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 OF NEUROIMMUNOLOGY SAS (NIU SAS)
DUBRAVSKA CESTA 9
845 10 BRATISLAVA

1.2. URL of the institute web site

http://www.niu.sav.sk/

1.3. Executive body of the institute and its composition

Directoriat	Name	Age	Years in the position
Director	Prof. Michal Novak, MDV, PhD, DSc, Dr.h.c.	68	20
Deputy director	RNDr. Rostislav Skrabana, PhD	50	6
Scientific secretary	RNDr. Monika Zilkova, PhD	43	6

1.4. Head of the Scientific Board

Assoc. Prof. RNDr. Peter Filipcik, PhD

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	39,0	13,750	45,0	12,180	42,0	12,100	37,0	11,520	**163,0**	**40,8**	**12,388**
Number of PhD students	25,0	0,000	20,0	0,000	19,0	0,000	15,0	0,000	**79,0**	**19,8**	**0,000**
Total number	64,0	13,750	65,0	12,180	61,0	12,100	52,0	11,520	**242,0**	**60,5**	**12,388**

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	19,0	13,750	21,0	12,180	18,0	12,100	18,0	11,520	**19,0**	**12,388**
Laboratory of neuroimmunology	5,0	2,790	5,0	3,500	5,0	2,500	5,0	2,460	**5,0**	**2,813**
Laboratory of applied neuroproteomics and metabolomics	3,0	3,000	4,0	2,000	4,0	3,300	3,0	2,970	**3,5**	**2,818**
Laboratory of structural biology and protein biophysics	3,0	2,080	3,0	2,500	3,0	2,500	3,0	2,500	**3,0**	**2,395**
Laboratory of molecular and cellular neurobiology	4,0	3,050	5,0	2,930	3,0	2,550	3,0	2,300	**3,8**	**2,708**
Laboratory of applied neuropathology	4,0	2,830	4,0	1,250	3,0	1,250	3,0	1,250	**3,5**	**1,645**
Laboratory of neurophysiology of the brain							1,0	0,040	**1,0**	**0,040**

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]*	285,281	289,401	290,023	291,998	**289,176**
Other Salary budget *[thousands of EUR]*	182,800	205,170	210,941	196,131	**198,761**

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

The Institute of Neuroimmunology of the Slovak Academy of Sciences (NiU SAS) is a research centre for neuroscience in Slovakia. Its focus of investigation is the central nervous system, which includes the molecular biology of nerve cells, the biological basis of normal and pathological behaviour and cognition. The Institute practices neuroscience at various levels, starting from the molecular level, through the cellular and systemic levels up to the cognitive level. The observations and findings help in the search for underlying causes of neurodegeneration and neurodegenerative diseases with special emphasis on Alzheimer's disease and related disorders (tauopathies) and other foldopathies like prion diseases. At the molecular level (molecular neuroscience) the Institute addresses altered neuronal molecular signals and the response of the immune system to these signals and stimuli (molecular neuroimmunology). At the cellular level (cellular neuroscience) the Institute investigates mechanisms of neuronal degeneration and participation of the immune system and its signalling pathways in this deleterious process. At the systemic level (systemic neuroscience) the Institute studies impact of neurodegeneration on physiological functions, such as sensorimotor integration, coordination and balance, neuromuscular functions, and alterations in

learning and memory. At the cognitive level (cognitive neuroscience) the Institute addresses the impact of neurodegeneration on cognitive functions. To achieve these goals the Institute uses the state-of-the-art genomic, transcriptomic, neuroproteomic and neurometabolomic techniques. The Institute provides doctoral studies in a) neuroscience, b) immunology and c) molecular biology, in collaborations with universities. Importantly, the Institute was the initiator of the first proposal for doctoral studies in neurosciences in Slovak republic, which was submitted along with the University of Veterinary Medicine and Pharmacy in Košice and approved by Accreditation Committee of the Slovak Government and Ministry of Education. In order to coordinate the education in neuroscience, the Centre of Biomedical Microbiology and Immunology (CBMI) was set up as a joint laboratory based at the campus of the University of Veterinary Medicine and Pharmacy in Košice.

The mission of the Institute is to deliver the results of the research from the bench to the patients and thus translates the scientific knowledge into the improvement of the everyday life.

In order to achive this goal, the Institute and the Foundation MEMORY have established the first Alzheimer's Diagnostic Centre, the Centre MEMORY, a specialized preventive diagnostic and educational daily care facility for elderly people and people with memory disorders, particularly for patients with Alzheimer's disease.

The Institute has also established the first National reference laboratory for transmissible spongiform encephalopathies (TSE) that was endorsed by the Government of the Slovak Republic.

The Institute has become the core of Slovak neuroscience research by coordinating two national Centers of Excellence - Centre of Excellence for Alzheimer's disease and Related Disorders ("AD Centre") and the Centre of Excellence for Brain Research ("Brain Centre"). Simultaneously, the Institute has established collaborative partnerships and networking within the Slovak Republic as well as with the international scientific community to coordinate research on neurodegenerative disorders. NiU has become the scientific representative of the Slovak republic in the EU Joint programming - Neurodegenerative disease research (JPND), the largest global research initiative aimed at tackling the challenge of neurodegenerative diseases. JPND aims to increase coordinated investment between participating countries in research aimed at finding causes, developing cures, and identifying appropriate ways to care for those with neurodegenerative diseases. In addition to be a part of the coordinating JPND initiative, NIU also participated and participates in several pan-European projects co-funded through JPND, ERA-NET and H2020 grants.

The Institute participated in the EU project ALzheimer's COoperative Valuation in Europe (ALCOVE), where NiU was in charge of the evaluation workpage of the project.

Finally, the Institute is the member of the prestigious Centres of Excellence in Neurodegeneration Research (CoEN), which joined the leading research organizations in the field of human

neurodegenerative disorders and pan-European collaborative initiative JPND, which coordinates research in the field of neurodegeneration within Europe.

The institute thus became one of the Europe's leading organizations in the field of neurodegeneration.

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)

Brief History

The Institute of Neuroimmunology belongs to the youngest institutions in the Slovak Academy of Sciences. It was founded in 1996, on the basis of the country's urgent need for a coordinated immuno-neuroscience research. The Institute unites clinicians and basic neuroscientists with the common aim to supervise and advance neuroscience research both in health and disease, with the special focus on neurodegenerative diseases such as Alzheimer's disease, human tauopathies and prion diseases. Our findings, expertise and cutting edge technology help to overcome the key challenges in Alzheimer´s disease research.

Prof. MVDr. Michal Novak, DrSc., the founder and director of the Institute, had been working in the **Laboratory of Molecular Biology, MRC Cambridge** for 10 years in collaboration with three Nobel Prize laureates – **Sir Aaron Klug, John Walker and Cesar Milstein**. César Milstein, who was awarded the Nobel Prize (1984) for the discovery of the principle for production of monoclonal antibodies, supported the foundation of the Institute. He attended the opening ceremony in 1996 and thus parsonally emphasized the significance of the newly established Institute. From the very beginning, the Institute was supported by and collaborated with the world-leading institutions in AD research - the MRC Laboratory of Molecular Biology in Cambridge (UK) and the Institute for Basic Research in Developmental Disabilities in New York (USA).

Translational neuroscience

The Institute of Neuroimmunology has become the driving force behind the innovative approaches to improve diagnosis of Alzheimer's disease and care for the patients with dementia and their caregivers. Already in 2002, the Institute, with the help of the Ministry of health and Slovak Academy of Sciences, has established the first **Alzheimer's Diagnostic Centre - Centre MEMORY** – a preventive, diagnostic and specialized daily care facility for elderly people with memory disorders and for patients with Alzheimer's disease and an educational centre for health care professionals and caregivers. The Centre MEMORY, in collaboration with NIU, offers the latest diagnostic techniques as an indispensable step for proper clinical evaluation of the patients, which also includes the genetic analyses of selected genes responsible for early-onset Alzheimer's disease. This improves the identification of the progression pattern and stages of mental

impairment, which then helps to plan the appropriate therapeutic interventions, rehabilitation and care.

With the aim to promote and collaborate the neuroscience research in the Slovak republic, the Institute founded the **Slovak Alzheimer's Society**. The Slovak Alzheimer's Society has become the official representative of the Slovak Republic in two global international organizations devoted to dementia research and treatment: **Alzheimer's Disease International (ADI)** and **Alzheimer Europe (AE).** Specialists from a number of different professions (scientists, researchers, medical doctors and other health care providers) involved in Alzheimer's disease and related disorders, together with the caregivers, are working intensively to disseminate provide information and knowledge about Alzheimer's disease to every interested person in the country. In particular, it is our mission to convey up–to-date information on diagnosis and treatment to general practitioners. The Society encourages and promotes information exchange, co-operation and the transfer of methods between scientists, caring professionals and caregivers. Our primary objective is to contribute to Alzheimer's disease diagnosis, improving treatments and the further identification of risk factors.

NiU is also a cofounder of the **Slovak Society for Neuroscience**, which is a member of FENS - **Federation of European Neuroscience Societies**. It unites neuroscientists throughout Slovakia in their effort to analyze the molecular underpinnings of the normal, neurodegenerative and neuroregenerative processes.

In addition, the Institute of Neuroimmunology received full accreditation from European Union and from the Slovak National Accreditation Service (SNAS) for screening of prion diseases and it was appointed as the **National Reference Laboratory** for the Transmissible Spongiform Encephalopathies by the Government of the Slovak Republic.

Education and Doctoral (PhD) Studies

The Institute of Neuroimmunology is accreditated for doctoral (PhD) studies by the Ministry of Education of the Slovak republic and is actively involved in the training of PhD students in the fields of neuroscience (4.2.16), immunology (4.2.15) and molecular biology (4.2.3). From the very beginning of its existence, the Institute paid great attention to building a competitive and well equipped environment for doctoral students. In the last four years, the infrastructure of the Institute's education of PhD students and young scientists has resulted in increased research and publication activities and in international acceptance of the Institute.

The three doctoral programs create a unique blend of research infrastructure at the Institute, allowing studies of all aspects of neurodegeneration and neuroscience in one team: neuroscience, molecular biology and immunology. This clearly documents that during the short period of its existence the Institute was able to fulfill and meet the goals outlined in its Foundation Charter.

Furthermore, with approval of the Presidium of Slovak Academy of Sciences and the Chancellor of the University of Veterinary Medicine and Pharmacy in Kosice, the **Centre of**

Biomedical Microbiology and Immunology (CBMI) was set up as a joint research undertaking located at the campus of the University in Kosice. Fully equipped, modern laboratories are used for research of zoonoses with special focus on **prion diseases** and **borreliosis** of animals and humans.

Leading position in national neuroscience research

Presidium of the Slovak Academy of Sciences endorsed set up of **the Centre of Excellence for Alzheimer's disease and Related Disorders** at **the Institute of Neuroimmunology (AD Centre).** The set up of the Centre of Excellence was an important milestone representing many years of hard and dedicated work to promote neuroscience research in Slovakia. The AD Centre was the **author of the first proposal for a PhD programme in neurosciences in Slovakia**, which was approved by the Accreditation Committee of the Slovak Government and Ministry of Education. The role of the AD Centre was to provide the unifying platform for the multidisciplinary and integrated approach in neurosciences and neurodegenerative diseases with main focus on Alzheimer's disease and related disorders (tauopathies). The cooperating institutions interconnect basic and applied reasearch, scientists and clinicians, and allow translation of basic scientific research into clinical praxis. As part of the project, the Centre offered service, information and support to the relatives of AD patients. The chosen structure of the Centre allowed very efficient and focused use of new techniques, equipment, expertise and methodology in neurosciences integrating all progressive forces in the field.

On the basis of the fruitful collaboration between the Institutions involved in the AD Centre, the Institute of Neuroimmunology initiated the establishment of the **Centre of Excellence for Brain Research** that was approved by the Presidium of SAS in 2011. The Centre further promoted the impact of Slovak neuroscience in an international context. The centre has specifically focused on three major neuroscience topics: 1) neurodegenerative diseases (Alzheimer's disease, Parkinson's disease), 2) neurodevelopmental disorders of the human brain (Asperger syndrome, autism), 3) traumatic spinal cord lesions and their treatment. The specific scientific goals of the Centre were the complex analyses of the brain neuroproteome, identification of the pathological forms of damaged proteins in the human neurodegenerative disorders, the search for novel biomarkers for Parkinson's disease, following the etiopathogenetic indicators of neurodevelopmental disorders and identification and validation of new regenerative treatments for traumatic spinal cord injuries. **The Brain Centre involved six members: Institute of Neuroimmunology SAS Bratislava; Institute of Neurobiology SAS, Kosice; Medical Faculty of the Commenius University, Bratislava; Jessenius Medical Faculty of the Commenius University, Martin; University of Veterinary Medicine and Pharmacy, Kosice; Centre MEMORY, Bratislava.** The Centre of Excellence has been fully integrated into the international research area by collaboration with many research organizations.

Leading position in international neuroscience research

A) The Institute of Neuroimmunology is the official representative of the Slovak republic in **the EU Joint programming - Neurodegenerative disease research (JPND, http://www.neurodegenerationresearch.eu/)**, **the largest global initiative in neurodegeneration research**, where 30 EU countries and 3 non-EU countries are already involved. Joint Programming in Research has been proposed in a communication of the European Commission COM(2008) 468 final, Brussels – *Working together to tackle common challenges more effectively*. Joint Programming is a unprecedented type of collaborative approach to research, in which countries come together to define a common vision, a strategic research agenda and a management structure, in order to address the 'grand challenges' facing the EU society in the coming years. The ultimate goal of JPND is to find cures for neurodegenerative diseases and to enable early diagnosis for early targeted treatments.

B) In its initial phase, the implementation of the JPND initiative was supported by the European Commission through the funding of the 4-year project **JUMPAHEAD - Coordination Action in support of the implementation of a Joint Programming Initiative for Combating Neurodegenerative Diseases, in particular Alzheimer's disease (FP7-HEALTH, GA no. 260774, September 2010; http://www.neurodegenerationresearch.eu/about/jumpahead/)**. NIU SAS was one of the 13 participating members.

The JUMPAHEAD project put in place the necessary infrastructures to support this completely new collaborative approach to European health research. The output of JUMPAHEAD over its 48 month duration included innovative ways of pooling national expertise and resources and the establishment of closer and robust research collaborations among the participating states in the field of neurodegeneration research. JUMPAHEAD contributed to the European Research Area by addressing the existing fragmentation of national research programmes. It aimed to improve to improve integration and co-ordination amongst research funders and research activities. By doing so, it aimed to ensure the maximum benefit for all European citizens from our research efforts into neurodegenerative diseases.

In the interim, JPND has, through its **Research Strategy Agenda,** identified common research goals that would benefit from joint action between countries in order to accelerate progress on solutions that can alleviate the symptoms, and lessen the social and economic impact of neurodegerative disorders for patients, families and health care systems.

Prof. Michal Novak, director of the Institute of Neuroimmunology, is the coauthor of **JPND Strategic Research Agenda** and was a member of the presentation board during its launch on Feb 7, 2012 at the EU Commission in Brussels.

C) The Centre of Excellence for Brain Research coordinated by NIU has been internationally recognized and became a member of CoEN (in 2012), **The Centres of Excellence in Neurodegeneration Research (CoEN, http://www.coen.org).** This is a parallel research

initiative operating under the umbrella of JPND, which aims to focus expertise within existing investments in recognised biomedical centres of excellence to address some of the immediate barriers to progress and wider collaborative working within these centres.

The admission criteria were met so far by the Canadian Institutes of Health Research (CIHR), the Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE), the Medical Research Council (MRC), Flanders Institute of Biotechnology (VIB Flanders, Belgium), the Health Research Board (Ireland), the Ministry of Health (Italy) and Centre of Excellence for Brain Research (through the Ministry of Education, Science, Research and Sport, Slovakia).

D) As part of the **Strategic Research Agenda**, JPND launched the first prestigious transnational call "*Neurodegenerative Diseases – a call for European research projects for the optimisation of biomarkers and harmonisation of their use between clinical centres*" on May 13, 2011. The Intitute of Neuroimmunology took part in the project **BIOMARKAPD - Biomarkers for Alzheimer's disease and Parkinson's disease** (**http://www.neurodegenerationresearch.eu**) that was funded within this call by JPND. The project was coordinated by Prof. Bengt Winblad from the Karolinska Institutet Alzheimer Disease Research Centre (Sweden). Dr. Norbert Zilka, a research scientist from the NiU SAS, was the country representative for Slovak republic. The ultimate goal of the project was to standardise the assessment of established and new cerebrospinal fluid biomarkers for AD and PD. The project was successfully accomplished in May 2016, but the collaboration of most of the participants continues under the umbrella of a CSF society.

E) On November 1, 2015, JPND began a new concerted support action with Horizon2020 called **JPsustaiND** - **Coordination Action in support of the sustainability and globalisation of the Joint Programming Initiative on Neurodegenerative Diseases (http://cordis.europa.eu/project/rcn/198527_en.html)**. The Institute of Neuroimmunology SAS participates in this action programme along with 13 additional institutions from France, Germany, Italy, Netherlands, UK, Spain, Denmark, Portugal, Croatia and Romania. The goal of this initiative is to establish a dedicated structure responsible for JPND management and implementation over the long term. By supporting further coordination and integration of national research and innovation programmes with the JPND research strategy, in coherence with Horizon 2020 objectives, JPsustaiND is thus creating a dedicated European Research Area for neurodegenerative diseases.

F) In 2015, JPND launched a joint transnational co-funded call in partnership with the European Commission under the ERA-NET Co-fund scheme. One of the projects that were accepted for funding is **REfrAME: Pathway complexities of protein misfolding in neurodegenerative diseases: a novel approach to risk evaluation and model development (http://www.neurodegenerationresearch.eu/initiatives/annual-calls-for-proposals/closed-**

calls/call-for-proposals/jpcofund-call-results-2015). The project aims to understand the molecular bases of Alzheimer's disease heterogeneity. The results may offer a major breakthrough in understanding the pathogenesis of degenerative disorders and may lead to the design of more appropriate therapies based on a deeper characterization of the subtypes of these disorders. This poject brought together the leaders in the neurodegeneration research in Europe, including A. Aguzzi (University of Zurich), M. Goedert (MRC Laboratory of Molecular Biology, UK), G. Legname (SISSA, Italy), M. Jucker (DZNE, Germany), G. Di Fede (IRCCS Foundation Carlo Besta Neurological Institute, Italy), J-Y. Li (Lund University, Sweden) and M. Novak (NIU, Slovakia).

G) **ALCOVE (ALzheimer's COoperative Valuation in Europe, http://www.alcove-project.eu)** was a Joint Action, co-financed by the **European Commission** (in the framework of the Public Health Programme, Grant Agreement N°2010 22 01) and was managed by the Executive Agency for Health and Consumers (EAHC) within the framework of the Community's 2008-2013 public health programmes. The joint action covered 30 partners from 19 countries (Belgium, Cyprus, Czech Republic, Finland, France, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, **Slovakia**, Spain, Sweden and the UK) all of which had agreed to work in a collaborative manner at European level. The work packages were focused on identification of the key stakeholders, including national Alzheimer associations. **Slovakia was represented by the Institute of Neuroimmunology, and was the leader of the Work package 3 (WP3) – Evaluation of the Joint action**.

H) The Government of the Slovak Republic appointed the **Institute of Neuroimmunology, SAS** to **the National Scientific Centre** under the auspices of the **International Centre for Genetic Engineering and Biotechnology (ICGEB, http://www.icgeb.org).** The Slovak Republic became the 41st member in this prestigious organization. Currently, ICGEB has over 60 member states. The role of the International Centre for Genetic Engineering and Biotechnology is to conduct innovative research in life sciences for the benefit of countries involved in the Centre. It strengthens the research capability of its members through training and funding programs and advisory services and represents a comprehensive approach to promoting biotechnology internationally. The Centre is dedicated to advanced research and training in molecular biology and biotechnology and pursues the prospect of advancing knowledge and applying the latest techniques in the fields of biomedicine, environmental protection/remediation and biopharmaceuticals production. Scientific activity focuses on several advanced projects in current biomedical research. It is important to note that the **ICGEB Board of Governors selected the Institute of Neuroimmunology as the Affiliated Centre of the ICGEB in the Slovak Republic.** ICGEB Council of Scientific Advisers reviewed the scientific output and research structure of the Institute of Neuroimmunology. Based on the information received and the outcome of the site visit a comprehensive report was issued and endorsed by the Board of Governors, which is responsible for granting the status of affiliated centre. Affiliated Centres are established research institutes in

Member States, which have attained a **high standard of research**. The Affiliated Centres (one only per Member State) form an effective **global research network**. They host many of the Centre's training activities and channel the resources and services of ICGEB to local institutions.

l) **NGP-NET (Non-globular proteins - from sequence to structure, function and application in molecular physiopathology) is a COST Action BM1405** financed by the European Commission.

Non-globular proteins (NGPs) encompass different molecular phenomena that defy the traditional sequence-structure-function paradigm. NGPs include intrinsically disordered regions, tandem repeats, aggregating domains, low-complexity sequences and transmembrane domains. Although growing evidence suggests that NGPs are central to many human diseases, functional annotation is very limited. It was recently estimated that close to 40 of all residues in the human proteome lack functional annotation and many of these are NGPs. This Action aims to create a pan-European scientific network of groups that work on NGPs to strengthen, focus and coordinate research in this field. NIU SAV researcher is from the May 2015 the member of the Management Committee of the COST Action project as one of the representatives of Slovak Republic. Involvement of NIU SAV in NGP-NET allows for the incorporation of the Institute research projects in the field of disordered, non-globular proteins in the neurodegenerative disorders, into the pan-european network of research.

Summary

To summarize, the Institute of Neuroimmunology SAS has become the leader in AD research in the Slovak national scientific milieu, supported by strong international collaborations and decisionmaking. It actively participates in several key European initiaives and projects (JPND, Jumpahead, ALCOVE, REfraAME, JPsustaiND). Importantly, NiU SAS became a member of the prestigious Centres of Excellence in Neurodegeneration Research CoEN that joins together leading institutions in the field of neurodegenerative disorders.

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/applied research: 60 % / 40 %
international research/regional research: 90 % / 10 %

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. Filipcik P, Zilka N, Bugos O, Kucerak J, Koson P, Novak P *et al.* First transgenic rat model developing progressive cortical neurofibrillary tangles. *Neurobiology of Aging* 2012; 33(7): 1448-1456. (6.189 - IF2011). doi:10.1016/j.neurobiolaging.2010.10.015. Times Cited: 27

2. Zilka N, Kovacech B, Barath P, Kontsekova E, Novak M. The self-perpetuating tau truncation circle. *Biochemical Society Transactions* 2012; 40: 681-686. (3.711 - IF2011) doi:10.1042/bst20120015. Times Cited: 14

3. Zilka N, Kazmerova Z, Jadhav S, Neradil P, Madari A, Obetkova D *et al.* Who fans the flames of Alzheimer's disease brains? Misfolded tau on the crossroad of neurodegenerative and inflammatory pathways. *Journal of Neuroinflammation* 2012; 9. (3.827 - IF2011)

4. Kovac A, Somikova Z, Zilka N, Novak M. Liquid chromatography-tandem mass spectrometry method for determination of panel of neurotransmitters in cerebrospinal fluid from the rat model for tauopathy. *Talanta* 2014; 119: 284-290. (3.511 - IF2013) doi:10.1016/j.talanta.2013.10.027 Times Cited: 12

5. Filipcik P, Novak P, Mravec B, Ondicova K, Krajciova G, Novak M *et al.* Tau Protein Phosphorylation in Diverse Brain Areas of Normal and CRH Deficient Mice: Up-Regulation by Stress. *Cellular and molecular neurobiology* 2012; 32(5): 837-845. (1.969 - IF2011)

6. Opattova A, Filipcik P, Cente M, Novak M. Intracellular Degradation of Misfolded Tau Protein Induced by Geldanamycin is Associated with Activation of the Proteasome. *Journal of Alzheimers Disease* 2013; 33(2): 339-348. (4.174 - IF2012)

7. Majerova P, Zilkova M, Kazmerova Z, Kovac A, Paholikova K, Kovacech B *et al.* Microglia display modest phagocytic capacity for extracellular tau oligomers. *Journal of Neuroinflammation* 2014; 11. (4.902 - IF2013) doi:16110.1186/s12974-014-0161-z. Times Cited: 6

8. Paholikova K, Salingova B, Opattova A, Skrabana R, Majerova P, Zilka N *et al.* N-terminal Truncation of Microtubule Associated Protein Tau Dysregulates its Cellular Localization. *Journal of Alzheimers Disease* 2015; 43(3): 915-926. (4.151 - IF2014)

9. Bhide M, Natarajan S, Hresko S, Aguilar C, Bencurova E. Rapid in vitro protein synthesis pipeline: a promising tool for cost-effective protein array design. *Molecular Biosystems* 2014; 10(6): 1236-1245. (3.183 - IF2013)

10. Jadhav S, Zilka N, Novak M. Protein Truncation as a Common Denominator of Human Neurodegenerative Foldopathies. *Molecular Neurobiology* 2013; 48(3): 516-532. (5.471 - IF2012)

11. Bhide M, Bhide K, Pulzova L, Madar M, Mlynarcik P, Bencurov E *et al.* Variable regions in the sushi domains 6-7 and 19-20 of factor H in animals and human lead to change in the affinity to factor H binding protein of Borrelia. *Journal of Proteomics* 2012; 75(14): 4520-4528. (4.878 - IF2011)

12. Jadhav S, Katina S, Kovac A, Kazmerova Z, Novak M, Zilka N. Truncated tau deregulates synaptic markers in rat model for human tauopathy. Frontiers in Cellular Neuroscience 2015; 9. (4.289 - IF2014) doi:10.1016/j.neurobiolaging.2015.05.003.

13. Madari A, Farbakova J, Katina S, Smolek T, Novak P, Weissova T et al. Assessment of severity and progression of canine cognitive dysfunction syndrome using the CAnine DEmentia Scale (CADES). Applied Animal Behaviour Science 2015; 171: 138-145. (1.691 - IF2014)

14. Filipcik P, Cente M, Zilka N, Smolek T, Hanes J, Kucerak J *et al.* Intraneuronal accumulation of misfolded tau protein induces overexpression of Hsp27 in activated astrocytes. *Biochimica Et Biophysica Acta-Molecular Basis of Disease* 2015; 1852(7): 1219-1229. (4.882 - IF2014)

15. Kralovicova J, Patel A, Searle M, Vorechovsky I. The role of short RNA loops in recognition of a single-hairpin exon derived from a mammalian-wide interspersed repeat. *Rna Biology* 2015; 12(1): 54-69. (4.974 - IF2014)
16. Prcina M, Kontsekova E, Novak M. Prion protein prevents heavy metals overloading of cells and thus protects them against their toxicity. *Acta Virologica* 2015; 59(2): 179-184. (1.280 - IF2014)
17. Skrabana R, Cehlar O, Novak M. Non-robotic high-throughput setup for manual assembly of nanolitre vapour-diffusion protein crystallization screens. *Journal of Applied Crystallography* 2012; 45: 1061-1065. (5.152 - IF2011)
18. Zilka N, Stozicka Z, Cente M, Kazmerova Z, Kovacech B, Novak M. Immunomodulation of Memory-Impairing Protein Tau in Alzheimer's Disease. *Neurodegenerative Diseases* 2012; 10(1-4): 242-245. (3.056 - IF2011)
19. Kruse N, Persson S, Alcolea D, Bahl JMC, Baldeiras I, Capello E *et al.* Validation of a quantitative cerebrospinal fluid alpha-synuclein assay in a European-wide interlaboratory study. *Neurobiology of Aging* 2015; 36(9): 2587-2596. (5.013 - IF2014).

    (This paper is the result of international collaboration with significant contribution of employee of NIU SAS)
20. Tang Z, Bereczki E, Zhang H, Wang S, Li C, Ji X, Filipcik P, *et al.* Mammalian Target of Rapamycin (mTor) Mediates Tau Protein Dyshomeostasis: Implication for Alzheimer Disease. *Journal of Biological Chemistry* 2013; 288(22): 15556-15570. (4.651 - IF2012) doi: 10.1074/jbc.M112.435123 Times Cited: 36

    (The paper is the result of international collaboration with significant contribution of employee of NIU SAS)

2.1.3 List of monographs/books published abroad

NOSEK, J. - BREJOVÁ, B - NEBOHÁČOVÁ, Martina - BARÁTH, Peter - BHATIA-KISSOVA, Ingrid - VALENT, Ivan - KOLLÁR, Richard - TOMÁŠKA, L. Genomika. CreateSpace Independent Publishing Platform, 2013. ISBN 978-1494230623.

2.1.4. List of monographs/books published in Slovakia

BHIDE, Mangesh - BENCÚROVÁ, Elena - HREŠKO, Stanislav - MLYNARČÍK, Patrik - MUCHA, Rastislav. Nové trendy vo využívaní bioinformatických analýz v genomike a proteomike. Košice : University of veterinary medicine and pharmacy, 2013. ISBN 978-80-8077-321-2.

ŽILKA, Norbert - PILIPČINEC, E. - NOVÁK, Michal. Imunologická pavučina mozgu. Bratislava : VEDA, 2013. ISBN 978-80-224-1265-0.

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

BARÁTH, Peter. Proteomika. In NOSEK, J. et al. *Genomika*. - CreateSpace Independent Publishing Platform, 2013, p.111-128. ISBN 978-1494230623.

ČÍŽKOVÁ, Dáša - ŽILKA, Norbert - KÁŽMÉROVÁ, Zuzana - SLOVINSKÁ, Lucia - VANICKÝ, Ivo - GRUĽOVÁ, Ivana - CIGÁNKOVÁ, V. - ČÍŽEK, Milan - NOVÁK, Michal. Mesenchymal stromal cells and neural stem cells potential for neural repair in spinal cord injury and human neurodegenerative disorders. In *Neural stem cells and therapy*. 1st ed. - Janeza Trdine 9, Rijeka, Croatia, 2012 : InTech, p. 359-382, 17 chapter. ISBN 978-953-307-958-5.

PULZOVÁ, Lucia - MLYNARČÍK, Patrik - BENCÚROVÁ, Elena - BHIDE, Mangesh. It takes two to tango: protein-protein interactions in the translocation of pathogens accross a blood-brain barrier. In *The Blood-Brain Barrier: New Research*. 2012. - Nova Science Publishers, 2012, p.79-115. ISBN 978-1-62100-766-1.

JADHAV, Santosh - CUBÍNKOVÁ, Veronika - ZIMOVÁ, Ivana - BREZOVÁKOVÁ, Veronika - MAĎARI, Aladár - CIGÁNKOVÁ, V. - ŽILKA, Norbert. Tau-mediated synaptic damage in Alzheimer's disease. In *Translational Neuroscience*, 2015, vol.6, no.1, p.214-226. ISSN 2081-3856.

MRAVEC, Boris - LEJAVOVÁ, Katarína - CUBÍNKOVÁ, Veronika. Locus (coeruleus) minoris resistentiae in pathogenesis of Alzheimer's disease. In *Current Alzheimer Research*, 2014, vol. 11, no. 10, p. 992 - 1001. (3.796 - IF2013). ISSN 1567-2050.

PULZOVÁ, Lucia - BHIDE, Mangesh. Outer Surface Proteins of Borrelia: Peerless Immune Evasion Tools. In *Current Protein & Peptide Science*, 2014, vol. 15, p. 75-88. (2.328 - IF2013). ISSN 1389-2037.

BARR, Christine - RIOLACCI-DHOYEN, Nathalie - GALBRAITH, Maggie - LEPERRE-DESPLANQUES, Armelle - NOVÁK, Michal - ŠKRABANA, Rostislav - JEŽOVIČOVÁ, Martina. Sharing knowledge to advance healthcare policies in Europe for people living with dementia and their carers: the ALCOVE project. In *Archives of Public Heath*, 2012, vol.70, p.21. ISSN 0778-7367.

REIJS, B. - TEUNISSEN, C. - GONCHARENKO, N. - BETSOU, F. - BLENNOW, K. - KOSOŇ, Peter. The central biobank and virtual biobank of BiOMarKaPD: a resource for studies on neurodegenerative diseases. In *Frontiers in Neurology*, 2015, vol.6, p.UNSP216. ISSN 1664-2295.

MITRO, Alexander - GALLATZ, K. - PALKOVITS, M. - KISS, Alexander. Ependymal cells variations in the central canal of the rat spinal cord filum terminale: an ultrastructural investigation. In *Endocrine Regulations*, 2013, vol. 47, no. 2, p. 93-99. ISSN 1210-0668.

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

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

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	1,0	0,082	0,003	0,0	0,000	0,000	0,0	0,000	0,000	**1,0**	**0,3**	**0,020**	**0,001**
Scientific monographs and monographic studies in journals and proceedings published in Slovakia *(AAB, ABB)*	0,0	0,000	0,000	2,0	0,164	0,007	0,0	0,000	0,000	0,0	0,000	0,000	**2,0**	**0,5**	**0,040**	**0,002**
Chapters in scientific monographs published abroad *(ABC)*	2,0	0,145	0,007	1,0	0,082	0,003	0,0	0,000	0,000	0,0	0,000	0,000	**3,0**	**0,8**	**0,061**	**0,003**
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	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Scientific papers published in journals registered in Current Contents Connect *(ADCA, ADCB, ADDA, ADDB)*	11,0	0,800	0,039	9,0	0,739	0,031	7,0	0,579	0,024	19,0	1,649	0,065	**46,0**	**11,5**	**0,928**	**0,040**
Scientific papers published in journals registered in Web of Science Core Collection and SCOPUS *(ADMA, ADMB, ADNA, ADNB)*	4,0	0,291	0,014	2,0	0,164	0,007	2,0	0,165	0,007	4,0	0,347	0,014	**12,0**	**3,0**	**0,242**	**0,010**
Scientific papers published in other foreign journals (not listed above) *(ADEA, ADEB)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	1,0	0,087	0,003	**1,0**	**0,3**	**0,020**	**0,001**
Scientific papers published in other domestic journals (not listed above) *(ADFA, ADFB)*	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 foreign peer-reviewed proceedings *(AEC, AECA)*	3,0	0,218	0,011	5,0	0,411	0,017	0,0	0,000	0,000	0,0	0,000	0,000	**8,0**	**2,0**	**0,161**	**0,007**
Scientific papers published in domestic peer-reviewed proceedings *(AED, AEDA)*	0,0	0,000	0,000	8,0	0,657	0,028	4,0	0,331	0,014	3,0	0,260	0,010	**15,0**	**3,8**	**0,303**	**0,013**
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)*	1,0	0,073	0,004	1,0	0,082	0,003	0,0	0,000	0,000	0,0	0,000	0,000	**2,0**	**0,5**	**0,040**	**0,002**

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

In the last five years (2012-2015) the institute successfully retained its high standard in the field of neurodegenerative disease research, the number of publications accepted into journals with higher impact factors increased likewise. The institute made significant improvement in the number of publications per salary budget. The price per one paper decreased within last 3 years and publication activity as well as the price per one paper has been very much improved in 2015.

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)	300,0	21,818	256,0	21,018	296,0	24,463	263,0	22,830	**1115,0**	**278,8**	**22,503**
Citations in SCOPUS (1.2, 2.2) if not listed above	32,0	2,327	43,0	3,530	51,0	4,215	42,0	3,646	**168,0**	**42,0**	**3,391**
Citations in other citation indexes and databases (not listed above) (3.2,4.2,9,10)	0,0	0,000	2,0	0,164	0,0	0,000	0,0	0,000	**2,0**	**0,5**	**0,040**
Other citations (not listed above) (3, 4, 3.1, 4.1)	2,0	0,145	0,0	0,000	0,0	0,000	0,0	0,000	**2,0**	**0,5**	**0,040**
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. ALONSO, A. - ZAIDI, T. - NOVÁK, Michal - GRUNDKE-IQBAL, I. - IQBAL, K. Hyperphosphorylation induces self-assembly of tau into tangles of paired helical filaments/ straight filaments. Proceedings of the National Academy of Sciences of the United States of America, 2001, vol. 98, p. 6923 - 6928.
   Citations: 140

2. SENGUPTA, A. - KABÁT, Juraj - NOVÁK, Michal - WU, Q.L. - GRUNDKE-IQBAL, I. - IQBAL, K. Phosphorylation of tau at both Thr 231 and Ser 262 is required for maximal inhibition of its binding to microtubules. Archives of Biochemistry and Biophysics, 1998, vol.357, p.299-309.
   Citations: 46

3. ALONSO, A. - MEDERLYOVÁ, Anna - NOVÁK, Michal GRUNDKE-IQBAL, I. - IQBAL, K. Promotion of Hyperphosphorylation by Frontotemporal Dementia Tau Mutations. Journal of Biological Chemistry, 2004, vol. 279, no. 33, p. 34873-34881.
   Citations: 43

4. EBRINGER, L. - FERENČÍK, Miroslav - KRAJČOVIČ, J. Beneficial health effects of milk and fermented dairy products. Folia microbiologica, 2008, vol.53, p.378-394.
   Citations: 40

5. MADER, Simone - GRENDLER, Viktoria - SCHANDA, Kathrin ROSTASY, Kevin - DUJMOVIC, Irena - PFALLER, Kristian - LUTTEROTTI, Andreas - JARIUS, Sven - DI PAULI, Franziska - KUENZ, Bettina - EHLING, Rainer - HEGEN, Harald - DEISENHAMMER, Florian - ABOUL-ENEIN, Fahmy STORCH, Maria K. - KOSOŇ, Peter - DRULOVIC, Jelena - KRISTOFERITSCH, Wolfgang - BERGER, Thomas - REINDL, Markus. Complement activating antibodies to myelin oligodendrocyte glycoprotein in neuromyelitis optica and related disorders. Journal of Neuroinflammation, 2011, vol. 8, p.184
   Citations: 38

6. NOVÁK, Michal - KABÁT, Juraj - WISCHIK, C.M. Molecular characterization of the minimal protease resistant tau-unit of the alzheimers-disease paired helical filament. EMBO journal : European Molecular Biology Organization, 1993, vol.12, p. 365-370
   Citations: 35

7. ŽILKA, Norbert - FILIPČÍK, Peter - KOSOŇ, Peter - FIALOVÁ, Ľubica - ŠKRABANA, Rostislav - ŽILKOVÁ, Monika - ROLKOVÁ, Gabriela KONTSEKOVÁ, Eva - NOVÁK, Michal. Truncated tau from sporadic Alzheimers disease suffices to drive neurofibrillary degeneration in vivo. FEBS Letters :Federation of European Biochemical Societies Letters for the Rapid Publication of Short Reports in Biochemistry, Biophysics and Molecular Biology. - Amsterdam :
   Elsevier Science Publishers, 2006, vol.580, p.3582-3588.
   Citations: 34

8. MUCHA, Rastislav - BHIDE, Mangesh - CHAKURKAR, E. - NOVÁK, Michal - MIKULA, Ivan. Toll-like receptors TLR1, TLR2 and TLR4 gene mutations and natural resistance to Mycobacterium avium subsp paratuberculosis infection in cattle. Veterinary immunology and immunopathology, 2009, vol.128, p.381 -388.
   Citations: 29

9. CANU, N. - DUS, L. - BARBATO, C. - CIOTTI, M. - BRANCOLINI, C. - RINALDI, A.W. - NOVÁK, Michal - CATTANEO, A. - BRADBURY, A. - CALISSANO, P.

Tau cleavage and dephosphorylation in cerebellar granule neurons undergoing apoptosis. Journal of Neuroscience, 1998, vol. 18, p.7061 -7074.
Citations: 28

10. KOVÁČ, Andrej - ERICKSON, Michelle A. - BANKS, William A. Brain microvascular pericytes are immunoactive in culture: cytokine, chemokine, nitric oxide, and LRP-1 expression in response to lipopolysaccharide. Journal of Neuroinflammation, 2011, vol. 8, p. 139
Citations: 24

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).

[1] Prof. MVD. Michal Novak, DSc

Citations: 1108

[2] Assoc. prof. MVD. Norbert Zilka, DSc

Citations: 364

[3] Assoc. prof. RNDr. Peter Filipcik, CSc

Citations: 185

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

Reported citations were extracted from the Thomson Reuters Web of Knowledge database apps.webofknowledge.com/.

Despite the fact, that Institute of Neuroimmunology of SAS celebrated only 20th anniversary of its foundation last year, Institute reaches high Hirsch index: 29, which is a significant improvement in comparison with the previous evaluation period (Hirsch index 22).

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

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

In the international context, the Institute of Neuroimmunology cooperates in its research activities with following institutions:

[1] Institute for Ageing and Health, Newcastle University, Newcastle upon Tyne – providing brain tissue samplesas part of projects “Mapping functional protein interactions in the human brain – Human interactome“ and “Brain neuroproteome in Alzheimer's disease“

[2] Karolinska Institutet, Alzheimer Disease Research Center – standardisation of the AD and PD biomarker measurements across Europe as part of the project “Biomarkers for Alzheimer’s disease and Parkinson’s disease”

[3] Department of Psychiatry, University Hospitals, Geneva – providing brain tissue samples as part of the project “Infectious tauon strains as a tool for stratification of patients with Alzheimer's disease”

[4] Institut National de la Sante et de la Recherche Medicale (Inserm), France

[5] Medical Research Council, United Kingdom

[6] Bundesministerium fuer Bildung und Forschung, Germany

[7] Deutsches Zentrum fuer Luft - und Raumfahrt Ev, Germany

[8] Zorgonderzoek Nederland Zon, Netherlands

[9] Fondation de Cooperation Scientifique Maladie d'Alzheimer et Maladies Apparentees, France

[10] Ministero dell'istruzione, dell'universita' e della Ricerca Italy

[11] Instituto De Salud Carlos Iii Spain

[12] Inserm - Transfert Sa France

[13] Innovationsfonden Denmark

[14] Vetenskapsradet - Swedish Research Council Sweden

[15] Fundacao Para A Ciencia E A Tecnologia Portugal

[16] Sveuciliste U Zagrebu Medicinski Fakultet Croatia

[17] Autoritatea Nationala Pentru Cercetare Stiintifica Si Inovare Romania

[18] Department of Psychiatry, University Hospitals, Geneva – providing brain tissue samples as part of the project “Infectious tauon strains as a tool for stratification of patients with Alzheimer's disease”

[19] Laboratory of molecular structure characterization, Institute of Microbiology, CAS – characterisation of interaction domains using high-resolution mass spectrometry as part of the project “Mapping functional protein interactions in the human brain – Human interactome“

[20] Institute of macromolecular chemistry CAS, BIOCEV, Prague, Institute of organic chemistry and biochemistry CAS, CEITEC, Brno, Max Perutz Laboratory Vienna – collaboration on developing new crystallography approaches to biological macromolecules, computational modelling of biological macromolecules, using their expertise with molecular spectroscopy as part of the project “Intrinsically disordered proteins participating in the pathogenesis of human neurodegenerative disorders”

[21] Synchrotron institutions EMBL DESY Hamburg, SLS Villigen, ESRF Grenoble – using synchrotron sources to approach specific crystallography challenges, using small-angle x-ray scattering, continuous collaboration on European projects under existing project schemes on structural biology and biophysics as part of the project “Intrinsically disordered proteins participating in the pathogenesis of human neurodegenerative disorders”

[22] Institute of Physiology CAS – collaboration on embryotransfer and cryopreservation of embryos as part of the project “Humanized animal models of human neurodegenerative disorders”

[23] School of Medicine, Charles University in Prague – changes in the composition of muscarinic receptors in specific brain areas of animal models of Alzheimer's disease and Parkinson's disease as part of the project “Humanized animal models of human neurodegenerative disorders”

[24] The Institute of Neuroimmunology (NIU) SAS is the National Affiliated Centre for the cooperation of the Slovak Republic with the **International Centre for Genetic Engineering and Biotechnology** of the UN (**ICGEB**). The director of the Institute of Neuroimmunology prof. DVM. Michal Novak, PhD., is the ICGEB governor for the Slovak Republic.

[25] The institute of Neuroimmunology SAS founded and became the coordinator of the **National Centre of Excellence for Brain Research** (**AD Brain Centre**) in Slovakia, which includes the Institute of Neurobiology, Institute of Experimental Endocrinology, Jessenius Faculty of Medicine in Martin, Medical Faculty in Bratislava, University of Veterinary Medicine and Pharmacy in Košice and The Centre MEMORY. with the aim to build an integrated platform for excellent research focused on the brain research. In 2011, the **AD Brain Centre** joined the international elite group focused on the human neurodegenerative diseases - **The Centres of Excellence in Neurodegeneration Research (CoEN)** together

with Canadian Institutes of Health Research (CIHR), the German center for neurodegenerative diseases - Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE), Medical Research Council (MRC), Flanders Institute of Biotechnology (VIB Flanders, Belgium), The Health Research Board (Ireland) and The Ministry of health (Italy).

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 title:** Nanomechanics of intermediate filament networks – NANONET
   Project number: Action BM1002, **COST**
   Duration: 05/2010-05/2014
   Principal Investigator: Norbert Zilka
   Role of the Org.: Participant
   Funding: 0

2. **Project title:** Coordination action in support of the implementation of a Joint Programming Initiative for combating Neurodegenerative Diseases, in particular Alzheimer's Disease (JUMPAHEAD)
   Project number: 260774, **JPND**
   Duration: 09/2010-08/2014
   Principal Investigator: Michal Novak
   Role of the Org.: Participant
   Funding: 0

3. **Project title:** Tau truncation: the self-renewing propagator of neurofibrillary degeneration in Alzheimer's disease
   Project number: CRP/SVK 10-01,**ICGEB**
   Duration: 01/2011-12/2013
   Principal Investigator: Branislav Kovacech
   Role of the Org.: Coordinator
   Funding: 42 000

4. **Project title:** ALzheimer COoperative Valuation in Europe (ALCOVE)
   Project number: 20102201, **DGSANCO**
   Duration: 04/2011-03/2013
   Principal Investigator: Michal Novak
   Role of the Org.: Participant
   Funding: 38 168

5. **Project title:** BiomarkAPD - Biomarkers for Alzheimer's disease and Parkinson's disease
   Project number: 370/2012, **JPND**
   Duration: 06/2012-05/2015
   Principal Investigator: Norbert Zilka
   Role of the Org.: Participant
   Funding: 362 400

6. **Project title:** Non-globular proteins - from sequence to structure, function and application in molecular physiopathology
Project number: BM1405, **COST**
Duration: 05/2015-03/2019
Principal Investigator: Rostislav Skrabana
Role of the Org.: Participant
Funding: 0

7. **Project title:** JPsustaiND -Coordination Action in support of the sustainability and globalisation of the Joint Programming Initiative on Neurodegenerative Diseases
Project number: 681043, **HORIZON2020**
Duration: 11/2015-10/2019
Principal Investigator: Michal Novak
Role of the Org.: Participant
Funding: 25 000

8. **Project title:** Synaptic Dysfunction in Alzheimer Disease (SyDAD)
Project number: 676144,**HORIZON 2020** Marie Sklodowska Curie Actions
Duration: 11/2015-10/2019
Principal Investigator: Michal Novak
Role of the Org.: Participant
Funding: 120 000

9. **Project title:** REfrAME: Pathway complexities of protein misfolding in neurodegenerative diseases: a novel approach to risks evaluation and model development
Project number: JPCOFUND_FP-829-085, **HORIZON2020**
Duration: 05/2016-04/2019
Principal Investigator: Michal Novak
Role of the Org.: Participant
Funding: 490 000

10. In addition, new grant applications are being continuously submitted (e.g. in EraNet 2016 two proposals are currently under review)

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

No	Year	Conference	Place
1.	2015	Behind the curtain of canine and feline dementia: from neuroscience research to treatment	Kosice
2.	2015	7th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
3.	2014	6th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
4.	2014	19th Management Board (MB) meeting of the EU Joint Programme on neurodegenerative diseases	Bratislava
5.	2013	7th international symposium on Experimental and Clinical Neurobiology	Kosice
6.	2013	FENS Featured Regional Meeting	Praha
7.	2013	5th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
8.	2012	4th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava

2.3.3. List of edited proceedings from international scientific conferences.

No	Year	Conference	Place
1.	2015	Behind the curtain of canine and feline dementia: from neuroscience research to treatment	Kosice
2.	2015	7th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
3.	2014	6th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
4.	2014	19th Management Board (MB) meeting of the EU Joint Programme on neurodegenerative diseases	Bratislava
5.	2013	7th international symposium on Experimental and Clinical Neurobiology	Kosice
6.	2013	FENS Featured Regional Meeting	Praha
7.	2013	5th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
8.	2012	4th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava

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**

Position of NIU SAS in national context:

[1] NIU SAS is the main coordinator for the **Slovak Society for Neuroscience (SSN)** activities. The central task of the Slovak Society for Neuroscience is the development and enhancement of neuroscience in the Slovak Republic. SSN is a member of FENS - Federation of European Neuroscience Societies. **Director of the Institute was FENS Schools Committee Member (2008-2012) and representative of FENS 2008-2012).**

[2] NIU SAS founded and greatly contributes to the activities of the **Slovak Alzheimer Society**. The aim of the Society is to coordinate research on Alzheimer's disease and other neurodegenerative disorders, the application of the latest scientific knowledge into medical care and support of the caregivers and patients at home. The Slovak Alzheimer's Society represents Slovakia in the the international federation of Alzheimer associations around the world - **Alzheimer's Disease International** (ADI) and Alzheimer Europe (AE). The Society works closely with the Czech Alzheimer Society, the coordinating committee for Citizens with Disabilities and the vocational integration of people with disabilities in the Ministry of Labour, Social Affairs and Family.

[3] In 2002 NIU, together with the Memory Foundation, founded the **Centre MEMORY**, first joint institution for translating the basic research outputs into clinical practice in the field of neurodegenerative disease with focus on Alzheimer's disease. The Centre MEMORY is the first specialized day care centre in Slovakia providing preventive, diagnostic and educational services for people with memory impairments, for people suffering from Alzheimer's disease as well as help and support to their families.

[4] NIU SAS is the major contributor to the activities of the **Slovak Immunological Society (SIMS)**. SIMS is a member of the European Federation of immunological societies - EFIS and the International Union of Immunological Societies - IUIS.

[5] NIU SAS, in cooperation with the University of Veterinary Medicine and Pharmacy in Kosice, established the **Biomedical Centre of Microbiology and Immunology (CMBI)**. The Centre is focused on the study of gene polymorphism of people for determining of their sensitivity to zoonoses.

[6] The Institute of Neuroimmunology SAS and the Ministry of Education, Science, Research and Sport of the Slovak Republic are the official representatives of Slovakia in **Joint Programming in Neurodegenerative Disease Research** (**JPND**, 28 EU countries). The director of the Institute of Neuroimmunology Prof. DVM. Michal Novak, PhD. was a member of the Management Board of JPND and is a co-author of the Strategic research agenda of JPND, which defines the main priorities and strategies for research management on human neurodegenerative diseases in Europe over the next 10 years.

[7] In 2012, NIU SAS was evaluated as an excellent research institution and awarded the highest level of scientific **excellence A*** by the **Accreditation International Scientific Committee**.

2.3.5. List of selected projects of national importance

	Project title	Agency
1.	Transcriptional and proteomic analysis of redox system in neurons expressing pathological tau protein isoforms	APVV
2.	Complex approach to structural study of intrinsically disordered protein tau associated with neurodegenerations	APVV
3.	Identification of the posttranslational modifications of the neuronal protein tau leading to neurofibrillary degeneration in tauopathies	APVV
4.	Is stress a crucial factor in the process of neurodegeneration accompanying Alzheimer´s disease?	APVV
5.	Risk factors and proteomic signature of cognitive dysfunctions in animal models for human dementias	APVV
6.	Mechnism of immune and neuronal system interaction in the brain during neurodegeneration	APVV
7.	Etiopathogenesis of neurodegenerative diseases: focus on RNA processing regulation in development and progression of sporadic tauopathies and Alzheimer´s disease	APVV
8.	Development of novel peptide based system for delivery of therapeutics into the brain	APVV
9.	The model of the neuroimmune crosstalk in Alzheimer´s disease	APVV
10.	Impact of pathological forms of tau protein on structural changes of neurovascular unit in the rat model of Alzheimer's disease	VEGA
11.	Monoclonal antibodies as a tool for study of conformational changes of tau protein in Alzheimer´s disease	VEGA
12.	Intrinsically disordered protein tau and its structural changes analyzed by its immunological imprint - conformation-specific monoclonal antibody	VEGA
13.	Molecular mechanisms of neurotoxicity induced by expression of naturaly unfolded proteins	VEGA
14.	Fourth microtubule-binding region of disordered tau protein studied by complementary methods of structural biology: insight into its role in physiology and pathology	VEGA
15.	Inflammatory pathways influenced by the gentic background in tauopathy	VEGA
16.	Study of multiple complement evasion strategies used by neuroinvasive Francisella and Borrelia	VEGA
17.	Analysis of biomarkers in cerebrospinal fluid in transgenic animal models for human tauopathies	VEGA
18.	Effect RNA secondary structure on RNA splicing effciency. Implication for regulation sythesis of tau exon10 +/-	VEGA
19.	Studies of tau protein functions in nuclei of neurons	VEGA
20.	Conversion of the neuronal protein tau into pathological forms in the animal model of neurofibrillary degeneration	VEGA

21.	Ubiquitin proteasomal system and it's activity in cellular model of neurodegeneration: implications for etiopathogenesis of degenerative diseases of brain	VEGA
22.	Biophysics and structure of intrinsically disordered polypeptides studied on the N-terminal tail of tau protein: implications for neurodegenerative tauopathies	VEGA
23.	Identification of molecular mechanisms underlying dysregulated proteostasis in neurodegenerative proteinopathy	VEGA
24.	Molecular profiling of miRNA and gene expression changes in a model of human tauopathy	VEGA
25.	Damage of the blood-brain barrier of transgenic rat models for tauopathies	VEGA
26.	Structural study of multiple homologous epitopes present on the molecule of intrinsically disordered protein tau	VEGA
27.	Center of Excellence for Brain Research	SAV
28.	Screening assay for the identification of biomarkers for early diagnostic of Parkinson disease	VA

APVV - Slovak Research and Development Agency (SRDA)

VEGA - Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic

SAV - Slovak Academy of Sciences (SAS)

VA - Research Agency

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

1. **Project title:** Transcriptional and proteomic analysis of redox system in neurons expressing pathological tau protein isoforms
   Project number: LPP-0043-09
   Duration: 09/2009-08/2012
   Principal Investigator: Peter Filipcik
   Role of the Org.: Coordinator
   Funding: 49 800 €

2. **Project title:** Complex approach to structural study of intrinsically disordered protein tau associated with neurodegenerations
   Project number: LPP-0038-09
   Duration: 09/2009-08/2013
   Principal Investigator: Rostislav Skrabana
   Role of the Org.: Coordinator
   Funding: 83 000 €

3. **Project title:** Identification of the posttranslational modifications of the neuronal protein tau leading to neurofibrillary degeneration in tauopathies
   Project number: APVV-0399-10
   Duration: 05/2011-08/2014
   Principal Investigator: Branislav Kovacech
   Role of the Org.: Coordinator
   Funding: 249 856 €

4. **Project title:** Is stress a crucial factor in the process of neurodegeneration accompanying Alzheimer´s disease?
   Project number: APVV-0088-10
   Duration: 05/2011-10/2014
   Principal Investigator: Richard Kvetnansky / Peter Filipcik
   Role of the Org.: Participant
   Funding: 100 000 €

5. **Project title:** Risk factors and proteomic signature of cognitive dysfunctions in animal models for human dementias
   Project number: APVV-0206-11
   Duration: 07/2012- 06/2015
   Principal Investigator: Norbert Zilka
   Role of the Org.: Coordinator
   Funding: 122 400 €

6. **Project title:** Mechnism of immune and neuronal system interaction in the brain during neurodegeneration
   Project number: APVV-0200-11
   Duration: 07/2012- 06/2015
   Principal Investigator: Monika Zilkova
   Role of the Org.: Coordinator
   Funding: 160 000 €

7. **Project title:** Etiopathogenesis of neurodegenerative diseases: focus on RNA processing regulation in development and progression of sporadic tauopathies and Alzheimer´s disease
   Project number: APVV-0677-12
   Duration: 10/2013-09/2016
   Principal Investigator: Peter Filipcik
   Role of the Org.: Coordinator
   Funding: 199 950 €

8. **Project title:** Development of novel peptide based system for delivery of therapeutics into the brain
   Project number: APVV-14-0547
   Duration: 07/2015-06/2018
   Principal Investigator: Andrej Kovac
   Role of the Org.: Coordinator
   Funding: 244 264 €

9. **Project title:** The model of the neuroimmune crosstalk in Alzheimer´s disease
   Project number: APVV-14-0872
   Duration: 07/2015-06/2018
   Principal Investigator: Norbert Zilka

Role of the Org.: Coordinator
Funding: 248 996 €

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

1. **Project title:** Analysis of biomarkers in cerebrospinal fluid in transgenic animal models for human tauopathies
   Project number: 2/0205/11
   Duration: 01/2011-12/2013
   Principal Investigator: Peter Kosoň
   Role of the Org.: Coordinator
   Funding: 11 230

2. **Project title:** Effect RNA secondary structure on RNA splicing effciency. Implication for regulation sythesis of tau exon10 +/-
   Project number: 2/0179/12
   Duration: 01/2012-12/2014
   Principal Investigator: Jana Kráľovičová
   Role of the Org.: Coordinator
   Funding: 19 570

3. **Project title:** Studies of tau protein functions in nuclei of neurons
   Project number: 2/0186/12
   Duration: 01/2012-12/2015
   Principal Investigator: Peter Baráth
   Role of the Org.: Coordinator
   Funding: 28 542

4. **Project title:** Conversion of the neuronal protein tau into pathological forms in the animal model of neurofibrillary degeneration
   Project number: 2/0155/13
   Duration: 01/2013-12/2016
   Principal Investigator: Branislav Kováčech
   Role of the Org.: Coordinator
   Funding: 25 339

5. **Project title:** Ubiquitin proteasomal system and its activity in cellular model of neurodegeneration: implications for etiopathogenesis of degenerative diseases of brain
   Project number: 2/0161/13
   Duration: 01/2013-12/2015
   Principal Investigator: Peter Filipčík
   Role of the Org.: Coordinator
   Funding: 13 952

6. **Project title:** Biophysics and structure of intrinsically disordered polypeptides studied on the N-terminal tail of tau protein: implications for neurodegenerative tauopathies
   Project number: 2/0163/13
   Duration: 01/2013-12/2016
   Principal Investigator: Rostislav Škrabana
   Role of the Org.: Coordinator
   Funding: 27 462

7. **Project title:** Identification of molecular mechanisms underlying dysregulated proteostasis in neurodegenerative proteinopathy
   Project number: 2/0194/14
   Duration: 01/2014-12/2016
   Principal Investigator: Monika Zilkova
   Role of the Org.: Coordinator
   Funding: 17 379

8. **Project title:** Molecular profiling of miRNA and gene expression changes in a model of human tauopathy
   Project number: 2/0141/15
   Duration: 01/2015-12/2018
   Principal Investigator: Peter Koson
   Role of the Org.: Coordinator
   Funding: 18 656

9. **Project title:** Damage of the blood-brain barrier of transgenic rat models for tauopathies
   Project number: 2/0159/15
   Duration: 01/2015-12/2017
   Principal Investigator: Andrej Kovac
   Role of the Org.: Coordinator
   Funding: 12 198

10. **Project title:** Structural study of multiple homologous epitopes present on the molecule of intrinsically disordered protein tau
    Project number: 2/0177/15
    Duration: 01/2015-12/2018
    Principal Investigator: Ondrej Cehlar
    Role of the Org.: Coordinator
    Funding: 11 502

2.3.8. Projects of SAS Centres of Excellence

Project title: Center of Excellence for Brain Research
Project number: II/2/2011
Duration: 08/2011-08/2015

Principal Investigator: Norbert Zilka

Role of the Org.: Coordinator

Funding: 120.833

2.3.9. National projects supported by EU Structural Funds

Project title: Screening assay for the identification of biomarkers for early diagnostic of Parkinson disease

Project number: 26240220046

Duration: 11/2010-04/2013

Principal Investigator: Peter Filipcik

Role of the Org.: Coordinator

Funding: 853.228,49

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

1. NOVÁK, Michal – ŽILKA, Norbert – KOVÁČECH, Branislav – BARÁTH, Peter – KONTSEKOVÁ, Eva - The self- perpetuating tau truncation circle. A Biochemical Society Focused Meeting: The biology and pathology of Tau and its role in tauopathies II, Cambridge, UK, Robinson College, 8-9.1.2012, S013 s7, **invited presentation**

2. BHIDE, Mangesh - Protein synthesis pipelines for study of protein-protein interaction. Farm animal proteomics COST Action FA1002 Vilamoura Portugalsko, 12-13.4.2012, **invited presentation**

3. NOVÁK, Michal – ŽILKA, Norbert – KOVÁČECH, Branislav – BARÁTH, Peter – KONTSEKOVÁ, Eva – Tau truncation: The most productive post-translational modification. Alzheimer‘s Association International Conference 2012, Vancouver, British Columbia, 14-19.7.2012, P424, **invited presentation**

4. NOVÁK, Michal – Misfolded tau destroys synapses in the absence of Aβ pathology. 8th International Winter Conference on Alzheimer's disease. AD Drug Therapy – Hope and Reality New targets in sight? Zürs, Austria, 7-10.12.2012, s52, **invited presentation**

5. KOVÁČECH, Branislav - Alzheimer's disease tau proteome – pathogenic and protective tau truncation in Alzheimer's disease. AD Drug Therapy – Hope and

Reality New targets in sight? Zürs, Austria, 7-10.12.2012, s50, **invited presentation**

6. ŽILKA, Norbert – Two faces of neuroinflammation in Alzheimer's disease. AD Drug Therapy – Hope and Reality New targets in sight? Zürs, Austria, 7-10.12.2012, s56, **invited presentation**

7. NOVÁK, Petr – Stress as a contributing factor in tau neurodegeneration. AD Drug Therapy – Hope and Reality New targets in sight? Zürs, Austria, 7-10.12.2012, s54, **invited presentation**

8. BHIDE, Mangesh - CEPKOVA, Martina. Mutations in TLR-1 and TLR-2 cause hyporesponsiveness to Listeria infection. 18. International Symposium on Problems of Listeriosis, Goa, India, 19.-22.9.2013, **invited presentation**

9. BHIDE, Mangesh. Molecular and proteomics aspects of complement evasion mechanisms by the model pathogens. Proteomics in Farm animal immunology, Milano, Taliansko, 28.8.2013, **invited presentation**

10. BHIDE, Mangesh. Rapid protein synthesis pipelines. Annual national conference ItPA, Padova, Taliansko, 18-21.6. 2013, **invited presentation**

11. KONTSEKOVA, Eva. The future without Alzheimer's disease. 5th International scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease, Bratislava, 19-20.9. 2013, **invited presentation**

12. ZILKA, Norbert – NOVAK, Michal. Inflammation behind the barrier – Neuroinflammation as a disease modifying factor of Alzheimer's disease. 2nd Meeting of Middle-European Societies for Immunology and Allergology, Opatija, Chorvátsko, Október 10-13, 2013, **invited presentation**

13. ZILKA, Norbert - Neuro-immune proteomic crosstalk in health and disease: Partners in love, partners in divorce. Farm animal proteomics 3rd Meeting, Košice, Slovensko, Apríl 25-26, 2013, **invited presentation**

14. NOVAK, Michal – Misfolded Protein Tau as Driving Force in Alzheimer's Disease Neurofibrillary Degeneration. IBRO-APRC School: Injury and Regeneration of the Nervous System, Nantong, Čína, 25.10.- 1. 11. 2013, **invited presentation**

15. NOVAK, Michal – Vaccine for Alzheimer's disease: Tau protein and/or beta-amyloid? A joint meeting ČSAKI and the CIS "The brain and nerves – are they still immunologically privileged?" Praha, Česká republika, 12. 9. 2013, **invited presentation**

16. NOVAK, Michal – Tau mediated neuroinflammation – Two sides of one coin, FENS Featured Regional Meeting, Praha, Česká republika, 11. -14. 9. 2013, **invited presentation**

17. NOVAK, Michal – ŽILKA, Norbert, - KOVAČECH, Branislav, - KONTSEKOVA, Eva - Tau Immuno – Therapy – The way how to crack the immune code of misfolded protein tau, AAIC, Boston, USA, 13. 7. - 18. 7. 2013, **invited presentation**

18. NOVAK, Michal – Tau truncation – driving force of Alzheimer's disease. 7th International symposium on Experimental and Clinical Neurobiology, 23. – 27. 6. 2013, Košice, Slovensko, **invited presentation**

19. NOVAK, Michal. First-in-man and First-in-class Tau Vaccine, the Alzheimers Association International Conference 2014 AAIC, Copenhagen, Denmark, 12-17.7.2014, **invited presentation**

20. ŽILKA, Norbert - NOVÁK, Michal. Naturally disordered proteins as a new form of infectious pathogens, Infectious and parasitic diseases of animals, 5th international scientific conference, 4.-5.9. 2014, Košice, **invited presentation**

21. ŽILKA, N. Was the Alzheimer's disease on the Pandora's Box? 6th International scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease, 18. 9. 2014, Bratislava, **invited presentation**

22. ŠKRABANA, Rostislav – KOVAČECH, Branislav – CEHLÁR, Ondrej – NOVÁK, Michal. Structural biology of unstructured protein tau, involved in Alzheimer's disease. XXIV. Biochemický zjazd, Hotel Saffron, Bratislava, 19.9.2014, **invited presentation**

23. NOVÁK, Michal. Immunotherapy of Alzheimer's disease, Kongres CSAKI, CIS, SSAKI, SIMS, 15.-18.10.2014, Ostrava, **invited presentation**

24. KONTSEKOVÁ, Eva. Immunotherapy of Alzheimer's disease: amyloid versus tau, Czech and Slovak Meeting of Immunological Laboratories (ČASOMIL), XVIII, 11. 6.– 13. 6. 2014, Vysoké Tatry, **invited presentation**

25. NOVÁK, M. TAU VACCINE AADVAC1 - THE ROAD TO PHASE II CLINICAL TRIALS, The 12th International Conference on Alzheimer's & Parkinson's, Nice, France March 18-22, 2015, **invited presentation**

26. NOVÁK, M. Tau vaccine and human clinical trial, the Inge Grundke-Iqbal Symposium on Tau Therapeutic, NY, USA, 27.2.2015, **invited presentation**

27. NOVÁK, M. Two sides of one coin – efficacy and safety in pre-clinical studies on tau immunotherapeutics, Clinical Trials on Alzheimer's Disease, BARCELONA, Spain, 5.-7.11.2015, **invited presentation**

28. KOVAC, A. Tau protein and its role in neurodegeneration. 12th International Symposium on Vip, Pacap And Related Peptides, Cappadocia, Turkey, September 21-26, 2015, **invited presentation**

29. KOVAC, A. Neurovascular changes in tauopathies. IRB, Blood-brain barrier meeting, Barcelona, Spain, November 2-4, 2015, **invited presentation**

30. KOVAC, A. Determination of phenylalanine, tyrosine, tryptophan and kynurenine in plasma of rat model for tauopathies by HPLC with fluorescent and mass spectrometry detection. 34th International Winter Workshop-Clinical, Chemical and Biochemical Aspects of Pteridines and Related Topics, Innsbruck, Austria, February 24-27, 2015, **invited presentation**

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

No	Name	Year	Conference	Place
1.	**Novak**	2015	7th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
		2014	6th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
		2014	19th Management Board (MB) meeting of the EU Joint Programme on neurodegenerative diseases	Bratislava
		2013	7th international symposium on Experimental and Clinical Neurobiology	Kosice
		2013	FENS Featured Regional Meeting	Praha
		2013	5th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
		2012	4th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
2.	**Zilka**	2015	Behind the curtain of canine and feline dementia: from meuroscience research to treatment	Kosice
3.	**Kvetnansky**	2013	FENS Featured Regional Meeting	Praha

- **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

1. NOVÁK, Michal – ŽILKA, Norbert – KOVÁČECH, Branislav – BARÁTH, Peter – KONTSEKOVÁ, Eva - 20 years of tau truncation – long research of a shortened protein. Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s14, **invited presentation**

2. KVETŇANSKÝ, Richard – LEJAVOVÁ, K – NOVÁK, Petr - NAGYOVÁ, Emília- MRAVEC, Boris – FILIPČÍK, Peter - NOVÁK, Michal - Relationship between stress, catecholaminergic system and tau protein in a rat model of Alzheimer‘s disease (AD). Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s20, **invited presentation**

3. KOVÁČECH, Branislav - BARÁTH, Peter – NOVÁK, Michal – Tau proteome in neurodegenerative disorders. Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s19, **invited presentation**

4. ŽILKOVÁ, Monika – ŽILKA, Norbert – KÁŽMEROVÁ, Zuzana – MAJEROVÁ, Petra - NOVÁK, Michal – Neuroprotective impact of mesenchymal stem cells therapy on Alzheimer's disease cell model with expression of pathological truncated tau protein. Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence

for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s27, **invited presentation**

5. ŽILKA, Norbert – KOVÁČ, Andrej - NOVÁK, Michal -The fatal dialog between chronic neuroinflammation and intrinsically disordered proteins. Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s26, **invited presentation**

6. VESELÁ, Alžbeta – Memory centre a complex care of people with memory impairment and Alzheimer‘s disease. Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s25, **invited presentation**

7. BHIDE, Mangesh - Protein synthesis pipelines for study of protein: protein interactions. Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s15, **invited presentation**

8. PULZOVÁ, Lucia- KOVÁČ, Andrej - BHIDE, Mangesh - Neuroinvasive borrelia activates downstream signaling pathway in BMECs. Annual Meeting of Slovak Society for Neuroscience & Centre of Excellence for Brain Research, Smolenice, Slovensko, 24-26.5.2012, s22-23, **invited presentation**

9. ŠKRABANA, Rostislav – ŽILKA, Norbert – NOVÁK, Michal. Will the Alzheimer's disease touch us all?, lecture for the public: "Do not forget to come", organized by the Foundation of Centre Memory, KC Dunaj, Bratislava, 11.2.2013, **invited presentation**

10. NOVÁK, Michal. Joint Programming in Neurodegenerative Diseases. Annual Meeting of Slovak National JPND Consortium "National Program for Combating Alzheimers Disease", Smolenice Castle, 20-22.3.2014, **invited presentation**

11. KOSOŇ, Peter. Clinical diagnostics in Alzheimers disease and related dementias, Annual Meeting of Slovak National JPND Consortium "National Program for Combating Alzheimers Disease", Smolenice Castle, 20-22.3.2014, **invited presentation**

12. KOVÁČECH, Branislav. Body fluids biomarkers for Alzheimers disease, Annual Meeting of Slovak National JPND Consortium "National Program for Combating Alzheimers Disease", Smolenice Castle, 20-22.3.2014, **invited presentation**

13. ŽILKA, Norbert. Brain banking and post-mortem diagnostics of Alzheimers disease, Annual Meeting of Slovak National JPND Consortium "National Program for Combating Alzheimers Disease", Smolenice Castle, 20-22.3.2014, **invited presentation**

14. BARÁTH, Peter. Tau proteome in Alzheimers disease, Annual Meeting of Slovak National JPND Consortium "National Program for Combating Alzheimers Disease", Smolenice Castle, 20-22.3.2014, **invited presentation**

15. KONTSEKOVÁ, Eva - NOVÁK, Michal. Biological therapy of Alzheimer's disease: Status quo and novel trends. Biological therapy in theory and practice. Conference of Slovak Immunological Society SAS and NIU SAS, Conference hall SAS Bratislava, 4.9.2014, **invited presentation**

16. KOVÁĆECH, Branislav. Identification of targets for biological therapy of Alzheimer's disease - pathological forms of neuronal protein tau. Biological therapy in theory and practice. Conference of Slovak Immunological Society SAS and NIU SAS Conference hall SAS Bratislava, 4.9.2014, **invited presentation**

17. NOVÁK, M. 25 years of tau truncation – long research of a shortened protein, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

18. NOVÁK, P. The immunological strategies of disease- modifying therapy of Alzheimer's disease, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

19. SMOLEK, T. The neurobiology of canine dementia, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

20. JADHAV, S. The tau synaptic abnormalities in brain disorders, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

21. ČENTE, M. Nucleic acid as biomarkers for neurodegenerative diseases, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

22. MICHALICOVÁ, A.The blood-brain barrier in health and disease - damage of blood-brain barrier of transgenic rat model for tauopathies, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

23. KOVÁČECH, B. The brain tau proteome, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

24. ŠKRABANA, R. Structure of intrinsically disordered proteins in the brain diseases, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

25. ŽILKA, N. Infectious proteins as a new entity of dangerous pathogens, The immune and nervous systems – teamwork, ageing and diseases, Smolenice, Slovakia, 20. – 22. 10. 2015, **invited presentation**

26. NOVÁK, M. Immunotherapy of Alzheimer's disease, Biological therapy in theory and practice. Conference of Slovak Immunological Society SAS and NIU SAS, Bratislava, Slovakia, 23.9.2015, **invited presentation**

27. NOVÁK P. The vaccines for therapy of neurodegeneration diseases, Biological

therapy in theory and practice. Conference of Slovak Immunological Society SAS and NIU SAS, Bratislava, Slovakia, 23.9.2015, **invited presentation**

28. Škrabana R. 3D analysis of antigen-antibody interaction: perspectives for clinical practice, Biological therapy in theory and practice. Conference of Slovak Immunological Society SAS and NIU SAS, Bratislava, Slovakia, 23.9.2015, **invited presentation**

29. FILIPČÍK P. Nucleic acids as biologics: renaissance or new trend, Biological therapy in theory and practice. Conference of Slovak Immunological Society SAS and NIU SAS, Bratislava, Slovakia, 23.9.2015, **invited presentation**

30. SMOLEK, T. Neurobiology of dog dementia, Surgical days of Dr. Juraj Fajnor, Smolenice, Slovakia, 5.6.2015, **invited presentation**

31. JADHAV, S. Tau protein as a perpetrator of synaptic impairment. When biochemistry meets pharmacology and toxicology, IVth Miniconference of PhD Students 2015, nstitute of Experimental Pharmacology and Toxicology of the Slovak Academy of Sciences in Bratislava, Slovakia, 24. June, 2015, **invited presentation**

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

No	Name	Year	Conference	Place
1.	**Novak**	2015	The Immune and Nervous system; teamwork, ageing and disease	Smolenice
		2015	Biological therapy in theory and practice II	Bratislava
		2014	Annual meeting of Slovak National JPND Consortium "National program for Combating Alzheimers disease"	Smolenice
		2014	Biological therapy in theory and practice I	Bratislava
		2012	Annual Meeting of Slovak Society for Neuroscience and Centre of Excellence for Brain Research	Smolenice
2.	**Zilkova**	2015	The Immune and Nervous system; teamwork, ageing and disease	Smolenice
		2014	Annual meeting of Slovak National JPND Consortium "National program for Combating Alzheimers disease"	Smolenice
		2012	Annual meeting of slovak society for neuroscience and centre of excellence for brain research	Smolenice
3.	**Zilka**	2015	The Immune and Nervous system; teamwork, ageing and disease	Smolenice
		2014	Annual meeting of Slovak National JPND Consortium "National program for Combating Alzheimers disease"	Smolenice
4.	**Filipcik**	2015	Biological therapy in theory and practice II	Bratislava
		2014	Biological therapy in theory and practice I	Bratislava
5.	**Cente**	2015	Biological therapy in theory and practice II	Bratislava
		2014	Biological therapy in theory and practice I	Bratislava
6.	**Kovacech**	2015	The Immune and Nervous system; teamwork, ageing and disease	Smolenice
7.	**Skrabana**	2015	Biological therapy in theory and practiceII	Bratislava
8.	**Kvetnansky**	2012	Annual meeting of slovak society for neuroscience and centre of excellence for brain research	Smolenice
9.	**Prcina**	2012	Annual Meeting of Slovak Society for Neuroscience and Centre of Excellence for Brain Research	Smolenice

- **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	Nanomechanics of intermediate filament networks (NANONET)	COST/BM1002	05/2010-05/2014	0	I / Norbert Zilka
	Coordination action in support of the implementation of a Joint Programming Initiative for combating eurodegenerative Diseases, in particular Alzheimer's Disease (Jumpahead)	FP7/260774	09/2010-08/2014	0	I / Michal Novak
	Tau truncation: the self-renewing propagator of neurofibrillary degeneration in Alzheimer's disease	ICGEB/CRP/SVK 10-01	01/2011-12/2013	42000	C / Branislav Kovacech
	ALzheimer COoperative Valuation in Europe (ALCOVE)	DG SANCO/20102201	04/2011-03/2013	38168	W / Michal Novak
	Biomarkers for Alzheimer's disease and Parkinson's disease (BIOMARKAPD)	JPND/370/2012	06/2012-05/2015	362400	I / Norbert Zilka
2013					
2014					
2015	Non-globular proteins - from sequence to structure, function and application in molecular physiopathology (NGP-NET)	COST/BM1405	05/2015-03/2019	600	I / Rostislav Skrabana
	Coordination Action in support of the sustainability and globalisation of the Joint Programming Initiative on Neurodegenerative Diseases (JPsustaiND)	Horizon2020/681043	11/2015-10/2019	25000	I / Michal Novak
	Synaptic Dysfunction in Alzheimer Disease (SyDAD)	Horizon2020/ETN/676144	11/2015-10/2019	120 000	I / Michal Novak

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

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

- **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	Transcriptional and proteomic analysis of redox system in neurons expressing pathological tau protein isoforms	LPP-0043-09	09/2009-08/2012	49 800	C / Peter Filipcik
	Complex approach to structural study of intrinsically disordered protein tau associated with neurodegenerations	LPP-0038-09	09/2009-08/2013	83 000	C / Rostislav Skrabana
	Identification of the posttranslational modifications of the neuronal protein tau leading to neurofibrillary degeneration in tauopathies	APVV-0399-10	05/2011-08/2014	249 856	C / Branislav Kovacech
	Is stress a crucial factor in the process of neurodegeneration accompanying Alzheimer´s disease?	APVV-0088-10	05/2011-10/2014	100 000	I / Peter Filipcik
	Mechanism of immune and neuronal system interaction in the brain during neurodegeneration	APVV-0200-11	07/2012-06/2015	160 000	C / Monika Zilkova
	Risk factors and proteomic signature of cognitive dysfunctions in animal models for human dementias	APVV-0206-11	07/2012-06/2015	122 400	C / Norbert Zilka
2013	Etiopathogenesis of neurodegenerative diseases: focus on RNA processing regulation in development and progression of sporadic tauopathies and Alzheimer´s disease	APVV-0677-12	0/2013-09/201	199 950	C / Peter Filipcik
2014					
2015	Development of novel peptide based system for delivery of therapeutics into the brain	APVV-14-0547	7/2015-06/201	244 264	C / Andrej Kovac
	The model of the neuroimmune crosstalk in Alzheimer´s disease	APVV-14-0872	7/2015-06/201	248 996	C / Norbert Zilka

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	15	13	7	8
Funding in the year (EUR)	89817	79601	42364	56828

[1]

- **Summary of funding from external resources**

2.4.6. List of projects supported by EU Structural Funds

Project title: Screening assay for the identification of biomarkers for early diagnostic of Parkinson disease

Project number: 26240220046

Duration: 11/2010-04/2013

Principal Investigator: Peter Filipcik

Role of the Org.: Coordinator

[1] Excluding projects for the popularisation of science

Funding: 853.228,49

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	Screening assay for the identification of biomarkers for early diagnostic of Parkinson disease	26240220046	11/2010-04/2013	853228,49	C
2013					
2014					
2015					

External resources	2012	2013	2014	2015	total	average
External resources (milions of EUR)	0,308	0,168	0,012		**0,488**	**0,163**
External resources transfered to coooperating research institute (milions of EUR)					**0,000**	

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

2.5. PhD studies and educational activities

The Institute of Neuroimmunology is accreditated for doctoral (PhD) studies by the Ministry of Education of the Slovak republic and is actively involved in the training of PhD students in the following subjects:

- neuroscience (4.2.16),
- immunology (4.2.15),
- molecular biology (4.2.3).

From the very beginning of its existence, the Institute paid great attention to building a competitive and well equipped environment for doctoral students. In the last four years, the infrastructure of the Institute's education of PhD students and young scientists has resulted in increased research and publication activities and in international acceptance of the Institute.

The three doctoral specializations create a unique research blend at the Institute, allowing studies of all aspects of neurodegeneration and neuroscience in one team: neuroscience, molecular

biology and immunology. This clearly documents that Institute during short period of its existence was able to fulfill and meet its goals outlined in its Foundation Charter. The success of the Institute's PhD program is documented by 11 PhD theses defended during the period of 2012-2015. The commitment of the Institute to educate a new generation of scientists manifests also in the very **high ratio of PhD students to the number of employees involved in the research projects.**

Furthermore, with approval of the Presidium of Slovak Academy of Sciences and the Chancellor of the University of Veterinary Medicine and Pharmacy in Kosice, the Centre of Biomedical Microbiology and Immunology (CBMI) was set up as a joint research undertaking located at the campus of the University in Kosice. Fully equipped, modern laboratories are used for research of zoonoses with special focus on prion diseases and borreliosis of animals and humans.

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

[1] Immunology 4.2.15
Period of validity: without time restriction

[2] Molecular biology 4.2.3
Period of validity: without time restriction

[3] Neuroscience 4.2.16
Period of validity: 31. august, 2018

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	12			13			13			12		
PhD students	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted
Internal	13,0	6,0	2,0	12,0	2,0	1,0	11,0	3,0	2,0	12,0	0,0	1,0
External	2,0	0,0	0,0	2,0	0,0	1,0	3,0	0,0	0,0	2,0	0,0	0,0
Other supervised by the research employees of the institute	2,0				2,0							

2.5.3. Summary table on educational activities

Teaching	2012	2013	2014	2015
Lectures (hours/year)[2]	8	2	2	17
Practicum courses (hours/year)[2]	0	0	0	0
Supervised bachelor theses (in total)	0	0	0	0
Supervised diploma theses (in total)	0	1	2	1
Supervised PhD theses (in total)	25	20	19	15
Members in PhD committees (in total)	5	3	2	3
Members in DrSc. committees (in total)	3	1	1	2
Members in university/faculty councils (in total)	1	1	1	1
Members in habilitation/inauguration committees (in total)	0	0	1	1

[2]

2.5.4. List of published university textbooks

1. ČÍŽKOVÁ, Dáša - ŽILKA, Norbert - KÁŽMÉROVÁ, Zuzana - SLOVINSKÁ, Lucia - VANICKÝ, Ivo - NOVOTNÁ-GRUĽOVÁ, Ivana - CIGÁNKOVÁ, V. - ČÍŽEK, Milan - NOVÁK, Michal. Mesenchymal stromal cells and neural stem cells potential for neural repair in spinal cord injury and human neurodegenerative disorders. In Neural stem cells and therapy. First published February, 2012. - Janeza Trdine 9, Rijeka, Croatia : InTech, p. 359-382, 17 chapter. ISBN 978-953-307-958-5.

2. PULZOVÁ, Lucia - MLYNARČÍK, Patrik - BENCÚROVÁ, Elena - BHIDE, Mangesh. It takes two to tango: protein-protein interactions in the translocation of pathogens accross a blood-brain barrier. In The Blood-Brain Barrier: New Research. 2012. - Nova Science Publishers, p.79-115. ISBN 978-1-62100-766-1.

3. NOSEK, Jozef - BREJOVÁ, Broňa - NEBOHÁČOVÁ, Martina - BARÁTH, Peter BHATIA-KISSOVA, Ingrid - VALENT, Ivan - KOLLÁR, Richard - TOMÁŠKA, Genomika. CreateSpace Independent Publishing Platform, 2013. ISBN 978-1494230623.

4. BHIDE, Mangesh - BENCÚROVÁ, Elena - HREŠKO, Stanislav - MLYNARČÍK, Patrik - MUCHA, Rastislav. Nové trendy vo využívaní bioinformatických analýz v genomike a proteomike. Košice : University of veterinary medicine and pharmacy, 2013. ISBN 978-80-8077-321-2.

5. ŽILKA, Norbert - PILIPČINEC, E. - NOVÁK, Michal. Imunologická pavučina mozgu. Bratislava : VEDA, 2013. ISBN 978-80-224-1265-0.

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

2.5.5. Number of published academic course books

1. ČÍŽKOVÁ, Dáša - ŽILKA, Norbert - KÁŽMÉROVÁ, Zuzana - SLOVINSKÁ, Lucia - VANICKÝ, Ivo - NOVOTNÁ-GRUĽOVÁ, Ivana - CIGÁNKOVÁ, V. - ČÍŽEK, Milan - NOVÁK, Michal. Mesenchymal stromal cells and neural stem cells potential for neural repair in spinal cord injury and human neurodegenerative disorders. In Neural stem cells and therapy. First published February, 2012. - Janeza Trdine 9, Rijeka, Croatia : InTech, p. 359-382, 17 chapter. ISBN 978-953-307-958-5.

2. PULZOVÁ, Lucia - MLYNARČÍK, Patrik - BENCÚROVÁ, Elena - BHIDE, Mangesh. It takes two to tango: protein-protein interactions in the translocation of pathogens accross a blood-brain barrier. In The Blood-Brain Barrier: New Research. 2012. - Nova Science Publishers, p.79-115. ISBN 978-1-62100-766-1.

3. NOSEK, Jozef - BREJOVÁ, Broňa - NEBOHÁČOVÁ, Martina - BARÁTH, Peter BHATIA-KISSOVA, Ingrid - VALENT, Ivan - KOLLÁR, Richard - TOMÁŠKA, Genomika. CreateSpace Independent Publishing Platform, 2013. ISBN 978-1494230623.

4. BHIDE, Mangesh - BENCÚROVÁ, Elena - HREŠKO, Stanislav - MLYNARČÍK, Patrik - MUCHA, Rastislav. Nové trendy vo využívaní bioinformatických analýz v genomike a proteomike. Košice : University of veterinary medicine and pharmacy, 2013. ISBN 978-80-8077-321-2.

5. ŽILKA, Norbert - PILIPČINEC, E. - NOVÁK, Michal. Imunologická pavučina mozgu. Bratislava : VEDA, 2013. ISBN 978-80-224-1265-0.

2.5.6. List of joint research laboratories/facilities with universities

1. LABORATORY OF BIOMEDICAL MICROBIOLOGY AND IMMUNOLOGY (LBMI)

The laboratory was established in the year 1996 by signing the agreement between the President of Slovak Academy of Sciences and the Chancellor of the “University of veterinary medicine in Kosice” about establishment of a joint initiative with the name “Laboratory of Biomedical Microbiology and Immunology (LBMI)”. The laboratory described herein now became a stand-alone unit managed both by the chancellor of the “University of veterinary medicine in Kosice (UVLP)” and the director of Institute of Neuroimmunology (NIU) where both the employees of UVLP and NIU participate on accomplishment of scientific projects.

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

PhD students of the Institiute and postdocs have received several national and internation awards:

Travel Awards Grant:

1. **Mgr. Zuzana Kážmérová, PhD.**
   8-th FENS Forum of European Neuroscience
   Barcelona, Spain
   14.7.-18.7.2012

2. **RNDr. Martin Čente, PhD.**
   8-th FENS Forum of European Neuroscience
   Barcelona, Spain
   14.7.-18.7.2012

3. **RNDr. Martin Čente, PhD.**
   EUROPEAN YOUNG LEADERS AGAINST DEMENTIA CONFERENCE 2015
   London, Great Britain
   26.2.-28.2.2015

4. **PharmDr. Andrej Kováč, PhD.**
   INSTITUTE FOR RESEARCH IN BIOMEDICINE - BLOOD BRAIN BARRIER CONFERENCE
   Barcelona, Spain
   31.10.-25.11.2015

List of former NIU PhD students who have received international fellowships:

1. Ing. Alena Opattova, PhD., Czech Academy of Sciences, Prague
2. Mgr. Zuzana Flachbartova, PhD., University of Glasgow, Glasgow,
3. MVDr. Lucia Pulzova, PhD., Palacky University of Olomouc, Czech republic
4. Ing. Juraj Kucerak, PhD., Bioveta a.s., Vyskov, Czech republic
5. Ing. Ondrej Cehlar, 45th Course of Biomolecular Crystalography, Italy
6. Ing. Ondrej Cehlar, PhD., Hercules – Neutron and Synchrotron Radiation for condensed matter studies (Biology), Grenoble, France

List of former NIU PhD students who have received position at domestic biotech companies:

1. RNDr. Michal Prcina, PhD. Axon Neuroscience, S.E.
2. Mgr. Petra Majerova, PhD. Axon Neuroscience, S.E.

Student from abroad who defended PhD thesis at NIU SAS:

MSc. Santosh Ram Jadhav, PhD. (India)

Student from abroad who will start PhD program at NIU SAS:

MSc. Thomas Vogels, Netherlands (from 1.9.2016)
MSc. Sandra Mihaljevic, Croatia (from 1.9.2016)
MSc. Adriana Murgoci, Hungary (from 1.9.2016)

2.6. Social impact

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

1. The Institute of Neuroimmunology in collaboration with Centre Memory established the **DNA-diagnostic procedures** for identification of familial forms of patients suffering from Alzheimer's disease and other forms of neurodegenerative disorders.

2. The Institute of Neuroimmunology in collaboration with Centre Memory established **Cognitive training** for the prevention of AD and other forms of cognitive dysfunctions

3. The Institute of Neuroimmunology in collaboration with Centre Memory developed a **program for screening of cognitive functions** in the Slovak population. This program is used for the identification of patients suffering from mild cognitive impairment or mild forms of AD.

4. The Institute of Neuroimmunology in collaboration with the University of Veterinary Medicine and Pharmacy in Kosice discovered a **method for screening of dementia in dogs**. This method allows to identify early behavioral changes characteristic for canine dementia.
   MAĎARI, Aladár - FARBAKOVÁ, Jana - KATINA, Stanislav - SMOLEK, Tomáš, NOVÁK, Petr - WEISSOVÁ, Tatiana - NOVÁK, Michal- ŽILKA, Norbert. **Assessment of severity and progression of canine cognitive dysfunction syndrome using the CAnine DEmentia Scale (CADES).** In Applied Animal Behaviour Science, October 2015, Volume 171, Pages 138–145 (1.691 – IF 2014). (2015 - Current Contents). ISSN: 0168-1591

5. The Institute of Neuroimmunology is doing a **routine analysis of CSF biomarkers** in AD diagnosis. The ability of the biomarkers amyloid beta, total tau and phospho tau to discriminate patients with AD from those with subjective memory complaints. Increased levels of tau and decreased levels of amyloid support the diagnosis of Alzhemer´s disease.

6. The Institute of Neuroimmunology is involved in evaluation/acreditations commities: **Accreditation Commitee**, (advisory bord of Slovak Government):
   prof. RNDr. Eva Kontseková, DrSc.
   Mgr. Branislav Kováčech, PhD
   prof. MVDr. Ivan Mikula, DrSc.
   prof. MVDr. Michal Novák, DrSc., Dr.h.c.
   The Institute of Neuroimmunology is involved in evaluation of ERC grants:
   ERC reviewer: prof. MVDr. Michal Novák, DrSc., Dr.h.c.

7. Skrabana, R., Cehlar, O. & Novak, M. **Non-robotic, high-throughput setup for manual assembly of nanoliter vapour-diffusion protein crystallization screens**. (2012) Journal of Applied Crystallography 45, 1061–1065 (IF2011 = 5.152)

8. The Institute of Neuroimmunology in collaboration with Centre Memory established the **methodology for improvement of quality of life for patients and caregivers**, published in Bulletin of Slovak Alzheimer's Society, 2013
   Authors: Slovak Alzheimer's Society, NIU SAS, The Council of Slovak Scientific Societies under the Slovak Academy of Science

9. KOVÁČ, Andrej - SOMÍKOVÁ, Zuzana - ŽILKA, Norbert - NOVÁK, Michal. **Liquid chromatography–tandem mass spectrometry method for determination of panel of neurotransmitters in cerebrospinal fluid from the rat model for tauopathy**. In Talanta, 2014, vol. 119, p.284-290. (3.511 - IF2013). (2014 - Current Contents). ISSN 0039-9140.

A major social impact of NIU SAS is associated with the activities of Centre Memory. Social impact of our work has been appreciated by director of Centre Memory Mgr. Maria Cunderlikova:

“Dear profesor Michal Novak and research team of Institute of Neuroimmunology, let me express my deepest gratitude to you and all the researchers involved in collaboration with Centre Memory. Your fundamental contribution to diagnostic and therapeutic as well as educational activities of Memory Center led to development of a unique and vital institution, which is actively involved in fighting against Alzheimers disease.”

According to WHO, the social and economic impact of dementia is diverse and far-reaching:

1. There is a lack of awareness about dementia and the disease is highly stigmatized. For both the person with dementia and his or her carer, this stigmatization can contribute to social isolation and delays in seeking diagnosis and care.
2. Behavioural and psychological symptoms linked to dementia profoundly affect the quality of life of people living with dementia and their carers.
3. Providing informal care to people living with dementia incurs a substantial emotional burden, including a detrimental impact on carers’ mental and physical health.

The mission of Centre Memory is to help society to tackle all the above mentioned problems. Here are the testimonials (selection) of target population from the Centre Memory web page: (http://www.alzheimer.sk/centrum-memory/dalsie-referencie.aspx)

Translation from Slovak:

"Our experience with the Centre of Memory is great and we are very grateful to selfless and knowledgeable staff for everything they did for my mother and for us.... Mom was coming from the Centre generally smiling and full of new experiences, though she would tell of them in the context of her youth. During the training events, we were discovering the nature of Alzheimer's disease, and in particular we learned ways of coexistence with those affected by it. At the same time, the Centre meant significant relief for us, allowing us to meet other business and personal obligations.

Family P.

"I want to thank you for the beautiful lecture that gave me a lot of knowledge, but most of all I'm excited about what one can do with people affected by Alzheimer's. I really like working with this group of people, and when one sees that they can be happy in the world, so I think that is a reward for all !!! :) :) :)

Z.P., Head nurse BSK, participant at the conference

"The response to the conference can only be recognition, praise and thanks. On the way home we talked a lot about it and we found that everyone was touched by a different part of the program. The program was balanced and flexible. The organization is very good. We would appreciate very much if such a courses could be organized also in eastern Slovakia. Thank you again and wishing you further successes".

J.P., Conference participant

1. **The activities for caregivers: How to communicate with AD patients**

   Series of practical manuals for families with AD patient issued so far (in Slovak):

   (1) "How to better understand people with dementia and respect them"

   (2) "How to care for patients with AD from distance"

   (3) "Personal and emotional burden during care for patients with AD"

   (4) "How to preserve cognitive abilities of patients with AD"

   (5) "Wandering – a problem of AD patients"

   (6) "Safety in the household and design of interiors"

   (8) "Driving and dementia"

2. **The activities for patients with AD**

   - **Diagnostic test for memory assessment (Slovak version)**
   - **Manuals for cognitive training:**

   (1) "Memory training for everyone"
   (2) "Let´s improve our memory"
   (3) "For better memory"
   (4) "To be active in older age"
   (5) "It´s possible even with the Alzheimer´s disease..."
   (6) "Improve your cognitive performance"

Number of people, which attended specific courses focused to prevent, delay and treat AD (nonpharnmacologically) within the years 2012 – 2015:

Daily stay	**2015**	**2014**	**2013**	**2012**
Number of clients per day/average	17,55	17	17	18
Total number of clients	47	57	52	47
Social service				
Specialized service (daily form)	Program for maintain daily living activities			
	Cognitive rehabilitation			
	Occupational therapy			
	Snoezelen			
	Music therapy			
	Art Therapy			
	Bibliotherapy			
	Reminiscence therapy			
Health care				
	Psychiatric ambulance			
	Ambulance of medical pedagogist			

Educational service		2015		2014		2013		2012	
		hrs	clients	hrs	clients	hrs	clients	hrs	clients
Training courses accredited by the Ministry of Education, Science, Research and Sport	Modul: Cognitive activization of seniors	38	21	38	14	38	18	40	40
	Modul: Development of coaching potential in cognitive activation seniors	38	8			38	12	40	18
	Modul: Application of activation programs for clients with dementia, social services workers			38	7				
	Modul: Clients with Alzheimer's in social services	38	7	40	31	40	90	40	66
	Modul: Cognitive training of functions and special features of communication in people with memory disorders							40	9
Educational workshops	Reminiscence in work with seniors		20						
	Cognitive rehabilitation for seniors with demencia		36						
	Snoezelen for patients with AD		16						
	Dance activation for people with dementia		8						
Education in facilities of social services		4 days	34						
Training for nurses of Slovak Catholic Charity			34						
International scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer´s disease		2days	200		200		200		144
Seminar - "In September we talk about dementia"					24				
Brain Awareness Week		1 week	162*	1 week	138*	1 week	93*	1 week	62*

* number of participants

National Program for Combating Alzheimers disease

The Institute of Neuroimmunology takes an initiative to propose the National program for combating Alzheimer´s disease. It should become a strategic document for the Slovak Academy of Sciences and Slovak government.

The Program addresses the major challenges in the Alzheimer's disease field and outlines the various goals and activities such as increasing public awareness of dementia, improving the health and the social services system, direct support for family members, expanding the training of the caregivers, research of the brain and the molecular changes that are associated with dementia, study of lifestyle choices that may delay the disease, physical and mental activities to enhance quality of life and slow down disease process and many others.

The National program will be realised by Slovak Brain Power – national network of clinical, academic and research institutions and Alzheimer's diagnostic centres. The activities will be coordinate by the Institute of Neuroimmunology, Slovak Alzheimer Society and Memory Centre. The program will be realized in collaboration with the Ministry of Education, Science, Research and Sport of the Slovak Republic and Ministry of Health of the Slovak Republic.

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

1. **Implementation project JUMPAHEAD of the "EU Joint Programme – Neurodegenerative Disease Research" (JPND) initiative**

A pan-european initiative "Joint programming in neurodegenerative disease research" (JPND) launched an FP7 coordination action JUMPAHEAD that supported its implementation ("Coordination action in support of the implementation of a Joint Programming Initiative for Combating Neurodegenrative Diseases, in particular Alzheimer's disease")

Grant No.: FP7-HEALTH-2010-single-stage, GA no. 260774

Principal coordinator: Prof. Phillippe Amouyel, MD, PhD, Inst. Pasteur de Lille, INSERM, France

Coordinator for Slovakia: Prof. MVDr. Michal Novak, DrSc, Institute of Neuroimmunology SAS

JUMPAHEAD built the foundations for the JPND initiative by supporting the development and implementation of the **JPND Strategic Research Agenda**, launched on February 7th, 2012, as well as its dissemination and evaluation.

The outputs of JUMPAHEAD over its 48 month duration included innovative ways of pooling national expertise and resources and the establishment of closer and robust research collaborations among the participating states in the field of neurodegeneration research.

More particularly, JUMPAHEAD facilitated:

- The commitment of up to 100 million euro of funding in the period of 2012 - 2015, which is in addition to funds already being spent by national funding organizations;
- The launch of a pan - European Research Strategy (SRA) to guide neurodegenerative disease research activity in Europe over the next ten years;
- Formation of an international Scientific Advisory Board composed of eighteen top - ranking scientists from academic research, industry and patient organisations from across the EU and beyond;
- Generation of common procedures for joint transnational calls for research proposals;
- Creation of a research mapping database available on the JPND website.

JUMPAHEAD contributed to the European Research Area by addressing the existing fragmentation of national research programmes, and improving coordination amongst research funders and research activities. By doing so, and through active communication and engagement with stakeholders and the wider public, it ensures the maximum benefit for all European citizens from our research efforts into neurodegenerative diseases.

2. ALzheimer's COoperative Valuation in Europe - ALCOVE

Grant Agreement No. 2010 22 01, Public Health Programme

Principal coordinator: Dr. Armelle Leperre-Desplanques, MD, PhD, Haute Autorité de Santé, France

Coordinator WP3 Evaluation of the Alcove Project: Prof. MVDr. Michal Novak, DrSc, Institute of Neuroimmunology SAS

ALCOVE was a 2 year Joint Action, which was co-financed by the European Commission and was managed by the Executive Agency for Health and Consumers (EAHC) within the framework of the Community's 2008-2013 public health programmes. It combined a wide spectrum of expertise by including input from physicians, researchers, clinicians, policy makers and legal experts. ALCOVE contributed to the wellbeing of persons with dementia, by improving knowledge and developing preventive and care recommendations to facilitate policy and health care decision making in European countries. The main aim is to improve knowledge on Alzheimer’s disease and its consequences and to reflect together on the best

means of preserving quality of life, autonomy and the rights of people living with dementia and their carers in EU member states.

Three main anticipated outcomes are:
- The establishment of sustainable European network for the exchange of experiences and knowledge at the level of health care institutions in order to improve quality of care and services
- To inform and advise decision-makers, health care professionals, care givers and citizens in general through convergent recommendations in terms of health policy
- A reduction in the risks associated with psychotropic drugs, with a common focus on the use of psychotropic drugs, in particular antipsychotics

3. Annual Meeting of Slovak National JPND Consortium, „National Program for Combating Alzheimers disease“, Smolenice 2014

Main organizators of meeting: Institute of Neuroimmunology in cooperation with institutions grouped in the Centre of Excellence for Brain Research (Institute of Neurobiology, Institute of Experimental Endocrinology, Jessenius Faculty of Medicine, Martin, Medical Faculty, Bratislava, University of Veterinary Medicine and Pharmacy, Košice and Centre MEMORY). Conclusions from the conference formed the basis for the formulation of the National Programme for Combating Alzheimer's disease.

National Program for Combating Alzheimers disease

The Institute of Neuroimmunology takes an initiative to propose the National program for combating Alzheimer´s disease. It should become a strategic document for Slovak Academy of Sciences and Slovak government.
The Program addresses the major challenges in Alzheimer’s disease field and outlines the various goals and activities such as increasing public awareness of dementia, improving the healthcare and the social services system, direct support for family members, expanding the training of the caregivers, research of the brain and the molecular changes that are associated with dementia, study of lifestyle choices that may delay the disease, physical and mental activities to enhance quality of life and slow down disease process and many others.
The National program will be realised by Slovak Brain Power – a national network of clinical, academic and research institutions and Alzheimer’s diagnostic centres. The activities will be coordinated by the Institute of Neuroimmunology, the Slovak Alzheimer Society and the Centre MEMORY. The program will be realized in collaboration with the

Ministry of Education, Science, Research and Sport of the Slovak Republic and Ministry of Health of the Slovak Republic.

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

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

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

1. **Educational Program accredited by the Ministry of Education, Science, Research and Sport of the Slovak Republic: Increase in cognitive activity of elderly in Centre Memory**
   Lecture: Brain and memory - scientific background and the latest knowledge
   Author: Doc. MVDr. Žilka Norbert, PhD.
   Place: Centre Memory
   Date: two lectures (2013, 2015)

2. **Educational Program accredited by the Ministry of Education, Science, Research and Sport of the Slovak Republi: Certified memory trainer in Centre Memory**
   Lecture: Brain and memory - scientific background and the latest knowledge
   Author: Doc. MVDr. Žilka Norbert, PhD.
   Place: Centre Memory
   Date: two lectures (2012)

3. **List of scientific conferences co-organized by the Institute in collaboration with the Centre MEMORY**

No	Year	Conference	Place
1.	2015	7th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
2.	2014	6th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
3.	2013	5th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava
4.	2012	4th international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease	Bratislava

2.6.6. Summary of relevant activities, max. 300 words

NiU has become the driving force behind the innovative approaches to proper diagnosis and care of Alzheimer‘s patients. In 2002 the Institute, with the help of the Ministry of health and Slovak Academy of Sciences, has established the first Alzheimer’s Diagnostic Centre - Centre Memory. Here, the Institute set up a diagnostic program that allows identifying patients suffering from familial forms of AD. Simultaneously, the Institute participates in establishing of cognitive screening allowing the identification of patients with mild cognitive impairment and mild forms of AD.

In collaboration wirth Centre MEMORY, the Institute has organized an Education Program accredited by the Ministry of Education, Science, Research and Sport of the Slovak

Republic, which is dedicated to memory trainers. The program educated volunteers working as cargivers in Senior homes and people interested in professional care about AD patients.

The Institute established a reference laboratory for analyses of CSF biomarkers use for AD diagnostics. The laboratory staff was trained under the umbrella of the BIOMARKAPD project. The laboratory is performing routine analyses of CSF biomarkers and cooperates with various neurologists.

In collaboration with the University of Veterinary medicine and pharmacy in Kosice, the Institute developed a new method – CADES, for diagnostics of canine dementia. The method was promoted by the prestigious journal SCIENCE.

Thank to these activities, the Institute takes the initiative to propose the National program for combating Alzheimer's disease The National program is thematically divided into three main parts: 1) understanding the mechanism of disease, 2) improving the quality of life of people with dementia and their carers, and 3) mobilization of society in the fight against dementia. Each of these areas involves a number of guidelines to help integrate the National Program for Combating Alzheimer's disease into the political agenda of the SR.

2.7. Popularisation of Science (outreach activities)

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

1. Lecture: Alzheimer's disease from the perspective of neuroscientist
Author: prof. RNDr.Kontseková Eva, DrSc.
Place: Centrum Memory, Bratislava
Date: 2012

2. Activity: 4th International scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease"
Lecture: Challenges and developments of the diagnosis of Alzheimer's disease
Author: MUDr. Novák Petr, PhD
Place: G* hotel Bratislava
Date: 2012

3. Activity: World Alzheimer's Day 2012, Press Conference
Lecture: Seniors - The target of Alzheimer's disease
Author: Ing.Veselá Alžbeta
Place: Public Health Authority of the Slovak Republic, Bratislava
Date: 2012

4. Activity: Brain Awareneess Week 2012
Main organizators: Slovak Alzheimer Society, Memory Centre, NIU SAS, Public Health Authority of the Slovak Republic
In the week 12 to 18 March 2012, 62 organizations from Slovak republic (29 regional public health offices and 5 regional branches of Slovak Red Cross) organized 196 different events across the country.
Date: 2012

5. Activity: Exhibition and lecture "Do not forget to come"
Lecture: Will the Alzheimer's disease touch us all?
Author: RNDr. Rostislav Škrabana, PhD
Place: KC Dunaj, Bratislava
Date: 2013

6. Activity: 5th International scientific conference "Senior´s training and non-pharmacological intervention in Alzheimer's disease, Bratislava
Lecture: The future without Alzheimer's disease
Author: prof. RNDr.Kontseková Eva, DrSc.
Place: Hotel Druzba, Bratislava
Date: 2013

7. Activity: Bulletin of Slovak Alzheimer's Society
Authors: Slovak Alzheimer's Society, NIU SAS, The Council of Slovak Scientific Societies under the Slovak Academy of Science
Date: 2013

8. Activity: Brain Awareness Week 2013, Afternoon lectures
Main organizators: Slovak Alzheimer's Society, Memory Centre, NIU SAS
Place: Palace of Zichy
Date: 2013

9. Activity: World Alzheimer's Month 2014
Lecture: Alzheimer's disease: Two sides of the same coin
Author: prof. RNDr.Kontseková Eva, DrSc.
Place: Primacial Palace, Bratislava
Date: 2014

10. Activity: EKOTOP FILM
Lecture: Exploration of the human brain with "hammer and saw"
Author: Doc. MVDr. Žilka Norbert, PhD.
Place: Bratislava
Date: 2014

11. Activity: 7th International scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer's disease
Lecture: The dark side of the ageing – Is there an expiration date of the human brain?
Author: Doc. MVDr. Žilka Norbert, PhD.
Place: Memory, Centre, Bratislava
Date: 2015

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	1	1	1	1	4
Appearances in telecommunication media popularising results of science, in particular those achieved by the Institute	1	1	1	1	4
Public popularisation lectures	4	2	2	1	9

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

The major outreach activities in which NIU SAS takes part are represented by “Brain awarnes week” and “World Alzheimer´s day”.

Brain Awareness Week (BAW) is the global campaign to increase public awareness of the progress and benefits of brain research. The BAW is organized once per year during one week in March. In Slovakia the BAW activities are coordinated by the Institute of Neuroimmunology, the Centre MEMORY and the Slovak Alzheimer Society. They organise various lectures on brain-related topics, on disorders of the human brain and on cognitive exercises. The BAW has become a attractive platform for education of a broad audience with special focus on students.

World Alzheimer’s Day, September 21st of each year, is a day on which Alzheimer’s organizations all around the world concentrate their efforts on raising awareness about Alzheimer’s disease and other forms of dementia. In Slovakia the World Alzheimer’s Day activities are coordinated by the Institute of Neuroimmunology, Centre MEMORY and Slovak Alzheimer Society. The organizing institutions usually prepare a well focus lecture on Alzheimer´s disease and related disorders. Centre MEMORY and the Institute organize a Press release for Slovak journalists to inform them about their activities and plans.

In general, via these two activities NIU-SAS consistently, every year, increases the public education and knowledge on recent trends in the field of brain research in general and also on the cognitive impairements in elderly and the ways how to prevent or slow down the deterioration of brain using recently available means.

The institute co-organizes international scientific conference "Senior´s training and nonpharmacological intervention for Alzheimer’s disease”, where experts from neuroscience research inform the broad audience about the current trends in therapy, diagnostics and prevention in AD. This conference bridges the gap between the basic research and translational research and helps to disseminate current knowledge on AD.

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	50,0	54,0	50,0	45,0
Research employees from Tab. Research staff	19,0	21,0	18,0	18,0
FTE from Tab. Research staff	13,750	12,180	12,100	11,520
Average age of research employees with university degree	45,0	46,9	47,4	48,4

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.									
Other researchers PhD./CSc.	1		3	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.				1				1	3
II.a / Assoc. prof.			2	1	1	2			
Other researchers PhD./CSc.	1	2	3	3	1	2		1	
doc. / Assoc. prof.				1		1			

2.8.2. Postdoctoral and mobility scheme

2.8.2.1. Postdoctoral positions supported by national and international resources

2.8.2.2. Postdoctoral positions supported by external funding

2.8.2.3. SAS stipends and SASPRO stipends

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

MVDr. Mangesh Ramesh Bhide 1.5.2008 – 30.4.2012

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

Current organisational structure and research infrastructure of the Institute:

Laboratory of applied neuroproteomics and metabolomics

The Laboratory of applied neuroproteomics and metabolomics analyses pathological and physiological roles of proteins in the central nervous system, and identifies and quantifies potential biomarkers of neurodegenerative disorders. The laboratory develops analytical techniques and performs routine and advanced analyses of tissue proteomes, and targeted metabolomic analyses of biological fluids and tissues with high reproducibility, specificity, and sensitivity. Mass spectrometry combined with powerful separation techniques (UPLC, UHPLC) are the main identification and quantification approaches. The laboratory benefits mainly from its rich experience with neuroproteomics and metabolomics, processing of biological samples, as well as several years of experience with using modern analytical techniques and equipment. Current state-of-the-art equipment includes: (1) Ion trap for detection of post-translational protein modifications, such as phosphorylation, ubiquitinylation, etc. (2) Premier 3 quadrupol for detection of endogenic substance a xenobiotics, and targeted metabolic analysis, (3) MALDI for identification and characterization of proteins and their post-translational modifications (4) HPLC for protein analysis

Laboratory of structural biology and protein biophysics

Laboratory of structural biology and protein biophysics is the only laboratory in Slovakia specializing in the research of structure and interaction thermodynamics of intrinsically disordered proteins associated with many biological processes, under physiological and neurodegenerative conditions. For the analysis of interactions of biomolecules using surface plasmon analysis, the laboratory is equipped with BIACORE 3000, including Biacore Control Software v4.1, BIAevaluation Software v4.1, and external thermostat pump. The crystallography unit for solving structures of biological macromolecules and their complexes is equipped with a temperature-controlled (+/- 0,5 °C) crystallography setup for preparing crystals of biological macromolecules and their complexes, in combination with a microscope for observing the process of crystallization, digital photography of crystals, cryo-preservation of

diffraction-quality crystals, powerful workstations for processing of diffraction data, solving and refining structures, and computational molecular modelling. Molecular spectroscopy and optical methods for analysis of conformations and dynamics of biomacromolecules in solution: NIR FTIR spectrometer (<0.09 cm-1 resolution), transmission and ATR cells, sensitive MCT detector, humidity and CO2 control for FTIR, highly sensitive UV-VIS spectrometer, an apparatus for measuring static and dynamic light refraction. A complete unit for preparing, isolation, automatic purification, and characterisation of natural and recombinant biomacromolecules: temperature-controlled shaker for recombinant expression of proteins, French-press disintegrator for host cells, high-capacity centrifuge, equipment for automatic chromatographic purification of biomacromolecules (3x).

Laboratory of neurophysiology of the brain

The Laboratory of neurophysiology is the only laboratory in Slovakia focused on investigating causal changes during the pathogenesis of neurodegeneration in-vivo. Combination of the latest experimental techniques, electrophysiology, multiphoton microscopy, optogenetics, and behavioural approaches creates a comprehensive experimental platform for detailed studies of structural and functional changes in the brain, from synapses to cognition. The laboratory contains the necessary equipment for studying the dynamics of neurodegeneration-related changes in the brain in-vivo. Unique in its focus and experimental techniques, the laboratory specialises in mapping the detailed subcellular changes in structure and activity of synaptic contacts and their impact on activity of well-defined (genetically, spatially) neuronal circuits and networks in Alzheimer's disease. Currently, the laboratory is equipped with the latest technology for studying the ethology of laboratory animals, such as the Catwalk system for studying motor impairment, Phenotyper for temporal and spatial behavioural analysis, and Ethovision for video tracking analysis of rodent maze experiments.

Laboratory of applied neuropathology

The first laboratory platform focuses on studying and modelling the pathogenic processes leading to neurofibrillary degeneration. The facility is equipped with the latest technologies for performing technologically challenging experiments. The second laboratory platform focuses on post-mortem diagnosis of human neurodegenerative disorders, especially Alzheimer's disease and fronto-temporal lobar degeneration. It is capable of analysing neuropathologic and molecular changes in the brain tissue. Available are light and fluorescent microscopes, as well as a unique confocal microscope customized for processing of human brain tissue. Single-photon fluorescent microscopy system Zeiss LSM710 (with software) is equipped for performing all kinds of fluorescence analyses of tissues, cells, and tissue cultures. The installed set of lasers covers the entire visible spectrum and part of the UV range. The histology unit is equipped with cryo-microtome, vibratome, rotational microtome, microscopes and cameras, and it is able to process all types of histological samples, be it paraffin sections, vibratome sections, or cryosections. The system has been designed to enable all types of post-mortem diagnostic approaches.

Laboratory of molecular and cellular neurobiology

The Laboratory of molecular and cellular neurobiology consists of three experimental platforms:

(a) Development and production of specific genetic vectors based on replication-defective viral particles. (b) In-vitro cultivation of cerebral neurons for detailed modelling of regulations of signalling pathways associated with neuronal disorders in the central nervous system. (c) Transcriptomic analysis of signalling pathways associated with physiological and pathological processes in the central nervous system, focused on the role of the regulatory nucleic acids, such as miRNAs and other non-coding RNAs. The laboratory has standard equipment for molecular biology and genetics at its disposal (AB Applied Biosystems 3130 Genetic Analyzer, Q-RT-PCR plus Bioanalyzer, digital PCR)

Laboratory of neuroimmunology

The Laboratory of functional neuroimmunology researches markers of the ageing immune system and their connection to the ability to respond to new immune stimuli. Alterations in frequency of naive helper T-lymphocytes expressing co-stimulatory protein CD28 (CD4+/CD28+/CD45RA+) are estimated using flow cytometry. The laboratory contains complete equipment for proteomic and molecular analyses and a restricted access area for cell biology research. The available state-of-the-art flow cytometer Becton Dickinson LSR Fortessa (5 lasers, 20 channels) can follow 20 surface parameters in parallel in a single run.

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

The institute of Neuroimmunology earned the highest grade (A*) in the last accreditation evaluation (2007-2011). In the previous assessment we have got recommendations for further improvement in several areas:

1. Projects structure, research grants and other external funding resources (Recommendation: The Institute should intensify efforts to obtain integrative FP grants.)
2. Organization of PhD education and other pedagogical activities (Recommendation: The Panel recommends to increase the number of DrSc to stabilize the PhD programs.)
3. Socio-economic outputs (Recommendation: More attention should be given to the collaborative work with local clinics.)

Our response:

1. During last 4 years we have received several prestigious international grants: (1) Coordination action in support of the sustainability and globalisation of the joint programming initiative on neurodegenerative diseases; (Research period: Nov. 2015 – Nov. 2019). (2) Pathway complexities of protein misfolding in neurodegenerative diseases: a novel approach to risks evaluation and model development; (Res. Period: May 2016 – April 2019). Within

these projects we are collaborating with the prominent research groups in Europe, which are led by worldwide recognized expers such as Adriano Aguzzi, Michael Goedert, Mathias Jucker and others. We are continuing in submitting new applications (for the EraNet 2016 call we have submitted 2 proposals which are currently under review: “Repetitive Subconcussive Head Impacts - Brain Alterations and Clinical Consequences” and “Spinal cord repair: releasing the neuron-intrinsic brake on axon regeneration” in which we are partners for larger European consortia)

2. The number of DrSc (members of NIU) was increased, Dr Zilka has defended his DSc. Thesis at the end of 2015. The number of DrSc was further increased in 2016 (Dr. Cizkova). The PhD programs have been more stabilized.
3. We have intensified our collaboration with the Ministry of health SR and worked out the “National program for fighting against Alzheimer’s disease”. Indeed, this program includes a close collaboration with the local clinics, which has increased. We have been avarded a VEGA grant (and other proposals are under review), which is based on collaborative projects with three local clinics in Bratislava and one clinic in Kosice. Other project in large extent covers “National program for fighting against Alzheimers disease”. This is the program, which our institute has initiated and is cooperating with the ministry of health in its promotion.

In the last four years (2012-2015), the institute successfully retained its high standard in the field of neurodegenerative disease research, the number of earned grants increased, the number of publications accepted into journals with higher impact factors increased likewise, we have attracted a greater number of exceptionally talented PhD students, and we have obtained several EU grants (see above). The institute made significant improvement in the areas, which have been identified as weekness in last evaluation. The price per one paper was clearly decreased within last 3 years and publication activity as well as the price per one paper has been very much improved in 2015.

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

The infrastructure we have obtained in BITCET program (BIACORE3000) is available for other institutions of SAS as well. It has been used in proteomic and structural projects of the Institute of Virology and Instiute of Molecular biology.

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

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

Recent status of the Institute in the national context

The Institute's of Neuroimmunology long-term and goal-oriented effort is to fight neurodegenerative diseases with focus on Alzheimer's disease and other tauopathies. NIU SAS represents the "hub institution" connecting the national neuroscience research focused on human neurodegenerative disorders. The Institute is the major national organizer of the research on brain diseases. Simultaneously, the Institute is accepted and recognized as one of the major forces in EU programs and projects on tau protein associated signaling pathways in Alzheimer's disease and related disorders. NIU SAS is an important national player in the transfer of the knowledge from research to clinical and social spheres. NIU SAS designed the "National Programme to fight Alzheimer's disease" and helps the Presidium of SAS and the Government of Slovakia with its implementation.

Recent status of the Institute in the international context

Institute of Neuroimmunology (NIU) is among the world's top five institutions engaged in a systematic study of the role of tau protein in the pathogenesis of Alzheimer's disease. Slovak Republic through NIU attended meetings of the G7 economic forum, the main item on the agenda was the issue of dementias (March 2015, London).

NIU is the founder and coordinator of the new National Center for Research on the brain - "Slovak Brain Power" implemented by brain research priorities defined by the European Union and the World Health Organization. Slovak Brain Power represents a modernly designed neuroscience center that can effectively join the European projects (Horizon 2020 Alzheimer's Disease initiative), to transfer knowledge from the field of neuroscience to Slovak research environment, realize ambitious projects with application outputs and disseminate new insights and discoveries on land Slovak Academy of Sciences as well as other Slovak and foreign scientific research institutions.

The European Commission has included brain research with an emphasis on serious neurodegenerative and neuropsychiatric disorders among the most important themes of the framework program, Horizon 2020. The Slovak Republic, through the Institute of Neuroimmunology, is a co-author of the new call of the framework program Horizon 2020 aimed at human neurodegenerative diseases. The concept of this call is the result of collaboration between 28 EU countries, including Slovakia, grouped under the initiative known as the "Joint Programming in Neurodegenerative Disease Research" - JPND.

The Institute of Neuroimmunology was involved in the implementation of the JPND project - JUMPAHEAD ("Coordination Action in support of the implementation of a Joint Programming Initiative for Combating Neurodegenerative Diseases, in particular Alzheimer's disease") supported by FP7. It maped out the research potential of participating European countries, and built

organizational structures to support the common approach of EU Member States in the research and treatment of Alzheimer's disease.

The Institute of Neuroimmunology represents the Slovak Republic in the international project "Alzheimer Cooperative Valuation in Europe" - ALCOVE. NIU SAS was responsible for the evaluation of the project and monitoring its progress and relevance of the results. The project perfectly mapped the current situation with regard to diagnosis, therapy and care for patients with Alzheimer's disease.

The Centre of Excellence in Brain Research (CEBR), coordinated by NIU SAS, was accepted as a member of the elite club COEN (Network of Centres of Excellence in Neurodegeneration), which comprises the following centers: Canadian Institutes of Health Research (CIHR), the Deutsche Zentrum für Neurodegenerative Erkrankungen (DZNE, Germany), the Medical Research Council (MRC, United Kingdom), the Flanders Institute of Biotechnology (VIB Flanders, Belgium), the Health Research Board (HRB), Ireland / Science Foundation Ireland (SFI), and the Ministero della Salute (MDS, Italy), the Instituto de Salud Carlos III (Spain) and the Ministry of Health - The Ministry of Health (Italy). COEN offers space to build consortia to address challenging projects with high added value in Alzheimer's disease.

In 2015, the Institute became part of the new project "Non-globular proteins - from sequence to structure, function and application in molecular physiopathology (NGP-NET)", which is implemented under the project of COST (COST Action BM1405).

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

Alzheimer's disease has become a top priority of EU research. The incidence within the European Union is estimated at 800,000 new cases every year. In Slovakia, the prevalence of Alzheimer's disease is estimated at 60,000 patients. Slovakia is the fastest aging country in Europe (Infostat). According to the Statistical Office in 2060 almost 850,000 people less than this year will live in Slovakia. Despite the population decline, however, the country will have nearly one million pensioners more than today. It is expected that in 2050, 150 000 patients with Alzheimer's disease will live in Slovakia.

NIU SAS wishes to prevent the collapse of national health systems that provide financing of care for Alzheimer's patients. We believe that NIU SAS has the potential to significantly contribute to addressing this critical situation and its impact on society. To this end, NIU SAS drew up a "National program to combat Alzheimer's disease", based on the strategic research agenda of the EU. The main objective of the National Programme is to increase support for research into the human brain and its transfer into practice through a network of Centers of memory. NIU SAS is actively involved in the implementation of National Programme in the following areas:

1. Knowledge of the mechanism of Alzheimer’s disease (AD)
2. The harmonization of diagnostic procedures for AD
3. Epidemiological and prospective studies in dementia
4. Improving the quality of life of people with dementia
5. Mobilisation of the fight against dementia

NIU SAS has the research potential, state of the art equipment and up to date laboratories alloving it to take part in global projects aiming at solving critical problems of contemporary neuroscience.

Research strategy of NIU SAS for the years 2016-2020

The Institute of Neuroimmunology as a distinct scientific and research institution will continue to function as neuroscience research center in Slovakia, with a focus on brain research. Scientific research aims of the institution will be directed to continue studying the fundamental mechanisms of neurodegenerative diseases, particularly Alzheimer's disease and related neurodegenerative disorders (tauopathies), focusing on their treatment.The research will be done on the

a) molecular,

b) cellular,

c) systemic and

d) cognitive levels.

Major research objectives of NIU SAS:

- Study of neuronal signaling and immune responses involved in early stages of neurodegenerative diseases, with focus on Alzheimer's disease
- Analysis of potential biomarkers of neurodegenerative disorders using neuroproteomics, metabolomics and transcriptomics.
- Development of novel specific antibodies for neuroimmuno-imprinting leading to 3D high resolution view of pathological structures occurring in neurodegenerative diseases
- Constructing novel cell and animal models for analysis of pathological processes occurring in patients suffering from neuro-degeneration
- Understanding of causal changes during the pathogenesis of neurodegeneration in-vivo using combination of the latest experimental techniques, electrophysiology, multiphoton microscopy, optogenetics, and behavioural approaches.
- Biophysical analysis of the normal and pathological proteins underlying neurodegenerative diseases.
- Development of diagnostic tests for the early diagnosis of neurodegenerative diseases

Methods and experimental procedures needed to reach above objectives have been introduced at the NIU SAS, represent cutting edge of modern neuroscience and correspond to the modern infrastructure, which is in place in the laboratories of NIU SAS.

NIU main strategic goals will be achieved within the following project schemes:

- Joint Programming in research of neurodegenerative diseases - JPND (Joint Programming in Neurodegenerative Disease Research) which represents cooperation with 28 EU countries in the framework of the priorities of the National Programme to fight Alzheimer's disease
- Project calls in the framework program Horizon 2020
- Networks of excellence in the EU - COST initiative – promote extensive network of European bodies, active in research on Alzheimer's and human tauopathies.
- Excellent research through COEN
- Creation and application of diagnostic centers Memory

The objectives will be achieved via employing the infrastructure described above and in a close cooperation with our main international partners:

- New York State Institute for Basic Research in Developmental Disabilities, New York, USA
- Department of Psychiatry, University of Geneva School of Medicine, Geneva, Switzerland

- Division of Gerontology and Geriatric Medicine, University of Washington, Seattle, USA
- Karolinska Institute, Stockholm, Sweden
- Neurobiology Department, International School for Advanced Studies, Trieste, Italy Scuola Normale Superiore di Pisa, Italy
- Department of Neuroscience, University of Tor Vergata, Rome, Italy
- Institute of Physiology ASCR, Prague, Czech Republic
- Hungarian Academy of Sciences, Szeged, Hungary
- ICGEB (International Centre for Genetic Engineering and Biotechnology) at the United Nations
- Institute of Molecular Genetics, ASCR

We hope that within the next 20 years, the research in the field of neuroscience will bring definitive solutions to many contemporary problems in the pathogenesis of neurodegenerative diseases and we believe NIU SAS will contribute to the future success of neuroimmunology by large extent.

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

4. Other information relevant for the assessment

The research activities as well as the activities in applied science and science popularization during the evaluated period have been highly appreciated by national and international authorities. This can be documented by following examples:

1. Our institute has been appointed by Ministry of health to organize the conference on the Alzheimers disease, which will be held at the occasion of Slovak EU presidency. The conference will be held on fall of 2016 and members of NIU-SAS have worked out their active participation.
2. Director of the Institute prof. Novak has been awarded by WHO and he has received the prestigious price “His Highness Sheikh Sabah Al-Ahmad Al-Jaber Al-Sabah Prize for Research in Health Care for the Elderly and in Health Promotion“ for his outstanding work and achievements in health development. Furthermore professor Novak has received the price of Slovak Academy of Science for establishment of neuroimmunology in Slovakia and founding and succesfull governing the Institute of Neuroimmunology.
3. Professor Novak has been invited speaker at TedEx event in Bratislava and his lecture was extremely well accepted by public.

Prof. Michal Novak, MDV, PhD, DSc, Dr.h.c.

Director of the Institute of Neuroimmunology, SAS

Bratislava 1st August 2016