

# Questionnaire

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

Period: January 1, 2016 - December 31, 2021



### 1. Basic information on the institute:

#### 1.1. Legal name and address

Centre of Experimental Medicine, Slovak Academy of Sciences  
Dúbravská cesta 9, 841 04 Bratislava, Slovakia

#### 1.2. URL of the institute web site

<http://www.cem.sav.sk>

#### 1.3. Executive body of the institute and its composition

**Institute of Experimental Pharmacology and Toxicology, SAS 2016-2017**

Directoriat	Name	Year of birth	Years in the position, from-to
Director	RNDr. Michal Dubovický, PhD	1966	2012-2017
Deputy director	RNDr. Mojmír Mach, PhD.	1977	2012-2017
Scientific secretary	RNDr. Tatiana Mačičková, CSc.	1950	2012-2017

**Institute of Normal and Pathological Physiology, SAS 2016-2017**

Directoriat	Name	Year of birth	Years in the position, from-to
Director	doc.RNDr. Oľga Pecháňová, DrSc.	1962	2007-2017
Deputy director	RNDr. Iveta Bernátová, DrSc.	1967	2014-2017
Scientific secretary	RNDr. Martina Cebová, PhD RNDr. Soňa Čačányiová	1978 1971	2014-2017 2014-2017

## Institute for Heart Research, SAS 2016-2017

Directoriat	Name	Year of birth	Years in the position, from-to
Director	RNDr. Miroslav Barančík, DrSc.	1962	2010-2017
Deputy director	RNDr. Ľudmila Okruhlicová, PhD	1956	2010-2017
Scientific secretary	Not specified		

## Centre of Experimental Medicine, SAS 2018 - 2021

Directoriat	Name	Year of birth	Years in the position, from-to
Director	RNDr. Michal Dubovický, PhD doc.RNDr. Oľga Pecháňová, DrSc.	1966	1/2018 – 5/2018
		1962	6/2018 – 8/2022
Deputy director	RNDr. Mojmír Mach, PhD	1977	1/2018 – 5/2018, 1/2020-8/2022
	RNDr. Michal Dubovický, PhD	1966	6/2018 – 12/2019
	RNDr. Miroslav Barančík, DrSc.	1962	6/2018 – until now
	RNDr. Iveta Bernátová, DrSc.	1967	6/2018 – 12/2018
	RNDr. Soňa Čačányiová	1971	1/2019 - until now
Scientific secretary	RNDr. Tatiana Mačičková, CSc.	1950	1/2018 – 12/2020
	RNDr. Martina Cebová, PhD	1978	6/2018 – 12/2018
	RNDr. Iveta Bernátová, DrSc.	1967	1/2019 - until now
	doc.RNDr. Monika Barteková, PhD	1973	1/2019 – until now
	Ing. Marta Šoltésová Prnová, PhD	1986	1/2021 – until now

### 1.4. Head of the Scientific Board

RNDr. Mojmír Mach, PhD 2018-2019

Igor Riečanský, MD, PhD 2020 - until now

#### 1.4.1 Composition of the International Advisory Board

Prof. Dr. Sawa Kostin, MD, PhD, Max-Planck-Institute for Heart and Lung Research, Bad Nauheim, Germany, e-mail: [sawa.kostin@mpi-bn.mpg.de](mailto:sawa.kostin@mpi-bn.mpg.de)

Prof. Dr. Marcin Ufnal, Ph.D.; Department of Experimental Physiology and Pathophysiology; Medical University of Wasraw, Poland; e-mail: [mufnal@wum.edu.pl](mailto:mufnal@wum.edu.pl)

Prof. Dr. Zoltán Papp, Faculty of Medicine, Division of Clinical Physiology, University of Debrecen, e-mail: [pappz@med.unideb.hu](mailto:pappz@med.unideb.hu)

Prof Carmen Domene, University of Oxford, Chemistry Research Laboratory, Mansfield Road, Oxford, United Kingdom, e-mail: [C.Domene@bath.ac.uk](mailto:C.Domene@bath.ac.uk)

Emanuela Corsini, PhD., Associate Professor of Toxicology, Laboratory of Toxicology, Department of Environmental Science and Policy Università degli Studi di Milano Via Balzaretti 9, 20133 Milano, Italy, e-mail: [emanuela.corsini@unimi.it](mailto:emanuela.corsini@unimi.it)

Prof. Dr. Milan Brázdil, Ph.D.; Department of Behavioural and Social Neuroscience, CEITEC, Brno; e-mail: [milan.brazdil@ceitec.muni.cz](mailto:milan.brazdil@ceitec.muni.cz)

Prof Kemal Yelekci, Kadir Has University, Cibali, Fatih, Turkey, Istanbul, [yelekci@khas.edu.tr](mailto:yelekci@khas.edu.tr)

## 1.5. Basic information on the research personnel

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

2016		2017		2018		2019		2020		2021		2016-2021	
FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	FTE all	FTE researchers	average FTE all per year	average FTE researchers per year
131.54	77.95	133.85	77.65	121.92	70.67	125.93	71.20	121.39	69.61	124.41	70.61	126.51	72.95

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

Center of Experimental Medicine, Slovak Academy of Sciences was established on January 1<sup>st</sup>, by merging originally independent legal entities, namely the Institute of Experimental Pharmacology and Toxicology, Slovak Academy of Sciences, the Institute of Normal and Pathological Physiology, Slovak Academy of Sciences and the Institute for Heart Research, Slovak Academy of Sciences. The successor organization was the Institute of Experimental Pharmacology and Toxicology, Slovak Academy of Sciences, which retained its legal personality and its original identification number.

## 1.6. Basic information on the funding of the institute

### 1.6.1. Institutional salary budget, other salary budget<sup>1</sup>, non-salary budget<sup>2</sup>

<sup>1</sup> Salary budget originating outside the regular budgetary resources of the organization, e.g. from the project funding.

<sup>2</sup> Includes Goods and Services and PhD fellowships

<b>Salary budget</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>average</b>
<b>Institutional salary budget</b> <i>[millions of EUR]</i>	1.656	1.752	1.892	2.139	2.290	2.287	<b>2.003</b>
<b>Other salary budget</b> <i>[millions of EUR]</i>	0.115	0.154	0.180	0.232	0.188	0.286	<b>0.193</b>
<b>Total salary budget</b> <i>[millions of EUR]</i>	1.771	1.906	2.072	2.371	2.478	2.573	<b>2.195</b>
<b>Non-salary budget</b> <i>[millions of EUR]</i>	1.047	1.032	1.055	1.190	1.129	1.168	<b>1.104</b>

## **1.7. Mission Statement of the Institute as presented in the Foundation Charter indicating the years when it was adopted (2021) and revised**

(1) The predominant main activity of the organization is to carry out research in the fields of science and technology (hereinafter also "fields"): Normal and pathological physiology (030106), Pharmacology (030104), Pharmaceutical chemistry (030102), Toxicology (030107), Biochemistry (also for medical, pharmaceutical, veterinary, agricultural, forestry and water sciences) (010403), Bioorganic chemistry (010406), Animal physiology (010607), Ethology (also for agricultural and forestry sciences) (010604), Molecular biology (010613), Neurosciences (010617), Biophysics (also for medical, pharmaceutical, veterinary and agricultural, forestry and chemical sciences) (010303), Other related branches of biological sciences (010699), Clinical psychology (050102), General psychology (050107), Other related fields of psychological sciences (050199), Biomaterials (021005), New Biomaterials (021009), Nanomaterials (021101), Other Related Branches of Basic Fields of Medical and Pharmaceutical Sciences (030199), Materials Chemistry (010 407), Inorganic Technology and Materials (020501).

(2) Other main activities of the organization are:

(a) the provision and management of the research and development infrastructure to which the organization has ownership or otherwise; the scope of the research and development infrastructure, the rights to which the organization acquires by changing the legal form of the organization to a public research institution on 1.1.2022, will result from the protocol between the Slovak Academy of Sciences and the organization according to § 21aa par. 11 of the Academy Act,

(b) the acquisition, processing and dissemination of information in the field of science and technology and knowledge from the organisation's own research and development, in the fields referred to in paragraph 1; publishing domestic and international scientific periodicals

c) cooperation with the university in the implementation of study programs of the PhD study, namely:

i) study programs 4.2.10. Animal physiology, 4.2.12. Ethology, 4.2.3. Molecular biology and 4.2.16. Neurosciences in the field of study Biology,

ii) study program 4.1.22. Biochemistry in the field of study Chemistry,

iii) study program 7.3.2. Pharmacology in the field of study Pharmacy,

iv) study programs 7.1.3. Normal and pathological physiology, 7.1.18. Toxicology, 7.1.28 Medical, clinical and pharmaceutical biochemistry, 7.1.41. Medical neurosciences and 7.1.27. Medical biophysics in the field of study General Medicine,

(d) cooperation in science and technology with universities, other legal entities carrying out research and development and with entrepreneurs, in the fields referred to in paragraph 1.

(3) The activities of the organization according to § 2 par. 1 of the **Public Research Institution (from 2021, therefore, some parts are repeated)** Act are:

(a) activities:

i) conducting research,

(ii) provision and management of research and development infrastructure,

(iii) obtaining, processing and disseminating information in the field of science and technology and knowledge from its own research and development; and

(iv) cooperation in the field of science and technology with universities, other legal entities carrying out research and development and with entrepreneurs,

in the fields of: Normal and pathological physiology (030106), Pharmacology (030104), Pharmaceutical chemistry (030102), Toxicology (030107), Biochemistry (also for medical, pharmaceutical, veterinary, agricultural, forestry and water sciences) (010403), Bioorganic chemistry (010406), Animal physiology (010607), Ethology (also for agricultural and forestry sciences) (010604), Molecular biology (010613), Neurosciences (010617), Biophysics (also for medical, pharmaceutical, veterinary and agricultural, forestry and chemical sciences) ) (010303), Other related fields of biological sciences (010699), Clinical psychology (050102), General psychology (050107), Other related fields of psychological sciences (050199), Biomaterials (021005), New biomaterials (021009), Nanomaterials (021101) , Other related fields of basic fields of medical and pharmaceutical sciences (030199), Materials chemistry (010407), Inorganic technology and materials (020501); on the basis of the requirements of public administration bodies under the conditions according to special regulations,

(b) activities:

i) conducting research,

(ii) provision and management of research and development infrastructure; and

iii) acquisition, processing and dissemination of information in the field of science and technology and knowledge from own research and development, in the branches referred to in point (a), as a business activity,

(c) development and innovation activities in the fields referred to in point (a), namely:

i) on the basis of the requirements of public administration bodies under the conditions pursuant to special regulations,

as a business activity, or

iii) in the form of projects according to special regulations.

**1.8. Summary of R&D activity pursued by the institute during the evaluation period in both national and international contexts. Describe the scientific importance and societal impact of each important result/discovery. Explain on general level – the information should be understandable for a non-specialist (recommended 5 pages, max. 10 pages for larger institutes with more than 50 average FTE researchers per year as per Table 1.5.1.)**

According to the World Health Organization (WHO), 15-30% of the world's population today suffers from diseases of civilization. It is a cluster of diseases that develop due to inappropriate lifestyle such as decreased physical activity, unsuitable diet, smoking and adverse changes of the environment including pollution of air, water, etc. This problem is most intense in developed countries where diseases of civilization are gaining epidemic proportions today. The most common diseases of civilization include cardiovascular diseases (arterial hypertension, myocardial ischemia, myocardial

infarction, stroke), metabolic diseases (diabetes mellitus, hyperlipidemia, obesity), mental disorders (depression, addictions), musculoskeletal and motion disorders, and cancer. The research of CEM SAS is focused on the comprehensive study of all mentioned civilization diseases from different perspectives. Our approach is mostly experimental, from in silico models to human studies, from pathophysiological mechanisms to pharmacological interventions and novel drug design.

### **Cardiovascular diseases**

In the reviewed period we focused on the role of several lifestyle-related risk factors in **cardioprotection and the resistance of the heart to ischemia**. We found that comorbidities, such as hypertension or hyperglycemia exerted a negative impact on the myocardial response to ischemia and reduced the effectivity of adaptive protective intervention induced by brief episodes of ischemia (preconditioning) prior to sustained insult. As we have shown in both normotensive and hypertensive rats, heart's ability to resist ischemia could be restored by modulation of the type or intensity of adaptive stimuli, and potentiated by combination with antioxidant treatment, which could reduce the size of infarction. Age and gender determine the extent of cardiac injury, as well as efficiency of ischemic preconditioning. This was observed already during maturation when lowering of ischemic tolerance was associated with decline in the levels of proteins involved in the mechanisms of cell survival (p-Akt, PKC-epsilon, eNOS) induced by preconditioning. Activation of the transcription factor PPAR simulated the effect of preconditioning and protected the heart via up-regulation of genes of fatty acids metabolism, the activation of Akt-eNOS, as well as through anti-oxidative effects and suppression of apoptosis (programmed cell death suggesting a positive role of metabolic genes in acute myocardial ischemia and in adaptive processes in the heart). Strong protection could be conferred by other, non-invasive interventions, such as "remote" preconditioning, in which ischemia of a distant organ evoked anti-ischemic protection in the heart. Remote preconditioning effectively attenuated irreversible consequences of lethal ischemic injury, also in the diabetic heart. Similarly, sub-chronic voluntary exercise reduced infarct size via activation of proteins of protective cell signaling. **Myocardial infarction** led to increased nitric oxide synthase activity in all investigated zones of myocardium as well as circulating levels of cytokines like TNF- $\alpha$  and IL-6 in hypertensive rats. These results are in line with the goals of an international research in the frame of the Pan-European consortium on Cardioprotection (EU-CARDIOPROTECTION COST action CA 16225) aimed at improvement of public health via management of ischemic heart disease.

Significant progress has been achieved in **analyzing cardiac connexin-43 channel disorders**. Our findings point out that disorders of cardiac connexin-43 channels and extracellular matrix, which affect electrical properties of the heart, are crucial factors promoting life-threatening arrhythmias. We have demonstrated this in various rat models mimicking cardiovascular diseases in humans, such as hypertension, obesity, hyperthyroid status or light-pollution. On the other hand, treatment with omega-3 fatty acids, red palm oil or melatonin attenuated connexin-43 and extracellular matrix disorders and reduced the propensity of the heart to malignant arrhythmias. Our findings have elucidated novel molecular mechanisms of non-pharmacological compounds and indicate that they exert a beneficial effect on connexin-43 and extracellular matrix under pathological conditions. These preclinical results open ways for exploring antiarrhythmic potential of omega-3 fatty acids and melatonin in patients and humans at increased risk of cardiovascular diseases.

Considerable research effort was related to **the blood pressure regulation pathways**, in particular **the role of gaseous transmitters** (NO, H<sub>2</sub>S, CO), aberrant redox signaling, hyperglycemia, hyperuricemia, and iron metabolism in the development of endothelial dysfunction and/or hypertension in various experimental models of hypertension in rats. These mechanisms can be considerably modified by acute or chronic stress. Special attention was paid on perivascular adipose

tissue and its role in paracrine regulation of arterial reactivity in individuals with various degree of body adiposity and severity of the impairment of the cardiovascular system. The results revealed that perivascular sympathetic nerves importantly interact with perivascular fat, and the nerves themselves are contained in adipose vascular layer. To find a common intersection between basic research and clinical domain we collaborated with the Department of Urology, University Hospital in Bratislava, which ensured the supply of human arterial tissue samples obtained from patients after nephrectomy. This allowed us to correlate studies from animal models with those from human individuals. The main outcome was a novel finding that in patients there is a considerable heterogeneity of the vasoactive effects of nitroso-sulfide signaling pathways, depending on the presence of hypertension and increased plasma glucose levels. The results show that the end-products of nitroso-sulfide interaction as well as endogenous sulfide signaling pathways could represent a prospective pharmacological target to modulate the vasoactive properties of patients with arterial hypertension.

Notable are our studies into the **epidemiology of hypertension and obesity**. We have collected representative data of body mass index (BMI) in children and adolescents and contributed to the development of reference values of BMI for young Slovak population. This allows an objective evaluation of changes during the child's growth and development, as well as evaluation of population trends in obesity and/or malnutrition. Furthermore, blood pressure data were collected and included into the National Cardiovascular Registry. In children with hypertension, we have analyzed the relationship between blood pressure and a number of variables such as family and personal history, anthropometry, laboratory tests, subjective and objective difficulties, associated diseases, and the treatment with antihypertensive drugs. We have found that elevated blood pressure values persist into adulthood in 57% of adolescents despite pharmacotherapy, suggesting that the effectiveness of prevention and treatment of primary hypertension is not satisfactory. This research was also part of an international network of studies on risk factors for non-communicable diseases, Non-communicable diseases Risk Factor Collaboration (NCD-RisC). This collaboration has resulted in notable papers published in the most prestigious scientific journals. From a world-wide perspective, it provides an important contribution towards prevention of cardiovascular and metabolic diseases and revelation of the crucial determinants of healthy development in young population.

Another important line of research with a promising potential of translation into clinical practice was related to **COVID-19**, study of which has become a priority worldwide. Two funded projects were focused on developing an animal model to improve the evaluation of the efficacy of candidate pharmacological substances to treat COVID-19. While one of the projects has still been underway, within the already successfully completed project, we detected the mechanisms and signal pathways involved into the pathological changes in the cardiovascular system of patients with COVID-19 suffering from hypertension. Pre-existing cardiovascular diseases, such as hypertension, are risk factors that predispose patients with SARS-CoV-2 infection to serious complications or death so that the improvement of vascular function might be beneficial for SARS-CoV-2-infected patients. We simulated the action of SARS-CoV-2 by administering inhibitor of ACE2 receptors, the main target of the virus, to animals suffering from essential hypertension and tested the mechanisms of action of agents with high pharmaceutical potential in COVID-19, a natural NO-releasing flavonoid taxifolin and a H<sub>2</sub>S-releasing ACE inhibitor. Our research identified the mechanisms that could block the cascade of pathological processes developed in the cardiovascular system of patients with COVID-19. Concurrently, we are working on a clinical study of patients who have overcome COVID-19 and have persistent cardiovascular consequences. Thus, we can compare the mechanisms of the consequences with the real symptoms of patients, which can be of great importance for the setting of treatment.

## Metabolic diseases

**Metabolic syndrome** is the most common metabolic disorder and represents a cluster of conditions that occur together (including obesity, hyperglycemia, insulin resistance, dyslipidemia, and hypertension) and increase the risk of heart disease, stroke, and type 2 diabetes. Our investigations employed long-term supplementation of fructose, a lipogenic sugar used to induce metabolic disorders in various experimental models. We monitored the effect of long-term fructose intake on vasoactive responses of isolated arteries in normotensive and spontaneously hypertensive rats. Our results suggest that increased fructose intake impairs endothelial function, which can be (at least partially) attributed to disrupted interaction between the NO and H<sub>2</sub>S signaling pathways. Moreover, we confirmed a similar significance of this interaction also in **hypertriglyceridemic rats**, a specific non-obese model of metabolic syndrome. Endothelial cells play a major regulatory role in vascular health, including vascular smooth muscle cell relaxation and growth inhibition, inhibition of inflammatory responses, and antithrombotic actions. Our studies highlight endothelial dysfunction as a critical pathomechanism for development of atherosclerosis in metabolic syndrome.

We have also characterized the mechanisms of mitochondrial adaptive response of the myocardium to increased energy load in **experimental acute diabetes mellitus** in the rats. Using liquid chromatography–mass spectrometry (LC-MS) proteomic analysis of mitochondrial proteome we elucidated cardioprotective processes in the conditions of reduced oxygen consumption simulated by acute diabetes mellitus. The methodological approach we have chosen for the complex characterization of cardiac mitochondrial energy modulation proved to be very useful. Our findings show that it is beneficial for the heart cell to produce energy using glycolytic metabolism in hypoxia or reduce oxygen utilization in acute diabetes. We also found that mitochondrial proteome in a state of reduced oxygen consumption was affected by administration of dichloroacetate, an inhibitor of glycolysis. In the group of diabetic rats, dichloroacetate decreased the expression of all complexes of the mitochondrial respiratory chain, in particular complexes II and IV. Furthermore, the application of dichloroacetate in this group resulted in downregulation the proteins of the mitochondrial permeability transition pore, a transmembrane protein residing in the mitochondrial inner membrane which is involved in several pathological states. Our results show that in diabetic myocardium, reduced oxygen utilization plays a positive role in the initiation of endogenous protection processes.

## Inflammatory injury and oxidative stress

**Na, K-ATPase** is a key enzyme in cellular physiology responsible for maintaining an optimal intracellular balance of sodium and potassium ions. Using enzyme kinetics methods, we have gathered new information the enzyme's functional properties in various physiological and disease-state situations in the brain, kidneys, and erythrocytes. This enzyme was highly sensitive to conditions of impaired oxidative status in the body, such as those resulting from radiation therapy or experimentally induced inflammation in rats. Inflammation diminished the number of active molecules of Na, K-ATPase in erythrocytes, which was accompanied with decreased deformability, i.e., the ability of erythrocytes to pass through narrow capillaries of the circulation. Supplementation of carotenoids for 10 days reverted these effects of inflammation. Furthermore, supplementing healthy young volunteers with vitamin C (1000 mg/day for 3 weeks) increased the number of active K-ATPase molecules in erythrocytes and improved their deformability. These findings are important given that abnormalities in functional properties of erythrocytes are associated with a variety of diseases.

Another line of research using two animal inflammation models showed that bioactive dipeptide **arnosine** has systemic anti-inflammatory activity and protects rat brain and cultured articular



chondrocytes from oxidative stress. Carnosine reduced hind paw edema and significantly affect the markers of oxidative stress as well as the proinflammatory cytokine IL-1 $\alpha$ . Similar effects were also observed in chondrocytes pretreated with carnosine. This finding suggests that carnosine might be beneficial for treating arthritic diseases. We also showed that addition of natural immunomodulatory and antioxidant substances to a standard treatment with methotrexate in rheumatoid arthritis has a beneficial effects and reduced inflammation more effectively than methotrexate alone. Combination therapy with natural substances thus have the potential to improve efficacy and reduce side effects of methotrexate and represents one possible direction in the adjuvant treatment of rheumatoid arthritis.

Microglia, the resident macrophages in the central nervous system, were postulated to act as principal drivers in neuroinflammation and brain aging. Thus, we investigated the potential mitigating effects of the novel chlorinated derivatives of flavonoid **quercetin** (CI-XQ) on activated microglial cells and microglia-enriched brain cultures established from aged rats. The CI-XQ compounds effectively suppressed the activation markers (including iNOS, COX-2, and TNF $\alpha$  protein levels) in microglia and reduced hypersensitivity markers in aged rat microglia while affording their protection against oxidative stress. Therefore, CI-XQs can represent agents useful for new effective pharmaceutical interventions against brain aging, which might overcome the common limitations of the clinical applicability of quercetin.

### **Mental functions and neuropsychiatric disorders**

Mental disorders are among the most common causes of disability and the resulting disease burden is among the highest of all diseases. WHO reflected mental health problems in its Thirteenth General Programme of Work (GPW13) and formulated an action plan, declaring a need for accelerated research in this field. Relatedly, the National Institute of Mental Health has recognized that progress in this area requires deeper understanding of the basic biological and cognitive processes outside the confines of current diagnostic categories. In line with these priorities, our research activities have focused on research of the neurobiological basis of human cognitive and motor functions and dysfunction in neuropsychiatric disorders. The research has brought several novel and important discoveries.

One focus of the research projects was the role of the neurotransmitter NO in cognitive (dys)function and the **pathogenesis of schizophrenia**. Genetic architecture of schizophrenia is a hotly debated topic. Carriers of certain genetic variants of neuronal NO synthase (the enzyme producing NO in the brain) are at increased risk of schizophrenia and we found that these individuals show deficit in filtering out irrelevant sensory stimuli, i.e. gating, which is a hallmark of schizophrenia. Moreover, we showed that gating efficiency decreases with increasing number of carried risk alleles of NO synthase, indicating the etiological importance of additive effects of common genetic risk variants in schizophrenia. Furthermore, in a rat model of schizophrenia, we showed that disrupted synthesis of NO is related to impaired brain development controlled by the action of neurotrophic regulatory peptides/factors (VGF, BDNF, VEGF), disclosing yet unidentified mechanisms contributing to neurodevelopmental disturbance considered to play a key role in the pathogenesis of schizophrenia. Overall, these findings contribute to the understanding schizophrenia and provide a firm basis for further research into etiopathogenesis of this devastating disorder, and possibilities of its prevention and treatment.

A related line of investigation has focused on the **neurocognitive mechanisms of thinking**, which is severely impaired in many mental disorders (including schizophrenia). Our research has shown that psychosocial stress, via activation of the sympathetic branch of the autonomic nervous system,

disrupts flexible thinking, accessibility, and integration of semantic knowledge. We have further shown that retrieval of semantically related concepts from long-term memory is supported by synchronization of brain activity in the so-called theta band (~6 Hz) and that left lateral prefrontal cortex plays role in the executive control of the retrieval from semantic memory. Broadly speaking, these findings help us to understand how thinking emerges out from the activity of the brain. Within the framework of this research, we also developed new psychometric methods enabling to assess multiple aspects of semantic memory in research and clinical settings.

Notable is also our collaboration with the SCAN-Unit, Faculty of Psychology, University of Vienna, in the field of **social cognitive neuroscience**. This research has resulted in several publications showing, for instance, that empathy for pain of other individuals is supported by somatosensory and motor processes and the action of endogenous opioids. These findings represent an important contribution in the effort to understand neural mechanisms of human social cognition.

Our research also involved investigations of the **mechanisms of posture and gait** control in elderly and patients with neurodegenerative diseases. Falls are the second leading cause of unintentional injury deaths worldwide and elderly adults suffer the greatest number of fatal falls. Our findings help us to understand the neurophysiological mechanisms of age-and pathology-related decline of these functions and can be used to develop novel effective strategies for rehabilitation of motor functions, training and prevention of falls.

Another important topic was research focused on the improvement of maternal and newborn mental health and on the role of prenatal factors in the development of psychopathology later in life. Treatment of stress-related disorders such as depression during gestation rises a number of concerns related to the safety of these drugs for the developing fetus. Our data suggest that gestational treatment with antidepressants limits the negative impact of **maternal depression** in adult offspring and provide more insight into the possible outcomes associated with perinatal antidepressant therapy. Furthermore, our research show that immune activation of mothers during pregnancy affects in the offspring the activity of serotonergic and dopaminergic neurons, which are implicated in severe mental disorders such as depression or schizophrenia. These results provide a new insight into the role of immunological and neurodevelopmental processes in psychopathology and contribute to the understanding why children of women exposed to an infectious illness during pregnancy are at increased risk of developing mental disorders.

### **Strategies for the prevention and reduction of diseases of civilization**

A common pathogenetic denominator of most civilization diseases, in particular cardiovascular, metabolic, and oncological diseases, is oxidative stress of the cell – a state characterized by increased formation of hydroxyl and nitrosyl radicals. In the period under review, we therefore focused on searching a suitable scavenger for these radicals. We have identified **molecular hydrogen (H<sub>2</sub>)** as an effective scavenger of free radicals from a number of antioxidant substances. Consumption of hydrogen rich water and inhalation of H<sub>2</sub> proved to be the most suitable application, depending on the pathophysiological conditions. In cooperation with industry, we have prepared a prototype of a device for super-saturation of hydrogen water and a device enabling the preparation of hydrogen-enriched air of various concentrations for inhalation for therapeutic purposes. Based on our preclinical animal studies, the optimal strategy for H<sub>2</sub> administration for clinical use has been developed. Of the various H<sub>2</sub> application methods, we used oral administration of hydrogen-saturated water and inhalation of 3% H<sub>2</sub> mixed with air. We found that although inhalation has clear advantages over oral administration, it may not be the most effective method. We also focused on radiation damage to the heart, myocardial ischemia and reperfusion, heart failure, and the use of the

pluripotent effect of hydrogen for heart storage and transplantation. We found that H<sub>2</sub> has antioxidant, anti-apoptotic and anti-inflammatory properties. We monitored H<sub>2</sub> effectiveness by state of the art analyzes of oxidative stress markers and by changes in miRNA expression and confirmed that molecular hydrogen acts as an antioxidant and reduces inflammatory markers via Nfr2-regulated AKT pathways and directly or indirectly increases the level of antioxidant enzymes. In cooperation with university clinical departments, we have also carried out clinical trials in metabolic syndrome, non-alcoholic fatty liver disease (steatosis), colon inflammatory disease and rectal cancer, as well as preclinical pig heart transplantation experiments. The outcomes were overall positive, characterized by a significant mitigation of symptoms and improvement of the quality of life of oncology and cardiology patients.

Very important findings have been obtained in the research of another powerful antioxidants - **natural polyphenols**. There is an enormous boom of the use of natural substances, including various polyphenols (e.g. flavonoids), as a nutritional supplements believed to be beneficial for the cardiovascular system and human health. Natural polyphenols are widely enriched in human food, e.g. in vegetables, fruits, cocoa, tea, as well as in different juices and red wine; thus research in this field is very attractive and has a high societal impact. Natural flavonoids have been generally recognized to be effective in the prevention and treatment of hypertension. In this context, the cocoa flavanol **(-)-epicatechin** is a very promising substance. Our results confirmed that (-)-epicatechin reduced blood pressure, and iron content in blood of young prehypertensive rats (BHR, a common animal model of human primary pre-hypertension), showing that the (-)-epicatechin can be effective in the prevention of early stages of hypertension development.

In addition to their effects on blood pressure, natural polyphenols seem to be beneficial for the heart function and are effective against ischemia of the heart. However, beneficial effects of majority of these substances in preventing the ischemia-reperfusion injury (a damage after restoration of blood flow to previously ischemic tissues) have been experimentally proven exclusively in young healthy animals exposed to cardiac ischemia-reperfusion, which does not reflect a real life situation of cardiac patients who are mostly elderly people suffering from different comorbidities, such as diabetes or obesity. To obtain clinically relevant data on the effects of natural polyphenols in heart injury, we have tested the effects of natural flavonoid **quercetin** (QCT) enriched in fruits and vegetables on vascular function and heart resistance to ischemia-reperfusion injury in ageing Zucker Diabetic Fatty rats – an animal model of obesity and type 2 diabetes. We found that QCT by its chronic application exerted age-dependent protective effect on the relaxation of elastic arteries; on the other hand, QCT was ineffective in preventing ischemia-reperfusion injury of the heart in this animal model. One of the possible mechanisms causing the failure of cardioprotection by chronic QCT treatment seems to be an inappropriate activation of the so-called RISK (Reperfusion Injury Salvage Kinases) signaling pathway known to be activated by different cardioprotective interventions in young animals. Thus, cardioprotective potential of QCT, and possibly other polyphenols or other natural substances, might be significantly affected by age and/or metabolic comorbidities. This finding is very important from a clinical perspective and should be considered when administrating polyphenols to ageing people and in the presence of different lifestyle-related comorbidities. In next study we found anti-hypertensive effects of a small synthetic molecule pioglitazone (the peroxisome proliferator-activated receptor  $\gamma$  agonist) in young BHR and spontaneously hypertensive rats (SHR, a common animal model of human primary hypertension) which was associated with improved redox regulation. Altogether, our findings are relevant for better understanding of the mechanisms of anti-hypertensive effects of natural or synthetic drugs taking into account the age and/or metabolic comorbidities.

In several studies, we also confirmed the potency of natural flavonoids to prevent and treat metabolic syndrome. For instance, we found that the administration of polyphenols decreased blood pressure and plasma glucose level, as well as down-regulated pro-inflammatory markers such as the nuclear factor kappa B (NF- $\kappa$ B) and iNOS in rats with metabolic syndrome. Moreover, an extract from cornelian cherry, involving high concentration of polyphenols, reduced total and LDL cholesterol levels probably due to increased SOD and decreased NADPH oxidase proteins expressions. Furthermore, in cooperation with the University of Eastern Finland, Kuopio, we have gained several interesting findings indicating that polyphenols also affect proteins associated with cancer and diabetes. These results indicate that polyphenols may have broad therapeutic implications for age-related diseases and that novel pharmacological interventions in metabolic diseases (e.g. diabetes) may target the mechanisms of calcium regulation in the cell. Altogether, this research revealed yet unknown mechanisms of polyphenol actions and opened new ways toward future studies of prevention and treatment of civilization diseases.

In the last decade, an enormous interest of the scientific community has been directed to the **nanomaterials** in biomedical applications. A novel approach to improve the bioavailability and stability of aliskiren, an antihypertensive renin inhibiting drug and simvastatin, a lipid-lowering drug is using drug-loading **polymeric nanoparticles**. With the aim to streamline the antihypertensive and lipid-lowering therapies, we studied the effects of aliskiren- and simvastatin-loaded polymeric nanoparticles on blood pressure, lipid profile and NO/ROS balance in the cardiovascular system of spontaneously hypertensive and obese Zucker rats, respectively. Our results revealed a more significant effect of drug-loaded nanoparticles on all analysing parameters comparing pure drugs but improving the form of polymeric nanoparticles remains the aim of our further studies. We confirmed that loading pharmacologically active substances within polymeric nanoparticles allows for controlled release in the target tissue, increasing the drug effect while reducing drug dose and side effects.

Our research has further focused on **iron oxide nanoparticles** (IONs). An important original finding is that acute stress altered distribution of IONs into organs and led to hypotension in normotensive rats. In SHR, repeated administration of IONs also reduced blood pressure, which was associated with increased NO production in the liver, showing an important role of hepatic circulation in development of side effects of IONs. These finding may have clinical importance as hypotension is one of the negative side effects of IONs in patients. Our results suggest caution specifically when IONs are used in hypertensive patients and/or in conditions associated with acute stress. We have also developed magnetometric method for distinguishing biogenic iron from iron derived from IONs.

**Cemtirestat** is a novel original drug **developed at CEM SAS**, which has been patented (WO2015057175; Slovak Patent No. 288508). Cemtirestat is a promising inhibitor of aldose reductase for treatment of diabetic complications. Preclinical evaluation focused on neuroprotective effects of cemtirestat and its toxicology. Studies *in vivo* in rat models of diabetes revealed antihypertriglyceride activity of the drug and its ability to attenuate symptoms of peripheral neuropathy with high efficacy. Additional mechanistic *ex vivo* studies in the rat brain cortical slices and *in vitro* investigations in models of free radical damage showed that cemtirestat represents a promising therapeutic strategy against chronic complications in diabetes based on multiple pharmacological activities.

**We are pleased that the experimental basis of our studies leads to clinical studies and the development of new drugs. Ultimately, our research thus represents a significant social impact and benefit society in the form of a healthier population.**

## **2. Partial indicators of main activities:**

### **2.1. Research output**

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

The main scientific fields of our outputs are as follows:

Clinical Medicine	30%
Pharmacology&Toxicology	30%
Neurosciences&Behavior	20%
Plant&Animal Sciences	15%
Biology&Biochemistry	5%

Basic research represents 90% and international 95%.

#### **2.1.2 List of selected publications documenting the most important results of basic research. The total number of publications should not exceed the number of average FTE researchers per year. The principal research outputs (max. 10% of the total number of selected publications, including Digital Object Identifier – DOI if available) should be underlined. Authors from the evaluated organizations should be underlined.**

In this section, we present the most representative publications of CEM. This list has been selected to best document the research at CEM, which is reflected by the fact that researchers of CEM are in these papers in the position of corresponding and/or first authors. The list has been ordered alphabetically. Notable research outputs, in which researchers of CEM were not in the position of leading authors are listed elsewhere (2.1.5, 2.1.9).

1. ANDELOVÁ, Katarína - EGAN BEŇOVÁ, Tamara - SZEIFFOVÁ BAČOVÁ, Barbara - SÝKORA, Matúš - PRADO, Natalia - DIEZ, Emiliano - HLIVÁK, Peter - TRIBULOVÁ, Narcisa\*\*. Cardiac Connexin-43 Hemichannels and Pannexin1 Channels: Provocative Antiarrhythmic Targets. In *International Journal of Molecular Sciences*, 2021, vol. 22, art. no. 260. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms22010260>. Type ADCA

2. ANDELOVÁ, Natália - WACZULÍKOVÁ, Iveta - TALIAN, Ivan - SÝKORA, Matúš - FERKO, Miroslav\*\*. mPTP Proteins Regulated by Streptozotocin-Induced Diabetes Mellitus Are Effectively Involved in the Processes of Maintaining Myocardial Metabolic Adaptation. In *International Journal of Molecular Sciences*, 2020, vol. 21, pii. 2622. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21072622>. Type ADCA

3. BARANČÍK, Miroslav - KURA, Branislav - LE BARON, Tyler W. - BOLLI, Roberto - BUDAY, Jozef - SLEZÁK, Ján\*\*. Molecular and Cellular Mechanisms Associated with Effects of Molecular Hydrogen in Cardiovascular and Central Nervous Systems. In *Antioxidants*, 2020, vol. 9, iss. 12, article no. 1281. (2019: 5.014 - IF, Q1 - JCR, 1.100 - SJR, Q1 - SJR). (2020 - WOS, SCOPUS). ISSN 2076-3921. Available at: <https://doi.org/10.3390/antiox9121281>. Type ADMA

4. BARTEKOVÁ, Monika - RADOŠINSKÁ, Jana - JELEMENSKÝ, Marek - DHALLA, Naranjan S.\*\*. Role of cytokines and inflammation in heart function during health and disease. In *Heart Failure Reviews*, 2018, vol. 23, no. 5, p. 733-758. (2017: 4.104 - IF, Q2 - JCR, 1.887 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1382-4147. Available at: <https://doi.org/10.1007/s10741-018-9716-x>. Type ADCA

5. BARTEKOVÁ, Monika\*\* - ADAMEOVÁ, Adriana - GÖRBE, Anikó - FERENCZYOVÁ, Kristína - PECHÁNOVÁ, Oľga - LAZOU, Antigone - DHALLA, Naranjan S. - FERDINANDY, Péter - GIRICZ, Zoltán\*\*. Natural and synthetic antioxidants targeting cardiac oxidative stress and redox signaling in cardiometabolic diseases. In *Free Radical Biology and Medicine*, 2021, vol. 169, p. 446-477. (2020: 7.376 - IF, Q1 - JCR, 1.912 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 0891-5849. Available at: <https://doi.org/10.1016/j.freeradbiomed.2021.03.045>. Type ADCA

6. BERÉNYIOVÁ, Andrea - DOVINOVÁ, Ima - KVANDOVÁ, Miroslava - KRISTEK, František - JANSEN, Eugene - MAJZUNOVÁ, Miroslava - ČACÁNYIOVÁ, Soňa\*\*. The effect of chronic NO synthase inhibition on the vasoactive and structural properties of thoracic aorta, NO synthase activity, and oxidative stress biomarkers in young SHR. In *Oxidative medicine and cellular longevity*, 2018, vol. 2018, art. no. 2502843. (2017: 4.936 - IF, Q2 - JCR, 1.558 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2018/2502843>. Type ADMA

7. BERÉNYIOVÁ, Andrea\*\* - GOLAS, Samuel - DROBNÁ, Magdaléna - CEBOVÁ, Martina - ČACÁNYIOVÁ, Soňa. Fructose intake impairs the synergistic vasomotor manifestation of nitric oxide and hydrogen sulfide in rat aorta. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 9, art. no. 4749, 17 p. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms22094749>. Type ADCA

8. BERNÁTOVÁ, Iveta\*\* - LÍŠKOVÁ, Silvia. Mechanisms modified by (-)-epicatechin and taxifolin relevant for the treatment of hypertension and viral infection: Knowledge from preclinical studies. In *Antioxidants*, 2021, vol. 10, no. 3, art. no. 467, p. 1-26. (2020: 6.313 - IF, Q1 - JCR, 1.067 - SJR, Q2 - SJR). ISSN 2076-3921. Available at: <https://doi.org/10.3390/antiox10030467>. Type ADMA

9. BERNÁTOVÁ, Iveta\*\* - PÚZSEROVÁ, Angelika - BALIŠ, Peter - ŠESTÁKOVÁ, Natália - HORVÁTHOVÁ, Martina - KRALOVIČOVÁ, Zuzana - ŽITŇANOVÁ, Ingrid. Chronic stress produces persistent increases in plasma corticosterone, reductions in brain and cardiac nitric oxide production, and delayed alterations in endothelial function in young prehypertensive rats. In *Frontiers in Physiology*, 2018, vol. 9, art. no. 1179, p. 1-11. (2017: 3.394 - IF, Q1 - JCR, 1.590 - SJR, Q1 - SJR). ISSN 1664-042X. Available at: <https://doi.org/10.3389/fphys.2018.01179>. Type ADMA

10. BERNÁTOVÁ, Iveta\*\*. Biological activities of (-)-epicatechin and (-)-epicatechin-containing foods: Focus on cardiovascular and neuropsychological health. In *Biotechnology Advances*, 2018, vol. 36, no. 3, p. 666-681. (2017: 11.452 - IF, Q1 - JCR, 3.006 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 0734-9750. Available at: <https://doi.org/10.1016/j.biotechadv.2018.01.009>. Type ADCA

11. BOŤANSKÁ, Barbora - BARTEKOVÁ, Monika - FERENCZYOVÁ, Kristína - FOGARASSYOVÁ, Mária - KINDERNAY, Lucia - BARANČÍK, Miroslav\*\*. Matrix Metalloproteinases and Their Role in Mechanisms Underlying Effects of Quercetin on Heart Function in Aged Zucker Diabetic Fatty Rats. In *International Journal of Molecular Sciences*, 2021, vol. 22, art. no. 4457. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 -

SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms22094457>. Type ADCA

12. CEBOVÁ, Martina - KLIMENTOVÁ, Jana - JANEGA, Pavol - PECHÁŇOVÁ, Oľga. Effect of bioactive compound of Aronia melanocarpa on cardiovascular system in experimental hypertension. In *Oxidative Medicine and Cellular Longevity*, 2017, vol. 2017, article ID 8156594, 8 p. (2016: 4.593 - IF, Q2 - JCR, 1.547 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2017/8156594>. Type ADMA

13. CEBOVÁ, Martina - REHÁKOVÁ, Radoslava - KOŠÚTOVÁ, Michaela - PECHÁŇOVÁ, Oľga\*\* . Simvastatin does not affect nitric oxide generation increased by sesame oil in obese Zucker rats. In *Oxidative Medicine and Cellular Longevity*, 2018, vol. 2018, art. no. 5413423, 7 p. (2017: 4.936 - IF, Q2 - JCR, 1.558 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2018/5413423>. Type ADMA

14. CSATLÓSOVÁ, Kristína - BÖGI, Eszter - ĎURIŠOVÁ, Barbora - GRINCHII, Daniil - PALIOKHA, Ruslan - MORAVČÍKOVÁ, Lucia - LACINOVÁ, Ľubica - JEŽOVÁ, Daniela - DREMENCOV, Eliyahu\*\* . Maternal immune activation in rats attenuates the excitability of monoamine-secreting neurons in adult offspring in a sex-specific way. In *European Neuropsychopharmacology*, 2021, vol. 43, p. 82-91. (2020: 4.600 - IF, Q2 - JCR, 1.603 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 0924-977X. Available at: <https://doi.org/10.1016/j.euroneuro.2020.12.002>. Type ADCA

15. CSEKES, Erika - VÁGVÖLGYI, Máté - HUNYADI, Attila - RAČKOVÁ, Lucia\*\* . Protoflavones in melanoma therapy: Prooxidant and pro-senescence effect of protoapigenone and its synthetic alkyl derivative in A375 cells. In *Life Sciences*, 2020, vol. 260, art. no. 118419. (2019: 3.647 - IF, Q2 - JCR, 1.031 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0024-3205. Available at: <https://doi.org/10.1016/j.lfs.2020.118419>. Type ADCA

16. CSEKES, Erika\*\* - RAČKOVÁ, Lucia\*\* . Skin Aging, Cellular Senescence and Natural Polyphenols. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 23, 51 p., art. no. 12641. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms222312641>. Type ADCA

17. DAYAR, Ezgi - CEBOVÁ, Martina - LIETAVA, Ján - PANGHYOVÁ, Elena - PECHÁŇOVÁ, Oľga\*\* . Antioxidant effect of Lonicera caerulea L. in the cardiovascular system of obese Zucker rats. In *Antioxidants*, 2021, vol. 10, no. 8, art. no. 1199. (2020: 6.313 - IF, Q1 - JCR, 1.067 - SJR, Q2 - SJR). ISSN 2076-3921. Available at: <https://doi.org/10.3390/antiox10081199>. Type ADMA

18. FERENCZYOVÁ, Kristína - KINDERNAY, Lucia - VLKOVIČOVÁ, Jana - KALOČAYOVÁ, Barbora - RAJTÍK, Tomáš - BARTEKOVÁ, Monika\*\* . Pharmacology of Catechins in Ischemia-Reperfusion Injury of the Heart. In *Antioxidants*, 2021, vol. 10, art. no. 1390. (2020: 6.313 - IF, Q1 - JCR, 1.067 - SJR, Q2 - SJR). ISSN 2076-3921. Available at: <https://doi.org/10.3390/antiox10091390>. Type ADMA

19. FERENCZYOVÁ, Kristína\* - KALOČAYOVÁ, Barbora\* - BARTEKOVÁ, Monika\*\* . Potential Implications of Quercetin and its Derivatives in Cardioprotection. In *International Journal of Molecular Sciences*, 2020, vol. 21, no. 5, pii: E1585. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21051585>. Type ADCA

20. FERKO, Miroslav\*\* - ANDELOVÁ, Natália - SZEIFFOVÁ BAČOVÁ, Barbara - JAŠOVÁ, Magdaléna. Myocardial Adaptation in Pseudohypoxia: Signaling and

Regulation of mPTP via Mitochondrial Connexin 43 and Cardiolipin. In *Cells*, 2019, vol. 8, iss. 11, article no. 1449. (2018: 5.656 - IF, Q1 - JCR). ISSN 2073-4409. *Mitochondria in Health and Diseases*, s. 365-382. (2018: 5.656 - IF, Q1 - JCR). Available at: <https://doi.org/10.3390/cells8111449>. Type ADMA

21. HEGER, Vladimír - BENEŠOVÁ, Barbora - VISKUPIČOVÁ, Jana - MÁJEKOVÁ, Magdaléna - ZOOFISHAN, Zoofishan - HUNYADI, Attila - HORÁKOVÁ, Ľubica\*\*  
Phenolic Compounds from *Morus nigra* Regulate Viability and Apoptosis of Pancreatic  $\beta$ -Cells Possibly via SERCA Activity. In *ACS Medicinal Chemistry Letters*, 2020, vol. 11, no. 5, p. 1006-1013. (2019: 3.975 - IF, Q2 - JCR, 1.158 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 1948-5875. Available at: <https://doi.org/10.1021/acsmchemlett.0c00047>. Type ADCA

22. HEGER, Vladimír\* - TYNI, Jonna\* - HUNYADI, Attila - HORÁKOVÁ, Ľubica - KAKKONEN-LAHTELA, Maija - RILLA-RAHNASTO, Minna\*\*  
Quercetin based derivatives as sirtuin inhibitors. In *Biomedicine & Pharmacotherapy*, 2019, vol. 111, p. 1326-1333. (2018: 3.743 - IF, Q1 - JCR, 0.931 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 0753-3322. Available at: <https://doi.org/10.1016/j.biopha.2019.01.035>. Type ADCA

23. HLAVÁČ, Matúš - KOVÁČIKOVÁ, Lucia - ŠOLTÉSOVÁ PRNOVÁ, Marta - ŠRAMEL, Peter - ADDOVÁ, Gabriela - MÁJEKOVÁ, Magdaléna - HANQUET, Gilles - BOHÁČ, A. - ŠTEFEK, Milan\*\*  
Development of Novel Oxotriazinoindole Inhibitors of Aldose Reductase: Isosteric Sulfur/Oxygen Replacement in the Thioxotriazinoindole Cemtirestat Markedly Improved Inhibition Selectivity. In *Journal of Medicinal Chemistry*, 2020, vol. 63, no. 1, p. 369-381. (2019: 6.205 - IF, Q1 - JCR, 2.093 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0022-2623. Available at: <https://doi.org/10.1021/acs.jmedchem.9b01747>. Type ADCA

24. HORVÁTH, Csaba - YOUNG, Megan - JARABICOVÁ, Izabela - KINDERNAY, Lucia - FERENCZYOVÁ, Kristína - RAVINGEROVÁ, Táňa - LEWIS, Martin - SULEIMAN, Saadeh - ADAMEOVÁ, Adriana\*\*  
Inhibition of Cardiac RIP3 Mitigates Early Reperfusion Injury and Calcium-Induced Mitochondrial Swelling without Altering Necroptotic Signalling. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 15, art. no. 7983. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms22157983>. Type ADCA

25. JASENOVEC, Tomáš - RADOŠINSKÁ, Dominika - KOLLÁROVÁ, Marta - BALIŠ, Peter - DAYAR, Ezgi - BERNÁTOVÁ, Iveta - ZORAD, Štefan - VRBJAR, Norbert - ČAČANYIOVÁ, Soňa - RADOŠINSKÁ, Jana\*\*  
Angiotensin system modulations in spontaneously hypertensive rats and consequences on erythrocyte properties; action of MLN-4760 and zofenopril. In *Biomedicines*, 2021, vol. 9, no. 12, art. no. 1902. (2020: 6.081 - IF, Q1 - JCR, 1.511 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 2227-9059. Available at: <https://doi.org/10.3390/biomedicines9121902>. Type ADCA

26. JELEMENSKÝ, Marek\* - KOVÁCSHÁZI, Csenger\* - FERENCZYOVÁ, Kristína - HOFBAUEROVÁ, Monika - Benkovičová - KISS, Bernadett - PÁLLINGER, Éva - KITTEL, Ágnes - SAYOUR, Viktor Nabil - GÖRBE, Anikó - PELYHE, Csilla - HAMBALKÓ, Szabolcs - KINDERNAY, Lucia - BARANČÍK, Miroslav - FERDINANDY, Péter - BARTEKOVÁ, Monika\*\* - GIRICZ, Zoltán\*\*  
Helium Conditioning Increases Cardiac Fibroblast Migration Which Effect Is Not Propagated via Soluble Factors or Extracellular Vesicles. In *International Journal of Molecular Sciences*, 2021, vol. 22, art. no. 10504. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms221910504>. Type ADCA



27. KINDERNAY, Lucia - FARKAŠOVÁ, Veronika - NECKÁŘ, Jan - HRDLIČKA, Jaroslav - YTREHUS, Kirsti - RAVINGEROVÁ, Táňa\*\*. Impact of Maturation on Myocardial Response to Ischemia and the Effectiveness of Remote Preconditioning in Male Rats. In *International Journal of Molecular Sciences*, 2021, vol. 22, iss. 20, art. no. 11009. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms222011009>. Type ADCA

28. KLUKNAVSKÝ, Michal - BALIŠ, Peter - PÚZSEROVÁ, Angelika - RADOŠINSKÁ, Jana - BERÉNYIOVÁ, Andrea - DROBNÁ, Magdaléna - LUKÁČ, Štefan - MUCHOVÁ, Jana - BERNÁTOVÁ, Iveta. (-)-Epicatechin prevents blood pressure increase and reduces locomotor hyperactivity in young spontaneously hypertensive rats. In *Oxidative medicine and cellular longevity*, 2016, vol. 2016, article ID 6949020, 14 p. (2015: 4.492 - IF, Q2 - JCR, 1.706 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2016/6949020>. Type ADMA

29. KLUKNAVSKÝ, Michal - BALIŠ, Peter - ŠKRÁTEK, Martin - MAŇKA, Ján - BERNÁTOVÁ, Iveta\*\*. (-)-Epicatechin reduces the blood pressure of young borderline hypertensive rats during the post-treatment period. In *Antioxidants*, 2020, vol. 9, no. 2, article no. 96. (2019: 5.014 - IF, Q1 - JCR, 1.100 - SJR, Q1 - SJR). (2020 - WOS, SCOPUS). ISSN 2076-3921. Available at: <https://doi.org/10.3390/antiox9020096>. Type ADMA

30. KOLLÁROVÁ, Marta - PÚZSEROVÁ, Angelika - BALIŠ, Peter - RADOŠINSKÁ, D. - TÓTHOVÁ, Ľubomíra - BARTEKOVÁ, Monika - BARANČÍK, Miroslav - RADOŠINSKÁ, Jana. Age- and Phenotype-Dependent Changes in Circulating MMP-2 and MMP-9 Activities in Normotensive and Hypertensive Rats. In *International Journal of Molecular Sciences*, 2020, vol. 21, art. no. 7286. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21197286>. Type ADCA

31. KOPRDOVÁ, Romana - OSACKÁ, Jana - MACH, Mojmír - KISS, Alexander\*\*. Acute impact of selected pyridoindole derivatives on Fos expression in different structures of the rat brain. In *Cellular and Molecular Neurobiology*, 2018, vol. 38, no. 1, p. 171-180. (2017: 3.895 - IF, Q2 - JCR, 1.283 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 0272-4340. Available at: <https://doi.org/10.1007/s10571-017-0520-2>. Type ADCA

32. KOVÁČIKOVÁ, Lucia - ŠOLTÉSOVÁ PRNOVÁ, Marta - MÁJEKOVÁ, Magdaléna - BOHÁČ, A. - KARASU, Çimen - ŠTEFEK, Milan\*\*. Development of Novel Indole-Based Bifunctional Aldose Reductase Inhibitors/Antioxidants as Promising Drugs for the Treatment of Diabetic Complications. In *Molecules*, 2021, vol. 26, no. 10, art. no. 2867. (2020: 4.412 - IF, Q2 - JCR, 0.782 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents, WOS, SCOPUS). ISSN 1420-3049. Available at: <https://doi.org/10.3390/molecules26102867>. Type ADCA

33. KURA, Branislav - KALOČAYOVÁ, Barbora - DEVAUX, Yvan - BARTEKOVÁ, Monika\*\*. Potential Clinical Implications of miR-1 and miR-21 in Heart Disease and Cardioprotection. In *International Journal of Molecular Sciences*, 2020, vol. 21, no. 3, pii: E700. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21030700>. Type ADCA

34. KURA, Branislav - SZEIFFOVÁ BAČOVÁ, Barbara - KALOČAYOVÁ, Barbora - SÝKORA, Matúš - SLEZÁK, Ján\*\*. Oxidative Stress-Responsive MicroRNAs in Heart Injury. In *International Journal of Molecular Sciences*, 2020, vol. 21, no. 1, art. no. E358.

(2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21010358>. Type ADCA

35. KUTLÍKOVÁ, Hana - BABKOVÁ DURDIAKOVÁ, Jaroslava - WAGNER, Bernhard - VLČEK, Miroslav - EISENEGGER, Christoph - LAMM, Claus - RIEČANSKÝ, Igor\*\*. The effects of testosterone on the physiological response to social and somatic stressors. In *Psychoneuroendocrinology*, 2020, vol. 117, art. no. UNSP 104693. (2019: 4.732 - IF, Q1 - JCR, 2.049 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0306-4530. Available at: <https://doi.org/10.1016/j.psyneuen.2020.104693>. Type ADCA

36. LE BARON, Tyler W. - ASGHARZADEH, Fereshteh - KHAZEI, Majid - KURA, Branislav - TARNAVA, Alex - SLEZÁK, Ján. Molecular hydrogen is comparable to sulfasalazine as a treatment for DSS-induced colitis in mice. In *EXCLI Journal*, 2021, vol. 20, p. 1106-1117. (2020: 4.068 - IF, Q2 - JCR, 0.812 - SJR, Q1 - SJR). ISSN 1611-2156. Available at: <https://doi.org/10.17179/excli2021-3762>. Type ADMA

37. LÍŠKOVÁ, Alžbeta - LETAŠIOVÁ, Silvia - JANTOVÁ, Soňa - BREZOVÁ, Vlasta - KANĎÁROVÁ, Helena\*\*. Evaluation of phototoxic and cytotoxic potential of TiO<sub>2</sub> nanosheets in a 3D reconstructed human skin model. In *ALTEX : Alternatives to Animal Experimentation*, 2020, vol. 37, no. 3, 441-450. (2019: 5.787 - IF, Q1 - JCR, 1.270 - SJR, Q1 - SJR). ISSN 1868-596X. Available at: <https://doi.org/10.14573/altex.1910012>. Type ADMA

38. LUPTÁKOVÁ, Dominika - BAČIAK, Ladislav - PLUHÁČEK, Tomáš - SKŘÍBA, Anton - ŠEDIVÁ, Blanka - HAVLÍČEK, Vladimír\*\* - JURÁNEK, Ivo. Membrane depolarization and aberrant lipid distributions in the neonatal rat brain following hypoxic-ischaemic insult. In *Scientific Reports*, 2018, vol. 8, no. 1, art. no. 6952. (2017: 4.122 - IF, Q1 - JCR, 1.533 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents, WOS, SCOPUS). ISSN 2045-2322. Available at: <https://doi.org/10.1038/s41598-018-25088-2>. Type ADCA

39. MÁJEKOVÁ, Magdaléna\*\*. Ligand-based drug design of novel aldose reductase inhibitors. In *Future Medicinal Chemistry*, 2018, vol. 10, no. 21, p. 2493-2496. (2017: 3.969 - IF, Q1 - JCR, 1.111 - SJR, Q1 - SJR). ISSN 1756-8919. Available at: <https://doi.org/10.4155/fmc-2018-0127>. Type ADMA

40. MAJZÚNOVÁ, Miroslava\*\* - KVANDOVÁ, Miroslava - BERÉNYIOVÁ, Andrea - BALIŠ, Peter - DOVINOVÁ, Ima - ČAČÁNYIOVÁ, Soňa. Chronic NOS inhibition affects oxidative state and antioxidant response differently in the kidneys of young normotensive and hypertensive rats. In *Oxidative medicine and cellular longevity*, 2019, vol. 2019, article ID 5349398, 10 p. (2018: 4.868 - IF, Q2 - JCR, 1.388 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2019/5349398>. Type ADMA

41. MARKO, Martin - CIMROVÁ, Barbora - RIEČANSKÝ, Igor\*\*. Neural theta oscillations support semantic memory retrieval. In *Scientific Reports*, 2019, vol. 9, art. no. 17667, 10 p. (2018: 4.011 - IF, Q1 - JCR, 1.414 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 2045-2322. Available at: <https://doi.org/10.1038/s41598-019-53813-y>. Type ADCA

42. MARKO, Martin - MICHALKO, Drahomír - RIEČANSKÝ, Igor\*\*. Remote associates test: An empirical proof of concept. In *Behavior Research Methods*, 2019, vol. 51, no. 6, p. 2700-2711. (2018: 4.063 - IF, Q1 - JCR, 2.686 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 1554-351X. Available at: <https://doi.org/10.3758/s13428-018-1131-7>. Type ADCA

43. MARKO, Martin - RIEČANSKÝ, Igor\*\*. Sympathetic arousal, but not disturbed executive functioning, mediates the impairment of cognitive flexibility under stress. In *Cognition*, 2018, vol. 174, p. 94-102. (2017: 3.354 - IF, Q1 - JCR, 2.455 - SJR, Q1 - SJR,

Current Contents - CCC). (2018 - Current Contents). ISSN 0010-0277. Available at: <https://doi.org/10.1016/j.cognition.2018.02.004>. Type ADCA

44. MARKO, Martin - RIEČANSKÝ, Igor\*\*. The left prefrontal cortex supports inhibitory processing during semantic memory retrieval. In *Cortex*, 2021, vol. 134, p. 296-306. (2020: 4.027 - IF, Q1 - JCR, 1.786 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 0010-9452. Available at: <https://doi.org/10.1016/j.cortex.2020.11.001>. Type ADCA

45. MIČUROVÁ, Andrea - KLUKNAVSKÝ, Michal - LÍŠKOVÁ, Silvia - BALIŠ, Peter - ŠKRÁTEK, Martin - OKRUHLICOVÁ, Ľudmila - MAŇKA, Ján - BERNÁTOVÁ, Iveta\*\*. Differences in distribution and biological effects of F3O4@PEG nanoparticles in normotensive and hypertensive rats—focus on vascular function and liver. In *Biomedicines*, 2021, vol. 9, no. 12, art. no. 1855. (2020: 6.081 - IF, Q1 - JCR, 1.511 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 2227-9059. Available at: <https://doi.org/10.3390/biomedicines9121855>. Type ADCA

46. MICHÁLIKOVÁ, Dominka\*\* - TYUKOS KAPRINAY, Barbara - LIPTÁK, Boris - ŠVÍK, Karol - SLOVÁK, Lukáš - SOTNÍKOVÁ, Ružena - KNEZL, Vladimír - GÁSPÁROVÁ, Zdenka. Natural substance rutin versus standard drug atorvastatin in a treatment of metabolic syndrome-like condition. In *Saudi Pharmaceutical Journal*, 2019, vol. 27, no. 8, p. 1196-1202. (2018: 3.643 - IF, Q1 - JCR, 0.670 - SJR, Q1 - SJR). ISSN 1319-0164. Available at: <https://doi.org/10.1016/j.jsps.2019.10.002>. Type ADMA

47. MOHD SIDDIQUE, Mohd Usman\* - THAKUR, Abhishek\* - SHILKAR, Deepak\* - YASMIN, Sabina\* - HALÁKOVÁ, Dominika - KOVÁČIKOVÁ, Lucia - ŠOLTÉSOVÁ PRNOVÁ, Marta - ŠTEFEK, Milan\*\* - ACEVEDO, Orlando - DASARARAJU, Gayathri - DEVADASAN, Velmurugan - KUMAR MONDAL, Susanta - JAYAPRAKASH, Venkatesan\*\*. Non-carboxylic acid inhibitors of aldose reductase based on N-substituted thiazolidinedione derivatives. In *European Journal of Medicinal Chemistry*, 2021, vol. 223, art. no. 113630. (2020: 6.514 - IF, Q1 - JCR, 1.177 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 0223-5234. Available at: <https://doi.org/10.1016/j.ejmech.2021.113630>. Type ADCA

48. PONIŠT, Silvester - DRÁFI, František - KUNCÍROVÁ, Viera - MIHALOVÁ, Danica - RAČKOVÁ, Lucia - DANIŠOVIČ, Ľuboš - ONDREJIČKOVÁ, Oľga - TUMOVÁ, Ingrid - TRUNOVÁ, Oľga - FEDOROVA, Tatiana - BAUEROVÁ, Katarína. Effect of carnosine in experimental arthritis and on primary culture chondrocytes. In *Oxidative medicine and cellular longevity*, 2016, vol. 2016, article ID 8470589, 11 p. (2015: 4.492 - IF, Q2 - JCR, 1.706 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2016/8470589>. Type ADMA

49. PRADO, N. J. - EGAN BEŇOVÁ, Tamara - DIEZ, Emiliano\*\* - KNEZL, Vladimír - LIPTÁK, Boris - PONCE ZUMINO, A.Z. - LLAMEDO-SORIA, M. - SZEIFFOVÁ BAČOVÁ, Barbara - MIATELLO, R. M. - TRIBULOVÁ, Narcisa\*\*. Melatonin receptor activation protects against low potassium-induced ventricular fibrillation by preserving action potentials and connexin-43 topology in isolated rat hearts. In *Journal of Pineal Research*, 2019, vol. 67, no. 4, p. e12605. (2018: 15.221 - IF, Q1 - JCR, 3.850 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 0742-3098. Available at: <https://doi.org/10.1111/jpi.12605>. Type ADCA

50. RAČKOVÁ, Lucia\*\* - CSEKES, Erika. Proteasome Biology: Chemistry and Bioengineering Insights. In *Polymers : Open Access Polymer Science Journal*, 2020, vol. 12, no. 12, art. no. 2909, [58] p. (2019: 3.426 - IF, Q1 - JCR, 0.704 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 2073-4360. Available at: <https://doi.org/10.3390/polym12122909>. Type ADCA

51. RAČKOVÁ, Lucia\*\* - MACH, Mojmír - BRNOLIAKOVÁ, Zuzana. An update in toxicology of ageing. In *Environmental Toxicology and Pharmacology*, 2021, vol. 84, art. no. 103611. (2020: 4.860 - IF, Q1 - JCR, 0.924 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1382-6689. Available at: <https://doi.org/10.1016/j.etap.2021.103611>. Type ADCA
52. RADOŠINSKÁ, Jana\*\* - VRBJAR, Norbert. Erythrocyte Deformability and Na,K-ATPase Activity in Various Pathophysiological Situations and Their Protection by Selected Nutritional Antioxidants in Humans. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 21, art. no. 11924. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms222111924>. Type ADCA
53. RAVINGEROVÁ, Táňa - KINDERDAY, Lucia - BARTEKOVÁ, Monika - FERKO, Miroslav - ADAMEOVÁ, Adriana - ZOHDI, Vladislava - BERNÁTOVÁ, Iveta - FERENCZYOVÁ, Kristína - LAZOU, Antigone. The Molecular Mechanisms of Iron Metabolism and Its Role in Cardiac Dysfunction and Cardioprotection. In *International Journal of Molecular Sciences*, 2020, vol. 21, no. 21, article no. 7889. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21217889>. Type ADCA
54. RODRÍGUEZ, Yoel - MÁJEKOVÁ, Magdaléna\*\*. Structural Changes of Sarco/Endoplasmic Reticulum Ca<sup>2+</sup>-ATPase Induced by Rutin Arachidonate: A Molecular Dynamics Study. In *Biomolecules : Open Access Journal*, 2020, vol. 10, no. 2, art. no. 214. (2019: 4.082 - IF, Q2 - JCR, 1.614 - SJR, Q1 - SJR). ISSN 2218-273X. Available at: <https://doi.org/10.3390/biom10020214>. Type ADMA
55. ROVNÝ, Rastislav - MARKO, Martin - KATINA, Stanislav - MURÍNOVÁ, Jana - ROHÁRIKOVÁ, Veronika - CIMROVÁ, Barbora - REPISKÁ, Gabriela - MINÁRIK, Gabriel - RIEČANSKÝ, Igor\*\*. Association between genetic variability of neuronal nitric oxide synthase and sensorimotor gating in humans. In *Nitric Oxide : Biology and Chemistry*, 2018, vol. 80, p. 32-36. (2017: 4.367 - IF, Q1 - JCR, 1.278 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1089-8603. Available at: <https://doi.org/10.1016/j.niox.2018.08.002>. Type ADCA
56. SÝKORA, Matúš - SZEIFFOVÁ BAČOVÁ, Barbara - EGAN BEŇOVÁ, Tamara - BARANČÍK, Miroslav - ŽURMANOVÁ, Jitka - RAUCHOVÁ, H. - WEISMANN, Peter - PAVELKA, Stanislav - KURAHARA, Lin Hai - SLEZÁK, Ján - SOUKUP, Tomáš - TRIBULOVÁ, Narcisa\*\*. Cardiac Cx43 and ECM Responses to Altered Thyroid Status Are Blunted in Spontaneously Hypertensive versus Normotensive Rats. In *International Journal of Molecular Sciences*, 2019, vol. 20, no. 15, pii: E3758. (2018: 4.183 - IF, Q2 - JCR, 1.312 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms20153758>. Type ADCA
57. SZEIFFOVÁ BAČOVÁ, Barbara - RADOŠINSKÁ, Jana - WALLUKAT, G. - BARANČÍK, Miroslav - WALLUKAT, A. - KNEZL, Vladimír - SÝKORA, Matúš - PAULIS, Ľudovít - TRIBULOVÁ, Narcisa\*\*. Suppression of  $\beta$ 1-Adrenoceptor Autoantibodies is Involved in the Antiarrhythmic Effects of Omega-3 Fatty Acids in Male and Female Hypertensive Rats. In *International Journal of Molecular Sciences*, 2020, vol. 21, no. 2, art. no. 526. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21020526>. Type ADCA
58. SZEIFFOVÁ BAČOVÁ, Barbara - VICZENCZOVÁ, Csilla - ANDELOVÁ, Katarína - SÝKORA, Matúš - CHAUDAGAR, Kiranj - BARANČÍK, Miroslav - ADAMCOVÁ, Michaela - KNEZL, Vladimír - EGAN BEŇOVÁ, Tamara - WEISMANN, Peter - SLEZÁK, Ján - TRIBULOVÁ, Narcisa\*\*. Antiarrhythmic Effects of Melatonin and Omega-3 Are Linked

With Protection of Myocardial Cx43 Topology and Suppression of Fibrosis in Catecholamine Stressed Normotensive and Hypertensive Rats. In *Antioxidants*, 2020, vol. 9, iss. 6, art. no. E546. (2019: 5.014 - IF, Q1 - JCR, 1.100 - SJR, Q1 - SJR). (2020 - WOS, SCOPUS). ISSN 2076-3921. Available at: <https://doi.org/10.3390/antiox9060546>. Type ADMA

59. SZEIFFOVÁ BAČOVÁ, Barbara - VICZENCZOVÁ, Csilla - ŽURMANOVÁ, Jitka - KAŠPAROVÁ, Dita - KNEZL, Vladimír - EGAN BEŇOVÁ, Tamara - PAVELKA, Stanislav - SOUKUP, Tomáš - TRIBULOVÁ, Narcisa. Altered thyroid status affects myocardial expression of connexin-43 and susceptibility of rat heart to malignant arrhythmias that can be partially normalized by red palm oil intake. In *Histochemistry and Cell Biology*, 2017, vol. 147, no. 1, p. 63-73. (2016: 2.553 - IF, Q1 - JCR, 1.163 - SJR, Q1 - SJR, Current Contents - CCC). (2017 - Current Contents). ISSN 0948-6143. Available at: <https://doi.org/10.1007/s00418-016-1488-6>. Type ADCA

60. SZOBI, Adrián - FARKAŠOVÁ-LEDVÉNYIOVÁ, Veronika - LICHÝ, Martin - MURÁRIKOVÁ, Martina - ČARNICKÁ, Slávka - RAVINGEROVÁ, Táňa - ADAMEOVÁ, Adriana\*\*. Cardioprotection of ischaemic preconditioning is associated with inhibition of translocation of MLKL within the plasma membrane. In *Journal of cellular and molecular medicine*, 2018, vol. 22, no. 9, pp. 4183-4196. (2017: 4.302 - IF, Q1 - JCR, 1.647 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1582-1838. Available at: <https://doi.org/10.1111/jcmm.13697>. Type ADCA

61. ŠKANDÍK, Martin - MRVOVÁ, Nataša - BEZEK, Štefan - RAČKOVÁ, Lucia\*\*. **Semisynthetic quercetin-quinone mitigates BV-2 microglia activation through modulation of Nrf2 pathway.** In *Free Radical Biology and Medicine*, 2020, vol. 152, p. 18-32. (2019: 6.170 - IF, Q1 - JCR, 1.841 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0891-5849. Available at: <https://doi.org/10.1016/j.freeradbiomed.2020.02.030>. Type ADCA

62. TAMER ABD-EL RAZIK, Tamer Mahmoud - HASSAN, Mohamed A.\*\* - VALACHOVÁ, Katarína\*\* - OMER, Ahmed Mohamed - EL-SHAFEEY, Muhammad E.A. - MOHY-ELDIN, Mohamed Samir - ŠOLTÉS, Ladislav. Enhancement of wound healing by chitosan/hyaluronan polyelectrolyte membrane loaded with glutathione: in vitro and in vivo evaluations. In *Journal of Biotechnology*, 2020, vol. 310, p. 103-113. (2019: 3.503 - IF, Q2 - JCR, 0.992 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0168-1656. Available at: <https://doi.org/10.1016/j.jbiotec.2020.02.002>. Type ADCA

63. TÖRÖK, Jozsef\*\* - ZEMANČIKOVÁ, Anna\*\* - VALÁŠKOVÁ, Zuzana - BALIŠ, Peter. The role of perivascular adipose tissue in early changes in arterial function during high-fat diet and its combination with high-fructose intake in rats. In *Biomedicines*, 2021, vol. 9, no. 11, art. no. 1552, 12 p. (2020: 6.081 - IF, Q1 - JCR, 1.511 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 2227-9059. Available at: <https://doi.org/10.3390/biomedicines9111552>. Type ADCA

64. TRIBULOVÁ, Narcisa - KURAHARA, Lin Hai - HLIVÁK, Peter - HIRANO, Katsuya - SZEIFFOVÁ BAČOVÁ, Barbara. Pro-Arrhythmic Signaling of Thyroid Hormones and Its Relevance in Subclinical Hyperthyroidism. In *International Journal of Molecular Sciences*, 2020, vol. 21, pii. 2844. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21082844>. Type ADCA

65. TRIBULOVÁ, Narcisa - SZEIFFOVÁ BAČOVÁ, Barbara - EGAN BEŇOVÁ, Tamara - KNEZL, Vladimír - BARANČÍK, Miroslav - SLEZÁK, Ján. Omega-3 Index and Anti-Arrhythmic Potential of Omega-3 PUFAs. In *Nutrients*, 2017, vol. 9, no. 11, art. no. E1191. (2016: 3.550 - IF, Q2 - JCR, 1.543 - SJR, Q1 - SJR). ISSN 2072-6643. Available at: <https://doi.org/10.3390/nu9111191>. Type ADMA

66. TSIKLAURI, Lia - ŠVÍK, Karol - CHRASTINA, Martin - PONIŠT, Silvester - DRÁFI, František - SLOVÁK, Lukáš - ALANIA, Mery - KEMERTELIDZE, Ether - BAUEROVÁ, Katarína\*\*. Bioflavonoid Robinin from *Astragalus falcatus* Lam. Mildly Improves the Effect of Methotrexate in Rats with Adjuvant Arthritis. In *Nutrients*, 2021, vol. 13, no. 4, art. no. 1268. (2020: 5.719 - IF, Q1 - JCR, 1.418 - SJR, Q1 - SJR). ISSN 2072-6643. Available at: <https://doi.org/10.3390/nu13041268>. Type ADMA

67. VALACHOVÁ, Katarína - MACH, Mojmír\*\* - ŠOLTÉS, Ladislav. Oxidative Degradation of High-Molar-Mass Hyaluronan: Effects of Some Indole Derivatives to Hyaluronan Decay. In *International Journal of Molecular Sciences*, 2020, vol. 21, no. 16, art. no. 5609. (2019: 4.556 - IF, Q1 - JCR, 1.317 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms21165609>. Type ADCA

68. VALACHOVÁ, Katarína - ŠVÍK, Karol - BIRÓ, Csaba - JURČÍK, Rastislav - ONDRUŠKA, Ľubomír - ŠOLTÉS, Ladislav. Impact of Ergothioneine, Hercynine, and Histidine on Oxidative Degradation of Hyaluronan and Wound Healing. In *Polymers : Open Access Polymer Science Journal*, 2021, vol. 13, no. 1, art. no. 95. (2020: 4.329 - IF, Q1 - JCR, 0.770 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 2073-4360. Available at: <https://doi.org/10.3390/polym13010095>. Type ADCA

69. VALACHOVÁ, Katarína - TOPOL'SKÁ, Dominika - MENDICHI, Raniero - COLLINS, Maurice N. - SASINKOVÁ, Vlasta - ŠOLTÉS, Ladislav. Hydrogen peroxide generation by the Weissberger biogenic oxidative system during hyaluronan degradation. In *Carbohydrate Polymers*, 2016, vol. 148, p. 189-193. (2015: 4.219 - IF, Q1 - JCR, 1.440 - SJR, Q1 - SJR, Current Contents - CCC). (2016 - Current Contents). ISSN 0144-8617. Available at: <https://doi.org/10.1016/j.carbpol.2016.04.063>. Type ADCA

70. VALACHOVÁ, Katarína\*\* - RAPTA, Peter\*\* - MOURA, Nuno M.M. - BATINIC-HABERLE, Ines - ŠOLTÉS, Ladislav. Ortho Isomeric Mn(III) N-Alkyl- and Alkoxyalkylpyridylporphyrins-Enhancers of Hyaluronan Degradation Induced by Ascorbate and Cupric Ions. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 16, art. no. 8608. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms22168608>. Type ADCA

71. VALACHOVÁ, Katarína\*\* - ŠOLTÉS, Ladislav. Assessment of the Substance Antioxidative Profile by Hyaluronan, Cu(II) and Ascorbate. In *Pharmaceutics*, 2021, vol. 13, no. 11, art. no. 1815. (2020: 6.321 - IF, Q1 - JCR, 1.054 - SJR, Q1 - SJR). ISSN 1999-4923. Available at: <https://doi.org/10.3390/pharmaceutics13111815>. Type ADMA

72. VALACHOVÁ, Katarína\*\* - ŠOLTÉS, Ladislav. Hyaluronan as a Prominent Biomolecule with Numerous Applications in Medicine. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 13, art. no. 7077. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms22137077>. Type ADCA

73. VALACHOVÁ, Katarína\*\* - ŠOLTÉS, Ladislav. Self-Associating Polymers Chitosan and Hyaluronan for Constructing Composite Membranes as Skin-Wound Dressings Carrying Therapeutics. In *Molecules*, 2021, vol. 26, no. 9, art. no. 2535. (2020: 4.412 - IF, Q2 - JCR, 0.782 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents, WOS, SCOPUS). ISSN 1420-3049. Available at: <https://doi.org/10.3390/molecules26092535>. Type ADCA

74. VALACHOVÁ, Katarína\*\* - ŠOLTÉS, Ladislav. Versatile Use of Chitosan and Hyaluronan in Medicine. In *Molecules*, 2021, vol. 26, no. 4, art. no. 1195. (2020: 4.412 - IF, Q2 - JCR, 0.782 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents,

WOS, SCOPUS). ISSN 1420-3049. Available at:  
<https://doi.org/10.3390/molecules26041195>. Type ADCA

75. VALACHOVÁ, Katarína\*\* - ŠVÍK, Karol - BIRÓ, Csaba - ŠOLTÉS, Ladislav. Skin wound healing with composite biomembranes loaded by tiopronin or captopril. In *Journal of Biotechnology*, 2020, vol. 310, p. 49-53. (2019: 3.503 - IF, Q2 - JCR, 0.992 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0168-1656. Available at: <https://doi.org/10.1016/j.jbiotec.2020.02.001>. Type ADCA

76. VICZENCZOVÁ, Csilla - KURA, Branislav - EGAN BEŇOVÁ, Tamara - YIN, Ch. - KUKREJA, R. C. - SLEZÁK, Ján - TRIBULOVÁ, Narcisa - SZEIFFOVÁ BAČOVÁ, Barbara\*\*. Irradiation-Induced Cardiac Connexin-43 and miR-21 Responses Are Hampered by Treatment with Atorvastatin and Aspirin. In *International Journal of Molecular Sciences*, 2018, vol. 19, iss.4, p. E1128. (2017: 3.687 - IF, Q2 - JCR, 1.260 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms19041128>. Type ADCA

77. VRANKOVÁ, Stanislava - BARTA, Andrej - KLIMENTOVA, Jana - DOVINOVA, Ima - LÍŠKOVÁ, Silvia - DOBEŠOVÁ, Zdena - PECHÁNOVÁ, Oľga - KUNEŠ, Jaroslav - ZICHA, Josef. The regulatory role of nuclear factor kappa B in the heart of hereditary hypertriglyceridemic rat. In *Oxidative medicine and cellular longevity*, 2016, vol. 2016, article ID 9814038, 6 p. (2015: 4.492 - IF, Q2 - JCR, 1.706 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2016/9814038>. Type ADMA

78. VRANKOVÁ, Stanislava\*\* - GALANDÁKOVÁ, Zuzana - BENKO, Jakub - CEBOVÁ, Martina - RIEČANSKÝ, Igor - PECHÁNOVÁ, Oľga. Duration of social isolation affects production of nitric oxide in the rat brain. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 19, art. no. 10340. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms221910340>. Type ADCA

79. ZEMANČÍKOVÁ, Anna\*\* - TÖRÖK, Jozef. Influence of age on anticontractile effect of perivascular adipose tissue in normotensive and hypertensive rats. In *Oxidative Medicine and Cellular Longevity*, 2019, vol. 2019, article ID 9314260, 8 p. (2018: 4.868 - IF, Q2 - JCR, 1.388 - SJR, Q1 - SJR). ISSN 1942-0900. Available at: <https://doi.org/10.1155/2019/9314260>. Type ADMA

80. ŽIŽKOVÁ, Petronela - VISKUPIČOVÁ, Jana - HEGER, Vladimír - RAČKOVÁ, Lucia - MÁJEKOVÁ, Magdaléna - HORÁKOVÁ, Ľubica\*\*. Dysfunction of SERCA pumps as novel mechanism of methylglyoxal cytotoxicity. In *Cell Calcium*, 2018, vol. 74, p. 112-122. (2017: 3.718 - IF, Q2 - JCR, 2.004 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 0143-4160. Available at: <https://doi.org/10.1016/j.ceca.2018.06.003>. Type ADCA

### 2.1.3 List of monographs/books published abroad

BRUCKNEROVÁ, Ingrid - TRNKA, Michal - BRUCKNEROVÁ, Jana - CINKOVÁ, Nikola - DUBOVICKÝ, Michal - FARKAŠ, Michal - FOLTAN, Tomáš - KOLNÍKOVÁ, Miriam - KOPÁNI, M. - KOSNÁČOVÁ, Helena - LAUROVIČOVÁ, Miroslava - LETENAYOVÁ, Ivana - MACH, Mojmír - MIČEVOVÁ, Jana - MUSILOVÁ, Tereza - NEDOMOVÁ, Barbora - PLAVČANOVÁ, Zuzana - POKORNÁ, Pavla - ŠEMBEROVÁ, J. - ŠTOURAC, Petr - TITTEL, Peter - TOMČÍKOVÁ, Dana - UJHÁZY, Eduard - VITOVÍČ, Pavol - WAGNER, Alexandra - ZUBALOVÁ, Eva. *Zdravé dieťa : Farby života*. Recenzenti: Anna Holomáňová, Radek Ptáček. 1. vydanie. Praha : Evropská asociace pro fototerapii, 2021. 258 s. ISBN 978-80-87861-16-5. Typ: AAA

#### 2.1.4. List of monographs/books published in Slovakia

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

This section involves further notable publications of CEM, not listed above. In general, these outputs resulted from collaboration of CEM with other institutions so that researchers of CEM need not appear in the position of leading authors (in contrast to 2.1.2). Note that the list does not include publications resulting from large-scale collaborative projects, which are listed in 2.1.9.

1. ANDREADOU, Ioanna\*\* - SCHULZ, Rainer - BADIMON, L. - ADAMEOVÁ, Adriana - KLEINBOGARD, Petra - LECOUR, Sandrine - NIKOLAOU, P. E. - FALCÃO-PIRES, I. - VILAHUR, Gemma - WOUDBERG, N. - HEUSCH, Gerd - FERDINANDY, Péter\*\*. Hyperlipidaemia and cardioprotection: animal models for translational studies. In *British journal of pharmacology*, 2020, vol. 117, no. 23, p. 5287-5311. (2019: 7.730 - IF, Q1 - JCR, 2.493 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0007-1188. Available at: <https://doi.org/10.1111/bph.14931>. Typ: ADCA

2. BEI, Yihua - DAS, Saumya - RODOSTHENOUS, Rodosthenis S. - HOLVOET, Paul - VANHAVERBEKE, Maarten - MONTEIRO, Marta C. - MONTEIRO, Valter V.S. - RADOŠINSKÁ, Jana - BARTEKOVÁ, Monika - JANSEN, Felix - LI, Qian - RAJASINGH, Johnson - XIAO, Junjie. Extracellular Vesicles in Cardiovascular Theranostics. In *Theranostics*, 2017, vol. 7, no. 17, p. 4168-4182. (2016: 8.766 - IF, Q1 - JCR, 2.375 - SJR, Q1 - SJR). ISSN 1838-7640. Available at: <https://doi.org/10.7150/thno.21274>. Typ: ADMA

3. CSEKES, Erika - VÁGVÖLGYI, Máté - HUNYADI, Attila - RAČKOVÁ, Lucia\*\*. Protoflavones in melanoma therapy: Prooxidant and pro-senescence effect of protoapigenone and its synthetic alkyl derivative in A375 cells. In *Life Sciences*, 2020, vol. 260, art. no. 118419. (2019: 3.647 - IF, Q2 - JCR, 1.031 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0024-3205. Available at: <https://doi.org/10.1016/j.lfs.2020.118419>. Typ: ADCA

4. KEJLOVÁ, Kristína\*\* - BENDO VÁ, Hana - CHRZ, Jan - DVOŘÁKOVÁ, Markéta - SVOBODOVÁ, Lada - VLKOVÁ, Alena - KUBÁČ, Lubomír - KORÍNKOVÁ, Radka - ČERNÝ, Jiří - OČADLÍKOVÁ, Danuše - RUCKI, Marián - HEINONEN, Tuula - JÍROVÁ, Dagmar - LETAŠIOVÁ, Silvia - KANĎÁROVÁ, Helena\*\* - KOLÁŘOVÁ, Hana. Toxicological testing of a photoactive phthalocyanine-based antimicrobial substance. In *Regulatory Toxicology and Pharmacology*, 2020, vol. 115, art. no. 104685. (2019: 2.652 - IF, Q1 - JCR, 0.842 - SJR, Q2 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0273-2300. Available at: <https://doi.org/10.1016/j.yrtph.2020.104685>. Typ: ADCA

5. KNIGHT, Erik L.\*\* - MCSHANE, Blakeley B.\*\* - KUTLÍKOVÁ, Hana\*\* - MORALES, Pablo J. - CHRISTIAN, Colton B. - HARBAUGH, William T. - MAYR, Ulrich - ORTIZ, Triana L. - GILBERT, Kimberly - MA-KELLAMS, Christine - RIEČANSKÝ, Igor - WATSON, Neil V. - EISENEGGER, Christoph - LAMM, Claus - MEHTA, Pranjal H. - CARRÉ, Justin M.\*\*. Weak and Variable Effects of Exogenous Testosterone on Cognitive Reflection Test Performance in Three Experiments: Commentary on Nave, Nadler, Zava, and Camerer (2017). In *Psychological Science*, 2020, vol. 31, no. 7, p. 890–897. (2019: 5.389 - IF, Q1 - JCR, 3.303 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0956-7976. Available at: <https://doi.org/10.1177/0956797619885607>. Typ: ADCA



6. KOHÚTOVÁ, J. - ELSNICOVÁ, B. - HOLZEROVÁ, K. - NECKÁŘ, Jan - ŠEBESTA, O. - JEŽKOVÁ, J. - VĚČKA, M. - VEBR, P. - HORNÍKOVÁ, D. - SZEIFFOVÁ BAČOVÁ, Barbara - EGAN BEŇOVÁ, Tamara - HLAVÁČKOVÁ, Markéta - TRIBULOVÁ, Narcisa - KOLÁŘ, František - NOVÁKOVÁ, Olga - ŽURMANOVÁ, Jitka\*\*. Anti-arrhythmic Cardiac Phenotype Elicited by Chronic Intermittent Hypoxia Is Associated With Alterations in Connexin-43 Expression, Phosphorylation, and Distribution. In *Frontiers in Endocrinology*, 2019, 25. 1. (2018: 3.634 - IF, Q2 - JCR, 1.344 - SJR, Q1 - SJR). ISSN 1664-2392. Available at: <https://doi.org/10.3389/fendo.2018.00789>. Typ: ADMA
7. KONCSOS, Gábor - VARGA, Zoltán V. - BARANYAI, Tamás - BOENGLER, Kerstin - ROHRBACH, Susanne - LI, Ling - SCHLÜTER, Klaus-Dieter - SCHRECKENBERG, Rolf - RADOVITS, Tamás - OLÁH, Attila - MÁTYÁS, Csaba - LUX, Árpád - KOMLÓDI, Tímea - AL-KHRASANI, Mahmoud - BUKOSZA, Nóra - MÁTHÉ, Domokos - DERES, László - BARTEKOVÁ, Monika - RAJTÍK, Tomáš - ADAMEOVÁ, Adriana - SZIGETI, Krisztián - HAMAR, Péter - HELYES, Zsuzsanna - TRETTER, László - PACHER, Pál - MERKELY, Béla - GIRICZ, Zoltán - SCHULZ, Rainer - FERDINANDY, Péter. Diastolic dysfunction in prediabetic male rats: role of mitochondrial oxidative stress. In *American Journal of Physiology - Heart and Circulatory Physiology*, 2016, vol. 311, no. 4, p. H927-H943. (2015: 3.324 - IF, Q2 - JCR, 1.883 - SJR, Q1 - SJR, Current Contents - CCC). (2016 - Current Contents). ISSN 0363-6135. Available at: <https://doi.org/10.1152/ajpheart.00049.2016>. Typ: ADCA
8. KOUTSOPOULOS, Konstantinos - LAVRENTAKI, Vasiliki - ANTONIOU, Ioakeim - KOUSAXIDIS, Antonios - LEFKOPOULOU, Matina - TSANTILI-KAKOULIDOU, Anna - KOVÁČIKOVÁ, Lucia - ŠTEFEK, Milan - NICOLAOU, Ioannis\*\*. Design synthesis and evaluation of novel aldose reductase inhibitors: The case of indolyl-sulfonyl-phenols. In *Bioorganic & Medicinal Chemistry*, 2020, vol. 28, no. 15, art. no. 115575. (2019: 3.073 - IF, Q2 - JCR, 0.739 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0968-0896. Available at: <https://doi.org/10.1016/j.bmc.2020.115575>. Typ: ADCA
9. KRÁTKÝ, Vojtěch\*\* - VAŇOURKOVÁ, Zdeňka - SÝKORA, Matúš - SZEIFFOVÁ BAČOVÁ, Barbara - HRUŠKOVÁ, Zdeňka - KIKERLOVÁ, Soňa - HÚSKOVÁ, Zuzana - KOPKAN, Libor. AT 1 receptor blocker, but not an ACE inhibitor, prevents kidneys from hypoperfusion during congestive heart failure in normotensive and hypertensive rats. In *Scientific Reports*, 2021, vol. 11, no. 1, art. no. 4271. (2020: 4.380 - IF, Q1 - JCR, 1.240 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents, WOS, SCOPUS). ISSN 2045-2322. Available at: <https://doi.org/10.1038/s41598-021-83906-6>. Typ: ADCA
10. LAZOU, Antigone\*\* - IKONOMIDIS, Ignatios - BARTEKOVÁ, Monika - BENEDEK, Theodora - MAKAVOS, George - PALIOURA, D. - CABRERA FUENTES, Hector - ANDREADOU, Ioanna\*\*. Chronic inflammatory diseases, myocardial function and cardioprotection. In *British Journal of Pharmacology*, 2020, vol. 177, no. 23, p. 5357-5374. (2019: 7.730 - IF, Q1 - JCR, 2.493 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0007-1188. Available at: <https://doi.org/10.1111/bph.14975>. Typ: ADCA
11. NOVÁK, David - VISKUPIČOVÁ, Jana - ZATLOUKALOVÁ, Martina - HEGER, Vladimír - MICHÁLIKOVÁ, Silvia - MÁJEKOVÁ, Magdaléna - VACEK, Jan\*\*. Electrochemical behavior of sarco/endoplasmic reticulum Ca-ATPase in response to carbonylation processes. In *Journal of Electroanalytical Chemistry*, 2018, vol. 812, p. 258-264. (2017: 3.235 - IF, Q1 - JCR, 0.765 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 0022-0728. Available at: <https://doi.org/10.1016/j.jelechem.2018.01.036>. Typ: ADCA
12. PAULIS, Ľudovít - FOULQUIER, Sébastien - NAMSOLLECK, Paweł - RECARTI, Chiara - STECKELINGS, U.M. - UNGER, Thomas. Combined angiotensin receptor modulation in the management of cardio-metabolic disorders. In *Drugs*, 2016, vol. 76, no. 1, p. 1-12. (2015: 4.883 - IF, Q1 - JCR, 1.683 - SJR, Q1 - SJR, Current Contents - CCC).

(2016 - Current Contents). ISSN 0012-6667. Available at: <https://doi.org/10.1007/s40265-015-0509-4>. Typ: ADCA

13. PFABIGAN, Daniela M.\*\* - RÜTGEN, Markus - KROLL, S.L. - RIEČANSKÝ, Igor - LAMM, Claus\*\*. The administration of the opioid buprenorphine decreases motivational error signals. In *Psychoneuroendocrinology*, 2021, vol. 128, art. no. 105199, 9p. (2020: 4.905 - IF, Q1 - JCR, 1.955 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 0306-4530. Available at: <https://doi.org/10.1016/j.psyneuen.2021.105199>. Typ: ADCA

14. RIEČANSKÝ, Igor - LAMM, Claus\*\*. The role of sensorimotor processes in pain empathy. In *Brain Topography*, 2019, vol. 32, no. 6, p. 965-976. (2018: 3.104 - IF, Q2 - JCR, 1.175 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents). ISSN 0896-0267. Available at: <https://doi.org/10.1007/s10548-019-00738-4>. Typ: ADCA

15. RÜTGEN, Markus\*\* - WIRTH, Eva-Maria - RIEČANSKÝ, Igor - HUMMER, Allan - WINDISCHBERGER, Christian - PETROVIC, Predrag - SILANI, Giorgia - LAMM, Claus. Beyond sharing unpleasant affect - evidence for pain-specific opioidergic modulation of empathy for pain. In *Cerebral Cortex*, 2021, vol. 31, no. 6, p. 2773-2768. (2020: 5.357 - IF, Q1 - JCR, 2.694 - SJR, Q1 - SJR, Current Contents - CCC). (2021 - Current Contents). ISSN 1047-3211. Available at: <https://doi.org/10.1093/cercor/bhaa385>. Typ: ADCA

16. SVOBODOVÁ, Lada\*\* - DVOŘÁKOVÁ, Markéta - RUCKI, Marián - KEJLOVÁ, Kristína - KANĎÁROVÁ, Helena - KOLÁŘOVÁ, Hana - MANNERSTROM, Marika - HEINONEN, Tuula. Safety testing of adult novelties using in vitro methods. In *Regulatory Toxicology and Pharmacology*, 2020, vol. 117, art. no. 104780. (2019: 2.652 - IF, Q1 - JCR, 0.842 - SJR, Q2 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0273-2300. Available at: <https://doi.org/10.1016/j.yrtph.2020.104780>. Typ: ADCA

17. ŠOLTÉSOVÁ PRNOVÁ, Marta - MEDINA-CAMPOS, Omar Noel - PEDRAZA-CHAVERRI, José - COLIN-GONZÁLES, Ana Laura - PIEDRA-GARCIA, Francisco - RANGEL-LÓPEZ, Edgar - KOVÁČIKOVÁ, Lucia - CEYLAN-ISIK, Asli F. - KARASU, Çimen - SANTAMARIA, Abel - ŠTEFEK, Milan\*\*. Antioxidant Mechanisms in the Neuroprotective Action of Cemtirestat: Studies in Chemical Models, Liposomes and Rat Brain Cortical Slices. In *Neuroscience*, 2020, vol. 443, p. 206-217. (2019: 3.056 - IF, Q2 - JCR, 1.364 - SJR, Q2 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0306-4522. Available at: <https://doi.org/10.1016/j.neuroscience.2020.07.014>. Typ: ADCA

18. TAMER ABD-EL RAZIK, Tamer Mahmoud - COLLINS, Maurice N.\*\* - VALACHOVÁ, Katarína - HASSAN, Mohamed A. - OMER, Ahmed Mohamed - MOHY-ELDIN, Mohamed Samir - ŠVÍK, Karol - JURČÍK, Rastislav - ONDRUŠKA, Ľubomír - BIRÓ, Csaba - ALBADARIN, Ahmad B. - ŠOLTÉS, Ladislav. MitoQ loaded Chitosan-Hyaluronan composite membranes for wound healing. In *Materials (Basel)*, 2018, vol. 11, no. 4, art. no. 569. (2017: 2.467 - IF, Q2 - JCR, 0.732 - SJR, Q2 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1996-1944. Available at: <https://doi.org/10.3390/ma11040569>. Typ: ADCA

19. AMER ABD-EL RAZIK, Tamer Mahmoud - HASSAN, Mohamed A.\*\* - VALACHOVÁ, Katarína\*\* - OMER, Ahmed Mohamed - EL-SHAFFEEY, Muhammad E.A. - MOHY-ELDIN, Mohamed Samir - ŠOLTÉS, Ladislav. Enhancement of wound healing by chitosan/hyaluronan polyelectrolyte membrane loaded with glutathione: in vitro and in vivo evaluations. In *Journal of Biotechnology*, 2020, vol. 310, p. 103-113. (2019: 3.503 - IF, Q2 - JCR, 0.992 - SJR, Q1 - SJR, Current Contents - CCC). (2020 - Current Contents). ISSN 0168-1656. Available at: <https://doi.org/10.1016/j.jbiotec.2020.02.002>. Typ: ADCA

20. VAN THIEL, Bibi - GOES MARTINI, Alexandre - TE RIET, Luuk - SEVERS, David - UIJL, Estrellita - GARRELD, Ingrid M. - LEIJTEN, Frank P.J. - VAN DER PLUIJM, Ingrid - ESSERS, Jeroen - QADRI, Fatimunnisa - ALENINA, Natalia - BADER, Michael - PAULIS, Ľudovít - RAJKOVIČOVÁ, R. - DOMENIG, O. - POGLITSCH, M. - DANSER, A.H. Jan. Brain renin-angiotensin system does it exist? In *Hypertension*, 2017, vol. 69, no. 6, p. 1136-1144. (2016: 6.857 - IF, Q1 - JCR, 3.287 - SJR, Q1 - SJR, Current Contents - CCC). (2017 - Current Contents). ISSN 0194-911X. Typ: ADCA

#### **2.1.6. List of patents, patent applications, and other intellectual property rights registered abroad**

ŠOLTÉS LADISLAV, VALACHOVÁ KATARÍNA, MACH MOJMÍR, JURÁNEK IVO, Composite membranes containing a smart-released cytoprotectant targeting the inflamed tissue and use thereof. European Patent Application EP20020280.2 (prioritný dátum registrácie 17. 06. 2020)

Patent application PP 50074-2020 (ŠTEFEK, Milan - KOVÁČIKOVÁ, Lucia - ŠOLTÉSOVÁ PRNOVÁ, Marta - ADDOVÁ, Gabriela - BOHÁČ, A. Compound cemtirestat disulfide, precursor of aldoketoreductase inhibitor, method of its preparation, pharmaceutical composition with its content and its use, date of filing of the application: 14.12.2020 Banská Bystrica: Office of Industrial Property of the Slovak Republic, 2020. 25 s) was extended in the form of an international patent application PCT / SK2021 / 050015 (ŠTEFEK, Milan - KOVÁČIKOVÁ, Lucia - ŠOLTÉSOVÁ PRNOVÁ, Marta - ADDOVÁ, Gabriela - BOHÁČ, Andrej. Cemtirestat disulfide, prodrug of aldo-keto reductase inhibitor, preparation, pharmaceutical composition and use thereof: International patent application, filing date 13. 12. 2021. Applicant: Center for Experimental Medicine, Institute of Experimental Pharmacology and Toxicology SAS, Dúbravská road 9, 841 04 Bratislava, SK. Banská Bystrica: Industrial Property Office of the Slovak Republic, 2021. 24 p.).

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

ŠTEFEK, Milan - BALLEKOVÁ, Jana - ŠOLTÉSOVÁ PRNOVÁ, Marta - MÁJEKOVÁ, Magdaléna. Use of 5-carboxymethyl-1,2,3,4-tetrahydro-1H-pyrido [4,3-b] indoles and pharmaceutical composition containing them: patent application PP 50049-2016, filing date: 02.08.2016, international patent application classification: A61K31 / 00 version MPT: 16, Applicant: Institute of Experimental Pharmacology and Toxicology SAS, Dubravska cesta 9, 841 04 Bratislava, SK. Banská Bystrica: Industrial Property Office of the Slovak Republic, 2016.

ŠTEFEK, Milan - MILÁČKOVÁ, Ivana - DIEZ-DACAL, Beatriz - PÉREZ-SALA, Dolores Gozalo - ŠOLTÉSOVÁ-PRNOVÁ, Marta. Use of 5-carboxymethyl-3-mercapto-1,2,4-triazino- [5,6-b] indoles and a pharmaceutical composition containing them: PP 97-2013. Application number 97-2013, application date 15.10.2013. International patent classification A61K31 / 00, version: 13. Name and address of applicant: Institute of Experimental Pharmacology and Toxicology SAS, Dúbravská cesta 9, 841 04 Bratislava, SK. 2013. Patent no. 288508, granted 28.8. 2017.

ŠOLTÉS, Ladislav - TAMER ABD-EL RAZIK, Tamer Mahmoud - VEVERKA, Miroslav - VALACHOVÁ, Katarína - MOHY-ELDIN, Mohamed Samir. Self-assembling biopolymer membranes as carriers of medicinal products with antioxidant properties and their use: patent file no. 288581. Document's type: B6. Application number: 5032-2015. Date of submitting the application: 10. 7. 2015. Date of publishing the application: 2. 2. 2017. Bulletin of the Industrial Property Office of the Slovak Republic No. : 02/2017. Date of notification of the grant of the patent: 2 August 2018. Bulletin of the Industrial Property Office of the Slovak

Republic No. : 08/2018. Date of making the patent available to the public: June 11, 2018. Int. Cl. (2018.01): A61L 15/00, A61K 31/00, A61K 38/00, A61P 17/00. Owner: Institute of Experimental Pharmacology and Toxicology SAS, Bratislava, SK = Biopolymer membrane used to treat wounds on body surface, comprises high molecular weight hyaluronic acid or its derivative and chitosan or its derivative, together forming a carrier for antioxidants incorporated in membrane. Banská Bystrica: Industrial Property Office of the Slovak Republic, 2018.

ŠTEFEK, Milan - BALLEKOVÁ, Jana - ŠOLTÉSOVÁ PRNOVÁ, Marta - MÁJEKOVÁ, Magdaléna. Use of 5-carboxymethyl-1,2,3,4-tetrahydro-1H-pyrido [4,3-b] indoles and a pharmaceutical composition containing them: patent no. 288725 (09.12.2019), patent application of the file PP 50049-2016, (02.08.2016). Document's type: B6. M PT: A61K 31/00, A61P 9/00, A61P 13/00, A61P 15/00, A61P 19/00, A61P 25/00, A61P 27/00, A61P 35/00. Patent owner: Institute of Experimental Pharmacology and Toxicology of the Slovak Academy of Sciences, Dúbravská cesta 9, 841 04 Bratislava, SK. Banská Bystrica: Industrial Property Office of the Slovak Republic, 2019.

ŠTEFEK, Milan - KOVÁČIKOVÁ, Lucia - ŠOLTÉSOVÁ PRNOVÁ, Marta - ADDOVÁ, Gabriela - BOHÁČ, A. Compound cemtirestat disulfide, precursor of aldoketoreductase inhibitor, method of its preparation, pharmaceutical composition with its content and its use: patent application PP 50074-2020, date of filing of the application: 14.12.2020. Banská Bystrica: Industrial Property Office of the Slovak Republic, 2020.

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

In this section we provide short description of research findings, which are highlighted in section 2.1.2 as the most representative research outputs. I.e., these outputs involve researchers of CEM in the position of corresponding and/or first author. Note that we did not include papers resulting from large-scale collaboration activities with participation of CEM.

#### **I. Cardiovascular and metabolic disorders**

PRADO, N. J. - EGAN BEŇOVÁ, Tamara - DIEZ, Emiliano\*\* - KNEZL, Vladimír - LIPTÁK, Boris - PONCE ZUMINO, A.Z. - LLAMEDO-SORIA, M. - SZEIFFOVÁ BAČOVÁ, Barbara - MIATELLO, R. M. - TRIBULOVÁ, Narcisa\*\*. Melatonin receptor activation protects against low potassium-induced ventricular fibrillation by preserving action potentials and connexin-43 topology in isolated rat hearts. In Journal of Pineal Research, 2019, vol. 67, no. 4, p. e12605. (2018: 15.221 - IF, Q1 - JCR, 3.850 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents). ISSN 0742-3098. Available at: <https://doi.org/10.1111/jpi.12605>

Findings of this study unraveled protective effects of circadian pineal hormone melatonin via its cardiac receptors. Melatonin prevented the pro-arrhythmic action potential of heart cells and abnormalities of the channel protein connexin-43 induced by hypokalemia in experimental conditions in rats. This study indicates that monitoring of circulating melatonin and its exogenous application might be beneficial to reduce the risk of malignant cardiac arrhythmia in patients at specific clinical conditions as well as in humans with circadian disruption due to shift-work.

BARTEKOVÁ, Monika\*\* - ADAMEOVÁ, Adriana - GÖRBE, Anikó - FERENCZYOVÁ, Kristína - PECHÁŇOVÁ, Oľga - LAZOU, Antigone - DHALLA, Naranjan S. - FERDINANDY, Péter - GIRICZ, Zoltán\*\*. Natural and synthetic antioxidants targeting cardiac oxidative stress and redox signaling in

cardiometabolic diseases. In *Free Radical Biology and Medicine*, 2021, vol. 169, p. 446-477. (2020: 7.376 - IF, Q1 - JCR, 1.912 - SJR, Q1 - SJR, karentované - CCC). (2021 - Current Contents). ISSN 0891-5849. Available at: <https://doi.org/10.1016/j.freeradbiomed.2021.03.045>

Pathophysiology of most cardiometabolic diseases (CMDs), i.e. metabolic diseases associated with cardiac pathologies (e.g. obesity, diabetes or atherosclerosis) involves increased production of reactive oxygen species and impaired antioxidant defense systems, resulting in cardiac oxidative stress. To alleviate oxidative stress, various antioxidants have been investigated in CMDs. In this article we reviewed the effect of CMDs on cardiac redox homeostasis, the role of oxidative stress in cardiac pathologies, as well as experimental and clinical data on the therapeutic potential of natural and synthetic antioxidants in CMDs including original findings obtained at CEM SAS and recently published. As no antioxidant indicated for the prevention and/or treatment of CMDs has reached the market so far, we also highlighted potential factors that may contribute to the failure of translation of antioxidant therapies in CMDs.

BERÉNYIOVÁ, Andrea\*\* - GOLAS, Samuel - DROBNÁ, Magdaléna - CEBOVÁ, Martina - ČAČÁNYIOVÁ, Soňa. Fructose intake impairs the synergistic vasomotor manifestation of nitric oxide and hydrogen sulfide in rat aorta. In *International Journal of Molecular Sciences*, 2021, vol. 22, no. 9, art. no. 4749, 17 p. (2020: 5.924 - IF, Q1 - JCR, 1.455 - SJR, Q1 - SJR, karentované - CCC). (2021 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms22094749>

Increasing consumption of fructose (either as a monosaccharide or bound in sucrose) contributes to raising incidence of metabolic syndrome. Our findings point out that increased fructose consumption evokes pathological alterations in the cardiovascular system, predicting possible cardiovascular complications. In rats, increased fructose intake impaired endothelium-dependent vasorelaxation of the thoracic aorta, most probably due to altered interaction between NO and H<sub>2</sub>S. Our results thus highlight the importance of the sulphide signalisation in cardiovascular regulations and suggest this signalling pathway as a potential target to alleviate the pathological changes induced by fructose.

HLAVÁČ, Matúš - KOVÁČIKOVÁ, Lucia - ŠOLTÉSOVÁ PRNOVÁ, Marta - ŠRAMEL, Peter - ADDOVÁ, Gabriela - MÁJEKOVÁ, Magdaléna - HANQUET, Gilles - BOHÁČ, A. - ŠTEFEK, Milan\*\*. Development of Novel Oxotriazinoindole Inhibitors of Aldose Reductase: Isosteric Sulfur/Oxygen Replacement in the Thioxotriazinoindole Cemtirestat Markedly Improved Inhibition Selectivity. In *Journal of Medicinal Chemistry*, 2020, vol. 63, no. 1, p. 369-381. (2019: 6.205 - IF, Q1 - JCR, 2.093 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0022-2623. Available at: <https://doi.org/10.1021/acs.jmedchem.9b01747>

Inhibition of aldose reductase, the first enzyme of the polyol pathway, is a promising approach to the treatment of multiple diabetic complications. Epalrestat is the only aldose reductase inhibitor used clinically for the therapy of diabetic peripheral polyneuropathy, yet with unwanted side effects. Therefore, efficient and selective aldose reductase inhibitors based on novel chemotypes are sought for. Structure modification of cemtirestat (a carboxymethylated thioxotriazinoindole) by isosteric replacement of sulfur with oxygen in combination with variable N-2 substituents provided novel derivatives with increased aldose reductase inhibition efficacy and markedly improved selectivity. More electronegative and less bulky oxygen of the novel compounds compared to the sulfur of the original thioxotriazinoindole congeners was found to form a stronger H-bond with Leu300 within the selectivity pocket of the aldose reductase enzyme and to render larger rotational flexibility to the carboxymethyl pharmacophore. Molecular obesity indices revealed excellent drug-likeness of the novel derivatives with favorable oral bioavailability predicted. This finding may lead to novel efficient drugs to treat diabetes.

## II. Prevention and treatment

BERNÁTOVÁ, Iveta\*\*. Biological activities of (-)-epicatechin and (-)-epicatechin-containing foods: Focus on cardiovascular and neuropsychological health. In *Biotechnology Advances*, 2018, vol. 36, no. 3, p. 666-681. (2017: 11.452 - IF, Q1 - JCR, 3.006 - SJR, Q1 - SJR, karentované - CCC). (2018 - Current Contents). ISSN 0734-9750. Available at: <https://doi.org/10.1016/j.biotechadv.2018.01.009>

Aging is a serious medical and socio-economic problem, characterized by a high prevalence of hypertension, which contributes to brain disorders that considerably affect the quality of life in older age. This review summarizes the scientific knowledge on biological activities of foods containing cocoa flavanol (-)-epicatechin (or (-)-epicatechin per se) and their potential in prevention and treatment of hypertension and selected brain disorders. The focus of the review is also on our original research, in rodent models as well as in humans, highlighting the molecular mechanisms by which (-)-epicatechin impacts cardiovascular and brain functions. Current knowledge indicates that the consumption of cocoa-containing foods can be suggested as a dietary approach to improve cardiovascular and neuropsychological functions. Thus, (-)-epicatechin-rich foods may promote human health and positively contribute to longevity.

ŠKANDÍK, Martin - MRVOVÁ, Nataša - BEZEK, Štefan - RAČKOVÁ, Lucia\*\*. Semisynthetic quercetin-quinone mitigates BV-2 microglia activation through modulation of Nrf2 pathway. In *Free Radical Biology and Medicine*, 2020, vol. 152, p. 18-32. (2019: 6.170 - IF, Q1 - JCR, 1.841 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0891-5849. Available at: <https://doi.org/10.1016/j.freeradbiomed.2020.02.030>

Activators of the redox-sensitive transcription factor Nrf2 are promising substances with many potential clinical applications, including treatment of age-related health problems. Using the relevant cell culture model, we identified a novel synthetic conjugate of a flavonoid quercetin, quercetin-quinone (CHNQ), as a molecule helpful in preventing and treating neuroinflammatory diseases commonly accompanying the ageing process. We also elucidated the molecular mechanism of the biological action of CHNQ, which mainly consists in the upregulation of Nrf2 and showed that CHNQ is a more efficient Nrf2 activator than the parent quercetin. Our research highlights the chemically modified quercetin, CHNQ, as a novel Nrf2 activator capable of neuroprotection through bolstering the natural cytoprotective responses of the body.

## III. Neuropsychological research and mental disorders

MARKO, Martin - CIMROVÁ, Barbora - RIEČANSKÝ, Igor\*\*. Neural theta oscillations support semantic memory retrieval. In *Scientific Reports*, 2019, vol. 9, art. no. 17667, 10 p. (2018: 4.011 - IF, Q1 - JCR, 1.414 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 2045-2322. Available at: <https://doi.org/10.1038/s41598-019-53813-y>

Semantic memory is a repository of general world knowledge and one of most defining human traits. Using transcranial alternating current stimulation, a non-invasive neurostimulation method, we have shown in this study that synchronization of brain activity in the theta band (~6 Hz) supports retrieval of semantically related words from long-term memory. These findings indicate that theta synchronization may constitute a neurocognitive mechanism for binding and maintenance of representations in semantic memory. Our findings cast new lights on how semantic memory is implemented in the brain and may be used in the future to develop novel efficient therapeutic methods to restore deteriorated cognitive functions in patients with neuropsychiatric disorders.

CSATLÓSOVÁ, Kristína - BÖGI, Eszter - ĎURIŠOVÁ, Barbora - GRINCHII, Daniil - PALIOKHA, Ruslan - MORAVČÍKOVÁ, Lucia - LACINOVÁ, Ľubica - JEŽOVÁ, Daniela - DREMENCOV, Eliyahu\*\*. Maternal immune activation in rats attenuates the excitability of monoamine-secreting neurons in adult offspring in a sex-specific way. In *European Neuropsychopharmacology*, 2021, vol. 43, p. 82-91. (2020: 4.600 - IF, Q2 - JCR, 1.603 - SJR, Q1 - SJR, karentované - CCC). (2021 - Current Contents). ISSN 0924-977X. Available at: <https://doi.org/10.1016/j.euroneuro.2020.12.002>

Children of women exposed to an infectious illness during pregnancy are at increased risk of developing several mental disorders, including depression, anxiety or schizophrenia. Disturbance of serotonergic neurotransmission plays a key role in depression and anxiety, while dopaminergic neurotransmission is implicated in schizophrenia. Therefore, altered activity of the serotonergic and dopaminergic neurons is likely to be involved in behavioral disorders due to maternal immune activation. In our experiments we used *in vivo* electrophysiology, where glass electrodes were inserted under anesthesia into monoamine-secreting cell areas of the rat brain. Our results show that immune activation of mothers during pregnancy resulted in altered neuronal activity in the offspring such as that the firing rate of serotonergic neurons was suppressed but the firing rate of dopaminergic neurons was elevated. These results contribute to the understanding of the link between immunological processes and disrupted neuronal activity playing role in the etiopathogenesis of severe mental disorders.

## 2.1.9. Table of research outputs

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	2016			2017			2018			2019			2020			2021			total			
	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	No. / FTE researches	No. / one million total salary budget	number	averaged number per year	av. No. / FTE researches	av. No. / one million total salary budget
Scientific monographs and monographic studies in journals and proceedings published abroad (AAA, ABA)	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	1	0.014	0.389	1	0.167	0.002	0.076
Scientific monographs and monographic studies in journals and proceedings published in Slovakia (AAB, ABB)	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.000
Chapters in scientific monographs published abroad (ABC)	6	0.077	3.388	2	0.026	1.049	4	0.057	1.931	7	0.098	2.952	2	0.029	0.807	3	0.042	1.166	24	4.000	0.055	1.822
Chapters in scientific monographs published in Slovakia (ABD)	4	0.051	2.259	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	4	0.667	0.009	0.304
Scientific papers published in journals registered in Current Contents Connect (ADCA, ADCB, ADDA, ADDB)	58	0.744	32.750	46	0.592	24.134	51	0.722	24.614	48	0.674	20.245	72	1.034	29.056	65	0.921	25.262	340	56.667	0.777	25.814
Scientific papers published in journals registered in Web of Science Core Collection and SCOPUS not listed above (ADMA, ADMB, ADNA, ADNBN)	33	0.423	18.634	33	0.425	17.314	12	0.170	5.792	22	0.309	9.279	28	0.402	11.299	28	0.397	10.882	156	26.000	0.356	11.844
Scientific papers published in other foreign journals (not listed above) (ADEA, ADEB)	11	0.141	6.211	3	0.039	1.574	1	0.014	0.483	0	0.000	0.000	1	0.014	0.404	1	0.014	0.389	17	2.833	0.039	1.291
Scientific papers published in other domestic journals (not listed above) (ADFA, ADFB)	1	0.013	0.565	18	0.232	9.444	3	0.042	1.448	0	0.000	0.000	0	0.000	0.000	6	0.085	2.332	28	4.667	0.064	2.126
Scientific papers published in foreign peer-reviewed proceedings (AECA)	6	0.077	3.388	0	0.000	0.000	1	0.014	0.483	3	0.042	1.265	2	0.029	0.807	15	0.212	5.830	27	4.500	0.062	2.050
Scientific papers published in domestic peer-reviewed proceedings (AEDA)	2	0.026	1.129	1	0.013	0.525	1	0.014	0.483	2	0.028	0.844	3	0.043	1.211	1	0.014	0.389	10	1.667	0.023	0.759
Published papers (full text) from foreign scientific conferences (AFA, AFC)	0	0.000	0.000	0	0.000	0.000	1	0.014	0.483	2	0.028	0.844	1	0.014	0.404	0	0.000	0.000	4	0.667	0.009	0.304
Published papers (full text) from domestic scientific conferences (AFB, AFD)	1	0.013	0.565	2	0.026	1.049	5	0.071	2.413	5	0.070	2.109	3	0.043	1.211	7	0	3	23	4	0	2



## Papers from international collaborations:

### **NCD Risk Factor Collaboration (NCD-RisC):**

BIXBY, Honor - BENTHAM, James - ZHOU, Bin - DI CESARE, Mariachiara - PACIOREK, Christopher J. - REGECOVÁ, Valéria. Rising rural body-mass index is the main driver of the global obesity epidemic in adults. In *Nature*, 2019, vol. 569, no. 7755, p. 260-264. (2018: 43.070 - IF, Q1 - JCR, 16.345 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 0028-0836. Available at: <https://doi.org/10.1038/s41586-019-1171-x>. Typ: ADCA

### **NCD Risk Factor Collaboration (NCD-RisC):**

RODRIGUEZ-MARTINEZ, A. - ZHOU, B. - SOPHIEA, M.K. - BENTHAM, J. - PACIOREK, C.J. - REGECOVÁ, Valéria. Height and body-mass index trajectories of school-aged children and adolescents from 1985 to 2019 in 200 countries and territories: a pooled analysis of 2181 population-based studies with 65 million participants. In *Lancet*, 2020, vol. 396, no. 10261, p. 1511-1524. (2019: 60.392 - IF, Q1 - JCR, 14.554 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0140-6736. Available at: [https://doi.org/10.1016/S0140-6736\(20\)31859-6](https://doi.org/10.1016/S0140-6736(20)31859-6). Typ: ADCA

### **NCD Risk Factor Collaboration (NCD-RisC):**

ZHOU, Bin - CARRILLO-LARCO, Rodrigo M - DANAEI, Goodarz - RILEY, Leanne M. - PACIOREK, Christopher J. - REGECOVÁ, Valéria. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. In *Lancet*, 2021, vol. 398, no. 10304, p. 957-980. (2020: 79.323 - IF, Q1 - JCR, 13.103 - SJR, Q1 - SJR, karentované - CCC). (2021 - Current Contents). ISSN 0140-6736. Available at: [https://doi.org/10.1016/S0140-6736\(21\)01330-1](https://doi.org/10.1016/S0140-6736(21)01330-1). Typ: ADCA

### **NCD Risk Factor Collaboration (NCD-RisC):**

IURILLI, Maria LC - ZHOU, Bin - BENNETT, James E - CARRILLO-LARCO, Rodrigo M - SOPHIEA, Marisa K - REGECOVÁ, Valéria. Heterogeneous contributions of change in population distribution of body mass index to change in obesity and underweight. In *eLife*, 2021, vol. 10, art. no. e60060. (2020: 8.146 - IF, Q1 - JCR, 5.879 - SJR, Q1 - SJR). ISSN 2050-084X. Available at: <https://doi.org/10.7554/eLife.60060>. Typ: ADMA

### **EU-CardioRNA COST Action CA17129:**

ROBINSON, E. L. - GOMES, CPC. - POTOČNJAK, I. - HELLEMANS, J. - BETSOU, J. - BARTEKOVÁ, Monika - KALOČAYOVÁ, Barbora - KURA, Branislav. A Year in the Life of the EU-CardioRNA COST Action: CA17129 Catalysing Transcriptomics Research in Cardiovascular Disease. In *Non-coding RNA*, 2020, vol. 6, no. 2, art. no. 17. (2019: 1.274 - SJR, Q1 - SJR). ISSN 2311-553X. Available at: <https://doi.org/10.3390/NCRNA6020017>. Typ: BDMB

GOMES, Clarissa P.D.C. - ÁGG, Bence - ANDOVA, Andrejaana - ARSLAN, Serdal - BAKER, Andrew - BARTEKOVÁ, Monika - BEIS, Dimitris - BETSOU, Fay - WETTINGER, Stephanie Bezzina - BUGARSKI, Branko - CONDORELLI, Gianluigi - DA SILVA, Gustavo J. J. - DANILIN, Sabrina - GONZALO-CALVO, David - BUIL, Alfonso - CARMO-FONSECA, Maria - ENGUIA, Francisco J. - FELEKKIS, Kyriacos - FERDINANDY, Péter - GYÖNGYÖSI, Mariann - HACKL, Matthias - KARADUZOVIC-HADZIABDIC, Kanita - HELLEMANS, Jan - HEYMANS, Stephane - HLAVÁČKOVÁ, Markéta - HOYDAL, Morten A. - JANKOVIC, Aleksandra - JUSIC, Amela - KARDASSIS, Dimitris - KERKELÄ, Risto - KUSTER, Gabriela M. - LAKKISTO, Päivi - LESZEK, Przemyslaw - LUSTREK, Mitja - MAEGDEFESSEL, Lars - MARTELLI, Fabio - NOVELLA, Susana - O'BRIEN, Timothy - PAPANEOPHYTOU, Christos - PEDRAZZINI, Thierry - PINET, Florence - POPESCU, Octavian - POTOČNJAK, Ines - ROBINSON, Emma - SASSON,

Shlomo - SCHOLZ, Markus - SIMIONESCU, Maya - STOLL, Monika - VARGA, Zoltan V. - VINCIGUERRA, Manlio - XUEREB, Angela - YILMAZ, Mehmet B. - EMANUELI, Costanza - DEVAUX, Yvan\*\*. Catalyzing Transcriptomics Research in Cardiovascular Disease: The CardioRNA COST Action CA17129. In *Non-coding RNA*, 2019, vol. 5, no. 2, art. no. 31. (2018: 0.620 - SJR, Q3 - SJR). ISSN 2311-553X. Available at: <https://doi.org/10.3390/ncrna5020031> Typ: ADMB

**EU-CARDIOPROTECT COST Action CA16225:**

ANDREADOU, Ioannou - ADAMOVSKI, Pavle - BARTEKOVÁ, Monika - BEAULOYE, Christophe - BERTRAND, Luc - BIEDERMANN, David - BORUTAITE, Vilmante - BØTKER, Hans Erik - CHLOPICKI, Stefan - DAMBROVA, Maija - DAVIDSON, Sean - DEVAUX, Yvan - DI LISA, Fabio - DJURIC, Dragan - ERLINGE, David - FALCAO-PIRES, Inês - GALATOU, Eleftheria - GARCÍA-DORADO, David - GARCIA-SOSA, Alfonso T. - GIRÃO, Henrique - GIRICZ, Zoltán - GYÖNGYÖSI, Mariann - HEALY, Donagh - HEUSCH, Gerd - JAKOVLJEVIC, Vladimir Lj. - JOVANIC, Jelena - KOLÁŘ, František - KWAK, Brenda R. - LESZEK, Przemyslaw - LIEPINSH, Edgars - LONGNUS, Sarah - MARINOVIC, Jasna - MUNTEAN, Danina Mirela - NEZIC, Lana - OVIZE, Michael - PAGLIARO, Pasquale - PEDROSA DA COSTA GOMES, Clarissa - PERNOW, John - PERSIDIS, Andreas - PISCHKE, Sören Erik - PODESSER, Bruno K. - PRUNIER, Fabrice - RAVINGEROVÁ, Táňa - RUIZ-MEANA, Marisol - SCHULZ, Rainer - SCRIDON, Alina - SLAGSVOLD, Katrine H. - THOMSEN LØNBORG, Jacob - TURAN, Belma - VAN ROYEN, Niels - VENDELIN, Marko - WALSH, Stewart - YELLON, Derek - ZIDAR, Nace - ZUURBIER, Coert J - FERDINANDY, Péter - HAUSENLOY, Derek J. Realizing the therapeutic potential of novel cardioprotective therapies: The EU-CARDIOPROTECTION COST Action - CA16225. In *Conditioning Medicine*, 2018, vol. 1, iss. 3, p. 116-123. ISSN 2577-3240. Available at: <http://www.conditionmed.org/Data/View/1255> Typ: ADEB

**MitoEAGLE Task Group:**

GNAIGER, Erich - AASANDER FROSTNER, Eleonor - NORWAHIDAH, Abdul Karim - FERKO, Miroslav. Mitochondrial physiology. Available at: <https://doi.org/10.26124/bec:2020-0001.v1>. Typ: GHG

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

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

*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) are listed separately*

Citations, reviews	2015		2016		2017		2018		2019		2020		total		
	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	No. / FTE researchers	number	averaged number per year	av. No. / FTE researchers
<b>Citations in Web of Science Core Collection (1.1, 2.1)</b>	1,341	17.20	1,560	20.09	1,665	23.56	1,769	24.85	1,985	28.52	2,293	32.47	<b>10,613</b>	<b>1,768.83</b>	<b>24.25</b>
<b>Citations in SCOPUS (1.2, 2.2) if not listed above</b>	276	3.54	204	2.63	247	3.50	228	3.20	215	3.09	272	3.85	<b>1,442</b>	<b>240.33</b>	<b>3.29</b>
<b>Citations in other citation indexes and databases (not listed above) (3.2,4.2)</b>	15	0.19	11	0.14	11	0.16	17	0.24	21	0.30	10	0.14	<b>85</b>	<b>14.17</b>	<b>0.19</b>
<b>Other citations (not listed above) (3.1, 4.1)</b>	103	1.32	65	0.84	29	0.41	109	1.53	115	1.65	66	0.93	<b>487</b>	<b>81.17</b>	<b>1.11</b>
<b>Reviews (5,6)</b>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	<b>0</b>	<b>0.00</b>	<b>0.00</b>

Citation of papers from international collaborations:

**NCD Risk Factor Collaboration (NCD-RisC):**

BIXBY, Honor - BENTHAM, James - ZHOU, Bin - DI CESARE, Mariachiara - PACIOREK, Christopher J. - REGECOVÁ, Valéria. Rising rural body-mass index is the main driver of the global obesity epidemic in adults. In *Nature*, 2019, vol. 569, no. 7755, p. 260-264. (2018: 43.070 - IF, Q1 - JCR, 16.345 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 0028-0836. Available at: <https://doi.org/10.1038/s41586-019-1171-x>. Typ: ADCA

Number of citations: **77**

**NCD Risk Factor Collaboration (NCD-RisC):**

RODRIGUEZ-MARTINEZ, A. - ZHOU, B. - SOPHIEA, M.K. - BENTHAM, J. - PACIOREK, C.J. - REGECOVÁ, Valéria. Height and body-mass index trajectories of school-aged children and adolescents from 1985 to 2019 in 200 countries and territories: a pooled analysis of 2181 population-based studies with 65 million participants. In *Lancet*, 2020, vol. 396, no. 10261, p. 1511-1524. (2019: 60.392 - IF, Q1 - JCR, 14.554 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0140-6736. Available at: [https://doi.org/10.1016/S0140-6736\(20\)31859-6](https://doi.org/10.1016/S0140-6736(20)31859-6). Typ: ADCA

Number of citations: **2**

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

KOGAN, Grigorij - ŠOLTÉS, Ladislav - STERN, Robert - GEMEINER, Peter. Hyaluronic acid: a natural biopolymer with a broad range of biomedical and industrial applications. In *Biotechnology Letters*, 2007, vol. 29, no. 1, p. 17-25. (2006: 1.134 - IF, Q3 - JCR, 0.546 - SJR, Q2 - SJR, karentované - CCC). (2007 - Current Contents). ISSN 0141-5492. Available at: <https://doi.org/10.1007/s10529-006-9219-z>. Typ: ADCA

**Number of citations: 394**

STERN, Robert - KOGAN, Grigorij - JEDRZEJAS, Mark J. - ŠOLTÉS, Ladislav. The many ways to cleave hyaluronan. In *Biotechnology Advances*, 2007, vol. 25, p. 537-557. (2006: 4.943 - IF, Q1 - JCR, 1.715 - SJR, Q1 - SJR, karentované - CCC). (2007 - Current Contents). ISSN 0734-9750. Available at: <https://doi.org/10.1016/j.biotechadv.2007.07.001>. Typ: ADCA

**Number of citations: 152**

ŠESTÁKOVÁ, Natália - PÚZSEROVÁ, Angelika - KLUKNAVSKÝ, Michal - BERNÁTOVÁ, Iveta. Determination of motor activity and anxiety-related behaviour in rodents: methodological aspects and role of nitric oxide. In *Interdisciplinary toxicology*, 2013, vol. 6, no. 3, p. 126-135. (2012: 0.258 - SJR). ISSN 1337-6853. Typ: ADNB

**Number of citations: 104**

PILŠÁKOVÁ, Ludmila - RIEČANSKÝ, Igor - JAGLA, Fedor. The physiological actions of isoflavone phytoestrogens. In *Physiological Research*, 2010, vol. 59, no. 5, p. 651-664. (2009: 1.430 - IF, Q3 - JCR, 0.574 - SJR, Q2 - SJR, karentované - CCC). (2010 - Current Contents). ISSN 0862-8408. Typ: ADCA

**Number of citations: 101**

AUGUSTYNIAK, Agnieszka - BARTOSZ, Gregorz - ČIPAK, Ana - DUBURS, Gunars - HORÁKOVÁ, Ľubica - LUCZAJ, Wojciech - MÁJEKOVÁ, Magdaléna - ODYSSEOS, Andreani D. - RAČKOVÁ, Lucia - SKRZYDLEWSKA, Elzbieta - ŠTEFEK, Milan - ŠTROSOVÁ, Miriam - TIRZITIS, Gunars - VENSKUTONIS, Petras Rimantas - VISKUPIČOVÁ, Jana - VRAKA, Panagiota S. - ŽARKOVIČ, Neven. Natural and synthetic antioxidants: an updated overview. In *Free Radical Research : official journal of the Society for Free Radical Research -European Region*, 2010, vol. 44, no. 10, p. 1216-1262. (2009: 2.215 - IF, Q3 - JCR, 0.921 - SJR, Q1 - SJR, karentované - CCC). (2010 - Current

Contents). ISSN 1071-5762. Available at: <https://doi.org/10.3109/10715762.2010.508495>, Typ: ABA

**Number of citations: 89**

ABRAHÁMOVÁ, Diana - HLAVAČKA, František. Age-related changes of human balance during quiet stance. In *Physiological Research*, 2008, vol. 57, no. 6, p. 957-964. (2007: 1.505 - IF, Q3 - JCR, 0.762 - SJR, Q1 - SJR, karentované - CCC). (2008 - Current Contents). ISSN 0862-8408. Typ: ADCA

**Number of citations: 88**

ŠOLTÉS, Ladislav - MENDICHI, Raniero - KOGAN, Grigorij - SCHILLER, Jürgen - STANKOVSKÁ, Monika - AMHOLD, Jürgen. Degradative action of reactive oxygen species on hyaluronan. In *Biomacromolecules* [seriál], 2006, vol. 7, no. 3, p. 659-668. (2005: 3.618 - IF, Q1 - JCR, 1.665 - SJR, Q1 - SJR, karentované - CCC). (2006 - Current Contents). ISSN 1525-7797. Available at: <https://doi.org/10.1021/bm050867v>. Typ: ADCA

**Number of citations: 83**

VOLPI, Nikola - SCHILLER, Jürgen - STERN, Robert - ŠOLTÉS, Ladislav. Role, metabolism, chemical modifications and applications of hyaluronan. In *Current Medicinal Chemistry*, 2009, vol. 16, iss. 14, p. 1718-1745. (2008: 4.823 - IF, Q1 - JCR, 1.900 - SJR, Q1 - SJR, karentované - CCC). (2009 - Current Contents). ISSN 0929-8673. Available at: <https://doi.org/10.2174/092986709788186138>. Typ: ADCA

**Number of citations: 78**

KOVRIŽNYCH, Jevgenij A. - SOTNÍKOVÁ, Ružena - ZELJENKOVÁ, Dagmar - ROLLEROVÁ, Eva - SZABOVÁ, Elena - WIMMEROVÁ, Soňa. Acute toxicity of 31 different nanoparticles to zebrafish (*Danio rerio*) tested in adulthood and in early life stages - comparative study. In *Interdisciplinary toxicology*, 2013, vol. 6, no. 2, p. 67-73. (2012: 0.258 - SJR). ISSN 1337-6853. Available at: <https://doi.org/10.2478/intox-2013-0012>. Typ: ADNB

**Number of citations: 78**

BIXBY, Honor - BENTHAM, James - ZHOU, Bin - DI CESARE, Mariachiara - PACIOREK, Christopher J. - REGECOVÁ, Valéria. Rising rural body-mass index is the main driver of the global obesity epidemic in adults. In *Nature*, 2019, vol. 569, no. 7755, p. 260-264. (2018: 43.070 - IF, Q1 - JCR, 16.345 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 0028-0836. Available at: <https://doi.org/10.1038/s41586-019-1171-x>. Typ: ADCA

**Number of citations: 77**

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

KOGAN, Grigorij - ŠOLTÉS, Ladislav - STERN, Robert - GEMEINER, Peter. Hyaluronic acid: a natural biopolymer with a broad range of biomedical and industrial applications. In *Biotechnology Letters*, 2007, vol. 29, no. 1, p. 17-25. (2006: 1.134 - IF, Q3 - JCR, 0.546 - SJR, Q2 - SJR, Current Contents - CCC). (2007 - Current Contents). ISSN 0141-5492. Available at: <https://doi.org/10.1007/s10529-006-9219-z>. Typ: ADCA.

**Number of citations: 613**

STERN, Robert - KOGAN, Grigorij - JEDRZEJAS, Mark J. - ŠOLTÉS, Ladislav. The many ways to cleave hyaluronan. In *Biotechnology Advances*, 2007, vol. 25, p. 537-557. (2006: 4.943 - IF, Q1 - JCR, 1.715 - SJR, Q1 - SJR, Current Contents - CCC). (2007 - Current Contents). ISSN 0734-9750. Available at: <https://doi.org/10.1016/j.biotechadv.2007.07.001>. Typ: ADCA.

**Number of citations: 243**

BAUEROVÁ, Katarína - BEZEK, Štefan. Role of reactive oxygen and nitrogen species in etiopathogenesis of rheumatoid arthritis. In *General physiology and biophysics: an international*

*journal*, 1999, vol. 18, focus issue, p.15-20. (1998: 0.714 - IF, Current Contents - CCC). (1999 - Current Contents). ISSN 0231-5882. Typ: ADDA.

**Number of citations: 186**

BRILLANTES, Anne-Marie B. - ONDRIAŠ, Karol - SCOTT, Andrew - KOBRINSKY, Evgeny - ONDRIAŠOVÁ, Elena - MOSCHELLA, Maria C. - JAYARAMAN, Thottala - LANDERS, Mark - EHRLICH, Barbara E. - MARKS, Andrew R. Stabilization of calcium release channel (ryanodine receptor) function by FK506-binding protein. In *Cell*, 1994, vol. 77, iss. 4, p. 513-523. ISSN 0092-8674. Available at: [https://doi.org/10.1016/0092-8674\(94\)90214-3](https://doi.org/10.1016/0092-8674(94)90214-3). Typ: ADCA.

**Number of citations: 171**

HORAK, F. B. - HLAVAČKA, František. Somatosensory loss increases vestibulospinal sensitivity. In *Journal of Neurophysiology*, 2001, vol. 86, no. 2, p. 575-585. (2000: 3.855 - IF, Current Contents - CCC). (2001 - Current Contents). ISSN 0022-3077. Typ: ADCA.

**Number of citations: 169**

JURÁNEK, Ivo - BEZEK, Štefan. Controversy of free radical hypothesis: reactive oxygen species - cause or consequence of tissue injury? In *General physiology and biophysics : an international journal*. - Bratislava : Institute of Molecular Physiology and Genetics SAS, 2005, vol. 24, p. 263 - 278. (2004: 0.694 - IF, Current Contents - CCC). (2005 - Current Contents). ISSN 0231-5882. Typ: ADDA.

**Number of citations: 160**

KYSEĽOVÁ, Zuzana - ŠTEFEK, Milan - BAUER, Viktor. Pharmacological prevention of diabetic cataract. In *Journal of diabetes and its complications*. - New York : Elsevier, 2004, vol. 18, p. 129 - 140. (2003: 2.345 - IF). ISSN 1056-8727. Available at: [https://doi.org/10.1016/S1056-8727\(03\)00009-6](https://doi.org/10.1016/S1056-8727(03)00009-6). Typ: ADCA.

**Number of citations: 157**

PILŠÁKOVÁ, Ľudmila - RIEČANSKÝ, Igor - JAGLA, Fedor. The physiological actions of isoflavone phytoestrogens. In *Physiological Research*, 2010, vol. 59, no. 5, p. 651-664. (2009: 1.430 - IF, Q3 - JCR, 0.574 - SJR, Q2 - SJR, Current Contents - CCC). (2010 - Current Contents). ISSN 0862-8408. Typ: ADCA.

**Number of citations: 157**

ŠOLTÉS, Ladislav - MENDICHI, Raniero - KOGAN, Grigorij - SCHILLER, Jürgen - STANKOVSKÁ, Monika - AMHOLD, Jürgen. Degradative action of reactive oxygen species on hyaluronan. In *Biomacromolecules [seriál]*, 2006, vol. 7, no. 3, p. 659-668. (2005: 3.618 - IF, Q1 - JCR, 1.665 - SJR, Q1 - SJR, Current Contents - CCC). (2006 - Current Contents). ISSN 1525-7797. Available at: <https://doi.org/10.1021/bm050867v>. Typ: ADCA.

**Number of citations: 151**

RAČKOVÁ, Lucia - MÁJEKOVÁ, Magdaléna - KOŠŤÁLOVÁ, Daniela - ŠTEFEK, Milan. Antiradical and antioxidant activities of alkaloids isolated from Mahonia aquifolium. Structural aspects. In *Bioorganic & medicinal chemistry*. - Oxford : Pergamon-Elsevier, 2004, vol. 12, no. 17, p. 4709 - 4715. (2003: 2.185 - IF, Current Contents - CCC). (2004 - Current Contents). ISSN 0968-0896. Dostupné na: <https://doi.org/10.1016/j.bmc.2004.06.035>. Typ: ADCA.

**Number of citations: 146**

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

BIXBY, Honor - BENTHAM, James - ZHOU, Bin - DI CESARE, Mariachiara - PACIOREK, Christopher J. - REGECOVÁ, Valéria. Rising rural body-mass index is the main driver of the global obesity epidemic in adults. In *Nature*, 2019, vol. 569, no. 7755, p. 260-264. (2018: 43.070 - IF, Q1 - JCR, 16.345 - SJR, Q1 - SJR, Current Contents - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 0028-0836. Available at: <https://doi.org/10.1038/s41586-019-1171-x>. Typ: ADCA

**Number of citations: 159**

BARTEKOVÁ, Monika - RADOŠINSKÁ, Jana - JELEMENSKÝ, Marek - DHALLA, Naranjan S.\*\*. Role of cytokines and inflammation in heart function during health and disease. In *Heart Failure Reviews*, 2018, vol. 23, no. 5, p. 733-758. (2017: 4.104 - IF, Q2 - JCR, 1.887 - SJR, Q1 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1382-4147. Available at: <https://doi.org/10.1007/s10741-018-9716-x>. Typ: ADCA

**Number of citations: 110**

BEI, Yihua - DAS, Saumya - RODOSTHENOUS, Rodosthenis S. - HOLVOET, Paul - VANHAVERBEKE, Maarten - MONTEIRO, Marta C. - MONTEIRO, Valter V.S. - RADOŠINSKÁ, Jana - BARTEKOVÁ, Monika - JANSEN, Felix - LI, Qian - RAJASINGH, Johnson - XIAO, Junjie. Extracellular Vesicles in Cardiovascular Theranostics. In *Theranostics*, 2017, vol. 7, no. 17, p. 4168-4182. (2016: 8.766 - IF, Q1 - JCR, 2.375 - SJR, Q1 - SJR). ISSN 1838-7640. Available at: <https://doi.org/10.7150/thno.21274>. Typ: ADCA

**Number of citations: 78**

BARANČÍK, Miroslav - GREŠOVÁ, Linda - BARTEKOVÁ, Monika - DOVINOVA, Ima. Nrf2 as a Key Player of Redox Regulation in Cardiovascular Diseases. In *Physiological Research*, 2016, vol. 65, suppl. 1, p.S1-S10. (2015: 1.643 - IF, Q3 - JCR, 0.749 - SJR, Q2 - SJR, Current Contents - CCC). (2016 - Current Contents). ISSN 0862-8408. Available at: [https://www.biomed.cas.cz/physiolres/pdf/65%20Suppl%201/65\\_S1.pdf](https://www.biomed.cas.cz/physiolres/pdf/65%20Suppl%201/65_S1.pdf). Typ: ADCA

**Number of citations: 70**

TAMER ABD-EL RAZIK, Tamer Mahmoud - HASSAN, Mohamed A. - OMER, Ahmed Mohamed - VALACHOVÁ, Katarína - MOHY-ELDIN, Mohamed Samir - COLLINS, Maurice N. - ŠOLTÉS, Ladislav. Antibacterial and antioxidative activity of O-amine functionalized chitosan. In *Carbohydrate Polymers*, 2017, vol. 169, p. 441-450. (2016: 4.811 - IF, Q1 - JCR, 1.419 - SJR, Q1 - SJR, Current Contents - CCC). (2017 - Current Contents). ISSN 0144-8617. Available at: <https://doi.org/10.1016/j.carbpol.2017.04.027>. Typ: ADCA

**Number of citations: 62**

BELOVIČOVÁ, Kristína - BÖGI, Eszter - CSATLÓSOVÁ, Kristína - DUBOVICKÝ, Michal. Animal tests for anxiety-like and depression-like behavior in rats. In *Interdisciplinary toxicology*, 2017, vol. 10, no. 1, p. 40-43. (2016: 0.409 - SJR, Q3 - SJR). (2017 - SCOPUS). ISSN 1337-6853. Typ: ADNB

**Number of citations: 60**

MURÍNOVÁ, Jana - HLAVÁČOVÁ, Nataša - CHMELOVÁ, Magdaléna - RIEČANSKÝ, Igor. The evidence for altered BDNF expression in the brain of rats reared or housed in social isolation: a systematic review. In *Frontiers in Behavioral Neuroscience*, 2017, vol. 11, art. no. 101, p. 1-10. (2016: 3.104 - IF, Q2 - JCR, 1.828 - SJR, Q1 - SJR). ISSN 1662-5153. Available at: <https://doi.org/10.3389/fnbeh.2017.00101>. Typ: ADMA

**Number of citations: 56**

HRENÁK, Jaroslav - PAULIS, Ľudovít - ŠIMKO, Fedor. Angiotensin A/Alamandine/MrgD Axis: Another Clue to Understanding Cardiovascular Pathophysiology. In *International Journal of Molecular Sciences*, 2016, vol. 17, no. 7, article number 1098. (2015: 3.257 - IF, Q2 - JCR, 1.157 - SJR, Q1 - SJR, Current Contents - CCC). (2016 - Current Contents). ISSN 1422-0067. Available at: <https://doi.org/10.3390/ijms17071098>. Typ: ADCA

**Number of citations: 55**

TAMER ABD-EL RAZIK, Tamer Mahmoud - COLLINS, Maurice N.\*\* - VALACHOVÁ, Katarína - HASSAN, Mohamed A. - OMER, Ahmed Mohamed - MOHY-ELDIN, Mohamed Samir - ŠVÍK, Karol

- JURČÍK, Rastislav - ONDRUŠKA, Ľubomír - BIRÓ, Csaba - ALBADARIN, Ahmad B. - ŠOLTÉS, Ladislav. MitoQ loaded Chitosan-Hyaluronan composite membranes for wound healing. In *Materials (Basel)*, 2018, vol. 11, no. 4, art. no. 569. (2017: 2.467 - IF, Q2 - JCR, 0.732 - SJR, Q2 - SJR, Current Contents - CCC). (2018 - Current Contents). ISSN 1996-1944. Available at: <https://doi.org/10.3390/ma11040569>. Typ: ADCA

**Number of citations: 50**

KVANDOVÁ, Miroslava - MAJZÚNOVÁ, Miroslava - DOVINOVÁ, Ima. The role of PPAR $\gamma$  in cardiovascular diseases. In *Physiological Research*, 2016, vol. 65, suppl. 3, p. S343-S363. (2015: 1.643 - IF, Q3 - JCR, 0.749 - SJR, Q2 - SJR, Current Contents - CCC). (2016 - Current Contents). ISSN 0862-8408. Available at: [http://www.biomed.cas.cz/physiolres/pdf/65/65\\_S343.pdf](http://www.biomed.cas.cz/physiolres/pdf/65/65_S343.pdf). Typ: ADCA

**Number of citations: 47**

**2.2.5. List of most-cited authors from the Institute (at most 10 % of average FTE researchers per year) and their number of citations in the assessment period (2015– 2020). The cited papers must bear the address of the institute**

Author: Šoltés Ladislav 1950-  
Number of citations: 1387

Author: Pecháňová Oľga 1962-  
Number of citations: 1060

Author: Štefek Milan 1950-  
Number of citations: 857

Author: Barančík Miroslav 1962-  
Number of citations: 806

Author: Paulis Ľudovít 1981-  
Number of citations: 800

Author: Bernátová Iveta 1967-  
Number of citations: 786

Author: Ravingerová Táňa 1951-  
Number of citations: 644

Author: Tribulová Narcisa 1946-  
Number of citations: 626

Author: Navarová Jana 1945-  
Number of citations: 605

Author: Račková Lucia 1975-  
Number of citations: 566

**2.2.6. List of most-cited authors from the Institute (at most 10 % of average FTE researchers per year) and their number of citations obtained until 2020. The cited papers must bear the address of the Institute**

Author: Šoltés Ladislav 1950-  
Number of citations: 2636



Author: Pecháňová Oľga 1962-  
Number of citations: 2372

Author: Štefek Milan 1950-  
Number of citations: 1917

Author: Bernátová Iveta 1967-  
Number of citations: 1584

Author: Barančík Miroslav 1962-  
Number of citations: 1471

Author: Paulis Ľudovít 1981-  
Number of citations: 1256

Author: Ravingerová Táňa 1951-  
Number of citations: 1246

Author: Hlavačka František 1944-  
Number of citations: 1207

Author: Navarová Jana 1945-  
Number of citations: 1164

Autor: Tribulová Narcisa 1946-  
Number of citations: 1055

**2.2.7. List of most-cited authors from the Institute (at most 10 % of average FTE researchers per year) and their number of citations obtained until 2021 of their papers published during the evaluation period (2016– 2021). The cited papers must bear the address of the Institute**

Author: Barteková Monika 1973-  
Number of citations: 539

Author: Šoltés Ladislav 1950-  
Number of citations: 360

Author: Valachová Katarína 1981-  
Number of citations: 355

Author: Barančík Miroslav 1962-  
Number of citations: 319

Author: Slezák Ján  
Number of citations: 310

Author: Kura Branislav 1988-  
Number of citations: 286

Author: Tribulová Narcisa 1946-  
Number of citations: 227

Author: Regecová Valéria 1954-2020  
Number of citations: 222

Author: Szeiffová Bačová Barbara 1985-

Number of citations: 200

Author: Paulis Ľudovít 1981-

Number of citations: 190

## 2.3. Research status of the institute in international and national context

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

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

***International collaborations:***

University in Kragujevac - research and pedagogical cooperation enables research selected biochemical mechanisms of cardiovascular diseases. Pedagogical cooperation in within the lectures of the subject Biochemical physiology

Victor Babeş University of Medicine and Pharmacy, Romania - the cooperation is focused on scientific research of the effects of active substances bound to nanoparticles as well as the pedagogical cooperation in lectures of Biochemistry

Gazi University, Faculty of Medicine, Medical Pharmacology, Ankara, Turecko - Scientific research cooperation aimed on modulation of cellular stress response by natural substances

Institute of Clinical and Experimental Medicine, Prague, Czech Republic - Scientific research cooperation aimed on evaluation of cardiovascular complications in metabolic syndrome

Semmelweis University, Faculty of Medicine, Department of Pharmacology and Pharmacotherapy, Budapest, Hungary – Scientific collaboration aimed on revealing the role of non-codingRNA and extracellular vesicles in cardioprotection.

Institute of Neurobiology, Bulgarian Academy of Sciences - Study the role of iron oxide nanoparticles in a model of hypertension and comorbid Alzheimer's disease, SAV-BAV-18-11

Academy of Sciences of Czech Republic - Stress-induced pressor responses: endothelial factors vs. central regulation of sympathetic tone, SAV-AV ČR 16-18

University of Vienna, Faculty of Psychology – research and pedagogical collaboration in the field of cognitive neuroscience

***Major projects:***

HORIZON 2020: LogicLab - Molecular logic lab-on-a-vesicle for intracellular diagnostics, Programme - H2020-EU.1.3. - EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions, Topic - MSCA-ITN-2018 - Innovative Training Networks, Funding Scheme - MSCA-ITN-ETN - European Training Networks, Grant No. 813920, 2018-2022, PI (Institute): Mojmír Mach

HORIZON 2020: ONTOX - Ontology-driven and artificial intelligence-based repeated dose toxicity testing of chemicals for next generation risk assessment, Programme - H2020-EU.3.1. - SOCIETAL CHALLENGES - Health, demographic change and well-being, Topic - SC1-BHC-11-2020 - Advancing the safety assessment of chemicals without the use of animal testing, Funding Scheme - RIA - Research and Innovation action, Grant No. 963845, 2021-2026, PI (Institute): Helena Kandárová

EU-ROS: The European Network on Oxidative Stress and Redox Biology Research – COST project; PI: Oľga Pecháňová  
 Magnesium Nanocomposites for Biodegradable Medical Implants – Interacademic agreement; PI: Oľga Pecháňová  
 BIOMEDIRES - Center for Biomedical Research - European structural and investment funds; PI: Oľga Pecháňová  
 BIOVID 19 - Development of biomodels to improve the efficiency of drugs and substances that have potential to treat COVID-19 - European structural and investment funds; PI: Oľga Pecháňová  
 COST Action CA16225 EU CARDIOPROTECT – Pan-European consortium aimed at scientific research in the field of cardioprotection. Members of the Management Committee (MC) from Slovakia: T. Ravingerova, M. Bartekova  
 COST Action CA17129 EU CardioRNA – Pan-European consortium aimed at catalysing transcriptomic research in the field of cardiovascular diseases and cardioprotection. Management Committee (MC) member from Slovakia: M. Bartekova

*Other significant activities of the SAS organization:*

NO Club - The NO Club contributes to the association of scientists whose research is focused on the signaling and regulatory role of nitric oxide.

Pathophysiology - the official journal of the International Pathophysiological Society, whose president is currently Dr. Pechanova (she has contributed to a significant improvement in the quality of this journal and since 2020 it is included in MDPI as an international "open" access "journal)

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

1. Joint Meeting of the Slovak and Serbian National Physiological Societies, Smolenice, 80 participants, 15.05.-18.05.2016 main organizer: Oľga Pecháňová
2. The 9th International Symposium NITRIC OXIDE: FROM BASIC REGULATIONS TO LIFESTYLE-RELATED DISEASES, Croatia, Vrsar, 30 participants, 13.09.-16.09.2016, organiser: I. Bernátová
3. 25th C.I.A.N.S. 2016., Bratislava, 80 participants, 21.09.-23.09.2016
4. Committee of Experimental Cardiology: 400 Years of Cardiovascular Research - Tribute to W.Harvey, KC Academia, Stará Lesná, 80 participants, 17.10.-19.10.2016, organiser: I. Bernátová
5. 21<sup>st</sup> Interdisciplinary Toxicological Conference TOXCON 2016, June 22-24, 2016, Stara Lesna, High Tatras, Slovak Republic
6. 5th international conference: Molecular hydrogen medicine of 21th century. Ostrava, Czech republic, 27.05.-27.05.2017, 150 participants, organizer: Ján Slezák
7. Heart, brain, blood vessels: from normal to pathological physiology, KC Smolenice, 60 participants, 04.04.-06.04.2017 main organizer: Soňa Čačányiová

8. EUROTOX 2017 - 53<sup>rd</sup> Congress of the European Societies of Toxicology, September 10-13, 2017, Bratislava, Slovak National Theater, Slovak Republic
9. 5th European Section meeting of the International Academy of Cardiovascular Sciences (IACS-ES) "Advances in Cardiovascular Research – from basic mechanisms to therapeutic strategies", Smolenice, 113 participants, 23.05.-26.05.2018; main organizer: Ján Slezák
10. The 10th International Symposium NITRIC OXIDE: FROM BASIC REGULATIONS TO LIFESTYLE-RELATED DISEASES, Smolenice, 45 participants, 03.09.-05.09.2018, organiser: I. Bernátová
11. 8th International Congress of Pathophysiology, Bratislava, 220 participants, 05.09.-08.09.2018 president: Oľga Pecháňová
12. 8th International Posture Symposium, Congress Center Smolenice SAS, 60 participants, 09.09.-12.09.2018
13. 13th Conference "New Frontiers in Basic Cardiovascular Research", Prague, 100 participants, 21.11.-24.11.2018
14. 23<sup>rd</sup> Interdisciplinary Toxicological Conference TOXCON 2018, June 20-22, 2018, Stara Lesna, High Tatras, Slovak Republic
15. 24<sup>th</sup> Interdisciplinary Toxicological Conference TOXCON 2019, June 26-28, 2019, Vyhne, Slovak Republic
16. Symposium of Clinical and Experimental Neonatology, Bratislava, 20 participants, 13.04.-14.04.2019
17. 47th Conference of the Committee of Experimental Cardiology, Slovak Republic, Senec, 50 participants, 07.10.-09.10.2019
18. Metabolic syndrome - cardiovascular and metabolic risks, Bratislava, 40 participants, 13.11. – 14.11.2019, main organizer: Soňa Čačányiová
19. JMMC 2019 - 11th Joint Meeting on Medicinal Chemistry 2019 : June 27-30, 2019, Prague, Czech Republic. - Prague
20. TOXCON 2020, Prague, online 100 participants
21. TOXCON 2021 - 26th Interdisciplinary Toxicology Conference, ACADEMIA Congress Center, Stará Lesná, 70 participants, 15.09.-17.09.2021
22. The 24th meeting of the European Council for Cardiovascular Research (ECCR) 130 participants, 08.10.-09.10.2021 executive committee member - Martina Cebová
23. International Congress of the International Society for Pathophysiology (30th anniversary), 70 participants, 29.11.- 30.11.2021 main organizer: Oľga Pecháňová

### 2.3.3. List of edited proceedings from international scientific conferences

2nd Joint Meeting of Slovak and Serbian Physiological Societies "Physiology without Frontiers", May 15-18, 2016, Smolenice : book of abstracts. Edited by T. Ravingerová, O. Pecháňová and V. Farkašová. Bratislava : Institute of Normal and Pathological Physiology, SAS, 2016. 70 s. ISBN 978-80-971699-3-0

TOXCON 2016 : 21st Interdisciplinary toxicological conference. Programme & abstracts. Editors: Michal Dubovický, Mojmir Mach. ISSN 1337-6853

Srdce, mozog, cievy: od normálnej k patologickej fyziológii : zborník abstraktov, Smolenice, 4.-6. apríl 2017. Bratislava : Ústav normálnej a patologickej fyziológie SAV, 2017. 68 s. ISBN 978-80-971699-7-8

TOXCON 2017 : 22nd Interdisciplinary toxicological conference. Programme & abstracts. Editors: Michal Dubovický, Mojmir Mach. ISSN 1337-6853

FD 2017 : the 67th Czech and Slovak Pharmacological Days. Programme & abstracts. Editors: Michal Dubovický, Mojmir Mach. ISSN 1337-6853

5th European Section meeting of the International Academy of Cardiovascular Sciences (IACS-ES) : Advances in Cardiovascular Research: From basic mechanisms to therapeutic strategies, May 23-26, 2018, Smolenice. Program and Book of Abstracts. Editori: T. Ravingerová, V. Farkašová, J. Slezák. Bratislava : VEDA, 2018. 111 s. ISBN 978-80-224-1649-8

TOXCON 2018 : 23rd Interdisciplinary Toxicological Conference. The High Tatras Slovakia, Stará Lesná, June 20-22, 2018. Programme & Abstracts. Abstract Book. Editor: Mojmir Mach. ISSN 1337-6853

Abstracts of the 8th International Posture Symposium : Smolenice, September 9-12, 2018. Editors: František Hlavačka, Jana Kimijanová. Bratislava : Institute of Normal and Pathological Physiology CEM SAV, 2018. 132 p. ISBN 978-80-89991-00-6

Abstracts of the 8th International Congress of Pathophysiology : 5-8 September, 2018, Bratislava, Slovakia. Editor: Olga Pechanova. Bratislava : Ústav normálnej a patologickej fyziológie SAV, CEM, 2018. 160 p. heslo k pdf súboru: ICPBratislava. ISBN 978-80-89991-02-0

30th Anniversary of the ISP : eBook of Abstracts. Edited by Olga Pechanova. Bratislava : Centre of Experimental Medicine Slovak Academy of Sciences, 2021. 43 p. Available at: <<https://savba.savba.sk/service/home/~/?auth=co&loc=sk&id=37573&part=3>>. ISBN 978-80-89991-07-5

Nitric Oxide: From Basic Regulations to Lifestyle-Related Diseases : Book of Abstracts. The 9th International Symposium, Vrsar, Croatia, September 13-16, 2016. Editor Iveta Bernátová, reviewers Tatiana Ravingerová, Ingrid Žitňanová. Bratislava : Institute of Normal and Pathological Physiology, SAS, 2016. 36 p. ISBN 978-80-971699-5-4

44. konferencia Komisie experimentálnej kardiológie: 400 rokov kardiovaskulárneho výskumu - pocta W. Harveymu. : Zborník abstraktov [elektronický zdroj]. Editori: Peter Bališ, Iveta Bernátová, Angelika Púzserová. Bratislava : Ústav normálnej a patologickej fyziológie SAV, 2016. 48 s.

Available at: <<http://www.is.muni.cz/publication/1368477/KEK2016-abstrakta.pdf>>. ISBN 978-80-971699-6-1

47. pracovná konferencia Komisie Experimentálnej Kardiológie. Kardioprotekcia: od buniek a proteínov až po celý organizmus. Senec, október 7-9, 2019, SR : Zborník abstraktov. Ústav pre výskum srdca CEM SAV : Občianske združenie Preveda, 2019. 31 s. ISBN 978-80-972360-5-2

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

Journal/Source title	INTERDISCIPLINARY TOXICOLOGY												
Published since (year)	2008		Periodicity	4/year		Peer-reviewed y/n	y						
ISSN/e-ISSN	1337-6853/1337-9569 eISSN												
Official publisher	Institute of Experimental Pharmacology of Slovak Academy of Sciences, Slovak Toxicology Society SETOX, (SCIENDO)												
Website	<a href="https://sciendo.com/journal/INTOX">https://sciendo.com/journal/INTOX</a>												
	number of issues	CCC	WoS CC	JIF (JCR)	IF best Q (JCR)	Scopus	Scopus CiteScore	SJR (metric)	SJR best Q (Scimago JR)	Nordic List Level	open acces (for reading)	CC License	DOAJ
		y/n	y/n			y/n					y/n		y/n
2016	4	n	n	-	-	y	2,7	0,409	Q3	-	y	BY NC ND	y
2017	4	n	n	-	-	y	2,9	0,58	Q3	1	y	BY NC ND	y
2018	4	n	n	-	-	y	2	0,274	Q3	1	y	BY NC ND	y
2019	4	n	n	-	-	y	1,9	0,337	Q3	1	y	BY NC ND	y
2020	4	n	n	-	-	y	1,9	0,297	Q3	1	y	BY NC ND	y
2021	4	n	n	-	-	?	až v júni	0,43	Q3	1	y	BY NC ND	y
Other indexing (databases)	Baidu Scholar, Cabell's Whitelist, CABI (over 50 subsections), Case, Chemical Abstracts Service (CAS) - CAPlus, Chemical Abstracts Service (CAS) - SciFinder, CNKI Scholar (China National Knowledge Infrastructure), CNPIEC - cnpLINKer, Dimensions, EBSCO (relevant databases), EBSCO Discovery Service, FSTA - Food Science & Technology Abstracts, Genamics JournalSeek, Google Scholar, ICAP Alcohol Information Databases, Japan Science and Technology Agency (JST), J-Gate, JournalGuide, JournalTOCs, KESLI-NDSL (Korean National Discovery for Science Leaders), Meta, Microsoft Academic, MyScienceWork, Naver Academic, Naviga (Softweco), Norwegian Register for Scientific Journals, Series and Publishers, Primo Central (ExLibris), ProQuest (relevant databases), Publons, PubMed, PubMed Central, QOAM (Quality Open Access Market), ReadCube, Reaxys, Semantic Scholar, Sherpa/RoMEO, Summon (ProQuest), TDNet, Ulrich's Periodicals Directory/ulrichsweb, WanFang Data, WorldCat (OCLC)												
Journal/Source title	ACTIVITAS NERVOSEA SUPERIOR REDIVIVA												
Published since (year)	2009		Periodicity	4/y		Peer-reviewed y/n	y						
ISSN/e-ISSN	1337-933X/1338-4015 (online)												
Official publisher	Institute of Normal and Pathological Physiology, SAS and St. Elisabeth University College of Health and Social Work/Maghira & Maas Publications												
Website	<a href="http://www.rediviva.sav.sk/">http://www.rediviva.sav.sk/</a>												
	number of issues	CCC	WoS CC	JIF (JCR)	IF best Q (JCR)	Scopus	Scopus CiteScore	SJR (metric)	SJR best Q (Scimago JR)	Nordic List Level	open acces (for reading)	CC License	DOAJ

	y/n	y/n			y/n					y/n		y/n
2016	n	y	-	-	y	0,8	0,265	Q4		-	y	n
2017	n	y	-	-	y	0,8	0,129	Q4		-	y	n
2018	n	y	-	-	y	0,7	0,111	Q4		-	y	n
2019	n	y	-	-	y	0,5	0,145	Q4		-	y	n
2020	n	y	-	-	y	0,6	0,128	Q4		-	y	n
2021	n	y	-	-	y	až v júni	0,112	Q4		-	y	n
Other indexing (databases)	Index Copernicus, EMBASE											

- **National position of the institute**

### 2.3.5. List of selected activities of national importance

Membership in advisory boards of the National Council of the Slovak Republic, the Government of the Slovak Republic, ministries of the Slovak Republic:

- Dr. Oľga Pecháňová is a member of the Working group of the The Ministry of Education, Science, Research and Sport of the Slovak Republic (MESRS SR) for Biomedicine and Biotechnology RIS3

Membership in committees for evaluation of national projects of Scientific Grant Agency of The Ministry of Education, Science, Research and Sport of the Slovak Republic:

- Committee no. 3 for Chemical Sciences, Chemical Engineering and Biotechnology (Milan Štefek, Helena Kandárová)
- Committee no. 4 for Biological Sciences (Iveta Bernátová, Soňa Čáčányiová)
- Committee no. 9 for Medical and Pharmaceutical Sciences (Radomír Nosál, Igor Riečanský, Oľga Pecháňová, Táňa Ravingerová, Monika Barteková, Narcisa Tribulová, Mojmír Mach, Katarína Bauerová)

Membership in the Committee of the Slovak Physiological Society (Soňa Čáčányiová, Oľga Pecháňová, Táňa Ravingerová)

Chairman of the Supervisory Board of the Slovak Physiological Society (Jozef Török)

President and scientific secretary of the Slovak Society for Higher Brain Functions (Fedor Jagla, Igor Riečanský)

Topic coordinator of Open Academy (Oľga Pecháňová)

Membership in the Committee of the Section of Biological Psychiatry of the Slovak Psychiatric Association (Igor Riečanský)

Membership in the Committee of the Slovak Society for Neurosciences (Igor Riečanský)

Membership in the Committee of the Slovak Society of Pathological and Clinical Physiology (Jozef Török)

Membership in the Committee of the Czechoslovak Society of Arts and Sciences (Peter Bališ, Ima Dovinová, Valéria Regecová)

Membership in the Committee of the Slovak Society for Biochemistry and Molecular Biology (Miroslav Barančík)

President of the Slovak Toxicology Society SETOX (Michal Dubovický)

Member of the Executive Board of the Slovak Toxicology Society SETOX (Helena Kandárová, Mojmír Mach)

Member of the National expert group on alternative methods at the Ministry of Agriculture and Rural Development of Slovak republic (Helena Kandárová)

Member of the Technical Committee 102 / Medical devices at the Institute for Standardisation and Normalisation of Slovak republic - (Helena Kandárová)

Scientific and popularization activities:

"March for Science Slovakia" (14.4. 2018, Bratislava) and "Weekend with SAS"(21.- 22.6. 2019, Bratislava)

- the ability to measure blood pressure in volunteers
- the possibility to see vascular pathology in a microscope

"European Researchers' Night in Bratislava" - event that takes place annually:

- blood pressure measurements, glucose level and body fat measurements in volunteers
- the possibility to see vascular pathology in a microscope
- the possibility to take a quiz about the cardiovascular system and to try out virtual reality

Working Group of Experimental Cardiology:

Slovak Society of Cardiology consists of 16 working groups; almost all of them are preferentially oriented to clinical research and clinical practice. Recently (19.9.2018), a new one has been established, Working Group of Experimental Cardiology where the first chairman until 2021 was doc. MUDr. Jozef Török, CSc. (INPP CEM SAS). Since 2021, the chairman is Ing. Miroslav Ferko, PhD. (ICR CEM SAS), Scientific Secretary RNDr. Peter Balis, PhD. (INPP CEM SAS) and the members of the committee are Mgr. Andrea Berényiová, PhD. (INPP CEM SAS) a MUDr. RNDr. Ľudovít Paulis, PhD. MPH. (INPP CEM SAS). This group was created from the initiative of young research workers from institutes associated in the Center of Experimental Medicine. The main mission of the Working Group is to integrate the issue and results of basic research into a broader context of cardiological practice. The presented concept includes the orientation of basic research in accordance with current issues of clinical cardiology, on the other hand it includes the mediation of basic research results for the needs of clinical study design and their application in clinical practice as well. The concrete outputs originating from the link between the basic research and clinic include joint projects, collaborations, conferences, symposia, seminars, training for undergraduates and postgraduates students.

Cooperation with clinics:

Cooperation with the Endocrinology Outpatient Clinic of UNsP Milosrdní bratia, spol. s.r.o in Bratislava: Dr. A. Puzserova (INPP CEM SAS) analysed selected biochemical and hemodynamic parameters after the treatment procedures, as well as the occurrence in patients with primary hyperparathyroidism and subacute thyroiditis.

Cooperation with the Department of Endocrinology, National Institute of Endocrinology and Diabetology in Ľubochňa: Dr. A. Puzserova (INPP CEM SAS) compared the incidence of hypertension and diabetes mellitus as well as the effect of treatment in patients with central and peripheral Cushing's syndrome.

Cooperation with the Department of Internal Medicine with JIS-metabolic Hospital Poprad, s.r.o in Poprad: Dr. P. Bališ investigated the effect of antiplatelet and anticoagulant treatment on the gastrointestinal tract and the current position of noak at present; incidence of infections in patients with liver cirrhosis and viral hepatitis E in the Slovak population.

Cooperation with L. Dérer's Hospital - scientific cooperation between Department of Urology and our Department of Vascular Disorders enables research of selected physiological mechanisms and biochemical parameters on samples of human material, vessels isolated after surgical procedures (nephrectomy) in normotensive, hypertensive, and diabetic patients.

Cooperation with The National Institute for Cardiovascular Diseases – scientific cooperation focused on the determination of adequate predictive markers of atrial fibrillations. Coordinator from IHR CEM SAS – Dr. N. Tribulová).



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

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

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

**2021**

BARTEKOVÁ, Monika. Targeting Myocardial Ischemia-Reperfusion Injury with Flavonoid Quercetin: Impact of Age and Selected Comorbidities. 7th Meeting of the European Section and 8th Meeting of the North American Section of the International Academy of Cardiovascular Sciences (IACS), Banja Luka 20-23 September 2021.

PECHÁŇOVÁ, Oľga. Hypertension and obesity: Targeted therapy vs. natural polyphenolic substances. Pathophysiology at the Heart of Medicine. International meeting organized by Victor Babes University in Timisoara on line. December 9-10, 2021.

PECHÁŇOVÁ, Oľga. Beneficial Effects of Cornelian Cherry polyphenols on NO/ROS balance in Obese Zucker Rats. 15th World Congress on Polyphenols Applications 2022 on line. September 28-30, 2022.

PECHÁŇOVÁ, Oľga. Natural polyphenols and body reactivity and sanogenesis. 2nd Dubrovnik Cutting Edge School of Integrative Pathophysiology. Dubrovnik, Croatia, September 26-30, 2021.

RAVINGEROVÁ, Táňa. Non-Invasive "Conditioning": Potential Mechanisms of Antiischemic Cardioprotection. 7th Meeting of the European Section and 8th Meeting of the North American Section of the International Academy of Cardiovascular Sciences (IACS), Banja Luka 20-23 September 2021.

SLEZÁK, Ján. Molecular Hydrogen: Potential in Mitigating Oxidative-Stress-Induced Injury. 7th Meeting of the European Section and 8th Meeting of the North American Section of the International Academy of Cardiovascular Sciences (IACS), Banja Luka 20-23 September 2021.

**2020**

BERNÁTOVÁ, Iveta - Dlhodobý efekt (-)-epikatechínu na krvný tlak hranične hypertenzného potkana: mechanizmy účinku. 96. Fyziologické dni, 4. -6. február 2020, Martin.

KANĎÁROVÁ, Helena. Medical Devices Biocompatibility In Vitro - Are we there yet?: In Advances in Cell & Tissue Culture, ACTC 2020, 30th September - 1st October 2020, Cardiff, Wales. - Kirkstall Ltd., 2020, p. 12. (Advances in Cell and Tissue Culture 2020: annual conference - virtual).

KANĎÁROVÁ, Helena. Alternative methods in modern toxicology. In The Online Conference with international participation: Alternatives to animal experiments in biology, medicine, toxicology. September 24-25, 2020, Minsk, Belarus: online konference [elektronický zdroj]. - Minsk, Belarus: Belmapo.by, 2020. (Alternatives to animal experiments in biology, medicine, toxicology: The Online Conference with international participation).

KANĎÁROVÁ, Helena. Alternative methods in 21st century – opportunities, challenges and hopes:. In R2N Science Camp. January 20-22, 2020, Braunlage, Germany. Meeting Report in Altex, vol. 37, no. 2 (2020), 315-316. (R2N Science Camp).

KANĎÁROVÁ, Helena. In Vitro Skin Irritation Testing of Medical Devices – Concepts, Validation, Implementation: In Eurofins Medical Device Seminar 2020. Munich, Germany. 21. - 22. October 2020, event online. Available at: (Eurofins Medical Device Seminar 2020).

KANĎÁROVÁ, Helena. Alternative methods and OECD testing guidelines: In ESTIV Applied In Vitro Toxicology Training Course. Advanced Toxicology Training Course. 25-30 October 2020, Brussels. - Brussels : ESTIV, BelTox, UCLouvain, 2020, virtual event. Available at: (ESTIV Applied In Vitro Toxicology Training Course: Advanced Toxicology Training Course).

KANĎÁROVÁ, Helena. In vitro methods for skin irritation and corrosion testing: In ESTIV Applied In Vitro Toxicology Training Course. Advanced Toxicology Training Course. 25-30 October 2020, Brussels. - Brussels: ESTIV, BelTox, UCLouvain, 2020, virtual event. Available at: (ESTIV Applied In Vitro Toxicology Training Course : Advanced Toxicology Training Course).

KANĎÁROVÁ, Helena. Alternative Methods and 3D tissue models : In ToxGurukul Foundation. Representing Indian Toxicology Community. Webinars. 07.11.2020, India. - Kothrud, Pune, India: ToxGurukul, 2020, #05/2020. Available at: (ToxGurukul Foundation - webinar).

KANĎÁROVÁ, Helena. In Vitro Phototoxicity Testing of Food Supplements and Cosmetics: In LE STUDIUM WORKSHOP. Exploring the molecular diversity of grape, a source of natural ingredients. Virtual meeting. 3 December 2020, Tours, France: abstracts. - Orléans, France: Le Studium, Loire Valley, Institute for Advanced Studies, 2020, p. 16. Available at: (LE STUDIUM WORKSHOP: Exploring the molecular diversity of grape, a source of natural ingredients).

KANĎÁROVÁ, Helena. Reconstructed human 3D skin models for in vitro topical toxicity testing: In Virtual Summer School 2020 Lake Como School. Alternative methods and models in Science: a multidisciplinary in vitro approach. 3-4 June 2020. Dostupné na internete: (Lake Como School of Advanced Studies - Virtual Summer School 2020 : Alternative methods and models in Science: a multidisciplinary in vitro approach).

PECHÁŇOVÁ, OLGA. Advances in cardiovascular research. Workshop of 30th Anniversary Symposium of the European Academy of Sciences and Arts, Salzburg, Austria, March 6-7, 2020.

## **2019**

BARTEKOVÁ, Monika - FERENCZYOVÁ, Kristína - KALOČAYOVÁ, Barbora - KINDERNAY, Lucia - TRIBULOVÁ, Narcisa - OKRUHLICOVÁ, Ľudmila - DOVINOVÁ, Ima - RAVINGEROVÁ, Táňa - BARANČÍK, Miroslav. Quercetin as potential cardioprotective agent in I/R injury: role of selected comorbidities and comedications. 6th Meeting of European Section and 7th Meeting of North American Section of the International Academy of Cardiovascular Sciences (IACS): "Cardiometabolic Diseases: How New Research May Lead to New Cardioprotective Therapy". September 11th-14th, 2019, Vrnjacka Banja, Serbia.

HLAVAČKA, František - BZDÚŠKOVÁ, Diana - HIRJAKOVÁ, Zuzana - KIMIJANOVÁ, Jana - MOKOŠÁKOVÁ, Miroslava - CHLEBO, Ondrej. Body sway during upright and sitting posture used in biofeedback for postural test and rehabilitation. 4th International Conference on Movement Analysis, May 30-31, 2019, Kladno, Czech Republic.

KALOČAYOVÁ, Barbora. Realising the therapeutic potential of novel cardioprotective therapies. 3rd COST Action CardioRNA MC and WG Meeting, School of Medicine, University of Yei-tepe, Mavi (Blue) Conference, Yerleşimi, Ataşehir, 16.-18.10.2019, Istanbul, Turkey.

PECHÁŇOVÁ Oľga: Novel bioactive products acting on nitric oxide pathway and therapoetic potential in cardiovascular system. *25th National Meeting of Pharmacology, Kuşadası, Turkey, November 4-7, 2019*

PECHÁŇOVÁ Oľga: Polyphenol-rich red wine extract: From gentle preparation to biomedical analysis. 3. Slovensko - *Srbská konferencia národných fyziologických spoločností. Topola, Srbsko, Jún 20.-23, 2019*

PECHÁŇOVÁ Oľga: Novel tools affecting NO signaling in metabolic syndrome. *11th National Conference of Pathophysiology with International Participation. Tirgu Mures, Rumunsko, September 4.-6.9.2019*

RAVINGEROVÁ, Táňa. Exercise as a form of remote preconditioning of the heart. Preventive efficiency and clinical applicability. 6th Meeting of European Section and 7th Meeting of North American Section of the International Academy of Cardiovascular Sciences (IACS): "Cardiometabolic Diseases: How New Research May Lead to New Cardioprotective Therapy". September 11th-14th, 2019, Vrnjacka Banja, Serbia.

RIEČANSKÝ, Igor. Oxid dusnatý v patogenéze psychických porúch. 18. celostátní KONFERENCE BIOLOGICKÉ PSYCHIATRIE s mezinárodní účastí, Luhačovice 12.–15. června 2019, Česká republika.

ŠOLTÉSOVÁ PRNOVÁ, Marta: Cemtirestat Attenuates Neurological Disorders in Rat Models of Type I and Type II Diabetes: A Behavioral Study. *25th National Meeting of Pharmacology, Kuşadası Turkey, November 4-7, 2019*

ŠTEFEK, Milan: Cemtirestat, a Novel Aldose Reductase Inhibitor Based on Carboxymethylated Mercapto-Triazino-Indole Scaffold: Drug Design and Biological Activity. *25th National Meeting of Pharmacology, Kuşadası, Turkey, November 4-7, 2019*

ŠTEFEK, Milan: In Silico Medicinal Chemistry Approaches to Drug Design, *25th National Meeting of Pharmacology, Kuşadası, Turkey, November 4-7, 2019*

FRIMMEL, Karel . Protection of endothelial intercellular junctions in cardiovascular system by natural substances (omega-3 fatty acids, carotenoids) during pathophysiological conditions. Universitatea de Medicina si Farmacie V. Babes, Dept. Pathophysiology, Timisoara, Rumunsko, April 5, 2019.

OKRUHLICOVÁ, Ľudmila. Bacterial endotoxinrelated alterations of intercellular junctions in endothelium of cardiovascular system under pathophysiological conditions. Universitatea de Medicina si Farmacie V. Babes, Dept. Pathophysiology, Timisoara, Rumunsko, April 5, 2019.

## **2018**

BARTEKOVÁ, Monika. The role of quercetin in cardioprotection against ischemia-reperfusion injury: impact of age and co-medication with doxorubicin. EU-CARDIOPROTECTION COST Action Working Group Meeting, Oct 8-10 2018, Santorini, Greece.

CEBOVÁ, Martina - KNOWLES Catherine J. - PREDA Marilena L - VARY Calvin P.H. - PINZ Ilka M. The effect of palmitate exposure in utero on systolic and vascular function in mice. 8th International Congress of Pathophysiology, 5-8 September 2018, Bratislava, Slovakia.

DOVINOVÁ, Ima - BARANČÍK, Miroslav - KVANDOVÁ, Miroslava - MAJZÚNOVÁ,

Miroslava - HRABÁROVÁ, Eva - JANSEN, Eugene - MEINITZER, Andreas - ČAČÁNYIOVÁ, Soňa. Aberrant redox regulation and development of risk markers in cardiovascular diseases. 8th International Congress of Pathophysiology, 5-8 September 2018, Bratislava, Slovakia.

JAGLA, Fedor. Electrophysiological correlates (EOG, EEG, EMG) of human executive functioning. 4th Congress of Physiological Sciences of Serbia with International Participation, September 19-23, 2018, University of Nis, Republic of Serbia.

PAULIS, Ľudovít. Means for experimental and clinical RAAS profile modulation. 8th International Congress of Pathophysiology, 5-8 September 2018, Bratislava, Slovakia.

PECHÁŇOVÁ, Oľga - CEBOVÁ, Martina - REHÁKOVÁ, Radoslava - KOŠÚTOVÁ, Michaela - BARTA, Andrej. Nitric oxide-dependent signaling pathways in experimental metabolic syndrome. 4th Congress of Physiological Sciences of Serbia with International Participation, September 19-23, 2018, University of Nis, Republic of Serbia.

PECHÁŇOVÁ, Oľga. Effects of polyphenolic compound and statin therapy in experimental metabolic syndrome. The 30th Conference of physiology: Integrative physiology – From fundamental mechanisms to biomedical application, September 27-29, 2018, Cluj-Napoca, Romania

PECHÁŇOVÁ, Oľga - CEBOVÁ, Martina - REHÁKOVÁ, Radoslava - KOŠÚTOVÁ, Michaela - BARTA, Andrej. Experimental metabolic syndrome: standard and alternative therapies. 8th International Congress of Pathophysiology, 5-8 September 2018, Bratislava, Slovakia.

PÚZSEROVÁ, Angelika - ZEMANČÍKOVÁ, Anna - BALIŠ, Peter - BERÉNYIOVÁ, Andrea - RADOŠINSKÁ, Jana - BERNÁTOVÁ, Iveta - KLUKNAVSKÝ, Michal - ČAČÁNYIOVÁ, Soňa - KVANDOVÁ, Miroslava - TÖRÖK, Jozef. Endothelial aging in spontaneously hypertensive rats. 8th International Congress of Pathophysiology, 5-8 September 2018, Bratislava, Slovakia.

RIEČANSKÝ, Igor. Sensorimotor processes in empathy. 12th Middle European Interdisciplinary Conference in Cognitive Science 2018 (MEi: CogSci Conference), 14 - 16 June, 2018, Bratislava.

RIEČANSKÝ, Igor. An emerging role of nitric oxide in schizophrenia. 8th International Congress of Pathophysiology, 5-8 September 2018, Bratislava, Slovakia.

KALOČAYOVÁ, Barbora. Development a cell based comorbidity model for cardioprotection. EU-CARDIOPROTECTION COST Action Working Group Meeting, Oct 8-10 2018, Santorini, Greece.

MÁJEKOVÁ, Magdaléna - ŠTEFEK, Milan - ŠOLTÉSOVÁ PRNOVÁ, Marta - KOVÁČIKOVÁ, Lucia - BALLEKOVÁ, Jana. Ligand-based drug design considering specific features of aldose reductase. 8th Regional Biophysics Conference (RBC 2018), Slovenia Zreče : Slovenian Biophysical Society, s05-CL-03, session: Computational biophysics. Contributing lecture. <http://www.rbc2018.si/programme.html>

RAVINGEROVÁ, Táňa. The impact of comorbidities/confounders on cardioprotection afforded by “conditioning” of the heart. R30 Conference, St. Boniface Research Centre, University of Manitoba, Canada.

RAVINGEROVÁ, Táňa. Dual role of hyperosmolarity in non-preconditioned and preconditioned hearts: relevance to failure of IPC to induce cardioprotection in the diabetic heart. EU-CARDIOPROTECTION COST Action Working Group Meeting, Oct 8-10 2018, Santorini, Greece.

SLEZÁK, Ján – GVOZDJÁKOVÁ, Anna – KURA, Branislav. The role of molecular hydrogen treatment in adaptation of the heart to oxidative stress. International conference for adaptations and nutrition in sports ICANS. 17. – 20. júl 2018, Chonburi, Thailand.

SLEZÁK, Ján – GVOZDJÁKOVÁ, Anna – SINGAL, Pawan K. – BARANČÍK, Miroslav – KURA, Branislav. Therapeutic potentials of molecular hydrogen (H<sub>2</sub>) through Nfr2 pathway in mitigating oxidative stress induced cardiotoxicity. The 5th conference of Chinese hydrogen biomedical association of CPAM & congress of international society for hydrogen medicine and hydrogen biology. 12. - 14. október 2018, Beijing, China.

SLEZÁK, Ján – KURA, Branislav. Vplyv použitia vodíka na srdcové mitochondrie. 6. mezinárodná konferencia vodíkové lekárství pro výzkum a praxi ve 21. století. 2. jún 2018, Ostrava, Česká republika.

SLEZÁK, Ján – GVOZDJÁKOVÁ, Anna – KURA, Branislav – BARANČÍK, Miroslav. Possible mechanisms of action of molecular hydrogen as a new therapeutic agent against oxidative stress conditions: scavenger of hydroxyl radicals, innate antioxidants mediator, or promoter of ATP production? 4th congress of physiological sciences of serbia with international participation: Current trends in physiological sciences: from cell signals to the biology of aging. 19. – 23. september, 2018, Nis, Srbsko.

ŠTEFEK, Milan - KARASU, Çimen - BEZEK, Štefan - KOVÁČIKOVÁ, Lucia - MÁJEKOVÁ, Magdaléna - ŠOLTÉSOVÁ PRNOVÁ, Marta - ŠVÍK, Karol. Novel aldose reductase inhibitors based on carboxymethylated mercapto-triazino-indole scaffold: drug design and biological activity. 1st International Balkan Chemistry Congress. IBCC-2018, 17-20 September 2018, Edirne, Turkiye. Edirne : Trakya Universitesi.

## 2017

BERNÁTOVÁ, Iveta - PÚZSEROVÁ, Angelika. Beneficial cardiovascular effects of (-)-epicatechin-containing foods. BIOTECH 2017 and 7th Czech-Swiss Symposium with Exhibition, June 13-17, 2017, Prague, Czech Republic.

BERNÁTOVÁ, Iveta - PÚZSEROVÁ, Angelika - BALIŠ, Peter - KLUKNAVSKÝ, Michal - RADOŠINSKÁ, Jana - REGECOVÁ, Valéria - BERÉNYIOVÁ, Andrea - DROBNÁ, Magdaléna - JURKOVIČOVÁ, J. - BABJAKOVÁ, J. - FRIMMEL, Karel - HORVÁTHOVÁ, M. - MUCHOVÁ, Jana - VIDOŠOVIČOVÁ, Mária - LUKÁČ, Štefan. Beneficial effects of (-)-epicatechin and dark chocolate in rats and humans. Sympóziu „Srdce, mozog, cievy: od normálnej k patologickej fyziológii“, Smolenice, 4.-6. apríl 2017.

ČAČANYIOVÁ, Soňa - TÖRÖK, Jozef - KRISTEK, František - BERÉNYIOVÁ, Andrea - BUCHWALOW, I.B. - DOVINOVÁ, Ima - DROBNÁ, Magdaléna. NO - rezervné a kompenzačné mechanizmy vo vazoaktívnych odpovediach normotenzných a spontánne hypertenzných potkanov. Sympóziu „Srdce, mozog, cievy: od normálnej k patologickej fyziológii“, Smolenice, 4.-6. apríl 2017.

DOVINOVÁ, Ima - KVANDOVÁ, Miroslava - MAJZÚNOVÁ, Miroslava - BARTKOVÁ, K. - BARANČÍK, Miroslav. The role of nuclear transcription factors PPAR gamma and NRF2 in

pathophysiology of hypertension. In XXIX. Xenobiochemické symposium, 24. - 26.5. 2017, Telč, Česká republika.

HLAVAČKA, František. Posturálne reakcie pri náklone opornej plochy. II mezinárodná konferencia ANALÝZA POHYBU v Česku a na Slovensku. Fakulta telesnej kultúry Univerzity Palackého v Olomouci, 31.5. 2017, Česká republika.

HLAVAČKA, František - BZDÚŠKOVÁ, Diana - HIRJAKOVÁ, Zuzana - KIMIJANOVÁ, Jana. Posturálne odpovede na senzorickú stimuláciu - využitie pri objektivizácii a rehabilitácii porúch postoja. Sympóziu „Srdce, mozog, cievy: od normálnej k patologickej fyziológii“, Smolenice, 4.-6. apríl 2017.

KELLEROVÁ, Eva. Kardiovaskulárne reakcie na bežné sympatergné podnety u človeka. Sympóziu „Srdce, mozog, cievy: od normálnej k patologickej fyziológii“, Smolenice, 4.-6. apríl 2017.

KRISTEK, František - DROBNÁ, Magdaléna - CEBOVÁ, Martina - TÖRÖK, Jozef - ČAČÁNYIOVÁ, Soňa - GEROVÁ, Mária. Štrukturálne a funkčné zmeny v prírodných artériách u NO-deficitných a spontánne hypertenzných potkanov po chronickom podávaní vazoaktívnych látok. Sympóziu „Srdce, mozog, cievy: od normálnej k patologickej fyziológii“, Smolenice, 4.-6. apríl 2017.

PECHÁŇOVÁ, Oľga. Impact of melatonin on blood pressure regulation: Focused on nitric oxide. Romanian Pathophysiology Society Conference, Cluj-Napoca, Romania, September 7-9, 2017.

PECHÁŇOVÁ, Oľga. Food Nutrition - dietary sources of different polyphenols. 6th International Conference on Innovations in Chemical, Biological, Agricultural and Environmental Engineering, Bangkok, Thailand, May 3-4, 2017.

RIEČANSKÝ I. Zdieľané mozgové aktivácie a sociálna kognícia, Kognícia a umelý život, 31.5.-2.6.2017, Trenčianske Teplice, Slovakia.

RIEČANSKÝ I. Nitric oxide in the pathogenesis of schizophrenia, 17th Czech-Slovak Congress of Psychiatry, 19.-21.10.2017, Bratislava, Slovakia.

RIEČANSKÝ, Igor. Zdieľaná sensorimotorická aktivácia. Sympóziu „Srdce, mozog, cievy: od normálnej k patologickej fyziológii“, Smolenice, 4.-6. apríl 2017.

BARTEKOVÁ, Monika - FERENCZYOVÁ, Kristína - FOGARASSYOVÁ, Mária - RADOŠINSKÁ, Jana - TRIBULOVÁ, Narcisa - OKRUHLICOVÁ, Ľudmila - DOVINOVÁ, Ima - RAVINGEROVÁ, Táňa - BARANČÍK, Miroslav. Beneficial effects of quercetin in the heart exposed to different stress situations. Konferencia: IV. European Section Meeting of IACS, September 28-30, 2017, Pécs, Hungary.

KURA, Branislav - SUROVÝ, Juraj - BUDAY, Jozef - SLEZÁK, Ján. The effect of molecular hydrogen on miRNAs expression in the rat myocardium affected by irradiation. In The Molecular Hydrogen: 10th Year Anniversary Conference, 15. september 2017, Guangzhou, China.

KURA, Branislav - SLEZÁK, Ján. Účinok molekulárneho vodíka na expresiu mikroRNA v myokarde ožiarených potkanov. In 5. mezinárodná konferencia vodíkové lékařství 21. století, máj 27. 2017, Ostrava, Czech Republic.

RAVINGEROVÁ, Táňa - FARKAŠOVÁ, Veronika - GRIECISOVÁ, Lucia - LONEK, Ľubomír - ZOHDI, Vladislava - KOLÁŘ, František - LAZOU, Antigone. Attenuation of myocardial ischemic injury by limb

preconditioning as an approach to reduce a potential risk of heart failure. IV. European Section Meeting of IACS, September 28-30, 2017, Pécs, Hungary.

SLEZÁK, Ján - KURA, Branislav - ZÁLEŠÁK, Marek - RAVINGEROVÁ, Táňa - TRIBULOVÁ, Narcisa. Molecular hydrogen as a novel therapeutic tool in situations with excessive production of free radicals. In IV. European Section Meeting of IACS, September 28-30, 2017, Pécs, Hungary.

SLEZÁK, Ján - SUROVÝ, Juraj - BUDAY, Jozef - KURA, Branislav. Therapeutic application of molecular hydrogen in situations with excessive production of free radicals. In The Molecular Hydrogen: 10th Year Anniversary Conference, 15. september 2017, Guangzhou, China.

SLEZÁK, Ján – KURA, Branislav. Využitie molekulárneho vodíka pri radiáciou vyvolanom ochorení srdca. In 5. mezinárodní konference vodíkové lékařství 21. století, máj 27. 2017, Ostrava, Czech Republic.

TRIBULOVÁ, Narcisa. Cardiac connexin-43 mediated cell-cell coupling and PKC $\epsilon$  signaling are altered in experimental type 1 and type 2 diabetes mellitus. Benefit of omega-3 fatty acids intake. 2nd Global Diabetes Conference 5-6.8.2017, Prague, Czech Republic.

JURÁNEK, Ivo. On dangerous antioxidants and essential free (oxygen) radicals – In vivo veritas; pozvanie prof. V. Havlíčka, Mikrobiologický ústav Akadémie vied ČR, Praha, 20.10.2017.

BERNÁTOVÁ I. Hypertenzia indukovaná sociálnym stresom: Úloha stresových hormónov a endotelu. XXXIII. konference České společnosti pro hypertenzi, [6.-8.10.2016](#), Český Krumlov, Česká republika.

BERNÁTOVÁ, Iveta - PÚZSEROVÁ, Angelika - BALIŠ, Peter - KLUKNAVSKÝ, Michal - ŠESTÁKOVÁ, Natália. Chronic stress induces delayed behavioral hyperactivity and vascular alterations in young prehypertensive rats. 2nd Joint Meeting of Slovak and Serbian Physiological Societies "Physiology without Frontiers", May 15-18, 2016, Smolenice, Slovakia.

CEBOVÁ, Martina - KNOWLES, Catherine J. - PREDÁ, Marilena - VARY, Calvin - PINZ, Ilka M. The effect of palmitate exposure in utero on systolic and vascular function. 2nd Joint Meeting of Slovak and Serbian Physiological Societies "Physiology without Frontiers", May 15-18, 2016, Smolenice, Slovakia.

ČAČANYIOVÁ, Soňa - BERÉNYIOVÁ, Andrea - KRISTEK, František - ONDRIAŠ, Karol - GRMAN, Marián - BREZA, J. The role of NO-H<sub>2</sub>S interaction in the vascular tone regulation. 2nd Joint Meeting of Slovak and Serbian Physiological Societies "Physiology without Frontiers", May 15-18, 2016, Smolenice, Slovakia.

JAGLA, Fedor. Use of saccadic eye movement tasks in diagnostic tests of mental disorders. 2nd Joint Meeting of Slovak and Serbian Physiological Societies "Physiology without Frontiers", May 15-18, 2016, Smolenice, Slovakia.

LIETAVA J. Hypertenzia a ďalšie rizikové faktory kardiovaskulárnej mortality na Slovensku: Determinuje prevalencia prevenciu? XXXIII. konference České společnosti pro hypertenzi, [6.-8.10.2016](#), Český Krumlov, Česká republika.

PECHÁŇOVÁ, Oľga - KLIMENTOVIČ, Jana - BARTA, Andrej - KOVÁČSOVÁ, Mária - VRANKOVÁ, Stanislava - CEBOVÁ, Martina - MATÚŠKOVÁ, Zuzana - ČIERNA, Zuzana - JANEGA, Pavol. Red wine extract decreases pro-inflammatory markers in experimental metabolic syndrome. 2nd Joint

Meeting of Slovak and Serbian Physiological Societies "Physiology without Frontiers", May 15-18, 2016, Smolenice, Slovakia.

TÖRÖK J. Experimentálna vazológia“ v druhej polovici 20. storočia v Čechách a na Slovensku. 44. konferencia Komisie experimentálnej kardiológie: 400 rokov kardiovaskulárneho výskumu - pocta W. Harveymu, 17. -19. október 2016, Stará Lesná.

RAVINGEROVÁ, Táňa - FARKAŠOVÁ, Veronika - MURÁRIKOVÁ, Martina - GRIECISOVÁ, Lucia - ČARNICKÁ, Slávka - ZÁLEŠÁK, Marek - LONEK, Ľubomír - FERKO, Miroslav - SLEZÁK, Ján - ADAMEOVÁ, Adriana - LAZOU, Antigone. Activation of peroxisome proliferator-activated receptors as a potential mechanism of remote preconditioning-induced cardioprotection in healthy and diseased hearts. 3rd European Section Meeting of the International Academy of Cardiovascular Sciences (IACS),

RAVINGEROVÁ, Táňa - FARKAŠOVÁ, Veronika - MURÁRIKOVÁ, Martina - GRIECISOVÁ, Lucia - ČARNICKÁ, Slávka - LONEK, Ľubomír - FERKO, Miroslav - SLEZÁK, Ján - ADAMEOVÁ, Adriana - LAZOU, Antigone - KOLÁŘ, František. Novel "conditioning" approaches to mend the broken heart: a potential for clinical application? 4th Cardiovascular Forum for Promoting Centres of Excellence and Young Investigators, September 22-24, 2016, Sherbrooke, Canada.

SLEZÁK, Ján - BARANČÍK, Miroslav - RAVINGEROVÁ, Táňa - TRIBULOVÁ, Narcisa - KURA, Branislav - LAZOU, Antigone - KUKREJA, R. C. - SINGAL, Pawan - FULOP, M. - VICZENCZOVÁ, Csilla - OKRUHLICOVÁ, Ľudmila. Radiation induced heart disease and amelioration of x ray toxic effect with selected substances and H2. 4th Cardiovascular Forum for Promoting Centres of Excellence and Young Investigators, September 22-24, 2016, Sherbrooke, Canada.

SLEZÁK, Ján - KURA, Branislav - FRIMMEL, Karel - ZÁLEŠÁK, Marek - RAVINGEROVÁ, Táňa - VICZENCZOVÁ, Csilla - OKRUHLICOVÁ, Ľudmila - TRIBULOVÁ, Narcisa. Protection of the heart in situations of increased production of oxygen free radicals: radiation and reperfusion injury. 3rd European Section Meeting of the International Academy of Cardiovascular Sciences (IACS), Marseille, France.

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

#### **List of conferences 1-22 see 2.3.2**

Natália Andelová - 17

Miroslav Barančík, DrSc. - 9

Monika Barteková – 9

Monika Barteková - 3rd European Section Meeting of the International Academy of Cardiovascular Sciences (IACS), Marseille, France, 2016

- 6th IACS-ES Meeting, Serbia, 2019

- 7th European Section Meeting of the IACS, Banja Luka, Bosnia-Herzegovina, 2021

Andrea Berényiová, PhD. – 7, 10, 17

Soňa Čačányiová, PhD. – 7, 10, 11, 17

Soňa Čačányiová, PhD. - member of programme committee, 96th Physiological Days (Martin, Slovakia, 4/2/2020 -6/2/2020)

Jozef Török, CSc. – 17

Anna Zemančíková, PhD. – 7

Oľga Pecháňová, DrSc.- 2, 4, 10, 11, 22



- Polyphenols Applications; on-line; programme committee (2021)
- 23rd Meeting of the European Council for Cardiovascular Research (ECCR); on-line (2020)
- 3rd Conference of Serbian and Slovak Physiological Society, Topola; organising and programme committees (2019)
- FASE 2019, Heraklion; organising and programme committees
- The 11th National Conference of SRFP, Taru Mures; programme committee (2019)
- 4 th CONGRESS OF PHYSIOLOGICAL SCIENCES OF SERBIA: “ CURRENT TRENDS IN PHYSIOLOGICAL SCIENCES : FROM CELL SIGNALS TO THE BIOLOGY OF AGING “; Niš, Serbia; programme committee (2018)
- The 30th Conference of physiology: ”Integrative physiology – From fundamental mechanisms to biomedical application”, Cluj Napoca; programme committee (2018)
- FEPS – Vienna, Austria; programme committee (2017)
- The Conference of The Romanian Society of Pathophysiology, Cluj Napoca; programme committee (2017)
- 2nd JOINT MEETING OF SLOVAK AND SERBIAN PHYSIOLOGICAL SOCIETIES “PHYSIOLOGY WITHOUT FRONTIERS“, Smolenice; organising and programme committees (2016)

Martina Cebová, PhD.- 1, 4, 10, 11, 20

Martina Cebová, PhD.- 4

Martina Cebová, PhD.- ICSPS 2017, Auckland, New Zealand, organising committees (2017)

Iveta Bernátová, DrSc- 2, 4, 10, 11

Iveta Bernátová, DrSc- 2

Peter Bališ, PhD.- 2, 4, 10

Michal Kluknavský, PhD.- 2, 4, 10

Ima Dovinová, PhD.- 2, 10

Veronika Farkašová - 1

Miroslav Ferko – 9, 17

Angelika Púzserová, PhD.- 2, 4, 10

Valéria Regecová- 2, 10

Branislav Kura – 6, 17

Miroslava Kvandová- 4

Igor Riečanský - 3, 7, 11

- 7<sup>th</sup> Congress of the Slovak Neuropsychiatric Association, Tatranská Lomnica, 2021
- 8<sup>th</sup> Conference on Biological Psychiatry, Piešťany, 2021
- 7<sup>th</sup> Conference on Biological Psychiatry, Piešťany, 2019

František Hlavačka - 12

Diana Bzdúšková - 12

Zuzana Hirjaková - 12

Jana Kimijanová - 12

Fedor Jagla – 3, 11

- 5<sup>th</sup> Congress of the Slovak Neuropsychiatric Association, Bratislava, 2016
- 6<sup>th</sup> Congress of the Slovak Neuropsychiatric Association, Bratislava, 2018

Barbora Cimrová

- Kognícia a umelý život 2017, Trenčianske Teplice, Slovakia
- Kognice a umelý život 2018, Brno, Czech Republic
- Kognícia a umelý život 2019, Bratislava, Slovakia

Rastislav Rovný

- VIIth Miniconference of PhD. Students “Creating New Connections”, Bratislava 2018
- 

Táňa Ravingerová – 1, 9, 13, 17

Táňa Ravingerová - 7th European Section Meeting of the IACS, Banja Luka, Bosnia-Herzegovina, 2021

- 48th Conference of the Committee of Experimental Cardiology, Czech Republic, Kroměříž, 2021
- 4th European Section meeting of the International Academy of Cardiovascular Sciences, Pécs, Hungary, 2017

Ján Slezák – 6, 9

Ján Slezák - 3rd European Section Meeting of the International Academy of Cardiovascular Sciences (IACS), Marseille, France, 2016

- 4th Cardiovascular Forum for Promoting Centres of Excellence and Young Investigators, Canada, 2016

Matúš Sýkora - 17

Barbara Szeiffová Bačová. 17

Helena Kandarova, IN2TOX Inaugural meeting of Eurotox Specialty Section

Helena Kandarova, EUSAAT 2019

Helena Kandarova, ESTIV 2020 Congress

Helena Kandarova, ESTIV Applied Training course

Mojmír Mach - 5, 8, 14, 15, 19, 20

Helena Kandarova - 5, 8, 14, 15, 19, 20

Michal Dubovický - 5, 14, 15, 20

Eduard Ujházy - 5, 14, 15, 20

Michal Dubovický - 1, 2, 3, 4, 5

Mojmír Mach - 1, 2, 3, 4, 5

Eszter Bögi - 1, 2, 3, 4, 5

Romana Koprdová - 1, 2, 3, 4, 5

Eduard Ujházy - 2, 3, 4, 5

Tatiana Mačičková - 2, 3, 4, 5

Magdáléna Májeková - 6, 7

### **2.3.9. List of researchers who received an international scientific award**

#### **International scientific award (2016)**

Reháková Radoslava, 2nd place in the competition for the best ČSAT poster presentation, Czech Society for Atherosclerosis

Egan-Beňová Tamara - Travel Grant for ESC Congress 2016 from Council on Basic Cardiovascular Science (CBCS).

Farkašová Veronika - Travel Award from International Academy of Cardiovascular Sciences (IACS) for participation at conference "3rd European Section meeting of the International Academy of Cardiovascular Sciences (Marseille - France, 2016)

Križák Jakub - Young Investigator Fellowship from EAS for participation at 84-th EAS Conference in Innsbruck, Austria

#### **International scientific award (2017)**

Košťová Michaela, Award for the best poster at the international conference FEPS 2017, FEPS Commission 2017

Pecháňová Olga, Award of the Romanian Pathophysiological Society, Romanian Pathophysiological Society

Soltesova Prnova Marta, The SCT Best Poster Prize, Appraiser: Luc Van Hijfte, SCT President, Description: Best Poster at the International Conference: 53rd International Conference on Medicinal Chemistry, Toulouse, France. 5-7.7.2017

**International scientific award (2018)**

Cimrová Barbora, Best paper award, The 9th IEEE International Conference on Cognitive Infocommunications

Kluknavský Michal, Award for the best poster (1st place), NO Symposium 2018

Kluknavský Michal, Award for the best poster (1st place) in the High Blood Pressure section, The International Congress of Pathophysiology 2018

Pecháňová Olga, 1st place in cat. presented posters, Organizers of the 34th World Congress of Internal Medicine

Pecháňová Olga, Romanian Physiological Society Award, Romanian Physiological Society

Zemančíková Anna, Best poster award, 8th International Congress of Pathophysiology

Kura Branislav - Young Investigator Award for best oral presentation - International Academy of Cardiovascular Sciences - European Section (IACS-ES).

Ravingerová Táňa – Award “Distinguished Leadership Award in Cardiovascular Sciences” for significant contribution in research of cardiovascular disease. International Academy of Cardiovascular Sciences (IACS).

Sýkora Matúš – travel grant from International Society of Hypertension (ISH), for participation at the conference the 27th Scientific Meeting of ISG in Beijing, China.

Szeiffová Bačová Barbara - travel grant from The European Society of Hypertension. For participation at the conference 28th European Meeting on Hypertension 2018, Barcelona, Spain.

Szeiffová Bačová Barbara - travel grant from International Society of Hypertension (ISH), for participation at the conference the 27th Scientific Meeting of ISG in Beijing, China.

Szeiffová Bačová Barbara – travel grant from European Society of Cardiology (ECS) for ESC Congress 2018, Germany. From Council on Basic Cardiovascular Science, European Society of Cardiology.

Tribulová Narcisa - “Bohuslav Ostadal Award for Excellence in Cardiovascular Sciences”. Awarded by International Academy of Cardiovascular Sciences.

**International scientific award (2019)**

Bališ Peter, Second place - 95th Physiological Days Prague 2019, Slovak Physiological Society

Marko Martin, Award for the best poster, Psychiatric Society of the Czech Medical Society J. E. Purkyně

Pecháňová Olga, Diploma and Medal, Turkish Pharmacological Society

Pecháňová Oľga, Granting of "visiting professor" status, Victor Babeş University of Medicine and Pharmacy

Riečanský Igor, Award for the best poster, Psychiatric Society of the Czech Medical Society J. E. Purkyně

Bögi Eszter, Award of Oldřich Vinař for the best oral presentation within section „New Research“ (by Czech Neuropsychopharmacology Society, 2019).

Kandárová Helena, "Best Published Paper Award - Medical devices specialty Section US SOT",

Kandárová Helena, "Nomination - Lush Prize Shortlist"

Andelová Natália - FEPS Travel Award 2019 for participation at FEPS (Federation of European Physiological Societies) meeting in Bologna, Italy.

Slezák Ján - Medal of Merit from International Academy of Cardiovascular Sciences.

Szeiffová Bačová Barbara - Travel Grant Awards from European Society of Hypertension. Participation at the conference 29th European meeting on hypertension and cardiovascular protection, Milan, 2019

#### **International scientific award (2020)**

Zemančíková Anna, Hans-Kaffarnik-Preis, Deutsche Gesellschaft für Arterioskleroseforschung e.V.

2020 Lush Prize - Commended project, Valuator: Lush Prize, Description: Award in the LOBBYING category for the international team project "Validation of the protocol for Medical Devices testing in vitro. Medical Device In Vitro Irritation Team (MD-IV-IT)"

In addition, many of our researchers work in the renowned international scientific societies as presidents (Oľga Pecháňová - International Society for Pathophysiology, Helena Kandárová - ESTIV - European Society for Toxicology in Vitro, Fedor Jagla – C.I.A.N.S.), members of executive committees (Mojmir Mach - EUROTOX Federation of European Toxicologists and European Societies in Toxicology, Martina Cebová – European Council of Cardiovascular Research), experts and evaluators of international projects within various commissions, including EU funding programmes and others.

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

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

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

- Igor Riečanský: 7th Slovak Neuropsychiatric Congress, Tatranská Lomnica, 2021; 8th Conference on Biological Psychiatry, Piestany, 2021; 7th Conference on Biological Psychiatry, Piestany, 2019

- Helena Kandarova, Keynote lecture - Omics4Helath , Slovakia, 2020

- Helena Kandarova, Invited lecture - Slovenská kooperačná burza 2021 - SARIO - Využitie digitálnych inovácií v toxikológii , Slovakia,

<https://www.youtube.com/watch?v=eFKo2wTM7gY>, 2021

Helena Kandarova, Keynote Lecture - Doerenkamp-Zbinden Foundation Awardee 2021: Alternatives in the 21st century: what has changed in 20 years, TOXCON 2021 - Stara Lesna, High Tatras, Slovakia, [www.setox.eu](http://www.setox.eu), 2021

Helena Kandarova, Invited Lecture – RegToxInVitro, Bratislava, Slovakia, Slovakia, [www.setox.eu](http://www.setox.eu), 2021

Miroslav Ferko - XIII. Interactive Conference of Young Scientists 2021, [www.preveda.sk/conference](http://www.preveda.sk/conference)

Miroslav Ferko - XII. Interactive Conference of Young Scientists 2020, [www.preveda.sk/conference](http://www.preveda.sk/conference)

Miroslav Ferko - XI. Interactive Conference of Young Scientists 2019 - Travel and explore! Hotel Austria Trend, Bratislava, SR

Miroslav Ferko - X. Interactive Conference of Young Scientists 2018, Bratislava

Miroslav Ferko - IX. Interactive Conference of Young Scientists 2017, Bratislava

Miroslav Ferko – Conference “A drop of blood - from the heart for life”, 2017, Bratislava

Veronika Farkašová – Conference “A drop of blood - from the heart for life”, 2017, Bratislava

### **2.3.12. List of researchers who received a national scientific award**

#### **national scientific award (2016)**

Pechanova Olga, SAS price, Presidium of the SAS

Pecháňová Oľga, Appointment as coordinator of the Open Academy program topic, Presidium of the SAS

Bališ Peter, Diploma - 10 years with Preveda - we support team players, for a contribution in the section Biophysics, mathematical modeling, biostatistics, Civic Association PREVEDA

Čačányiová Soňa, Prize for Scientific and Professional Literature for 2015, Literary Fund

Kvandová Miroslava, Winner in section: Cell metabolism, physiology, molecular biology and genetics, Inactive Conference of Young Scientists will perform 2016

Púzserová Angelika, Award for the best poster (1st place), Slovak Society of Cardiology

Regecová Valéria, 3rd best publication in the journal Cardiology Letters, Slovak Society of Cardiology

Riečanský Igor, Award of the Slovak Physiological Society for the best publication in 2015, Slovak Physiological Society SLS

Matuška Andrej (student working on the project), Award for the best work - 2nd place in the section ŠVK Chemistry and Technology for Life, Conference Program Committee

Iveta Bernátová, project” Gender differences in etiopathogenesis of social stress-related cardiovascular and behavioral disorders in individuals with predisposition to hypertension”, The Slovak Research and Development Agency among the excellent projects and published in book” Excellence in Science 2016”

Nosál Radomír, Premium for the Development of Slovak Science at Home and Abroad for Lifetime Contribution to the Development of Slovak Science at Home and Abroad, Evaluator: Literary Fund, Section for Scientific and Professional Literature and Computer Programs, Description: Premium for Development of Slovak Science at Home and Abroad for Lifetime Contribution to the development of Slovak science at home and abroad

Štefek Milan and Šoltéssová Prnová Marta, Slovak Diabetologic Society Award, Appraiser: Slovak Diabetologic Society, Description: Ing. Marta Soltesova Prnova, PhD., Ing. Milan Štefek, PhD and co-authors from Dept. of Biochemical Pharmacology received Slovak Diabetologic Society Award for their experimental research new selective aldoseductase inhibitors.

Topol'ská Dominika, Rector's Award of the Slovak University of Technology, Award: Rector of the Slovak University of Technology, Description: For excellent results during doctoral studies in the field of biochemistry.

Ferko Miroslav, SAS price for the popularization of science, Presidium of the SAS

Okruhlicová Ľudmila - Ján Jessenius Honorary Plaque of the SAS, Presidium of the SAS

Ravingerová Táňa - The SAS Medal for Support of Science, Presidium of the SAS

Tribulová Narcisa - Memory letter of the Presidium of the SAS with merit appreciation for development of Slovak science

Egan-Beňová Tamara – 1st place for the best original publication published in the journal Cardiology Letters published in 2015, Slovak Society of Cardiology

Szeiffová Bačová Barbara - travel grant from Literary Fund for participation at the conference "Hypertension Seoul 2016"

Tribulová Narcisa - The Gold Medal of the Slovak Medical Association for merit in medical sciences

Zálešák Marek - Award of the Slovak Physiological Society for poster at the 92. Physiological Days.

#### **national scientific award (2017)**

Púzserová Angelika, Award for the best poster (1st place), Slovak Society of Cardiology

Török Jozef, Honorary membership in the Slovak Physiological Society, Slovak Physiological Society

Török Jozef, Honorary membership in the Slovak Society of Cardiology, Slovak Society of Cardiology

Török Jozef, Award for the development of Slovak science at home and abroad, Literary Fund of the Slovak Republic, Section for Scientific and Professional Literature and Computer Programs

Török Jozef, Silver Medal of the Faculty of Science, Charles University, Dean of the Faculty of Science, Charles University

Bögi Eszter, Schwarz Fund, Appraiser: Slovak Academy of Sciences, Description: Štefan Schwarz Support Fund for the creation of postdoctoral positions in SAS

Šoltéssová Prnová Marta, Competition of Young Scientists, 2nd place, Appraiser: Slovak Academy of Sciences (Pavol Šajgalík)

Kancírová Ivana - Award of the Slovak Physiological Society for the 2nd place in poster competition of young scientists at the Physiological Days.

Ravingerová Táňa – The Gold Medal of the Slovak Medical Association.

#### **national scientific award (2018)**

Bališ Peter, The Best Poster Award, Center of Experimental Medicine SAS, Slovak Physiological Society

Bernátová Iveta, 1st place in the competition of original lectures, Slovak Hypertensiological Society

Bernátová Iveta, Bronze Medal of the Slovak Medical Society, Slovak Hypertensiological Society

Čačányiová Soňa, The most important results of VEGA, VEGA

Majzúnová Miroslava, Award for the best publication of the Slovak Physiological Society in 2017, Slovak Physiological Society, SLS

Púzserová Angelika, 1st place in the competition Science has a future - science through the eyes of young people (7th year), AISIS, o. s., Bayer, SAS, Ministry of Economy of the Slovak Republic

Regecová Valéria, "Best Original Works" (3rd place), Slovak Hypertensiological Society SLS

Török Jozef, 3rd place in the competition for the best poster at XXIII. Congress of the Slovak Society of Cardiology, 2018, Slovak Society of Cardiology

Bögi Eszter, Junior Scientist Award, Appraiser: Slovak Toxicology Society SETOX, Description: Best lecture: BÖGI, Eszter - BELOVIČOVÁ, Kristína - CSATLÓSOVÁ, Kristína - MORAVČÍKOVÁ, Lucia - LACINOVÁ, Ľubica - MACH, Mojmír - DUBOVICKÝ, Michal. Impact of pre-gestational stress on offspring neurobehavioral development and hippocampal functioning.

Brnoliaková Zuzana, finalist of the 2nd year of the national scholarship competition for "Women in Science"

Appraiser: L'Óréal - UNESCO - SAV - SOVVA, Description: finalist of the 2nd year of the national scholarship competition for "Women in Science" with the project "Determination of serum glycans in rats by mass spectrometry as a tool for preclinical evaluation of new therapeutic approaches to the treatment of metabolic syndrome" ".

Škandík Martin, Award at the Interactive Conference of Young Scientists PREVEDA, Valuator: PREVEDA, Description: For the work: ŠKANDÍK, Martin - RAČKOVÁ, Lucia. Characterization of the In vitro replication senescence model. In PREVEDA: interaktívna konferencia mladých vedcov 2018. Book of abstracts. - Bratislava: Občianske združenie PREVEDA, 2018, abstract no. 1735. ISBN 978-80-972360-2-1.

Ujházy Eduard, Award for the development of Slovak science at home and abroad, as an expression of recognition for the lifelong contribution to their development. Appraiser: Committee of the Section for Scientific and Professional Literature and Computer Programs of the Literary Fund

Description: Premium for the development of Slovak science at home and abroad for many years of publishing activity and publication of the monograph "Teratology - principles and mechanisms of abnormal development", considered the first textbook of teratology in Slovakia.

Ferko Miroslav - SAS price for the popularization of science, Presidium of the SAS

#### **national scientific award (2019)**

Bernátová Iveta, Award of the Slovak Physiological Society for the best publication in 2018, Slovak Physiological Society

Púzserová Angelika, Honorable mention for excellent results with young people, Mayor of the Capital of the Slovak Republic, Bratislava Matúš Vallo

Púzserová Angelika, Award for talented youth for achieving excellent results in natural and technical sciences 2019, Mayor of the Capital of the Slovak Republic, Bratislava Matúš Vallo

Andelová Natália - travel grant from Literary Fund for participation at the 6th World Congress on Acute Heart Failure. 25 - 28 May 2019, Athens – Greece

#### **national scientific award (2020)**

Berényiová Andrea, Competition for the best poster of young scientists, Slovak Physiological Society

Bernátová Iveta, Requested lecture "Scientific news", Slovak Physiological Society

Jagla Fedor, Medal of the founding of the Iekarsko-slowanska Society, Presidium of the Slovak Medical Society

Majzúnová Miroslava, Award for the best publication of the Slovak Physiological Society in 2019, SLS

Koprdoová Romana, Štefan Schwarz Fund - extension, Evaluator: Slovak Academy of Sciences, Description: successful extension of the Štefan Schwarz Support Fund

Kandárová Helena, Woman in Science, Honorable Mention for Finalists - Category over 35, Awarder: L'Oréal-UNESCO For Women in Science, Slovakia - Talents program 2020, Description: 2020 L'Oréal-UNESCO For Women in Science, Slovakia - Talents program 2020 "Honorable Mention" in the category over 35 years

Branislav Kura – Award for young research workers under 35 years. Presidium of the SAS.

Szeiffová Bačová Barbara - Award of the Slovak Society of Cardiology for the 2-nd place in poster competition.

Szeiffová Bačová Barbara - Award at the XII. Interactive Conference of Young Scientists PREVEDA for the best publication in topic cardiovascular research.

#### **national scientific award (2021)**

Dayar Ezgi, High-Quality Project Application, The Presidium of the SAS and the Commission for Doctoral Studies of the SAS



Bališ Peter, Competition for the best original publication, published in the journal Cardiology Letters in 2020, in the category of authors under 35, Slovak Society of Cardiology

Berényiová Andrea, 2nd place for the best original publication published in the journal Cardiology Letters in 2020, Slovak Society of Cardiology

Čačányiová Soňa, Excellent projects, APVV

Pecháňová Oľga, Nomination for Eset Award, Eset

Pecháňová Oľga, Nomination in Slovak woman of the year 2021, Slovenka magazine

Ravingerová Táňa – Award Significant personality of SAS - Presidium of the SAS.

Andelová Natália - award of the organizing committee for presentation at Xth Miniconference of CEM PhD students

Ravingerová Táňa - honorary membership of Slovak Physiological Society

Slezák Ján - honorary membership of Slovak Physiological Society

Sýkora Matúš – Award from “Občianske združenie Preveda”, organizer of “Interactive Conference of Young Scientists 2021, for excellent presentation in section: Cellular metabolism, physiology, molecular biology, and genetics.

## 2.4. Research grants and other funding resources

**(List 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”. Add information on the projects which are interdisciplinary, and also on the joint projects with several participating SAS institutes)**

- **International projects**

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

EU-ROS: The European Network on Oxidative Stress and Redox Biology Research

Principal Investigator: Oľga Pecháňová

Project Duration: 2013-2016

Program: COST

EU-CARDIOPROTECT: COST Action CA16225 – Pan-European consortium aimed at scientific research in the field of cardioprotection. Members of the Management Committee (MC) from Slovakia: T. Ravingerova, M. Bartekova

EU-CardioRNA: COST Action CA17129 – Pan-European consortium aimed at catalysing transcriptomic research in the field of cardiovascular diseases and cardioprotection. Management Committee (MC) member from Slovakia: M. Bartekova

Molecular logic lab-on-a-vesicle for intracellular diagnostics

Principal Investigator: Mojmír Mach

Project Duration: 2018-2022

Program: Horizont 2020

Ontology-driven and artificial intelligence-based repeated dose toxicity testing of chemicals for next generation risk assessment

Principal Investigator: Helena Kandárová

Project Duration: 2021-2026

Program: Horizont 2020

An integrated European platform for pancreas cancer research: from basic science to clinical and public interventions for a rare disease

Principal Investigator: Mária Ďurišová

Project Duration: 2012-2016

Program: COST

Anti-inflammatory effect of astaxanthin, sulforaphane and Crocus sativus extract evaluated in two rodent models of age related diseases.

Principal Investigator: Katarína Bauerová

Project Duration: 2018-2021

Program: Inter - Academic Agreement

Bench to bedside transition for pharmacological regulation of NRF2 in noncommunicable diseases

Principal Investigator: Iveta Bernátová

Project Duration: 2021-2025

Program: COST

COST BM1204 : An integrated European platform for pancreas cancer research: from basic science to clinical and public health interventions for a rare disease

Principal Investigator: Magdaléna Májeková

Project Duration: 2012-2016

Program: COST

Catalysing transcriptomic research in cardiovascular disease

Principal Investigator: Monika Barteková

Project Duration: 2018-2022

Program: COST

Multi-target paradigm for innovative ligand identification in the drug discovery process

Principal Investigator: Magdaléna Májeková

Project Duration: 2015-2020

Program: COST

Realising the therapeutic potential of novel cardioprotective therapies

Principal Investigator: Táňa Ravingerová

Project Duration: 2017-2022

Program: COST

EU-NETVAL International Thyroid Validation Study

Principal Investigator: Helena Kandárová

Project Duration: 2021-2023

Program: Multilateral - Other

Evaluation of Quercetin and Green Tea in combination with Methotrexate for arthritis therapy  
(Acronym: PhytoArt 2.0)

Principal Investigator: Katarína Bauerová

Project Duration: 2016-2017

Program: Bilateral - Other

Magnesium Nanocomposites for Biodegradable Medical Implants

Principal Investigator: Oľga Pecháňová

Project Duration: 2014-2017

Program: Inter - Academic Agreement

Mechanisms of radiation injury to the heart. Preventive drug treatment.

Principal Investigator: Ján Slezák

Project Duration: 2014-2017

Program: Multilateral - Other

Multidisciplinary analysis of the combined effects of thyroid hormones and n-3 polyunsaturated fatty acids in rats

Principal Investigator: Narcisa Tribulová

Project Duration: 2015-2017

Program: Inter - Academic Agreement

Stress-induced pressor responses: endothelial factors vs. central regulation of sympathetic tone

Principal Investigator: Iveta Bernátová

Project Duration: 2016-2017

Program: Inter - Academic Agreement

Targeting Molecular Pathways of Glucolipotoxicity by a Novel Carboxymethylated Mercaptotriazinoindole Inhibitor of Aldo-Keto Reductase AKR1B1 In Diabetes, Inflammation and Age-related Neurodegeneration

Principal Investigator: Milan Štefek

Project Duration: 2016-2019

Program: Bilateral - Other

Anti-inflammatory effects of natural compounds isolated from Vietnam medicinal plants

Principal Investigator: Katarína Bauerová

Project Duration: 2020-2022

Program: Bilateral - Other

Investigation of the mechanisms involved in antiarrhythmic effects of melatonin

Principal Investigator: Narcisa Tribulová

Project Duration: 2014-2020

Program: Bilateral - Other

Collaboration on a complex pharmacological assessment of inflammatory diseases of the musculo-skeletal system and gastrointestinal tract on experimental animal models

Principal Investigator: Katarína Bauerová

Project Duration: 2019-2022

Program: Bilateral - Other

Postural and core stability in association with respiratory functions in healthy and lung transplant individuals

Principal Investigator: František Hlavačka

Project Duration: 2016-2017

Program: Bilateral - Other

Study of the triggering mechanisms and transmission of cardioprotective signals induced by noninvasive adaptive stimuli

Principal Investigator: Táňa Ravingerová

Project Duration: 2018-2020

Program: Inter - Academic Agreement

Study the role of iron oxide nanoparticles in a model of hypertension and comorbid Alzheimer's disease

Principal Investigator: Iveta Bernátová

Project Duration: 2018-2020

Program: Inter - Academic Agreement

Training Network for improving of safety of medical devices - focus on oral cavity

Principal Investigator: Helena Kandárová

Project Duration: 2020-2022

Program: Multilateral - Other

Effect of pathological states on cardiac resistance against myocardial ischemia: study of molecular mechanisms and novel approaches to cardioprotection

Principal Investigator: Táňa Ravingerová

Project Duration: 2015-2017

Program: Inter - Academic Agreement

- **National projects, incl. international projects with only national funding**

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

#### **2.4.3. List of projects of the Slovak Research and Development Agency, APVV**

Study of regulation of radical and cellular signaling during hypertension and influence of novel therapies on this signaling

Principal Investigator Miroslav Barančík

Project Duration: 2013-2017

Effects of nanoencapsulated simvastatin on cardiovascular system in experimental metabolic syndrome

Principal Investigator Oľga Pecháňová

Project Duration: 2015-2019

Investigation of anatomical-functional differences between the effects of aripiprazole and quetiapine, atypical antipsychotics with similar therapeutic indications, but different impact on brain dopaminergic receptors, in experimental animals

Principal Investigator Mojmír Mach

Project Duration: 2016-2020

Study of biological effects of H<sub>2</sub>S/NO products and molecular mechanism of their actions

Principal Investigator Soňa Čačányiová  
Project Duration: 2016-2020

Prenatal and postnatal effects of  $\delta$  and  $\mu$  opioid receptor ligands on the hippocampal development and function  
Principal Investigator Michal Dubovický  
Project Duration: 2016-2020

Protection of the heart in situations of increased production of oxygen free radicals: Radiation and reperfusion injury.  
Principal Investigator Ján Slezák  
Project Duration: 2016-2020

New perspectives in the treatment of cardiovascular complications associated with COVID-19  
Principal Investigator Soňa Čačányiová  
Project Duration: 2020-2021

New regulatory effects of nitric oxide and their role in the development of essential hypertension  
Principal Investigator Soňa Čačányiová  
Project Duration: 2016-2020

Design and implementation of visual biofeedback for the rehabilitation of mobility deficiencies in patients with low back pain  
Principal Investigator František Hlavačka  
Project Duration: 2017-2019

Molecular-pharmacological approaches to innovative rheumatoid arthritis therapy evaluated in experimental conditions in vivo and in vitro  
Principal Investigator Katarína Bauerová  
Project Duration: 2016-2020

Possible dual function of P-glycoprotein in multidrug resistance of leukemic cells: efflux pump and regulatory protein  
Principal Investigator Miroslav Barančík  
Project Duration: 2014-2018

Study of endogenous compensatory mechanisms effective against energy deficiency in pathologically loaded myocardium: Innovative approaches in experimental cardioprotection.  
Principal Investigator Miroslav Ferko  
Project Duration: 2016-2020

Dynamics of myocardial damage: a role of necroptotic cell death and survival of cardiomyocytes.  
Principal Investigator Táňa Ravingerová  
Project Duration: 2016-2020

Pharmacological intervention in glucose-toxicity in type 2 diabetes  
Principal Investigator Magdaléna Májeková  
Project Duration: 2016-2020

Interaction of nitrergic, neurotrophic and endocrine signaling in the etiopathogenesis of schizophrenia  
Principal Investigator Igor Riečanský  
Project Duration: 2015-2019

Chemoenzymatic synthesis and evaluation of biological activities of natural glycophenols and their analogues

Principal Investigator Miroslav Barančík

Project Duration: 2013-2017

Research of magnetic forms of iron in development of cardiovascular diseases and behavioural disorders

Principal Investigator Iveta Bernátová

Project Duration: 2017-2021

**2.4.4. List of projects of the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education, VEGA (for funding specify only total sum obtained from all VEGA grants in particular year)**

<b>Financial support from VEGA</b>						
<b>Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
<b>Support in EUR</b>	243773	267932	253984	244219	270963	251179

Aldo-keto reductases in chronic diseases – in silico modeling of significant enzymes and their complexes with indole derivatives

Principal Investigator Magdaléna Májeková

Project Duration: 2014-2017

Bioenergetic aspects of myocardial protection by means of remote ischemic preconditioning. The role of cardiac mitochondria

Principal Investigator Miroslav Ferko

Project Duration: 2015-2017

Indole-1-acetic acid derivatives as aldose reductase inhibitors: design, synthesis and biological activity

Principal Investigator Milan Štefek

Project Duration: 2015-2017

Indole-1-acetic acid derivatives as aldose reductase inhibitors: structure – activity relationships

Principal Investigator Marta Šoltésová Prnová

Project Duration: 2018-2021

Effect of lyophilisate *Cornus mas* L. on cardiometabolic and inflammatory parameters in experimental metabolic syndrome

Principal Investigator Ján Lietava

Project Duration: 2016-2018

The effect of nitric oxide and hydrogen sulfide on structure and function of cardiovascular system in normotensive and hypertensive rats.

Principal Investigator František Kristek

Project Duration: 2013-2016

Electrophysiological correlates and determinants of visual working memory precision

Principal Investigator Igor Riečanský

Project Duration: 2019-2021

Epicatechin in prevention of early development of primary hypertension: mechanisms of action in the cardiovascular and central nervous systems

Principal Investigator Iveta Bernátová

Project Duration: 2014-2016

Sensory information filtering in persons with genetic risk of schizophrenia

Principal Investigator Fedor Jagla

Project Duration: 2014-2016

Functional tests in diagnostics of postural stability and strength of core muscles

Principal Investigator František Hlavačka

Project Duration: 2014-2016

Hypoxia in the prevention of heart failure in rats and its influence in various stages of heart failure: Characteristics of functional, structural and molecular changes.

Principal Investigator Veronika Farkašová

Project Duration: 2017-2019

Inhibition of proliferation and induction of apoptosis in cancer cells by affecting the metabolic profile

Principal Investigator Dušan Blaškovič

Project Duration: 2015-2018

Crosstalk of metabolic factors and neurogenic signaling in experimental models of depression

Principal Investigator Stanislava Vranková

Project Duration: 2018-2020

Matrix-metalloproteinases, microRNAs and deformability of erythrocytes as a novel diagnostic and predictive biomarkers of heart failure

Principal Investigator Monika Barteková

Project Duration: 2014-2017

Mechanisms involved in uric acid-induced endothelial dysfunction depending on the age and genetic predisposition to hypertension

Principal Investigator Angelika Púzserová

Project Duration: 2017-2020

Mechanisms, early detection and therapy of asphyxial injury in perinatal period - comparison of experimental data with clinical observation of asphyxial newborns

Principal Investigator Eduard Ujházy

Project Duration: 2015-2018

Mitochondria as a key effector in processes of cardioprotective intervention

Principal Investigator Miroslav Ferko

Project Duration: 2018-2021

Molecular mechanisms involved in the effects of doxorubicin in rats with developed hypertension and ways of modulation of these effects of doxorubicin by quercetin.

Principal Investigator Miroslav Barančík

Project Duration: 2015-2017

Research into the influence of inflammation, chronic autoimmune response and redox regulation of the organism in experimental arthritis using new substances for adjuvant therapy of rheumatoid arthritis

Principal Investigator Katarína Bauerová

Project Duration: 2015-2018

Nitroso-sulphide signal pathway - novel regulator vasoactive effects in different types of arterial hypertension

Principal Investigator Soňa Čačányiová

Project Duration: 2018-2021

Novel compounds in prevention and treatment of diseases caused by glucose toxicity

Principal Investigator Magdaléna Májeková

Project Duration: 2018-2021

New molecular mechanisms of damage to the cardiovascular system by ionizing radiation and possibilities of its targeted drug prevention

Principal Investigator Ján Slezák

Project Duration: 2015-2017

New approaches to the treatment of cachexia, inflammation and oxidative stress in experimental arthritis: The effect of various plant extracts of olive leaves, *Rhodiola rosea*, *Tribulus terrestris* and extra virgin olive oil

Principal Investigator Silvester Poništ

Project Duration: 2019-2021

Protection of mechanisms modulating endothelial permeability in the heart.

Principal Investigator Ludmila Okruhlicová

Project Duration: 2016-2019

Protection of the heart from maladaptive extracellular matrix remodeling and searching the mechanisms of its regression.

Principal Investigator Barbara Szeiffová Bačová

Project Duration: 2015-2018

Heart protection in situations of excessive formation of oxygen and nitrosyl radicals: Molecular hydrogen as a new potential therapeutic tool?

Principal Investigator Branislav Kura

Project Duration: 2018-2021

Nitric oxide and brain redox status in an experimental neurodevelopmental model of schizophrenia

Principal Investigator Stanislava Vranková

Project Duration: 2015-2017

Prenatal programming of psychiatric diseases: experimental approaches for evaluation of causes and mechanisms of their origin

Principal Investigator Mojmír Mach

Project Duration: 2016-2019

Prevention of hypoxic-ischemic damage of the neonatal rat brain: testing of novel approaches involving pharmacological and non-pharmacological intervention

Principal Investigator Ivo Juránek

Project Duration: 2016-2019

Protection of hypertensive and failure heart by I(f) channel blocker ivabradin: comparison with ACE inhibition and melatonin

Principal Investigator Oľga Pecháňová

Project Duration: 2015-2018

Protective effects of natural and synthetic substances against oxidative damage of high-molar-mass hyaluronan, isolated mammal cells and their mitochondria

Principal Investigator Katarína Valachová

Project Duration: 2015-2018

Protective effect of NO and CO donors in experimental myocardial infarction with hypertensive complications



Principal Investigator Oľga Pecháňová  
Project Duration: 2015-2018

Redox Homeostasis, Proteostasis and Inflammation as Potential Targets For Influencing Ageing and Age-Related Diseases: Modulation by the compounds of natural and synthetic origin

Principal Investigator Lucia Račková  
Project Duration: 2017-2020

Redox control of the professional phagocytes in blood and in the central nervous system: Molecular mechanisms and functional significance.

Principal Investigator Viera Jančinová  
Project Duration: 2016-2018

Relevance of necrosis in myocardial tissue death due to different types of damage: effect on excitatory-contractile interconnection

Principal Investigator Miroslav Ferko  
Project Duration: 2016-2019

Risk factors of cardiovascular and cerebrovascular diseases and pharmacological possibilities of their influence

Principal Investigator Zdenka Gáspárová  
Project Duration: 2015-2018

Development of SQUID Gradiometric and Susceptometric Methods for Iron Homeostasis Related Bio-Applications

Principal Investigator Iveta Bernátová  
Project Duration: 2013-2016

NO and H<sub>2</sub>S signal pathways and their interaction in the control of vascular tone during early developmental stage of experimental hypertension

Principal Investigator Soňa Čačányiová  
Project Duration: 2014-2017

Investigation of regulatory mechanisms of cardiac cell-cell communication for targeted protection from heart failure.

Principal Investigator Narcisa Tribulová  
Project Duration: 2016-2019

Study of critical endogenous biomarkers and signaling pathways in hypertension and cardiovascular diseases

Principal Investigator Ima Dovinová  
Project Duration: 2017-2019

Specific methods and innovative procedures for assessing performance in athletes and physical fitness in the general population

Principal Investigator Diana Bzdúšková  
Project Duration: 2017-2019

Study of consequences of maternal depression and antidepressant venlafaxine treatment on functional development of the brain and behavior of rat offspring

Principal Investigator Michal Dubovický  
Project Duration: 2015-2018

Study of the clinically relevant forms of preconditioning as an alternative method of myocardial protection against acute ischemia in the organism challenged with civilization diseases

Principal Investigator Táňa Ravingerová  
Project Duration: 2015-2017

Study of triggering factors and signal transduction mechanisms induced by noninvasive adaptive interventions in rats aimed to protect myocardium against ischemia  
Principal Investigator Táňa Ravingerová  
Project Duration: 2018-2021

Participation of HMGB1 in experimental myocardial infarction: cardioprotection vs. cardiac depression  
Principal Investigator Martina Cebová  
Project Duration: 2014-2016

The effect of STAT1 and ISG15 inhibitors on biochemical and morphological parameters in experimental myocardial infarction  
Principal Investigator Martina Cebová  
Project Duration: 2017-2019

The role of extracellular vesicles in inter-organ communication related to remote cardioprotection  
Principal Investigator Monika Barteková  
Project Duration: 2016-2019

Role of Nrf2 signaling pathway in responses of cardiac cells to pathological conditions  
Principal Investigator Miroslav Barančík  
Project Duration: 2018-2020

The role of perivascular adipose tissue in the regulation of vascular tone in rats with cardiovascular dysfunction  
Principal Investigator Anna Zemančíková  
Project Duration: 2015-2017

Effect of aging on the endothelial function in experimental hypertension  
Principal Investigator Angelika Púzszerová  
Project Duration: 2014-2017  
Program: Other Projects

Response of the Na,K-ATPase, representing one of the crucial systems in maintaining the sodium homeostasis, to civilization diseases namely: hypertension, diabetes and hypertriglyceridemia.  
Principal Investigator Norbert Vrbjar  
Project Duration: 2013-2016

Properties of the Na,K-ATPase, representing one of the crucial systems in maintaining the sodium homeostasis in the organism, after irradiation.  
Principal Investigator Norbert Vrbjar  
Project Duration: 2017-2020

Effect of PPAR gamma agonists on antioxidant response and on regulation of radical and cell signaling in hypertension  
Principal Investigator Ima Dovinová  
Project Duration: 2014-2016

Influence of endogenous nitric oxide and hydrogen sulfide levels on blood pressure, pulse wave, vascular wall function and structure  
Principal Investigator František Kristek  
Project Duration: 2017-2018

The influence of constitutional factors of redox regulation on endophenotypic markers of schizophrenia

Principal Investigator Igor Riečanský  
Project Duration: 2016-2018

The effect of transcranial DC stimulation of the brain on sensorimotor gating in humans  
Principal Investigator Fedor Jagla  
Project Duration: 2017-2019

Effect of ultrasmall superparamagnetic iron oxide nanoparticles on the cardiovascular system of rats with high blood pressure  
Principal Investigator Iveta Bernátová  
Project Duration: 2017-2020

Age-related changes in sensory control of balance during sit-to-stand and gait  
Principal Investigator František Hlavačka  
Project Duration: 2016-2018

The effect of virtual reality on the sensory regulation of balance control, physiological and psychological functions in humans  
Principal Investigator Zuzana Hirjaková  
Project Duration: 2019-2021

Research on possibilities and development of SQUID magnetometry for selected applications in biomedicine and material research  
Principal Investigator Iveta Bernátová  
Project Duration: 2017-2020

Cognitive skills from the perspective of functional asymmetry of the brain  
Principal Investigator Barbora Cimrová  
Project Duration: 2015-2017

Relationship between body adiposity and functional properties of arteries in rat  
Principal Investigator Anna Zemančíková  
Project Duration: 2018-2020

#### **2.4.5. List of projects supported by EU Structural Funds**

BIOMEDIRES - Center for Biomedical Research - European structural and investment funds; PI: Oľga Pecháňová

BIOVID 19 - Development of biomodels to improve the efficiency of drugs and substances that have potential to treat COVID-19 - European structural and investment funds; PI: Oľga Pecháňová

Development of products by modification of natural substances and study of their multimodal effects on COVID-19 - European structural and investment funds; PI: Magdaléna Májeková

Study of structural changes of complex glycoconjugates in the process of inherited metabolic and civilization diseases - European structural and investment funds; PI: Zuzana Brnoliaková

#### **2.4.6. List of other projects funded from national resources**

Cardiovascular Effects of Nanoencapsulated Simvastain and Coenzyme Q10 in Experimental Hyperlipidemia (KANASTA)

Principal Investigator Radoslava Reháková

Project Duration: 2015-2018

Program: Other Projects

MVTS: An integrated European platform for pancreas cancer research: from basic science to clinical and public health interventions for a rare disease

Principal Investigator Magdaléna Májeková

Project Duration: 2013-2016

Program: Other Projects

MVTS: Multi-target paradigm for innovative ligand identification in the drug discovery process

Principal Investigator Magdaléna Májeková

Project Duration: 2016-2020

Program: Other Projects

MVTS: Stimulating organic syntheses inspired by nature - from the chemistry of natural products to the discovery of drugs

Principal Investigator Ľubica Horáková

Project Duration: 2015-2019

Program: Other Projects

National Programme for Prevention of Cardiovascular Disease

Principal Investigator Valéria Regecová

Project Duration: 2011-2016

Program: Other Projects

New methods to improve diagnostics, prevention, and treatment of cardiovascular diseases with focus on oxidative stress. Protection from radiation-induced heart damage. Reperfusion injury - heart transplantation

Principal Investigator Ján Slezák

Project Duration: 2018-2019

Program: Other Projects

New methods of prevention and treatment of oxidative stress, ischemia-reperfusion injury and heart transplantation

Principal Investigator Ján Slezák

Project Duration: 2019-2021

Program: Other Projects

Investigation of molecular mechanisms of cardioprotective effects of melatonin and omacor in the development of metabolic syndrome in experimental conditions

Principal Investigator Tamara Egan-Beňová

Project Duration: 2014-2017

Program: Other Projects

The influence of prenatal hypoxia on the development of the individual and the possibility of therapy for its long-term consequences

Principal Investigator Michaela Piešová

Project Duration: 2020-2020

Program: Doktograd

#### **2.4.7. List of projects funded from private funds**

The influence of variability of NOS1 and DAT1 genes on sensorimotor gating in humans: the implications for the pathophysiology of schizophrenia

Principal Investigator Igor Riečanský

Project Duration: 2013-2016

Program: R & D Projects

Research of innovative dosage forms and technological procedures in ecological processing of biological waste of eggshells

Principal Investigator Michal Dubovický

Project Duration: 2015-2018

Program: R & D Projects

## 2.5. PhD studies and educational activities

### 2.5.1. List of accredited programmes of doctoral studies, period of validity, source of funding

- [1] Study programme 7.1.3 Normal and Pathological Physiology, Ministry of Education, Science, Research and Sport of the Slovak Republic, in cooperation with the Faculty of Medicine, Comenius University, Bratislava (period of validity: 2004 - 2020).
- [2] Study programme 4.2.10 Animal Physiology, Ministry of Education, Science, Research and Sport of the Slovak Republic, in cooperation with the Faculty of Natural Sciences, Comenius University, Bratislava (period of validity: 2012 - 2020)
- [3] Study programme 7.3.2 – Pharmacology, Ministry of Education, Science, Research and Sport of the Slovak Republic, in coordination with Jessenius Faculty of Medicine, Comenius University, Martin (period of validity: 2012-continually)
- [4] Study programme Animal Physiology, Field Biology 3, Ministry of Education, Science, Research and Sport of the Slovak Republic, in cooperation with the Faculty of Natural Sciences, Comenius University, Bratislava (period of validity: 2020-continually)
- [5] Study programme Biochemistry, Field Chemistry 17, Ministry of Education, Science, Research and Sport of the Slovak Republic, in cooperation with the Faculty of Natural Sciences, Comenius University, Bratislava and Faculty of Chemical and Food Technology, Bratislava, Slovak University of Technology (period of validity: 2020-continually)
- [6] Study programme Normal and Pathological Physiology, Field General Medicine, Ministry of Education, Science, Research and Sport of the Slovak Republic, in cooperation with the Faculty of Medicine, Comenius University, Bratislava (period of validity: 2020-continually)
- [7] Study programme Neuroscience, Field General Medicine, Ministry of Education, Science, Research and Sport of the Slovak Republic, in cooperation with the Faculty of Medicine, Comenius University, Bratislava (period of validity: 2021-continually)

### 2.5.2. Summary table on doctoral studies (number of internal/external PhD students at the end of the year; number of foreign PhD students, number of

**students who successfully completed their theses during the year, number of PhD students who quit the programme during the year)**

PhD study	2016			2017			2018			2019			2020			2021		
Number of potential PhD supervisors																		
PhD students	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted	number, end of year	defended thesis	students quitted
Internal total	31	8	1	27	12	0	27	8	0	28	2	0	26	5	2	22	4	4
from which foreign citizens	0	0	0	1	0	0	2	0	0	4	0	0	4	0	1	5	0	0
External	3	1	1	2	1	0	5	0	0	3	2	0	3	0	1	2	1	0
Other supervised by the research employees of the institute	1	0	0	1	0	0	1	0	0	2	1	0	1	0	0	1	0	0

**2.5.3. PhD carrier path – Information on the next career steps of the PhD graduates who received their degree from the institute**

Michal Kluknavský – he continues in his specialization as a post-doc at INPP (2018 - by now)

Miroslava Kvandová – she continues in her specialization as a post-doc at University Medicine/Center of Cardiology - Cardiology 1, University Medical Center Mainz, Johannes Gutenberg University Mainz, Germany

Miroslava Majzúnová – she continues in her specialization at Faculty of Natural Sciences, Comenius University Bratislava (full-time) and also at INPP (part-time)

Zuzana Matúšková, Mgr., PhD. (2016) - maternal leave without continuation in sciences

Radoslava Reháková, RNDr., PhD. (2017) - she continues in her specialization in pharmaceutical company

Michaela Košútová - (2019) she does not continue in her specialisation

Rastislav Rovný (2018) - post-doctoral research scientist at CEM

Jana Murínová (2017) - does not follow an academic carrier

Barbora Kaločayová, PhD. (2016) - she continues in her specialization as a post-doc at the institute (2017 - by now)

Csilla Viczenczová, PhD. (2016) - she does not continue in her specialization

Ivana Kancírová, PhD. (2017) – maternal leave

Branislav Kura, PhD. (2017) - he continues in his specialization as a post-doc at the institute (2017 - by now)

Martina Muráriková, PhD. (2017) - she does not continue in her specialization

Lucia Griecsová (Kindernay) (2018) - she continues in her specialization as a post-doc at the institute (2018 - by now)

Magdaléna Jašová, PhD. (2018) – in part-time she continues in her specialization at the institute (2018 - by now)

Jakub Križák, PhD. (2018) - he does not continue in his specialization

Ľubomír Lonek PhD. (2019) – in years 2019-2021 he continued in his specialization at the Institute

Kristína Ferenczyová, PhD. (2020) - she continues in her specialization as a post-doc at the institute (2020 - by now)

Matúš Sýkora, PhD. (2021) - he continues in his specialization as a post-doc at the institute (2021 - by now)

Bačiak Ladislav (2017) - works in the field at the Central laboratories - In-vivo NMR Laboratory of the Slovak technical University  
 Belovičová Kristína (2018) - she continues in her specialization as a post-doc at the institute  
 Bogi Eszter (2016) - she continues in her specialization at the institute  
 Csatlósová Kristína (2021) - post-doctoral research scientist at CEM – currently on post doc position funded by SAIA, Ireland  
 Csekes Erika (2020) - she continues in her specialization as a post-doc at Faculty of Natural Sciences, Comenius University Bratislava  
 Grobarčík Balleková Jana (2017) - she continues in her specialization in pharmaceutical company  
 Heger Vladimír (2020) - he continues in his specialization as a post-doc at the institute  
 Koprďová Romana (2017) - she continues in her specialization as a post-doc at the institute  
 Lipták Boris (2019) - he does not continue in his specialization  
 Mrvová Nataša (2016) - she continues in her specialization in pharmaceutical company  
 Piešová Michaela (2021) - she continues in her specialization in pharmaceutical company  
 Slovák Lukáš (2017) - he continues in his specialization at State Institute for Drug Control (full-time) and also at institute (part-time)  
 Stará Veronika (2017) - she continues in her specialization in pharmaceutical company  
 Škandík Martin (2020) - he continues in his specialization as a post-doc at University in Helsinki, Finland  
 Tyukos Barbara (2018) - she continues in her specialization in pharmaceutical company

#### 2.5.4. Summary table on educational activities

Teaching	2016	2017	2018	2019	2020	2021
Lectures (hours/year)*	417	335	400	444	426	346
Practicum courses (hours/year)*	1,145	2,037	3,106	2,469	2,514	2,903
Supervised diploma and bachelor thesis (in total)	16	16	35	28	35	31
Members in PhD committees (in total)	5	7	15	14	9	10
Members in DrSc. committees (in total)	2	2	3	2	3	3
Members in university/faculty councils (in total)	9	7	22	23	24	20
Members in habilitation/inauguration committees (in total)	1	3	5	3	6	5

#### 2.5.5. List of published university textbooks

BREIER, Albert - LAKATOŠ, Boris - VAREČKA, Ľudovít - MIHALOV, J. - BARTEKOVÁ, Monika. Princípy molekulárnej medicíny. Bratislava : Fakulta chemickej a potravinárskej technológie STU, 2017. 306 s. ISBN 978-80-89597-59-8 Typ: ACB

#### 2.5.6. Number of published academic course books

#### 2.5.7. List of joint research laboratories/facilities with universities

-Scientific research cooperation from 2016  
Faculty of Medicine UPJŠ  
Faculty of Electrical Engineering and Informatics STU  
Masaryk University Brno, Czech Republic

-Scientific research cooperation from 2017  
University of Catania, Department of Biomedical and Biotechnological Sciences,  
Catania, Italy

-interinstitutional agreement from 2016  
University of Vienna, Austria  
University of Kragujevac, Serbia  
Charité-University Medicine, Berlin, Germany  
University of Glasgow, School of Mathematics and Statistics, Glasgow, UK  
Royal College of Surgeons in Ireland, Dublin, Ireland

-interinstitutional agreement from 2017-2019  
Cape Peninsula University of Technology, JAR

-Scientific research cooperation from 2018  
Faculty of Pharmacy, UK  
Faculty of Medicine, UK  
Faculty of Science  
Slovak Technical University in Bratislava  
University of Szeged, Hungary

- Pedagogical cooperation from 2018  
Faculty of Medicine, UK  
Faculty of Science, UK  
Slovak Technical University in Bratislava

-Scientific research cooperation from 2021  
Slovak Medical University – histological joint research laboratory

#### **2.5.8. Supplementary information and/or comments on doctoral studies and educational activities – focused on what changes have occurred since the last evaluation in 2016**

Until 2018, doctoral students were trained within the individual institutes in the fields of normal and pathological physiology, animal physiology, biochemistry and pharmacology, but not every institute was able to train in all fields. After the merger of the institutes into the CEM SAS, the possibilities of training in all fields were extended to all organizational units. Subsequently, the lists of possible trainers for individual departments were updated. CEM SAS has a sufficient number of supervisors and infrastructure to ensure quality doctoral studies, while doctoral students work not only in domestic but also international projects.

In connection with the reorganization of PhD study, where changes in the names and classification of fields and their respective programs took place, the Internal Quality Assessment System for PhD study has been accepted for PhD students (starting since 2020). It defines the criteria for the selection of supervisors, the selection of listed topics of doctoral studies, control of the course of doctoral studies as well as the requirements for the quality of doctoral study graduates. Based on the system, the following were approved as new guarantors for CEM SAS in the individual fields: Dr.



Bernátová - biology, Dr. Bauerová - pharmacy, Dr. Barančík - chemistry, Dr. Pechanova and Dr. Riečanský - general medicine. In 2020, new framework agreements were also prepared with the Faculty of Natural Sciences and Faculty of Medicine and Pharmacological Faculty of Comenius University as well as with Faculty of Chemical and Food Technology, Slovak University of Technology.

Within PHD study at CEM regular activities are organized: introductory seminar for newly admitted doctoral students, a conference of CEM doctoral students with a presentation of the achieved results, which they organize themselves, and a regular evaluation of the course of study within the meeting with the guarantors of individual fields. CEM has successfully managed to internationalize PhD study and attract quality students from abroad, whose number is growing from year to year (in 2021 we trained 7 students from various foreign countries).

## 2.6. Societal impact

### 2.6.1. The most important case studies of the research with direct societal impact, max. 4 for institute with up to 50 average FTE researchers per year, 8 for institutes with 50 – 100 average FTE researchers per year and so on. Structure: Summary of the impact; Underpinning research; References to the research; Details of the impact; Sources to corroborate the impact. One page per one case study

**Title:** Development of national reference values of body mass index (BMI) for children and adolescents from 2 to 18 years, according recommendations of National Center for Health Statistics / World Health Organization (NCHS / WHO)

**Summary:** BMI values were defined for overweight, obesity, and excessively low weight categories at 6-month intervals by age and gender. By applying the percentile values obtained by the LMS method, Slovakia is now included among the countries that have their national BMI standards, developed by the NCHS / WHO standards. This allows 1) an objective evaluation of the growth and development of individual child, 2) epidemiologic monitoring the trends of BMI in Slovak population compared to other nations/populations, 3) assessment of the incidence of obesity and malnutrition in at both regional and global level. BMI percentage values are now available to the pediatrician and general public on the official website of the Public Health Authority of the Slovak Republic since November 2017. Data are also available for large-scale international collaboration and published in prestige journals.

#### **Underpinning research**

The basic indirect indicator of body weight and weigh proportionality is the BMI, which serves as a screening method for overweight and obesity in children and adolescents (1,2). While the limits for healthy weight (BMI = 25) and obesity (BMI  $\geq$  30) in adults were set based on the likelihood of overweight or obesity-related diseases, such studies were lacking in children. In Slovakia, the first percentile tables and BMI graphs were published on the basis of data obtained from the National Anthropometric Survey in 2001 (3), which, however, have not been analyzed according to WHO recommendations (1,4,5). This research resulted in Slovak national BMI standards developed according to the generally accepted LMS methodology (4).

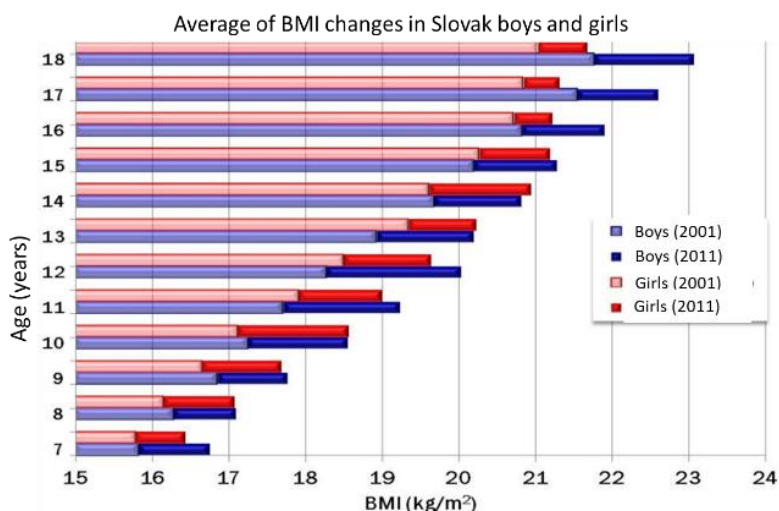
#### **References to the research**

1. World Health Organization. Physical Status: The Use and Interpretation of Anthropometry. Report of the WHO Expert Committee. WHO Technical Report Series 854. Geneva: WHO, 1995: 161-262. 2. World Health Organization. Obesity: Preventing and managing the global epidemic, Report of a WHO consultation. WHO Technical Report Series, No. 894, Geneva: WHO, 2000. 3. Ševčíková L, at al. Telesný vývoj detí a mládeže v SR: Výsledky VI. celoštátneho prieskumu v roku 2001. Bratislava: Úrad verejného zdravotníctva SR, 2004: 184. 4. Cole TJ, Green PJ. Smoothing reference centile curves: the LMS method and penalized likelihood. Stat Med 1992; 11:

1305-1319. 5. de Onis M, et al. Comparison of the World Health Organization (WHO) Child Growth Standards and the National Center for Health Statistics/WHO international growth reference: implications for child health programmes for the WHO Multicentre Growth Reference Study Group Public Health Nutrition 2006;9:942-7.

#### Sources to corroborate the impact:

1. REGECOVÁ, Valéria - et al. Classification of body mass index values in children and adolescents. Available at: [https://www.uvzsr.sk/docs/info/hdm/Telesny\\_vyvin\\_deti\\_a\\_ml.pdf](https://www.uvzsr.sk/docs/info/hdm/Telesny_vyvin_deti_a_ml.pdf)
2. BIXBY, Honor - BENTHAM, James - ZHOU, Bin - DI CESARE, Mariachiara - PACIOREK, Christopher J. - REGECOVÁ, Valéria Rising rural body-mass index is the main driver of the global obesity epidemic in adults. In Nature, 2019, vol. 569, no. 7755, p. 260-264. <https://doi.org/10.1038/s41586-019-1171-x>.
3. RODRIGUEZ-MARTINEZ, A. - ZHOU, Bin - SOPHIEA, M.K. - BENTHAM, J. - PACIOREK, C.J. - REGECOVÁ, Valéria. Height and body-mass index trajectories of school-aged children and adolescents from 1985 to 2019 in 200 countries and territories: a pooled analysis of 2181 population-based studies with 65 million participants. In Lancet, 2020, vol. 396, no. 10261, p. 1511-1524. Dostupné na: [https://doi.org/10.1016/S0140-6736\(20\)31859-6](https://doi.org/10.1016/S0140-6736(20)31859-6).



#### Details of the impact:

**Impact:** New national Slovak reference standards of BMI for 2-18 years old population, developed according to recommendations of NCHS / WHO. Its impact is evidenced by three headings below:

**Knowledge** of development trends in the body structure of the young Slovak population, which allows comparison with other populations at the regional level, within the EU and globally. Based on deviations from the established norm, it is possible to identify overweight, obesity but also malnutrition in an individual child with regard to his/her age.

**Preventive measures:** In case of deviation from the norm, it is possible to take preventive measures to adjust the weight and thus prevent obesity and subsequent comorbidities such as hypertension and diabetes mellitus.

**Health improvement and reduced health care costs:** Early recognition of deviations from normal growth and the application of suitable preventive measures in childhood have a significant socio-economic impact and lead to an improvement in the health status of the population and consequently to a reduction in health care costs.

**Names of researcher:** Valéria Regecová

#### Title: SAFETY ASSESEMENT OF CHEMICALS FOR REGISTRATION

Institute of Experimental Pharmacology and Toxicology (IEPT) is able to conduct relevant in vivo and in vitro studies in compliance with **Good Laboratory Practice (GLP)** which is an essential condition for carrying out studies for the needs of the REACH legislation. REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) is a European Union regulation adopted to

improve the protection of human health and the environment from the risks posed by chemicals, while increasing the competitiveness of the EU chemical industry. Laboratories involved to GLP mode are regularly controlled by the Slovak National Accreditation Service. The Institute significantly contributes to identification of risks associated with the substances produced and placed on EU market. EU firms are required to demonstrate to ECHA (European Chemical Agency) how the substances can be used safely and users must be informed of the risk management measures. The Institute provides in vivo and in vitro toxicology studies mostly to foreign sponsors. Several experimental studies were done within assessed period. Namely, acute oral toxicities and prenatal developmental studies, in vitro skin corrosion, skin irritation and eye irritation tests and ISO 10993 methods for testing medical devices in vitro.

### **Underpinning research**

The personnel of the IEPT has been involved in number of the validation studies and test methods development projects. In the recent period, the in vitro toxicology laboratory established completely new portfolio of 5 OECD and 2 ISO test methods, that are conducted without the use of animals. The personnel participated in the process of development and regulatory acceptance of 2 new guidelines (OECD TG 498 in vitro phototoxicity testing) and ISO 10993-23 (in vitro intracutaneous test). Furthermore it participates on the EURL-ECVAM coordinated validation study on thyroid disruption methods, and develops new assays with reconstructed human tissue models to enhance the applicability domain of ISO 10993-23 via 2 APVV and 1 VEGA funded projects. The involvement of the new generation risk assessment approach is further expanded via ONTOX H2020 project.

### **References to the research**

AHUJA, Varun - KRISHNAPPA, M. - KANĎÁROVÁ, Helena. In silico toxicity prediction using Derek Nexus® for skin sensitization, phototoxicity, hepatotoxicity and in vitro hERG inhibition = In silico toxicity prediction using Derek Nexus (R) for skin sensitization, phototoxicity, hepatotoxicity and in vitro hERG inhibition. In Toxicology Letters : official journal of EUROTOX, 2021, vol. 350, suppl., p. S250, LP-18. (2020: 4.374 - IF, Q2 - JCR, 1.007 - SJR, Q1 - SJR, karentované - CCC). (2021 - Current Contents). ISSN 0378-4274. (EUROTOX 2021 : Congress of the European Societies of Toxicology)

ALLEN, Dave - BAE, Ok-Nam - ESKEŠ, Chantra - KANĎÁROVÁ, Helena - HOFFMANN, Sebastian - KOJIMA, Hajime. Independent Peer-Review Panel Report on the scientific validity of the KeraSkin™ Skin Irritation Test Reconstructed human Epidermis method as a similar test according to OECD Test Guideline 439 and Guidance Document 220 : PRP Report - 29 July 2020, KeraSkin™ SIT RhE method. In OECD, 29 July 2020. Produced in the context of update of OECD TG 439 : Report of the peer-review of the validation of KeraSkin™. - OECD, 2020, 8 p. Available at: <<https://www.oecd.org/env/ehs/testing/section4-health-effects.htm>  
[https://www.oecd.org/env/ehs/testing/KeraSkin\\_PRP\\_report\\_Final\\_29July2020.pdf](https://www.oecd.org/env/ehs/testing/KeraSkin_PRP_report_Final_29July2020.pdf)>

CALONI, Francesca - CAZZANIGA, Alessandra - COCCINI, Teresa - GUTLEB, Arno C. - KANĎÁROVÁ, Helena - MELONI, Marisa - RASHIDI, Hassan - SAMBUY, Yula - WILFLINGSEDER, Doris - CASATI, Giulio. Virtual Summer School: Alternative Methods and Models in Science: A Multidisciplinary In Vitro Approach : meeting report. In ALTEX : Alternatives to Animal Experimentation, 2020, vol. 37, no. 3, p. 500-502. (2019: 5.787 - IF, Q1 - JCR, 1.270 - SJR, Q1 - SJR). ISSN 1868-596X. Dostupné na: <https://doi.org/10.14573/altex.2006251> (Lake Como School of Advanced Studies - Virtual Summer School 2020 : Alternative methods and models in Science: a multidisciplinary in vitro approach)

CALONI, Francesca - CAZZANIGA, Alessandra - COCCINI, Teresa - GUTLEB, Arno C. - KANĎÁROVÁ, Helena - CERIOTTI, Laura - RASHIDI, Hassan - SAMBUY, Yula - VON AULOCK, Sonja - WILFLINGSEDER, Doris. Second Virtual Summer School: Alternative Methods in Science: Towards Model Complexity : meeting report. In ALTEX : Alternatives to Animal Experimentation,

2021, vol. 38, no. 3, p. 510-512. (2020: 6.043 - IF, Q1 - JCR, 0.975 - SJR, Q1 - SJR). ISSN 1868-596X. Dostupné na: <https://doi.org/10.14573/altex.2106221> (Lake Como School of Advanced Studies - Second Virtual Summer School 2021 : Alternative Methods in Science: towards model complexity)

DE JONG, Wim - COLEMAN, Kelly - HOFFMANN, Sebastian - LEE, Michelle - KANĎÁROVÁ, Helena - LETAŠIOVÁ, Silvia - DE LA FONTEYNE, Liset - PELLEVOISIN, Christian - HAISHIMA, Yuji - BACHELOR, Michael - TURLEY, Audrey - ROLLINS, Thor. In vitro irritation testing of medical devices: Validation and acceptance. In ALTEX Proceedings : Abstracts of the 11th World Congress, Maastricht, 2021. - Springer Spektrum, 2021, vol. 9, no. 1, p. 88. ISSN 2194-0479. (World Congress on Alternatives and Animal Use in the Life Sciences)

KANĎÁROVÁ, Helena - HAYDEN, Patrick J. Standardised Reconstructed Skin Models in Toxicology and Pharmacology: State of the Art and Future Development. In Handbook of Experimental Pharmacology. - Springer Nature, 2021, 2021, vol. 265, p. 57-71. (2020: 1.605 - SJR, Q1 - SJR). ISSN 0171-2004. Available at: [https://doi.org/10.1007/164\\_2020\\_417](https://doi.org/10.1007/164_2020_417)

KANĎÁROVÁ, Helena. Alternative methods to animal experimentation and their role in modern toxicology. In Toxicological Risk Assessment and Multi-System Health Impacts from Exposure. - Elsevier Inc., Academic Press, 2021, part 1, chapter 2, P. 13-22. ISBN 978-0-323-85215-9.

KEJLOVÁ, Kristína - BENDO VÁ, Hana - CHRZ, Jan - DVOŘÁKOVÁ, Markéta - SVOBODOVÁ, Lada - VLKOVÁ, Alena - KUBÁČ, Lubomír - KOŘÍNKOVÁ, Radka - ČERNÝ, Jiří - OČADLÍKOVÁ, Danuše - RUCKI, Marián - HEINONEN, Tuula - JÍROVÁ, Dagmar - LETAŠIOVÁ, Silvia - KANĎÁROVÁ, Helena - KOLÁŘOVÁ, Hana. Toxicological testing of a photoactive phthalocyanine-based antimicrobial substance. In Regulatory Toxicology and Pharmacology, 2020, vol. 115, art. no. 104685. (2019: 2.652 - IF, Q1 - JCR, 0.842 - SJR, Q2 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0273-2300. Available at: <https://doi.org/10.1016/j.yrtph.2020.104685>

19 Acute oral toxicities according to OECD 423 test guideline in 2020: Final Reports 0001-2020 – 0009-2020; Final Reports 0017-2020 – 0026-2020

7 In vitro studies according to OECD 423 test guideline in 2020: Final Reports 0010–0016-2020

2 Prenatal Developmental Studies according to OECD 414 test guideline in 2020-2021: Final Reports 0027-2020 – 0028-2020

16 Acute oral toxicities according to OECD 423 test guideline in 2021: Final Reports 0001-2021 – 0016-2021

### **Details on the impact**

The IEPT makes a significant contribution to the collection and evaluation of information on the properties and hazards of substances. ECHA receives and evaluates individual registrations for compliance and EU Member States evaluate selected substances to clarify initial concerns for human health and the environment. Authorities can ban hazardous substances if the risks cannot be controlled. They may also decide to restrict the use of the substance or make it subject to prior authorization.

**2.6.2. List of the most important studies and/or other activities commissioned for the decision-making authorities, the government and NGOs, international and foreign institutes (title, name of institution, contract value, purpose (max 20 words))**

Studies in the frame of the Non-communicable diseases (NCD) Risk Factor Collaboration (NCD-RisC)

The non-communicable diseases (NCD) Risk Factor Collaboration (NCD-RisC) group works closely with the World Health Organisation (WHO), through the WHO Collaborating Centre on NCD Surveillance and Epidemiology at Imperial College London. NCD-RisC pools high-quality population-based data using advanced statistical methods, designed specifically for analysing NCD risk factors. The Collaboration currently has data from over 2,545 population-based surveys from 193 countries since 1957, with nearly 129 million participants whose risk factor levels have been measured.

<https://www.cuore.iss.it/eng/collaboration/ncd>

V. Regecová was a member of this collaboration in 2015-2020 and supplied the group with data related to blood pressure and anthropometric parameters (for determination of obesity) of young Slovak population. These are included in publications below.

BIXBY, Honor - BENTHAM, James - ZHOU, Bin - DI CESARE, Mariachiara - PACIOREK, Christopher J. - REGECOVÁ, Valéria. Rising rural body-mass index is the main driver of the global obesity epidemic in adults. In *Nature*, 2019, vol. 569, no. 7755, p. 260-264. (2018: 43.070 - IF, Q1 - JCR, 16.345 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 0028-0836. Available at: <https://doi.org/10.1038/s41586-019-1171-x> (160)

RODRIGUEZ-MARTINEZ, A. - ZHOU, Bin - SOPHIEA, M.K. - BENTHAM, J. - PACIOREK, C.J. - REGECOVÁ, Valéria. Height and body-mass index trajectories of school-aged children and adolescents from 1985 to 2019 in 200 countries and territories: a pooled analysis of 2181 population-based studies with 65 million participants. In *Lancet*, 2020, vol. 396, no. 10261, p. 1511-1524. (2019: 60.392 - IF, Q1 - JCR, 14.554 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0140-6736. Available at: [https://doi.org/10.1016/S0140-6736\(20\)31859-6](https://doi.org/10.1016/S0140-6736(20)31859-6) (30)

ZHOU, Bin - CARRILLO-LARCO, Rodrigo M - DANAEI, Goodarz - RILEY, Leanne M. - PACIOREK, Christopher J. - REGECOVÁ, Valéria. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. In *Lancet*, 2021, vol. 398, no. 10304, p. 957-980. (2020: 79.323 - IF, Q1 - JCR, 13.103 - SJR, Q1 - SJR, karentované - CCC). (2021 - Current Contents). ISSN 0140-6736. Available at: [https://doi.org/10.1016/S0140-6736\(21\)01330-1](https://doi.org/10.1016/S0140-6736(21)01330-1) (15)

IURILLI, Maria LC - ZHOU, Bin - BENNETT, James E - CARRILLO-LARCO, Rodrigo M - SOPHIEA, Marisa K - REGECOVÁ, Valéria. Heterogeneous contributions of change in population distribution of body mass index to change in obesity and underweight. In *eLife*, 2021, vol. 10, art. no. e60060. (2020: 8.146 - IF, Q1 - JCR, 5.879 - SJR, Q1 - SJR). ISSN 2050-084X. Available at: <https://doi.org/10.7554/eLife.60060> (8)

Expertise in the frame of WHO European Childhood Obesity Surveillance Initiative (COSI)

Since 2015 Slovakia is part of the international project WHO European Childhood Obesity Surveillance Initiative (COSI) aimed at monitoring and preventing childhood obesity in 40 European countries. The guarantor of the project in the Slovak Republic is the office of the WHO SR and the Ministry of Health of the SR.

<https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/activities/who-european-childhood-obesity-surveillance-initiative-cosi/about-cosi>

For COSI purposes, Dr. V. Regecová performed processing and evaluation of anthropometric parameters in about 6100 children aged 7 to 8 years, which parameters were measured in the years 2018 – 2019.

REGECOVÁ, Valéria - HAMADE, Jana - KÁLAYOVÁ, Daniela - TICHÁ Ľubica. Sledovanie nadváhy a obezity u detí mladšieho školského veku v rámci V. kola medzinárodného projektu COSI. In Životné podmienky a zdravie: zborník vedeckých prác. - Bratislava: Univerzita Komenského v Bratislave, 2020, s. 212-223. ISBN 978-80-223-4934-5

[https://www.fmed.uniba.sk/fileadmin/lf/sucasti/Teoreticke\\_ustavy/Ustav\\_hygieny/Webpic/Zborniky/ZPaZ\\_2020\\_web.pdf](https://www.fmed.uniba.sk/fileadmin/lf/sucasti/Teoreticke_ustavy/Ustav_hygieny/Webpic/Zborniky/ZPaZ_2020_web.pdf)

Activities for the National Health Information Center (NHIC), Public Health Authority (PHA) of the Slovak Republic and for the Ministry of Health (MH) of the Slovak Republic

1. In cooperation with PHA, Dr. V. Regecová considerably contributed to the development of reference values of body mass index (BMI) for children and adolescents from 2 to 18 years of age, according to the methodological recommendations of WHO. BMI values were defined for overweight, obesity, and excessively low weight at 6-month intervals by age and gender according to the WHO methodology (LMS methodology). This allows an objective evaluation of changes during the child's growth and development in individual cases, as well as evaluation of population trends in obesity and malnutrition at the regional or national levels. BMI values have been available to the public since November 2017. Available at: [https://www.uvzsr.sk/docs/info/hdm/Telesny\\_vyvin\\_deti\\_a\\_ml.pdf](https://www.uvzsr.sk/docs/info/hdm/Telesny_vyvin_deti_a_ml.pdf)

2. The "Hypertension Register - Children" is one of the three components of the National Register of National Cardiovascular Registry in the NHIC and has no equivalent in Europe. The NHIC Register contains a large amount of (45) data concerning family and personal history, circumstances of high blood pressure (BP), anthropometry, laboratory tests, subjective and objective difficulties, associated diseases, course and type of therapy of each patient, which are detailed analysed exclusively at INPP CEM SAS. This information is important for the creation and implementation of state health policy, for improving the quality of prevention, streamlining and continuously improving the quality of health care.

Currently, the Register contains data from 2011, a total of 3057 records from 2043 patients sent from 48 pediatric cardiology clinics from all over Slovakia. Newly diagnosed hypertension was identified in 1221 patients. Elevated blood pressure values persist into adulthood in 57% of adolescents during pharmacotherapy, suggesting that the effectiveness of prevention and treatment of primary hypertension is not yet satisfactory. Independent of therapy, a large proportion of patients with insufficient reduction in nocturnal blood pressure (45%) were confirmed. The phenomenon of non-dipping is significantly related to obesity, which affects almost half of the patients registered with the NHIC Registry.

REGECOVÁ, Valéria – Šimurka, P., Baráková, A, Mašura, J. Register primárnej hypertenzie u detí a adolescentov v SR. In Informačný bulletin hlavného hygienika Slovenskej republiky, 2017, č. 1, s. 124-129. [https://www.nczisk.sk/Documents/nzr/prezentacie/register\\_primarne\\_hypertenzie.pdf](https://www.nczisk.sk/Documents/nzr/prezentacie/register_primarne_hypertenzie.pdf)

3. For a Chief Expert of the Ministry of Health of the Slovak Republic for pediatric cardiology, Dr. V. Regecová worked as an expert commented on the "Report on the implementation of the National Action Plan for Obesity Prevention 2015-2020." [https://www.uvzsr.sk/index.php?option=com\\_content&view=article&id=2777:narodny-akny-plan%20vnprevencii-obezity-na-roky-2015-2025](https://www.uvzsr.sk/index.php?option=com_content&view=article&id=2777:narodny-akny-plan%20vnprevencii-obezity-na-roky-2015-2025)

## **Safety assesement of chemicals**

Acute oral toxicity according to OECD TG 423, 42 substances, sponsors from Switzerland, Germany, Belgium, China, Israel, Sweden, Italy, Netherlands, France and Slovakia

Prenatal Developmental Toxicity Studies according to TG 414 on rats, 2 substances, sponsor from China

In Vitro Skin Corrosion Test: Reconstructed Human Epidermis Test Method (OECD TG 431), 1 substance, sponsor from Sweden.

In Vitro Skin Irritation Test: Reconstructed Human Epidermis Test Method (OECD TG 439), 3 substances, sponsors from Netherland, Finland and Slovakia

In Vitro Eye Irritation Test: Reconstructed Human Cornea-like Test Method (OECD TG 492), 3 substances, sponsors from Netherland, Finland and Slovakia

For the in vitro field:

- International collaboration on the development and implementation of the reconstructed human tissue models into the OECD, as OECD TG 498
- International collaboration on the ISO 10993-23 implementing in vitro intracutaneous test into the ISO standards
- Providing expertize to OECD expert pannel on the topical toxicity testing and phototoxicity testing. Percipitation on the creation of several regulatory relevant documents linked to in vitro testing strategies for eye irritation and phototoxicity
- Provision of the expertize to the EPAA (he European Partnership for Alternative Approaches to Animal Testing) via EPAA mirror group

### **2.6.3. List of contracts and research projects with industrial and other commercial partners, incl. revenues (study title, name of institution, contract value, country of partner, purpose (max 20 words))**

#### **Industrial research project - BioVendor**

Partner: BioVendor, s.r.o., Brno, Czech Republic

Volume of funds received in the 2016-2019 (€): **72 129**

Brief description: A long-term cooperation in the production of hyperimmune sera in rabbits for the production of diagnostic kits used in clinical practice.

#### **Test of Eye Tolerance**

Partner: Unimed Pharma, Ltd.

Volume of funds received in the 2016 (€): **5 110**

Brief description: An ocular tolerance study of LEVODEXA drops in rabbits. The study showed that LAVODEXA eye drops have no irritant, corrosive or toxic effect, are well tolerated and safe.

#### **Industrial research project - Biomin**

Partner: BIOMIN, a.s. Cífer

Volume of funds received in the 2016-2017 (€): **91 908**

Brief description: A research of innovative dosage forms and technological procedures in the ecological processing of biological waste of eggshells. IEPT became a co-solver of the project in November 2016, the selection was made by a public procurement company BIOMIN. The responsible staff prepared a feasibility study of the project, specifically an evaluation of the effects and kinetics of natural calcium from eggshells (BIOMIN H dosage form) in rats.

### **Reproductive toxicity studies according to OECD 422 Guideline**

Partner: hameln, rds

Volume of funds raised in the 2017-2020 (€): **40 000**

Brief description of the output / result: The Institute participated in the evaluation of the reproductive toxicity of the test substance under the REACH program.

### **Production of hyperimmune sera from rabbits**

Partner: DB Biotech, s.r.o.

Volume of funds raised in the 2018 (€): **10 500**

Brief description: Based on the order of DB Biotech, s.r.o. we prepared hyperimmune sera for them in the required quantities and quality.

### **GLP studies in vivo**

Partner: SITNO Pharma, s.r.o.

Volume of funds raised in the 2020-2021 (€): **227 420**

Brief description: Studies in the field of prenatal toxicity according to OECD 414 and acute toxicity according to OECD 423

### **GLP studies in vitro**

Partner: SITNO Pharma, s.r.o.

Volume of funds raised in the 2020 (€): **7 300**

Brief description: Studies in the field of skin and eye irritation and corrosivity

### **Preclinical research study: efficacy of Chondroitin sulfate of different origin in the adjuvant arthritis rat model**

Partner: ZPD A / S, Denmark

Volume of funds raised in the 2021 (€): **10 000**

## **2.7. Popularisation of Science (outreach activities)**

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

Obesity and beneficial substances in red wine - Oľga Pecháňová, Martina Cebová, Radoslava Reháková, Andrej Barta, Zuzana Matuskova, Michaela Košťutová, Juraj Laco; television, news article; 2016

The human heart and high blood pressure - Oľga Pecháňová; web page article; 2017

Why we are stressed -Iveta Bernátová, discussion for public and associated articles in printed media, Nu Spirit Club; 13.1.2016

<https://www.youtube.com/watch?v=4ZxRXXnUssM>

Open door days – INPP, presentation and discussion for children in Hungarian language; 9.11. 2017, 7.11.2018

exkurzia[http://www.tyzdenvedy.sk/buxus/generate\\_page.php?page\\_id=1117](http://www.tyzdenvedy.sk/buxus/generate_page.php?page_id=1117)

[http://www.tyzdenvedy.sk/buxus/generate\\_page.php?page\\_id=12467](http://www.tyzdenvedy.sk/buxus/generate_page.php?page_id=12467), 7.11.2018

How does cardiovascular system work? – Soňa Čačányiová; 2016; educational film; <https://www.youtube.com/watch?v=nx84dVZFwqA>



Hypertension - a silent enemy – Soňa Čačányiová; popularization article; 2017; <http://liek.beautywoma.n.sk/clanok/1628>

To keep the science alive – Miroslav Ferko; popularization article in journal Život number 14, 7.4.2018

Find within yourself the scientist – Miroslav Ferko, interview for radio, <http://radio-arch-pp.stv.livebox.sk/a520/00/0015/001517/00151740-1.mp3>, 28.3.2018

Interview - Marta Šoltésová Prnová, 2018, <https://www6.teraz.sk/regiony/zilina-raodshow-mladych-vedcov-sav-mo/329113-clanok.html>

Organism from a functional point of view - Find a scientist in yourself – INPP, excursion for students, 23. 4.2019

[https://www.sav.sk/?lang=sk&charset=&doc=services-news&source\\_no=20&news\\_no=8208](https://www.sav.sk/?lang=sk&charset=&doc=services-news&source_no=20&news_no=8208)

Future of science in the form of young hopes – Interactive conference of young scientists 2019 – Miroslav Ferko, interview, [http://www.schems.sk/chemzi\\_pdf/ChemZi\\_1\\_2019.pdf](http://www.schems.sk/chemzi_pdf/ChemZi_1_2019.pdf)

When is cocoa for health – Iveta Bernátová; interview for Aktuality.sk; 25. 11. 2020

Free Radicals Abroad – Katarína Valachová, internet, 30.6.2019, <https://sfrbm.org/publications/dot-newsletter/june-2019/free-radicals-abroad/>

An evening of curious – Nerd Nite; talk to the audience Andrea Berényiová 24.4. 2019  
Slovak experts from the SAS are working on a project to help fight a coronavirus pandemic; Soňa Čačányiová, press interview, 17. 9. 2020

<https://newsbeezer.com/slovakiaeng/slovak-experts-from-the-sas-are-working-on-a-project-to-help-fight-a-coronavirus-pandemic/>

### 2.7.2. Table of outreach activities according to institute annual reports

Outreach activities	2016	2017	2018	2019	2020	2021	total
Articles in press media/internet popularising results of science, in particular those achieved by the Organization	46	18	19	30	0	77	190
Appearances in telecommunication media popularising results of science, in particular those achieved by the Organization	5	8	8	3	0	8	32
Public popularisation lectures	8	8	8	21	0	14	59

## 2.8. Background and management. Infrastructure and human resources, incl. support and incentives for young researchers

### 2.8.1. Summary table of personnel

### 2.8.1.1. Professional qualification structure (as of 31 December 2021)

	Degree/rank				Research position		
	DrSc./DSc	CSc./PhD.	professor	docent/ assoc. prof.	I.	II.a.	II.b.
<b>Male</b>	5	32	2	3	8	15	12
<b>Female</b>	5	50	1	4	6	26	22

I. – director of research with a degree of doctor of science/DrSc.

II.a – Senior researcher

II.b – PhD holder/Postdoc

### 2.8.1.2. Age and gender structure of researchers (as of 31 December 2021)

Age structure of researchers	< 31		31-35		36-40		41-45		46-50		51-55		56-60		61-65		> 65	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
<b>Male</b>	10.0	2.7	7.0	6.5	4.0	3.3	6.0	4.0	1.0	1.0	1.0	1.0	3.0	3.0	1.0	1.3	9.0	5.0
<b>Female</b>	17.0	4.5	16.0	8.2	14.0	12.1	5.0	5.0	5.0	4.2	1.0	1.0	6.0	5.2	6.0	5.6	5.0	4.3

A – number

B – FTE

### 2.8.2. Postdoctoral fellowships (list of positions with holder name, starting date, duration. Add brief information about each fellow's career path before and after receiving PhD degree, etc.)

Michal Kluknavský - 1/2018 - by now, post doc at Department of Experimental Hypertension, INPP. He started at the INPP as undergraduate student. After he obtained MSc. degree, he continued at PhD study by 8/2017. After a brief break, he started as a postdoc (1/2018) working under supervision of I. Bernatova.

Andrea Berényiová - 9/2015 - post doc at Department of Vascular Disorder, INPP; till now junior scientist at Department of Vascular Disorder, INPP

Miroslava Majzúnová – 9/2015 - post doc at Department of Experimental Hypertension till 12/2019 INPP; 1/2020 till now - junior scientist at Department of Vascular Disorder

Barbora Kaločayová – 9/2016 – post doc at Department of Biochemistry, IHR; till now scientist at Biochemistry, IHR CEM

Branislav Kura 9/2017 – post doc at Department of Morphology and Electron Microscopy IHR; till now scientist at Department of Morphology and Electron Microscopy, IHR CEM

Lucia Griecsová (Kindernay) 9/2018 – post doc at Department of Cardiovascular Physiology and Pathophysiology, IHR; till now scientist at Department of Cardiovascular Physiology and Pathophysiology, IHR CEM

Kristína Ferenczyová 9/2020 – post doc at Department of Cardiovascular Physiology and Pathophysiology, IHR; till now scientist at Department of Cardiovascular Physiology and Pathophysiology, IHR CEM

Matúš Sýkora 9/2021 – post doc at Department of Morphology and Electron Microscopy IHR; till now scientist at Department of Morphology and Electron Microscopy, IHR CEM

Eszter Bogi 9/2016 - post doc at The Department of Cellular Pharmacology and Developmental Toxicology IEPT CEM; till now senior scientist at The Department of Cellular Pharmacology and Developmental Toxicology IEPT CEM

Romana Koprdoová 9/2017 - post doc at The Department of Cellular Pharmacology and Developmental Toxicology IEPT CEM; till now junior scientist at The Department of Cellular Pharmacology and Developmental Toxicology IEPT CEM

Kristína Csatoslová 9/2021 - post doc at The Department of Cellular Pharmacology and Developmental Toxicology IEPT CEM; till now junior scientist at The Department of Cellular Pharmacology and Developmental Toxicology IEPT CEM

Vladimír Heger 9/2020 - post doc at The Department of Biochemical Pharmacology IEPT CEM; till now junior scientist at The Department of Biochemical Pharmacology IEPT CEM

#### **2.8.2.1. MoRePro and SASPRO fellowships**

#### **2.8.2.2. Stefan Schwarz fellowships**

##### INPP

Peter Bališ - 1/2015 -12/2018

Miroslava Majzúnová - 5/2016 – 4/ 2020

##### IHR

Veronika Farkašová

Branislav Kura 2019-2021

Barbora Kaločayová- 2021- 2022

##### IEPT

Eszter Bogi (2017-2020)

Romana Koprdoová (2018-2021)

#### **2.8.2.3. Postdoctoral positions from other resources (specify)**

Andrea Berényiová - her salary was partially paid from APVV-15-0565 funds (1.7. 2016-31.12. 2017)

Drahomír Michalko – position partially funded from the project APVV-19-0570 (since 2020)

#### **2.8.3. Important research infrastructure introduced during the evaluation period with the information about the sources of funding (max. 2 pages)**

Infrastructure of the INPP CEM has been expanded and modernized during the evaluation period. The Institute has fully equipped biochemical lab including traditional techniques of gel electrophoresis, western blots and protein sequencing. New ChemiDoc Imaging System is a compact, full featured, chemiluminescent-capable gel/blot imaging instrument which support also colorimetric western blotting applications, and DNA/protein gel visualization (funding: extra-budgetary resources).

For improvement the biochemical, proteomic and genomic analyses new equipment were purchased: a high-precision orbital/linear shaking water bath (OLS26), drying oven (SLW 53 Smart), luminometer (Glomax 20/20, Promega), Western blots apparatuses 2x (PowerPac, MiniPROTEAN, BioRad, 6000€), on-site blood chemistry analyzer (Celercare M5) Nanodrop spectrophotometer for quantification and qualification of DNA, RNA, and protein samples in seconds with only 1-2 µL, and obtain full-spectral data, mechanic tissue homogenisator (POLYTRON® PT 1300 D), an ultrasonic homogenizers, autoclave (Icanclave class B, 23L), pH meter, one-side blood chemistry analyser that delivers fast and reliable results from full blood, plasma and serum, provides a wide spectrum of analysed parameters, included general chemistry, liver function and electrolyte parameters and others. Financial resources obtained from the projects SRDA PP-Covid-20-0043 and partially by APVV-16-0263.

New laboratory “OvoLab” for research of angiogenesis using in ovo and ex ovo cultures was established and put into operation in 2020 at INPP. The laboratory is fully equipped with infrastructure needed: 3 egg incubators (Mettler IF160, SLW 53 Smart, and WQ -96 for egg

cultivation), laminar hood (Helago, BC-01H), trinocular microscope (Motic SMZ171, Motic) with computer, high-speed camera (Bresser MikroCam II, 12MP) with software (MicroCamLabII) to record static and dynamic records of chorioallantoic membrane growth either directly in the egg or in ex ovo model. Laboratory was built with financial resources obtained from the projects SRDA PP-Covid-20-0043 and partially by APVV-16-0263.

A new laboratory was reconstructed for determination of vascular functions equipped with new Multi Myograph System 620M with Powerlab 4/26 and Labchart; (27058,72 €) (ADInstruments) in addition to the already existing myographs and organ bath system - for evaluation of vasoactive responses of isolated large/conduit arteries. For in vivo analysis Ultrasonic Perivascular Flow System was established, which provides accurate and precise measurement of fluid volume flow in a single vessel, designed for use with a range of corresponding flowprobes together with Small Animal Anaesthesia System, an inhalation anesthetic system grants a continuous and stable supply of anesthesia for the process of rodent surgeries. Financial resources obtained from the project SRDA PP-Covid-20-0043 and partially by APVV-15-0565.

The Institute has also equipped laboratory for microscopy, histology and immunohistochemistry which also has been supplemented by new devices: cryostat – the device for immunohistochemical staining, for making proper sections, optical microscope with multiple utilization, equipped with camera. Financial resources obtained from the project SRDA PP-Covid-20-0043.

Further equipment includes a psychophysiological lab with a system for presentation of sensory stimuli, virtual reality, device for registration of behavioral responses, multichannel amplifier of biosignals, devices for transcranial electric brain stimulation, eye tracker, posturography, inertial sensors, videotracker of body movements.

The infrastructure of the IEPT CEM has been modernised as well as repurposed during the evaluation period to address the needs of the research teams and projects. A new in vitro GLP compliant laboratory unit has been formed at the Dept. of Tissue Cultures and Biochemical Engineering. It serves as a Slovak reference NETVAL laboratory and is used for developing and validating new approach methodologies as well as a training laboratory for the international project TrainSafe-MDs, DS-FR-2019-0048 ([www.medicaldevicessafety.com](http://www.medicaldevicessafety.com)). The laboratory is equipped with a Cell culture hood with laminar flow, safety category II, spectrophotometer with a laptop, fluorimeter, two CO2 incubators (Heracell 150) for culturing of 3D tissue models and permanent cell lines, a microfluidic device (MIVO) with a separate CO2 incubator allowing dynamic culture conditions, automatic cell counter (Scepter), plate shaker, vortex, autoclave, inverted microscope with camera and centrifuge. All devices are operated in the GLP modus and serviced annually (funding: extra-budgetary resources and partly APVV project APVV-19-0591, VEGA grant 2/0153/20).

Involvement in the international project ONTOX (Horizon 2020, scheme SC1-BHC-11-2020) allowed the participating team to upgrade the existing IT infrastructure. The upgrade was essential for realising the work package tasks, i.e. communication, dissemination, data management and exploitation of the project. The team purchased two laptops, data sharing and project management tools (MS Teams, Monday.com) and additional licenses needed for general administrative and creative work (software Canva, CAMTASIA). Financial resources were obtained from the project ONTOX (SC1-BHC-11-2020, Contract: 963845).

### **3. Implementation of the recommendations from the previous evaluation period**

Since January 1<sup>st</sup>, 2018, the Institute of Experimental Pharmacology and Toxicology SAS, Institute of Normal and Pathological Physiology SAS, and Institute for Heart Research SAS created the Centre of Experimental Medicine SAS (CEM SAS). The founding of this new Centre followed the recommendations of the international evaluation panel of the Accreditation Commission. The aim of CEM SAS creation was better and more effective utilization of scientific potential, infrastructure and human resources with following increased scientific production.

Following the conclusions of the international evaluation panel of the Accreditation Commission, the basic points of the action plan were developed, which concerned the adoption of new measures. The creation of a unified model for the evaluation of scientists, on the basis of which they are evaluated annually, has contributed to improving the quality of basic research outputs. In addition to other criteria, this model places particular emphasis on the quality of journals in which outputs are published (quartile, impact factor), the number of references to publication outputs, as well as the success in obtaining foreign and domestic projects. To increase the quality and internationalize PhD study, a system for evaluating the quality has been incorporated, within which emphasis is placed on the admission of applicants from abroad (dual doctoral studies, topics in English). The condition for successful completion of the study is, in addition to the criteria for publishing activities, a stay at a foreign workplace, while the topic must correspond to the topic of thesis or be related to new methodological procedures usable within CEM. The participation of PhD students in educational events such as schools and workshops organized by domestic and foreign workplaces and professional societies (e.g. European Society of Hypertension Summer School, Summer School on Stress, Hypertension School of the Slovak Hypertensive Society, toxicological courses, etc.) also contributed to the improvement of PhD study. Subsequently, in the selection of post-doctoral students, CEM preferred those students who during their studies were the authors of publications published in journals in the first and second quartiles, their work was adequately cited and during the study they actively participated in non-scientific activities, e.g. popularization and pedagogical activities. To improve the quality of scientific outputs, we have increased the level of international cooperation, which is also confirmed by the joint publications listed in Chapter 2.1.5. We have also strengthened interaction and collaboration with the clinical sector: we evaluated and compared the vasoactive properties of blood vessels isolated after nephrectomy of normotensive and hypertensive patients, we developed new psychometric methods enabling to assess multiple aspects of semantic memory in clinical settings, we have developed an original device to elucidate the mechanisms for maintaining balance in patients after a stroke and to help them move the affected side again, and we have evaluated specific biomarkers of atrial fibrillations.

According to conclusions from our previous accreditation we have consolidated research agenda and created larger research groups (departments). Although the Accreditation Commission recommended decrease and consolidate number of research projects, we were not able to do that since it is the nature of grant support specific for Slovak Academy of Sciences. Instead of decreasing the number of VEGA projects we focused on larger project from other source with consolidated topics and try to develop strategies to increase research funding and IP management. International collaboration in projects and publications was significantly improved and two major EU projects were granted to our institute. Funding from competitive national and international research grant schemes was improved and contracts with industrial partners were reinforced. This funding not only compensates the lack of governmental support, but also created the platform for internal grant schemes for younger researcher and modernization of research infrastructure. As a consequence, the career structure and promotion of younger researcher to senior level is highly encouraged.

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

##### **Research strategy of the institute in the national and international contexts, objectives, and methods (including the information on when the strategy was adopted)**

Research of CEM SAS will continue in addressing the most important health challenges of the developed countries and modern societies, the so-called diseases of civilization. The research will reflect the main objectives and priorities identified by WHO within the programmes Global Strategy and Action Plan for Ageing and Health for 2016–2020 and its continuation the Decade of Healthy Ageing 2020–2030.

According to WHO the latest available data top 10 global causes of death include:

1. Ischaemic heart disease
2. Stroke
3. Chronic obstructive pulmonary disease
4. Lower respiratory infections
5. Neonatal conditions
6. Trachea, bronchus, lung cancers
7. Alzheimer disease and other dementias
8. Diarrhoeal diseases
9. Diabetes mellitus
10. Kidney diseases

Furthermore, the overall burden of disease (related to the chronic character and societal impact) is best characterized by the so-called disability-adjusted life years (DALYs). Top 10 contributors to DALYs in the European region rank as follows:

1. Ischaemic heart disease
2. Stroke
3. Trachea, bronchus, lung cancers
4. Diabetes mellitus
5. Back and neck pain
6. Chronic obstructive pulmonary disease
7. Alzheimer diseases and other demetias
8. Falls
9. Depressive disorder
10. Cirrhosis of the liver

Underlined are the diseases that are the subjects of research of CEM SAS. This clearly demonstrates that the strategic mission of our Centre aims to elucidation and prevention of key problems of the society. CEM SAS has the research potential and up to date laboratories allowing it to be a part of global research aiming at solving problems of cardiovascular, metabolic, neuropsychiatric, developmental and toxicological science. The research strategy, objectives, and methods for the future development consists of several parts:

**1) Research topics.** The Centre of Experimental Medicine SAS as a scientific and research institution will continue to function as biomedical research centre with focus on lifestyle diseases. Scientific research aims of the CEM SAS will be directed to continue studying the fundamental mechanisms of chronic diseases, particularly cardiovascular diseases, metabolic diseases, inflammatory injury and oxidative stress, mental functions and neuropsychiatric disorders, focusing on their treatment and prevention. The research will be done on the a) molecular, b) cellular and c)

systemic levels. Special attention will be made on risk assessment of chemicals and introduction of new approaches in toxicity testing using alternative methods that assist in validations to the EU Reference Laboratory for Alternatives to Animal Testing (EURL ECVAM). Here we list some of the examples of specific research subjects in the near future:

- We want to focus on developing a new toxicology field, toxicology of aging, and within it, on establishing novel approaches to identify environmental toxicants accelerating the aging process. We also plan to develop a screening platform for identifying biomarkers of aging and age-related pathologies and move toward linking to clinical practice and commercial activities (comparably to GlycanAge <https://glycanage.com/>).
- Our goal is also to broaden our cooperation focused on developing biopolymers highly applicable in clinical practice using efficient biocompatibility testing methods. We will continue developing the novel assessment methods applicable in regulatory toxicology and implementing the approaches based on the New Generation Risk Assessment, not relying on animal data (as established within the recently awarded projects ONTOX, ASPIS cluster, EU-NETVAL). These strategies were adopted within currently granted national and international projects.
- We want to focus on elucidation of gestational hypoxia as a factor of prenatal programming of cardiovascular and neurodevelopmental diseases.
- We want to focus on further studying the effect of antidepressants during sensitive stages of development, particularly gestation and lactation. A comprehensive study of the antidepressant venlafaxine and atypical antidepressants bupropion and mirtazapine revealed that the consequences of untreated depression can be more severe than antidepressant administration. In several cases, antidepressants had a preventive and therapeutic effect on the maternal organism as well as on the offspring of treated rat mothers (venlafaxine, mirtazapine).
- We want to focus on study of inflammatory autoimmune processes. Our future perspectives will be in research focused on better understanding and treatment of different pathological conditions accompanying rheumatoid arthritis. The coexistence of immune-mediated inflammatory diseases with depression has long been recognised. Data that illustrate the intimate associations between peripheral and brain immune responses raise the possibility of shared pathophysiological mechanisms. We would like to focus on assessment of the behavioural changes in rats suffering arthritis and also the effect of monotherapy and in combination therapy on depression.
- We want to focus on preclinical evaluation of the novel original drugs, developed at the CEM SAS as a promising inhibitors of aldose reductase for treatment of diabetic complications. The investigations will be focused on neuroprotective effects of tested substances and its toxicology. Our previous in vivo studies in rat models of diabetes revealed antihypertriglyceride activity of the drug Cemtirestat and its ability to attenuate symptoms of peripheral neuropathy with high significance. Mechanistic ex vivo studies in the rat brain cortical slices and in vitro investigations in models of free radical damage pointed to a potential role of antioxidant activity in the neuroprotection. Moreover, the results proved that the direct free radical scavenging activity of Cemtirestat was complemented by its ability to restore thiol-disulfide homeostasis by releasing free GSH from the pool of endogenously bound disulfides. Considering favorable results of toxicological evaluations, cemtirestat represents a practical example of a therapeutic strategy against chronic complications in diabetes based on multiple pharmacological activities.
- We want to focus on study of influence of lifestyle associated risk factors including high blood pressure, obesity, hyperglycemia, and dyslipidemia on heart and coronary artery diseases induction and development.

- In different acute and chronic experimental settings mimicking human conditions we want to focus on further elucidation of factors and mechanisms that participate in pathogenesis of cardiovascular diseases as well as on possibilities of their prevention with novel approaches in the treatment (molecular hydrogen, antioxidant substances). Elucidation of molecular mechanisms involved in modulation of pathophysiological states could provide an effective tool for the development of potential therapeutic targets. The research in this area has an ambition of translation into clinical practice in the long-term.
- We want to focus on development of new strategies for the prevention and reduction of cardiac connexin-43 channel disorders. These affect electrical properties of the heart and are crucial factors promoting life-threatening arrhythmias. We want to focus on preclinical evaluation of non-pharmacological compounds which can exert a beneficial effect on connexin-43 and extracellular matrix under pathological conditions. The results open ways for exploring antiarrhythmic potential of non-pharmacological compounds in patients and humans at increased risk of cardiovascular diseases.
- We will continue in investigation of humoral and neural vasoactive mechanisms in regulation of vascular function and blood pressure using animal models of chronic non-communicable disease such as hypertension, heart diseases, metabolic syndrome, non-alcoholic fatty liver disease and others. The influence of dietary habits and stress in etiopathology of above mentioned diseases will be investigated with regards to sex and age. We will focus also on the role of gasotransmitters, inflammation, factors produced by perivascular adipose tissue and various endothelium-derived factor in modulation of vascular function. In addition, the possible beneficial effect of various synthetic and natural hydrogen sulfide donors, polyphenols and antioxidants, which appear to be a promising pharmacological tools in the treatment of endothelial dysfunction in hypertensive and/or aged patients will be investigated. Molecular studies will be focused on determination of proteins involved in NO production (eNOS, iNOS and nNOS), H<sub>2</sub>S production (cystathionine  $\beta$ -synthase (CBS), cystathionine  $\gamma$ -lyase (CSE), and 3-mercaptopyruvate sulfurtransferase (3MST)), antioxidant defence system (superoxide dismutase (SOD), glutathione peroxidase (GPx), catalase (CAT), hemoxygenase (HO-1)), inflammation markers (interleukines IL-1 $\beta$ , TNF- $\alpha$ , Nf $\kappa$ B, hepcidin, COX1, COX2), as well as on expression of the nuclear factor kappa B, nuclear factor erythroid 2-related factor 2 (Nrf2) and role for AMP-dependent protein kinase (AMPK) in vascular and cardiac function.
- We will also explore the role of candidate pathophysiological pathways involved in ischemia/reperfusion injury on cardiac remodeling in different pathological conditions such as hypertension, obesity and aging, as well as to look for suitable substances that prevent the action of free oxygen radicals and positively affect the mechanism to protect the myocardium from cardiac remodeling, oxidative damage and tissue degeneration after myocardial infarction. Using the arterial samples obtained from human patients, we will investigate new signaling pathways, the research of which will help to reveal the mechanisms involved in the development of arterial hypertension and metabolic syndrome and other metabolic diseases in humans.
- We will also continue in the development of further biomodels suitable for investigation the consequences of COVID-19 and for improving the evaluation of the efficacy of drugs identified as having potential in the treatment of COVID-19.
- We will also continue with focusing on gaining new knowledge on the antidepressant effect of natural psychoplastogen 7,8-dihydroxyflavone and mTOR activator (NV-5138) on the development of depression-like behaviour in the animal model. These substances are capable of rapid induction of structural and functional neural plasticity with the ultimate modulation of cognitive functions.
- We will continue our research into the neural mechanisms of mental functions in order to understand the relationship between brain and behaviour, as well as the neurobiological



basis of neuropsychiatric disorders. We will also focus on the neurophysiological mechanisms of posture and gait regulation, which can help to prevent falls in elderly and people with neurodegenerative diseases.

**2) Dissemination.** Our research addresses societally important topics – population aging, lifestyle-related diseases, and alternatives to animal testing in toxicity assessment – has attracted a number of students studying under national graduate and doctoral degree programs. Therefore, another strategic goal will be dissemination of the knowledge generated within our projects through specialized courses and university lectures, social media, conferences and announcements in press, radio and TV.

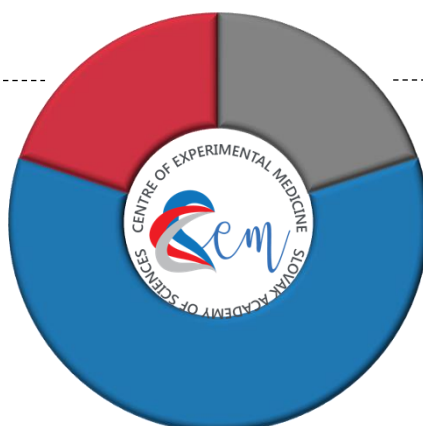
**3) International cooperation and recognition.** We aim to widen our current mobility or integrative international projects (such as Marie Skłodowska-Curie Actions, COST, etc.) within further research projects of international and EU significance (framed as Horizon or ERC programs). Although some researchers are well-recognized internationally, this recognition has to be further supported in the next years. There are several ways how to accomplish this task.

- Publishing a high-quality work in high-quality journals (preferably in journal ranking high in the WOS database)
- Presentations at high-reputation international conferences
- Participation in international research projects with top research teams
- Personal contacts based on the post-doctoral positions
- Research stays of doctorate students in internationally recognized labs

**4) Diversification of R&D Capital.** The research and scientific capital (know-how), representing all skills and capacity of researchers will be split into three main areas. The major area will be basic research and will cover more than 70% of all activities of CEM. Other two areas will focus on applied research and scientific services and advisory. The detailed information about diversification of R&D is depicted on the scheme below. The idea behind this is to support basic research but also represent an advisory body for community. Scientific services can supplement lack of governmental financial support and be the ecosystem for internal grant schemes and support for young scientist.

#### APPLIED RESEARCH

- Design of new substances and derivatives
- Search for new therapeutic approaches
- Patenting
- Participation on clinical trials



#### SCIENTIFIC SERVICES

- Pharmacological safety
  - Toxicological profile of substances
- REACH documentations
  - Breeding and sale of laboratory animals

#### BASIC RESEARCH

Causes, mechanisms of origin and possibilities of prevention and treatment of socially serious chronic diseases