases, College of Medicine, Department of Microbiology & Immunology, University of South Alabama, USA

2. Name: **Petra Bullová**
Year of graduation: 2016
Title of thesis: Molecular Mechanisms of Pheochromocytoma and Paraganglioma as Targets for Therapy
Supervisor: Juraj Kopáček

Next career position and workplace: Section on Medical Neuroendocrinology, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, Maryland 20892, from 2018 Department of Microbiology, Tumor and Cell Biology, Karolinska Institutet, SE-17177 Stockholm, Sweden.

3. Name: **Erika Ďuriníková**
Year of graduation: 2016
Title of thesis: The Study of Efficiency of Gene-Directed Enzyme/Prodrug Therapy Using Mesenchymal Stromal Cells on Chemoresistant Tumor Cells
Supervisor: Miroslava Matúšková
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS, from 2017 Candiolo Cancer Institute, FPO - IRCCS, Candiolo, Torino, Italy, from 2022 Senior Research Scientist at Exscientia, Vienna, Austria

4. Name: **Elena Pánisová**
Year of graduation: 2016
Title of thesis / name of supervisor: Role of CA IX in oxidative metabolism of glutamine and pyruvate in cancer cells (Mgr. Eliška Švastová, PhD.)
Next career position and workplace: Experimental Infectious Diseases and Cancer Research, University Children's Hospital of Zurich, and Children's Research Center, University Children's Hospital of Zurich, Switzerland.

5. Name: **Lenka Toro**
Year of graduation: 2016
Title of thesis / name of supervisor: Gene therapy of metastatic disease using genetically modified mesenchymal stem cells
Supervisor: Lucia Kučerová
Next career position and workplace: lecturer, Universidad EIA, Colombia

6. Name: **Jaroslav Hollý**
Year of graduation: 2017
Title of thesis: The induction of antiviral immunity by recombinant influenza A virus proteins
Supervisor: František Kostolanský
Next career position and workplace: Postdoctoral fellowship, Laboratory of Viral Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland, USA

7. Name: **Lucia Toporová**
Year of graduation: 2017
Title of thesis: Biological Activity of Retinoid Ligands of Nuclear Receptor Heterodimers in Tumour Tissue Cells
Supervisor: Július Brtko
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS, from 2019 Postdoctoral Position at Institut de Recherche en Cancerologie de Montpellier, France

8. Name: **Daniel Daniš**
Year of graduation: 2018
Title of thesis: Identification of Rare Etiopathogenetic Mechanism of Selected Monogenic Diseases Using Next Generation Sequencing
Supervisor: Daniela Gašperíková
Next career position and workplace: associate computational scientist, JAX Genomic Medicine, Farmington, Connecticut, USA

9. Name: **Barbora Mikolášková**
Year of graduation: 2018
Title of thesis: The function of post-translational modifications in post-transcriptional regulation
Supervisor: Ľuboš Čipák
Next career position and workplace: researcher, Biomedical Research Center, SAS, post-doc fellowship, Max Perutz Labs, Vienna

10. Name: **Martin Kéry**
Year of graduation: 2018
Title of thesis: Molecular pathways regulated by carbonic anhydrase IX in hypoxic cancer cells
Supervisor: Juraj Kopáček
Next career position and workplace: Postdoctoral fellowship, Ohio State University Wexner Medical Center and OSU Comprehensive Cancer Center, Columbus, Ohio, USA

11. Name: **Magdaléna Chmelová**
Year of graduation: 2019
Title of thesis: Selected neuroendocrine correlates of psychological changes in a rat model of social isolation
Supervisor: Nataša Hlaváčová
Next career position and workplace: scientific researcher, Laboratory of Pharmacology and Brain Biostructure, Department of Pharmacology, Institute of Pharmacology, Polish Academy of Sciences, Krakow, Polan

12. Name: **Alexandra Reichová**
Year of graduation: 2020
Title of thesis: Neurobiological aspects of neurite formation and extension in the models of developmental disorders
Supervisor: Ján Bakoš
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS, from 2021 postdoctoral fellowship, Université de Bordeaux; Institut de Neurosciences Cognitives et Intégratives d'Aquitaine, Bordeaux, Nouvelle-Aquitaine, France

Positions at the national research institutions

13. Name: **Michaela Debreová**
Year of graduation: 2016
Title of thesis: Hypoxia-induced carbonic anhydrase IX as a component of the metastatic cascade
Supervisor: Eliška Švastová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS, from 2019 Faculty of Medicine, Comenius University in Bratislava, Slovakia, National Institute of Rheumatic, Diseases, Piešťany, Slovakia

14. Name: **Andrea Gálusová** (external PhD study)
Year of graduation: 2016
Title of thesis: Neuroendocrinne and Metablic Changes in Criticall Illness
Supervisor: Adela Penesová
Next career position and workplace: physician (anaestesiologist), Bratislava University Hospital, Slovakia

15. Name: **Alexandra Garafová** (external PhD study)
Year of graduation: 2016
Title of thesis: Neuroedocrine mechanisms in patients with incipient metabolic syndrome
Supervisor: Adela Penesová
Next career position and workplace: physician (neonatologist), Bratislava University Hospital, Slovakia

16. Name: **Lucia Miková**
Year of graduation: 2016
Title of thesis: The neurobiological research of cancer disease
Supervisor: Boris Mravec
Next career position and workplace: Institute of Physiology, Faculty of Medicine, Comenius University in Bratislava, Slovakia

17. Name: **Jana Valáriková**
Year of graduation: 2016
Title of thesis: Study of genes involved in peptidoglycan biosynthesis of Rickettsia sp.
Supervisor: Marco Quevedo Diaz
Next career position and workplace: scientific researcher, Institute of Chemistry, SAS

18. Name: **Jana Kubíčková**
Year of graduation: 2017
Title of thesis: Mechanism of the action of haloperidol and its effect on plasticity of neuronal cells
Supervisor: Oľga Križanová
Next career position and workplace: scientific researcher, Faculty of Chemical and Food Technology, Slovak University of Technology in Bratislava

19. Name: **Veronika Lachová**
Year of graduation: 2017
Title of thesis: Applications of NS1 deletion mutants of Influenza virus in therapy
Supervisor: Tatiana Betáková
Next career position and workplace: assistant professor, Faculty of Pharmacy, Comenius University, Bratislava, Slovakia

20. Name: **Martina Mravcová**
Year of graduation: 2017
Title of thesis: Molecular mechanisms of immune response in patients with chronic inflammatory
Supervisor: Miroslav Vlček
Next career position and workplace: physician, Spa Piešťany, Slovakia

21. Name: **Martina Zdurienčíková**
Year of graduation: 2017
Title of thesis: The in vitro effect of exosomes on the cell death induction in malignant cells
Suoervisor: Ján Sedlák
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS, from 2019 private sector (Hameln rds a.s.)

22. Name: **Andrea Fabianová**
Year of graduation: 2018
Title of thesis: Influence of persistent viral infection on carbonic anhydrase activity IX
Supervisor: Jaromír Pastorek
Next career position and workplace: University ss. Cyril and Metod, Trnava, Slovakia

23. Name: **Lucia Turianová**
Year of graduation: 2019
Title of thesis: Type III interferons in pathogenesis of influenza viruses
Supervisor: Tatiana Betáková
Next career position and workplace: healthcare management – private sector, Slovakia

24. Name: **Mária Vozárová**
Year of graduation: 2019
Title of thesis: Pathogenesis of primary influenza and secondary bacterial infection in mouse model
Supervisor: František Kostolanský
Next career position and workplace: private sector – laboratory diagnosis, Slovakia

25. Name: **Denisa Máderová**
Year of graduation: 2019
Title of thesis: The role of biologically active molecules integrating an adaptive response to exercise in patients with metabolic and neurodegenerative diseases
Supervisor: Jozef Ukropec
Next career position and workplace: scientific researcher, Institute of Neuroimmunology, SAS

26. Name: **Matúš Jurčík**
Year of graduation: 2021
Title of thesis: Unravelling the mechanisms of post-translational regulation of splicing factors in maintenance of genome
Supervisor: Ľuboš Čipák
Next career position and workplace: Medirex, Nitra, Slovakia

Positions at the BMC SAS

27. Name: **Barbora Buliaková**
Year of graduation: 2016
Title of thesis: Mechanism of nanoparticle uptake into cell
Supervisor: Alena Gábelová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

28. Name: **Pavol Košík**
Year of graduation: 2016
Title of thesis: DNA repair and preleukemic clones in cord blood stem cells
Supervisor: Igor Beliaev
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

29. Name: **Svetlana Miklíková**
Year of graduation: 2016
Title of thesis: Molecular Signalling Between Tumor Stroma and Human Breast Cancer Cells
Supervisor: Lucia Kučerová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

30. Name: **Roman Bohovič**
Year of graduation: 2016
Title of thesis: Human mesenchymal stem cells exploitation in cancer gene therapy
Supervisor: Lucia Kučerová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS (up to 2018)

31. Name: **Agneša Csánová**
Year of graduation: 2017
Title of thesis: Changes in beta3-adrenergic receptors and the kynurenine pathway in neuroendocrine regulations under stress conditions
Supervisor: Daniela Ježová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

32. Name: **Matúš Durdík**
Year of graduation: 2017
Title of thesis: Effect of different radiation types and hyperthermia on DNA damage in human lymphocytes and hematopoietic stem cells
Supervisor: Eva Marková

Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

33. Name: **Lucia Jakubcová**
Year of graduation: 2017
Title of thesis: The impact of the change of fusion activity of influenza type A viruses on their biological activity
Supervisor: Eva Varečková
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

34. Name: **Radka Matúšková**
Year of graduation: 2017
Title of thesis: Preparation and characterisation of M3 immunomodulatory protein encoded by Murine gammaherpesvirus 4 using methods of directed mutagenesis
Supervisor: Marcela Kúdelová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

35. Name: **Viera Holíková**
Year of graduation: 2018
Title of thesis: The bioactive compounds in tick salivary glands and their use in the regulation of cellular processes during physiological and pathophysiological conditions
Supervisor: Iveta Štibrániová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

36. Name: **Lukáš Jakl**
Year of graduation: 2018
Title of thesis: Biomarkers for estimation of cancer risks from low-dose radiation
Supervisor: Igor Beliaev
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

37. Name: **Lenka Kalinková**
Year of graduation: 2018
Title of thesis: DNA methylation profiles in metastatic breast cancers
Supervisor: Ivana Fridrichová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

38. Name: **Eva Székiová**
Year of graduation: 2018
Title of thesis: Monitoring the neuroprotective effect of trophic factors after rat spinal cord injury with focus on stem cells and biomaterials
Suoervisor: Daša Čížková
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

39. Name: **Monika Závodská**
Year of graduation: 2018
Title of thesis: Testing of therapeutic approaches after experimentally induced trauma of the spinal cord
Supervisor: Nadežda Lukáčová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

40. Name: **Patrik Krumpolec**
Year of graduation: 2018
Title of thesis: Importance of physical fitness in metabolic and neurodegenerative diseases: exercise as medicine
Supervisor: Jozef Ukropec
Next career position and workplace: scientific researcher (part-time job), Biomedical Research Center, SAS / private sector

41. Name: **Nina Sihelská**
Year of graduation: 2019
Title of thesis: Newly emerging viral pathogens of economically important crops, their molecular diversity and detection
Supervisor: Miroslav Glasa
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

42. Name: **Karolína Tomčíková**
Year of graduation: 2019
Title of thesis: The role of heterosubtyp immunity in the pathogenesis of influenza infection
Supervisor: Eva Varečková
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

43. Name: **Radivojka Bánová**
Year of graduation: 2019

Title of thesis: Carbonic anhydrases and metabolic pathways of hypoxic tumors
Supervisor: Ľudovít Škultéty
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

44. Name: **Silvia Schmidtová**
Year of graduation: 2019
Title of thesis: Investigation of candidate genes associated with cisplatin chemoresistance of testicular germ cell tumors
Supervisor: Lucia Kučerová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

45. Name: **Michal Šelc**
Year of graduation: 2019
Title of thesis: The mechanisms of action of gold and iron oxide nanoparticles for the selected types of kidney cells
Supervisor: Andrea Bábelová
Next career position and workplace: scientific researcher, Biomedical Research Center/ Centre for Advanced Materials Application, SAS

46. Name: **Lucia Demková**
Year of graduation: 2019
Title of thesis: Intracellular Signaling mediated by Receptors of Growth Factor in Human Metastatic Melanoma Tumor Cells
Supervisor: Lucia Kučerová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

47. Name: **Lucia Balagová**
Year of graduation: 2019
Title of thesis: Indicators of short-term and long-term stress load
Supervisor: Daniela Ježová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

48. Name: **Viktória Dobrócsyová**
Year of graduation: 2019
Title of thesis: Modulation of adipogenesis and oxidative stress by flavonoids and mycotoxins: positive or negative impact on metabolism of adipose tissue
Superviror: Štefan Zorád
Next career position and workplace: scientific researcher (part-time job), Biomedical Research Center, SAS + private sector (Junior HTA Manager, Pharm-In spol. s r. o, Slovakia)

49. Name: **Katarína Bimbová**
Year of graduation: 2019
Title of thesis: Analysis of changes in spinal cord after traumatic injury and recovery
Supervisor: Nadežda Lukáčová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

50. Name: **Mária Bačová**
Year of graduation: 2019
Title of thesis: Study of the possibillities to treat trauma injured spinal cord in the rat by mobilization of endogenous mechanisms of regeneration of nervous tissue (neuroregeneration) Supervisor: Ján Gálik
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

51. Name: **Barbora Chovancová**
Year of graduation: 2020
Title of thesis: Calcium signaling in tumors
Supervisor: Oľga Križanová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

52. Name: **Jana Fedorová**
Year of graduation: 2020
Title of thesis: The impact of local spinal cord injury on the expression of Angiotensin II receptors Supervisor: Jaroslav Pavel
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

53. Name: **Jana Jachová**
Year of graduation: 2020
Title of thesis: Protective mechanism in ischemic tolerance
Supervisor: Petra Bonová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

54. Name: **Mário Benko**
Year of graduation: 2020
Title of thesis: Biological and binding properties of the clinically significant human cytomegalovirus UL144 glycoprotein
Supervisor: Ivana Nemčovičová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

55. Name: **František Csicsay**
Year of graduation: 2020
Title of thesis: Study of the immunogenic macromolecules of Rickettsia sp. and C. burnetii
Supervisor: Marco Quevedo Diaz
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

56. Name: **Michal Nemec**
Year of graduation: 2020
Title of thesis: The impact of exercise on skeletal muscle metabolism in patients with idiopathic inflammatory myositis and in elderly sedentary population
Supervisor: Jozef Ukropec
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

57. Name: **Peter Karailiev**
Year of graduation: 2021
Title of thesis: Atypical biomarkers of the stress response
Supervisor: Daniela Ježová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

58. Name: **Jana Plavá**
Year of graduation: 2020
Title of thesi: Impact of Tumour Stroma on Chemoresistance and Invasiveness of Tumour Cells in Breast Cancer
Supervisor: Miroslava Matúšková
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

59. Name: **Kristína Boršová**
Year of graduation: 2021
Title of thesis: Employment of the mouse-tick-tick-borne encephalitis virus experimental model for the development of anti-tick vaccines
Suervisor: Boris Klempa
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

60. Name: **Zuzana Pös**
Year of graduation: 2021
Title of thesis: Study of the practical possibilities of using of genomic analysis in personalized medicine Suoervisor: Ján Radvánszky
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

61. Name: **Ján Roška**
Year of graduation: 2021
Title of thesis: DNA damage and repair as a prognostic biomarker in human diseases
Supervisor: Dana Jurkovičová
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

62. Name: **Terézia Valkovičová**
Year of graduation: 2021
Title of thesis: Identification of genetic causes of insulin secretion impairment
Supervisor: Daniela Gašperíková
Next career position and workplace: scientific researcher, Biomedical Research Center, SAS

Other

63. Name: **Dominika Gabčová**
Year of graduation: 2016
Title of thesis: Molecular-biology aspects of hereditary lipid disorders
Supervisor: Daniela Gašperíková
Next career position and workplace: maternity leave

64. Name: **Soňa Kontseková**
Year of graduation: 2016
Title of thesis: Molecular and functional implications of endosialin in tumor angiogenesis
Supervisor: Silvia Pastoreková
Next career position and workplace: maternity leave

65. Name: **Zuzana Lešťanová**
Year of graduation: 2016
Title of thesis: The effects of neuropeptides on neuronal morphology and function in vitro
Supervisor: Ján Bakoš
Next career position and workplace: personnel officer, SIKO (private sector)

66. Name: Lívia Mikuška
Year of graduation: 2016
Title of thesis: The effect of manipulation with food intake on the development of organ systems and physiological parameters in rats
Supervisor: Boris Mravec
Next career position and workplace: information not available

67. Name: **Zuzana Vozárová**
Year of graduation: 2016
Title of thesis: Study of the plum pox virus molecular interactions with the host plant
Supervisor: Zdeno Šubr
Next career position and workplace: information not available

68. Name: **Róbert Szabó**
Year of graduation: 2017
Title of thesis: Molecular epidemiology of hantaviruses in Central Europe and antiviral screening against zoonotic viruses causing hemorrhagic fevers
Supervisors: Boris Klempa DrSc., prof. Alessandra Pani (University of Cagliari)
Next career position and workplace: information not available

69. Name: **Ludmila Trusinová**
Year of graduation: 2017
Title of thesis: Role of the methoprene tolerant and ecdysone receptor in molecular action of juvenile hormone during metamorphosis in Drosophila melanogaster
Supervisor: Robert Farkaš
Next career position and workplace: information not available

70. Name: **Andreas Angelidis**
Year of graduation: 2018
Title of thesis: The role of blood vessels in neuroblast migration in rats under normal and pathological conditions
Supervisor: Marela Martončíková
Next career position and workplace: information not available

71. Name: **Peter Tomko**
Year of graduation: 2018
Title of thesis: Development of secondary damage after experimental spinal cord injury in the rat and preparation of primary Schwann cells in vitro for autotransplantation
Supervisor: Ivo Vanický
Next career position and workplace: teacher, Gymnasium sv. Edity Steinovej, Košice

72. Name: **Boris Bajer**
Year of graduation: 2020
Title of thesis: Effect of diet and physical activity on cardiometabolic risk factors
Supervisor: Adela Penesová
Next career position and workplace: Owner of company focused on lifestyle intervention

73. Name: **Kristína Beňová**
Year of graduation: 2021
Title of thesis: The role of cytokines in the immune response to influenza virus infection
Supervisor: Tatiana Betáková
Next career position and workplace: information not available

74. Name: **Simona Lenhartová**
Year of graduation: 2021
Title of thesis: Viral immunomodulatory protein complexes: The molecular and structural characterization
Supervisor: Ivana Nemčovičová
Next career position and workplace: Laboratory Diagnostician (hematology) – College Hospital with Polyclinic of F. D. Roosvelt, Banská Bystrica, Slovakia

2.5.4. Summary table on educational activities

Teaching	2016	2017	2018	2019	2020	2021
Lectures (hours/year)*	603	403	434	408	380	470
Practicum courses (hours/year)*	1 906	1 238	732	525	924	963
Supervised diploma and bachelor thesis (in total)	88	67	86	93	83	75
Members in PhD committees (in total)	20	20	16	16	17	17
Members in DrSc. committees (in total)	6	5	6	6	7	7
Members in university/faculty councils (in total)						
Members in habilitation/inauguration committees (in total)	7	6	3	4	5	6

2.5.5. List of published university textbooks

1) ANTOLOVÁ, Daniela - BADALÍK, Ladislav - BAKOSS, Pavol - BAŠKA, Tibor - BUCHVALD, Jozef - ČATÁR, Gustáv - ČISLÁKOVÁ, Lýdia - DUBINSKÝ, Pavol - GURYČOVÁ, Darina - JALILI, N.A. - JAREKOVÁ, Jana - HUDEČKOVÁ, Henrieta - KMEŤOVÁ, Marta - KOCIANOVÁ, Elena - KRIŠTÚFKOVÁ, Zuzana - LABUDA, Milan - MAĎAR, Rastislav - MACHÁČOVÁ, Erika - MIKAS, Ján - MITROVÁ, Eva - SOLOVIČ, Ivan - STRAKA, Štefan - ŠTEFKOVIČOVÁ, Mária - ŠPALEKOVÁ, Margita - VOLLEKOVÁ, Anna - VÝROSTEKOVÁ, Vanda. Špeciálna epidemiológia. Sylvia Bazovská (ed.) Špliňo Miroslav, Schréter Miroslav (rec.). 2. doplnené a aktualizované vydanie. Bratislava: Univerzita Komenského v Bratislave, 2017. 366s. ISBN ISBN 978-80- 223-4179-0.
2) KOSTRÁBOVÁ, A. - PASTOREKOVÁ, Silvia - BETÁKOVÁ, Tatiana. Biosyntéza vírusov. I. diel. 1. vyd. Bratislava : Univerzita Komenského v Bratislave : Vydavateľstvo UK, 2017. 135 s. ISBN 978-80-223-4402-9.
3) BAUEROVÁ-HLINKOVÁ, Vladena - KABÁT, Peter - BAUER, Jacob. Proteíny štrukúra a funkcia. 1. diel. štruktúra proteínov. 1. vyd. Bratislava: Vydavateľstvo Univerzity Komenského v Bratislave, 2020. 109 s. ISBN 978-80-223-4524-8
4) KABÁT, Peter - BAUEROVÁ, Vladena - BAUER, Jacob. Proteíny štruktúra a funkcia : 2. diel Funkcia proteínov. H. Drahovská, M. Kúdelová. 1. vyd. Bratislava: Univerzita Komenského, 2021. 105 s. ISBN 978-80-223-5094-5
5) LAKOTA, Ján. Hematological malignancies. In Introduction to Clinical Oncology. 1. vydanie. - Bratislava: Univerzita Komenského, 2021, s. 366-379. ISBN 978-80-223-4988-8.

2.5.6. Number of published academic course books

None in the evalutaion period.

2.5.7. List of joint research laboratories/facilities with universities

1. Joint research facility: **Laboratories of Virology, Institute of Virology BMC SAS**
Shared with: Department of Microbiology and Virology, Faculty of Natural Sciences, Comenius University in Bratislava
Since: 1968
Field of research cooperation: virology, with focus on herpesviruses and influenza viruses
Brief description: Since the establishment of the Department of General and Applied Virology (current Department of Microbiology and Virology) in 1968, the Institute of Virology has provided spaces for the experimental research activities of the Department as well as for practical courses and seminars in virology for students, and for execution of their diploma and doctoral theses.

2. Joint research facility: **Laboratory of Human Genetics, Department of Molecular Biology, Faculty of Natural Sciences, Comenius University in Bratislava**
Shared with: Department of Human Genetics, Institute of clinical and Translational Research BMC SAS
Since: 1980 (?)
Field of research cooperation: human genetics based on genomic approaches
Brief description: Implementation of joint projects related to research of monogenic human diseases, education of pre-graduate and postgraduate students .

3. Joint research facility: **MEDIPARK, University of Pavel Jozef Šafárik, Košice**
Shared with: Institute of Neurobiology BMC SAS
Since: 2014
Field of research cooperation: research of molecular mechanisms of neurodegeneration and neuroregeneration
Brief description: Implementation of joint research projects, scientific and pedagogical activities, popularization of science and research and application of results in practice in accordance with the Cooperation Agreement concluded between UPJŠ and SAS.

4. Joint research facility: **University Science Park for Biomedicine in Bratislava**
Shared with: Institute of Molecular Biomedicine, Faculty of Medicine, Comenius University in Bratislava
Since: 2015
Field of research cooperation: molecular physiology
Brief description: Sharing research infrastructure and expertise, coopertaion and stimulation of joint research activities, practical education of young researchers and university students

5. Joint research facility: **Department of Metabolic Disorders Research, Institute of Experimental Endocrinology BMC SAS**
Shared with: 1st clinic of otorhinolaryngology, Faculty of Medicine, Comenius University in Bratislava
Since: 2011
Field of research cooperation: hereditary hearing loss
Brief description: Implementation of joint research projects, sharing infrastructure and expertise, providing opportunities for accomplishment of experimental part of PhD studies of the faculty students.

2.5.8. Supplementary information and/or comments on doctoral studies and educational activities – focused on what changes have occurred since the last evaluation in 2016

Doctoral studies and educational activities are very important for the BMC SAS sustainability and future development. Therefore, our aim is to continuously improve the quality and attractivenes of education for talented students, both at pre- and post-graduate levels. This is one of the reasons why many BMC SAS researchers act as external teachers performing experience-based lecturing at several faculties of the major Slovak universities, and take care of the students already during their bachelor's and diploma thesis. This strategy allows for recognition of most skilled and motivated young people and their engagement in the doctoral studies at the BMC SAS. During the evaluation period, we introduced new guidelines for PhD education, specifying the necessary attributes and the role of the PhD guarantor, supervisor, and student, and their mutual relationship with the empasis on their commitments to research ethics and integrity.

In order to improve the quality of pre-graduate and potgraduate research education, BMC SAS has been offering extertise in a broad range of biomedical topics and modern research methods and techniques. This specturm was extended during the evalutaion period by including **Biochemistry** (Faculty of Natural Sciences, Comenius University in Bratislava), **Biophysics** (Faculty of Science, UPJŠ Košice) and **Sport sciences** (Faculty of Physical Education and Sport, Comenius University in Bratislava) into the portfolio of the accredited **study programs**. In addition, PhD students funded by our collaborating faculties were invited to perform experimental parts of their studies in our laboratories, under the guidance of our supervisors and supervisor-specialists. We have regularly organised internal mini-conferences, where PhD students presented their research results to the entire academic community of the BMC SAS. We have also organised summer schools on molecular biology and workshops on bioinformatics. Of particular importance for education of PhD students and young researchers working mainly in cancer research area were numerous lectures by renowned experts in oncology and biomedical technology, seminars on soft skills (e.g. how to write project proposals, how to interact with industry, how to manage projects etc), practical courses in experimental techniques and research exchanges organised within the VISION Twinning projects. Many interesting seminars were also organised

under CAPSID INTERREG project, mainly dedicated to structural biology and virology. The list of trainigs, courses and lectures is available below this supplementary information on the next page.

PhD students at the BMC SAS can also propose their own projects and apply for the support via Doktogrant (the program of grants for PhD students funded by the SAS). Since the first call of the program in 2019, the Doktogrants were awarded to the following PhD students of the BMC SAS: Matúš Jurčík, Ján Jurčík, Andrea Holičková, Zuzana Dzurjašková, Sabína Strapcová, Stanislava Bukatová, Tomáš Selický, Veronika Kubašová, and Pooneh Chokhachi Baradaran.

We have also continuously stimulated PhD students and young researchers to gain new experiences and skills through short-term and long-term visits to excellent reseearch laboratories abroad. These visits opened them new windows for collaborations and in some cases also for post-doctoral stays, as evident in the section 2.5.3.. Unfortunately, many face-to-face and travel activities were interrupted due to COVID-19 pandemics.
Examples of international mobility of the BMC SAS PhD students during the evaluation period:

- **Nina Sihelská**, 2016, Neustadt an der Weinstrasse, Germany, 3-months, DLR Institute for Plant Protection, research of synergistic and antagonistic interactions among selected grapevine viruses.
- **Silvia Schmidtová,** 2018, Department of Pathology, Laboratory for Experimental Patho-Oncology, Erasmus MC Cancer Institute, University Medical Center Rotterdam, The Netherlands, research on mechanisms and targeting of cancer chemorestance
- **Jana Fedorová**, 2019, ICM Institute for Brain and Spine, Paris, France, 7 weeks, research on myelin plasticity and regeneration
- **Jana Jachová,** 2019, University of Basque Country, Spain, SAIA fellowship, 3 months, expertise in preparation of rat fetal primary neuronal cultures as an in vitro model for testing ischemia and therapeutic approaches using ex vivo stimulated blood cells
- **Lucia Slobodová,** 2019, Cheng Kung University, Taiwan, 1 month, sharing expertise in intervention studies of patienst with Alzhemer's disease, including complex aspects of protocol, eye-tracking method, EEG monitoring and preparation / evaluation of cognitive tests
- **Martin Schön,** 2019, Monash Centre for Health Research and Implementation, Australia, 6 months, new expertise based two randomized, placebo-controlled studies related to effect of carnosine on metabolism, congnitive functions and cardiovascular risk using non-invasive monitoring approaches
- **Terézia Valkovičová,** 2020, 7,5 months, ULB Center for Diabetes Research, Université Libre de Bruxelles, Brusel, Belgium, preparation of pancreatic β-cells via reprogramming of blood cells from patients with MEHMO and Wolfram syndromes to stem cells subjected to differentiation, to obtain in vitro model for study of genotype-phenotype relationships.
- **Alexandra Reichová,** since 2020, Institut de Neurosciences Cognitives et Intégratives d'Aquitaine, University of Bordeaux, research of amyotrophic lateral sclerosis, stay still ongoing.

During the past two decades, the entire Slovakia has been increasingly suffering from a problem of brain drain that has partially obstructed also our efforts to attract / stabilise talented young people. In research, occurs on one hand hand due to unfavourable rewarding system that generates much worse life standard for young researchers when compared to the situation abroad and on the other one due to the underfunded and overbyrocratic system of research support that generates barriers to creative research activities. These conditions also demotivate excellent foreing PhD students / young researchers to come to Slovakia and thus, our experience from the attempts related to internationalisation have not been satisfactory so far (with few exceptions). This is why we value very much our PhD students who are willing (and even keen) to continue their carrier at the BMC SAS or reintegrate after their postdoctoral stays abroad using their expertise for the development of our national scientific research. Therefore, our strategy is aimed primarily at education-stabilisation in a reasonable balance with internationalisation.

During the evaluation period, several excellent young reasearchers, past PhD students returned from the postdoctoral stays to continue their career at the BMC SAS, including **Katarína Lopušná** (from the Department of Anatomy and Cell Biology, University of Florida College of Medicine, Gainesville, Florida, USA), **Tomáš Havránek** (Department of Pediatrics and Division of Neonatal-Perinatal Medicine, Children's Hospital at Montefiore, NY, USA), **Miroslav Baláž** and **Lucia Balážová** (Institute of Food, Nutrition and Health, ETH Zurich, Schwerzenbach, Switzerland). The excellence of the latter two researchers was recognised by the award of SASRO 2 projects starting from 2022. We strongly believe, that these young researchers will use their talent and creative energy to further advance the research at the BMC SAS.

In order to create an inspirative environment and provide PhD students, postdocs and young researchers with opprotunities to develop their skills and knowledge, we have used channels offered by two international projects to attract leading speakers to share their expertise. To this end, a number of events were organised as listed. below

Trainings, lectures and other educational activities organised within the VISION project

Young researchers at the BMC SAS but also at collaborating universities have strongly benefited from the VISION project (described in more detail on pages 59-60) in the form of valuable educational activities provided by internationally-recognised experts. The activities were focused on transfer of knowledge in oncology and nanobiology and also on development of soft skills. The educational materials are available at https://drive.google.com/drive/folders/1PZCR6QnBGzy3Olw3c_OOg1Vcu_hX9KXx?usp=sharing

TRAININGS

Training in advanced in vitro models (Slovakia)
Training in epigenetic analyses – DNA methylation (Slovakia)
Training in qPCR and gene expression (Slovakia)
Training in cellular stress response (Slovakia)
Training in advanced co-culture intestine model (Germany)
Training in in vitro 3D cell cultivation and stem cell differentiation (Germany)
Study of cellular biological processes using nanoparticle devices (Spain)
The use of the liquid biopsy in precision medicine (Spain)
Isolation and culture of tumor and stroma cells from primary tumors (Spain)
The involvement of tumor microenvironment in cancer progression (Spain)
The use of mouse models in oncology research (Spain)
Flow cytometry analysis of tumor biomarkers (Spain)
Training in treating patients with GI tumors (Greece)
Training in enrolling patients with GI tumors in research protocols (Greece)
Training in surgical operational procedures aiming to treat patients with GI tumors (Greece)
Initiation in Medical Genetics and Genetic Counselling (Greece)
Training in exosome isolation methodology (Greece)
Training in circulating tumor cells isolation methodology (Greece)
Training in protein expression analysis (Greece)
High throughput genotoxicity testing training (Norway)
Training in confocal microscopy (characterisation, uptake of nanomaterials and in situ oxidative stress on live cells) (Norway)
Advanced 3D models: ALI co-cultures and liver spheroids - application of the comet assay (Norway)

COURSES

Course how to interact with industry
Course on academic publishing
Course in Good Laboratory Practice (GLP) for in vitro nano and genotoxicology, best practices with nanomaterial
Course how to write proposals
Course: Project management
Online course on the use of the liquid biopsy in medical oncology
Comet Assay - Practical online course/video learning
Overview and Future Perspectives in Colorectal Cancer
The Treatment Landscape for Hepatocellular Carcinoma
Diagnostic and Therapeutic Aspects of Handling GPNETs
Statistical Analysis of Biomedical Data: Basic Principles and Practicals
Course: Patenting of medical inventions
Course on Ethics in biomedical research
Practical methods in oncological research (online lectures)

LECTURES

Dipl. Ing. Thorsten Knoll - Microfluidic technologies and their applications in cell biology
Dr. Pantelis Antonakis - Bariatric surgery and nonalcoholic fatty liver disease
Dr. Pavel Vodička, CSc. - Genomic instability, microenvironment and telomere homeostasis in colorectal cancer
prof. Núria Malats - Objective: Personalised Prevention of Pancreatic Cancer
Prof. Alfredo Carrato - Future approaches of pancreatic ductal adenocarcinoma
Dr. Julie Earl - Advances in familial pancreatic cancers
Dr. Laura Garcia Bermejo - Molecular and Cellular mechanisms/biomarkers in PDAC

Educational activities organised within the CAPSID project

Additional educational opportunities were provided in the frame of CAPSID project (described in more detail on page 67). The education was focused on the knowledge tranfer in structural biology, see https://capsid.vbcf.ac.at/events/

SEMINARS

From MST to TRIC – using and benchmarking the NanoTemper Monolith
Interrogating HIV-1 On A New Level
From Viruses to Cells. Toward high-resolution cellular structural biology using cryo-electron tomography
How can thin filaments protect a nucleus? The structure and function of lamins.
Network Medicine: From protein-protein to drug-drug and human-machine interactions
DNA mismatch repairs: K27-linked diubiquitin inhibits UCHL3 via an unusual kinetic trap
A role of complex composition in biomolecular condensates
Imagining the LIFE and DEATH of mRNAs in single cell
Liquid phase electron microscopy fundamentals: The application to study membrane proteins in whole cells, and future outlook
Laser-based IR spectroscopy: A new perspective for protein secondary structure analysis
Normal mode analysis (NMA): Application to protein structure studies
The role of AUC and SAXS: Understanding the structural basis for bacterial virulence factor function
The Bristol MultiBac Platform in the COVID19 Response: New avenues to combat the pandemic
The sarcomeric protein myomesin has it all-in-one: Rigidity, flexibility and elasticity
Why should life maintain chirality?
Lanthanide Chelating Tags in Structural Biology
Unraveling the structure of toxic protein aggregates in situ
Locating specific structures or molecules in cells by correlative cryo-3D Xray imaging
Imaging G-protein signaling with genetically encoded fluorescent probes
Potential and Limitations of Multi-Method Approaches: Studying dynamic of multiprotein interactions with applications of SARS-CoV-2 nucleocapsid interactions
GoldenBac: A simple, highly efficient, and widely applicable system for construction of multi-gene expression
Molecular snapshots of cell cycle control by cryo-EM
Light waves meet molecular machines: Probing single molecules on μ-interferometers

2.6. Societal impact

2.6.1. The most important case studies of the research with direct societal impact, max. 4 for institute with up to 50 FTE researchers, 8 for institutes with 50 – 100 FTE researchers and so on. Structure: Summary of the impact; Underpinning research; References to the research; Details of the impact; Sources to corroborate the impact. One page per one case study

1. Improving surveillance of SARS-CoV-2 infection in Slovakia through development, validation and routine use of novel RT qPCR assays and sequencing approaches

Summary of the impact

Timely development and/or validation of original IVD certified RT qPCR assays for detection of SARS-CoV-2 RNA, testing for diagnostic and preventive purposes and implementation of sequencing to identify onset of virus variants directly contributed to improved public health surveillance in the COVID-19 pandemic in Slovakia.

Underpinning research

The team of Boris Klempa at the Department of Virus Ecology, Institute fo Virology BMC SAS has got a strong expertise in zoonotic virus infections based on the long-lasting research of hantaviruses and tick-borne viruses in collaboration with world-leading laboratories of EVA GLOBAL consortium, namely the Institute of Virology at Charité Berlin. This expertise was key to preparedness of the team to immediately react to the onset of COVID-19 pandemic by fast introduction of testing, followed by participation in development and/or validation of novel IVD tests and sequencing of virus variants. The kits for detection of SARS-CoV-2 RNA were developed and/or validated in collaboration with MultiplexDX company led by Pavol Čekan, whereas sequencing was introduced in collaboration with the team of Jozef Nosek at the Faculty of Natural Sciences, and data were

analysed in cooperation with Tomáš Vinař at the Faculty of mathematics, physics and informatics, Comenius University in Bratislava. The team of Boris Klempa obtained several SARS-CoV-2 virus isolates representing diverse virus variants that were archived in the European virus archive and were made available for academic research and industrial development. The virus isolates were also used as a source of the positive control RNA in the newly developed kits and served for testing of virus neutralization activities of antibodies and diverse compounds. The sequencing activites led to discovery of novel virus variants spreading in Slovakia.

References to the research

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Details of the impact

When COVID-19 pandemic reached Slovakia in March 2020, Boris Klempa and his colleagues from the Institute of Virology BMC SAS immediately adopted spaces of the BSL3 laboratory, introduced RT qPCR detection of SARS-CoV-2 viral RNA and offered their testing expertise and capacity to the Public Health Authority (PHA) of the Slovak Republic. During the progression of the pandemic, they participated in the development and/or validation of a series of novel RT qPCR diagnostic kits in collaboration with the MultiplexDX. The kits were equipped with the positive control RNA obtained at the BMC SAS from the virus isolates from Slovak patients. The kits were certified by the State Institute for Drug Control for IVD use (SUKL, see below). During the first and second wave of the pandemic, when the state testing capacity was at critically low level, the BMC SAS researchers had been performing routine testing of samples from PHA and several hospitals. Later on, the testing was provided to artists and sportsmen, to policymakers to ensure safety during the GLOBSEC meetings, and to other professionals endangered by the pandemics. Testing was also performed at weekly basis to the employees of the Slovak Academy of Sciences. Moreover, sequencing allowed for early identification of the onset of B.1.1.7, alfa, delta and omicron variants with direct impacts on decisions of state authorities on anti-pandemic measures. Of high importance for routine testing efficiency was also introduction and validation of gargle sampling as an approach suitable especially for testing of school children. This way of sampling was then regularly used for majority of RT qPCR tests at BMC SAS. Sample pooling was also examined as an approach suitable for testing closed groups of people.

Sources to corroborate the impact

- Certificates of participation in external quality assessments schemes for molecular diagnistics of SARS-CoV-2 (July 2020) and SARS-CoV-2 variants (September 2021) awarded by ECDC and performed at RIVM, Netherlands
- IVD certificates by SUKL for vDETECT COVID-19 RT-qPCR, Kit rTEST COVID-19 B.1.1.7 qPCR, Kit rTEST COVID-19 qPCR, Kit rTEST COVID-19/FLU qPCR, Kit Vivid COVID-19 LAMP Direct-G developed by MultiplexDX and validated at BMC SAS
- Standard Operating Procedures for molecular diagnostics of SARS-CoV-2 approved by the Ministry of Health (co-authored by Boris Klempa and Silvia Pastoreková)


CERTIFICATE OF PARTICIPATION
awarded to
INSTITUTE OF VIROLOGY, BIOMEDICAL RESEARCH CENTER, SAS,
DEPARTMENT OF VIRUS ECOLOGY
BRATISLAVA, SLOVAKIA
to attest completion of ERLI-Net & EVD-LabNet
EXTERNAL QUALITY ASSESSMENT SCHEME FOR
MOLECULAR DIAGNOSTICS OF SARS-COV-2 VARIANTS, SEPTEMBER 2021
Covering the following:
• Accurate detection of SARS-CoV-2 in 12 coded and inactivated samples
Organised by:
European Centre for Disease Prevention and Control
Mike Catchpole, Chief Scientist
Performed under ECDC/2017/002 specific contract 3 by:
National Institute for Public Health and the Environment – The Netherlands (RIVM)
Chantal Reusken, coordinator EQA and EVD-LabNet
Charité – Berlin (CUB)
Jan Felix Drexler, coordinator EQA

2. Monitoring of SARS-CoV-2 seroprevalence to assess epidemiological prospects in Slovakia

Summary of the impact

Based on the detection of antibodies against SARS-CoV-2 virus, it was possible to estimate the antibody levels in the population of selected regions of Slovakia and subsequently optimize the testing strategy and epidemiological monitoring in relation to the risk of exposure to SARS-CoV-2 infection with rapidly spreading of new virus variants.

Underpinning research

The research team of the Department of Tumor Biology used its expertise in the development of ELISA methodology and successfully performed testing of the SAS employees using SARS-CoV-2 ELISA tests. Based on the validation carried out at the BMC SAS in the summer of 2020, as well as on data published in the literature, ELISA tets from the German company EUROIMMUN were selected as most reliable and accessible. With these sets, the BMC SAV studied the dynamics of antibody production in serum and saliva after vaccination and/or COVID-19. Traditionally, venous blood collected according to standard procedures by medical personnel is used for antibody analysis. However, this approach is to a greater extent logistically, timely and personnely very demanding and invasive for the examined persons. Thus, we introduced and validated a new approach based on the collection of capillary blood from finger pricks using lancet as a suitable alternative to a venous blood serum sample. This was experimentally verified at BMC SAV and the results obtained with venous blood coincided with the results with dry drops of capillary r. In addition, BMC prepared and validated its own cards suitable for dry blood collection.

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Details of the impact

In late autumn 2021, another seroprevalence study was perfomerd in Slovakia for the Ministry of Health of the Slovak Republic and involved medical faculties from Bratislava and Košice together with BMC SAS. Epidemiologists led by prof. Brazinová and Halanova were in charge of collecting samples in the field, the BMC SAS performed the analysis of samples and Doc. Kollar from the Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava participated in the statistical processing of the results. A total of 3785 laboratory tests were evaluated from samples tested in five districts of Cadca (CA), Povazska Bystrica (PB), Komarno (KN), Kezmarok (KK), Lucenec (LC) and two cities Kosice (KE) and Bratislava (BA). This study was the first seroepidemiological study to monitor antibodies to SARS-CoV-2 in the population of Slovakia and brought several interesting results. The main finding of the study was that more than a half of the participants did not have antibodies to SARS-CoV-2 virus. Large regional differences in the presence of antibodies to the virus were also found, and up to 80% of the population in the capital Bratislava had antibodies

Sources to corroborate the impact

- The studies helped in strategic decision-making and the selection of appropriate measures to curb the spread of COVID-19, with particular emphasis on the real situation and possible threats to selected subpopulations.
- Follow-up study comparing antibody levels before and after the omicron wave showed that high antibody levels to S protein of SARS-CoV-2 at the onset of the omicron were protective from the reinfection of the BMC SAS employees (data analysis is in process).
- According to ECDC, the results of seroprevalence studies are of great importance for developing accurate modelling forecasts useful for public health policy.

3. Diagnostics and prevention of Q fever, rickettsial and chamydila infections.

Summary of the impact

Development and validation of highly purified corpuscular antigens for rapid, simple, sensitive and specific detection of antibodies against *Coxiella burnetii* and some chlamydial or rickettsial species in serum, plasma or milk of animals and men. The Laboratory for Diagnosis and Prevention of Rickettsial and Chlamydial Infections of the Department of Rickettsiology, in cooperation with the Public Health Authority, significantly contribute to the surveillance of the etiological agents of these diseases. Within the framework of scientific and technical cooperation with SMEs, the laboratory also participates in development of experimental vaccines against coxiellosis and chlamydial infections in livestock, goats or sheep.

Underpinning research

The Department of Rickettsiology, Institute of Virology, BMC SAS has an extended history in research on Q fever and chlamydial or rickettsial infections. The team investigated host-pathogen interactions and reveal novel virulence strategies of the etiological agents. Important knowledge on antibiotic resistance/tolerance mechanism were also delivered. The researchers systematically identified specific protein biomarkers, immunoreactive, and virulence-related proteins and searched for protein candidates suitable for diagnostics of Q fever, chlamydial infections or rickettsioses. Particular attention was paid on development of novel diagnostic tools and subunit vaccine to improve prophylaxis of these re-emerging infections.

References to the research

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Zuniga-Navarrete F, Flores-Ramirez G, , Quevedo Diaz M, Skultety L Counting of viable C. burnetii cells by quantitative reverse transcription PCR using a recombinant plasmid (pCB-dotA) as a standard. Acta Virologica, 2018, 62, 409-414.

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Details of the impact

The strong expertise of individual members of the Department of Rickettsiology in the diagnosis of rickettsial disease and Q fever has created a preconditions for establishment of the National Reference Center (NRC) for Rickettsioses by the Public Health Authorities. The department developed diagnostic antigen and vaccine candidates against these re-emerging infections, which contains imunoreactives proteins and lipopoly-saccharides. Under the guidance of Ludovit Skultety, the Laboratory for diagnosis and prevention of rickettsial and chlamydial Infections which is the executive laboratory of the NRC provided a rapid and reliable detection of *Rickettsia* spp. and rickettsia-like organisms across Slovakia The laboratory analyzes the presence of bacterial DNA by RT qPCR and production of IgG and IgM antibodies to spotted fever group rickettsia and *C. burnetii*. Special emphasis has been paid to development of novel diagnostic tool by employing in-house prepared diagnostic antigens.

Sources to corroborate the impact

- Laboratory for Diagnosis and Prevention of Rickettsial and Chlamydial Infections is operating under the "**Good Laboratory Practice**" Compliance Programme of **the Slovak National Accreditation Service (G-027)**
- This laboratory is also the executive laboratory of **National Reference Center for Rickettsioses** of the Public Health Authority of the Slovak Republic
- Licence for development of Q fever vaccine granted to Moredun Scientific, Scotland, UK

4. Monitoring natural foci of ticks and vector-borne pathogens to improve surveillance of human and animal health using molecular detection methods

Summary of the impact

Domestic and wild animals are the common reservoirs of *Rickettsia* spp and rickettsia-like organism (*Ehrlichia, Anaplasma, Bartonella, and Babesia*). The bacteria are usually spread to humans through bites of ticks, mites, fleas, or lice. Thus, monitoring of these microorganisms in natural foci is critically important because it can enhance their control in Slovakia.

Underpinning research

Department of Rickettsiology has outstanding research expertise in elucidation of epidemiological and epizootological aspects of vector-borne bacteria in Slovakia. The major aim of researchers has been to map the natural foci of these pathogens, isolate new species and characterize them by methods of molecular biology and immunology.
Based on long-term research on various vectors and vector-borne pathogens we detected, identified and isolated diverse tick-borne microorganisms, such as Rickettsia spp., Coxiella burnetii, Anaplasma

phagocytophilum, Neoehrlichia mikurensis, Borrellia burgdorferi, Bartonella and Babesia using PCR-based methods followed by sequencing.

References to the research

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Details of the impact

Ticks are one of the principal vectors responsible for the transmission of pathogens to humans, domestic animals and livestock throughout the world.There is growing evidence that ticks distribution and tick-borne disease transmission are increasing across Europe including Slovakia. Climate change has resulted in milder winter temperatures at temperate latitudes, leading to an increase in ticks survival and triggering tick activity earlier in the year. The most prevalent tick species in Slovakia is the common sheep or deer tick (Ixodes ricinus), which will seek hosts when temperatures rise above 7 ◦C for 5 days consecutively. This parameter determine the duration of periods during the year when ticks are active and when humans and livestock are at risk of exposure to tick-borne pathogens. Thus, there is an urgent need to improve the scope of diagnostic pathogen testing for tick borne diseases that can support surveillance based on detection of disease. It is critically important to understand disease transmission dynamics.

Sources to corroborate the impact

- Cooperation with Infection clinics of public hospitals in cases of suspicious rickettsial infection via tick vector
- Public awareness program for tick-borne infectious pathogens
  Testing ticks for presence of infectious pathogens

5. Facilitating clinical decisions related to personalised treatment of monogenic diseases based on DNA diagnostics

Summary of the impact

Development of an innovative comprehensive diagnostics of monogenic diabetes using molecular genetic methods and implementation of this procedure into clinical practice allows for application of the personalized management based on the principles of pharmacogenetics to patients from the entire Slovakia.

Underpinning research

The Diabgene Laboratory at the Department of Metabolic Disorders, Institute of Experimental Endocrinology founded by Iwar Klimeš and currently led by Daniela Gašperíková has a strong experience in DNA analysis of genes responsible for hereditary types of diabetes. Monogenic diabetes mellitus is one of the few diseases where a large proportion of patients can benefit from the tailor-made treatment. We have developed and implemented the innovative DNA diagnostics pipeline related to the monogenic diabetes. For this purpose, the special panel for iSeq sequencing platform, which includes 70 genes has been designed and implemented into the laboratory practice. Moreover, the patients with syndromic forms of monogenic diabetes undergo the whole exome sequencing, where we have developed in house bioinformatic analysis pipeline from open source tools. Since the NGS technologies produce a substantial number of variants with unknown pathogenicity, we have implemented several *in vitro* approaches for the functional assessment of the newly identified variants. Based on our achievemnets we were invited into the Monogenic Diabetes Variant Curation Expert Panel Group

supervised by ClinGen (NIH)-funded resource dedicated to building a central resource that defines the clinical relevance of genes and variants for use in precision medicine and research.

References to the research

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BOWMAN, P. – et al - KLIMEŠ, Iwar - SZOPA, M. - POLAK, M. - IAFUSCO, D. - HATTERSLEY, A. T.** - NJOLSTAD, P.R. - NEONATAL DIABETES INTERNATIONAL COLLABORATIVE GROUP (including GAŠPERÍKOVÁ, Daniela, STANÍK, Juraj). Effectiveness and safety of long-term treatment with sulfonylureas in patients with neonatal diabetes due to KCNJ11 mutations: an international cohort study. In Lancet Diabetes & Endocrinology, 2018, vol. 6, no. 8, p. 637-646.

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Details of the impact

Diabetes mellitus (DM) is no longer considered to be a homogeneous disease. Precise identification of the DM type is needed for effective personalized treatment of the patients. In certain types of monogenic diabetes, insulin treatment can be switched to sulphonylurea tablets, or, in case of GCK-MODY diabetes, the patients do not require any medication thanks to proven lack of diabetic complications. These changes in treatment not only improve the quality of life of the patients dramatically, but lead also to better metabolic compensation and overall outcome of their disease. The Diabgene Laboratory provides the DNA testing for patients with monogenic diabetes all over Slovakia. Until now >1500 patients from >700 families are included into the DNA biobank of monogenic diabetes supervised and maintained by our team. The new methodological approaches including innovative panel of 70 monogenic diabetes genes is recently used for comprehensive DNA testing. It is targeted to genes involved in the MODY-type diabetes, monogenic autoimmune diabetes, as well as the most common mitochondrial diabetes mutation, and allows also for assessment of a polygenic risk score for type 1 diabetes and genes linked to hyperinsulinism.

Sources to corroborate the impact

- More than 1 500 clinical reports based on the EMQN rules have been sent to the clinicians.
- More than 400 patients were reported to the National Registry of Rare Ddiseases at the National Health Information Center
- Certificates of participation in external quality assessments scheme for molecular genetics diagnostics of monogenic diabetes (2012-2021) awarded by EMQN
- ClinGen Monogenic Diabetes Expert Panel Specifications to the ACMG/AMP Variant Interpretation Guidelines Version 1.1 Curation Activity Procedures - September 30, 2021
- Reduced healthcare costs due to the cheaper treatment (e.g., sulphonylurea tablets vs insulin treatment in the case of neonatal diabetes, (Greeley et al 2011 Diabetes Care 34, 622-627).

6. Improving quality of life through physical activity-mediated intervention: Prevention and treatment of chronic non-communicable diseases

Summary of the impact

Sedentary lifestyle and obesity, which reach epidemic proportions in affluent modern societies, accelerate the processes of ageing and contribute substantially to the pathogenesis of many chronic noncommunicable diseases. To increase health-span and to reduce morbidity of ageing population, it is of utmost importance to (i) provide convincing evidence that regular exercise is an effective therapeutic strategy and could be used to prevent or treat chronic diseases, as well as to (ii) translate these findings into clinical practice. We do strive to create a model system where exercise prescription is being used as a component of the complex lifestyle intervention, with monitoring its effects and exploring its mechanisms. In cooperation with colleagues active in clinical medicine, we co-organize educational activities and participate in creating guidelines for the specialists.

Underpinning research

The team led by a tandem of scientists Jozef Ukropec and Barbara Ukropcová at the Department of Metabolic Disease Research, Institute of Experimental Endocrinology & Center of Physical Activity Research BMC SAS, has strong expertise in molecular, cellular, and integrative physiology with the specific accent on energy

metabolism. This could be documented by the results of clinical intervention studies using exercise as the key benefactor, improving metabolic health, physical fitness and motor functions in patients with obesity and metabolic disease, in the elderly with mild cognitive impairment (collaboration with 1st& 2ndDep. of Neurology, University Hospital Bratislava), early-stage Parkinson disease (collaboration with 2nd Dep. of Neurology, University Hospital Bratislava), testicular cancer survivors with late chemotherapy-induced metabolic toxicity (collaboration with National Cancer Institute), and patients with idiopathic inflammatory myopathy (collaboration with Institute of Rheumatology, Prague, Czech Republic). The long-term supervised training interventions and nutrition monitoring strategies are necessary to validate feasibility and effectiveness of exercise as a treatment modality, thus providing an incentive to establish the Centre of Physical Activity Research (CPA) BMC SAS (2017). Complex intervention programmes with an extensive follow-up testing battery, including wearables and innovative technologies enabling online coaching, monitoring of habitual physical activity, and diet are being implemented at the CPA, under the supervision of experienced physiotherapists / trainers / exercise physiologists.

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Details of the impact

Since 2017, we performed five intervention studies implementing exercise as a treatment modality. More than 250 patients were subjected to 3-6 month exercise intervention program, and currently, up to 60 seniors and 30 patients with obesity and chronic metabolic diseases, cancer survivors and patients with Parkinson disease continuously exercise in our Center (CPA BMC SAS, long-term 5-years follow up is undergoing). Efforts to establish follow-up training programs in collaborating private exercise facilities are pursued. Seniors who participated in our research programs founded with our full support a non-profit organisation “Strieborné líšky“ (Silver foxes) with the aim to promote exercise, healthy lifestyle and active way of ageing. They organize activities for seniors, young children, and exhibitions where art is interconnected with science, to support the charity projects and activities.

Sources to corroborate the impact

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- Center for Physical Activity Research Biomedical Research Center SAS was awarded by Association of institutions for adults education in Slovak Republic in category „AGE MANAGEMENT“ 2020 and received SENIOR FRIENDLY AWARD 2021, for exceptional activities for seniors.
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7. Initiation of clinical trial based on original results obtained during PhD study

Summary of the impact
Ongoing clinical trial at the National Cancer Institute for platina refractory testicular germ cell cancer.

Underpinning research
Silvia Schmidtova, PhD. student at the Department of Molecular Oncology, Cancer Research Institute BMC SAS under supervision of Lucia Kucerova initiaded cooperation with National Cancer Institute and focused their research on breakdown of cisplatin resistance in testicular germ cell tumours (TGCTs). TGCTs represent the most common solid tumours among men between the age of 20 to 40. Almost 80% of patients with TGCTs including the ones with disseminated disease are cured by cisplatin-based chemotherapy. Some patients with metastatic disease do not respond effectively to the treatment, and succumb to a progressive disease. Identifying novel therapeutic targets could improve the therapeutic outcome. During the PhD study cispaltin-resistant cell lines with high activity of aldehyde dehydrogenase (ALDH) activity were derived and analysed.

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Details of the impact
The study demonstrated that ALDH is overexpressed in the cisplatin-resistant TGCTs. ALDH inhibitor disulfiram restored the sensitivity to cisplatin and significantly inhibited xenograft growth. The clinical relevance of these findings, was proved at 216 patient samples. This study showed for the first time significant differences in the ALDH1A3 expression in different histological subtypes of testicular tumours compared to normal testicular tissue. Based on these findings a clinical trial was initiated.

Sources to corroborate the impact
Phase II study of disulfiram and cisplatin in refractory testicular germ cell cancer; EudraCT Number: 2019-000558-68

8. Development of protocols for isolation of *yCD:UPRT* suicide gene transduced mesenchymal stromal cells (MSCs): small extracellular vesicles with *yCD:UPRT* mRNA for innovative cancer therapy

Summary of the impact
Development of cell free gene-directed enzyme/prodrug therapeutic system for cancers based on MSC–small extracellular vesicles.

Underpinning research
The team of Cestmir Altaner at the Department of Molecular Oncology, Cancer Research Institute BMC SAS has got a strong expertise in involvement of retroviruses in tumour inductions in small laboratory animals. Studies published about avian retroviruses B77 isolated in Bratislava lead to the stay of C. Altaner at University of Wisconsin, Madison in the laboratory of prof. H.M. Temin, latterly Nobel price laureate in medicine. Ability of retroviruses to replicate through DNA provirus integrated in cell DNA triggered development of retrovirus vectors able to integrate and express genes in recipient cells. This was the start of our retrovirus bicistronic vector able to produce virus for transduction of mesenchymal stromal cells (MSCs) with suicide gene and allowing to select homogenous population of *yCD::UPRT* gene MSCs. Our discovery of secretion of small extracellular vesicles (sEVs) possessing mRNA in their cargo formed the cell-free tool enabling to kill variety of tumour cells both in vitro and in vivo.

References to the research
Altanerova U, Jakubechova J, Benejova K, Priscakova P, Pesta M, Pitule P, Topolcan O, Kausitz J, Zduriencikova M, Repiska V, Altaner C. Prodrug suicide gene therapy for cancer targeted intracellular by mesenchymal stem cell exosomes.. Int J Cancer. 2019 Feb 15;144(4):897-908. doi: 10.1002/ijc.31792

Altaner C, Altanerova U. Mesenchymal Stem Cell Exosome-Mediated Prodrug Gene Therapy for Cancer. Methods Mol Biol. 2019;1895:75-85. doi: 10.1007/978-1-4939-8922-5_6.

Altanerova U, Jakubechova J, Benejova K, Priscakova P, Repiska V, Babelova A, Smolkova B, Altaner C. Intracellular prodrug gene therapy for cancer mediated by tumor cell suicide gene exosomes. Int J Cancer. 2021 Jan 1;148(1):128-139. doi: 10.1002/ijc.33188.

Details of the impact
When the developed gene-directed enzyme/prodrug therapeutic system by means of MSC–small extracellular vesicles with suicide gene yCD:PRT will be validated in controlled clinical studies with positive outcome, it will have direct societal impact.

Sources to corroborate the impact
High reproducibility in preclinical settings and high citation rate in leading cancer journals, including clinical trials of mesenchymal stromal cell therapy.

9. Development of diagnostic method for histological evaluation of spinal cord injury

Summary of the impact
New quantitative method overcomes the issue of underestimation of neural tissue loss or overestimation of spared tissue after traumatic spinal cord injury (SCI) due to post-traumatic spinal cord shrinkage. It is relative fast, accurate, optimally reproducible and, therefore it provides a reliable diagnostic tool for validating the effectiveness of potential therapeutic approaches.

Underpinning research
One of the common experimental parameters characterizing the severity and the extent of SCI as well as determining the efficacy of potential neuroprotective therapies in correlation with locomotor deficit is the amount of lost or spared neural tissue. However, its accurate assessment remains a recurring problem for the following reasons. First, due to a progressive degradation of injured spinal cord tissue resulting in spinal cord shrinkage, especially during later phases of injury, direct measurement of the lesion cross-sectional area can lead to underestimation of lesion volume or overestimation of spared tissue. Second, the differentiation between damaged and spared neural tissue at the lesion site is very complicated and often based on subjective evaluation, resulting in suboptimal reproducibility. Morevover, processing large numbers of stained sections associated with manual measurement is a very time-consuming operation. Our new quantitative method based on the prediction of the cross-sectional area at the lesion site as well as on automatic selection and measurement of spared neural tissue overcomes these negative factors.

References to the research
Fedorova J, Pavel J. An Accurate Method for Histological Determination of Neural Tissue Loss/Sparing after Compression-Induced Spinal Cord Injury with Optimal Reproducibility. J Neurotrauma. 2019 Sep 15;36(18):2665-2675. doi: 10.1089/neu.2018.6140.

Details of the impact
A major goal of traumatic SCI research is to develop effective therapeutic interventions that can halt or at least reduce secondary injury to prevent disability of the affected person. The preservation of as much functional tissue as possible is a critical requirement for the success of either spontaneous or therapeutically affected neurological recovery after SCI. Minimizing the lesion extent makes the injured spinal cord more responsive to therapeutic interventions and induces more successful subsequent rehabilitation. The precise and reproducible evaluation of lesion extent correlating with injury severity is a critical factor for determining the effectiveness of the applied therapeutic intervention.

Sources to corroborate the impact
Despite intensive research aimed at repair and regeneration of damaged spinal cord and the identification of many promising targets for treatment, there is still no effective and clinically fully accepted cure available for patient with SCI. Frustrantigly, most of published experimental data are difficult to reproduce for many reasons. Therefore, there is a growing effort by the scientific community to provide guidelines for replication and reproducibility in SCI research to improve the basic and translational Neuroscience (Steward et al. 2012, Landis et al. 2012, Lazic and Essioux, 2013; Callahan et al. 2017). Our method provides an indispensable and reliable tool for precise, standardized and optimally reproducible quantification of spared tissue at the lesion site after spinal cord trauma.

10. Olfactory testing in patients with persistent olfactory dysfunction after COVID-19

Summary of the impact
Olfactory dysfunction (OD) is an early symptom of many serious neurological and neuropsychiatric diseases and it was also recognized as one of the symptoms of COVID-19 caused by SARS-CoV-2. OD associated with SARS-CoV-2 infection affects a lot of patients and some of them suffer from persistent OD, which affects their everyday life and endangers their health. Objective olfactory testing is not yet established in clinical practice in Slovakia. Hence, the project “Smell and COVID-19” focused on olfactory testing of post-covid patients with

persistent OD was designed. The project was conducted in collaboration with otolaryngologists, who set up a network of outpatient clinics throughout the country, where patients could receive medical care.

Underpinning research
The research team of Dr. Račeková from the Laboratory of Neuromorphology and Developmental Neurobiology of the Institute of Neurobiology BRC SAS is focused on the research of postnatal neurogenesis in the olfactory system. Her team gained important data about processes of neurogenesis under physiological conditions regarding the number of proliferating cells, cell dying or description of characteristic, species specific pattern of blood vessels arrangement in the olfactory neurogenic region. The team of Dr. Račeková was among the first to find that processes of adult neurogenesis can be influenced by different environmental factors. The team has experience with smell testing in human, which were acquired in cooperation with the Czech otolaryngologists.

References to the research
Martončíková M., Račeková E., Orendáčová J.: Olfactory dysfunction as a very early premotoric indicator of neurodegenerative diseases. Biologia 57/6: 643-649, 2002

Martončíková M., Orendáčová J., Račeková E.: Klinický význam testovania čuchových funkcií pre včasné odhalenie neurodegeneratívnych ochorení. Čes. a slov. Neurol. Neurochir., 66/99: 3-7, 2003

Martončíková, M., Lievajová, K., Orendáčová, J., Blaško, J., Račeková, E. Odor enrichment influences neurogenesis in the rostral migratory stream of young rats. Acta Histochem., 113 (3): 326-332, 2011

RAČEKOVÁ, Eniko – ZÁPOTOCKÝ, Martin, VODIČKA, Jan.: Anatomie, embryologie a fyziologie čichového systému. In VODIČKA, Jan, FAITLOVÁ, Hana a kol. Poruchy čichu a chuti. Medicína hlavy a krku. Editor: Viktor Chrobok, Tobiáš, 2012, p. 16-39. ISBN 978-80-7311-125-0.

Fabianová, K., Martončíková, M, Fabian, D., Blaško, J., Račeková, E.: Diverse effect of different odor stimuli on behavior and Fos protein production in the olfactory system neurogenic region of adult rats. Behav. Brain Res., 265: 38-48, 2014

Vodicka, J., Bronthankova, P., Ottaviano, G., Nguyen, D.T., Racekova, E., Martoncikova, M., Furukawa, Y.: Evaluation of pleasantness of odorants in different European countries. Chemical Senses, 40: 294, 2015

Details of the impact
Our initiative of remote smell testing using standartized smell test during the pandemic has met with great interest. A total of 1025 requested smell testing. Impaired smell ability was detected in the vast majority of participants and many of them seek medical assistance. Finally, persistent loss of sense of smell due to COVID-19 has drawn the attention of professionals to the importance of this sense, which has only rarely been addressed in clinical practice in Slovakia so far.

Sources to corroborate the impact
Very important indicator of the urgency to solve the clinical smell investigation in Slovakia is that there were more than 13 300 original accesses to the project report published on the WEB reading of the Slovak Academy of Sciences on June 22, 2022. There are few news on the WEB of the SAS that have achieved such readability.

2.6.2. List of the most important studies and/or other activities commissioned for the decision-making authorities, the government and NGOs, international and foreign institutes

Studies commissioned for decision-making authorities

1. Title: **RT PCR testing of swab samples for SARS-CoV-2 RNA**
Authority: Government of the Slovak Republic
Period: 03/2020-08/2020
Value: 348 000 € (delivered via SAS office in the form of an addition to the institutional budget)
Purpose: Introduction of RT PCR detection of SARS-CoV-2 RNA and routine testing of specimens delivered to Public Health Auhority of the Slovak Republic and testing of specimens directly from hospitals.

2. Title: **Regular RT PCR testing of employees of the Slovak Academy of Sciences for SARS-CoV-2 infection**
Authority: Presidium of the Slovak Academy of Sciences
Period: 11/2020-04/2022
Value: 100 307 €
Purpose: To monitor and control SARS-CoV-2 infection in the environment of the Slovak Academy of Sciences in order to facilitate optimal functioning of the SAS institutes during the pandemics. Testing was accomplished once weekly throughout the pandemic waves starting in the autumn 2020 to the spring 2022.

3. Title: **Pilot validation of gargle sampling and pooling for RT PCR testing of school children to control SARS-CoV-2 infection in schools**
Authority: Ministry of Education, Science, Research and Sports of the Slovak Republic and Ministry of Health of the Slovak Republic
Period: 11/2020-12/2020
Value: 0 €
Purpose: To demonstrate the suitability of gargle sampling and sample pooling for large-scale RT PCR testing of children in school environment. Testing was succesfully performed in two primary schools.

4. Title: **Validation of gargle and saliva sampling and pooled sample testing by RT PCR and LAMP and implementation in routine testing**
Authority: Ministry of Investment, Regional Development and Informatisation of the Slovak Republic
Period: 12/2020-03/2021
Value: 500 000 € (delivered via SAS office in the form of an addition to the institutional budget)
Purpose: To evaluation the practical use of gargling and saliva sampling followed by sample pooling as a strategy for large-scale RT PCR testing during the period of high pandemic burden.

5. Title: **RT PCR testing of inhabitants of Bratislava Old Town**
Authority: City Office of Bratislava Old Town
Period: 01/2021-03/2021
Value: 0 €
Purpose: To validate RT PCR testing of pooled gargle samples with respect to its sensitivity in comparison to antigen testing.

6. Title: **RT PCR testing of participants of GLOBSEC 2020 and 2021 Bratislava Forum**
Authority: City Office of Bratislava Old Town
Period: 06/2020 and 10/2021
Value: 0 €
Purpose: To secure epidemic safety at the key international strategic conference with participantion of the most-influential politicy-makers, NGO experts, heads of international organizations and other global stakeholders.

7. Title: **Sequencing of SARS-CoV-2 genome to identify new virus variants**
Authority: Ministry of Education, Science, Research and Sports of the Slovak Republic
Period: 03/2021-05/2021 and 06/2021-12/2021
Value: 28 800 € (1st phase) and 181 440 € (2nd phase)
Purpose: To facilitate COVID-19 surveillance based on early identification of new SARS-CoV-2 variants emerging and spreading in the population of Slovakia. The obtained sequence data were deposited in the GISIAD.org database, epidemiologically processed by the Public Health Authority and provided to ECDC (European Centre for Disease Prevention and Control).

8. Title: **Validation of the pharmaceutical quality of SPUTNIK V vaccine**
Authority: Ministry of Health of the Slovak Republic and State Institute for Drug Control
Period: 03/2021-04/2021
Value: 0 €
Purpose: To perform quality tests according to the protocols provided by the vaccine producer, compare their results with the producer-claimed parameters and with European Phamacopeia and provide expert background to the concluding statement of the State Institute for Drug Control. The quality tests included detection of replication-competent adenoviruses, identification vaccine components, verification its immunogenicity, detection of residual proteins etc., altogether 16 tests accimplished partly in the BSL3 facility of BMC SAS in Bratislava and partly in the Biotechnological and analytical laboratories BMC SAS in Šarišské Michaľany.

9. Title: **Study of seroprevalence of SARS-CoV-2 specific antibodies among the employees of the Slovak Academy of Sciences using self-collected dry blood samples**
Authority: Presidium of the Slovak Academy of Sciences
Period: 07-09/2021
Value: 89 910 €
Purpose: To evaluate the prevalence of antibody immunity in the environment of the Slovak Academy of Sciences as a background information for informed decision on protective measures during the subsequent pandemic wave, to provide information on SARS-CoV-2 specific antibody levels in relationship to vaccination

versus infection and severity of COVID-19 symptoms and to indicate relative safeguard of the working environemnt at the SAS institutes.

10. Title: **Study of seroprevalence of SARS-CoV-2 specific antibodies among non-vaccinated subpopulation of Slovakia**
Authority: Ministry of Health of the Slovak Republic
Period: 10-12/2021
Value: 114 645 €
Purpose: To assess the prevalence of antibody immunity in non-vaccinated inhabitants of selected Slovak regions in order to predict possible development of epidemiological situation in the upcoming pandemic period. The study was performed in collaboration with Faculty of Medicine, Comenius University on Bratislava, Faculty of Medicine and University of Pavel Jozef Šafárik in Košice.

10. Title: **Study of seroprevalence of SARS-CoV-2 specific antibodies among inhabitants of city Trenčín**
Authority: City Office of Trenčín
Period: 12/2021-03/2022
Value: 68 787 €
Purpose: To assess the prevalence of antibody immunity in inhabitants of Trenčín city in order to predict possible development of epidemiological situation in the raising omicron wave.

11. Title: **Report on surveillance of zoonoses, alimentary and water borne infections**
Authority: Ministry of Agriculture and Rural Development of the Slovak Republic
Period: 2020
Value: 0 €
Purpose: To evaluate prevalence of zoonoses, alimentary and water borne infections in Slovakia, in collaboration with the State Veterinary and Food Administration, Public Health Authority and relevant universities.

Other activities commissioned for decision-making authorities

Activities related to COVID-19 pandemic
In connection with the efforts to resolve pandemic situation, the researchers of the Institute of Virology BMC SAS Boris KLEMPA, Silvia PASTOREKOVA, and Juraj KOPACEK, were invited to participate in expert discussions with the President of the Slovak Republic, the Prime Minister of the Slovak Republic, the Deputy Prime Minister of the Slovak Republic, the Minister of Economy of the Slovak Republic, the Minister of Health of the Slovak Republic, as well as representatives of several ministries and members of the crisis staff. They communicated their expert opinions individually or as part of an initiative “Science helps - COVID-19”. The conclusions of several expert discussions were presented in the form of press conferences with leading state officials and as officially adopted recommendations for anti-pandemic measures. Moreover, Boris Klempa and Silvia Pastoreková were invited to join expert delegation accompanying the President of the Slovak Republic Zuzana Čaputová during her official visit in Copenhagen, Denmark and attended the Staten Serum Institute, where they discussed Danish attitudes to mitigation of the pandemic. Juraj Kopacek and Boris Klempa also took part in several commissions for public procurement of antigen tests and PCR kits at the Ministry of Economy, Administration of State Material Reserves and the Ministry of Education, Science, Research and Sport of the Slovak Republic.

Activities towards improvement of public procurement methodology in R&D
In 2020, the director of the BMC SAS Silvia PASTOREKOVA has initiated the discussion with the high-level representatives of the Office of Public Procurement (OPP) of the Slovak Republic in order to inform them about barriers to effective public procurement in the area of research, especially afflicting large institutes that are unable to procure below limit tenders. Subsequently, the report on practical experiences, including hurdles faced by the researchers and their consequences on research performance was sent from BMC SAS to OPP. The discussions resulted in invitation of BMC SAS to review the methodological manual on public procurement legislation and procedures in R&D. In early 2021, BMC SAS has opened a new department to facilitate PP execution to researchers and hired Tatiana ELANOVÁ, a specialist who was instructive in further communication with OPP. Later on, BMC SAS director contacted the partner institutes from the Alliance4Life consortium and collected best practice examples kindly provided by their PP officers. The best practice examples from different EU countries were then provided to OPP representatives. Follow-up discussion at the national and then EC level have led to inclusion of useful changes towards better PP practice in R&D.

Innovation Day of the Ministry of Foreign and European Affairs of the Slovak Republic
On July 1st, 2021, the BMC SAS and the President of the Slovak Academy of Sciences hosted the State secretary of the Ministry of Foreign and European Affairs of the Slovak Republic (MFEA), State secretary of the Ministry of Education, Science, Research and Sports, and foreign ambassadors accredited in the Slovak Republic at an event called "8th Innovation Day". The purpose of the event organised by the MFEA was to introduce the SAS and specifically the research activities of the BMC SAS related to challenges of COVID-19 pandemics and inform the ambassadors about possibilities of international cooperation in research and development. The event included presentations, excursion to the exterior of the BSL3 laboratory used for work with SARS-CoV-2 virus, followed by discussions and contact building.

Expert activities for EU boards and organs

BELYAEV Igor
Expert in Risk assessment, Health and Consumers, Directorate-General, European Commision (2016-17)
Member of European Academy of Environmental Medicine EUROPEAM (2016-17)
Expert for European Science Foundation (2017)

IMRICH, Richard
National delegate of Health SC1 board, European Commission (2016-)

JEŽOVÁ Daniela
Vice President of ALLEA – All Europen Academies (2016-17)

Expert activities for government, ministries and state service of the Slovak Republic

IMRICH, Richard
Member of the Scientific Board of the Ministry of Health SR (2017-2019, 2021-)

JEŽOVÁ Daniela
Member of the Slovak Commission for Scientific Degrees at the Ministry of Education, Science, Research and Sports(2016-2021)
Accreditation Commission – advisory organ of the Ministry of Education, Science, Research and Sports (2016-)

KÁDAŠI Ľudevít
Forensic expert for DNA analysis, Ministry of justice SR, and Institute of the Police Academy of the Slovak Republic (2016-2021)
Member of Ethics Committee of the Ministry of Health SR (2017-)

KOPÁČEK Juraj
Member of National expert group for European Food Safety Authority (2016-2021)
Member of the ....for public procurment of antigen tests....

KRIŽANOVÁ Oľga
Member of the Slovak Accreditation Service (2016-2021)

KÚDELOVÁ Marcela
Expert of the Slovak National Accrediation Service (SNAS) for accreditation and supervision of diagnostic medicinal laboratories

MATÚŠKOVÁ Miroslava
Advisor for State veterinary and food service SR, expert evaluation of projects on experiments with animal models (2016-2021)

PASTOREK Jaromír
Member of the Government Council for Science and Technology (2016)
Member of the Government Council for The Knowledge Society (2016)

PASTOREKOVÁ Silvia
Deputy Chair of the Slovak Commission for Scientific Degrees (2016-2021)
Member of the Scientific Board of the Ministry of Health SR (2021-)

SEKEYOVÁ Zuzana
Expert for synthetic biology, Ministry of Environment SR (2016-2021)
Expert of the Slovak National Accrediation Service (SNAS) for accreditation and supervision of diagnostic medicinal laboratories

ŠKULTÉTY Ľudovít
Expert for analysis of unknown substances, Criminal Office of Financial Administration SR, Mass spectrometric analyzes to identify captured unknowns from groups of growth factors (2016-2021)

ŠPITALSKÁ Eva
Expert for zoonoses, Ministry of Agriculture and Rural Development of the Slovak Republic
National contact of European Food Safety Authority (2016-)
Elaboration of annaul reports on zoonoses, food and water-borne diseases

Expert activities for research governing bodies and grant agencies

In the years 2016-2021 employees of the BMC SAS evaluated grant proposals for Slovak grant agencies and acted as members of the evaluation committees/boards at VEGA and APVV.

	Number of reviewed project proposals for VEGA	Number of reviewed project proposals for APVV	Number of reviewed project proposals for other grant schemes	Number of VEGA evaluation committee members	Number of APVV evaluation board members
2016	22	10	61	12	3
2017	21	7	71	9	3
2018	32	21	75	11	2
2019	26	2	120	10	2
2020	8	0	43	9	2
2021	20	2	4	9	2

Table shows the numbers of project proposals evaluated by the BMC SAS researchers for the national grant agencies. In addition, more than 100 projects were evaluated for the foreign grant agencies

The following BMC SAS researchers served as members of the following commissions for defenses and approvals of the highest scientific qualification in Slovakia, the Doctor of Science (DrSc.) degree:

Slovak Commission for Scientific Qualifications, members:
JEŽOVÁ Daniela, PASTOREKOVÁ Silvia

Commissions for DrSc. defenses and awards, members:
BETÁKOVÁ Tatiana, GAŠPERÍKOVÁ Daniela, IMRICH Richard, JEŽOVÁ Daniela, KÁDAŠI Ľudevít, KLEMPA Boris, KOPÁČEK Juraj, KRIŽANOVÁ Oľga, KÚDELOVÁ Marcela, LUKÁČOVÁ Nadežda, PASTOREKOVÁ Silvia, ŠKULTÉTY Ľudovít.

2.6.3. List of contracts and research projects with industrial and other commercial partners, incl. revenues (study title, name of institution, contract value, country of partner, purpose (max 20 words))

1. Title: Cooperation agreement
Contractor: **EF BIO, s.r.o.**, Slovakia
Start: 2010
Duration: 2023
Contract value: performance-dependent
Revenues: 37 500 € (2019), 38 200 € (2020), 13 500 € (2021)
Purpose: Production of monoclonal antibodies for diagnostics of influenza, Institute of Virology BMC SAS

2. Title: Work contract
Contractor: **IMUNA Pharm, a.s.**, Slovakia
Start: 2015
Duration: ongoing
Contract value: performance-dependent
Revenues: 363 411 € (2019), 288 541 € (2020), 20 899 € (2021)
Purpose: Development and validation of methodologies for quality control of raw materials and final pharmaceuticals, Biotechnological and analytical Laboratories BMC SAS

3. Title: Work contract
Contractor: **Progresa Final, s.r.o.**, Slovakia
Start: 2017
Duration: ongoing
Contract value: performance-dependent
Revenues: 720 € (2020)
Purpose: Development and validation of methods for testing sterility and microbiological load of medical materials, Biotechnological and analytical Laboratories BMC SAS

4. Title: Work contract
Contractor: **National Institute of Children's Diseases**, Slovakia

Start: 2017
Duration: ongoing
Contract value: performance-dependent
Revenues: 5 860 € (2019), 3 478 € (2020), 4 391 € (2021)
Purpose: Testing sterility and microbiological load of samples, Biotechnological and analytical Laboratories BMC SAS

5. Title: Study contract
Contractor: **PHARMAGAL-BIO, s.r.o.**, Slovakia
Start: 2017
Duration: 2021
Purpose: To prove the non-tumorigenicity of the cell line used for virus production in immunodeficient mouse model, Cancerc Research Institute, Animal house for immunodeficient mice BMC SAS

6. Title: Work contract
Contractor: **Centraleuropean Biotech Institute, s.r.o.**
Start: 2020
Duration: 2021
Contract value: performance-dependent
Revenues: 750 € (2019), 27 600 € (2020), 16 400 € (2021)
Purpose: Biological testing of pharmaceuticals based on bacteriophages, Biotechnological and analytical Laboratories BMC SAS

7. Title: Work contract
Contractor: **Regenmed, s.r.o.**
Start: 2020
Duration: 2021
Contract value: performance-dependent
Revenues: 20 000 € (2020), 11 000 € (2021)
Purpose: Preparation of research batches of bacteriophages, Biotechnological and analytical Laboratories BMC SAS

8. Title: Work contract
Contractor: **Ruvirex, a.s.**
Start: 2020
Duration: 2022
Contract value: performance-dependent
Revenues: 10 000 € (2020)
Purpose: Preparation of research batches of bacteriophages, Biotechnological and analytical Laboratories BMC SAS

9. Title: Contract on testing samples
Contractor: **CALENDULA, a.s.**
Start: 2021
Duration: ongoing
Contract value: performance-dependent
Revenues: 600 € (2021)
Purpose: Monitoring of the customer 's premises and development of amended methodologies for microbiological testing of preparations and auxiliary material, Biotechnological and analytical Laboratories BMC SAS

10. Title: Project agreement
Contractor: **Kompetenz Initiative e. V.**
Start: 2021
Duration: 2021
Revenues: 17 700 €
Purpose: Testing of blood samples for genomic instability, Cancer Research Institute BMC SAS

11. Title: Work contract
Contractor: **Railway Company Slovakia, a.s.**
Start: 2020
Duration: 2022

Contract value: performance-dependent
Revenues: 16 000 € (2021)
Purpose: Microbial monitoring of train spaces, Biotechnological and analytical Laboratories BMC SAS

12. Title: Collaboration research and testing agreement
Contractor: **ALCHIMIA, Italy**
Start: 2021
Duration: 2021
Revenues: 5 000 € (2021)
Purpose: Analysis and testing of virus transport medium PRO-046, Institute of Virology BMC SAS

13. Title: Service contract
Contractor: **GlaxoSmithKline Healthcare Slovakia s.r.o.**
Start: 2020
Duration: 2022
Contract value: performance-dependent
Revenues: 12 000 € (2021)
Purpose: Testing of inactivation capacity of antivirus spray against SARS-CoV-2, Institute of Virology BMC SAS

14. Title: Collaboration agreement
Contractor: **AXON Neuroscience R&D Services SE**
Start: 2020
Duration: 2021
Revenues: 34 080 € (2021)
Purpose: Testing of neutralization capacity of monoclonal antibodies against SARS-CoV-2 S protein, Institute of Virology BMC SAS

15. Title: Framework agreement on research cooperation
Contractor: **MultiplexDX, a.s**., Slovakia
Start: 2020
Duration: ongoing
Contract value: performance and sales-dependent
Revenues: 20 614 € (2021) and 339 000 € (received in 2022)
Purpose: Development and validation of tests for virus detection and research of infectious pathogens, Institute of Virology BMC SAS

2.6.4.1 List of intangible fixed assets (internally registered IP (confidential know-how), patent applications, patents granted, trademarks registered) denoting background IPR

Patents

BMC SAS is an owner of a series of patents related to the identification of MN/CA IX Gene and protein at the Institute of Virology SAS (continuations-in-part of the parent US patent 5387676, inventors ZÁVADA, Jan – PASTOREKOVÁ, Silvia – PASTOREK, Jaromír), which were registered at US Patent Office.

Soluble form of carbonic anhydrase IX (s-CA IX), assays to detect s-CA IX, CA IX's coexpression with HER-2/neu/c-erbB-2, and CA IX-specific monoclonal antibodies to non-immunodominant epitopes
Patent numbers: US7833728, US7816493, US7846673
Assignee: Institute of Virology
Inventors: PASTOREK, Jaromír – PASTOREKOVÁ, Silvia – ZATOVICOVA, Miriam - Zavada, J. - Ortova Gut, M. – Zavadova, Z.
https://patents.google.com/patent/US7833728B2/en?oq=US7833728
https://patents.google.com/patent/US7816493B2/en?oq=US7816493
https://patents.google.com/patent/US7846673B2/en?oq=US7846673

MN gene and protein
Patent numbers: US7855185, US7851455, US7910549
Assignee: Institute of Virology
Inventors: HARRIS, A.H. – RATCLIFFE, P.J.

https://patents.google.com/patent/US7855185B2/en?oq=US7855185+(B2)
https://patents.google.com/patent/US7851455B2/en?oq=7851455

MN/CA IX/CA9 and Renal Cancer Prognosis
Patent numbers: US7838240
Assignee: Institute of Virology
Inventors: SOYUPAK, B. – ERDOGAN, S.
https://patents.google.com/patent/US7838240B2/en?oq=US7838240

MN/CA IX and EGFR pathway inhibition
Patent numbers: US7820159
Inventors: DORAI, T.
Assignee: Institute of Virology
https://patents.google.com/patent/US7820159B2/en?oq=US7820159
The above-mentioned patents cover the methods of use of the MN/CA IX gene and protein and derived antibodies and/or nucleic acids in cancer diagnostics and therapy. Currently, MN/CA IX antibodies are subject of three non-exclusive licenses to private companies developing anticancer strategies, as described in 2.6.4.2.

Internally registered IP (confidential know-how)

To summarise internally registered IP and make it available to external subjects for licensing, commecialization and/or research collaboration, BMC SAS has initiated elaboration of a catalogue of unique reagents, tools, methods and biological materials that were generated in-house by researchers of the BMC SAS and its institutes. Examples of internally registered IP include:

- hybridomas and monoclonal antibodies specific for CA IX cancer biomerker of hypoxia, for S100P cancer-associated calcium-binding protein, for Endosialin- biomarker of tumor angiogensis, for LCM virus, herpesvirus HSV1, influenza virus, HLA G antigen etc.
- genetically modified cells lines with overexpression or knock-out of selected regulatory molecules studied at BMC SAS
- viruses and virus-derived components (biobanked in the Europen Virus Archive)
- collection of blood samples and fibroblasts of patients with monogenic disorders
- collection of tumor tissue specimens
- specialised methods of DNA analysis for genetic diagnostics (including special expertise in data interpretation and functional assays), immunodetection methods etc.

Specific internally registered IP is represented by methods for analysis of pharmaceuticals and other medicinal products in-house developed in Biotechnological and Analytical Laboratories BMC SAS. The methods comply with the Europen Pharmacopeia and are certified by the State Institute for Drug Control. List of certified methods involves tests of purity, identity, density, composition, concentration, opalescence, osmolarity, stability, sterility and gravimetric, electrochemical, refractometric, argentometric and other tests that are required for complex characterization of semiproducts and/or products subjected to analysis.

2.6.4.2 List of licences sold abroad and in Slovakia, incl. revenues (background IPR identification, name of institution, contract value, country of partner, purpose (max 20 words))

2017

Title: Non-exclusive License Agreement
Licensee: BioScience Slovakia, s.r.o.
Country: Slovakia
IPR: selected MN/CA IX patents identified in the Annex to Agreement
Contract value: Royalties from sales
Purpose: commercial use of CA IX-specific M75 monoclonal antibody for research and in vitro diagnostics
https://crz.gov.sk/2937225/

Title: Non-exclusive License Agreement
Licensee: WILEX a.g.
Country: Germany
IPR: selected MN/CA IX patents identified in the Annex to Agreement
Contract value: Royalties from sales
Purpose: commercial use of CA IX-specific M75 monoclonal antibody for in vitro diagnostics and patient stratification to mmunotherapy

https://crz.gov.sk/2944845/

Title: Non-exclusive License Agreement
Licensee: MABPRO, s.r.o.
Country: Slovakia
IPR: selected MN/CA IX patents identified in the Annex to Agreement
Contract value: Royalties from sales
Purpose: commercial use of CA IX-specific M75 monoclonal antibody for cancer diagnostics and therapy
https://crz.gov.sk/3049938/

2020

Title: Non-exclusive License Agreement
Licensee: BioLegend, Inc.
Country: California, USA
IPR: internally registered, in-house produced hybridomas
Contract value: Royalties from sales
Purpose: commercialization of monoclonal antibodies specific for Endosialin, a marker of tumor angiogenesis, for research use
https://crz.gov.sk/4948728

2021

Title: Non-exclusive License Agreement
Licensee: Moredun Research Instiute
Country: Scotland, UK
IPR: internal - live culture of Coxiella burnetii strain RSA439 growing on axenic medium
Contract value: Royalties from sales
Purpose: development of Q fever vaccine
https://crz.gov.sk/zmluva/6026939/

2.6.5. Summary of relevant activities, max. 300 words (describe the pipeline of valorization in terms of Number of disclosure, Number of registered IP internally, number of CCR/LIC contracts and their respective summary values, the support you are receiving in specific points internally at the institute, at SAS, externally – also the limitations and drawbacks.

Valorization of knowledge achieved through research at the BMC SAS has been mainly done by licensing of either existing patented IP or internally registered IP (see above). Attempts to protect new IP by patenting were scarce mainly because of expected delays in publications, which are key outputs of our activities. In addition, in the absence of external investors, costs of patents‘ filing and maitenance are beyond our budget frame especially once they reach national phases. On the other hand, without the IP protection, private companies may not be willing to make an investment into biomedicine that belongs to most risky areas of venture undertakings. Therefore, we have decided to enforce our internal IP portfolio through creating a catalogue of unique reagents, materials and in-house developed diagnostic methods to be offered for licensing and/or services to external biomed, pharma and healthcare subjects. We have also considered creating a spin-off for specialized diagnostics in the scope of our expertise, but are not at this stage yet both due to unclear legislation and an incomplete readiness to comply with all administrative requirements, which are very strict and complex in the biomedical area. In fact, the DIABGENE Laboratory has been already acting in the spin-off-like manner through providing specialized DNA diagnostics for clinical treatment decisions, but these activities were not commercialised as a service to clinical practice, because such diagnostics in not covered by our heath insurance system and its inclusion into the system is currentky hardly achievable. On the other hand, expertise in GMP-certified testing of medicinal products and materials for human use in our Biotechnological and analytical laboratories has been exploited in several commercial contracts, and will be further supported. Finally, COVID-19 pandemic has promoted our collaboration with SMEs developing diagnostic and therapeutic tools, leading to commercialisation activities that brough us direct financial benefits.

2.7. Popularisation of Science (outreach activities)

2.7.1. List of the most important popularisation activities, max. 20 items

SCIENTIFIC WORKSHOPS IN ONCOLOGY

are educational and popularizing workshops aimed at spreading awareness of cancer among high school students throughout Slovakia and inspire them to study medicine, natural, social and technical sciences, because educated people can better understand the changes they can make to prevent, delay or moderate the onset and progression of a clinically manifested disease. The workshops have been organized annually for more than 10 years by the Cancer Research Institute BMC SAS in the cooperation with the Cancer Research Foundation. They are opened for around 30-40 high schools in the entire Slovakia and yearly count more than 100 events. BMC SAS PhD students, postdocs and young researchers are visiting schools and present interactive lectures to hundreds of students in a popular form attractive for lay public. They also build awareness of the importance of prevention and healthy lifestyle. The workshops series starts traditionally on the World Cancer Day, lasts about one month and is usually concluded with the Research competition of young oncologists (including categories of h high schools students, university students, PhD students and postdocs). The 2020 workshops took part in February, but the competition had to be organised online. In 2021, the workshops have been canceled due to pandemics, but will continue again as an important way of public engagement.

SLOVAK OBESITY DAY

is an annual event co-organized by the Department of under guidance of the Slovak obesity association and the Obesity section of the Slovak society of diabetology in order to raise public awareness of obesity as a major health risk issue preventable by changes in the lifestyle. The BMC SAS researchers with strong expertise in physical activity and nutrition regularly actively participate in the event organisation and in presentations and discussion with lay public.

SCIENCE CAFÉ KOŠICE

offers monthly popularization lectures organized for more than 10 years by the Institute of Neurobiology BMC SAS in order to present interesting and important research achievements, to explain the impact of science on society, to introduce outstanding Slovak scientists to general public and stimulate their mutual discussions. This format of science propagation has gained great popularity and became part of the cultural life of the city of Košice. The event is organized in the premises of the cultural center Tabačka regularly every month except the summer holiday season. Science Café Košice is also registered by the SAS Commission for Communication and the media, in recent years it has also allocated funds for their operation through the Department of the Institute of Public Administration of the Slovak Academy of Sciences. More information about the cafés, their list and a photo gallery are available on the web page: http://www.vedeckakaviaren.sk.

GENERALI BALANS PROGRAM

In 2019, we initiated the cooperation with the insurance company Generali, a.s., within which experts from BMC SAS promote healthy lifestyle and provide expert comments on the subject. The program Generali Balans is focused on the society-broad interest in need of compliance with physical activity programs such as the prevention of chronic diseases for the general public. The program is coordinated by Barbara Ukropcová.

EUROPEAN RESEARCHERS‘ NIGHTS

The European Researchers' Nights are the events dedicated to science popularization and fun learning. They represent a unique opportunity for public to meet researchers, talk to them, and find out what they really do for society, in interactive and engaging ways. This can be through hands-on experiments, science shows, learning activities for children, guided visits of research labs, science quizzes, games, competitions with researchers and more. The European Researchers' Night take place every year all over Europe and neighbouring countries the last Friday of September and the BMC SAS researchers regularly participate at these events to present and explain interesting topics of their research to lay public. These presentations are always met with enournous interest especially of children and young people who join diverse connected activities, such as virus drawing, virtual excursion from molecules through viruses to humans etc., physical exercide, isolation of DNA, etc. The activities connected to the European Researchers' Night are highly interactive and stimulate interst and curiosity through direct lively communication with researchers. However, in the pandemic period the presentation were in online form.

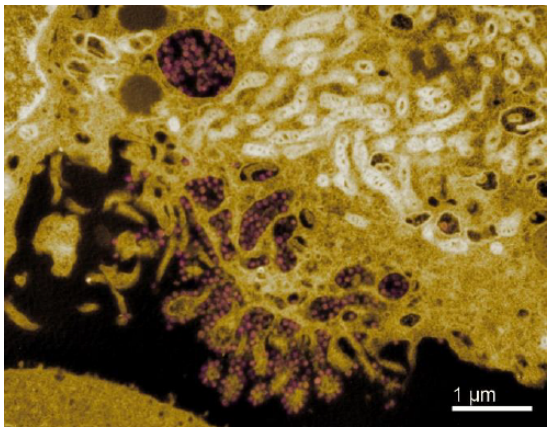
WEEK OF SCIENCE AND TECHNOLOGY (DAY OF OPEN DOORS)

Day of open doors reguklarly occurs in the frame of the Week of Science and Technology organized by the Ministry of Education, Science, Research, and Sports of the Slovak Republic in order to increase awareness of the public about Slovak science and technology and to attract the interest of young people in R&D. Lectures on interesting research topics (such as obesity, cancer, viruses, lifestyle etc.) are regularly given by the experienced BMC SAS scientists to school children and expositions and include active interactions of the public with our young researchers.

OUTREACH ACTIVITIES RELATED TO COVID-19 PANDEMICS

BMC SAS virologists were very active especially during the COVID-19 pandemics providing expert opinions on different SARS-CoV-2 and COVID-19 related topics. They provided numerous interviews both in spoken and written form, wrote articles, participated at press conferences of major policy-makers (president, prime minister, minister of health), and made reports for TV, radio and newspapers. Activities of the BMC SAS researchers addressing pandemic challenges count more than 400. In addition, expert opinions and anti-pandemic activities of the BMC SAS were mentioned in major media more than 500 times. Articles presented on the SAS website with information from the BMC SAS virologists related to pandemic attracted enormous interest (e.g. >68 000 views of the information published on 28-02-2020, >28 000 views 09-03-2020, >6 400 23-03-2020, >4400 views 09-04-2021, >12 000 views 07-07-2021 etc).
In addition, virologists Boris Klempa, Silvia Pastoreková and Juraj Kopáček also provided their expert opinions and acted in the documentary film “Pandemia” produced by RTVS (Broadcasting and Television of Slovakia).

CREATIVE RESILIENCE – ART BY WOMEN IN SCIENCE



In November 2021 UNESCO exhibition dedicated to creative resilience was opened in Paris. It presented the artistic expressions by women scientists from around the world as a testimony of the impact of the COVID-19 pandemic. BMC SAS was represented at the exhibition by Marta NOVOTOVÁ, who is an expert in electron microscopy. She was invited to expose her artistic view on SARS-CoV-2 virus propagating in infected cells. The art was a results of her cooperation with virologists Monika Sláviková a Boris Klempa and designer M. Baláž. The virtual exhibition: https://en.unesco.org/creativeresilience/virtual-exhibition.

2.7.2. Table of outreach activities according to institute annual reports

Outreach activities	2016	2017	2018	2019	2020	2021	total
Articles in press media/internet popularising results of science, in particular those achieved by the Organization	34	21	26	16	17	186	300
Appearances in telecommunication media popularising results of science, in particular those achieved by the Organization	15	12	17	16	95	46	201
Public popularisation lectures	112	81	88	108	129	44	562

2.8. Background and management. Infrastructure and human resources, incl. support and incentives for young researchers

The organization, management structure and the internal operational rules are specified in the Organisation guideline and a number of directives of BMC SAS. In brief, our research activities are performed in 18 research departments and 17 specialized laboratories/facilities and are supported by 5 administrative and technical units (see pages 9 and 20).

2.8.1. Summary table of personnel

2.8.1.1. Professional qualification structure (as of 31 December 2021)

	Degree/rank				Research position		
	DrSc./DSc	CSc./PhD.	professor	docent/ assoc. prof.	I.	II.a.	II.b.
Male	16	68	5	8	14	38	29
Female	12	145	5	3	10	80	66

I. – director of research with a degree of doctor of science/DrSc.
II.a – Senior researcher
II.b – PhD holder/Postdoc

2.8.1.2. Age and gender structure of researchers (as of 31 December 2021)

Age structure of researchers	< 31		31-35		36-40		41-45		46-50		51-55		56-60		61-65		> 65	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Male	9,0	4,4	10,0	7,8	11,0	9,2	13,0	9,8	8,0	6,4	4,0	3,5	6,0	5,2	11,0	9,3	8,0	4.5
Female	37,0	23,9	20,0	17,6	21,0	18,3	30,0	29,5	20,0	18,7	10,0	8,7	7,0	6,1	8,0	8,0	9,0	7,,4

A – number, B – FTE

2.8.2. Postdoctoral fellowships (list of positions with holder name, starting date, duration. Add brief information about each fellow's career path before and after receiving PhD degree, etc.)

2.8.2.1. SASPRO fellowships

Name: Ivana NEMČOVIČOVÁ
Department, institute: Department of Viral Immunology, Institute of Virology BMC SAS
Project name: **IMMUNOVIROLOGICS: Immune modulation by HCMV and its immunotherapeutic potential**
Starting date: 1.7.2015
Duration: 3.5 years (42 months)
Previous postdoctoral position: Division of Immune Regulation and Division of Cell Biology, La Jolla Institute for Allergy and Immunology, La Jolla (the collaboration is still ongoing)
Career path after completion of the SASPRO fellowship: Head of the Department of Tumor Immunology, Institute of Viorology BMC SAS (from 2018), Marie Curie fellow, PhD supervisor
Other awards: INTERREG project, APVV projects, SAS Award 2020 for the Nature index publication
Brief description of the project: Human cytomegalovirus (HCMV) is a very widespread herpes virus in the population and is currently the clinically most important causative agent of opportunistic infections in immunodeficient patients. HCMV is the world's paradigm for an effective escape from our immune system; its key ability to induce latency in its host upon overcoming a primary infection, and the ability to reactivate at any time due to a weakened immune system together, effectively suppress the protective function of NK and T

cells in the body. The project enabled to recombinantly prepare, characterize and determine expression and purification profiles of both viral and human genes that are associated with cytotoxicity and viroprotectivity processes in the cell, and to study these processes. The aim of the project was to elucidate the mechanisms by which HCMV effectively escapes the immune system at the molecular level. This project also contributed to the development of immunomodulatory biological agents for the treatment of HCMV infection. In addition, a detailed investigation of the persistence of HCMV opened an opprotunity for its use as a unique carrier for vaccines in the treatment of cancer or other autoimmune diseases. The results were published in two J Biol Chem papers.

Name: Jana JAKUBÍKOVÁ
Department, institute: Department of Tumor Immunology, Cancer Research Institute BMC SAS
Project name: **Clonal dynamics of multiple myeloma**
Starting date: 1.9.2015
Duration: 3.3 years (40 months)
Previous postdoctoral position: Department of Medical Oncology, Jerome Lipper Multiple Myeloma Center, Dana Farber Cancer Institute, and Department of Medicine, Harvard Medical School, Boston, MA, USA (the collaboration is still ongoing)
Career path: Head of the Department of Tumor Immunology, Cancer Research Institute BMC SAS (from 2018) **,** PhD supervisor
Other awards: Marie Currie Reintegration Award, ERA-NET project coordinator, PI of APVV projects
Brief description of the project: Tumor heterogeneity is likely, from a Darwinian-selection perspective, to be the essential feature of clonal evolution, disease progression and relapse. Multiple myeloma (MM) and Waldenström macroglobulinemia (WM) are both B cell malignancies characterized by clonal proliferation of malignant plasma cells in MM and neoplastic IgM expressing mature B-lymphocytes in WM in the bone marrow (BM). They remain incurable despite improved survival after development of novel therapies. The overall objective of the study was to better understand intra-clonal evolution during the development and progression of MM and WM. In this project we evaluated the clonal evolution of primary patient-derived BM samples together with therapy involved intra-clonal selection and the role of the tumor microenvironment in clonal architecture by combining molecular/signaling pathways such as phosphorylation signatures, transcriptional factors and regulatory molecules and phenotypic (multiparametric flow and mass (CyTOF) cytometry analyses) approaches. Overall, our study contributed to the framework for development of novel or combination therapeutic strategies targeting clonal heterogeneity and evolution in MM and WM disease. The results were published in Br J Hematol, Oncotarget, Int J Mol Sci.

Name: Tereza GOLIAŠ
Department, institute: Department of Cancer Biolology, Institute of Virology BMC SAS
Project name: **Targeting carbonic anhydrase IX and pyruvate dehydrogenase kinase 1 in hypoxic colorectal tumors**
Starting date: 1.6.2015
Duration: 3.6 years (43 months)
Previous postdoctoral position: Department of Radiation Oncology, Ohio State University Comprehensive Cancer Center and Wexner Medical Center, Columbus, OH, USA (the collaboration is still ongoing).
Career path: researcher at the Department of Rumor Biology**,** PI of national grants, PhD supervisor
Brief description of the project: The ability of tumor cells to respond to changing environmental oxygen tension through the induction of carbonic anhydrase IX (CAIX) and pyruvate dehydrogenase kinase 1 (PDHK1), implicated in pH regulation and glucose metabolism, respectively, appears to be necessary for tumor growth, and their high level of expression in human tumors predicts for poor patient outcome. These two hypoxia-regulated proteins therefore present promising new targets for the design of novel, non-standard chemotherapies that would negatively influence tumor cell proliferation and survival, and at the same time avoid normal tissue toxicity or increase efficacy of standard treatment regimens. This project examined molecular mechanisms governing regulation of these proteins in the hypoxic tumor microenvironment and approaches to target them in the background of colorectal cancer, and at the same time stratify patients who would benefit from such tumor microenvironment-directed therapy. Results were published in Sci Reports, Int J Cancer, Neoplasma, Cancer Metab.

Name: Ľuboš ČIPÁK
Department, institute: Department of Genetics, Cancer Research Institute BMC SAS
Project name: **Identification of substrates of essential protein kinases using "shokat" mutants**
Starting date: 1.4.2015
Duration: 3.75 years (45 months)
Previous postdoctoral position: Max F. Perutz Laboratories, University of Vienna, Vienna, Austria
Career path: group leader at the Department of Genetics

Other awards: PI of APVV projects
Brief description of the project: This project was aimed to identify direct targets of essential protein kinases and characterize functional relevance of phosphorylation of target proteins for regulation of splicing and fidelity of chromosome segregation by combining the power of analog-sensitive alleles of essential protein kinases with affinity purification and mass spectrometry approaches. The project provided a new framework for our understanding of how are pre-mRNA splicing and chromosome segregation regulated by phosphorylation. Since the basic cell cycle machinery is highly conserved from yeast to man, it is likely that processes governing in yeast will guide the way for studies of these processes in higher eukaryotes, including humans. Results were published in Nucleis Acid Res, Curr Genet, J Cell Sci.

Name: Andrea BÁBELOVÁ
Department, institute: Department of Nanobiology, Cancer Research Institute BMC SAS
Project name: **Functional consequences of renal cell activation due to iron oxide and gold nanoparticle uptake**
Starting date: 1.8.2015
Duration: 3 years (36 months)
Previous postdoctoral position: Institute for Cardiovascular Physiology (Physiology I), Faculty of Medicine, Goethe-University, Frankfurt am Main, Germany
Career path: Head of the Department of Nanobiology
Other awards: PI of national and international grants
Brief description of the project: The project was focused on screening of toxicity of gold and iron oxide nanoparticles in kidney cells, as very limited body of literature links nanoparticles and kidney function, yet. At the same time, kidney is the target organ for nanoparticle accumulation after systemic application, which may result in end-stage renal failure. Mesangial cells provide a structural support for the renal glomerulus, help regulate the filtration process, are involved in the control of glomerular haemodynamics and regulate glomerular elasticity. Podocytes as highly specialized epithelial cells attached to the glomerular basement membrane prevent the loss of serum proteins into urine. These two types of renal cells are mostly the primary targets. The main objective of the project was to investigate the interactions of nanomaterials (gold and iron oxide nanoparticles) and mesangial cells and podocytes, primary isolated from mouse kidney. The results wete published in Endocrinology, Neoplasma, Nanomedicine, Mutagenesis, BMC Cancer.

Name: Michal CAGALINEC
Department, institute: Department of Cellular Cardiology, Institute of Experimental Endocrinology BMC SAS
Project name: **Mitochondria-endoplasmic reticulum functional interplay in Wolfram Syndrome: emerging role for heart and brain protection**
Starting date: 1.3.2015 (since 2018 at the BMC SAS)
Duration: 3.8 years (46 months)
Previous positions: Department of Pharmacology, Institute of Biomedicine and Translational Medicine, University of Tartu, Tartu, Estonia, Department of Muscle Cell Research, Institute of Molecular Physiology and Genetics, Slovak Academy of Sciences, Bratislava, Slovakia (up to 2018)
Career path: Head of the Department of Cellular Cardiology
Other awards: PI of national projects, SAIA travel grant, The article Cagalinec et al., 2016 published in PLoS Biology has been nominated to the collection of 20 best papers published by authors from SAS
Brief description of the project: Wolfram syndrome (WS) is a recessive neurological disorder caused by mutation of the Wfs1 gene with the main symptoms characteristic for mitochondrial diseases. However, mutations of Wfs1 causing significant perturbations in the brain functions are not so prominent in the heart. One explanation of this tissue specificity is that a mechanism compensating for loss of Wfs1 protein function is present in the heart but not in neurons. Therefore, the project aim was to study the disturbance in contractile properties of the heart both at organ and cell level using the Wfs1-deficient animal models and analyse mitochondrial dynamics and ultrastructure in Wfs1 deficient myocytes. To understand the functional link of Wfs1 to mitochondria in neurons and myocytes we investigated whether it is mediated by direct ER-mitochondria interaction and/or by calcium. Mitochondria-ER contact sites were analysed by electron microscopy. The results of the project were published in PLoS Biol, EMBO J, Front Physiol.

2.8.2.2. Stefan Schwarz fellowships

Name: Lukáš Predajňa
Department, institute: Department of Virus Ecology, Institute of Virology BMC SAS
Project name: Utilisation of next generation sequencing (NGS) for identification and characterisation of plant viruses across the agro-ecological interface

Starting date: 1.1.2016
Duration: 4 years
Career path: researcher

Name: Marián Grman
Department, institute: Department of Molecular Physiology, Institute of Clinical and Translational Research
Project name: Effect of nitrosopersulfide and polysulfides on mitochondrial membrane channels and mitochondrial respiration
Starting date: 1.1.2016
Duration: 4 years
Career path: researcher, scientific secretary of the BMC SAS, member of the BMC SAS Management board, principal investigator of national grant

Name: Lenka Minichová
Department, institute: Department of Rickettsiology, Institute of Virology
Project name: Isolation and characterization of selected intracellular bacteria
Starting date: 1.5.2016
Duration: 4 years (paused due to maternity leave)
Career path: researcher, principal investigator of national grant

Name: Anton Mišák
Department, institute: Department of Molecular Physiology, Institute of Clinical and Translational Research
Project name: Effect of interaction products of hydrogen sulfide and nitric oxide on membrane channels derived from sarcoplasmic reticulum
Starting date: 1.1.2017
Duration: 4 years
Career path: senior researcher, principal investigator of national grant
Name: Svetlana Miklíková
Department, institute: Department of Molecular Oncology, Cancer Research Institute
Project name: Comparison of functional characteristics of mesenchymal stromal cells isolated from healthy donors and cancer patients
Starting date: 1.1.2017
Duration: 4 years
Career path: researcher**,** principal investigator of national and international grants (ERA-NET)
Other awards: L'Oréal-UNESCO For Women in Science 2020 – Slovakia, Eset Science Award 2020 outstanding young researcher finalist

Name: Monika Buríková
Department, institute: Department of Molecular Oncology, Cancer Research Institute
Project name: Chorioallantoic membrane of quail embryo (CAM assay) for the study of migration-invasive properties of tumor cells
Starting date: 1.6.2018
Duration: 2 years
Career path: researcher

Name: Lenka Tomášová
Department, institute: Department of Molecular Physiology, Institute of Clinical and Translational Research
Project name: Effect of intracolonic hydrogen sulphide on bioenergetics of liver mitochondria
Starting date: 1.6.2019
Duration: 3 years
Career path: researcher
Other awards: 3rd place at the Competition of Young Scientist under the age of 35 (Slovak Academy of Sciences, Bratislava, Slovakia, 2019)

Name: Matúš Durdík
Department, institute: Department of Radiobiology, Cancer Research Institute
Project name: Effects of different types of radiation on leukemogenic populations of the humjan hemaetopoietic stem/progenitor cells
Starting date: 1.6.2019
Duration: 3 years
Career path: researcher

Name: Viktória Čabanová
Department, institute: Department of Virus Ecology, Institute of Virology
Project name: Ecology of West Nile virus and other mosquito-borne viruses in the environment influenced by global changes
Starting date: 1.6.2020
Duration: 3 years (2 years + 1 year extended, continuing until 31.5.2023)
Career path: researcher, principal investigator of national and international grants
Other awards: Young Personality of Science and Technology for the year 2020 awarded by The Ministry of Education, Science, Research and Sport of the Slovak Republic

Name: Silvia Schmidtová
Department, institute: Department of Molecular Oncology, Cancer Research Institute
Project name: The role of carbonic anhydrase IX in the chemoresistance of testicular germ cell tumors
Starting date: 1.6.2020
Duration: 3 years (2 years + 1 year extended, continuing until 31.5.2023)
Career path: researcher, principal investigator of national grant
Other awards: L'Oréal-UNESCO For Women in Science 2021 - Slovakia

Name: Lucia Demková
Department, institute: Department of Molecular Oncology, Cancer Research Institute
Project name: Development of PDX models from primary tumors of patients with uveal malignant melanoma for testing a personalized therapeutic approach
Starting date: 1.1.2022
Duration: 2 years (continuing)
Career path: researcher, principal investigator of national grant

Name: Jana Plavá
Department, institute: Department of Molecular Oncology, Cancer Research Institute
Project name: The role of stromal component of tumor microenvironment in breast cancer treatment outcome
Starting date: 1.1.2022
Duration: 2 years (continuing)
Career path: researcher, principal investigator of national grant
Other awards: 2nd place at Competition of Young Scientist under the age of 35 (Slovak Academy of Sciences, Bratislava, Slovakia, April 2022); 1st place at Young Oncologist Award 2022 (Cancer Reseach Foundation, Slovakia, March 2022)

2.8.2.3. Postdoctoral positions from other resources (specify)

Four postdoctoral position were covered by the ESIF projects:

Long-term strategic research of prevention, intervention and mechanisms of obesity and its comorbidities
ITMS-313011V344 (OBEZITA-SK)

Mária Ileninová (05/2021 – 04/2022)
Tomáš Kuruc (09/2021 – 02/2023)
Petrová Klaudia (09/2021 – 02/2023)

Open Scientific Community for Modern Interdisciplinary Research in Medicine
ITMS- 313011V455 (OPENMED)

Adam Raček (01/2021 – 06/2023)

2.8.3. Important research infrastructure introduced during the evaluation period with the information about the sources of funding *(max. 2 pages)*

RESEARCH CLINIC

HEAD: Richard IMRICH
Sources of funding:
Spaces and major technological background were covered by the ESIF Project: University Science Park for Biomedicine, ITMS 26240220087 (2013-2015)
Major part of the equiment was funded from internal sources of the BMC SAS earned by research contracts.

The BMC SAS Research Clinic is localised on the ground floor of the Pavillion of Medical Sciences that was built in 2015 as a part of the University Research Park for Biomedicine funded by ESIF project. It hosts two departments that share facilities: the Department of Clinical Research of the Institute of Clinical and Translational Research, and the Department of Metabolic Disorders of the Institute of Experimental Endocrinology. Since 2016, the Research Clinic has been equipped with infrastructure for clinical research in diabetes, endocrinology, cardiovascular and autonomic nervous system, stress and autoimmunity, as well as age-related chronic diseases (metabolic, oncologic and neurodegenerative). It is also approved as an outpatient healthcare provider under the Act No. 578/2004 and is operated by experienced, GCP-certified staff with strong clinical and academic background. Two inpatient intensive care beds, 4 specialized outpatient rooms (metabolic, cardiovascular, autonomic and small surgery e.g. biopsy) are available at the CRU. Routinely used methods include insulin clamps, indirect calorimetry, bicycle spiroergometry, respirometry, drug testing, tilt table, Valsalva maneuver, tissue biopsy, microdialysis, blood sampling/processing/storage, cell isolation/sorting/FACS, standard hypothermia, bed-rest, etc.. The Research Clinic allowed for accomplishment of several clinical trials:

- Multiple Sclerosis: The Role of Mitochondrial Dysfunction in IR Resistance (MS-MIDY) NCT03052595
- Effect of Specific Diet and Physical Activity on Weight and/or Fat Loss NCT02325804
- Genetics and Mechanisms of Rheumatoid Arthritis (RASGENAS) NCT01788098
- Changes After Angiotensin Converting Enzyme (ACE) Inhibitor Replacement by Angiotensin II Receptor Type I (AT1) Blocker (ADIRAS) NCT01444833
- Skeletal Muscle as a Mediator of Exercise Induced Effects on Metabolism & Cognitive Function: Role for Myokines & miRNAs (Brain-Muscle) NCT02253732
- Effect of Carnosine on Diabetes and Cardiovascular Risk Factors (Carnorisk) NCT02011100
- Effects of Growth Hormone Supplementation to Adults With Growth Hormone Deficient on Metabolism and Adipose Tissue Molecular Phenotype (GHAT) NCT01616095.

During the COVID-19 pandemic period, the Research Clinic personnel was very supportive particularly in seroprevalence studies, particularly in collecting venbous blood samples for longitudinal study of antibody immune response to the disease or vaccination.

CENTER FOR PHYSICAL ACTIVITY

HEAD: Barbara UKROPCOVÁ
Sources of funding:
Rebuilding of spaces in the ground floor of the Institute of Virology (trainig hall, cloakrooms, showers and toiletts) and training equiments were mainly funded from internal sources of the BMC SAS earned by research contracts. Part of the costs was covered by contributions form clients and by income from Generali Balans program.

The Centre for Physical Activity was founded at the Biomedical Centre of the Slovak Academy of Sciences (BMC SAS) in the summer of 2017. It was created as a platform for researchers to evaluate the effects of physical activity on health. Researchers at BMC SAS carry our short- and long-term intervention studies, providing individualized training programs for different groups of patients.

In the course of the training program, participants:

- are educated about the beneficial effects of exercise on health and are provided regular feedback (individual consultations about the effects of the training program on their health as well as group seminars / lectures);
- are taught effective and appropriate exercise routines (via individualized training led by professional instructors);
- become members of a social group comprised of people with similar interests (social interaction);
- are monitored regularly and over long periods of time to determine the effects of exercise on their health and to provide evidence documenting the efficiency of the long-term training programs.

The Centre for Physical Activity (i) provides an environment for carrying out endurance and strength training programs suitable for both research study volunteers and clients of the BMC SAS research clinic, (ii) enables long-term monitoring of the effects of exercise on health and supports healthy ageing, and (iii) provides an excellent opportunity to generate valuable scientific knowledge and evidence about the beneficial effects of exercise on health. The Centre for Physical Activity BMC SAS collaborates with the Faculty of Physical Education and Sports and the Faculty of Medicine (Comenius University), the I. and II. Dep. of Neurology (University Hospital Bratislava, Comenius University), the National Institute of Pediatric Diseases and the National Institute of Oncology. Other partners include the Slovak Obesitology Association (SOA) and the Slovak Diabetes Association, particularly its Obesitology Section (www.obesitas.sk). The Centre also employs nutrition specialists).

LABORATORY OF BIOINFORMATICS

HEAD: Miloslav KARHÁNEK
Sources of funding:
The IT equiment was covered in part by the contribution from the SAS and in part by internal sources of the BMC SAS earned by research contracts.

The Laboratory of Bioinformatics has been founded by the end of 2018 in conection with the return of Dr. Karhánek from the long-term stay in the USA and as a reponse to the unmet need of the BMC SAS researchers. The laboratory focuses on the analysis of sequences produced by high-performance next generation sequencing (NGS). As part of this activity and cooperation on scientific projects, it provides consultations and service for other BMC SAS workplaces, designs and builds the necessary computer infrastructure, designs a system for backing up and processing high-volume data, as well as user databases.

The laboratory includes a new powerful server with 80 processors, which is used for fully automated primary sequence analysis of variants and mutations from several samples. With the help of bioinformatics laboratory experts, it is possible to transfer this analysis to the supercomputers of domestic and foreign data centers with a larger volume of samples. The laboratory is also preparing a flexible version for modern cloud technologies. The laboratory staff is gradually introducing bioinformatics applications, mainly from freely available open information projects, which enable further genomic, transcriptomic and metabolic analyzes. In addition, the expert staff of the laboratory provides transfer of knowledge to the colleagues and has also organoside workshops for PhD student amd young researchers of the BMC SAS.

ANIMAL FACILITY FOR IMMUNODEFICIENT MICE

HEAD: Miroslava MATÚŠKOVÁ
Sources of funding:
Spaces and major technological background (air filtration, autoclave, water system etc) were fcovered by the ESIF Project: University Science Park for Biomedicine, ITMS 26240220087 (2013-2015)
Major part of the equiment (isolators, laminair boxes etc.) was funded from internal sources of the BMC SAS earned by research contracts.

The animal house for immunodeficient mice is a special facility localized in the underground of the Pavillion of Medical Sciences. It was built in 2015 as a part of the University Science Park for Biomedicine and its eqipment was completed in 2016.
The animal facility for immunodeficient mice, licence No. SK UCH 02022, is approved for breeding and reproduction (for the own usage) of immunodeficient mice including genetically engineered animals. Animals are kept in aseptic conditions. For this purpose, the facility is equipped with individually ventilated cages (IVC, NexGen Allentown), laminairs and changing stations. Besides three rooms in which animals are kept, the facility has storerooms (for diet, bedding, cages) and an area for cleaning and sterilisation. Recently, the majority of experiments is performed on SCID/beige and NSG (NOD SCID gamma) mice. Breeding colonies of these severe immunodeficient strains are kept in the facility. All projects are assessed by the institutional Ethics committee and approved by the National competence authority – State Veterinary and Food Agency. The facility is equipped for surgery on small rodents including anaesthesia and is mostly used for cancer research. The immunodeficient status of animals enables the use of human tumour cells including cells derived from patient tissues (induction of subcutaneous or orthotopic patient-derived xenografts, PDX). The facility is used not only by BMC researchers but also by scientists from Comenius University. Several commercial projects (tests for tumorigenicity) were conducted during the last five years.

BSL3 LABORATORIES

HEADS: Ľudovít ŠKULTÉTY and Boris KLEMPA
Source of funding for modernisation and addition of new equipment:
Update and validation of air filtering system was funded from internal sources of the BMC SAS earned by research contracts, equipment was funded from the Goverment of the Slovak Republic (PCR block for testing SARS-CoV-2), from the Foundation of the Slovak Savings Bank (Biomek automatic RNA isolator and PCR block).

BSL3 Laboratories are localized in the building of the Institute of Virology and are composed of three units:

(1) First unit serves for manipulating highly infectious and pathogenic viruses (e.g. hantaviruses, tick-borne virus, influenza virus) and consists of highly protected laboratory and state-of-the-art animal facility for small laboratory animals and laboratory for experiments with infected cells. The animals are housed in individualy ventilated cages placed on racks with central ventilation system. This BSL3 unit provides also spaces for a part of the European Virus Archive now reaching global impact.
(2) Second unit was orginally designed for R&D of viral vaccines as well as for production of Coxiella Burnettii antigen for diagnostics of Q fever.
(3) Third unit is recently used for production of vaccination strain of C. burnetii on chick embryo yolk sacs and for C. burnetii growth in axenic media and subsequent purification of its immunogenic components.

All units are equipped with laminairs, incubators, autoclaves and other necessary instruments for research in virology and/or rickettsiology. All activities in BSL3 spaces procceed in strict compliance with national and EU legislation.

The BSL3 laboratories have played a crucial role in the BMC SAS activities during COVID-19 pandemic. The first one was used for isolation of SARS-CoV-2 viruses and for virus-neutralization tests, while the purpose of the seond one was shifted towards routine testing of SARS-CoV-2 using RT-qPCR and for validation of newly developed RT-qPCR tests in collaboration with MutiplexDX company.

BIOTECHNOLOGICAL AND ANALYTICAL LABORATORIES

HEAD: Vladimír ZELNÍK
Sources of funding:
Building with major technological background and majority of equipments were covered by the ESIF Project: Centre for Research and Develoment of Immunologically Active Substances, ITMS 26240220018 (2013-2015). Part of the equiment was funded from internal sources of the BMC SAS earned by research contracts.

Biotechnological and Analytical Laboratories (BTAL) BMC SAS is a high-tech facility with clean-room spaces localized in Šarišské Michaľany, Eastern Slovakia. BTAL building consists of R&D laboratories (A, B sections) and analytical laboratories (C setion). The R&D laboratories are equipped for development of biopharmaceuticals produced in eukaryotic cell systems, development and semiproduction of virus vaccines and substances of bacterial origin, and formulation of newly prepared biopharmaceuticals with improve stability and biological efficacy. The key infrastructure of R&D laboratories includes bioreactors with optional perfusion-based cultivation of eukaryotic cells, CO_2 incubators, high-capacity centrifuges, ultracentrifuges, laboratory fermenters, microbiological incubators, preparative chromatography system, semi-automatic filling station, various filtration systems, microscopes, laboratory lyophilisation unit, freezers and refrigerators and system for cryo-preservation of cells.

However, our recent activities have been mainly accomplished in the analytical laboratories equipped for the development and validation of analytical methods for testing efficacy of newly developed biologically active substances, characterization of their composition, and assessment of their identity, purity and safety. Analytical laboratories possess the Certificate of Good Manufacturing Practise (GMP) for control laboratories and their activities are supported by the following key infrastructure: various types of incubators (CO_2 or microbiology), thermal-room units, system for infrared spectroscopy, atomic absorption spectrophotometer, system for LAL test, equipment for total organic carbon measurement (TOC apparatus), HPLC system, cyclers for standard and real-time PCR, electrophoretic systems for nucleic acids and/or protein analyses, microscopes, particles counter etc.

BTAL also dispose of hot-air and/or steam sterilization devices, systems for preparation of purified and WFI water and other equipment and facilities for preparation and handling of laboratory material.

In addition to applied research funded by APVV and ESIF projects, BTAL personnel with long-lasting expertise in biopharmaceutical analytics performs contracted activities (see pages 179-181).

2.9 Supplementary information and/or comments on all items 2.1 – 2.8 (max. 2 pages in total for the whole section)

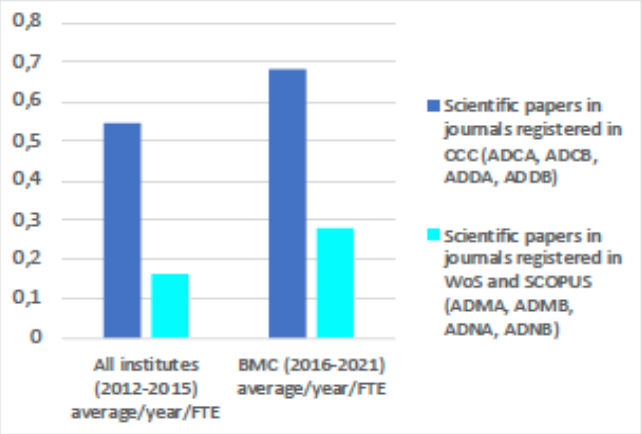
Supplementary information to 2.1.9 and 2.2.1 (research outputs and citations)

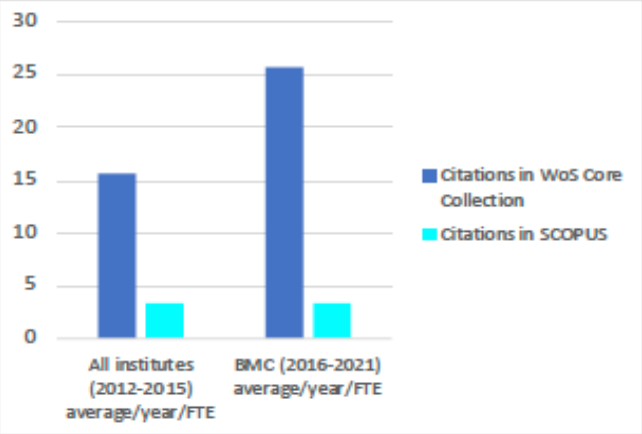
In order to better illustrate the BMC SAS publication activitiy and its citation impact during the evalutaion period 2016-2021, we compared the average values calculated per year per FTE of researchers with the values referred for the previous evaluation period 2012-2015 individually by the institutes that now belong to the BMC SAS. The table does not iclude the 2012-2015 numbers for the Institute of Clinical and Translation Research (ICTR, formerly Centre for Molecular Medicine), because its staff consisted of the part-time employed personnel of the other BMC SAS institutes and we wanted to avoid duplicity of claimed publications.

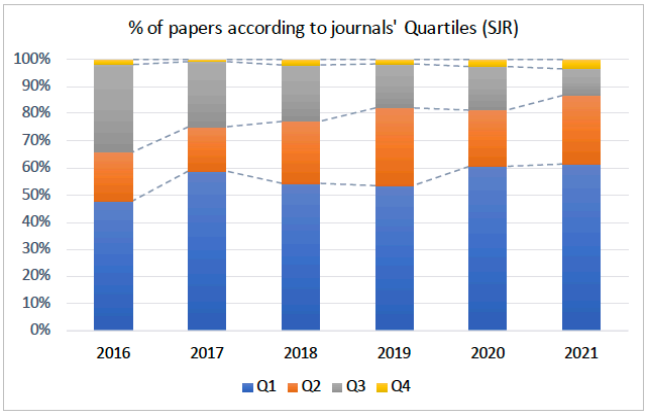
Both table and the graphs show that the overal publication activity increased despite objective difficulties connected with relatively long-lasting interruptions of experimental work during 2016 and 2020-2021. In 2016 it was due to moving to new spaces (IEE, CRI, ICTR) and lengthy issuance of necesary approvals for use of chemicals, biologicala and animals. During the pandemic period 2020-2021 it was because we not only reduced ordinary research activities due to lockdown measures, but also redirected our efforts to help society to mitigate the pandemic burden.

	IV (2012-2015) average/year/FTE	**IEE** (2012-2015) average/year/FTE	**CRI** (2012-2015) average/year/FTE	**INB** (2012-2015) average/year/FTE	**AVERAGE** (2012-2015)	**BMC** (2016-2021) average/year/FTE
Scientific papers in journals registered in CCC (ADCA, ADCB, ADDA, ADDB)	0,567	0,710	0,484	0,422	0,546	0,684
Scientific papers in journals registered in WoS and SCOPUS (ADMA, ADMB, ADNA, ADNB)	0,107	0,374	0,077	0,097	0,164	0,282
Citations in WoS Core Collection	17,416	19,807	14,187	10,999	15,602	25,710
Citations in SCOPUS	3,445	4,742	2,510	2,890	3,397	3,420

Abreviations: IV – Institute of Virology, IEE – Institute of Experimental Endocrinology, CRI – Cancer Resdearch Institute, INB- Institute of Neurobiology, CCC – Current Contents Connect, WoS - Web of Science





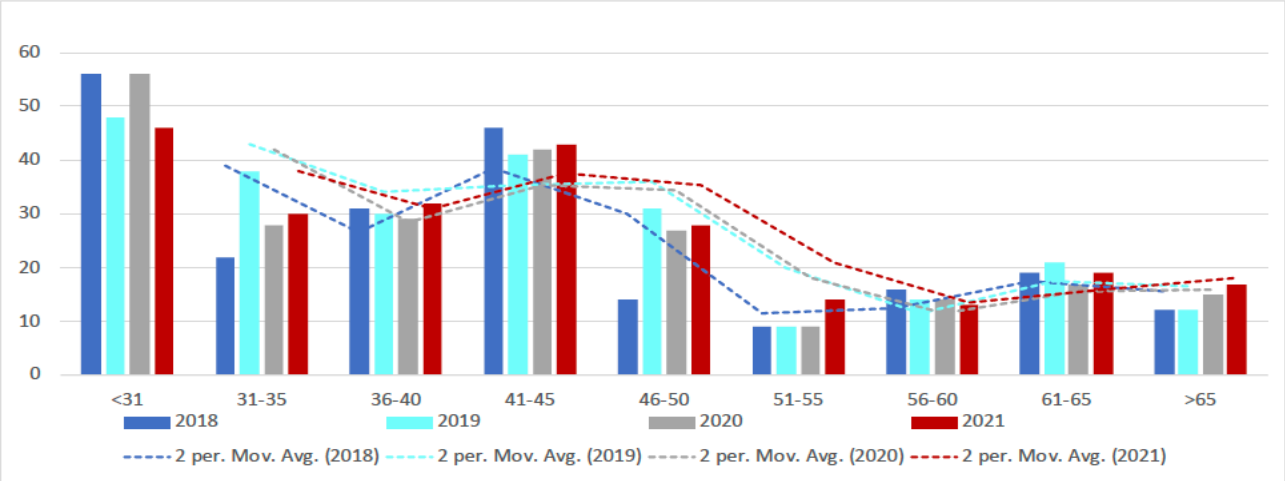


In addition, during the evaluation period, we published gradually increased proportion of papers in the journals of quartiles Q1 and Q2.

Thus, although our major focus has been on quality rather than quantity, we were able to improve our research performance in terms of both aspects.

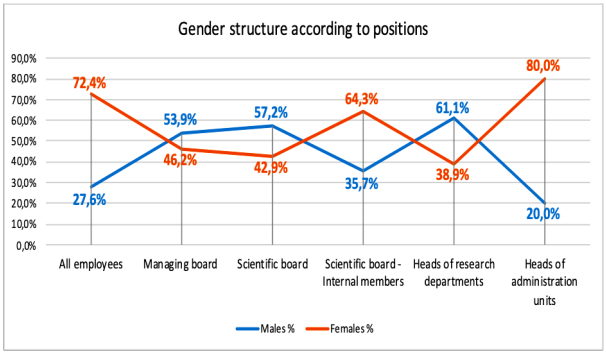
Supplementary information to 2.8.1.2. (age and gender structure of researchers)

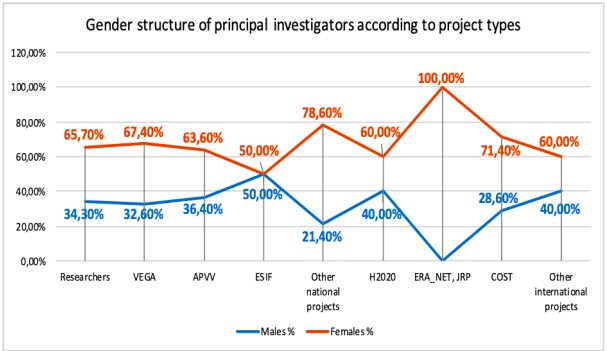
Sustainable research performance depends on a continuum of generations that facilitates transfer of knowledge and skills from senior to junior researchers. An importnat component of this continuum is the middle-age generation of experienced researchers, mostly principal investigators of projects that attract funding. Thus, it is very importnat to secure and support the middle-age generation, which was relatively weekly presented at the moment of the BMC SAS establishment. The graph below illustrates the age structure development of the BMC SAS researchers over the period of 2018-2021. The data show sequential reduction of the middle-age gap suggesting sucessfully ongoing generation exchange. At the same time, the number of junior scientists has been stabilised, thus creating a prerequitise for successful future development.



Age structure of the BMC SAS researchers participating in implementation of projects. Dashed lines denote the moving average in the respective age groups.

Data provided in 2.8.1. tables show the summary of research personnel in terms of qualification and age. Below graphs put them into the context of gender, particularly with respect to positions and the role of principal project investigators (data corresponding to the situation on December 31, 2021). The left graph shows that the BMC SAS staff consists mostly of women, who are highly represented particularly among administration personnel, but are minor in managing board and among the department heads. On the other hand, women are highly active as project PIs indicating their erudition and ability to lead research teams. This is partly inconsistent with the opinion of only 34% of women on the topic of leadership within the internal anonymous survey performed in BMC SAS in 2020 suggesting they need the support for promotion.





Supplementary information on submitted projects

To demonstrate networking potential of the BMC SAS researchers and their great efforts to cooperate with partners in ERA and gain funding, we present here the selection of international project proposals that they submitted either as individual scientists, or as partners or coordinators in the period of 2019-2021:

1. **Viral proteins targeting immune checkpoint receptors as novel therapeutic concept for hematologic cancer**, ERC-2021-STG, PI at BMC SAS: Katarína Lopušná
2. **Integrated Services for Infectious Disease Outbreak Research**, HORIZON-INFRA-2021-EMERGENCY-02, Coordinator: European Research Infrastructure on Highly Pathogenic Agents - ERINHA, Belgium, PI at BMC SAS: Boris Klempa

3. **Boosting autophagy to increase individual resilience to stress and mental health** (AutoResist), HORIZON-HLTH-2021-STAYHLTH-01, Coordinato: Max-Planck-Gesellschaft zur Forderung der Wissenschaften, Germany, PI at BMC SAS: Daniela Ježová
4. **A Coordination and Support Action to prepare UNCAN.eu platform**, HORIZON-MISS-2021-UNCAN-01, Coordinator: Institut National de la Sante et de la Recherche Medical, France, PI at BMC SAS: Miroslav Chovanec
5. **Novel drug delivery system for boron-based therapies utilizing neutron (BNCT) and proton (PBCT) beams for the local treatment of cancers**, ERANET - EURONANOMED 3 (JTC 2021), Coordinator: Institute of Microbiology, Academy of Sciences, Czechia, PI at BMC SAS: Miroslava Matúšková
6. **Iodinated NANOconTRAST agents for dual imaging**, ERANET - EURONANOMED 3 (JTC 2021), Coordinator: Vall d'Hebron Research Institute, Spain, PI at BMC SAS: Petra Bonová
7. **The role of advanced nanoplatforms in theranostic applications**, ERANET - EURONANOMED 3 (JTC 2021), Coordinator: Palacký University Olomouc, Czechia, PI at BMC SAS: Katarína Kozics
8. **DEvelopment of TME-guided New Precision THerapeutic stRAtegies**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: University of Florence, Italy, , PI at BMC SAS: Marína Cihová
9. **Bringing immunotherapy to pancreatic neuroendocrine tumours: novel strategies to target the tumour microenvironment**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator:Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Institute for Biomedical Engineering IBMT, PI at BMC SAS: Božena Smolková
10. **Longitudinal analysis of cancer and immune cells Plasticity regulating Resistance to IMMunotherapy in MelanomA**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: Université Claude Bernard Lyon 1, France, PI at BMC SAS: Miroslava Matúšková
11. **Viral-inspired checkpoint inhibitors as a novel therapeutic strategy for hematologic Malignancies**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: BMC SAS, PI: Ivana Nemčovičová
12. **Magnetically guided CD8+ T cells and monoclonal antibodies against carbonic anhydrase IX to boost therapeutic effects in heterogenic cancer organoids**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: Fondazione Istituto Nazionale di Genetica Molecolare-INGM, Italy, PI at BMC SAS: Monika Baráthová
13. **Identification of new immune related therapeutic targets in treatment refractory testicular germ cell tumors.** A multi-institutional international translational study, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: BMC SAS, PI: Michal Mego
14. **Dissecting the immune component of resistance mechanisms in retrospective and prospective cohorts of breast cancer patients**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: University of Oslo, Institute of Clinical Medicine, Norway, PI at BMC SAS: Marína Cihová
15. **Metabolism of immune microenvironment in renal tumors**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: University Hospital Regensburg, Germany, PI at BMC SAS: Jana Jakubíková
16. **Mapping and targeting high-grade glioma tumour microenvironment by a new generation of gene-modified T and NK cells to improve long-term efficacy**, ERANET – TRANSCAN-3 (JTC 2021), Coordinator: Universitätsklinikum Würzburg, PI at BMC SAS: Eliška Švastová
17. **Alliance for Life Sciences: From Strategies to Actions in Central and Eastern Europe**, H2020-SC1-2020-Single-Stage-RTD, Coordinator: CEITEC, Masaryk Univeszity, Brno, Czechia, PI at BMC SAS: Silvia Pastoreková
18. **Animal Free Framework for Chemical Testing and Safety**, H2020-SC1-2020-Single-Stage-RTD, Coordinator: Luxembourg Institute of Science and Technology, Luxemburg, PI at BMC SAS: Monika Šramková
19. **Pangenomics and Evolution for Coronavirus Epidemic Alert**, H2020-JTI-IMI2-2020-21-single-stage, Coordinator: Institut National de la Sante et de la Recherche Medical, France, Boris Klempa
20. **Psoriatic Arthritis Network for THerapy and Early Recognition**, H2020-JTI-IMI2-2020-20-two-stage, Coordinator: Medizinische Universität Wien, Austria, PI at BMC SAS: Richard Imrich
21. **Micro- and Nano-Plastics in the Freshwaters: Sources, Pathways and Impacts on the Ecosystem and Human Health**, H2020-SC1-2020-Single-Stage-RTD, Coordinator: Slovak Technical University in Bratislava, PI at BMC SAS: Katarína Kozics
22. **Intracellular Exchange of iron/zinc - A Novel Concept in Therapeutics**, H2020-FETOPEN-2018-2019-2020-01, Coordinator: The Hebrew University of Jerusalem, Izrael, PI at BMC SAS: Jozef Ukropec
23. **Viral immunomodulators as novel candidates in cancer therapy**, H2020-MSCA-IF-2020, PI at BMC SAS: Ivana Nemčovičová, Katarína Lopušná
24. **Antioxidant THerapeutic nanoparticlEs against Neurodegeneration in ALS**, ERANET - EURONANOMED 3 (JTC 2020), Coordinator: Vall d'Hebron Research Institute, Spain, PI at BMC SAS: Andrea Bábelová
25. **Promising inhibitors of epithelial-mesenchymal transition of breast cancer cells**, ERA.Net RUS Plus Call 2019, Coordinator: Moscow Region State University, Pushchino Scientific and Educational Center, Russia, PI at BMC SAS: Igor Belyaev
26. **Decoding the role of mitochondria in progression of colorectal cancer and its chemotherapeutic resistance,** ERA.Net RUS Plus Call 2019, National Institute of Chemical Physics and Biophysics,Estonia, PI at BMC SAS: Miroslava Matúšková
27. **Adoptive cell transfer of reprogrammed regulatory T-cells for the treatment of Homozygous Familial Hypercholesterolaemia**, ERANET - EJP RD (JTC 2020), Coordinator: Department of Excellence in Pharmacological and Biomolecular Sciences, University of Milan, PI at BMC SAS: Richard Imrich

28. **Multiple Approaches to treat Alkaptonuria**, ERANET - EJP RD (JTC 2020), Coordinator: Department of Biotechnology, Chemistry and Pharmacy, University of Siena, Italy, PI at BMC SAS: Andrea Zaťková
29. **Breakthrough therapies for Wolfram Syndrome**, ERANET - EJP RD (JTC 2020), Coordinator: INSERM, France, PI at BMC SAS: Daniela Gašperíková
30. **Systems and CEllular Neuroscience Toward the REGeneration of Olfactory Function**, ERANET - NEURON JTC 2020, Coordinator: Center for Regenerative Therapies TU Dresden, Germany, PI at BMC SAS: Barbara Ukropcová
31. **Preventing Effects of Aging by Regular Exercise. Non-invasive MR-Based detection of metabolic and structural addaptations to exercise in the elderly improvements and inter-organ crosstalk,** Herzfelder-Stiftung, Coordinator: Medical University of Vienna, PI at BMC SAS: Jozef Ukropec
32. **Hypothalamic cells: development, connections and alterations**, H2020-ERC-2019-COG, PI at BMC SAS: Ján Bakoš
33. **Elucidating the molecular mechanism and metabolic regulation outile cycles**, H2020-ERC-2020-STG, PI at BMC SAS: Miroslav Baláž
34. **Test bed for sustainable nano-enabled surfaces of packaging, nonwoven and textile materials**, H2020-NMBP-HUBS-2019, Coordinator: Teknologian tutkimuskeskus VTT Oy, Finland, PI at BMC SAS: Andrea Bábelová
35. **European Virus Archive GLOBAL**, H2020-INFRAIA-2019-1, Coordinator: Universite D'aix Marseille, France, PI at BMC SAS: Boris Klempa
36. **Safe and improved production of viruses and viroids-free seeds**, H2020-MSCA-RISE-2019, Coordinator: Instituto Valenciano de Investigaciones Agrarias, Spain, PI at BMC SAS: Miroslav Glasa
37. **Regeneration of Healthy Brown Adipose Tissue for Treatment of Obesity-Associated Metabolic Disorders**, H2020-SC1-2019-Single-Stage-RTD, Coordinator: Universitaetsklinikum Hamburg-Eppendorf, Germany, PI at BMC SAS: Jozef Ukropec
38. **Next Generation Neural Conduit**, H2020-SC1-2019-Single-Stage-RTD, Coordinator: Università degli Studi di Palermo, PI at BMC SAS: Ján Gálik
39. **Characterization of radiosensitivity and radiosusceptibility in humans and ecosystems**, H2020-NFRP-2019-2020-12, Coordinator: Institut national de la santé et de la recherche médicale, France, PI at BMC SAS: Igor Belyaev
40. **Platform for organ-on-chip animal-free hazard assessment**, H2020-NMBP-TR-IND-2020-twostage, Coordinator: Luxembourg Institute of Science and Technology, Luxemburg, PI at BMC SAS: Monika Šramková
41. **Identification of novel therapeutic targets for human brown fat activation**, EFSD Research Programme, PI at BMC SAS: Miroslav Baláž
42. **Advanced Funtional Nanocrystals For Multimodal Treatments of Preeclampsia**, ERANET - EURONANOMED 3, Coordinator: Vall Hebron Institute of Research, Spain, PI at BMC SAS: Andrea Bábelová
43. **Solid tuMor-Activable polymeR-illaTive nanoPROBes for navigated surgery**, ERANET - EURONANOMED 3, Coordinator: Institute of macromolecular chemistry of the Czech Academy of Sciences, Czechia, , PI at BMC SAS: Andrea Bábelová
44. **TEmprature-responsive Nanogels for TArgeted delivery of miCroRNAs in wound heaLing and tissue** rEgeneration applicationS, ERANET - EURONANOMED 3, Coordinator: Ospedale Pediatrico Bambino Gesù (OPBG), Italy, PI at BMC SAS: Alena Gábelová
45. **ApreciseKUre: an Alkaptonuria-dedicated digital integrated ecosystem**, ERANET - EJP RD (JTC 2019), Coordinator: University of Siena, Italy, PI at BMC SAS: Andrea Zaťková
46. **Deciphering the signalling pathways leading to cell death in Wolfram syndrome**, ERANET - EJP RD (JTC 2019), Coordinator: INSERM, France, PI at BMC SAS: Daniela Gašperíková
47. **Drug repurposing and response prediction to leflunomide and hydroxychloroquine combination therapy in patients with primary and secondary interstitial lung disease (ILD) by exploiting a systems medicine approach in a basket-trial setting**, ERANET - ERACoSysMed (JTC-3), Coordinator: University Medical Center Utrecht, Department ofRheumatology & Clinical Immunologynand Laboratory of Translational Immunology, Netherlands, PI at BMC SAS: Richard Imrich
48. **New Therapies in Cystic Fibrosis based on Systems Biolog,y** ERANET - ERACoSysMed (JTC-3), Coordinator: Mines-ParisTech, France, PI at BMC SAS: Andrea Šoltýsová
49. **Resistance under Combinatorial Treatment in Er+ and Er- Breast Cance**, ERANET - ERACoSysMed (JTC-3), Coordinator: University of Oslo, Institute of Basic Medical Sciences, Oslo Centre for Biostatistics and Epidemiology, Norway, PI at BMC SAS: Svetlana Miklíková
50. **Metabolic therapy of heart failure: which place for a cocktail of B vitamins?** ERANET - ERA-CVD JTC 2019, Coordinator: INSERM, Paris Sud University, PI at BMC SAS: Alexandra Zahradníková

3. *Implementation of the recommendations from the previous evaluation period*

Preceding evaluation of the SAS organizations took place in 2016, in the year of the establishment of the Biomedical Research Center SAS (BMC SAS). Because the evaluation period covered the years 2012-2015, the founding institutes of the BMC SAS (i.e. the Institute of Experimental Endocrinology, the Cancer Research Institute, the Institute of Clinical and Translational Research, and the Institute of Virology), as well as the Institute of Neurobiology, which joined the BMC SAS in 2018, were assessed separately and received separate recommendations with the common conclusion, in which the evaluation panel stated the opinion that the BMC SAS has a good potential to successfully promote the biomedical research and serve as an example for the further development of science in Slovakia.

The recommendations can be summarized as follows:

1. Horizontal integration of the BMC SAS institutes
2. Selection of quality, "redesign" and consolidation of the research agenda
3. Improvement of the publishing strategy
4. Establishment of the International Scientific Advisory Board
5. Support for young researchers
6. Support for development of the BMC SAS Research Clinic
7. Improvement of international mobility and cooperation
8. Elaboration and implementation of the Strategic / Action plan

1. Horizontal integration of the BMC SAS institutes

Consolidation of the operational rules and the internal culture of relations, communications and research activities, together with the horizontal integration of the research capacities, infrastructures and administrative procedures (including economic conjunction) were the principal steps towards the sustainability and development of the BMC SAS at the institutional level. Therefore, we put a lot of managerial and emotional efforts into the accomplishment of these steps through the following actions:

- In 2016, all administrative and technical support units composed of the personnel from the founding BMC SAS institutes were subjected to an **external audit**, resulting in the consolidation of the unit structure and staffing, elimination of duplications and creation of fully functional **legal** (including a new PR section)**, economic, and technical units** as well as of the **project unit** that was newly created to support researchers in administration and implementation of projects. In addition, new **unit for public procurement** was opened in 2021 to provide support in public procurement, which represents very high administrative burden, due to both strict legislation and size of the BMC SAS that requires above-limit purchase contracts. All these supporting units are taking care for the unified administrative and financial operations throughout the BMC SAS, following common guidelines and regulations adopted for the entire organization structure of the BMC SAS.
- As a part of the horizontal integration, **research infrastructure** of the BMC SAS is freely accessible and in a large extent shared among the BMC SAS institutes, and is also opened to the external research community. We are currently working towards the formal establishment of the BMC SAS **core facilities** from our existing specialized laboratories and facilities. We aim at adopting best practices through learning from our partners in the Alliance4Life consortium, using the opportunity provided by the Alliance4Life_ACTIONS H2020 project to acquire knowledge in this area and join the A4L network of core facilities, see https://a4l-facilities.fnusa-icrc.org. Completion of the CF establishment process is one of our key tasks for the near future.
- Horizonal integration within BMC SAS is also exemplified by the **cross-cutting projects** with joint participation of the BMC SAS institutes, such as Structural Funds projects OBEZITA-SK (dedicated to research of obesity and comorbidities – all institutes), LISPER (cancer diagnostics and therapy R&D – Cancer Research Institute and Institute of Virology), BIOFORD (biobanking of cancer and rare diseases – Cancer Research Institute, Institute of Experimental Endocrinology, Institute of Virology). Moreover, entire BMC SAS has become involved in the EU projects Alliance4Life (Closing research and innovation gap in EU), A4L_ACTIONS (From Strategies to Actions in CEE), and iPAAC (Innovative Partnership for Action Against Cancer).
- During the COVID-19 period 2020-2021, the BMC SAS institutes jointly participated in the national actions against pandemics. Although **the anti-pandemic activities** were governed and executed mainly by the Institute of Virology, researchers from the Cancer Research Institute and Institute of Experimental Endocrinology participated in PCR testing, while the medical staff of the Institute of Clinical and Translational Research working in Research clinic helped in blood sample collections and supervised the ethical and medical aspects of the serological surveys.

- Both externally and internally, **BMC SAS acts as a compact entity**, using common insignia and affiliation. However, to maintain the reference to origin and history, the institutes also use their original logos and names in connection with the BMC SAS's name at different occasions as well as in research publications.
- BMC SAS researchers share their results and opinions at the common seminars, internal conferences, meetings of the academic community and informal discussions, which are often leading to joint experiments or project proposals. The BMC SAS research community is represented by the corporate Scientific Board proportionally composed of the respected researchers from all BMS SAS institutes. There are **common rules** of performance evaluation, for allocation of doctoral students, and many other research-related activities.
- Finally, thanks to the extensive PR activities of the BMC SAS researchers particularly during the pandemic, public recognition of the BMC SAS has significantly increased.
- All these elements have collectively contributed to the horizontal integration and cohesion of the BMC SAS institutes and researchers both at the level of research and societal activities.

2. Selection of quality, "redesign" and consolidation of the research agenda

One of the major strengths of the BMC SAS "joint-venture" has been in the concentration of several outstanding Slovak scientists (and their teams), including an active middle generation of researchers and young promising scientists. For an optimal use of this human potential and selection of quality it was necessary to offer opportunities for the middle generation researchers to fully employ their leadership talents and for the young generation researchers to integrate into scientific teams and use their creative energy for excellent scientific work.

However, selection of quality and consolidation of the research agenda are complex and continuous processes affected by several inter-connected factors: flexibility of HR policy (constrained by legislation especially in cases of permanent senior positions fixed from the past, contrasting with the need for generation exchange), sustainability of research projects, introduction of new research groups and/or topics, limited salary budget and unpredictable funding opportunities. On the other hand, acquisition of additional salaries and other funds from grants and contracts is implicitly possible only with well-disposed scientific staff able to create competitive projects with strong research topics. This close mutual link between the research excellence and economic stability makes selection of quality and consolidation of research agenda imperative despite of all limiting factors.

To respond to this imperative and pursue the recommendation of the evaluation panel, we made the following efforts:

- In 2017, we **"redesigned" the structure of research departments**. Based on the research focus and composition of the research groups, previous 22 departments were rebuilt to 15 departments, consisting of the larger teams with related interests. This has initiated the convergence of research agenda within and across the newly formed departments that is still ongoing. In the frame of restructuring, seven researchers used the opportunity given by the "transfer holidays" and moved to another research groups, departments and/or institutes of the BMC SAS, where they successfully continue their research activities.
- In 2018, the number of departments increased to 18 due to the **acquisition of three new departments**: two at the Institute of Neurobiology adjoining the BMC SAS and one delimited from the Centre of Biosciences SAS.
- As a result of **new appointments,** the average age **of the department heads** was collectively decreased by almost 10 years. Four department heads were selected from the BMC SAS holders of just-completed prestigious SASPRO reintegration grants co-funded by the EC and SAS.
- In 2018, **systematization of the working positions** at the BMC SAS was introduced in order to stabilize the personnel size within limits given by the salary budget and allow for slow shift of the personnel structure towards younger researchers, middle age research leaders and more qualified supporting staff.
- In the period of 2016-2021, 15 senior scientists left BMC SAS due to personal reasons or as a result of the quality selection and generation-exchange processes. On the other hand, about 45 junior scientists joined the research staff as postdocs, while 10 % of them left for the postdoctoral stays abroad or for outside work positions.
- From 2018, we decided to abandon the VEGA projects evaluated in category C.
- In 2018, expert in bioinformatics Miloslav Karhánek returned from the USA and founded a Specialised Laboratory of Bioinformatics serving all BMC SAS researchers.
- Three excellent young researchers recently returned from their postdoctoral stays at ETH Zurich and University of Florida. Two of them, namely Miroslav Baláž and Lucia Balážová were awarded by the SASPRO II projects supporting of their reintegration from ETHZ. They will receive all support for the accomplishment of their independent research.
- The quality selection has been supported by the **annual evaluation of research performance** and by initial one-year probationary contracts of the newly acquired personnel.

Consolidation of research agenda remains an important part of the BMC SAS strategy for the future development. It is continuously ongoing in line with the pyramid strategy, in which small and specific national projects with complementary topics feed into the larger, more complex national and/or international projects. Such approach allows for amalgamation of the research directions. The pyramid strategy is occasionally challenged by unexpected grant calls, exploitation of which is important for the BMC SAS sustainability in the unstable and underfunded national research environment. Thus, we try to develop our research agenda to be both focused and flexible within the limits of our expertise and the external opportunities.

3. Improvement of the publishing strategy

BMC SAS publishing strategy is **strongly oriented on quality resulting from genuine research**, impactful ideas and specific skills of the BMC SAS researchers. However, publishing of this in-house research results is expected to be **balanced with** the publishing of results of **collaborations** with relevant national and/or foreign partners. Correspondingly, about 50% of papers published by the BMC SAS researchers in the evaluation period were generated in international and/or national collaborations.

Currently prevailing inadequate pressure on metrics and on numbers of research outputs decreases the motivation to perform high-risk innovative research. It also shifts the publishing tactics towards "salami slicing", and contributes to crisis of research reproducibility and reliability. In contrast, BMC SAS' publishing strategy is in line with the **"less and better" principle** reinforced also by the recent Research assessment scoping report of the European Commission. Therefore, we aim at both decreasing the pressure on the numbers of publications and generating more space for high quality research outputs to the extent allowed by the requirements of existing national funding systems. We believe that this attitude is very important from the long-term BMC SAS perspective.

Translation of this publishing strategy to practice is motivated by annual incentives based on the **internal research assessment rules** approved by the BMC SAS Scientific board in 2016 and revised in early 2018 and 2022. The rules partially reflect the assessment system of the SAS and consider quartile ranking of the journals, in which the papers were published in the given year. They include a bonification of papers with the first and/or corresponding author from the BMC SAS and of papers with more than a single author from the BMC SAS. In addition, we take into account citations, projects and engagement of researchers in teaching and other societal activities. We perform **regular comparative analysis of the trends** in quality and impact of publications and **accomplish internal surveys** of the scope of activities and visions of individual researchers and teams.

On the other hand, the strategy oriented on publishing in high quality journals in an open acces format that facilitates increased citation impact has been hardly translatable to practice in the absence of special financial support and/or nationally covered read-and-publish contracts with major publishing houses. Slovakia has the open acces strategy formally accepted, but no real benefits for researchers are in place. The level of funding available in Slovak grant agencies does not allow to cover both reagents and publishing expenses and therefore mainly early career researchers with smaller grants choose the journals that do not provide open access or provide it for a lower price. These journals have generally lower IF due to lower citation rates. Resolution of this issue a prerequisite for improved publishing, but it can be only partially addressed through limited institutional resources without major science policy decisions and actions at the national level.

Over the 2016-2021 period, we could observe overall increase in the publication activity, with slight temporary decreases. The decrease in 2017 was caused by the interruption of our research due to the complicated and lengthy administration of approvals related to the merger and movement to a new building in 2016, while the decrease in 2020-21 was mainly due to the overwhelming anti-pandemic activities that diverged a number of scientists from their research programs. On the other hand, we witnessed an increase in the proportion of papers published in Q1-Q2 journals and Nature index journals as well as an increase in the cumulative numbers of WoS / SCOPUS citations registered in the SAS Central Library repository. Values displayed on Table 2.1.9 on page 48 suggest that the quantity of the BMC SAS publications is close to the saturation limit. Further quantitative increase would be possible only through intentional re-orientation towards single collaborative contributions to papers of other research entities. This is, however, not compatible with our strategy and therefore, we will continue to cultivate our original research, make it more complex and improve its quality that would subsequently attract further collaborations.

4. Establishment of the International Scientific Advisory Board (ISAB)

The ISAB members' nominations and bylaws were approved by the BMC SAS Scientific Board in late 2019. Then, the ISAB was formally established in February 2020, just before the onset of the COVID-19 pandemics. Due to special circumstances during 2020-2021, which strongly affected the life at the BMC SAS, we did not call the ISAB to action. In addition, one of the ISAB members, prof. Christian Drosten, Director of the Institute of Virology at Berlin's Charité Medical School, has been the world's leading coronavirus expert playing the central role in the global fight against pandemics.

However, BMC SAS was subjected to two assessments accomplished as parts of key deliverables of the Alliance4Life and Alliance4Life_ACTIONS projects. The assessments covered the periods of 2015-2017 and 2018-2020 and resulted in publicly available documents, which offer insights into the position of the BMC SAS among the leading life science institutes from the CEE countries as well as into the evolution of its research performance, managerial practices, and institutional research culture https://alliance4life.ceitec.cz.

5. Support for young researchers

Talented young researchers have been important drivers of the BMC SAS development and therefore have received special attention both during their PhD studies and the postdoctoral period. BMC SAS has provided them with **opportunities** to gain broad range of experimental skills, to exchange ideas and develop collaborations. BMC SAS has also supported young researchers in **submission of project proposals** and in leadership of the project teams. During 2016-2021 period, postdocs were principal investigators of 10 VEGA projects, 2 ERA-NET projects and 2 APVV projects. As mentioned above, four of six young researchers, past recipients of SASPRO grants, became the heads of the departments. BMC SAS also support **founding of new research groups** under the leadership of talented junior researchers, as recently exemplified by Miroslav Baláž returning from the ETH Zurich.

Shortly after the BMC SAS establishment, young BMC researchers founded a Sci-Met club organising regular meetings, seminars and workshops. Club members were from the BMC SAS as well as from other SAS institutes. Later on, the activities of the club were overtaken and expanded by the Young researchers group established at the SAS level. The group has been chaired by Terézia Valkovičová a young researcher from the Institute of Experimental Endocrinology BMC SAS.

To facilitate the communication with young researchers and translate their opinions to the governance level, two representatives of the young generation have been **engaged in the BMC SAS Management board** as scientific secretaries responsible for the coordination of different activities related to PhD education and postdoctoral career developments, organization of various social events, and participation in BMC SAS undertakings. Young researchers are also represented in the BMC SAS Scientific Board. This allows them to gain experiences and managerial skills that can later become useful both for the young researchers themselves and for the future BMC SAS management.

Furthermore, BMC SAS expresses full support to young researchers through their **nominations to awards**. Indeed, many of the nominations resulted in multiple prestigious awards, including Student Personality of Slovakia, ESET Science Award Outstanding Young Researcher finalist, L'Oreal UNESCO Woman in Science, Minister of Education Young Researcher of the Year Award, SAS Young Researcher Award. These awards testify both excellent quality of our young scientists and favourable working environment at the BMC SAS.

In 2019, the BMC SAS management approved the intention to support young scientists from its own resources in the form of internal wage contributions, selected on the basis of quality. The selection is made from the candidates for the compensatory contribution of the SAS or the Schwarz Fund, which were not selected by the SAS commission but meet the criteria of quality and prospects for research at BMC SAS.

6. Support for development of the BMC SAS Research Clinic

The Research clinic was put into operation as a non-state outpatient medical facility (RÚVZ HZZ/ 03631/2016). It received a healthcare provider code from the Health Care Supervision Authority, and obtained a permit for the operation of medical facilities (03353/2016 / ZDR / 5) from the Bratislava Self-governing Region. We also prepared a basic architectural study of the project of the inpatient part of the Research Clinic, but due to the absence of a financial perspective, no further steps have been taken so far.

The **outpatient part of the Research Clinic** was equipped with the healthcare and medical research-related infrastructure and started to operate in 2016, accommodating biomedical research teams both from the Institute of Clinical and Translational Research and the Institute of Experimental Endocrinology. The activities of the RC have been guaranteed by the qualified medical specialists with the part-time employment status in the BMC SAS. The RC performs research related to obesity, diabetes, sclerosis multiplex, and other chronic diseases. The **staff of the Research clinic** initially consisting of the BMC SAS researchers and technicians **was enlarged** by the part-time working nurses, diabetologists, cardiologists, gastroenterologist, psychologist, and physiotherapists. This was possible in part thanks to the ongoing OBEZITA project supported by the Structural funds. The RC capacity building has been developed mainly with the aim to establish the first in Slovakia Centre for Obesity Management that would allow patients with morbid obesity to receive a complex care at one place.

Since the BMC SAS establishment, we also strengthened our connection and cooperation with clinical experts by their direct engagement into the BMC SAS research activities through their part-time employment. Currently, the clinical research staff of the BMC SAS includes two pediatric diabetologists, one otolarhinoryngologist, and three oncologists in addition to the CPA medical personnel mentioned above.

To support the RC activities and to strengthen the research related to impact of non-pharmacologic interventions on non-communicable diseases, **a new Centre for Physical Activity (CPA) has been established** in the original library spaces of the Institute of Virology and equipped with infrastructure and expert trainers in late 2017. The CPA operating rules were approved by the Regional Healthcare Office and the CPA premises were put into operation in early 2018. In 2020, additional premises were selected and adapted for the CPA activities. In 2021, adaptation of the **new training spaces** was completed and sanitary facilities have been reconstructed for the use by the training participants. The CPA provides tailored trainings to seniors and performs special research-connected activity programs dedicated to cancer survivors and patients with metabolic and neurodegenerative disorders in order to evaluate possible prevention / intervention approaches. The research/training participants take health benefits from the programs and on the other hand provide samples of blood and urine as well as muscles and adipose tissue specimens for the research purposes. This scenario has already generated excellent, highly cited research outputs and at the same time had a practical impact on the health status of the study participants.

7. Improving international mobility and cooperation

BMC SAS researchers are well aware of the importance of international cooperation and mobility. This fact is apparent also from the Alliance4Life research assessment, which showed that papers produced by A4L partner institutions in international collaborations were published in journals with higher impact factors (and/or better JCR ranking positions) and generate a higher number of citations. However, the IFs and numbers of citations to papers with the BMC corresponding authors has moved closer to the papers with the corresponding author of the collaborating partner over the evaluation period.

Many of the BMC SAS researchers maintain long-lasting partnerships with the foreign colleagues and make new connection at the international meeting and via new international projects. During the evaluation period, BMC SAS researchers participated in 7 H2020 projects, 2 7FP projects, 9 ERA-NET projects and 7 COST projects. These activities demonstrate an improved international cooperation. The list of actively cooperating partners is extensive, counting several tens of institutions (and even more when taking into account the EU consortia members). This fact is also evident from the authors' affiliations stated in the collaborative publications.

The international mobility of junior researchers is steadily increasing: during the evaluation period 13 young researchers entered the postdoc positions at institutes in other countries and more than 20 spent longer or shorter research stays abroad. The mobility-related activities were hampered in 2020 and 2021 by the pandemics, but are currently on the rise again.

8. Elaboration and implementation of the Strategic / Action plan

All recommendations of the evaluation panel (including those specifically targets to the BMC SAS institutes) served as a background and inspiration for the elaboration of the BMC SAS Development Strategy for the years 2017-2026. The Strategy includes the Implementation/Action Plan, which is thoroughly monitored and the progress is regularly presented to the Scientific Board members, to the academic community of the BMC SAS, to the members of the SAS Presidium during their visit at the BMC SAS and described within the Annual Reports of the BMC SAS.

Situation analysis of the personnel, projects and publications performed in 2017 together with the results of 2016 assessment by the evaluation panel served as a background for the following strategic goals and implementation plan (fully implemented tasks are designated with ✓✓ and partially implemented tasks with ✓)

STRATEGIC GOALS

- Enhance research quality and reach leading position in biomedical research in Slovakia
- Improve national and international visibility and reputation
- Increase transfer of knowledge and serve society
- Secure sustainability and foster progressive development

IMPLEMENTATION PLAN

Actions to enhance research quality and reach leading position in biomedical research in Slovakia:

- Consolidate the BMC's structure and functioning trough re-design of research departments, core facilities and supporting units, elaborate internal selection criteria for leading positions ✓✓
- Reduce research fragmentation via formation of larger research groups focusing on progressive core research topics, improve quality and impact of research outputs ✓
- Build specialized units required for up-to-date fundamental and translational biomedical research, including Laboratory of Bioinformatics and Research Clinic ✓✓
- Elaborate internal rules for recruitment and personal development based on equal opportunity ethics ✓
- Elaborate principles and profile of staffing and introduce systematization of research and supporting positions, maintain balance in development of BMC's institutes, while allowing promotion of best performing research groups ✓✓
- Elaborate principles for admission and incorporation of new partners into BMC's structure and functioning in order to generate an added value effect ✓
- Develop incentives based on regular evaluation of individual researchers and research teams using criteria approved by the Scientific Board of the BMC SAS ✓✓
- Promote career of the best performing researchers, support applications for academic degrees, memberships, nominations for awards and honors, create internal awards and recognitions ✓✓
- Promote career of starting young researchers and elaborate carrier path plans.
- Elaborate internal selection criteria for supervision of PhD students and for PhD students themselves, in order to increase quality of scientific education of future young researchers ✓
- Establish Board of Young Researchers advising BMC's management on career development, research focus and working conditions of PhD students, postdocs and young research fellows, on award of internal projects, mobility and nominations ✓
- Establish External Scientific Advisory Board of world-recognized experts and cooperate with them in key aspects of evaluation and decision-making towards promotion of excellence ✓

Actions to improve national and international visibility and reputation:

- Expand cooperation with national and foreign academic, clinical, public, governmental and/or industrial partners supported by new common projects, collaboration agreements, MoUs and support letters ✓
- Identify and refresh contacts with international alumni and where possible strengthen mutual communication and/or cooperation.
- Submit increasing number of prestigious projects and fellowship applications, increase quality of submissions, and reduce weakly funded (non-profitable) projects ✓✓
- Dedicate a part of BMC's budget to young-researchers' committed internal projects and travel grants for workshops, courses or fellowships in order to boost skills, education, fellowships and mobility ✓
- Improve operation of BMC's Editorial offices, increase quality and access of edited journals and establish editorial and publishing house of BMC SAS ✓
- Increase relationships and collaborations with relevant national and international foundations, professional networks, consortia and societies ✓
- Actively participate in the Alliance4Life consortium ✓✓
- Increase recognition via introduction and frequent updating of highly informative web page, PR activities, create position of PR manager, improve communications with media and public presentations of BMC' research activities ✓✓
- Generate visual identity of BMC SAS and consistently use insignia of BMC SAS and its institutes (logo and defined visual components) in all presentations at national and international events ✓
- Advertise BMC SAS and its institutes at all relevant occasions to research community, expert and lay public ✓✓

Actions to increase transfer of knowledge and serve society:

- Upgrade IP protection and licensing strategy and elaborate rules for invention development and transfer to practice supported by internal documents and forms, introduce systematic use of Material transfer agreement when providing specific research reagents upon request and protect pre-existing know-how in all project applications with external partners ✓✓
- Elaborate rules for spin-off activities, and support establishment of spin-off companies.
- Establish and drive the first Slovak Centre of Obesity Management as a lead model in Slovakia. ✓
- Enlarge spectrum of specialized applied research services to clinics, commercial partners and public ✓
- Increase engagement in teaching and education at universities and secondary schools, intensify active reactions to actual healthcare problems by providing advises and expert opinions to public through media or web page ✓

- Strengthen the role of BMC as an external PhD education institution by new partnerships with relevant faculties/universities ✓
- Develop and introduce system of attracting both domestic and foreign undergraduate and PhD students to BMC's research topics ✓
- Design education and training program for PhD students based on EC Principles for Innovative Doctoral Training, offer acquisition of diverse technical skills and experiences through rotation across departments and/or core facilities, and participation in workshops and courses at BMC SAS.
- Increase recognition by legal and decision-making authorities through active participation in strategic bodies and advisory committees, and by providing expert opinions ✓✓

Actions to secure sustainability and foster progressive development:

- Elaborate internal documents and operational rules necessary for fluent transformation of the BMC SAS into Public Research Institution ✓✓
- Elaborate incentives motivating BMC's researchers to develop and sustain internal collaborations across BMC's research departments and research groups in order to foster collegiality, interdisciplinarity, internal relationships and common projects ✓
- Aid researchers in project submission, administration and implementation via support from project, economic and legal units, create positions of lab managers affiliated with research departments ✓✓
- Support sustainability and improve functioning of state-of-art core facilities serving both internal and external researchers and capable of performing contract research with commercial partners, through regular revision of used-against-total running time of machines and engagement of experts in core facilities, elaborate cost-model and rules for operation of core facilities and other special infrastructure and equipment in order to create reserve budget for machine services, repairs, and upgrading ✓
- Secure technical and financial sustainability and optimize economy by effective planning and flexible adjustment of income versus costs in the context of unstable national economic environment and unpredictable funding opportunities ✓
- Increase proportion of income from external sources, including research grants, research contracts and IP licensing ✓
- Regularly monitor performance and progress against the accomplishment of the above-described actions and against the trend of measurable progress indicators ✓✓
- Adjust and continuously update the strategic plan in collaboration with Allaince4Life and External Advisory Scientific Board in order to meet actual internal needs, respond to external conditions, and improve progress ✓

4. Research strategy and future development of the BMC SAS for the next five years

The research strategy of the BMC SAS development in the near future will follow up on the existing Strategic plan 2017-2026 and will include updates reflecting current status of our internal as well as external environment. The strategy is formed along three major areas – research governance, research agenda and research culture. Our experiences from the past supported by the Self-assessment report, a key deliverable of the Alliance4Life_ACTIONS project, have shown that there is a strong interconnection between these strategic areas and that the **competent governance and favourable institutional culture are inevitable prerequisites for excellent research**. In all efforts to implement the strategy, quality and professional attitudes are our absolute priorities.

Research governance

Research governance is an important component of the current research practice, especially in the environment that is administratively demanding and provides only limited resources. Huge administrative burden requires enormous time and energy particularly in the institution of our size. Highly bureaucratic attitudes of different authorities in external control processes often lead to delays that hamper implementation of the projects (mainly those subsidised by the Structural funds). Moreover, recent transformation to public research institution (PRI) has become very challenging with respect to legal, administrative and economic aspects. There have been many formal changes accompanied by a number of new rules and guidelines, new legal and managing relations to properties, contracts' updates etc. Moreover, all budgetary and personalistic data had to be transferred to a new database, expected budget flexibility did not come to reality, and due to the PRI legal form we lost full financing of the ESIF projects and have to contribute by 5% to the projects' financing from internal non-budgetary sources (with was partially supplemenetd by the SAS in relationship to costs covering equipments). These circumstances together with the strict public procurement rules and recently growing energy costs generate constant pressure on the maintenance of the cashflow and on the effective financing of the research activities and operational expenses. Thus, one of the **major strategic tasks is to address these challenges through well-informed and forward-looking decisions of the Management board**, supported by the professional opinions of the leading internal administration capacities, in line with the needs and visions of the researchers.

An important task for the future research governance is to **improve the administrative and technical support to researchers** in the complex implementation of their project agenda and in overall research activities. To this end, we will continue in building and stabilising qualified and dedicated supporting staff and providing its members with opportunities to attend specialized courses and workshops to develop their expert and soft skills.

Additional strategic issues of the research governance that will be addressed in the near future include the **management of human resources** oriented on selection of quality and supportive to the talented junior researchers and active middle-age researchers (as commented above in the section 3. Implementation of recommendations). One of the major tasks here is to develop **career path strategy** containing models of career plans for different types of employees. Moreover, **English language** will be implemented into all important internal documents and communications to facilitate the process of internalization. Concept of **service-oriented core facilities** is intended to be finally brought to practice in order to enable effective use and sustainability of the unique research infrastructure. The rules of management and operation, guidelines for evaluation, cost model and booking system are under preparation. Challenging aspects of the implementation of this CF concept reside on one hand in attraction of specialised personnel dedicated to career in expert service to researchers and on the other hand in ability to gain extra salary budget to support this personnel. So far, specialized facilities have been coordinated and/or operated by the leading researchers, which is not an optimal scenario as this activity is reducing time of their creative activities. In addition, our equipment is getting outdated (as explained below) and this is decreasing its attractiveness to external researchers and other potential customers.

In the following period, will also pay increased attention to **IP and technology transfer** aspects, through the formulation of TT strategy, identification of unique assets with commercial potential and education/training of researchers in this important topic. As a starting point, we are preparing a **catalogue of unique assets,** such as research tools, reagents, biological materials and specialised services that will become available to external subjects for licensing or research use. We expect that the catalogue will stimulate our tech transfer and collaborative research activities.

Finally, our key strategic goal is to continue in making **transparent, rational and fair decisions** and in **providing clear explanations of all critical undertakings** in order to keep our research governance reliable and trustworthy to the internal employees' community as well as to the external authorities.

Research agenda

Near-future agenda of research topics naturally reflects the latest developments in the portfolio of projects, composition of personnel, and active collaborations. Our aim is to **strengthen the existing research topics** and at the same time **open new research avenues**.

We intend to put major emphasis on the **leading research topics**, in which we demonstrated unique expertise, strong publication record, and which are supported by the significant national and/or international projects. They include the topics described in more detail in the section 2.1.8. with the research outputs listed among the most cited publications and pursued by the research teams that were most impactful during the past evaluation period.

Albeit we generally aim at a convergence of the research topics into strong basic pillars of our research agenda, we believe that it is also necessary to preserve the inherent research diversity, which is an important driver of new ideas. Therefore we will also maintain several traditional and **sustainable topics** that show potential for progressive development as judged according to the impact of their outputs, acquisition of reasonable funding and attraction/stabilisation of young researchers. Finally, we will support **emerging research topics** pursued by young talented researchers coming either from internal environment or returning from their postdoc stays at renowned foreign institutions.

Since the BMC SAS establishment, the **academic freedom** to follow new research ideas and submit project proposals has been fully respected, providing the ideas and proposals generally fit into or expand the main research interests of the institution towards interdisciplinarity. We intend to apply this principle also in the future. This will allow our scientists to examine their original ideas and gain preliminary data supporting or excluding new research directions. An **innovative research** will thus be promoted only when based on solid rationale and strong preliminary evidence.

In addition to basic research, we will strongly encourage **translational and clinical research activities** as well as the **applied research activities with societal impact**. Recent experiences from the COVID-19 pandemics have shown that the applied research can play a key role in the readiness of the society to respond to health crisis. In these activities, we will fully support the cooperation with healthcare authorities and relevant partners from clinical practice and industry.

Our strategic decisions and subsequent success of the research efforts are strongly affected by **generally poor availability of the research infrastructure at (or near to) the contemporary technological level**. Inability to verify research hypotheses using advanced instruments represents one of the major barriers that we have been facing over past years due to the long-lasting deficiency of investments into the update or replenishment of the infrastructure. This is particularly painful for the Bratislava district, which is not approved to use the EU structural funds for new research equipment. In addition, there are principally no other reasonable national resources available for the sustainability and acquisition of the infrastructure (with minor exceptions, such as in case of COVID-19 APVV projects and project of the Ministry of Health, which have been discontinued since 2020). One possibility, which we are constantly trying to explore, is being offered by the participation in the international projects, particularly large EU projects. However, a chronic absence of the stable national resources makes our endeavours in this direction much less competitive.

As a part of the **sustainability strategy**, the BMC SAS scientists have made very strong efforts to obtain national funds for their research as well as for the operational costs of the institution. These efforts have had a relatively high success rate, resulting in elevated number of projects. In addition, we have been performing contractual research as well as the research triggered by the needs of the society. This is on one hand a good sign of the expertise and motivation. On the other hand, too many project activities take too much implementation time, often on expense of the creative research outputs. Therefore, one of the key strategic questions that will still require thorough discussions both internally and with the ISAB is **how to balance creative research, economic sustainability and societal implications** especially within our underfunded and over bureaucratic R&D system**.** However, in this respect the international projects and strategic cooperation with clinics and industry will always represent clear benefits and will receive our priority.

Research culture

Quality of research culture provides a basic framework to all processes and interpersonal relations within the institution and to a large extent determines its interactions with the external environment. Therefore, a key strategic task for the future is to **continuously improve our internal research culture through strong adherence to the principles of fairness, openness and equal opportunities**. In an internal anonymous survey accomplished in late 2020 we learned, that the BMC SAS employees value research freedom, good communication at each professional level, collegiate trust and workplace wellbeing. These values are achievable only when behaving in line with the rules of research ethics and integrity. Our experiences from the past period suggest that it is too late to refer to these principles after the rules are

violated (although it is very important to have in place the guidelines how to solve the situation). Therefore, we will focus on prevention through regular training seminars to our academic community.

Additional aspect of the internal institutional environment that we consider of utmost importance is a **cultivation of mutual respect, empathy, generosity, and belonging** both in human and professional terms.

The central factor that determines the quality of institutional environment and culture of research in a scientific institution is **the scientist,** his/her personality, erudition, talent, passion, willingness to work beyond working hours and sacrifice part of the personal life to scientific research, ability to share the knowledge and skills with colleagues. and students, to align personal ambitions with the interests of the scientific team and the institution, and in all things to maintain humanity, legality and a critical view of one's own abilities, results and actions. The set of these qualities is rare and the researchers of the BMC SAS, who are their bearers, do have and will have our support. We believe that **it is very important for the institutional culture to be in favor of those who create lasting values for the institution** not only with their results, but also with their attitudes, behaviour and external representation.

Institutional culture is primarily a relational phenomenon that depends on the way of management and communication in which we are in favor of the transparency of operating rules, clearly defined intentions and expectations, responsibility and consistency. It is a phenomenon that is largely perceived subjectively, from the perspective of the interests of the individual or the group. However, a good institutional culture should also shape and develop individual and group interests so that they do not overshadow the interest in the good and well-being of the institution and the entire Slovak Academy of Sciences. This attitude will be actively enhanced through meetings, seminars, joint events and participation in SAS activities allowing for information and emotion sharing, open discussions, better knowledge and closer cooperation. We consider further cultivation of such an institutional culture to be our key strategic mission for the following period.

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