Questionnaire
Summary of the main activities of a research institute of the Slovak Academy of Sciences

Period: January 1, 2012 - December 31, 2015

1. Basic information on the institute:

1.1. Legal name and address

Institute for Clinical and Translational Research

Biomedical Research Centre

Slovak Academy of Sciences

Dúbravská cesta 9

84505 Bratislava

Slovakia

(Formerly: Centre for Molecular Medicine, Slovak Academy of Sciences, Vlárska 3-7, 83101 Bratislava, Slovakia)

1.2. URL of the institute web site

http://www.mmc.sav.sk

1.3. Executive body of the institute and its composition

Directoriat	Name	Age	Years in the position
Director	Miroslav Vlček	36	2015 -
	Peter Celec	36	2013-2015
	Richard Imrich	38	2007-2013
Deputy director	Richard Imrich	38	2015 -
Scientific secretary	N/A		

1.4. Head of the Scientific Board

Richard Imrich, MUDr., DrSc.

1.5. Basic information on the research personnel

1.5.1. Number of employees with university degrees (PhD students included) engaged in research projects, their full time equivalent work capacity (FTE) in 2012, 2013, 2014, 2015, and average number of employees in the assessment period

	2012		2013		2014		2015		total		
	number	FTE	number	FTE	number	FTE	number	FTE	number	averaged number per year	averaged FTE
Number of employees with university degrees	20,0	7,520	18,0	6,900	21,0	12,870	24,0	17,310	**83,0**	**20,8**	**11,150**
Number of PhD students	4,0	0,000	0,0	0,000	11,0	0,000	7,0	0,000	**22,0**	**5,5**	**0,000**
Total number	24,0	7,520	18,0	6,900	32,0	12,870	31,0	17,310	**105,0**	**26,3**	**11,150**

ICTR is regular scientific institute since 2014, thus PhD study was not accredited at ICTR. However, our employees are supervisors of PhD students registered at other institutes.

1.5.2. Institute units/departments and their FTE employees with university degrees engaged in research and development

Research staff	2012		2013		2014		2015		average	
	No.	FTE	No.	FTE	No.	FTE	No.	FTE	No.	FTE
Institute in whole	20,0	7,520	18,0	6,900	21,0	12,870	24,0	17,310	**20,8**	**11,150**
Cytoanalytical Section	1,0	0,270	1,0	0,270	1,0	1,000	1,0	1,000	**1,0**	**0,635**
Genomics Section	2,0	0,060	2,0	0,060	2,0	0,060	0,0	0,000	**1,5**	**0,045**
Proteomics Section	5,0	2,060	5,0	2,060	6,0	2,520	1,0	0,840	**4,3**	**1,870**
Department of Molecular Physiology and Genetics	2,0	0,220	2,0	0,220	1,0	0,220	12,0	6,780	**4,3**	**1,860**
Clinical Research Department	10,0	4,910	8,0	4,290	11,0	9,070	10,0	8,690	**9,8**	**6,740**

1.6. Basic information on the funding of the institute

Institutional salary budget and others salary budget

Salary budget	2012	2013	2014	2015	average
Institutional Salary budget *[thousands of EUR]*	71,000	81,000	165,000	175,000	**123,000**
Other Salary budget *[thousands of EUR]*	70,000	59,000	4,000	105,000	**59,500**

1.7. Mission Statement of the Institute as presented in the Foundation Charter

- Basic and translational research in the field of molecular medicine and biomedicine including: understanding of processes during illness, elucidation of pathogenesis at cellular and molecular level
- Transfer of knowledge into clinical praxis (diagnosis, prevention and treatment of diseases) leading to improved healthcare
- Realization of interdisciplinary projects in the field of molecular medicine and biomedical technologies
- Operation of unique technologies for cooperating SAS institutes
- Education, research and development in collaboration with universities
- Consulting services

1.8. Summary of R&D activity pursued by the institute during the assessment period in both national and international contexts, (recommended 5 pages, max. 10 pages)

The research activity of the institute was divided into several topics, based on the organisation structure, with slight changes during evaluated period due to changes in the institute structure. We have tried to focus on most important diseases for human population. Thus a great effort was spend in the research of cancer and cardiovascular diseases the two most common causes of mortality in our population. An important part of research was aimed to development of new diagnostic methods, which may be used in the future for rapid, simple and precise diagnosis of various diseases.

Cancer research

The research in this field composes an important part of the institute research output.

Carbonic anhydrase IX is an important enzyme for tumor growth. It is mainly present on cell surface in hypoxic solid tumors and has role in the cell proliferation. The research is aimed at the role of this enzyme in tumor growth. We showed several mechanisms by which this enzyme is important for the growth and the spreading of tumor. Also the possibilities of changing the expression were evaluated with the potential usage for the cancer treatment.

Projects:

1. Complex approach to the investigation of cell migration and invasion in 2D and 3D environment with quantitative output. VEGA 2/0129/11.
2. Study of molecular mechanisms of carbonic anhydrase IX regulation and significance of its expression in colorectal cancer. VEGA 2/0152/12.
3. Characterization of transport pathways of CA IX in tumor cells via real-time analysis. VEGA 2/0081/14.

Publications:

DITTE, Zuzana - DITTE, Peter - LABUDOVÁ, Martina - ŠIMKO, Veronika - JULIANO, Filippo - ZAŤOVIČOVÁ, Miriam - CSÁDEROVÁ, Lucia - PASTOREKOVÁ, Silvia - PASTOREK, Jaromír. Carnosine inhibits carbonic anhydrase IX-mediated extracellular acidosis and suppresses growth of HeLa tumor xenografts. In *BMC Cancer*, 2014, vol. 14, no. 1, p. 358-370. (3.319 - IF2013). (2014 - Current Contents). ISSN 1471-2407.

JANKOVIČOVÁ, B. - ŠKULTÉTY, Ľudovít - DUBROVČÁKOVÁ, Mária - STERN, Martin - BILKOVÁ, Z. - LAKOTA, Ján. Overlap of epitopes recognized by anti-carbonic anhydrase I IgG in patients with malignancy-related aplastic anemia-like syndrome and in patients with aplastic anemia. In *Immunology Letters*, 2013, vol. 153, no. 1-2, p. 47-49. (2.337 - IF2012). (2013 - Current Contents). ISSN 0165-2478.

RADVÁK, Peter - REPIČ, Anna - ŠVASTOVÁ, Eliška - TAKÁČOVÁ, Martina - CSÁDEROVÁ, Lucia - STRNAD, H. - PASTOREK, Jaromír - PASTOREKOVÁ, Silvia - KOPÁČEK, Juraj. Suppression of carbonic anhydrase IX leads to aberrant focal adhesion and decreased invasion of tumor cells. In *Oncology Reports*, 2013, vol. 29, no. 3, p. 1147-1153. (2.297 - IF2012). (2013 - Current Contents). ISSN 1021-335X.

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. (4.773 - IF2011). (2012 - Current Contents). ISSN 0021-9258.

TAKÁČOVÁ, Martina - BULLOVÁ, Petra - ŠIMKO, Veronika - ŠKVARKOVÁ, Lucia - POTURNAJOVÁ, M. - FEKETEOVÁ, L. - BABÁL, P. - KIVELA, A.J. - KUOPIO, T. - KOPÁČEK, Juraj - PASTOREK, Jaromír - PARKKILA, S. - PASTOREKOVÁ, Silvia.

Expression Pattern of Carbonic Anhydrase IX in MedullaryThyroid Carcinoma Supports a Role for RET-MediatedActivation of the HIF Pathway. In *American Journal of Pathology*, 2014, vol. 184, no.4, p. 953-965. (4.602 - IF2013). (2014 - Current Contents). ISSN 0002-9440.

Other approach to possible cancer treatment is the induction of apoptosis. Normally defect cell undergo process of apoptosis and die, this mechanism is not functional in tumor cell, allowing them uncontrolled proliferation. Our research is aimed at activation of apoptotic process by various stimuli and study of the involved pathways. One of promising pathways seems to be sulphide signalling in connection with intracellular calcium metabolism. The results of this research have potential implication in improved cancer treatment.

Projects:

1. Sulphide signalling as a potential mechanism in tumor´s treatment. APVV-14-0351.
2. Induction of apoptosis through IP3 receptors modulation in tumor cells. VEGA 2/0074/13.
3. Role of the Na/Ca exchanger in tumor diseases, the potential modulation of the selected transmitter. VEGA 2/0095/13.

Publications:

KRIŽANOVÁ, Oľga - STELIAROVÁ, Iveta - CSÁDEROVÁ, Lucia - PASTOREK, Michal - HUDECOVÁ, Soňa. Capsaicin induces apoptosis in PC12 cells through ER stress. In *Oncology Reports*, 2014, vol. 31, no. 2, p. 581-588. (2.191 - IF2013). (2014 - Current Contents). ISSN 1021-335X.

LENČEŠOVÁ, Ľubomíra - HUDECOVÁ, Soňa - CSÁDEROVÁ, Lucia - MARKOVÁ, Jana - ŠOLTÝSOVÁ, Andrea - PASTOREK, Michal - SEDLÁK, Ján - WOOD, M.E. - WHITEMAN, Mathew - ONDRIAŠ, Karol - KRIŽANOVÁ, Oľga. Sulphide signalling potentiates apoptosis through the up-regulation of IP3 receptors types 1 and 2. In *Acta Physiologica : official journal of the Federation of European Physiological Societies*, 2013, vol. 208, no. 4, p. 350-361. (4.382 - IF2012). (2013 - Current Contents). ISSN 1748-1708.

PACAK, K. - ŠÍROVÁ, Marta - GIUBELLINO, A - LENČEŠOVÁ, Ľubomíra - CSÁDEROVÁ, Lucia - LAUKOVÁ, Marcela - HUDECOVÁ, Soňa - KRIŽANOVÁ, Oľga. NF-κB inhibition significantly upregulates the norepinephrine transporter system, causes apoptosis in pheochromocytoma cell lines and prevents metastasis in an animal model. In *International Journal of Cancer*, 2012, vol. 31, no. 10, p. 2445-2455. (5.444 - IF2011). (2012 - Current Contents). ISSN 0020-7136.

PASTOREK, Michal - ŠIMKO, Veronika - TAKÁČOVÁ, Martina - BARÁTHOVÁ, Monika - BARTOŠOVÁ, Mária - HUNÁKOVÁ, Ľubica - SEDLÁKOVÁ, Oľga - HUDECOVÁ, Soňa - KRIŽANOVÁ, Oľga - DEQUIEDT, F. - PASTOREKOVÁ, Silvia - SEDLÁK, Ján. Sulforaphane reduces molecular response to hypoxia in ovarian tumor cells independently of their resistance to chemotherapy. In *International Journal of Oncology*, 2015, vol. 47, no. 1, p. 51-60. (3.025 - IF2014). (2015 - Current Contents). ISSN 1019-6439.

ŠOLTYSOVÁ, A. - BREZA, J. - TAKÁČOVÁ, Martina - FERUSZOVÁ, J. - HUDECOVÁ, S. - NOVOTNÁ, B. - ROZBORILOVÁ, E. - PASTOREKOVÁ, Silvia - KÁDAŠI, Ľudevít - KRIŽANOVÁ, Oľga. Deregulation of energetic metabolism in the clear cell renal cell carcinoma: A multiple pathway analysis based on microarray profiling. In *International Journal of Oncology*, 2015, vol. 47, no. 1, p. 287-295. (3.025 - IF2014). (2015 - Current Contents). ISSN 1019-6439

Cardiovascular diseases

Another important area of our interest is cardiovascular diseases research.

Activity in this field was aimed at the presence of insulin resistance in patients with hypertension and its possible role in the pathogenesis of primary hypertension. This has implication in treatment as well as in prevention of hypertension connected with diabetes, metabolic syndrome and obesity.

Publications:

GARAFOVÁ, Alexandra - PENESOVÁ, Adela - ČIŽMÁROVÁ, E. - MARKO, Andrea - VLČEK, Miroslav - JEŽOVÁ, Daniela. Cardiovascular and sympathetic responses to a mental stress task in young patients with hypertension and/or Obesity. In *Physiological Research*, 2014, vol. 63, suppl. 4, p. S459-S467. (1.487 - IF2013). (2014 - Current Contents). ISSN 0862-8408.

PENESOVÁ, Adela - KOŠKA, Juraj - ORTEGA, Emilio - BUNT, J. C. - BOGARDUS, C. - DE COURTEN, Barbora. Salsalate has no effect on insulin secretion but decreases insulin clearance: A randomized, placebo-controlled trial in subjects without diabetes. In *Diabetes obesity & metabolism*, 2015, vol. 17, no. 6, p. 608-612. (6.360 - IF2014). (2015 - Current Contents). ISSN 1462-8902.

The other part of research in this field is coping with role of H2S and NO signalling in the regulation of cardiovascular system, particularly blood pressure. Hydrogen sulphide and nitric oxide are important gaseous mediators serving for intercellular communication. Both substances are potent vasorelaxants, which dysregulation may have potential role in development of human hypertension.

Projects:

1. Influence of H2S and NO interaction products on membrane channels. VEGA 2/0050/13.

Publications:

BERÉNYIOVÁ, Andrea - GRMAN, Marián - MIJUSKOVIC, A. - STAŠKO, Andrej - MIŠÁK, Anton - NAGY, Peter - ONDRIAŠOVÁ, Elena - ČAČÁNYIOVÁ, Soňa - BREZOVÁ, Vlasta - FEELISCH, Martin - ONDRIAŠ, Karol. The reaction products of sulfide and S-nitrosoglutathione are potent vasorelaxants. In *Nitric Oxide : Biology and Chemistry*, 2015, vol. 46, p. 123-130. (3.521 - IF2014). (2015 - Current Contents). ISSN 1089-8603.

CORTESE-KROTT, Miriam M. - KUHNLE, Gunter G.C. - DYSON, Alex - FERNANDEZ, Bernadette O. - GRMAN, Marián - DUMOND, Jenna F. - BARROW, Mark p. - MCLEOD, George - NAKAGAWA, Hidehiko - ONDRIAŠ, Karol - NAGY, Péter - KING, Bruce S. - SAAVEDRA, Joseph E. - KEEFER, Larry K. - SINGER, Mervyn - KELM, Malte - BUTLER, Anthony - FEELISCH, Martin. Key bioactive reaction products of the NO/H2S interaction are S/N-hybrid species, polysulfides and nitroxyl. In *Proceedings of the National Academy of Sciences of the United States of America*, 2015, vol. 112, iss. 34, p. E4651-E4660. (9.674 - IF2014). (2015 - Current Contents). ISSN 0027-8424.

DROBNÁ, Magdaléna - MIŠÁK, Anton - HOLLAND, T. - KRISTEK, František - GRMAN, Marián - TOMÁŠOVÁ, Lenka - BERÉNYIOVÁ, Andrea - ČAČÁNYIOVÁ, Soňa - ONDRIAŠ, Karol. Captopril partially decreases the effect of H2S on rat blood pressure and inhibits H2S-induced nitric oxide release from S-nitrosoglutathione. In *Physiological Research*, 2015, vol. 64, p. 479-486. (1.293 - IF2014). (2015 - Current Contents). ISSN 0862-8408.

TOMÁŠOVÁ, Lenka - PAVLOVIČOVÁ, Michaela - MÁLEKOVÁ, Ľubica - MIŠÁK, Anton - KRISTEK, František - GRMAN, Marián - ČAČÁNYIOVÁ, Soňa - TOMÁŠEK, Milan - TOMÁŠKOVÁ, Zuzana - PERRY, Alexis - WOOD, Mark E. - LACINOVÁ, Ľubica - ONDRIAŠ, Karol - WHITEMAN, Mathew. Effects of AP39, a novel triphenylphosphonium derivatised anethole dithiolethione hydrogen sulfide donor, on rat haemodynamic parameters and chloride and calcium Ca(v)3 and RyR2 channels. In

Nitric Oxide : Biology and Chemistry, 2015, vol. 46, p. 131-144. (3.521 - IF2014). (2015 - Current Contents). ISSN 1089-8603.

Rheumatoid arthritis

The research was focused on genetic markers of disease development and diseases severity. The first part was genotyping of selected patients and healthy volunteers, followed by study of cellular mechanisms in connection with genome. A part of the research was coping also with role of hormonal regulation of immune system, now in connection with genes involved in regulation of steroid production.

Projects:

1. RASGENAS (Rheumatoid arthritis susceptibility genes in Austrian and Slovak population), Programme of cross-borded cooperation Slovakia – Austria / ATMOS N00024
2. Diagnostics of socially important disorders in Slovakia based on modern biotechnologies. ITMS 26240220058.
3. Functional Consequences of C1858T Polymorphism in PTPN22 Gene on T cell differentiation: A Bioinformatic Approach. VEGA 2/0018/12.

Publications:

IMRICH, Richard - VLČEK, Miroslav - KERLIK, Jana - VOGESER, M. - KIRCHHOFF, F. - PENESOVÁ, Adela - RÁDIKOVÁ, Žofia - LUKAC, J. - ROVENSKÝ, Jozef. Determinants of adrenal androgen hypofunction in premenopausal females with rheumatoid arthritis. In *Physiological Research*, 2014, vol. 63, no. 3, p. 321-329. (1.487 - IF2013). (2014 - Current Contents). ISSN 0862-8408.

MRAVCOVÁ, Martina - CHOVANOVÁ, Lucia - PAULIKOVA, L. - VLČEK, Miroslav - ROVENSKÝ, Jozef - KILLINGER, Z. - WENDL, J. - IMRICH, Richard. Genetics of neuroendocrine factors in rheumatoid arthritis. In *Hormone and Metabolic research*, 2015, vol. 47, no. 6, p. 411-417. (2.121 - IF2014). (2015 - Current Contents). ISSN 0018-5043.

PENESOVÁ, Adela - RÁDIKOVÁ, Žofia - VLČEK, Miroslav - KERLIK, Jana - LUKÁČ, J. - ROVENSKÝ, Jozef - IMRICH, Richard. Chronic inflammation and low-dose glucocorticoid effects on glucose metabolism in premenopausal females with rheumatoid arthritis free of conventional metabolic risk factors. In *Physiological Research*, 2013, vol. 62, no. 1, p. 75-83. (1.531 - IF2012). (2013 - Current Contents). ISSN 0862-8408.

CHOVANOVÁ, Lucia - VLČEK, Miroslav - KRŠKOVÁ, Katarína - PENESOVÁ, Adela - RÁDIKOVÁ, Žofia - ROVENSKÝ, Jozef - CHOLUJOVÁ, Dana - SEDLÁK, Ján - IMRICH, Richard. Increased production of IL-6 and IL-17 in lipopolysaccharide-stimulated peripheral mononuclears from patients with rheumatoid arthritis. In *General Physiology and Biophysics*, 2013, vol. 32, no. 3, p. 395-404. (0.852 - IF2012). (2013 - Current Contents, WOS, SCOPUS). ISSN 0231-5882.

Preeclampsia

Fetal DNA is a DNA form a foetus which is present in the blood of the mother during pregnacy. One possible usage of this type of DNA is for diagnosis of fetal DNA abberations without need for amniocentesis. It also seems that fetal DNA is connected with disease preeclampsia, serious problem in pregnant woman. Our research is aimed at the elucidation of fetal DNA role in this process, mainly if the elevation is occurring after the start of the disease, thus serving as diagnostic marker, or if the fetal DNA elevation could be primary problem afterwards causing the preeclampsia.

Publications:

KONEČNÁ, Barbora - VLKOVÁ, Barbora - CELEC, Peter. Role of fetal DNA in preeclampsia. In *International Journal of Molecular Medicine*, 2015, vol. 35, no. 2, p. 299-304. (2.088 - IF2014). (2015 - Current Contents). ISSN 1107-3756.

VLKOVÁ, Barbora - TURŇA, Ján - CELEC, Peter. Fetal DNA in maternal plasma in preeclamptic pregnancies. In *Hypertension in Pregnancy*, 2015, vol. 34, no. 1, p. 36-49. (1.407 - IF2014). (2015 - Current Contents). ISSN 1064-1955.

KONEČNÁ, Barbora - BORBÉLYOVÁ, Veronika - CELEC, Peter - VLKOVÁ, Barbora. Does rat fetal DNA induce preeclampsia in pregnant rats? In *Journal of Developmental Origins of Health and Disease*, 2015, vol. 6, no. 1, p. 5-9. (0.750 - IF2014). ISSN 2040-1744.

Genetic disorders

Our research was focused on several diseases like alkaptonuria, myotonic dystrophy and diabetes in which the change of genetic information play a crucial role. The approach was mainly DNA sequencing of samples obtained from patients in collaboration with clinicians. Several new mutations were discovered and the sequencing was also used for genetic diagnosis of patients.

Projects:

1. FP7 Health: Clinical Development of Nitisinone for Alkaptonuria. HEALTH-F5-2012-304985
2. Study of selected genes potential role in molecular pathogenesis of myotonic dystrophy. VEGA 2/0115/15.

Publications:

STANÍK, Juraj - DUSATKOVA, P. - CINEK, O. - VALENTÍNOVÁ, Lucia - HUČKOVÁ, Miroslava - ŠKOPKOVÁ, Martina - DUSATKOVA, Lenka - STANÍKOVÁ, Daniela - PURA, M. - KLIMEŠ, Iwar - LEBL, Ján - GAŠPERÍKOVÁ, Daniela - PRUHOVA, S. De novo mutations of GCK, HNF1A and HNF4A may be more frequent in MODY than previously assumed. In *Diabetologia : clinical and Experimental Diabetes and Metabolism*, 2014, vol. 57, no. 3, p. 480-484. (6.880 - IF2013). (2014 - Current Contents). ISSN 0012-186X.

VARGA, Lukáš - MAŠINDOVÁ, I. - HUČKOVÁ, Miroslava - KABÁTOVÁ, Z. - GAŠPERÍKOVÁ, Daniela - KLIMEŠ, Iwar - PROFANT, M. Prevalence of DFNB1 mutations among cochlear implant users in Slovakia and its clinical implications. In *European Archives of Oto-Rhino-Laryngology*, 2014, vol. 271, no. 6, p. 1401-1407. (1.608 - IF2013). (2014 - Current Contents). ISSN 0937-4477.

MAŠINDOVÁ, I. - ŠOLTÝSOVÁ, Andrea - VARGA, Lukáš - MÁTYÁS, Petra - FICEK, Andrej - HUČKOVÁ, Miloslava - SŮROVÁ, Martina - ŠAFKA-BROŽKOVÁ, Dana - ANWAR, Salma - BENE, Judith - STRAKA, Slavomír - JANICSEK, Ingrid - AHMED, Zubair M. - SEEMAN, Pavel - MELEGH, B. - PROFANT, Milan - KLIMEŠ, Iwar - RIAZUDDIN, Saima - KÁDAŠI, Ľudevít - GAŠPERÍKOVÁ, Daniela. MARVELD2 (DFNB49) Mutations in the Hearing Impaired Central European Roma Population - Prevalence, Clinical Impact and the Common Origin. In *PLoS ONE*, 2015, vol. 10, iss. 4, article number: e0124232. (3.234 - IF2014). ISSN 1932-6203.

VALENTÍNOVÁ, Lucia - BEER, N. L. - STANÍK, Juraj - TRIBBLE, N. D. - VAN DE BUNT, M. - HUČKOVÁ, Miroslava - BARRETT, Anthony A. - KLIMEŠ, Iwar - GAŠPERÍKOVÁ, Daniela - GLOYN, A. L. Identification and functional characterisation of novel glucokinase mutations causing maturity-onset diabetes of the young in Slovakia. In *PLoS ONE*, 2012, vol. 7, no. 4, p. e34541. (4.092 - IF2011). (2012 - MEDLINE). ISSN 1932-6203.

Disease diagnosis

This field included several approaches.

The first is mass spectrometry analysis of proteome. The research in this area use method of mass spectrometry for analysis of proteins in various biological samples. The main advantage is a broad spectrum of measured substances in relatively small sample size. The main results useful for diseases diagnostic included include proteome changes in

patients with aplastic anemia, detection of allergic proteins in wheat grain related to celiac disease and asthma. However a part of the activity was also used for measurement of changes in proteome of soybean in conditions like flooding or radiation.

Publications:

KLUBICOVÁ, Katarína - DANCHENKO, Maksym - ŠKULTÉTY, Ľudovít - BEREZHNA, Valentyna V. - RASHYDOV, N.M. - HAJDUCH, Martin. Radioactive Chernobyl Environment Has Produced High-Oil Flax Seeds That Show Proteome Alterations Related to Carbon Metabolism during Seed Development. In *Journal of Proteome Research*, 2013, vol. 12, no. 11, p. 4799-4806. (5.056 - IF2012). (2013 - Current Contents). ISSN 1535-3893.

NANJO, Y. - ŠKULTÉTY, Ľudovít - UVÁČKOVÁ, Ľubica - KLUBICOVÁ, Katarína - HAJDUCH, Martin - KOMATSU, S. Mass spectrometry-based analysis of proteomic changes in the root tips of flooded soybean seedlings. In *Journal of Proteome Research*, 2012, vol. 11, no.1, p. 372-385. (5.113 - IF2011). (2012 - Current Contents). ISSN 1535-3893.

UVÁČKOVÁ, Ľubica - ŠKULTÉTY, Ľudovít - BEKEŠOVÁ, Slávka - MCCLAIN, S. - HAJDUCH, Martin. MS(E) Based Multiplex Protein Analysis Quantified Important Allergenic Proteins and Detected Relevant Peptides Carrying Known Epitopes in Wheat Grain Extracts. In *Journal of Proteome Research*, 2013, vol. 12, no..11, p. 4862-4869. (5.056 - IF2012). (2013 - Current Contents). ISSN 1535-3893.

UVÁČKOVÁ, Ľubica - ŠKULTÉTY, Ľudovít - BEKEŠOVÁ, Slávka - MCCLAIN, S. - HAJDUCH, Martin. The MS(E) - proteomic analysis of gliadins and glutenins in wheat grain identifies and quantifies proteins associated with celiac disease and baker's asthma. In *Journal of Proteomics*, 2013, vol. 93, p. 65-73. (4.088 - IF2012). (2013 - Current Contents). ISSN 1874-3919.

The other approach was measurement of disease bio-markers in human saliva. Saliva samples could be used for non-invasive diagnosis and monitoring of various diseases. Our research was focused on selection and measurement of bio-markers in diseases like multiple sclerosis, kindney failure, etc. Markers of oxidative stress are one group of such bio-markers which correlate with the presence of multiple sclerosis.

Projects:

1. Early molecular markers of myocardial infarction. VEGA 2/0105/15.

Publications:

BAŇASOVÁ, Lenka - KAMODYOVÁ, Natália - JANŠÁKOVÁ, Katarína - TÓTHOVÁ, Ľubomíra - STANKO, Peter - TURŇA, Ján - CELEC, Peter. Salivary DNA and markers of oxidative stress in patients with chronic periodontitis. In *Clinical Oral Investigations*, 2015, vol. 19, no. 2, p. 201-207. (2.352 - IF2014). (2015 - Current Contents). ISSN 1432-6981.

CELEC, Peter - TÓTHOVÁ, Ľubomíra - ŠEBEKOVÁ, Katarína - PODRACKÁ, Ľudmila - BOOR, Peter. Salivary markers of kidney function - Potentials and limitations. In *Clinica chimica acta*, 2015, vol. 453, p. 28-37. (2.824 - IF2014). (2015 - Current Contents). ISSN 0009-8981.

KARLÍK, Martin - VALKOVIČ, Peter - HANČINOVÁ, Viera - KRÍŽOVÁ, Lucia - TÓTHOVÁ, Ľubomíra - CELEC, Peter. Markers of oxidative stress in plasma and saliva in patients with multiple sclerosis. In *Clinical Biochemistry*, 2015, vol. 48, no. 1-2, p. 24-28. (2.275 - IF2014). (2015 - Current Contents). ISSN 0009-9120.

KAMODYOVÁ, Natália - BAŇASOVÁ, Lenka - JANŠÁKOVÁ, Katarína - KOBOROVÁ, Ivana - TÓTHOVÁ, Ľubomíra - STANKO, Peter - CELEC, Peter. Blood Contamination in Saliva: Impact on the Measurement of Salivary Oxidative Stress Markers. In *Disease Markers*, 2015, article number 479251. (1.562 - IF2014). ISSN 0278-0240.

TÓTHOVÁ, Ľubomíra - KAMODYOVÁ, Natália - ČERVENKA, Tomáš - CELEC, Peter. Salivary markers of oxidative stress in oral diseases. In *Frontiers in Cellular and Infection Microbiology / Front. Cell. Infect. Microbiol. : Specialty Journal of Frontiers in Microbiology*,

2015, vol. 5, article number 73. (3.719 - IF2014). ISSN 2235-2988 (el).

To successfully perform research in our fields of interests the ICTR obtained several grants from national as well as from international funding agencies. The most important were: one FP7 grant, one Cross-border cooperation funding and two EU structural funding grants. This funding was used mainly to obtain new infrastructure as well as to cover consumables and to cover salary of research staff. The list of projects is in the part 2.4 of the questionare.

We tried to publish our results mainly in high quality scientific journals with higher impact factor. The majority of our papers were published in such journals as could be seen in other parts of questionnaire, where the scientific output is listed. One of our weaknesses is that our Institute was the youngest scientific institution of SAS. The first papers come out in the year 2009, thus the responses (number of citations) to our papers are still behind the parameters achieved by other well-established SAS institutions.

In national context our institute is becoming a recognizable part of SAS. We have several important collaborations including Comenius University (Faculty of Medicine, Faculty of Natural Sciences), Slovak Medical University, National Institute of Rheumatic Diseases, National Cancer Institute and other SAS institutes.

In international context our Institute is relatively small to be compared with similar institutions in Europe. However we have established a good international collaboration with several important research institutes based mainly on the previous research interests of individual members of the Institute (NIH, Bethesda USA; Brno, Czech Republic; Exeter, UK; Oregon, USA; AKH Vienna, AT; etc.).

In the first years of ICTR existence our role was specialised service institution for partner istitutes (Institute of experimental endocrinology, Institute of experimental oncology, Institute of virology, Institute of molecular physiology and genetics) so there exist a great overlap of research topics with those institutes. Later we have profiled as institute with its own research themes. At the end of 2015 we joined newly formed organisation Biomedical Research Centre composed of: Institute of experimental endocrinology, Institute of experimental oncology, Institute of virology and our Institute.

After the turbulent era of the Institute in 2014 and 2015 when major changes in management and structure occurred we hope that from now on, we will better fulfil our mission.

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 (ratios in percentage)

basic research 80% - applied research 20 %

international 80% - national 20%

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 average number of employees with university degrees engaged in research projects. The principal research outputs (max. 5, including Digital Object Identifier - DOI) should be underlined

1. BÁBÍČKOVÁ, Janka - BORBÉLYOVÁ, Veronika - TÓTHOVÁ, Ľubomíra - KUBIŠOVÁ, Katarína - JANEGA, Pavol - HODOSY, Július - CELEC, Peter. The Renal Effects of Prenatal Testosterone in Rats. In *Journal of Urology*, 2015, vol. 193, no. 5, p. 1700-1708. (**4.471 - IF2014**). (2015 - Current Contents). ISSN 0022-5347.

2. KLUBICOVÁ, Katarína - DANCHENKO, Maksym - ŠKULTÉTY, Ľudovít - BEREZHNA, Valentyna V. - RASHYDOV, N.M. - HAJDUCH, Martin. Radioactive Chernobyl Environment Has Produced High-Oil Flax Seeds That Show Proteome Alterations Related to Carbon Metabolism during Seed Development. In *Journal of Proteome Research*, 2013, vol. 12, no. 11, p. 4799-4806. (**5.056 - IF2012**). (2013 - Current Contents). ISSN 1535-3893.
3. LENČEŠOVÁ, Ľubomíra - HUDECOVÁ, Soňa - CSÁDEROVÁ, Lucia - MARKOVÁ, Jana - ŠOLTÝSOVÁ, Andrea - PASTOREK, Michal - SEDLÁK, Ján - WOOD, M.E. - WHITEMAN, Mathew - ONDRIAŠ, Karol - KRIŽANOVÁ, Oľga. Sulphide signalling potentiates apoptosis through the up-regulation of IP3 receptors types 1 and 2. In *Acta Physiologica : official journal of the Federation of European Physiological Societies*, 2013, vol. 208, no. 4, p. 350-361. (**4.382 - IF2012**). (2013 - Current Contents). ISSN 1748-1708. DOI: 10.1111/apha.12105
4. NANJO, Y. - ŠKULTÉTY, Ľudovít - UVÁČKOVÁ, Ľubica - KLUBICOVÁ, Katarína - HAJDUCH, Martin - KOMATSU, S. Mass spectrometry-based analysis of proteomic changes in the root tips of flooded soybean seedlings. In *Journal of Proteome Research*, 2012, vol. 11, no.1, p. 372-385. (**5.113 - IF2011**). (2012 - Current Contents). ISSN 1535-3893.
5. PACAK, K. - ŠÍROVÁ, Marta - GIUBELLINO, A - LENČEŠOVÁ, Ľubomíra - CSÁDEROVÁ, Lucia - LAUKOVÁ, Marcela - HUDECOVÁ, Soňa - KRIŽANOVÁ, Oľga. NF-κB inhibition significantly upregulates the norepinephrine transporter system, causes apoptosis in pheochromocytoma cell lines and prevents metastasis in an animal model. In *International Journal of Cancer*, 2012, vol. 31, no. 10, p. 2445-2455. (**5.444 - IF2011**). (2012 - Current Contents). ISSN 0020-7136. DOI: 10.1002/ijc.27524
6. PENESOVÁ, Adela - KOŠKA, Juraj - ORTEGA, Emilio - BUNT, J. C. - BOGARDUS, C. - DE COURTEN, Barbora. Salsalate has no effect on insulin secretion but decreases insulin clearance: A randomized, placebo-controlled trial in subjects without diabetes. In *Diabetes obesity & metabolism*, 2015, vol. 17, no. 6, p. 608-612. (**6.360 - IF2014**). (2015 - Current Contents). ISSN 1462-8902.
7. STANÍK, Juraj - DUSATKOVA, P. - CINEK, O. - VALENTÍNOVÁ, Lucia - HUČKOVÁ, Miroslava - ŠKOPKOVÁ, Martina - DUSATKOVA, Lenka - STANÍKOVÁ, Daniela - PURA, M. - KLIMEŠ, Iwar - LEBL, Ján - GAŠPERÍKOVÁ, Daniela - PRUHOVA, S. De novo mutations of GCK, HNF1A and HNF4A may be more frequent in MODY than previously assumed. In *Diabetologia : clinical and Experimental Diabetes and Metabolism*, 2014, vol. 57, no. 3, p. 480-484. (**6.880 - IF2013**). (2014 - Current Contents). ISSN 0012-186X.
8. 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. (**4.773 - IF2011**). (2012 - Current Contents). ISSN 0021-9258.
9. TAKÁČOVÁ, Martina - BULLOVÁ, Petra - ŠIMKO, Veronika - ŠKVARKOVÁ, Lucia - POTURNAJOVÁ, M. - FEKETEOVÁ, L. - BABÁL, P. - KIVELA, A.J. - KUOPIO, T. - KOPÁČEK, Juraj - PASTOREK, Jaromír - PARKKILA, S. - PASTOREKOVÁ, Silvia. Expression Pattern of Carbonic Anhydrase IX in MedullaryThyroid Carcinoma S upports a Role for RET-MediatedActivation of the HIF Pathway. In *American Journal of Pathology*, 2014, vol. 184, no.4, p. 953-965. (**4.602 - IF2013**). (2014 - Current Contents). ISSN 0002-9440.
10. UVÁČKOVÁ, Ľubica - ŠKULTÉTY, Ľudovít - BEKEŠOVÁ, Slávka - MCCLAIN, S. - HAJDUCH, Martin. MS(E) Based Multiplex Protein Analysis Quantified Important Allergenic Proteins and Detected Relevant Peptides Carrying Known Epitopes in Wheat Grain Extracts. In *Journal of Proteome Research*, 2013, vol.

12, no..11, p. 4862-4869. (**5.056 - IF2012**). (2013 - Current Contents). ISSN 1535-3893. DOI: 10.1021/pr400336f

11. UVÁČKOVÁ, Ľubica - ŠKULTÉTY, Ľudovít - BEKEŠOVÁ, Slávka - MCCLAIN, S. - HAJDUCH, Martin. The MS(E) - proteomic analysis of gliadins and glutenins in wheat grain identifies and quantifies proteins associated with celiac disease and baker's asthma. In *Journal of Proteomics*, 2013, vol. 93, p. 65-73. (**4.088 - IF2012**). (2013 - Current Contents). ISSN 1874-3919.
12. KLUBICOVÁ, Katarína - DANCHENKO, Maksym - ŠKULTÉTY, Ľudovít - BEREZHNA, V.V. - UVÁČKOVÁ, Ľubica - RASHYDOV, N.M. - HAJDUCH, Martin. Soybeans grown in the Chernobyl area produce fertile seeds that have increased heavy metal resistance and modified. In *PLoS ONE*, 2012, vol. 7, no. 10, p.e 48169 - 11. (**4.092 - IF2011**). (2012 - MEDLINE). ISSN 1932-6203.
13. VALENTÍNOVÁ, Lucia - BEER, N. L. - STANÍK, Juraj - TRIBBLE, N. D. - VAN DE BUNT, M. - HUČKOVÁ, Miroslava - BARRETT, Anthony A. - KLIMEŠ, Iwar - GAŠPERÍKOVÁ, Daniela - GLOYN, A. L. Identification and functional characterisation of novel glucokinase mutations causing maturity-onset diabetes of the young in Slovakia. In *PLoS ONE*, 2012, vol. 7, no. 4, p. e34541. (**4.092 - IF2011**). (2012 - MEDLINE). ISSN 1932-6203.
14. BERÉNYIOVÁ, Andrea - GRMAN, Marián - MIJUSKOVIC, A. - STAŠKO, Andrej - MIŠÁK, Anton - NAGY, Peter - ONDRIAŠOVÁ, Elena - ČAČÁNYIOVÁ, Soňa - BREZOVÁ, Vlasta - FEELISCH, Martin - ONDRIAŠ, Karol. The reaction products of sulfide and S-nitrosoglutathione are potent vasorelaxants. In *Nitric Oxide : Biology and Chemistry*, 2015, vol. 46, p. 123-130. (**3.521 - IF2014**). (2015 - Current Contents). ISSN 1089-8603.
15. DITTE, Zuzana - DITTE, Peter - LABUDOVÁ, Martina - ŠIMKO, Veronika - JULIANO, Filippo - ZAŤOVIČOVÁ, Miriam - CSÁDEROVÁ, Lucia - PASTOREKOVÁ, Silvia - PASTOREK, Jaromír. Carnosine inhibits carbonic anhydrase IX-mediated extracellular acidosis and suppresses growth of HeLa tumor xenografts. In *BMC Cancer*, 2014, vol. 14, no. 1, p. 358-370. (**3.319 - IF2013**). (2014 - Current Contents). ISSN 1471-2407.
16. PASTOREK, Michal - ŠIMKO, Veronika - TAKÁČOVÁ, Martina - BARÁTHOVÁ, Monika - BARTOŠOVÁ, Mária - HUNÁKOVÁ, Ľubica - SEDLÁKOVÁ, Oľga - HUDECOVÁ, Soňa - KRIŽANOVÁ, Oľga - DEQUIEDT, F. - PASTOREKOVÁ, Silvia - SEDLÁK, Ján. Sulforaphane reduces molecular response to hypoxia in ovarian tumor cells independently of their resistance to chemotherapy. In *International Journal of Oncology*, 2015, vol. 47, no. 1, p. 51-60. (**3.025 - IF2014**). (2015 - Current Contents). ISSN 1019-6439.
17. ŠOLTYSOVÁ, A. - BREZA, J. - TAKÁČOVÁ, Martina - FERUSZOVÁ, J. - HUDECOVÁ, S. - NOVOTNÁ, B. - ROZBORILOVÁ, E. - PASTOREKOVÁ, Silvia - KÁDAŠI, Ľudevít - KRIŽANOVÁ, Oľga. Deregulation of energetic metabolism in the clear cell renal cell carcinoma: A multiple pathway analysis based on microarray profiling. In *International Journal of Oncology*, 2015, vol. 47, no. 1, p. 287-295. (**3.025 - IF2014**). (2015 - Current Contents). ISSN 1019-6439. DOI: 10.3892/ijo.2015.3014
18. TOMÁŠOVÁ, Lenka - PAVLOVIČOVÁ, Michaela - MÁLEKOVÁ, Ľubica - MIŠÁK, Anton - KRISTEK, František - GRMAN, Marián - ČAČÁNYIOVÁ, Soňa - TOMÁŠEK, Milan - TOMÁŠKOVÁ, Zuzana - PERRY, Alexis - WOOD, Mark E. - LACINOVÁ, Ľubica - ONDRIAŠ, Karol - WHITEMAN, Mathew. Effects of AP39, a novel triphenylphosphonium derivatised anethole dithiolethione hydrogen sulfide donor, on rat haemodynamic parameters and chloride and calcium Ca(v)3 and RyR2 channels. In *Nitric Oxide : Biology and Chemistry*, 2015, vol. 46, p. 131-144. (**3.521 - IF2014**). (2015 - Current Contents). ISSN 1089-8603.
19. CELEC, Peter - OSTATNÍKOVÁ, Daniela - HODOSY, Július. On the effects of testosterone on brain behavioral functions. In *Frontiers in Neuroscience*, 2015, vol. 9, article number 12. (**3.656 - IF2014**). ISSN 1662-453X.
20. MAŠINDOVÁ, I. - ŠOLTÝSOVÁ, Andrea - VARGA, Lukáš - MÁTYÁS, Petra - FICEK, Andrej - HUČKOVÁ, Miloslava - SŮROVÁ, Martina - ŠAFKA-BROŽKOVÁ, Dana - ANWAR, Salma - BENE, Judith - STRAKA, Slavomír -

JANICSEK, Ingrid - AHMED, Zubair M. - SEEMAN, Pavel - MELEGH, B. - PROFANT, Milan - KLIMEŠ, Iwar - RIAZUDDIN, Saima - KÁDAŠI, Ľudevít - GAŠPERÍKOVÁ, Daniela. MARVELD2 (DFNB49) Mutations in the Hearing Impaired Central European Roma Population - Prevalence, Clinical Impact and the Common Origin. In *PLoS ONE*, 2015, vol. 10, iss. 4, article number: e0124232. (**3.234 - IF2014**). ISSN 1932-6203.

21. TÓTHOVÁ, Ľubomíra - KAMODYOVÁ, Natália - ČERVENKA, Tomáš - CELEC, Peter. Salivary markers of oxidative stress in oral diseases. In *Frontiers in Cellular and Infection Microbiology / Front. Cell. Infect. Microbiol. : Specialty Journal of Frontiers in Microbiology*, 2015, vol. 5, article number 73. (**3.719 - IF2014**). ISSN 2235-2988 doi: 10.3389/fcimb.2015.00073
22. IMRICH, Richard - ALEVIZOS, I. - BEBRIS, L. - GOLDSTEIN, D. S. - HOLMES, C.S. - ILLEI, G. - NIKOLOV, N. P. Predominant Glandular Cholinergic Dysautonomia in Patients With Primary Sjögren's Syndrome. In *Arthritis and Rheumatology*, 2015, vol. 67, no. 5, p. 1345-1352. ISSN 2326-5205.

2.1.3 List of monographs/books published abroad

0

2.1.4. List of monographs/books published in Slovakia

0

2.1.5. List of other scientific outputs specifically important for the institute, max. 10 items

1. CORTESE-KROTT, Miriam M. - KUHNLE, Gunter G.C. - DYSON, Alex - FERNANDEZ, Bernadette O. - GRMAN, Marián - DUMOND, Jenna F. - BARROW, Mark p. - MCLEOD, George - NAKAGAWA, Hidehiko - ONDRIAŠ, Karol - NAGY, Péter - KING, Bruce S. - SAAVEDRA, Joseph E. - KEEFER, Larry K. - SINGER, Mervyn - KELM, Malte - BUTLER, Anthony - FEELISCH, Martin. Key bioactive reaction products of the NO/H2S interaction are S/N-hybrid species, polysulfides and nitroxyl. In *Proceedings of the National Academy of Sciences of the United States of America*, 2015, vol. 112, iss. 34, p. E4651-E4660. (**9.674 - IF2014**). (2015 - Current Contents).
2. CELEC, Peter - MUCSKA, Imrich - HODOSY, Július. Oxidative Stress in Sleep Apnea. In *Modulation of Sleep by Obesity, Diabetes, Age, and Diet*. - Academic Press, 2014, p. 303-309. ISBN 978-012420168-2.
3. CSÁDEROVÁ, Lucia - DEBREOVÁ, M. - RADVÁK, Peter - STANO, Matej - VREŠTIAKOVÁ, Magdaléna - KOPÁČEK, Juraj - PASTOREKOVÁ, Silvia - ŠVASTOVÁ, Eliška. The effect of carbonic anhydrase IX on focal contacts during cell spreading and migration. In *Frontiers in Physiology*, 2013, vol. 4, no. 271, p. 1-12. (2013 - SCOPUS). ISSN 1664-042X.
4. BAJER, Boris - VLČEK, Miroslav - GÁLUSOVÁ, Andrea - IMRICH, Richard - PENESOVÁ, Adela. Exercise associated hormonal signals as powerful determinants of an effective fat mass loss. In *Endocrine Regulations*, 2015, vol. 49, no. 3, p. 151-163. ISSN 1210-0668.
5. ROVENSKÝ, Jozef - URBÁNEK, Tibor - IMRICH, Richard. Alkaptonuria and ochronosis-experience from Slovakia. In *Acta Facultatis Pharmaceuticae Universitatis Comenianae*, 2014, vol. 61, no. 1, p. 29-35. ISSN 0301-2298.

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

0

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

0

2.1.8. Table of research outputs (as in annual reports).

Papers from international collaborations in large-scale scientific projects (Dwarf team, ALICE Collaboration, ATLAS collaboration, CD Collaboration, H1 Collaboration, HADES Collaboration, and STAR Collaboration) have to be listed separately.

Scientific publications	2012			2013			2014			2015			total			
	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	averaged number per year	av. No. / FTE	av. No. / salary budget
Scientific monographs and monographic studies in journals and proceedings published abroad *(AAA, ABA)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Scientific monographs and monographic studies in journals and proceedings published in Slovakia *(AAB, ABB)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Chapters in scientific monographs published abroad *(ABC)*	0,0	0,000	0,000	0,0	0,000	0,000	1,0	0,078	0,006	0,0	0,000	0,000	**1,0**	**0,3**	**0,022**	**0,002**
Chapters in scientific monographs published in Slovakia *(ABD)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	1,0	0,058	0,006	**1,0**	**0,3**	**0,022**	**0,002**
Scientific papers published in journals registered in Current Contents Connect *(ADCA, ADCB, ADDA, ADDB)*	5,0	0,665	0,070	12,0	1,739	0,148	11,0	0,855	0,067	23,0	1,329	0,131	**51,0**	**12,8**	**1,143**	**0,104**
Scientific papers published in journals registered in Web of Science Core Collection and SCOPUS *(ADMA, ADMB, ADNA, ADNB)*	5,0	0,665	0,070	3,0	0,435	0,037	1,0	0,078	0,006	11,0	0,635	0,063	**20,0**	**5,0**	**0,448**	**0,041**
Scientific papers published in other foreign journals (not listed above) *(ADEA, ADEB)*	0,0	0,000	0,000	1,0	0,145	0,012	0,0	0,000	0,000	1,0	0,058	0,006	**2,0**	**0,5**	**0,045**	**0,004**
Scientific papers published in other domestic journals (not listed above) *(ADFA, ADFB)*	1,0	0,133	0,014	1,0	0,145	0,012	0,0	0,000	0,000	1,0	0,058	0,006	**3,0**	**0,8**	**0,067**	**0,006**
Scientific papers published in foreign peer-reviewed proceedings *(AEC, AECA)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Scientific papers published in domestic peer-reviewed proceedings *(AED, AEDA)*	0,0	0,000	0,000	0,0	0,000	0,000	4,0	0,311	0,024	0,0	0,000	0,000	**4,0**	**1,0**	**0,090**	**0,008**
Published papers (full text) from foreign and international scientific conferences *(AFA, AFC, AFBA, AFDA)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Published papers (full text) from domestic scientific conferences *(AFB, AFD, AFBB, AFDB)*	0,0	0,000	0,000	0,0	0,000	0,000	2,0	0,155	0,012	0,0	0,000	0,000	**2,0**	**0,5**	**0,045**	**0,004**

- **Supplementary information and/or comments on the scientific outputs of the institute.**

  It is important to mention that in the first years ICTR was specialised service institution and the staff was shared with other institutions. Scientist working in ICTR have personally much more papers published, however with affiliations of other institutes. ICTR is regular scientific institute from 2014.
  Moreover, in May 2015 several top researchers decide to join ICTR exclusively, unfortunately we could not account their previous papers due to affiliation to their previous institute, however we could expect high number of papers in the following years (Križanová 172 papers in WOS, Ondriáš 115 papers in WOS, Kádaši 93 papers in WOS)

2.2. Responses to the research outputs (citations, etc.)

2.2.1. Table with citations per annum.

Citations of papers from international collaborations in large-scale scientific projects (Dwarf team, ALICE Collaboration, ATLAS collaboration, CD Collaboration, H1 Collaboration, HADES Collaboration, and STAR Collaboration) have to be listed separately.

Citations, reviews	2011		2012		2013		2014		total		
	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	averaged number per year	av. No. / FTE
Citations in Web of Science Core Collection (1.1, 2.1)	21,0	2,793	37,0	5,362	56,0	4,351	71,0	4,102	**185,0**	**46,3**	**4,148**
Citations in SCOPUS (1.2, 2.2) if not listed above	2,0	0,266	8,0	1,159	19,0	1,476	15,0	0,867	**44,0**	**11,0**	**0,987**
Citations in other citation indexes and databases (not listed above) (3.2,4.2,9,10)	0,0	0,000	0,0	0,000	1,0	0,078	1,0	0,058	**2,0**	**0,5**	**0,045**
Other citations (not listed above) (3, 4, 3.1, 4.1)	0,0	0,000	0,0	0,000	0,0	0,000	0,0	0,000	**0,0**	**0,0**	**0,000**
Reviews (5,6)	0,0	0,000	0,0	0,000	0,0	0,000	0,0	0,000	**0,0**	**0,0**	**0,000**

2.2.2. List of 10 most-cited publications, with number of citations, in the assessment period (2011 – 2014).

1. ZAŤOVIČOVÁ, Miriam - JELENSKÁ, Lenka - HULÍKOVÁ, Alžbeta - CSÁDEROVÁ, Lucia - DITTE, Zuzana - DITTE, Peter - GOLIAŠOVÁ, Terézia - PASTOREK, Jaromír - PASTOREKOVÁ, Silvia. Carbonic anhydrase IX as an anticancer therapy target: preclinical evaluation of internalizing monoclonal antibody directed to catalytic domain. In *Current Pharmaceutical Design*, 2010, vol. 16, no. 29, p. 3255 - 3263. (4.414 - IF2009). (2010 - Current Contents). ISSN 1381-6128. **27 citations**
2. 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. (4.773 - IF2011). (2012 - Current Contents). ISSN 0021-9258. **20 citations**
3. NANJO, Y. - ŠKULTÉTY, Ľudovít - ASHRAF, Y. - KOMATSU, S. Comparative proteomic analysis of early-stage soybean seedling responses to flooding by using gel and gel-free techniques. In *Journal of Proteome Research*, 2010, vol. 6, no. 8, p. 3989 - 4002. (5.132 - IF2009). (2010 - Current Contents). ISSN 1535-3893. **15 citations**
4. DANCHENKO, Maksym - ŠKULTÉTY, Ľudovít - RASHYDOV, Namik M. - BEREZHNA, Valentyna V. - MÁTEL, Ľubomír - SALAJ, Terézia - PREŤOVÁ, Anna - HAJDUCH, Martin. Proteomic analysis of mature soybean seeds from the Chernobyl area suggests plant adaptation to the contaminated environment. In *Journal of Proteome Research*, 2009, vol. 8, no. 6, p. 2915-2922. (5.684 - IF2008). (2009 - Current Contents). ISSN 1535-3893. **13 citations**
5. NANJO, Y. - ŠKULTÉTY, Ľudovít - UVÁČKOVÁ, Ľubica - KLUBICOVÁ, Katarína - HAJDUCH, Martin - KOMATSU, S. Mass spectrometry-based analysis of proteomic changes in the root tips of flooded soybean seedlings. In *Journal of Proteome Research*, 2012, vol. 11, no.1, p. 372-385. (5.113 - IF2011). (2012 - Current Contents). ISSN 1535-3893. **12 citations**
6. TAKÁČOVÁ, Martina - BARTOŠOVÁ, Mária - ŠKVARKOVÁ, Lucia - ZAŤOVIČOVÁ, Miriam - VIDLIČKOVÁ, Ivana - CSÁDEROVÁ, Lucia - BARÁTHOVÁ, Monika - BREZA, J. - BUJDÁK, P. - PASTOREK, Jaromír - BREZA, Juraj - PASTOREKOVÁ, Silvia. Carbonic anhydrase IX is a clinically significant tissue and serum biomarker associated with renal cell carcinoma. In *Oncology Letters*, 2013, vol. 5, no. 1, p. 191-197. (0.237 - IF2012). ISSN 1792-1074. **10 citations**
7. DITTE, Peter - DEQUIEDT, F. - ŠVASTOVÁ, Eliška - HULÍKOVÁ, Alžbeta - OHRAĎANOVÁ, Anna - ZAŤOVIČOVÁ, Miriam - CSÁDEROVÁ, Lucia - KOPÁČEK, Juraj - SUPURAN, C.T. - PASTOREKOVÁ, Silvia - PASTOREK, Jaromír. Phosphorylation of carbonic anhydrase IX controls its ability to mediate extracellular acidification in hypoxic tumors. In *Cancer Research*, 2011, vol. 71, no. 24, p. 7558 - 7567. (8.234 - IF2010). (2011 - Current Contents). ISSN 0008-5472. **8 citations**
8. KLUBICOVÁ, Katarína - DANCHENKO, Maksym - ŠKULTÉTY, Ľudovít - MIERNYK, J.A. - RASHYDOV, N.M. - BEREZHNA, V.V. - PREŤOVÁ, Anna - HAJDUCH, Martin. Proteomics analysis of flax grown in Chernobyl area suggests limited effect of contaminated environment on seed proteome. In *Environmental Science and Technology*, 2010, vol. 44, no. 18, p. 6940-6946. (4.630 - IF2009). (2010 - Current Contents). ISSN 0013-936X. **8 citations**
9. KERLIK, Jana - PENESOVÁ, Adela - VLČEK, Miroslav - IMRICH, Richard - VOGESER, M. - RÁDIKOVÁ, Žofia. Comparison of salivary cortisol and calculated free plasma cortisol during low-dose ACTH test in healthy

subjects. In *Clinical Biochemistry*, 2010, vol. 43, no. 43, p. 764-767. (2.019 - IF2009). ISSN 0009-9120. **7 citations**

10. TOMÁŠKOVÁ, Zuzana - ONDRIAŠ, Karol. Mitochondrial chloride channels - What are they for? In *FEBS Letters*, 2010, vol. 584, no. 10, p. 2085-2092. (3.541 - IF2009). (2010 - Current Contents). ISSN 0014-5793. **7 citations**

2.2.3. List of most-cited authors from the Institute (at most 10 % of the research employees with university degree engaged in research projects) and their number of citations in the assessment period (2011– 2014).

Lucia Csáderová – 86 citations

Ľudovít Škultéty – 69 citations

Richard Imrich – 42 citations

- **Supplementary information and/or comments on responses to the scientific output of the institute.**

The number of citations is highly influenced by the short existence of the Institute. The ICTR was established in 2007 with first papers coming out in 2009. We could see clear trend of citations increase (23-45-76-87) and with increasing number of papers we could expect this number will rise in forthcoming years.

Also important to mention is that in the first years ICTR was specialised service institution and the staff was shared with other institutions. The scientist working in ICTR have personally much more citations, however with affiliations of other institutes (Imrich 719 citations in WOS, Škultéty 548 citations in WOS, Csáderová 297 citations in WOS). ICTR is regular scientific institute from 2014. In May 2015 several top researchers decide to join ICTR exclusively, unfortunately we could not account their citations due to the affiliation of previous institute, however we could expect high number of citations in next years (Križanová 1520 citations in WOS, Ondriáš 2800 citations in WOS, Kádaši 1285 citations in WOS).

2.3. Research status of the institute in international and national contexts

- **International/European position of the institute**

2.3.1. List of the most important research activities demonstrating the international relevance of the research performed by the institute, incl. major projects (details of projects should be supplied under Indicator 2.4). Max. 10 items.

1. Project RASGENAS (Rheumatoid Arthritis Susceptibility Genes in Austrian and Slovak Population) implemented in years 2009-2012. This international project was funded through Programme of cross-border cooperation Slovakia – Austria 2007-2013. The aims of the project were to establish cross-border collaboration in the field of rheumatoid arthritis research and from scientific point of view to assess influence of genetic factors on pathogenesis of rheumatoid arthritis.
2. Clinical and Laboratory Evaluation of the Autonomic Nervous System in Primary Sjogren's Syndrome. The co-operation with NIDCR/NIH USA during years 2008-2012 was targeted at evaluation of changes in autonomic nervous system in patients with Sjogren`s syndrome.
3. FP7 Health: Clinical Development of Nitisinone for Alkaptonuria. The project of 7^{th} Framework Programme of EC. The project started in 2012, our institute is implementing the project as one of the partners from 2015. The project is aimed at new treatment of disease alkaptonuria, which has unexpectedly high incidence in Slovakia. Our task is mainly sequencing of DNA samples from patients.

4. FP7-IDEAS, ERC Starting Grant, Electrochemical LEctin and glycan biochips integrated with NAnostructures. Our institute participate in this project as service provider with main task to collect samples from patients and healthy volunteers.

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

1. 2nd Molecular and Translational Medicine Conference, 26th June 2012, Bratislava, 40 participants

2.3.3. List of edited proceedings from international scientific conferences.

0

2.3.4. List of journals edited/published by the institute:

2.3.4.1. WOS (IF of journals in each year of the assessment period)

2.3.4.2. SCOPUS

2.3.4.3. other databases

2.3.4.4. not included in databases

- **National position of the institute**

2.3.5. List of selected projects of national importance

2.3.6. Projects of the Slovak Research and Development Agency (APVV)

4. Sulphide signalling as a potential mechanism in tumor´s treatment. APVV-14-0351. Project is aimed at the function of H2S in tumor growth.

2.3.7. Projects of the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA)

4. Complex approach to the investigation of cell migration and invasion in 2D and 3D environment with quantitative output. VEGA 2/0129/11. 2011-2013
5. Study of molecular mechanisms of carbonic anhydrase IX regulation and significance of its expression in colorectal cancer. VEGA 2/0152/12. 2012-2015
6. Functional Consequences of C1858T Polymorphism in PTPN22 Gene on T cell differentiation: A Bioinformatic Approach. VEGA 2/0018/12. 2012-2015
7. Characterization of transport pathways of CA IX in tumor cells via real-time analysis. VEGA 2/0081/14. 2014-2017
8. Early molecular markers of myocardial infarction. VEGA 2/0105/15. 2015-2017
9. Induction of apoptosis through IP3 receptors modulation in tumor cells. VEGA 2/0074/13. 2013-2015
10. Role of the Na/Ca exchanger in tumor diseases, the potential modulation of the selected transmitter. VEGA 2/0095/13. 2013-2015
11. Influence of H2S and NO interaction products on membrane channels. VEGA 2/0050/13. 2013-2016
12. Study of selected genes potential role in molecular pathogenesis of myotonic dystrophy. VEGA 2/0115/15. 2015-2017

2.3.8. Projects of SAS Centres of Excellence

0

2.3.9. National projects supported by EU Structural Funds

1. Establishment of competence centre for research and development in the field of molecular medicine. ITMS 26240220071. 2011-2015. Project partner
2. Diagnostics of socially important disorders in Slovakia based on modern biotechnologies. ITMS 26240220058. 2010-2013. Project partner.

2.3.10. List of journals (published only in the Slovak language) edited/published by the institute:

2.3.10.1. WOS (IF of journals in each year of the assessment period)

2.3.10.2. SCOPUS

2.3.10.3. Other databases

2.3.10.4. Not included in databases

- **Position of individual researchers in an international context**

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

ŠVASTOVÁ, Eliška - CSÁDEROVÁ, Lucia - WITARSKI, Wojciech - HULÍKOVÁ, Alžbeta - ZAŤOVIČOVÁ, Miriam - BARÁTHOVÁ, Monika - ŠKVARKOVÁ, Lucia - KOPÁČEK, Juraj - PASTOREK, Jaromír - PASTOREKOVÁ, Silvia. The role of CA IX in cell migration and invasion. The 9th International Conference on Carbonic Anhydrase (CA). Antalya, 2012

ŠIMKO, Veronika - LABUDOVÁ, Martina - CSÁDEROVÁ, Lucia - ZAŤOVIČOVÁ, Miriam - JULIANO, Filippo - DITTE, Zuzana - DITTE, Peter - PASTOREK, Jaromír. New aspects of the regulation of function of tumor Q associated carbonic anhydrase IX. In 1st ISCAM Meeting - 5th ISPDC Meeting - Cancer metabolism: mechanisms, consequences and therapeutic opportunities, Smolenice, 2014

IMRICH, Richard - VLČEK, Miroslav - PENESOVÁ, Adela - CHOVANOVÁ, Lucia. Rheumatoid arthritis: translating genetics to clinical care. In 79th Meeting of the Hungarian Physiological Society. - Szeged : SZTE ÁOK, 2015

KRIŽANOVÁ, Oľga. The role of Adrenergic Modulation in Tumor Growth. 11th Symposium on catecholamines and other neurotransmitters in stress., June 20-25. 2015

2.3.12. List of researchers who served as members of the organising and/or programme committees

KRIŽANOVÁ, Oľga – Executive Secretary - 11th symposium on catecholamines and other neurotransmitters in stress – Smolenice, 20-25 Jún, 2015

- **Position of individual researchers in a national context**

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

VLČEK, Miroslav. RA susceptibility genes in Slovak population. 2nd Molecular and translational medicine conference 2012, Bratislava, Slovensko, 26. jún 2012

CHOVANOVÁ, Lucia. Do different genetic backgrounds result in distinct peripheral lymphocyte phenotype in RA? 2nd Molecular and translational medicine conference 2012, Bratislava, Slovensko, 26. jún 2012

RADVÁNSZKY, Ján. Nové trendy v aplikácii princípov molekulárnej biológie do praxe. Laboratórna medicína 2015 - 17. ročník kongresu s medzinárodnou

účasťou. 27. – 28. november 2015, Hotel TURIEC, Martin. Blok: Inovácie: čo je nové – čo sa udialo za uplynulý rok

RADVÁNSZKY, Ján. Molekulárna cytogenetika. Laboratórna medicína 2015 - 17. ročník kongresu s medzinárodnou účasťou. 27. – 28. november 2015, Hotel TURIEC, Martin. Blok: Inovácie: čo je nové – čo sa udialo za uplynulý rok

PENESOVÁ, Adela - VLČEK, Miroslav - IMRICH, Richard. Inzulínová rezistencia a metabolický syndróm- rizikové faktory ICHS. Slovenská spoločnosť klinickej biochémie. Konferencia Martin 6.10.2014

PENESOVÁ, Adela. Inzulínová rezistencia a metabolický syndróm. Laboratórna medicína. 16. kongres s medzinárodnou účasťou. Martin 27.-30.11.2014

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

- **Supplementary information and/or comments documenting the international and national status of the Institute**

2.4. Tables of project structure, research grants and other funding resources

- **International projects and funding**

2.4.1. Major projects within the European Research Area and other important project – Framework Programmes of the EU, ERA-NET, European Science Foundation, NATO, COST, INTAS, etc. (here and in items below please specify: 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", investigator "I"),

	Project title	Typ / Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute / Responsible person
2012					
2013					
2014					
2015	Clinical Development of Nitisinone for Alkaptonuria.	FP7 Health, HEALTH-F5-2012-304985	11/2012-4/2018	5665	W - Andrea Zaťková

2.4.2. Other international projects, incl. total funding and funding for the institute

1. RASGENAS (Rheumatoid arthritis susceptibility genes in Austrian and Slovak population), Programme of cross-borded cooperation Slovakia – Austria / ATMOS N00024, 136909 € in 2012, project coordinator / Richard Imrich

2.4.3. Other important, international projects and collaborations without direct funding (max. 10 projects)

1. Electrochemical LEctin and glycan biochips integrated with NAnostructures (ELENA). FP7-IDEAS-ERC-SG-LS9, ERC Starting Grant, FP7-311532, 01/2013-12/2017, 99990€ for ICTR, service provider / Miroslav Vlcek

- **National projects and their funding**

2.4.4. Projects supported by the Slovak Research and Development Agency (APVV)

Role of the Institute e.g. coordinator “C”, investigator “I”.

	Project title	Typ / Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute / Responsible person
2012					
2013					
2014					
2015	Sulfide signaling as a potential mechanism in tumor´s treatment.	APVV-14-035	7/2015-6/2019	250000	C / Soňa Hudecová

ICTR was specialised service institution until 2014. We were able to receive APVV grants only from 2015. In 2016 we received 2 new APVV grants as coordinator.

2.4.5. Projects supported by the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA) for each year, and their funding

VEGA	2012	2013	2014	2015
Number	3	3	3	6
Funding in the year (EUR)	23893	26571	21548	24941

[1]

- **Summary of funding from external resources**

2.4.6. List of projects supported by EU Structural Funds

1. Establishment of competence centre for research and development in the field of molecular medicine. ITMS 26240220071. 2011-2015. Project partner
2. Diagnostics of socially important disorders in Slovakia based on modern biotechnologies. ITMS 26240220058. 2010-2013. Project partner.

[1] Excluding projects for the popularisation of science

2.4.7. Summary of external resources of the EU Structural Funds (ERDF/ESF)

Role of the Institute in the project, e.g. coordinator “C”, work package leader “W”, investigator “I”.

Year	Project title	Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute
2012	Diagnostics of socially important disorders in Slovakia, based on modern biotechnologies.	ITMS 26240220058	11/2010-1/2014	100000	W / Richard Imrich
	Establisment of competence center for research and development in the field of molecular medicine.	ITMS 26240220071	10/2011-10/2015	151678	W / Richard Imrich
2013					
2014					
2015					

External resources	2012	2013	2014	2015	total	average
External resources (milions of EUR)	0,137	0,065	0,078	0,174	**0,454**	**0,114**
External resources transfered to coooperating research institute (milions of EUR)	0,000	0,000	0,000	0,000	**0,000**	**0,000**

- **Supplementary information and/or comments on research projects and funding sources**

  The Institute was created in 2007 as a service institution and in the first years mainly personal and instrument infrastructure was build. In this process the two main projects were running: 1) project of Norway financial mechanism Development of Centre for molecular medicine 2008-2011 2) project RASGENAS.

  In the following years the main projects were EU structural funds, where our position were partner with own work package and national grants VEGA.

  Due to change from service organisation to scientific institution in 2014 we were able to receive national APVV grants only from 2015, when also our first project started. Two APVV grants were during 2015 registred under Institute of Virology. In 2016 we received 2 new APVV grants.

2.5. PhD studies and educational activities

2.5.1. List of accredited programmes of doctoral studies, period of validity

The institute did not have any accredited PhD programmes

2.5.2. Summary table on doctoral studies (number of internal/external PhD students; number of foreign PhD students, number of students who successfully completed their theses, number of PhD students who quit the programme*)*

PhD study	31.12.2012			31.12.2013			31.12.2014			31.12.2015		
Number of potential PhD supervisors	11			11			9			13		
PhD students	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted
Internal	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
External	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Other supervised by the research employees of the institute	4,0	0,0	0,0	0,0	0,0	0,0	11,0	0,0	0,0	7,0	0,0	0,0

2.5.3. Summary table on educational activities

Teaching	2012	2013	2014	2015
Lectures (hours/year)[2]	2	10	24	216
Practicum courses (hours/year)[2]	0	10	90	100
Supervised bachelor theses (in total)	0	0	0	0
Supervised diploma theses (in total)	5	1	18	13
Supervised PhD theses (in total)	4	0	11	7
Members in PhD committees (in total)	2	2	1	3
Members in DrSc. committees (in total)	0	0	0	2
Members in university/faculty councils (in total)	1	1	1	2
Members in habilitation/inauguration committees (in total)	0	0	0	2

2

2.5.4. List of published university textbooks

0

2.5.5. Number of published academic course books

0

[2] Do not include time spent with bachelor, diploma or PhD students during their supervising

2.5.6. List of joint research laboratories/facilities with universities

Institute of Molecular Biomedicine, Faculty of Medicine, Comenius University in Bratislava, Slovakia

Institute of Physiology, Faculty of Medicine, Comenius University in Bratislava, Slovakia

Institute of Pathological Physiology, Faculty of Medicine, Comenius University in Bratislava, Slovakia

Institute of Pathological Physiology, Faculty of Medicine, Slovak Medical University in Bratislava, Slovakia

Department of Molecular Biology, Faculty of Natural Sciences, Comenius University in Bratislava, Slovakia

Department of Animal Physiology and Ethology, Faculty of Natural Sciences, Comenius University in Bratislava, Slovakia

- **Supplementary information and/or comments on doctoral studies and educational activities**

Although the Institute did not have accredited PhD programmes, the staff of the institute was involved in education at universities and in PhD students' education. The supervisors present in ICTR teach PhD students, which were however registered at other institutions.

We have collaboration with several faculties at which our researchers give lectures and practicals.

2.6. Social impact

2.6.1. List of the most important results of applied research projects. Max. 10 items

1. ICTR has a long-standing collaboration with National Institute of Rheumatic Diseases in Piešťany. We co-operate in several projects aimed at rheumatoid arthritis (RA). One of the results is genetic panel for prediction of RA development, which also partially predict disease severity and activity. Today we are focused on prediction of response to treatment in RA.
2. In collaboration with Institute of Chemistry SAS and National Institute of Rheumatic Diseases we are involved in development of new method for diagnosis of various diseases (including rheumatic diseases) based on a lectin and glycan biochips.
3. Usage of saliva for diagnosis and monitoring of diseases. We design a method to assess various disease markers in human saliva (markers of oxidative stress, markers of kidney functions).

2.6.2. List of the most important studies commissioned for the decision-making authorities, the government and NGOs, international and foreign institutes

0

2.6.3. List of contracts and research projects with industrial and other commercial partners, incl. revenues

0

2.6.4. List of licences sold abroad and in Slovakia, incl. revenues

0

2.6.5. List of most important social discourses under the leadership or with significant participation of the institute (max. 10 items)

0

2.6.6. Summary of relevant activities, max. 300 words

2.7. Popularisation of Science (outreach activities)

2.7.1. List of the most important popularisation activities, max. 20 items

TV – Richard Imrich; Západoslovenská TV (West-Slovakia TV); 2012, 3 times; rheumatoid arthritis, project RASGENAS, MTM conference

Radio – Richard Imrich; Slovenský rozhlas (Slovak radio); 2012; rheumatoid arthritis, project RASGENAS

Press – Richard Imrich; Moja psychológia (My psychology); 2012; new treatment of rheumatoid arthritis

Press – Richard Imrich; Zdravotnícke noviny (Medical newspaper); 2012; therapy of rheumatoid arthritis

Press – Richard Imrich; Živnostenske noviny (Trader`s newspaper); 2012; RASGENAS project

Press – Boris Klempa; Plus jeden deň (daily newspaper); 2012; interview

Press – Richard Imrich; TASR (Slovak press agency); 2012; research of rheumatoid arthritis with British scientists

Internet – Richard Imrich;teraz.sk; 2012; research of rheumatoid arthritis with British scientists

TV – Boris Klempa; STV (Slovak television); 2012; documentary film for program Spectrum of science

TV – Roman Gardlík; Markíza TV; 2014, 2 times

TV – Ľubomíra Tóthová; Markíza TV; 2014

Press – Ľubomíra Tóthová; Život (weekly newspaper); 2014

TV – Peter Celec; Markíza TV, Slovak television, JOJ TV; 2014, 4 times

Press – Peter Celec; SME (daily newspaper), týždeň (weekly newspaper); 2014, 4 times

Public lecture – Peter Celec; CVTI (Slovak Centre of Scientific and Technical Information); 2014

Radio – Peter Celec; Slovenský rozhlas (Slovak radio); 2014

TV – Ľudevít Kádaši; JOJ TV; 2015; genetics of longevity

TV – Ľudevít Kádaši; TA3 TV; 2015; kid of three parents

Radio – Ľudevít Kádaši; Slovenský rozhlas (Slovak radio); 2015; inheritance of body height

Press – Ľudevít Kádaši; Pravda (daily newspaper); 2015; kid of three parents

2.7.2. Table of outreach activities according to institute annual reports

Outreach activities	2012	2013	2014	2015	total
Articles in press media/internet popularising results of science, in particular those achieved by the Institute	8	0	6	1	15
Appearances in telecommunication media popularising results of science, in particular those achieved by the Institute	5	0	9	3	17
Public popularisation lectures	0	0	1	0	1

- **Supplementary information and/or comments on popularisation activities, max. 300 words**

2.8. Background and management. Human resources and implementation of recommendations from previous assessment

2.8.1. Summary table of personnel

Personnel	2012	2013	2014	2015
All personnel	28,0	26,0	26,0	30,0
Research employees from Tab. Research staff	20,0	18,0	21,0	24,0
FTE from Tab. Research staff	7,520	6,900	12,870	17,310
Average age of research employees with university degree	44,1	42,6	37,3	40,0

2.8.1.1. Professional qualification structure (as of 31.12. 2015) FEMALE

FEMALE	AGE								
Number of	**< 30**	**31 - 34**	**35 - 39**	**40 - 44**	**45 - 49**	**50 - 54**	**55 - 59**	**60 - 64**	**> 65**
DrSc. / prof.							1		
II.a / Assoc. prof.			2	3			1		
Other researchers PhD./CSc.		2	2						
doc. / Assoc. prof.									

2.8.1.2. Professional qualification structure (as of 31.12. 2015) MALE

MALE	AGE								
Number of	< 30	31 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	> 65
DrSc. / prof.			2					2	
II.a / Assoc. prof.		1	1						
Other researchers PhD./CSc.	3	2							
doc. / Assoc. prof.			1						

2.8.2. Postdoctoral and mobility scheme

2.8.2.1. Postdoctoral positions supported by national and international resources

0

2.8.2.2. Postdoctoral positions supported by external funding

0

2.8.2.3. SAS stipends and SASPRO stipends

0

2.8.2.4. Internal funding - the Slovak Academy of Sciences Supporting Fund of Stefan Schwarz

0

2.8.3. Important research infrastructure *(max. 2 pages)*

Before 2014 the Institute was service institute for other SAS organisations. In this era several pieces of equipment were obtained to serve for collaborative research.

The clinical section main exceptionality is outpatient clinics which serve for studies on healthy volunteers and patients with various diseases. We are able to perform physiological tests, mainly to assess functions of nervous, cardiovascular and endocrine systems of human body. The infrastructure includes for example system for recording of various signals (ADInstruments), biochemical analyzer, infusion pumps, Quickstep ELISA processor for automated analysis of samples with ELISA methodology. In close collaboration with Institute of experimental endocrinology other parts of outpatient clinic are equipped with complex ergospirometric system and device for measurement of resting energy expenditure. The staff of clinical unit is formed by several medical doctors.

The clinical lab is also equipped with several instruments serving for cell culture experiments. This includes: laminar flow hood, CO2 incubator, centrifuge, cell counter, manual magnetic sorter, tissue dissociator. This unit is capable of performing various experiments with human primary cell cultures (mainly immune cells).

Cytoanalytical laboratory was equipped with cell analyser BD FACSCanto™ II – bench top system for fluorescent analysis of various cells in 3 laser 8 detector configuration, equipped wit high throughput sampler.

The same laboratory have also Auto MACS cell sorter – bench top system for automated cell sorting based on magnetic particles bound to specific cell types.

Genomic section (located at Institute of experimental endocrinology) is equipped with 7900HT Fast Real-Time PCR System. The system is in daily use for real-time PCR analysis of various samples as well as for single nucleotide polymorphism genotyping of human DNA samples

The molecular physiology and genetics group have their own cell culture room with several CO2 incubators and laminar flow hood for performing cell culture experiments. They are also equipped with infrastructure needed for analysis of changes in cells (real time PCR, western blot, electrophysiological measurements, …). The genetics laboratory (situated at Faculty of natural sciences, Comenius University) has access to several sequencers for human DNA analysis.

2.8.4. Description of how the results and suggestions of the previous assessment were taken into account

The institute is evaluated for the first time.

- **Supplementary information and/or comments on management, research infrastructure, and trends in personnel development**

  The management of the institute undergo huge changes in last years. We change the organisation from service institution to scientific institution in 2014. This was accompanied by changes in organisation scheme and in research staff. When serving as specialized institution for other SAS institutes, majority of the scientist had two affiliations in SAS, from 2014-2015 they are back at their home institutes. We are successfully heading to situation when most of the staff is exclusively working for ICTR.

  The work of supporting personnel was hugely changed at the end of 2015 when our organisation joined newly formed institute Biomedical Research Centre with common supporting department serving for whole BMC (approx. 400 employees).

  We think that our research personnel have relatively optimal structure; we have several young scientists after their PhD, several scientists around 40 years old which are new team-leaders and couple of experienced team-leaders. Joining BMC we have now opportunity to also have PhD students belonging to ICTR. In 2016 we will have 2 new PhD students.

  The research infrastructure was mainly developed during last years through structural funds and other founding. At the end of 2015 the great change was that we get new offices and laboratories in the new Building of Medical Sciences.

3. Research strategy and future development of the institute for the next five years (2016-2020) **(**Recommended 3 pages, max. 5 pages)

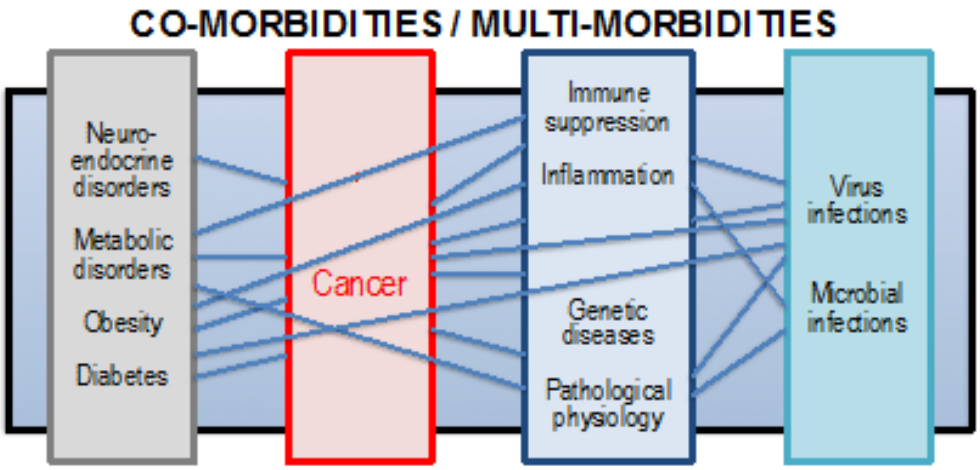
From January 1st, 2016, the former Centre for Molecular Medicine (now renamed as the Institute for Clinical and Translational Research) has become an integral part of the Biomedical Research Centre of the Slovak Academy of Sciences (BMC SAS), together with three other SAS institutes, namely the Cancer Research Institute, the Institute of Experimental Endocrinology, and the Institute of Virology.

The BMC SAS is currently the largest Slovak institution (>350 employees) devoted to basic and applied research in biomedical sciences, with the former SAS institutes representing its main structural units.

From this reason, the research and management strategy for the future development of the Institute for Clinical and Translational Research is described in the context of the BMC SAS and the Part 3 of the Questionnaire is common for all four BMC SAS institutes.

3.1. Present state of the art in both the national and the international contexts

Present state of the art in the biomedical research can be viewed both “vertically” in relationship to particular research areas central to the BMC institutes and “horizontally” as the intersection of these research areas towards understanding the cross-talk of diseases often simultaneously affecting the same human organism (also called co-morbidities or multi-morbidities). Establishment of the BMC SAS has created excellent conditions for both approaches, via combining interests, skills, knowledge and infrastructures.



The scheme depicts the types of diseases sharing common/similar underlying mechanisms (vertical groups) and evidence-based horizontal relationships and/or dependencies (due to primary or secondary effects). These relationships significantly influence progression of diseases and therapeutic responses.

The “vertical view” on the present state of the art

VIRAL and MICROBIAL INFECTIONS
Institute of Virology

Recent era faces the emergence of new infections and reappearance of old infectious agents with altered pathogenic properties, which occur due to civilization-related penetrations of humans into intact natural environment, increased travelling and climate changes. The pathogens often escape from vaccination barriers and the prevalence of persistent infections is growing. It is highly probable that the humans, animals and plants will be more often confronted with new types of infections in the near future.

Worldwide awareness of this threatening situation is associated with intensive developments of approaches and methods for rapid detection of infectious agents, new therapeutic strategies based on inhibition of molecular pathways important for multiplication of viruses and bacteria, production of recombinant vaccines and anti-viral compounds. Simultaneously, molecular changes in the cells and organisms, which host or transmit infection, are investigated with the purpose to understand genetic, epigenetic and physiological processes contributing to spread of infection and/or manifestation of pathologies.

Research activities at the Institute of Virology BMC SAS, the only Slovak institution consistently performing research on viruses, rickettsiae and chlamydiae, follow the trends mentioned above reaching the international level, particularly in the research of infectious agents and host cells/organisms at the molecular levels using state of the art technologies, and in the development of new vaccines.

The research staff of the Institute of Virology BMC SAS includes several internationally recognized researchers that built their reputation through excellent research achievements, such as discoveries of new hantaviruses, elucidation of the genetic diversity of economically important plant viruses, ecology of old but underestimated and/or emerging zoonoses, identification of new diagnostic markers of *Coxiella burnetii*-caused Q fever, clarification of immune responses to

influenza virus etc. Most of these middle-aged leaders have also demonstrated their networking abilities and collaborative potential through participation in several EU consortia including the European Virus Archive which reached global dimensions and is not just a bio-bank facility, but also performs breaking-through research in virology. In the national context IV BMC SAS plays an important role in epidemiological studies and surveys of diverse infections, development of reagents and methods for detection of viruses, rickettsiae and chamydiae, and in collaboration with healthcare institutions and domestic pharmaceutical industry.

CANCER

Cancer Research Institute (CRI), Institute of Experimental Endocrinology (IEE), Institute for Clinical and Translational Research (ICTR), and Institute of Virology (IV)

Civilization-associated demographic changes (increased age of the human population), altered life style (quality and composition of food, increased speed of life, more stresses), and increased exposition to environmental carcinogens lead to increasing frequency of cancer as well as of social and economic burden accompanying this devastating disease. On the other hand, we are witnessing a real revolution in our understanding of mechanisms underlying cancer initiation, development and progression, going hand-in-hand with enormous technological advances and shifts in clinical translations and therapeutic strategies.

Cancer cell-centric model dominating in tumor biology in the past century is now supplemented by the microenvironmental model that appreciates important roles of diverse tumor-associated cell types and subpopulations (such as mesenchymal stem cells, stromal fibroblasts and immune cells) as well as a complex secretome and physiological milieu of tumor tissue (including hypoxia, acidosis, extracellular matrix signalling etc), which altogether generate intratumoral heterogeneity now perceived as the one of the major factors of treatment failure. Thus, the attention of the basic cancer research community focuses a lot of attention on investigating the above-mentioned phenomena and on their possible implications for the clinic.

Similar shift in paradigm can be observed also in translational and clinical cancer research, where much emphasis is now given to patient-centric approach based on trials examining biology, developing biomarkers, and bringing together a range of health and scientific disciplines to work with patients. This is underlined by the recent success of new immunotherapy targeting immune checkpoint molecules co-opted by cancer cells to escape immune responses. Technological advances including new devices for multi-parametric analyses allow now for massive and detailed genomic, proteomic and immunologic profiling of tumor tissues, liquid biopsies, and tumor-bearing patients, uncovering common molecular and physiological drivers of different types of cancer. Deeper knowledge of tumor biology has recently promoted “basket clinical studies” that address different tumor types documented to be driven by the same molecular alterations. This strategy in turn further highlights the critical role of academic groups in acquisition of new knowledge on molecular mechanisms of oncogenesis and cancer progression and in development of pre-clinical models indicating which drug will be effective for which cancer type.

In line with these advances in the field of oncology, cancer researchers of the BMC SAS investigate key aspects of cancer biology and use up-to-date research approaches, including molecular and cellular mechanisms of tumor-stroma crosstalk (CRI), mechanisms of chemoresistance (CRI), DNA damage responses, genetic and epigenetic traits of cancer development and progression (CRI), advanced multiparametric immunophenotyping of leukemia patients (CRI), hypoxia and acidosis as critical physiologic factors of tumor microenvironment affecting tumor biology, metastatic propensity and response to therapy (IV), ion transport and signaling in cancer cells (ICTR), neuroendocrine mechanisms of cancer (IEE), effects of obesity and metabolism on tumor phenotype and progression (IEE), etc. as described in the questionnaires of the BMC institutes. Many of our achievements are at the forefront of the current cancer research and are well recognized by the international community. Some of them are being translated to clinical applications in the form of new biomarkers, detection assays for diagnostic, prognostic and predictive purposes (including the non-invasive formats) and of promising new therapeutic strategies. This international dimension of the cancer research at BMC SAS is

documented by a number of EU and other international projects, patents, invited talks at the international meetings, collaborations with universities and clinics, and highly cited publications.

With this reputation, BMC SAS represents the leading institution of the basic and translational cancer research in the Slovak Republic, activities of which fully conform to the current global trends in oncology and also respond to unmet needs of the home country which faces increasing prevalence of cancer and calls for concentration of experts and efforts to develop new treatment strategies taking into account specific characteristics of our population and the healthcare system.

STRESS, NEUROENDOCRINE DISORDERS, AND DEPRESSION

Institute of Experimental Endocrinology

Stress has been termed the "Health Epidemic of the 21st Century" by the World Health Organization. The effect of stress on human emotional and physical health can be devastating and negatively impacts on social relationships and work productivity leading to enormous economic losses. Stress is associated with increased rates of heart attack, hypertension, obesity, addiction, anxiety, depression and other disorders.

Recent stress research focuses on hypothalamic-pituitary-adrenal (HPA) axis, which plays a central role in the adaptive response to numerous stressors. This system has a strong influence on the brain and its major functions, such as cognition, memory, behavior, and mood. In addition, this system affects the general homeostasis of the human organism a may result in deterioration of diverse organs and tissues. Thus, the main challenge is to obtain complex understanding of the mechanisms mediating adaptive responses to stress, elucidate consequences of their abnormal activation and develop pharmacological, mental and exercise-based strategies for their normalization.

Researchers at the IEE BMC SAS investigate stress responses at the molecular and cellular levels as well as at the level of the entire organism using current state-of-art approaches. Studies of catecholamines at IEE are known worldwide similarly as the research focusing on psychopharmacology. The IEE regularly organizes international meetings of the world-leading endocrinologists and its scientists contributed to this area by a number of highly cited papers, some of which can be considered seminal for the development of this field.

METABOLIC DISORDERS, OBESITY AND DIABETES

Institute of Experimental Endocrinology and Institute for Clinical and Translational Research

Similarly, metabolic disorders, obesity and diabetes are designated as pandemics of the 21st century, due to their continuously and rapidly increasing prevalence and incidence.

About 415 million people around the world have diabetes (9% of adults). Over the next decade, this number is predicted to increase to 642 million people (according to WHO reports). Given that diabetes is a major cause of mortality, morbidity, and health care expenditures, addressing this chronic disease represents one of the greatest global health challenges of our time. Approximately 90% of the total diabetes burden is represented by the type 2 diabetes, which is determined by genetic factors and closely linked to obesity, unhealthy diet and physical inactivity.

IEE researchers contributed to this expanding global health problem by discovering new mutations responsible for the monogenic forms of diabetes. In addition to performing basic research in this area, they also accomplish genetic analyses to identify mutations driving the early onset of diabetes that are useful for diagnostic purposes with direct impact on clinical decisions. Thanks to their achievements, they have participated in large EU consortia and have established strong international cooperations.

Obesity is a major health-compromising problem not only worldwide, but also in Slovakia, where around 20% of population suffers from morbid obesity and about 50% people (including children)

are overweighed. This situation has constant health, societal and economic impact and is thus perceived as one of the most prominent challenges that urgently need solutions.

The obesity research at IEE is focused on adipose tissue and muscle metabolism, on the prevention of obesity through optimizing caloric intake, and on elucidation of effects of some food constituents such as flavonoids and mycotoxins on the development of obesity and metabolic disorders. In addition, its essential part is the study of atypical obesity hormones such as oxytocin, angiotensin peptides and aldosteron with respect to their role in mechanisms of fat tissue enlargement. Both IEE and ICTR researchers continuously develop translational and clinical studies on the importance of the physical activity in prevention of diabetes, treatment of neurodegenerative diseases, and improvement of cardiorespiratory fitness.

GENETIC AND INFLAMMATORY DISEASES

Institute for Clinical and Translational Research and Institute of Experimental Endocrinology

The rapid advance of genomic technologies have led to improved understanding of the genetic bases of diseases. Recent approaches encounter shift from targeted analyses of specific genes based on particular symptoms or family histories to sequencing of an entire genome or exome. Targeted approaches characteristically have a high yield for penetrant monogenic conditions; whole genome approaches have the potential to unravel a much larger proportion of genetic disease burden. Both directions can provide predictions about diagnoses, or susceptibilities to conditions with important implications for the affected person as well as for her/his relatives.

The BMC SAS researchers focus on identification of new mutations and mapping of genetic diseases with high prevalence in Slovak non-Romany inhabitants and specifically in Slovak Romany inhabitants, which is a genetically isolated population of almost 100% endogamy suffering from one of the highest phenylketonuria incidences in the world as well as from other monogenic disorders. The researchers who are currently based at BMC SAS have contributed to characterization of the genetic basis of alkaptonuria in non-Romany population, and monogenic hearing impairments and primary congenital glaucoma in Romany population in the Slovak Republic. They also participate in the National Screening Program and genetic testing of monogenic (ICTR), metabolic (IEE) and oncologic (CRI) disorders, using state of the art genomic technologies. The BMC researchers also develop international activities through participation in EU networks aimed at characterization of monogenic disorders.

Using state of the art genetic approaches, the BMC researchers also helped to uncover the impact of polymorphisms in genes of the hypothalamic-pituitary-adrenal (HPA)-axis regulation on the pathophysiology of rheumatoid arthritis (ICTR) and also brought new knowledge on neuroendocrine and inflammation-related factors contributing to this chronic disease. As in the case of other important topics investigated at BMC SAS, the ICTR researchers have been invited to large EU network, where they collaborate with renowned domestic and foreign clinics and research institutions.

The “horizontal view” on the present state of the art

CO-MORBIDITIES / MULTI-MORBIDITIES

One of the main advantages of the BMC SAS resides in the strong human infrastructure creating critical mass of internationally recognized experts in research of diverse human diseases. These experts can now join forces in order to take complex approach to understanding of human diseases with their co-morbidities. Up until now, both basic and clinical research has focused predominantly on single disease and episode, often with a focus on mortality as the main endpoint. Nowadays, the concept of co-morbidities (or multi-morbidities) is gaining more and more importance with increasing awareness that healthcare needs to address the management of persons with multiple coexisting diseases, who are now the norm rather the exception. The costs of management of multi-morbid patients are growing exponentially as the number of chronic conditions increases. Moreover, standard treatment protocols used for individual diagnoses may

not work due to co-existing pathologies. Co-morbidity can impact on a range of outcomes, including mortality and health-related quality of life. Etiological relationships between diseases may involve direct causation, associated risk factors, heterogeneity and independence. Co-occurrence of certain pathologies seems obvious, such as obesity linked with diabetes, cardiovascular problems, hormonal imbalance, cancer (particularly hormone-dependent tumors), and depression. However, current research helped to uncover the obesity connection to inflammation and increased sensitivity to infections (such as influenza virus)…. On the other hand, adenovirus 36 was recently identified as one of the factors contributing to the obesity. From the clinical point of view, treatment of obese patient with cancer would surely lead to different outcome as the same treatment of the lean person and this may be true for other pathologies. Moreover, co-morbidity may include the situation in which treatment for the one disease causes another condition, such as immunosuppressive chemotherapy may increase the permissiveness of cancer patient to virus infections. And vice versa, virus or microbial infections can cause inflammation, which may support cancer progression.

The BMC SAS is well predisposed to address the above-described problems mainly thanks to the renowned researcher leaders as well as excellent young researchers, who are now keen to closely cooperate. This will be facilitated by the availability of unique in vitro and in vivo models, modern infrastructure, up-to-date methodical portfolio and broad spectrum of academic and clinical partners. Our initial effort will be focused on prevention, risk stratification, treatment and overall mechanistic understanding and management of obesity and obesity-related comorbidities in the Slovak population, including cancer, neurologic, endocrine, immune and infectious diseases, with the vision to improve our healthcare and quality of life.

This brief overview shows that the research activities at BMC SAS, which are largely focused on chronic non-communicable diseases accounting for almost three quarters of deaths worldwide, correspond to the most recent state of the art in the biomedical field and react to global as well as national challenges of healthcare and society. At present, the BMC SAS stands at the crossroad that converges all experiences, skills and infrastructure, interconnects networks of existing collaborations, but also opens new directions for interdisciplinary approaches towards more complex knowledge on human diseases translatable to practice. As the most robust institution of this type in Slovakia, the BMC SAS is now becoming increasingly attractive to clinical partners, which already expressed their interest for more close cooperation in areas that urgently need solutions in our country and which have far reaching implications for basic knowledge.

3.2. Research strategy of the institute in the national and the international contexts, objectives and methods

In the course of 2015, four biomedical institutes of the Slovak Academy of Sciences, namely

- The Cancer Research Institute (CRI),
- The Institute for Clinical and Translational Research (ICTR, formerly Centre for Molecular Medicine)
- The Institute of Experimental Endocrinology (IEE),
- The Institute of Virology (IV),

represented by their managing and scientific boards decided to merge into a bigger entity named “Biomedical Research Center of the Slovak Academy of Sciences” (BMC SAS). By the end of the year, this decision was supported by the execution of the Memorandum of Understanding, signed by the directors and heads of scientific boards, which provided a framework for future co-existence and functioning of the institutes within the BMC SAS. Subsequently, the BMC SAS was **officially established on January 1st, 2016 by the Presidium of the Slovak Academy of Sciences**.

The first period of the BMC SAS was characterized by complex legal and administrative arrangements of the new institution (according to the law of the Slovak Republic, these could be accomplished only after the legal entity was officially established). This included all documents related to identification, accounting and financial operations, registration for VAT, social/health insurances, public prosecutions, status of research institution, transfer of projects, approvals of biosafety, approvals for work with GMO etc. Moreover, three of the institutes (except IV) had to undertake a time- and energy-consuming moving from the old buildings to the new Pavilion of

Medical Sciences in the main campus of the SAS. However, that brought the BMC institutes to close proximity, which now facilitates the communication and operation inside the BMC SAS.

The initial period of the BMC existence was also employed for the arrangement of the managing board, election of the scientific board, merging and reorganization of administrative and other supporting units and settlement of the overall structure of the BMC SAS, in which the institutes retain their internal academic life besides contributing to the common interests of the BMC SAS.

The **Managing board of the BMC SAS** consists of the representatives of all four founding institutions:
Director: prof. Silvia PASTOREKOVÁ, DSc.
Deputy Director and Scientific Director of the IV BMC: Juraj KOPÁČEK, MVD., DSc.
Scientific Director of the CRI BMC: Lucia KUČEROVÁ, PhD.
Scientific Director of the IEE BMC: Štefan ZÓRAD, PhD.
Scientific Director of the ICTR BMC: Miroslav VLČEK, MD., PhD.
Scientific Secretary: Jozef UKROPEC, PhD.
Scientific Secretary: Miroslav CHOVANEC, PhD.
Head of the Scientific Board: Richard IMRICH, MD., DSc.
Head of the Economic Unit: Hana KRASOŇOVÁ
Head of the Legal and Organizational Unit: Iveta ŠÁRNIKOVÁ, JUDr.
Head of the Project Evidence and Administration Unit: Erika CHUDĚJOVÁ
Head of the Technical Unit: Kornel DOBROČKA

The principal mission of this novel research center is to foster research excellence, develop interdisciplinary approaches, and stimulate innovative potential for the improvement of our knowledge on human diseases, its better translation to clinic and more effective practical use for the benefit of patients and the entire society.

The strategy for the future development of the BMC SAS stems from the historical backgrounds, infrastructures, human capacities and existing project portfolio of the institutes as its main pillars and takes advantage of the following attributes:

Compatibility of topics

All institutes of the BMC SAS perform research in biomedical area, and are principally aimed at elucidation of molecular and physiological mechanisms of human diseases, their epidemiology, and possibilities of better prevention, diagnostics and therapy. They investigate the human organism from different points of view in order to bring deeper understanding of metabolic, neuroendocrine, autoimmune disorders, cancer, and infections. These chronic diseases, known worldwide as non-communicable diseases (NCD), represent major socio-economic burden and health-care expenses also in Slovakia, and therefore, their control and management requires both basic research and translational approaches. Moreover, these pathologic situations, so far perceived as individual entities, often co-occur in the same organism and indeed, global biomedical

research of the 21st century faces co-morbidities (or multi-morbidities) as one of the key challenges of the human health and quality of life improvement. It is becoming more apparent that viruses readily infect humans, which are obese or suffer from cardiovascular or metabolic problems, that virus infection can even contribute to obesity and vice versa, that obesity facilitates progression of cancer and development of metabolic and cardiovascular disorders etc. This complex view on co-occurring disease, on their cross-talk (e.g. how infections develop in obese organism, how obesity modifies response to anticancer therapy, how neuroendocrine imbalances affect cardiovascular system etc.) opens a new space for the closer collaborations inside the BMC SAS, using existing models, methodical approaches and knowledge. This inter-institutional cooperation will receive a maximum support of the Managing board of the BMC SAS.

Complementarity of infrastructure

These collaborative efforts can be facilitated by the complementary infrastructure of the BMC SAS that was brought together by the merged institutes (as described in more details in their quests). Thus, the BMC SAS researchers have to disposition modern robust setups for genomics, proteomics, metabolomics, cytoanalytics, cell and animal bioimaging, biotechnological procedures, animal facilities for preclinical research (for highly contagious agents and immunodefficient animals), and small clinical research and health-care unit. The infrastructure is operated by the highly qualified, technically skilled and imaginative BMC researchers and is effectively used by the intramural personnel but also by external experts. In the near future, these infrastructures will receive the status of the BMC core facilities, which can be utilized not only for the basic research but also for the service purposes. This will, however, require investments and intesive care for the sustainable development of this infrastructure as discussed below.

Concentration of excellent research teams and experts

The merge of the institutes in the BMC SAS brought together several groups that were recently listed among the top research teams of SAS (according to ARRA, an independent ranking and rating agency, 2011). These teams continuously and successfully perform excellent research in the following areas:

- Hypoxia and acidosis in tumor microenvironment
- Signal transduction pathways in cancer cells
- Stem cells and gene therapy
- Genetic and metabolic factors of diabetes and obesity
- Neuroendocrine mechanisms of stress and depression
- Cell signaling mediated by calcium, hydrogen sulfide and catecholamines

Leading personalities of these teams, but also additional younger generation researchers, who grew up from the institutes, are now becoming the BMC “torch holders” whose main commitment is to maintain and further develop excellent research activities. In accord with this vision, preliminary individual research personnel assessment accomplished in June 2016 revealed that the BMC SAS concentrates a number of superb experienced researchers and young talents with a great potential for the future growth.

Critical mass of projects and capacities

In conjunction with the concentration of experts and teams, the BMC SAS has received a large project portfolio, composed mainly of the relatively high number of projects funded by the very competitive national grant agency APVV (including the new grants awarded this year). In addition, the portfolio contains several international projects comprising the highly prestigious EU FP7 and H2020-funded projects, albeit their number is lower than in the past. The projects funded by the EU Structural funds in the first program period were completed last year and are currently not active.
Thus, the BMC is now at the starting point of the competition for new projects. The rich project history as well as excellent research capacities and topics relevant for H2020 strategy and national RIS3 strategic priorities represent good prerequisites for the new project proposals, which are currently in the process of elaboration and submission by the leading BMC scientists.

The governance bodies of the BMC SAS will strongly support all activities leading to acquisition of new projects. That would require excellent research outputs, which in turn need reasonable funding of experimental work and other components of the research. This vicious cycle can be driven only through increased personal engagement and activities of the BMC researchers. The main task of the Managing board will be to create the best possible conditions for all the activities leading to excellent research outputs and new projects. In addition, researchers that are members of the managing and scientific boards are expected to develop great personal initiatives in all these activities in order to serve as a positive example for their colleagues.

Here we can build on past experiences and networking capabilities, which were demonstrated by a number of EU project proposals submitted during the assessment period by the institutes of the BMC SAS (see the table below).

BMC SAS institute	**Project proposals submitted to 7RP or H2020**	**2012**	**2013**	**2014**	**2015**
Cancer Research Institute	Institute as coordinator	0	0	0	**1**
	Institute as participant	**1**	0	**1**	**3**
Institute of Experimental Endocrinology	Institute as coordinator	0	0	0	0
	Institute as participant	0	**1**	**2**	0
Institute of Clinical and Translational Research	Institute as coordinator	0	0	0	0
	Institute as participant	0	0	0	0
Institute of Virology	Institute as coordinator	0	0	**1**	**3**
	Institute as participant	**12**	0	**4**	**5**

Coordinated approach to challenges of sustainable development

In realization of all the above-mentioned plans and strategies of sustainable development, the BMC SAS governance will face several serious limitations and obstacles. Successful passing of these hurdles would require enormous coordinated efforts within each aspect of the BMC SAS life, especially in the following areas:

Construction and management of the budget

The BMC SAS operates on a contributory budget basis, with the contribution allocated by the Presidium of the SAS and covering the most part of the personnel costs and the minor part of the operational costs such as energy, water, heating etc. (up to one third of the yearly expenses). Remaining costs, including the research, administration, maintenance of the buildings and infrastructure etc. has to be covered from the projects, contracts and other external sources. Thus, an attraction of new project funds and a good economic management are key for the sustainable development and motivation of the most active personnel. Additional strategic direction towards the active budget-building is the use of core facilities for service purposes as well as the stimulation and support of spin-off and start-up facilities.

Currently, the BMC budget is derived from the historical situation (four independent institutes, old infrastructure) and does not reflect the actual costs and requirements of the newly built infrastructure. It is composed of a common portion, allocated to the supporting units performing activities necessary for all partner institutions (economic operations, elaboration, administration and posting of documents, legal support, evidence and administration of

project documents, technical support and repairs, transportations, housing of animals, etc.). The other part of the budget is broken down into four parts allocated to the institutes for the research purposes and internal activities. Future budget management strategy will be constructed taking into account experiences from the first year of the BMC SAS, in order to achieve more coherence, optimize income and expenses and facilitate the convergence of the institutes.

Consolidation of personnel

The initial assessment indicates that despite excellent personalities, the individual performance of the BMC researchers needs consolidation in order to improve the research outcomes. This can be done by positive or negative motivation of the current personnel and/or by restructuring its composition.

Positive motivation of the best-performing individuals is complicated due to the limited resources related to salaries, especially with the intent to accept and stabilize new postdocs and young scientists. One possibility is to give a personal salary bonus on the basis of the active participation in the key projects (which has to be carefully planned by PIs upon the project proposal submission).

Negative motivation is also problematic, because most of the salaries are at the very basic level. Moreover, the institutes have got permanent contracts with some researchers (enabled by past legislation), and this creates legal disadvantages for any contractual changes. The situation can be solved by the step-wise restructuring of the research groups, through the staffing policy taking into account personal interaction and mutual benefit. However, this intervention is very case-sensitive due to big number of contracted running projects that require continuous research work and capacities to reach the goals.

Thus, we intend to keep eye on the performance of the research personnel through annual evaluations and regular reviews of the researchers in order to stimulate them to higher activity.

Convergence and optimization of supporting units

It is also necessary to optimize the structure and functioning of the supporting units of the BMC SAS, which have been assembled from the staff of the partner institutes, who were traditionally using quite diverse working procedures. Therefore, we intend to accomplish an external evaluation of the administrative personnel, its working processes, communications, and flow of the documents to achieve their harmonization and improved efficacy.

Common interests

The accomplishment of all the intended activities and strategic decisions will follow the common interests of the BMC SAS, mainly the support and development of research excellence, translation of the basic knowledge to applications and clinical practice, and increasing the awareness of the public about the BMC activities and principally about the importance and meaningful social role of the scientific research in our country and worldwide. One of the most prominent activities in this respect is the cross-institutional cooperation in drafting, elaborating and submission of common project proposals representing a horizontal intersection of the BMC topics.

Nevertheless, these common interests have to be first recognized and adopted by the people creating the community of the BMC SAS, and this can be made possible through building their collaborations, friendships, the feeling of responsibility for the future development of the BMC SAS. It is now the role of the BMC SAS governance to create conditions for such an empathic environment, particularly via open communications, transparent and helpful decisions, and also via personal positions, opinions, knowledge and activities that are worth to follow.

Conclusion

The Biomedical Research Center of the Slovak Academy of Sciences is at the beginning of its existence and faces many challenges. Our main goal is to stabilize and then strengthen the position of the BMC SAS in the national R&D context and to build and fix its reputation in the international research community through its excellent research and renowned personalities.

Project proposals submited to 7RP or H2020	2012	2013	2014	2015
Institute as coordinator	0	0	0	0
Institute as participant	0	0	0	0

4. Other information relevant for the assessment

The Institute for Clinical and Translational Research (ICTR) is the youngest and one of the smallest institutes of Slovak Academy of Sciences in the field of Life, Chemical, Medical, and Environmental Sciences. The ICTR was established in 2007 as a specialized service institute Centre for Molecular Medicine. It was originally a joint project of several SAS Institutes serving as common platform to perform research in the field of molecular medicine and to serve as bridge between academy and healthcare providers. The researchers were based in other SAS Institutes and the projects were mostly collaborative projects with other SAS Institutes. The institutes with similar research goals are quite common worldwide, however compared to such European institutions the ICTR is not comparable in size and budget.

After several years in the position as service institute it was decided to transform the institute to regular scientific institute, which was achieved in 2014. Together with this also personnel, who was working partially for their home institutes and partially for us, return to their home organisations.

During the year 2015, regarding planed transformation of Slovak Academy of Sciences and tendency to promote establishment of bigger institutes, the institute scientific board decided to join one of the newly formed organisation. From 1.1.2016 we became a part of Biomedical research centre SAS (BMC) and the name was changed to Institute for Clinical and Translational Research, BMC SAS. Together with this change several top researchers from Institute of Molecular Physiology and Genetics, SAS joined our organisation, because their institute decided not to join Biomedical Research Centre as whole.

Considering the history of our Institute, the number of publications and particularly citations (first papers are from 2009) could not be directly compared to other well-established institutes. Also our institute was not intended to teach PhD students in the past, explaining the missing accreditation for PhD study.

The changes during 2014 and particularly during 2015 transformed our Institute closer to the picture of established scientific organisation. However this process is not immediate and some parameters of our scientific production need longer time to reflect those changes.