Faculty of Medicine
Comenius University in Bratislava, Slovakia

Main Research Areas
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Comenius University in Bratislava, Slovakia

Main Research Areas

As for February 2019
Research at the Faculty of Medicine of the Comenius University in Bratislava

The Faculty of Medicine, which has been developing since 1919, is the first and founding faculty of the Comenius University in Bratislava. The Faculty of Medicine in Bratislava is the largest and oldest medical faculty in Slovakia.

From the beginning, the Faculty of Medicine was focused on two tightly interconnected activities, education and research. In 1921 there was established a scientific medical journal *Bratislava Medical Journal* (Bratisl Lek Listy), which has been published so far as the oldest medical journal in Slovakia.

In the last decade, the research at the Faculty of Medicine is focused on four main research areas:

- Neuroscience
- Cardiovascular diseases
- Oncological diseases
- Metabolic, endocrine, and inflammatory diseases
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</tr>
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<td>Modulatory effect of the brain on development and progression of somatic cancer</td>
<td>Social cognition, psychopharmacology</td>
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</tbody>
</table>
Neuroscience research has a long tradition at the Faculty of Medicine. Whereas in the past research was focused mainly on investigation of axonal transport and morphological features of nerve tissue, recently is represented by investigation of optimal therapy of cerebral gliomas, etiopathogenesis of neurodegenerative diseases, multiple sclerosis, depression and other disease.

**Principal investigators**

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A. Central nervous system tumors

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Topic
The main goals of research of the team:
• Improving the treatment of cerebral gliomas:
  - the possibilities of intraoperative visualization of the lenticulostriate arteries
  - methods of improvement of the intraoperative 3D ultrasound image
  - the MRI features of initial regrowth of the cerebral gliomas
• Study of the variations of the peripheral nerves:
  - intradural and extradural variations of the spinal nerves
  - variation of the peripheral nerves are relevant to surgery

Plans for future research
• Optimization of cerebral glioma therapy based on results of:
  - their genotyping, biomarkers determinations, by more precise investigation of their growth dynamics by employing of serial MRI,
  - morphological and radiological study of the lenticulostriate arteries.

Devices and methods
• Device for pre- and peri-operative stimulation of brain structures and for neuroimaging
• 3D navigated sonograph
• fMRI, DTI (MR) tractography (imaging of nervous pathways)
• Surgical microscopes (module for 5ALA, module for ICG angiography)
• Endoscope

Grants and Funding (in the last 10 years)
• VEGA 1/3430/06: Dynamics of changes of selected metabolic parameters of gliomas and surrounding brain tissue after different therapeutic modalities (2006-2008)
• VEGA 1/3439/06: Immunocytochemical analysis of glia precursor cells in adult brain tissue an in tissue cultures (2006-2008)
• VEGA 1/1166/10: Correlation between expression of cell proliferation markers, immunohistochemical profile, growth features of tumor and patient age with biological features of hormonally active hypophyseal adenoma (2011-2014)
VEGA 1/0959/16: Correlation of the accuracy of imaging the lenticulostrate arteries in patients with infiltrative gliomas of the insula by means of the intraoperative 3D sonography and the -Tesla MRI (2016-2018)

VEGA 1/0719/18: Analysis of the influence of the growth activity and the extent of the microsurgical resection of supratentorial infiltrative WHO grade II gliomas on their malignant transformation (2018-2020)

Selected publications


B. Neuroanatomy, deep brain stimulation, brain mapping, neuromonitoring

Investigators
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Plans for future research
- Verification of reliability of per-operative identification of small arterioles reaching deep brain structures by MRI and 3D-navigated sonography
- Improvement of patient selection for deep brain stimulation
- Improvement of electrode targeting and setting of stimulation parameters from long-term perspective

Devices and methods
- Device for pre- and peri-operative stimulation of brain structures and for neuroimaging
- 3D navigated sonograph
- fMRI, DTI (MR) tractography (imaging of nervous pathways)
- Surgical microscopes (module for 5ALA, module for ICG angiography)
- Endoscope

Grants and Funding (in the last 10 years)
- VEGA 1/0959/16: Correlation of imaging preciosity of lenticulostriatal arteries in patients with infiltrative glioma of insula by intraoperative 3D-sonography with imaging by pre-operative 3-Tesla MRI (2016-2018)

Selected publications


C1. Neurodegenerative diseases - dementias

Investigators
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Monika Siváková, MD
Jozef Szabo, MD
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Prof. Milan Buc, MD, DSc
Assoc. Prof. Ivana Shawkatova, RNDr, PhD
Juraj Javor, MD, PhD

Plans for future research
• Algorithms for early detection of MCI and Alzheimer’s disease
• Monitoring of changes in volume of brain structure
• Cerebral energetic metabolism in neurodegenerative diseases
• Define effects of aerobe-powerful training and/or carnosine at the level of body and muscle-specific metabolism (in vivo 31P-MRS), physical fitness as well as regulation of GABA/glutamatergic system in the brain (in vivo 1H-MRS) in relationship with intervention in patients with subjective or mild cognitive deficit and in early stages of Alzheimer’s or Parkinson’s disease
• Analysis of miRNA expression in serum, skeletal muscle, and cerebrospinal fluid in relationship with circulating levels of neurotrophins (BDNF), advanced product of glycation (AGEs) as well as with cognitive, motor, and metabolic functions in patients with neurodegenerative diseases
• Differential diagnosis of different types of dementias

Devices and methods
• Computer-assisted evaluation of cognitive functions
• MR spectroscopy
• MR volumetry
• In vivo imaging of amyloid and tau protein
• Expression of miRNA in serum, muscle, and liquor
• Determination of levels of neurotrophins and advanced product of glycation in serum and liquor

Grants and Funding (in the last 10 years)
• VEGA 1/0240/16: Immunogenetic markers in Slovak patients with Alzheimer’s disease (2016-2018)
Selected publications

C2. Neurodegenerative diseases - Parkinson’s disease

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Marianna Pápayová, PhDr
Jana Martinková, MD, PhD
Karin Gmitterová, MD, PhD
Zuzana Košutzká, MD, PhD
Jana Martinková, MD, PhD
Petra Brandoburová, PhD
Marianna Pápayová, PhDr
Igor Straka, MD
Alice Kušnírová, MD
Jana Švantnerová, MD
Prof. Zsolt Cséfalvay, PhDr, PhD
Prof. Boris Mravec, MD, PhD
Prof. Ivan Varga, RNDr, PhD
Andrea Gažová, PharmDr, PhD
Prof. Ján Kyselovič, PharmDr, PhD.
Assoc. Prof. Barbara Ukropcová, PhD.
Martin Schön, MD

Plans for future research
- Detection of new clinical and tissue biomarkers (pre-clinical diagnosis, differential diagnosis, and therapeutical responses)
- Improvement of genetic diagnostic
- Research of balance, communication deficits, quality of life, improvement of pharmacotherapy and surgical treatment (DBS)

Devices and methods
- Complex diagnosis of balance with emphasis on 3D motion capture system coupled with virtual reality
- Complex psychometric
- Imaging methods including 7T and 3T MRI
- Complex CSF diagnostic
- Histological and immunohistochemical diagnosis

Grants and Funding (in the last 10 years)
- VEGA 1/0070/11: Perforation tests of posture in functional diagnostic of sportsmen and individuals with altered motor functions (2011-2013)
- VEGA 1/0490/16: Effect of catechol-O-methyltransferase inhibitor tolcapone on levodopa induced hyperhomocysteinaemia among patients with Parkinson’s disease treated with levodopa/carbidopa intestinal gel (2016-2018)
• APVV 15-0155: Impaired communication ability in Parkinson’s disease (2016-2019)
• VEGA 2/0107/18: Synergic effects of exercise and carnosine supplementation on motor state, metabolism and characteristics of the skeletal muscle in patients with early-stage Parkinson’s disease (2018-2021)
• VEGA 1/0704/17: Study of biomarker spectrum in early Parkinson’s disease (2017-2019)

Selected publications


D1. Multiple sclerosis

**Investigators**
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Prof. Milan Buc, MD, DSc
Assoc. Prof. Vladimíra Žurmanová, RNDr, PhD
Juraj Javor, MD, PhD

**Plans for future research**
- Determination of the role of mitochondrial dysfunction on development of neurodegeneration
- Determination of presence of specific miRNA in liquor and plasma in multiple sclerosis
- Monitoring of changes of brain structures volume
- Genetic determination of sclerosis multiplex, the role of cytokines, chemokines, new inflammatory markers HMGB1 and TREM, miRNA and vitamin D in disease severity monitoring

**Devices and methods**
- Completely equipped laboratory for processing of biological material (serum, liquor, saliva)
- EndoPAT 2000 (Itamar-Medical), device for determination of endothelial function
- Finometer (Finapres Medical Systems), device for determination of baroreflex sensitivity
- PCR -SSP, PCR-RFLP, sequencing - methods for immunogenetic determination
- ELISA - method for estimation of the level of cytokines and chemokines

**Grants and Funding (in the last 10 years)**

**Selected publications**


D2. Multiple sclerosis

Investigators
Assoc. Prof. Michal Minár, MD, PhD (mmminar@gmail.com)
Prof. Peter Valkovič, MD, PhD
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Zuzana Košutzká, MD, PhD
Jana Martinková, MD, PhD
Igor Straka, MD
Martin Chrastina, MD, PhD

Plans for future research
• Epidemiology in general population
• Secundarities (pregnancy, multiple sclerosis, neurodegenerative disorders)
• Predictors of therapeutic response
• Quality of life

Devices and methods
• Complex psychodiagnostics
• Complex analysis of CSF
• Neurophysiological diagnosis
• Complex neuroimaging
• Continual EEG monitoring

Selected publications
• Minár M, Petrleničová D, Valkovič P. Higher prevalence of restless legs syndrome/Willis-Ekbom disease in multiple sclerosis patients is related to spinal cord lesions. Mult Scler Relat Disord 2017; 12: 54-58
D3. Multiple sclerosis

Investigators
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Assoc. Prof. Ivana Shawkatová, MSc, PhD
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Magda Suchánková, MD, PhD
Prof. Milan Buc, MD, DSc

Plans for future research
• Immunogenetic determination of inflammation in multiple sclerosis
• Polymorphism of cytokines, chemokines, adhesive molecules, vitamin D, transcription factors, receptors
• New inflammatory markers, cytokines, hormones, miRNA, vitamin D, soluble HLA-G, oxidative status
• Association with clinical stage of patients, EDSS, results of MRI, biologic therapy
• Currently, 600 samples are stored, biobanking samples and clinical data

Devices and methods
• PCR cyclers, centrifuges
• DNA/RNA spectrophotometer, transilluminator
• ELFO, photo-recording system
• ELISA, flow cytometer

Grants and Funding (in the last 10 years)
• VEGA 1/0810/12: Immunogenetic determination of response to biological therapy of patients suffering from multiple sclerosis (2012-2014)

Selected publications
E. Cerebrovascular diseases

Investigators
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Assoc. Prof. Marek Sýkora, MD, PhD
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Assoc. Prof. Stanislav Šutovský, MD, PhD
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Zoltán Goldenberg, MD, PhD
Vladimír Javorka, MD, PhD
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Assoc. Prof. Ingrid Zitňanová, MEng, PhD
Prof. Stanislav Oravec, MD, PhD
Prof. Igor Farkaš, MEng, PhD
Barbora Cimrová, RNDr, PhD

Plans for future research
• Complex investigation of stroke etiopathogenesis
• New view on the spectrum of risk factors
• Evaluation of drugs effect on brain perfusion
• Establishment of new therapeutic approaches in Slovakia
• Experimental research of mechanisms participating on stroke development and stroke-induced changes in organism

Devices and methods
• Standard equipment of centre focused on stroke therapy
• Complexly equipped laboratory for processing of biological materials (serum, liquor, saliva)
• Device for USG determination of brain circulation with possibility to detect embolus
• Angiograph
• EndoPAT 2000 (Itamar-Medical), device for determination of endothelial functions
• Finometer (Finapres Medical Systems), device for determination of baroreflex sensitivity
• Polysomnograph Alice 5 and Alice 6 (Philips-Respironics)
• C-Flow (Ornim), determination of non-invasive determination of cerebral blood flow
• Agregometer and viscosimeter (Chronolog, A. Paar)

Grants and Funding (in the last 10 years)
• European Regional Development Fund Research and Development Grant (ITMS 26240120015): Establishment of centre of excellence for stroke at Faculty of Medicine in Bratislava (2009-2011)
• European Regional Development Fund Research and Development Grant (ITMS:26240120023): Completion of centre of excellence for stroke at Faculty of Medicine in Bratislava (2012-2014)
• MZ-SR 2012/10-UKBA-10: Oxidative stress and its role in pathogenesis of stroke (2012-2016)
• APVV-0668-12: Interface brain-computer with adaptive robotic arm for rehabilitation (2012-2016)
• MZ-SR 2012/56-SAV-6: Changes of sleep architecture in patients with focal brain ischemia and its influence on cognitive functions (2012-2016)
• APVV-0028-10: Interaction between psychiatric, cardiovascular, neuroendocrin, and metabolic factors: from new animal models to clinical applications (2011-2014)

Selected publications

F. Sensory diseases

Investigators
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Lukáš Varga, MD, MSc, PhD
Branislava Bercíkova, MD
Lucia Demešová, MD
Zuzana Slobodova, MSc

Plans for future research
• Experimental audiology and functional outcomes in different hearing devices
• Molecular markers in ear diseases

Devices and methods
• Audiology outpatient department
• Vestibular section of the Department
• Center for cochlear implantation and other implantable hearing devices

Grants and Funding (in the last 10 years)
• VEGA 1/0214/16: Wide-exome sequencing in multiplex families with hereditary hearing disorders in Slovakia (2016-2019)
• APVV-0148-10: Screening of hereditary hearing disorders in Slovakia by methods of DNA analysis (2011-2014)
• ASFEU - structural founds of EU (ITMS: 26240220051): TRANSENDODGEN (Transfer of genetic knowledge of endocrine research into clinical praxis) (2014-2015)
• VEGA 1/0465/11: Incidence, DNA analysis, and phenotype spectrum of most frequent hereditary hearing disorders in Slovakia (2011-2013)

Selected publications


G1. Sleep disorders

Investigators
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Pavel Šiarník, MD, PhD
Katarína Klobučníková, MD, PhD
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Monika Siváková, MD
Prof. Igor Farkaš, MEng, PhD
Barbora Cimrová, RNDr, PhD

Plans for future research
• Sleep disturbances in patients with extrapyramidal diseases
• Effect of sleep disturbances on cognitive functions
• Sleep disturbances in patients with intracerebral hemorrhage
• Sleep disturbances in professional sportsmen

Devices and methods
• Polysomnograph Alice 5 and Alice 6 (Philips-Respironics)
• Auto-BiPAP (Philips-Respironics), device for titration of over-pressure ventilation
• EndoPAT 2000 (Itamar-Medical), device for determination of endothelial functions
• Finometer (Finapres Medical Systems), device for determination of baroreflex sensitivity

Grants and Funding (in the last 10 years)
• MZ-SR 2012/56-SAV-6: Changes of sleep architecture in patients with focal brain ischemia and its influence on cognitive functions (2012-2016)
• European Regional Development Fund Research and Development Grant (ITMS:26240120023): Completion of centre of excellence for stroke at Faculty of Medicine in Bratislava (2012-2014)

Selected publications
G2. Sleep disorders

Investigators
Prof. Peter Valkovič, MD, PhD (peter.valkovic@fmed.uniba.sk)
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Darina Petrleničová, MD, PhD
Igor Straka, MD
Zuzana Košutzká, MD

Plans for future research
• Epidemiology in general population
• Secundarities
• Predictors of therapeutic response
• Quality of life

Devices and methods
• Complex psychodiagnostics
• Complex analysis of liquor
• Neurophysiological diagnosis
• Complex neuroimaging
• Continual EEG monitoring

Grants and Funding (in the last 10 years)
• Grant of Boehringer Ingelheim: Eporis epidemiology of RLS in Slovakia (2011-2013)

Selected publications
H1. Depression in adults

Investigators
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Katarína Ondičová, MVD, PhD
Prof. Boris Mravec, MD, PhD

Grants and Funding (in the last 10 years)
- VEGA 1/0258/10: The study of mechanisms of peripheral anti-inflammatory effects of antidepressants (2010-2012)

Selected publications
H2. Depression in children

**Investigators**
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Zuzana Padúchová, RNDr, PhD
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Barbora Katrenčíková, MEng

**Topic**
Our research is focused on determination of molecular bases of child psychiatric disorders (depressive disorder, anxiety disorder, ADHD), involvement of inflammation, oxidative stress, corticosteroids in stress response, metabolism of neurotransmitters. We are interested also in the effects of natural compounds as an adjuvant therapy (polyphenols, omega-3 fatty acids).

**Plans for future research**
- Determination of metabolites of neurotransmitters in the blood (HPLC)
- Determination of fatty acids composition in erythrocyte membranes (GC)
- Determination of korticoids in saliva (Elisa)
- Determination of membrane fluidity (fluorospectrometric method)
- Determination of telomere length (molecular biology)
- Determination of oxidative damage to DNA by Comet assay and kinetic of DNA reparation (Comet assay)

**Devices and methods**
- Determination of oxidative damage to DNA by Comet assay and kinetic of DNA reparation – Comet assay
- Spectrophotometric, fluorospectrometric methods, Elisa methods, HPLC and GC methods
- Acrylamid electrophoresis of LDL/HDL lipoprotein subfractions (Lipoprint)

**Grants and Funding (in the last 10 years)**
- VEGA 1/0703/13: Molecular bases of childhood psychiatric disorders (depression, anxiety states), involvement of oxidative stress and the use of omega-3 fatty acids in therapy (2013-2015)

**Selected publications**


I. Schizophrenia

Investigators
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Michal Hajdúk PhDr, PhD

Grants and Funding (in the last 10 years)

- APVV-15-0037: 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 (2016-2018)
- Slovak Psychiatric Association Grant 2016: Perception and identification of face expression and their relationship to the functioning of patients with schizophrenia (2016)

Selected publications

J. Autism

Investigators

Prof. Daniela Ostatníková, MD, PhD (daniela.ostatnikova@fmed.uniba.sk)
Assoc. Prof. Katarína Babinská, MD, PhD
Silvia Hnilicová, MD, PhD
Aleksandra Tomova, MD, PhD
Aneta Kubranská, MD, PhD
Mária Vidošovičová, MD
Ján Bakoš, RNDr, PhD
Jaroslava Babková, RNDr, PhD
Gabriela Repíská, MSc, PhD
Diana Filčíková, MSc, PhD
Petra Keméniová, MD, PhD
Katarína Janšáková, MSc, PhD
Klaudia Kyselíková MSc, PhD
Assoc. Prof. Peter Celec, MD, Dipl Eng, Dr Rer Nat, DSc, MPH
Emese Renczés Domonkos, MSc, PhD
Veronika Borbélyová, MSc, PhD
Assoc. Prof. Mária Bucová, MD, PhD

Topic

The autism research project is focused on autism etiopathogenesis. The aims are defined in three lines– human studies, animal modeling and experiments on cell cultures. The general goal is the identification of possible markers (behavioral, endocrine, inflammatory or other) in homogenous subcategories of autistic population. In the Academic Centre for Autism Research being a part of this institution, the standardized diagnosis of autism spectrum disorders (ASD) is performed for indicating well-defined homogenous categories of individuals that are studied in association with possible biomarkers. The dominant approach is related to association of steroid metabolome, proteome and genome to behavioral characteristics. In human line the project also focuses on inflammatory markers and gut microbiota in ASD patients and their possible relations to specific behavioral characteristics and gastrointestinal problems. Sleep disturbances and deviations in melatonin production together with mitochondrial dysfunction is also in scope of the research. In parallel with the human research, animal studies are performed on knockout mice revealing the symptoms linked with knockout gene. The third line of research is focused on cell lines. Morphological changes of knockout mice cell cytoskeleton and synaptogenesis are studied in parallel with the effect of oxytocin on dendritic and axonal growth.

Plans for future research

• Investigation of autism etiology
• Interventional studies
• Investigation of autism epidemiology
• Investigation of the role of sex hormones, inflammation, new inflammatory molecules, cytokines and vitamin D in disease pathology
• Investigation of the dietary factors, intestinal microbiota and microbial overgrowth in autism
• Investigation of sleep disorders in autism
• Investigation of proteomic and metabolomic profiles in autism
Devices and methods

• Standardized international scales for Autism spectrum disorders screening and diagnosis
• Sysmex – blood cell analyzer
• Centrifuges, PCR cyclers, spectrophotometer, ELISA reader
• Actigraph – assessment of sleep disorders by actigraphy
• Multiplex cytokine assay
• Mass spectrometry - proteomic and metabolomic profiling
• Illumina MiSeq sequencer – microbial genome analysis
• In vitro neuronal cell culturing
• Gene and protein analysis
• Light and fluorescent microscopy
• Behavioral tests – assessment of autistic-like phenotype of mice
• Tests assessing sensory-motor function during early neurodevelopment
• EthoVision video-tracking software
• Mouse models of autism
• Colonoscopy in rodents

Grants and Funding (in the last 10 years)

• APVV 0254-11: Social, emotional, and cognitive picture of autism in interdisciplinary reflections (2012-2014)
• APVV-0253-10: Developmental effects of neuropetides (2011-2014)
• VEGA1/0141/17: Immunogenetic factors and chronic low grade inflammation in pathomechanisms of autism and their associations with gastrointestinal dysfunction, behavioural and biological markers (2017-2019)
• VEGA1/0086/14: Molecular biological analysis of fecal microflora and its impact on inflammation and gastrointestinal symptoms in autistic children (2014-2016)
• VEGA1/0066/12: Genetic factors as modulators of hormonal influences on cognitive functions (2013-2015)
• VEGA 1/0955/17: Multimodality of emotion regulation development in adolescents with the typical and atypical development. Perspective of complex dynamic interplay of structural and functional biological, psychological and social environmental system changes (2017-2020)

Selected publications

• Babinská K, Bucová M, Ďurmanová V, Lakatošová S, Jánošíková D, Bakoš J, Hlavatá A, Ostatníková D. Increased plasma levels of the high mobility group box 1 protein (HMGB1) are associated with a higher score of gastrointestinal dysfunction in individuals with autism. Physiol Res 2014; 63: S613-8.


K. Neurobiology of cancer

Investigators
Prof. Boris Mravec, MD, PhD (boris.mravec@fmed.uniba.sk)
Assoc. Prof. Zdenko Pirník, PharmDr, PhD
Miroslav Tibenský, MD
Alena Černáčková, MSc
Ivana Siváková, RNDr, PhD

Topic
Our research is focused on elucidation of pathways and mechanisms participating in bi-directional interactions between the nervous system and cancer tissue in animal tumor models. We have found that elimination of sympathetic nerves significantly reduces growth of solid tumors in rats. In *in vitro* experiments, we confirmed that administration of norepinephrine potentiates tumor cells proliferation. We also found that tumor growth affects activity of several brain structures in rats and that these changes are related to dynamics of cancer growth.

Plans for future research
• Determination of phenotypes of nerves innervating selected human cancers
• Investigation of effect of reduced nerves-tumor signaling on tumor growth
• Investigation of the role of hypothalamic inflammation in mechanisms of cancer cachexia

Devices and methods
• Digital stereotaxic apparatus for small laboratory animals
• Surgical microscope
• Devices and tools for microdissection of brain structures

Grants and Funding (in the last 10 years)
• APVV-17-0090: Neurobiological research of cancer: Investigation of bi-directional interactions between the nervous system and the tumor (2018-2022); principal investigator: Prof. Boris Mravec, MD, PhD
• APVV-0007-10: Neurobiology of cancer: the study of nervous system role in cancer growth and development of metastases (2011-2014)

Selected publications
Cardiovascular Diseases
<table>
<thead>
<tr>
<th>Research area</th>
<th>Topic</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Cardiovascular diseases</td>
<td>Heart diseases</td>
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<tr>
<td></td>
<td>Hypertension</td>
<td>New pharmacological approaches for protection of hypertension-induced heart damage</td>
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<td>Heart failure</td>
<td>Early changes in cardiovascular system in arterial hypertension</td>
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<td>Remodeling in cardiovascular system</td>
<td>RAAS and remodeling</td>
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<td></td>
<td>Cardiotoxicity/oncocardiology</td>
<td>Detection of cardiotoxicity of anti-cancer drugs</td>
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<td>Hereditary defects</td>
<td>Genetic polymorphisms and the risk of hereditary heart defects</td>
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<tr>
<td>Vascular diseases</td>
<td>Varicosity</td>
<td>Investigation of structures of wall of primary varicose veins</td>
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<td>Endothelium</td>
<td>Drug effects on endothelial dysfunction</td>
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<tr>
<td>Treatment</td>
<td>Pharmacopepidemiology of cardiovascular diseases</td>
<td>Adherence of patients to drugs used for secondary prevention of cardiovascular diseases in elderly</td>
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<td></td>
<td>Drugs for the therapy of hypertension</td>
<td>Role of L-NAME</td>
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</tbody>
</table>
In the field of cardiovascular disease, research at Faculty of Medicine in Bratislava is focused mainly on investigation of etiopathogenesis of hypertension, heart failure and vessels diseases. Original data were obtained from experiments investigating mechanisms of heart failure and remodeling in cardiovascular system.

**Principal investigators**

Prof. Viera Štvrtinová, MD, PhD
Prof. Beáta Mladosievičová, MD, PhD
Prof. Jozef Mašura, MD, PhD, FSCAI, FESC, FAEPC
Prof. Andrej Dukát, MD, PhD
Prof. Ludovít Gašpar, MD, PhD
Prof. Ján Murín, MD, PhD
Ludovít Paulis, MD, MSc, PhD
Prof. Fedor Šimko, MD, PhD
Prof. Martin Wawruch, MD, PhD
Assoc. Prof. Jana Poláková-Mištinová, MD, PhD
A. Hypertension

Investigators
Prof. Ján Murín, MD, PhD (jan.murin@sm.unb.sk)
Prof. Martin Wawruch, MD, PhD

Grants and Funding (in the last 10 years)
- VEGA 1/0939/14: Augmentation (augmentation index) of systolic blood pressure and aortal stiffness and therapy of arterial hypertension and its complications (2014-2016)

Selected publications
B. Heart failure

Investigators
Prof. Fedor Šimko, MD, PhD (fedor.simko@fmed.uniba.sk)

Grants and Funding (in the last 10 years)
- VEGA 1/3429/06: Modification of heart hypertrophy and heart failure in NO (nitric oxide)-deficient hypertension in rats by melatonin (2006-2008)
- VEGA 1/0187/09: Modification of heart hypertrophy and heart failure in continuous light-induced hypertension in rats by melatonin and captopril (2009-2011)
- VEGA 1/0227/12: Novel model of experimental hypertension, remodeling of left ventricle and heart failure induced by inhibition of transcription nuclear factor kappa B (NF-kB): protection by melatonin and captopril (2012-2014)
- VEGA 1/0071/15: Protection of hypertensive and failing heart by blocker of I(f) channel, ivabradine: comparison with ACE-inhibition and melatonin (2015-2018)
- NOREG - Centre of Excellence for Research on the regulatory role of nitric oxide in diseases of civilization (2011-2014)

Selected publications
• Simko F, Reiter RJ, Pechanova O, Paulis L. Experimental models of melatonin-deficient hypertension. Front Biosci (Landmark Ed) 2013; 18: 616-25.
C. Remodeling in cardiovascular system

Investigators
Ľudovít Paulis, MD, MSc, MPH, PhD (ludovit.paulis@fmed.uniba.sk)
Simona Trubačová, MSc
Romana Rajkovičová, MSc
Nina Paššáková, MD
Dominika Kováčová, Eng

Topic
Our research is focused on the elucidation and development of novel means for the prevention/treatment of adverse cardiovascular remodeling. Previously, we have described mechanisms responsible for the persistence of endothelial dysfunction (enhanced formation of endothelium-derived constricting factor) even after normalization of blood pressure, the desynchronized regression of fibrosis and hypertrophy of the left ventricle and the possible effects of melatonin on these outcomes. More recently, we focused the research interest on novel means of renin-angiotensin system modulation. We have described the de-stiffening properties of AT2 receptor stimulation using the investigational compound 21 in hypertension. Currently, we participate in the development of a new therapeutic approach using novel dual aminopeptidase inhibition of the renin-angiotensin-aldosterone system.

For our research, we employ methods allowing bench-to-bedside translation of experimental outcomes such as animal disease models, animal echocardiography, ex vivo vessel reactivity and biochemical tests having pendants in clinical practice. Those are being supplemented by statistical analyses, meta-analysis and systematic reviews.

Plans for future research
• Development of feasible peptide/non-peptide dual renin-angiotensin-aldosterone aminopeptidase inhibitor
• Investigation of the effects of dual aminopeptidase inhibition on heart failure and hemodynamically overloaded left or right ventricle

Devices and methods
• Rodent models of hypertension, pulmonary hypertension and heart failure
• Rodent echocardiography
• Ex vivo vessel reactivity and biochemical tests having pendants in clinical practice

Grants and Funding (in the last 10 years)
• VEGA 1/0127/17: Proof of concept of renin-angiotensin system (RAS) modulation by dual aminopeptidase/angiotensin-converting enzyme (AP/ACE) inhibition and its effect on target organ damage in hemodynamic overload (2017-2020)
• VEGA 1/0380/14: The effect of pharmacological stimulation of AT2 receptors on morphology and functional characteristics of failing myocardium in rats (2014-2016)
• VEGA 1/0831/11: Possible modulation of myocardial and vessels remodeling by pharmacological stimulation of AT2 receptors (2011-2013)
Selected publications


D. Cardiotoxicity

Investigators
Prof. Beata Mladosievičová, MD, PhD (beata.mladosievicova@fmed.uniba.sk)
Ljuba Bacharova, MD, DSc, MBA
Prof. Angelika Batorova, MD, PhD
Michal Chovanec, MD, PhD
Assoc. Prof. Jozef Mardiak, MD, PhD
Prof. Michal Mego, MD, DSc
Assoc. Prof. Martin Mistrik, MD, PhD
Lucia Petrikova-Setteyova, MD

Topic
Many standard chemotherapeutic agents (such as anthracyclines, cisplatin) as well as targeted therapy (such as tyrosine kinase inhibitors) changed progressive fatal malignancy with a poor prognosis to curable or chronic disease with significant better prognosis. Despite of their effectiveness, there is still a need of better understanding and prediction of cardiovascular complications of these agents. We have identified prevalence and dynamics of several types of cardiac and vascular toxicity and risk factors for development of these complications using modern imaging techniques, electrophysiologic and biochemical methods.

Plans for future research
• To confirm the role of selected biomarkers in early detection of cardiotoxicity in patients with hematologic malignancies treated with small molecule tyrosine kinase inhibitors and testicular tumors patients after cisplatin therapy
• To estimate the prevalence of small dense LDL phenotype in these patients and identify associated treatment factors
• To detect specific genes involved in resistance to tyrosine kinase inhibitors

Devices and methods
• ankle/brachial indices ultrasound device
• electrocardiography
• detection of cardiomarkers- specific biochemical and genetic tests

Grants and Funding (in the last 10 years)
• VEGA 1/0906/14: Biomarkers and genetic predictors of anti-cancer drugs toxicity (2014-2016)
• League against Cancer Slovak Republic: Modern diagnostics of lipoproteins in haematonoecologic patients after allogeneic haematooncologic stem cells transplantation (2015)
• VEGA 1/0906/14: Biomarkers and genetic predictors of anti-cancer drugs toxicity (2014-2016)
• VEGA 01/0610/18: Improvement of toxicity and resistance prediction in patients with for chronic myeloid leukemia treated with tyrosine kinase inhibitors (2018-2020)
Selected publications

E. Inherited heart defects

Investigators
Prof. Jozef Mašura, MD, PhD, FSCAI, FESC, FAEPC (masura@dkc-sr.sk)

Grants and Funding (in the last 10 years)
• VEGA 1/0593/11: Polymorphisms in methylentetrahydropholate reductase and risk of inherited heart defects (2001 -2013)

Selected publications
• Venczelova Z1, Tittel P, Masura J. The new Amplatzer duct occluder II: when is its use advantageous? Cardiol Young 2011; 21: 495-504.
F1. Vascular diseases

Investigators
Prof. Viera Štvrtinová, MD, PhD (viera.stvrtinova@fmed.uniba.sk)
Prof. Ľudovít Gašpar, MD, PhD
Assoc. Prof. Denisa Čelovská, MD, PhD
Marek Kučera, MD, PhD

Topic
Our research is focused on vascular diseases (mainly, arterial and venous of lower extremities) and their most important complications like critical limb ischemia, venous insufficiency, pulmonary embolism and/or diabetic foot. We have found that prostaglandine E1 treatment of critical limb ischemia without possibility of revascularization can postpone amputation but it does not affect patient’s life expectancy. An important part of our research is arterial hypertension.

Plans for future research
- Association between insulin administration by insulin pump and prognosis of patients with diabetes mellitus
- Prognostic significance of diurnal pattern loss in patients with arterial hypertension
- Healing of chronic venous and chronic arterial wounds during hyperbaric oxygentherapy
- Holter ECG monitoring in patients with medial arterial calcinosis
- Baroreflex sensitivity and prehypertension, masked hypertension, white coat hypertension, chronic heart failure with preserved ejection fraction and prediabetes

Devices and methods
- Complex non-invasive cardiovascular diagnostics (Holter ECG, ABPM, exercise load testing, echocardiography, Laser-Doppler investigation of vessels, transcutaneous oximetry – Periflux System 5000, Perimed AB, Sweden)
- Analysis of spectrum and sub-fractions of lipids by Lipoprint LDL and HDL method
- Spectral analysis of heart rate variability
- Diagnosis of cardiovascular autonomic neuropathy using Ewing battery of tests
- Determination of ankle-brachial index and prognosis of patients with critical limb ischemia and medial arterial calcinosis
- Baroreflex sensitivity obtained by sequence and spectral method by COLIN CBM 7000 equipment

Grants and Funding (in the last 10 years)
- APVV-16-0247: Changes in redox regulation and monitoring of specific biomarkers of cardiovascular diseases (2017-2021)
- VEGA 1/0807/18: Central systolic blood pressure in hypertension treatment optimalization (2018-2020)

Selected publications


F2. Vascular diseases

Investigators
Prof. Viera Kristová, MD, PhD (viera.kristova@fmed.uniba.sk)
Miriam Petrová, MD, PhD
Robert Vojtko, MD, PhD
Silvia Lišková, RNDr, PhD

Topic
The research topic of our group is divided in two main branches:
• The assessment of endothelium-protective drugs in various models of endothelial dysfunction and pathological conditions
• The evaluation of regulatory mechanisms involved in the physiological adjustments of vascular tone and in the alterations triggered during the development of pathophysiological conditions

Plans for future research
• The involvement of \( \text{Ca}^{2+} \)-dependent Cl\(-\) channels in regulation of vascular tone in different pathological models
• The quantification of diverse endothelium-dependent mechanisms in contraction of isolated arteries during ageing

Devices and methods
• Isometric wire myograph
• Isometric vessels measurements
• Perfusion measurements of isolated arteries
• Metabolic cages for small laboratory animals

Grants and Funding (in the last 10 years)
• VEGA 1/0314/08: Evaluation of drug effects on endothelial dysfunction in experimental and clinical conditions (2008-2010)
• VEGA 1/ 0501/11: The role of endothelium-released factors in contraction of isolated vessels in the development of hypertension (2011-2013)
• VEGA 1/0504/19: Interaction of \( \text{Ca}^{2+} \)-dependent Cl\(-\) channels and endothelium-derived constricting factor (EDCF) during ageing and hypertension (2019-2021)

Selected publications


G. Pharmacoepidemiology of cardiovascular diseases

Investigators
Prof. Martin Wawruch, MD, PhD (martin.wawruch@fmed.uniba.sk)
Prof. Jan Murin, MD, PhD

Topic
Our research is focused on pharmacoepidemiologic analysis of treatment in elderly patients in terms of the use of potentially inappropriate medications, drugs with anticholinergic effects, analyses of antihypertensive, antithrombotic and lipid-lowering therapy, adherence with secondary preventive medication in patients after an ischemic stroke/transient ischemic attack and peripheral artery disease of lower limbs. Using the methods of predictive statistics we identified specific groups of patients at increased risk for inappropriate medication use, suboptimal use of beneficial medications and non-adherence with preventive therapy. Identification of such risky groups of patients makes it possible to prepare educational programs for physicians and patients aimed at the improvement of physicians’ prescription and patients’ medication taking behaviour.

Plans for future research
• Evaluation of risk factors for non-persistence with preventive medication in elderly patients with peripheral artery disease
• Analysis of the patterns of medication prescription using the group based trajectory modelling

Devices and methods
• Statistical software IBM SPSS for Windows
• Statistical software R, module Adhere R

Grants and Funding (in the last 10 years)
• VEGA 1/0135/09: Specific features of pharmacotherapy in geriatrics and the possibilities of its quality assessment (2009-2011)
• VEGA 1/0886/14: Suboptimal use of drugs in secondary prevention of cardiovascular diseases in elderly patients (2014-2016)
• VEGA 1/0112/17: Adherence with pharmacotherapy – a basic precondition of successful secondary prevention of cardiovascular diseases in elderly patients (2017-2019)

Selected publications
H. Drugs for hypertension therapy

Investigators
Prof. Pavel Babál, MD, PhD (pavol.babal@fmed.uniba.sk)

Grants and Funding (in the last 10 years)
- VEGA 2/7064/7: Long-term administration of low dose of L-NAME: possibility for improvement of vessel wall function in borderline hypertension (2007)
- VEGA 1/1171/04: Protective effect of polygenole compounds against endothelial damage (2004-2005)

Selected publications
Oncological Diseases
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<th>Research area</th>
<th>Topic</th>
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<td>Mammary carcinoma</td>
<td>Circulating tumor cells (CTC)</td>
<td>Prognostic and predictive significance CTC</td>
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<td>Tumor microenvironment and CTC</td>
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<td>CTC and coagulation, CTC and immune system</td>
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<td></td>
<td>Functional breast MRI</td>
<td>Role of biomarkers in prediction of neoadjuvant chemotherapy response</td>
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<tr>
<td>Urologic malignity</td>
<td>Testicular cancer</td>
<td>Treatment of advanced stages, relapses, and refractory diseases</td>
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<td>Identification of biomarkers associated with resistance and late toxicity</td>
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<td>Late toxicity in the treatment of TGCTs, quality of life</td>
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<td>Development of experimental animal model of TGCTs</td>
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<td>Cultivation and characterization of TGCT from cell lines</td>
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<td>Optimization of therapy and follow-up patients with TGCT in I. clinical stage</td>
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<td>Hormonal substitution therapy by testosterone and defects of bone density in patients with TGCT</td>
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<td>Secondary malignity after therapy of testicular tumors</td>
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<td>Other tumors</td>
<td>Tumors of head and neck</td>
<td>Functional consequences of therapy of head and neck tumors</td>
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<td>Immunological and immunogenetic aspects of tumors and other lesion of head and neck.</td>
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<td>The role of HMGB1, TREM-1, and TREM-2 molecules and cytokines.</td>
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<td>Salivary and other molecular markers of head and neck tumors</td>
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<tr>
<td>Nuclear medicine</td>
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<tr>
<td>Late adverse effects</td>
<td>Late toxicity of anti-cancer therapy</td>
<td>Monitoring of late toxicity in pediatric and TGCTs patients</td>
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<tr>
<td>Probiotics</td>
<td>Probiotics as adjuvant to anti-cancer therapy</td>
<td>Safety of probiotics in oncological patients</td>
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<td>Prevention of irinotekan-induced diarrhea</td>
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<td>Prevention of chemotherapy toxicity and potentiation of its efficiency</td>
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</table>
OncoLOGICAL DISEASES

Oncological research is currently focused on investigation of etiopathogenesis of mammary, urological, and other malignancies. Outstanding findings were obtained in the research focused on the role of circulation tumor cells.

Principal investigators
Assoc. Prof. Jozef Mardiak, MD, PhD
Prof. Pavel Babáš, MD, PhD
Dr. h. c. Prof. Ján Breza, MD, DSc
Assoc. Prof. Soňa Balogová, MD, PhD
Prof. Ludovit Daníhel, MD, PhD
Prof. Štefan Durdík, MD, PhD
Prof. Michal Mego, MD, DSc
Prof. Beáta Mladosievičová, MD, PhD
Prof. Dalibor Ondruš, MD, DSc
Prof. Vanda Repíská, RNDr, PhD
Prof. Juraj Šteňo, MD, DSc
A1. Mammary carcinoma

Investigators
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Assoc. Prof. Jozef Mardiak, MD, PhD
Prof. Pavel Babál, MD, PhD
Assoc. Prof. Soňa Balogová, MD, PhD
Prof. Ludovit Danihel, MD, PhD
Prof. Štefan Durdík, MD, PhD
Zuzana Čierna, MD, PhD

Topic
Circulating tumor cells (CTC) are independent prognostic factor in primary as well as in metastatic breast cancer. CTC are heterogeneous population of tumor cells and play crucial role in metastatic cascade and tumor progression in process termed self-seeding. Presence of CTC in peripheral blood is a surrogate marker of tumor metastatic ability. We identified new subpopulation of CTCs with epithelial to mesenchymal transition phenotype, and we found prognostic value of this CTCs subpopulation. We also found association between CTCs and risk of venous thromboembolism, as well as with several clinicopathological characteristics. We identified association between CTC and immune system, coagulation factors and matrix-metalloproteinases.

Plans for future research
• Genotyping of tumors in relationship with circulating tumor cells
• Evaluation of predictive and prognostic value new subpopulation of circulating tumor cells with epithelial-mesenchymal transition

Devices and methods
• Standard equipment of laboratory
• Laminar box

Grants and Funding (in the last 10 years)
• APVV-16-0010: Identification and validation of signaling pathways associated with circulating tumor cells in breast carcinoma (2017-2020)
• VEGA 1/0044/15: Identification of factors participating on release and migration of circulating tumor cells in mammary carcinoma (2016-2018)
• VEGA 1/0724/11: Circulating tumor cells and epithelial-mesenchymal transition (2012-2014)
• APVV-14-0327: Identification of new biomarkers and alternative approaches for analysis of tumor DNA utilizable in diagnostics and prognostics of mammary carcinoma (2015-2018)

Selected publications


A2. Mammary carcinoma

Investigators
Assoc. Prof. Viera Lehotska, MD, PhD (viera.lehotska@ousa.sk)
Lucia Vanovcanova, MD, PhD
Prof. Stanislav Spanik, MD, PhD
Prof. Stefan Durdik, MD, PhD, MHA

Topic
Our research is focused on high risk women, especially on breast cancer detection rate in gene mutation carriers according their hormonal status and on elucidation, if menopausal status of gene mutation carriers at the time of breast carcinoma diagnosis influences the disease free survival. We also focus on identification of early predictive biomarkers in monitoring of anticancer threatment response.

Plans for future research
• MR-mammography in breast cancer detection rate in gene mutation carriers according to their age, type of mutation, breast density and hormonal status
• Identification of early predictive biomarkers in monitoring of response to neoadjuvant chemotherapy
• Identification of risk patient population non-responding to first-line chemotherapy in breast cancer treatment

Devices and methods
• 3T MR device
• Stereotactic and MR navigated vacuum-assisted biopsy (VAB)
• Stereotactic and US navigated breast lesion excision system (BLES)
• Tumor marking set

Grants and Funding (in the last 10 years)
• APVV 0297/10: Early detection of prostate cancer with 3T MRI (2010-2013)

Selected publications
B. Testicular cancer

Investigators
Assoc. Prof. Jozef Mardiak, MD, PhD (jozef.mardiak@nou.sk)
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Prof. Pavel Babál, MD, PhD
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Prof. Dalibor Ondruš, MD, DSc
Michal Chovanec, MD, PhD
Viera Miskovska, MD, PhD
Zuzana Cierna, MD, PhD
Ing. Katarina Kalavska, PhD
Katarina Rejlekova, MD, PhD

Topic
Testicular germ cell tumors (GCTs) are rare and unique malignancies, however, a long-term cure of >95% in all GCT patients was achieved with combination of chemotherapy, radiotherapy and surgery. Nevertheless, a proportion of patients with metastatic disease meet with dismal prognosis and these young men are dying in the prime of their lives. Experimental approaches to overcome the poor outcome in this group are scarce and lack significant efficacy since the introduction of salvage chemotherapy regimens over 20 years ago. The exciting era of novel targeting agents and immunotherapy with incredible success in other solid tumors seems to neglect GCTs and chemotherapy refractory patients remain without novel treatment options. This research initiative is aimed to explore the biology of GCTs, to overcome the resistance to conventional treatments.

Plans for future research
• Treatment of advanced stages
• Treatment of relapses and refractory diseases
• Identification of biomarkers associated with resistance
• Identification of biomarkers associated with late toxicity
• Late toxicity in the treatment of TGCTs, quality of life
• Development of experimental animal model of TGCTs
• Cultivation and characterization of TGCT from cell lines

Devices and methods
• Equipment in Department of clinical studies
• Equipment of Unit of translational research at Faculty of Medicine in Bratislava and National Institute of Cancer

Grants and Funding (in the last 10 years)
• Grant VEGA 1/0043/18: Using model systems to study resistance mechanisms associated with failure of chemotherapy treatment in patients with testicular germ cell tumors (2019-2021)
• Grant VEGA 1/0174/19: Use of experimental models for the study of choriocarcinoma syndrome in high-risk patients with germ cell tumors (2019-2021)
• APVV-0016-11: Identification of biomarkers associated with resistance on chemotherapy in testicular tumors from germinative cells (TGCTs) (2012-2015)

Selected publications


C. Tumors of head and neck

Investigators
Patrik Štefanička, MD, PhD (patrikstefanicka@yahoo.com)
Miroslav Tedla, MD, PhD
Prof. Milan Profant, MD, PhD
Lukáš Varga, MD, RNDr, PhD
Jozef Ukropec, MSc, DSc
Assoc. Prof. Barbara Ukropcova, MD, PhD

Topic
In cooperation with Institute of Experimental Endocrinology we focused on human brown fat thermogenesis. Presence and distribution of brown fat in adult humans was discovered with the positron emission tomography with 18F-deoxyglucose. During the Head and Neck and Thyroid surgeries we meticulously identified and took brown adipose tissue samples, specifically from peritracheal area. This material was subsequently thoroughly analyzed in Biomedical Research Center. In comparative proteotype analysis we revealed significant quantitative differences in protein abundances in human brown adipose tissue versus adjacent white adipose tissue and in turn differential functional capabilities. We found that Bmp4 promotes the differentiation of brown pre-adipocytes into white-like adipocytes, Bmp4 blunts the activity of mature brown adipocytes and obese type 2 diabetic subjects have higher levels of circulating Bmp4. We also found that peroxisome proliferator-activated receptors α and β/δ are dispensable for maintaining brown adipocyte function in vivo. By combining mouse and human transcriptome data, we identified a gene signature that can classify brown and white adipocytes.

Devices and methods
- Molecular and genetic analysis at Institute of Experimental Endocrinology, Biomedical Research Center, SAS
- Operating theatres at the Department of Otorhinolaryngology- Head and Neck Surgery

Grants and Funding (in the last 10 years)
- VEGA 2/0096/17: Molecular mechanisms of human brown fat thermogenesis and its relations to obesity, physical activity and ice water swimming (2017-2019)

Selected publications
D. Innovative clinical applications of diagnostic radiopharmaceuticals

Investigators
Assoc. Prof. Soňa Balogová, MD, PhD (sona.balogova@ousa.sk)

Plans for future research
- Evaluation of innovative clinical applications of diagnostic radiopharmaceuticals for PET in oncology

Grants and Funding (in the last 10 years)

Selected publications
E. Late toxicity

Investigators
Assoc. Prof. Jozef Mardiak, MD, PhD (mardiak@nou.sk)
Prof. Michal Mego, MD, DSc
Prof. Beáta Mladosievičová, MD, PhD
Prof. Dalibor Ondruš, MD, DSc
Michal Chovanec, MD, PhD
Viera Miskovska, MD, PhD
Katarina Kalavska, Eng, PhD
Katarina Rejlekova, MD, PhD

Topic
This research is aimed to address the long-term health issues associated with anticancer treatment, focusing mainly on long term toxicity of testicular germ cell tumors (TGCTs) survivors. Several clinical and biochemical markers associated with late toxicity of TGCTs survivors were identified.

Plans for future research
• Monitoring of late toxicity in patients with testicular cancer from germinative cells

Grants and Funding (in the last 10 years)
• VEGA 1/0327/19. Identification of the role of microbioma and immune molecular mechanisms of cognitive dysfunctions due to the late toxicity of treatment in germ cell testis (2019-2021)
• VEGA 1/0906/14: Biomarkers and genetic predictors of toxicity of anti-cancer therapy (2014-2016)

Selected publications
F. Probiotics

Investigators
Prof. Michal Mego, MD, DSc (misomego@gmail.com)
Assoc. Prof. Jozef Mardiak, MD, PhD
Assoc. Prof. Luboš Drgoňa, MD, PhD

Topic
Probiotics are live microorganisms, which as drugs or food supplements help to maintain health beneficial microbial balance in the digestive tract of a human or other host. Probiotics by their properties may help strengthen homeostasis and thus reduce side effects associated with cancer treatment. Experimental evidence suggests that probiotics might have beneficial effect on the toxicity of anticancer therapy. We found, that administration of probiotics in patients with colorectal cancer treated with irinotecan-based chemotherapy is safe and could lead to a reduction in the incidence and severity of gastrointestinal toxicity. We identified the prevalence, side-effect experience, and aspects that most likely influence probiotic use in cancer patients.

Plans for future research
• Prevention of irinotecan-induced diarrhea by probiotics. Clinical study phase III

Devices and methods
• Equipment of Unit of translational research at Faculty of Medicine in Bratislava and National Institute of Cancer

Grants and Funding (in the last 10 years)
• VEGA 1/0722/11: Prevention of irinotecan-induced diarrhea by probiotics (2011-2013)
• APVV-0646-11: The role of bacteria in process of carcinogenesis and syndrome of acquired immunodeficiency (2011-2013)

Selected publications
Metabolic, Endocrine, and Inflammatory Diseases
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<td>DNA diagnostics of rare diseases and syndromes associated with ORL diseases</td>
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<td>(alteration of hearing, malformation in ORL areas associated with endocrinopathies and metabolic disturbances)</td>
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<td>Bioenergetics</td>
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Traditionally, research at Faculty of Medicine in Bratislava is focused on investigation of etiopathogenesis of diabetes mellitus, osteoporosis, thyroid diseases, rheumatoid arthritis, sepsis, and other immune diseases.

**Principal investigators**

Prof. Juraj Payer, MD, PhD, MPH, FRCP  
Prof. Ľudmila Podracká, MD, PhD  
Prof. Tibor Hlavatý, MD, PhD  
Assoc. Prof. Mária Bucová, MD, PhD  
Assoc. Prof. Peter Celec, MD, Dipl Eng, Dr Rer Nat, DSc, MPH  
Assoc. Prof. Katarína Šebeková, MD, DSc  
Prof. Mária Šimaljaková, MD, PhD  
Prof. Ladislav Turecký, MD, PhD
A1. Diabetes mellitus - diabetic foot

Investigators
Prof. Ludovít Gašpar, MD, PhD (ludovitgaspar@gmail.com)
Prof. Viera Štvrtinová, MD, PhD
Prof. Stanislav Oravec, MD, PhD
Assoc. Prof. Jozed Bulas, MD, PhD
Martin Čaprnda, MD, PhD
Marek Kučera, MD, PhD
Denisa Čelovská, MD, PhD
Andrea Komorníková, MD

Topic
Our research is focused on chronic complications of diabetes mellitus, specifically on diabetic foot and cardiovascular autonomic neuropathy. We monitor the effect of hyperbaric oxygen on changes in vasomotion and healing process of diabetic wounds. Orthostatic hypotension as the most severe grade of cardiovascular autonomic neuropathy has also a great prognostic importance, and therefore we have dedicated our immense attention to this topic.

Plans for future research
• Optimization of diagnosis and therapy of patients with diabetic foot syndrome
• Association between insulin administration by insulin pump and prognosis of patients with diabetes mellitus
• Resistant hypertension in patients with diabetes mellitus
• Diabetes mellitus, dipping status and prognosis of patients
• Incidence of mediocalcinosis in patients with diabetes mellitus and their prognosis

Devices and methods
• Complex non-invasive cardiovascular diagnostics (Holter ECG, ABPM, exercise load testing, echocardiography, Laser-Doppler investigation of vessels, transcutaneous oximetry – Periflux System 5000, Perimed AB, Sweden)
• Analysis of spectrum and sub-fractions of lipids by method Lipoprint LDL and HDL
• Spectral analysis of heart rate variability
• Diagnosis of cardiovascular autonomic neuropathy
• Determination of ankle-brachial index and prognosis of patients with critical limb ischemia and medial arterial calcinosis

Grants and Funding (in the last 10 years)
• APVV-16-0247: Changes in redox regulation and monitoring of specific biomarkers of cardiovascular diseases (2017-2021)
• VEGA 1/0807/18: Central systolic blood pressure in hypertension treatment optimization (2018-2020)
• VEGA 1/0195/16: Effect of hyperbaric oxygen therapy in treatment of patients with diabetic polyneuropathy (2016-2017)
• 14 13 02 000 96, INTERREG IIIA AT-SR: Testing of vascular endothelium integrity (2007-2008)
• AV 4/0101/06: Evaluation of vascular endothelium integrity in population with ischemic heart disease, peripheral arterial obliterative disease, hyperlipoproteinemias and essential hypertension (2006-2008)
Selected publications


A2. Diabetes mellitus - monogenic disorders of insulin secretion and action

Investigators
Assoc. Prof. Juraj Staník, MD, PhD (stanik@dfnsp.sk)
Ľubomír Barák, MD, PhD
Daniela Staníková, MD, PhD
Denisa Lobotková, MD, PhD
Lukáš Varga, MD, PhD
Kristína Podoláková, MD

Topic
Our research is focused on clinical and genetic aspects of monogenic forms of diabetes mellitus and hypoglycemia. We have identified a genetic cause of the MEHMO syndrome, and also a first mutation in the promotor of the GCK gene causing GCK-MODY. We have also participated in several international studies focused on the pharmacogenetics in neonatal diabetes, and studies on biomarkers for various forms of Maturity Onset Diabetes of the Young (MODY).

Plans for future research
• Adjusting clinical diagnostic criteria for MODY
• Searching for a causal mutation in syndromic forms of diabetes using next-generation sequencing techniques
• Pharmacogenetics of monogenic diabetes and congenital hyperinsulinism
• Optimization of diagnosis and therapy of patients with mitochondrial diabetes

Devices and methods
• Molecular-genetic analysis at Biomedical Research Center, Slovak Academy of Sciences
• Clinical diagnostics and management in Children Diabetes Center at the Pediatric Department of Faculty of Medicine in Bratislava

Projects realized in the last 10 years
• APVV-17-0296: Genetic causes of rare diseases with emphasis on metabolic disorders associated with hypoglycemia and mitochondriopathies (2018-2022)
• VEGA 1/0211/18: Diagnostic and pharmacogenetic aspects of monogenic diabetes type MODY (2018-2021)
• VEGA 2/0083/17: Whole-exome sequencing in patients with a suspicion on primary mitochondriopathies (2017-2020)
• APVV 0107-12: Molecular-genetic research with pharmacogenetic consequences in children with hyperinsulinemic hypoglycemia (2013-2017); principal investigator: Assoc. Prof. Juraj Staník, MD, PhD
• VEGA 2/0166/14: Prevalence and mutation spectrum of the most common forms of monogenic obesity (2013-2016)
• VEGA 2/0151/11: Prevalence of various types of diabetes type MODY in Slovakia (2010-2014)
• ASFEU- structural founds of EU (ITMS: 26240220051): TRANSENDOGEN (Transfer of genetic knowledge of endocrine research into clinical praxis (2010-2014)
Selected publications


B. Osteoporosis

Investigators
Prof. Juraj Payer, MD, PhD, MPH, FRCP (payer@ru.unb.sk)
Assoc. Prof. Zdenko Killinger, MD, PhD
Assoc. Prof. Peter Jackuliak, MD, PhD
Assoc. Prof. Martin Kužma, MD, PhD
Prof. Tibor Hlavatý, MD, PhD
Assoc. Prof. Tomáš Koller, MD, PhD
Prof. Ľudmila Podracká, MD, PhD
Ľubica Tichá, MD, PhD

Topic
• Effect of selected therapeutic approaches on bone parameters with regards to bone structure assessment
• Secondary osteoporosis in rheumatoid arthritis – bone quality and the effect of biological treatment on bone
• Impact of adult growth hormone deficiency and on bone mineral density, trabecular bone score, and effect of vitamin D as cofactor in the treatment of growth hormone deficiency
• Prediction models of clinical fractures in patients with postmenopausal osteopenia
• The effect of glycemic compensation on bone - bone quality in diabetic patients
• Prevalence of osteoporosis in patients with inflammatory bowel diseases and the effect of treatment on bone parameters

Plans for future research
• Effect of acromegaly on bone parameters and incidence of clinical and morphometric vertebral fractures
• Chronic heart failure and incidence of clinical and morphometric vertebral fractures
• Effect of hydrocortisone treatment on bone in patients with Addison disease
• Association between hyperthyroidism, bone quality and novel bone turnover markers
• Assessment of bone quality in adults with hypophosphatasia
• Prevalence of fractures in patients with rheumatoid arthritis treated with biological therapy.
• Extend existing epidemiological data of osteoporotic fractures in diabetic patients
• Mutual influence of other factors of secondary osteoporosis on incidence of osteoporosis in diabetic patients
• Non-invasive measurement of advanced glycation end-products (AGEs)
• Metabolic consequences of bone disease in children
• New potential biomarkers of bone metabolism
• Aassessment of sarcopenia in selected groups with secondary osteoporosis

Devices and methods
• Determination of biochemical markers of bone metabolism
• Determination of vitamin D
• Investigation of calcium-related and calcium non-related effects of vitamin D
• Dual energy X-ray absorptiometry
• Trabecular bone score, hip structure analysis, 3D-DXA
• AGE reader for skin autofluorescence
• Serum CX3CL1/Fractalkine, IL-1Ra, IL-8
Projects realized in the last 10 years

- Center for Research on Serious Diseases and their Complications. Supported by the Operational Program Research and Development co-funded by the European Union from the European Regional Development Fund, ITMS Code 26240120038 (2013-2015)
- LipidomicNet – 7th Framework Program, European Commission, Brussels, Belgium – Lipid droplets as dynamic organelles of fat deposition and release: translational research towards human disease
- VEGA 1/0613/17: Early diagnosis of osteoporosis in children and adolescents with mental anorexia (2017-2019)

Selected publications

C. Short stature in children

Investigators
Assoc. Prof. Ludmila Košťálová, MD, PhD (kostalova@dfnsp.sk)
Zuzana Pribilincová, MD, PhD
Eva Vitáriušová, MD PhD
Ľubica Tichá, MD, PhD
Katarína Prochotská, MD, PhD
Zuzana Blusková, MD, PhD

Plans for future research
• Growth hormone treatment in children with deficit of growth hormone - effect and complications
• Growth hormone treatment in SGA born children - effect and complications
• Growth hormone treatment in Turner syndrome and rasopathies - effect and complications
• Growth hormone treatment children with disorder of sexual differentiation in mosaicism in karyotype - effect and complications
• Genetic causes of short stature (Geleophysic nanism, 3-M syndrome, Silver-Russell syndrome, Deficiency of SHOX gene)
• Onset of puberty in SGA born children

Devices and methods
• Hormonal and metabolic profile
• Body composition
• Genetic assay
• Evaluation of puberty
• Evaluation of bone age

Projects realized in the last 10 years
• ECOS - Easypod Connect observational Study (2012-2016)
• GeNeSIS - The genetic and endocrinology of Short Stature International Study (2006-2016)
• KIGS - Kabi international growth hormone study (1992-2015)

Selected publications
D. Disorders of sexual development

Investigators
Zuzana Pribilincová, MD, PhD (pribilincova@dfnsp.sk)
Assoc. Prof. Ľudmila Košťálová, MD, PhD
Eva Vitáriušová, MD PhD
Katarína Prochotská, MD, PhD
Peter Bartoň, MD
Jozef Babala, MD, PhD
Zuzana Nižňanská, MD, PhD
Judita Puškáčová, MD, PhD

Plans for future research
• Database of DSD in Slovakia
• Genotype – phenotype correlations in DSD patients
• Evaluating risk of gonadal cancer in DSD patients
• Role of Androstendione in evaluating treatment of CAH and other hyperandrogenic states
• Blood pressure and insulin resistance in paediatric CAH patients
• Surgical outcomes in DSD patients – novel approach

Devices and methods
• Genotyping DSD population
• Examination of metabolic status in CAH patients
• Analysis of circadian rhythms of blood pressure in CAH patients
• Immunohistochemistry in operated gonads in DSD patients, correlation with genotype

Projects realized in the last 10 years
• MESPE CAH study group, CEEPUS grant (1999-2002)
• VEGA 1/0497/08: Risk factors of metabolic syndrome in population of patients with exogenous obesity, mutation of melanocortin receptor 4 and classic form of congenital adrenal hyperplasia with 21 hydroxylase deficiency (2008-2012)

Selected publications

E. Metabolic syndrome in children

Investigators
Assoc. Prof. Ludmila Košťálová, MD, PhD (kostalova@dfnsp.sk)
Zuzana Pribilinčová, MD, PhD
Eva Vitáriušová, MD PhD
Katarína Prochotská, MD, PhD
Anna Hlavatá, MD, PhD, MPH
Zuzana Blusková, MD, PhD
Katarína Krivošíková, MD

Plans for future research
• Etiology of pediatric metabolic syndrome
• Components of metabolic syndrome and hormonal disturbances in praepubertal and pubertal SGA born children
• Components of metabolic syndrome and hormonal disturbances in Roma SGA born children
• Metabolic syndrome in Slovak Roma population
• Etiology pediatric primary hypertension
• Salt consumption and its influence on blood pressure
• Mineral and electrolyte metabolism in children with metabolic syndrome
• Changes in metabolic syndrome after intervention treatment

Devices and methods
• 24 hour blood pressure monitoring
• Adipokines
• Body composition, bioimpedance
• Examination of renal function and renal salt excretion
• Mineral and electrolyte metabolism
• Biochemical and humoral markers of metabolic syndrome
• Analysis of circadian and ultradian rhythms of blood pressure

Projects realized in the last 10 years
• VEGA 1/4278/07: Current state of nutrition and incidence of obesity in 6-15 years old children in selected regions of Slovakia (2007-2011)
• VEGA 1/0497/08: Risk factors of metabolic syndrome in population of patients with exogenous obesity, mutation of melanocortin receptor 4 and classic form of congenital adrenal hyperplasia with 21 hydroxylase deficiency (2008-2012)
• VEGA 1/1267/12: Chronic microinflammation of visceral fat and its role in development of cardiovascular and bone complications in obese children and in children with chronic inflammatory bowel disease (2012-2016)
• VEGA 1/0202/17: Humoral, renal and psychological factors in pediatric obesity and hypertension (2017-2019)

Selected publications
• Kovács L, Babinská K, Ševčíková Ľ. New trends in infant and child nutrition. TRIAD s.r.o. 2008; 92 pp.
• Kovács L, Babinská K et al. Obesity, nutrition and physical activity in children. LF UK 2008.
F. Inborn errors of metabolism

Investigators
Assoc. Prof. Vladimír Bzdúch, MD, PhD (bzduch@gmail.com)
Darina Behúlova, MD, PhD
Katarína Brennerová, MD
Anna Hlavatá, MD, PhD
Katarína Juričková, MD
Miriam Kolníková, MD, PhD
František Horn, MD, PhD

Topic
Our research is focused on analysis of clinical features of inborn errors of metabolism with dysmorphic features and use of new approaches to treatment. In disorder of cholesterol biosynthesis, Smith-Lemli-Opitz syndrome we discovered sacral dimple as a new skin manifestation of this syndrome. In nonketotic hyperglycinemia we used a new treatment with ketogenic diet and in lysosomal storage diseases, we used new combination of ERT a substrate inhibition therapy in Pompe disease. We used a new intrathecal baclofen therapy for improvement of quality of life in patients with mucopolysaccharidosis type II (Hunter syndrome).

Plans for future research
• We will continue obtain new experience with novel therapy of inborn errors of metabolism

Devices and methods
• Gas Chromatography mass spectrometry (GC/MS)
• Amino Acid Analyzer
• New biochemical methods for selective screening

Projects realized in the last 10 years
• VEGA 2/0083/17: Whole-exome sequencing in patients with a suspicion on primary mitochondriopathies (2017-2020)
• VEGA 1/0211/18: Diagnostic and pharmacogenetic aspects of monogenic diabetes type MODY (2018-2021)
• APVV-17-0296: Genetic causes of rare disease with emphasis on metabolic disorders associated with hypoglycemia and mitochondriopatjies (2018-2022)

Selected publications
G. Thyroid gland and ORL

Investigators
Assoc. Prof. Miroslav Tedla, MD, MPH, PhD (miro.tedla@gmail.com)
Patrik Štefanička, MD, PhD
Lukáš Varga, MD, PhD
Prof. Milan Profant, MD, PhD

Topic
One branch of our research focuses on various aspects of quality of life in relation to the thyroid gland surgery (neurophysiology complications, QoL, voice, swallowing alterations).
With conjunction with BMC SAV we also plan stratification of thyroid nodules with intermediate risk of malignancy using methods of molecular – genetic analysis.

Plans for future research
• Effect of thyroid gland surgery on quality of life (neurophysiology complications, QoL, voice, swallowing alterations)
• Thyroid gland and obesity

Devices and methods
• Molecular-genetic analysis at BMC SAV
• Surgical unit of ORL department in UNB
• Voice and swallowing analysis unit

Selected publications
H. Nutrition

Investigators
Prof. Jana Jurkovičová, MD, PhD (jana.jurkovicova@fmed.uniba.sk)
Prof. Ludmila Ševčíková, MD, PhD
Assoc. Prof. Lubica Argalášová, MD, PhD
Zuzana Štefániková, MD, PhD
Jana Babjaková, MD, PhD
Katarína Hirošová, RNDr, PhD
Martin Samohýl, MEng, PhDr, PhD
Alexandra Filová, MSc, PhD
Diana Vondrová, RNDr, PhD

Topic
Research of the institute has been oriented towards study of interactions between environment, nutrition and population health status, health protection and promotion of children and youth, study of psychosocial, behavioral and environmental risk factors of cardiovascular diseases and effects of noise on human health.

The most important results:
• the original comprehensive methodology for the risk assessment of cardiovascular diseases based on the evaluation of 32 risk factors suitable for screening was elaborated and verified in practice; valid data on the current state of nutrition and selected indicators of cardiovascular disease risk in the Slovak population were obtained;
• the impact of the risk of excessive noise pollution on the area of psychological and vegetative functions and the organ of hearing was verified - acceptance of the results of noise studies and their inclusion in the publications NASA/CR - 2001-211257, ENNAH Report 2012, WHO Environmental Noise Guidelines for European Region 2018; objectification of physiological reactions of a child’s body to noise were the basis for innovation of standards IEC 601-2-19 and IEC 601-2-20;
• the current growth and development standards of the Slovak children and adolescent population have been developed for individual assessment of the child’s development in pediatric practice; for quantification of the depot body fat for selected population groups; for group diagnostics in the field of state health surveillance and for research international comparative studies with regard to the new age categorization that has not yet been developed.

Plans for future research
• Detection of selected environmental, behavioral, and psychosocial risk factors of cardiovascular diseases prevalence in adolescents and university students
• Analysis of selected cardiometabolic parameters in adolescents for cardiovascular and other chronic diseases prevention and intervention
• Monitoring of risk factors and biological markers distribution in relation to age, gender, education, residence location
• Study of behavioral and physical risk factors in adolescents and adults

Devices and methods
• Reflotron – automatic device for screening of blood lipids and other biochemical parameters in capillary blood
• Futrex - NIR method for determination of body fat percentage
• Omron - BIA method for determination of body fat and lean body mass content
• Caliper method for determination of body fat percentage
• InBody 720 – precision body composition analyzer
• Software for nutrients intake and energy expenditure analysis and for relative cardiovascular risk calculation
• Bruel & Kjaer 2250 Handheld Sound Level Analyzer with Logging Software BZ7224

Grants and Funding (in the last 10 years)
• VEGA 1/3433/06: Study of somatic development in children and adolescents in relationship with selected genetic and psychosocial factors (2006-2008)
• VEGA 1/1045/12: Physical activity in relationship to somatic development, physical fitness, and psychical balance (2012 – 2014)
• Project proposal in the framework of the Memorandum of Understanding on Academic Exchanges between School of Medicine Comenius University in Bratislava and New York University School of Medicine No. O-15-101-/0001-00: The Youth and Parents Risk Factor Behaviour Survey in Slovakia (YABS) (2015-2016)

Selected publications


I. Autoimmunity and autoinflammation

Investigators
Prof. Milan Buc, MD, DSc (milan.buc@fmed.uniba.sk)
Assoc. Prof. Mária Bucová, MD, PhD
Assoc. Prof. Vladimíra Ŏurmanová, RNDr, PhD
Monika Homolová, MD, PhD
Juraj Javor, MD, PhD
Zuzana Párnická, MD, PhD
Assoc. Prof. Ivana Shawkatová, MSc, PhD
Magda Suchánková, MD, PhD
Assoc. Prof. Peter Čižnár, PhD
Tomáš Dallos, MD, PhD

Topic
The goal of our contemporary research activities concentrate on genetic determination of two diseases, multiple sclerosis (MS) and Alzheimer disease (AD). We have been studying associations between polymorphisms of genes coding for proinflammatory cytokines (TNF), adhesive molecules (VLA4, ICAM1) and MS, and AD respectively. In the field of paediatric rheumatology, we study a new approach to the treatment (a biological therapy) of juvenile idiopathic arthritis (JIA) in the frame of international projects. New classifications of subtypes of JIA were proposed and we try to apply it to our cohort of patients.

Plans for future research
• By means of association studies, we intend to contribute to the identification of suitable immunogenetic markers of Alzheimer`s disease within the groups of candidate genes studied
• Focus on autoinflammatory diseases: prevalence of autoinflammatory diseases
• Genetic aspects of primary immunodeficiencies

Devices and methods
• PCR cyclers, ELISA-reader, transilluminator, spectrophotometer, photo-recording system
• PCR-based methods (PCR-RFLP, PCR-SSP)
• HLA typing of classical and non-classical genes
• SNP typing of genes coding cytokines, cytokines receptors, adhesive molecules, membrane antigens and other immune-related molecules
• DNA sequencing
• ELISA for protein detections (cytokines, acute phase proteins, pattern recognition receptors, inflammatory markers)
• Flow cytometry (cell surface markers – CDs, cytokines)
• ELFO (agarose and polyacrylamide gels)

Grants and Funding (in the last 10 years)
• VEGA: 1/0240/16: Immunogenetic markers in Slovak patients with Alzheimer`s disease (2016-2018)
• VEGA: 1/0810/12: Immunogenetic determination of response to biological treatment of patients suffering from multiple sclerosis (2012-2014)
• VEGA: 1/0145/09: Immunogenetic determination of psoriasis vulgaris and pemphigus vulgaris (2009-2011)
Selected publications

J. Inflammation in cardiovascular diseases

Investigators
Assoc. Prof. Mária Bucová, MD, PhD (maria.bucova@fmed.uniba.sk)
Assoc. Prof. Ján Lietava, MD, PhD
Prof. Marian Bernadic, MD, PhD
Assoc. Prof. Július Hodosy, MD, MSc, PhD, MPH

Plans for future research
• Cytokine polymorphism and inflammation in cardiovascular diseases
• Determination of cytokines, chemokines, and new markers of inflammation, gene expression of TREM-1 and HMGB1, adhesive molecules
• Determination of new circulating nucleic acids as a marker of inflammation and myocardial damage
• Early predictors of mortality in myocardial infarction, the role of DNAse activity and extracellular DNA

Devices and methods
• PCR cyclers, PCR-SSP, RFLP, Taq Man, centrifuges
• DNA/RNA spectrophotometer, transilluminator
• ELFO, photo-recording system
• DNA/RNA isolation
• DNase activity measurement
• ELISA

Grants and Funding (in the last 10 years)

Selected publications


K. Rheumatoid arthritis

Investigators
Assoc. Prof. Zdenko Killinger, MD, PhD (killinger@ru.unb.sk)
Prof. Juraj Payer, MD, PhD, MPH, FRCP
Assoc. Prof. Peter Jackuliak, PhD
Assoc. Prof. Martin Kužma PhD
Kristína Brázdilová, MD, PhD
Daniel Čierny, MD, PhD
Monika Adamcová MD

Plans for future research
• Determination of effect of inflammatory rheumatic diseases on bone metabolism, metabolic syndrome and cardiovascular risk
• Evaluation of bone quality in secondary osteoporosis with focus on inflammatory rheumatic diseases
• Effect of biological therapy on bone metabolism and parameters related to bone quality
• Evaluation of sarcopenia and frailty syndrome using bioimpedance spectroscopy

Devices and methods
• Whole body densitometer (Discovery Wi Hologic) enabling to measure bone density, morphological scan of spine (software IVA, Hologic), Hip structure analysis software - measurement of several indexes characterizing solidity of femoral cervix, whole body composition - ration of fat, muscle and bone
• Non-invasive evaluation of aortal calcifications by DXA method
• Determination of parameters characterizing bone turnover, calcium phosphate metabolism
• Assessment of bone microarchitecture with trabecular bone score
• Sarcopenia assessment – bioimpedance spectroscopy, whole body densitometry, hand-grip, SARQoL questionnaire

Projects realized in the last 10 years
• Determination of cellular and molecular mechanisms responsible for pharmacological modulation of activity of phagocytes - neutrophil granulocytes and microglia cells
• Elucidation of effects of drugs affecting production of free oxygen and nitrate species
• Elucidation of changes in neutrophils activity in patients with rheumatoid arthritis

Selected publications


L. Inflammatory bowel diseases

Investigators
Prof. Tibor Hlavatý, MD, PhD (tibor.hlavaty@gmail.com)
Assoc. Prof. Tomáš Koller, MD, PhD
Assoc. Prof. Peter Celec, MD, Dipl Eng, Dr Rer Nat, DSc, MPH
Prof. Juraj Payer, MD, PhD, MPH, FRCP
Anna Krajčovičová, MD, PhD
Igor Šturdík, MD, PhD
Zuzana Lešková-Vráblicová, MD
Yashar Jaliali, MD

Topic
Our research is focused on elucidating the ethiology and pathogenesis of inflammatory bowel diseases (IBD), improving the diagnostic possibilities and researching new therapeutic options of patients with IBD. In a cross sectional study on a large cohort of IBD patients and healthy controls we identified risk factors associated with higher risk of IBD, i.e. shorter period of breastfeeding and reduced physical activity in childhood. We also researched the role of vitamin D in IBD and found a strong correlation between vitamin D serum concentrations and disease activity, further we identified mRNA microarrays of key cytokines that are influenced by vitamin D. We have studied also the role of chromoendoscopy and confocal laser endomicroscopy in the screening of CRC in IBD. Recently we focused on research of new therapeutic options. We study the role of faecal microbiota transplantation, possibilities to de-escalate medication in patients in deep remission and the role of therapeutic drug monitoring in tailoring the therapy of IBD.

Plans for future research
• Assessment of the optimal therapeutic regimen of vitamin D supplementation
• Evaluation of efficacy and safety of medical treatment of IBD
• Evaluation of efficacy and safety of fecal microbiota transplantation for IBD
• Evaluation of the role of therapeutic drug monitoring
• Systematic reviews and meta-analysis

Devices and methods
• Endoscopy department including videocolonoscopy, enteroscopy, chromoendoscopy
• Abdominal and small bowel ultrasound
• Infusion unit at the IBD centre
• Investigation of infliximab through levels and antibody formation
• Investigation of calcium related and calcium not related effects of vitamin D

Projects realized in the last 10 years
• Grant APVV (APVV-0672-11): The role of vitamin D in inflammatory bowel diseases (2012-2015)
• Ferring international scientific grant: Screening of colorectal dysplasia in IBD patients (2008-2011)
• VEGA (VEGA 1/0007/08): Pharmacogenetics of therapy for inflammatory bowel diseases (2008-2011)
Selected publications


M. Legionnaires´disease, Leptospirosis, Tularemia, nosocomial infections

Investigators
Assoc. Prof. Margita Špaleková, MD, PhD (margita.spalekova@fmed.uniba.sk)
Assoc. Prof. Alexandra Bražinová, MD, PhD, MPH
Martina Kotrbancová, MSc, PhD
Míriam Fulová MD, MSc
Vanda Výrosteková, MD, PhD
Erika Macháčová, MD, PhD
Jana Perželová, RNDr, PhD
Jana Kocrová, RNDr, PhD
Petra Vadovičová, PhDr, MSc, PhD
Veronika Sivčová, MSc

Topic
Surveillance of some selected notifiable communicable diseases (legionella infections, leptospira infections, tularemia, invasive pneumococcal infections, HPV infections, nosocomial infections).

Plans for future research
- Surveillance of legionelloses in Slovakia – annually published epidemiologic patterns/characteristics of legionella infections in Slovakia – confirmation, notification and classification of legionella cases in national EPIS (Epidemiologic Information System) of communicable system
- Diagnostics of legionelloses (cultivation, detection of legionella antigen in urine -ELISA, PCR, serological tests (immunofluorescence, agglutination), participation in international external control (ELISA, PCR)
- Epidemiological investigation and analysis of community and nosocomial legionella cases
- Investigation of legionellae colonisation in water systems, risk assessment in hospitals, monitoring of legionella in hospital´s water system and other water aerosol producing devices for treatment, wellness, etc.
- Cooperation with ECDC (European Centre for Prevention and Control) - ELDSNet (annual notification of Slovak cases in TESSY, national focal point, collaboration in investigation of TALD - (travel associated legionella cases)
- Surveillance of leptomioroses in Slovakia – annually published since 1970 with documented changing epidemiologic characteristics of leptospira infections in Slovakia last decades
- Diagnostics of leptomioroses (serological tests – agglutination -MAT, ELISA), cultivation, microscopy in dark field, detection of nucleic acid of leptospirae in PCR, participation in international external control (MAT)
- Notification of human leptomiora infection to national EPIS
- Investigation of leptomioral infections in foci (association with animal infections), risk assessment,
- Epidemiological investigation and analysis of community leptospira cases
- Surveillance of tularemia in Slovakia - annually published epidemiologic characteristics of francisellae infections
- Diagnostics of human tularemia - serological tests - agglutination, cultivation, PCR, investigation of natural focus – sampling animal sera, risk assessment, monitoring of natural focuses of infection
- Epidemiological investigation and analysis of tularemia community cases and other vector-borne zoonotic infections
- Cooperation with Veterinary Authorities and Slovak Academy of Sciences
- Assessment of surveillance system of notifiable communicable diseases, invasive pneumococcal infections, influenza
- Setting up surveillance system for Human Papillomavirus infection
- Surveillance of nosocomial infections in Slovakia
Surveillance of nosocomial legionella infections in Slovakia – epidemiologic characteristics and notification in national EPIS with proposed control measures

Epidemiological analysis of nosocomial infections in paediatric wards/hospitals in Slovakia, occurrence of legionella infections in children with oncologic diseases, in ICU and other risk units in legionella colonized hospital

Diagnostics of nosocomial legionelloses in adult patients with underlying diseases in hospitals (cultivation, detection of legionella antigen in urine - ELISA, PCR, serological tests (immunofluorescence, agglutination), cooperation with ECDC – ELDSNet (notification of nosocomial cases in TESSY, national focal point)

Devices and methods

- PCR termocycler, centrifuges, spectrophotometer, transilluminator
- ELFO, photo-recording system, ELISA reader, incubator

Projects realized in the last 10 years

- VEGA 2/7020/7: Species competensis of vectors in circulation of tick-borne transmitted microorganisms (2007-2009)
- VEGA 2/0142/10: Importance of ectoparasitic arthropodes (mites, ticks) in circulation of intracelular proteobacteriae (rickettsiae, anaplasme, Francisella tularensis) in natural foci on infections (2010-2012)
- VEGA 1/0426/11: Epidemiology and diagnostics of selected infectious diseases – tularemia, leptospiroses and legionelloses by classic and molecular biological methods (2011-2014)
- Project of League against cancer: Risk of legionelloses for paediatric oncologic patients (2016)

Selected publications

- Spalekova M. Epidemiology of legionellosis in Europe and in the Slovak Republic. Bratisl Lek Listy 2006; 107: 221.
N. Sepsis

Investigators
Assoc. Prof. Mária Bucová, MD, PhD (maria.bucova@fmed.uniba.sk)
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Magda Suchánková, MD, PhD
Anna Dobíšová, MD, PhD
Assoc. Prof. Vladimíra Ďurmanová, RNDr, PhD
Assoc. Prof. Juraj Koutun, MD, PhD
Assoc. Prof. Peter Celec, MD, Ing, RNDr, MPH, DSc
Barbora Izrael Vlková, RNDr, PhD

Plans for future research
• Determination of biomarkers of early diagnosis of sepsis, differentiation from SIRS and for monitoring and prediction of mortality
• New inflammatory markers HMGB1, TREM-1, TREM-2, sTREM-1, sTREM2, CD64, presepsin, IL-6, IL-10, IL-35, IFN-γ, and others
• Immunogenetic determination of cytokines polymorphism and polymorphism of TREM and HMGB1 molecules and cytokines
• The role of vitamin D in sepsis outcome, early and late mortality and degree of inflammation
• The role of HLA-G polymorphism and level of HLA-G in sepsis outcome, early and late mortality and degree of inflammation
• The role of extracellular DNA in sepsis outcome, early and late mortality and degree of inflammation

Devices and methods
• PCR cyclers, PCR-SSP, RFLP, Taq Man, centrifuges
• DNA/RNA spectrophotometer, transilluminator
• ELFO, photo-recording system
• ELISA
• Flow cytometry

Grants and Funding (in the last 10 years)
• VEGA 1/0156/17: The role of NETosis in the pathogenesis of preeclampsia (2017-2019)
• VEGA 1/0159/12: Fetal DNA and preeclampsia in the animal experiment (2012-2014)
• APVV-0754-10: The role of circulating nucleic acids in the pathogenesis of preeclampsia (2010-2012)

Selected publications


O1. Microscopic structure, development and evolution of thymus

Investigators
Prof. Ivan Varga, RNDr, PhD (ivan.varga@fmed.uniba.sk)
Prof. Štefan Polák, MD, PhD
Prof. Ludovit Daníhel, MD, PhD
Assoc. Prof. Jozef Záhumenský, MD, PhD
Michal Miko, MD, PhD
Paulína Gálfiová, MD, PhD
Martin Klein, MD
Petra Pšenková, MD

Topic
The last decade of research confirmed the presence of newly discovered population of cells within the interstitium of female genital organs. About the real significance of these cells – telocytes – are holding highly hypothetical conjectures. However, exist presumptions that these are the cells that functionally interconnect other cells within the microenvironment of female genital organs. That is why they appear in reflections on their possible involvement in a wide range of diseases, such as infertility, tubal pregnancy, pre-eclampsia or uterus myomatosus. Therefore, one of the topics of our research team is a detailed morphological identification and characterization of telocytes (electron microscopy, immunohistochemistry, in vitro culture) in normal and diseased tissues. However, telocytes are not the only “mysterious and neglected” structure within the histology of the female reproductive organs. Since 1904, no one paid any comprehensive attention to lymphatic drainage of the uterine tubes and uterus at the level of the lymph capillaries. Similarly, in the scientific, histological literature is ignored the issue of nomenclature of the epithelial cells of the uterine tubes, even though this tubal epithelium may be the source of high-grade ovarian carcinomas. Detailed identification of intraepithelial immunologically active cells can elucidate the questions regarding the immune suppression within the uterine tubes during sperm and/or embryo transport.

Plans for future research
• Identification of the immunologically active cells within the epithelium of uterine tubes and uterus
• Identification of telocytes in uterine tubes and uterus in health and disease
• Description of the lymphatic drainage of the mucosa of uterine tubes with respect to the function of uterine tubes in human reproduction

Devices and methods
• Light and fluorescent microscopy, include immunohistochemistry and histochemistry
• Transmission and scanning electron microscopy
• EDAX analysis

Grants and Funding (in the last 10 years)
• VEGA 1/0902/11: Thymus in human ontogenesis - changes in microscopic structure and ultrastructure of thymus in children with congenital heart defects (2011-2013)
• APVV-0434-12: Morphologic characterization of reparative and regenerative processes in myocardium during chronic diseases (2013-2017)
• VEGA 1/0086/17: Congenital gut motility disorders: histological and molecular biological study of aganglionar parts of colon of pediatric patients with Hirschsprung disease (2017-2021)
Selected publications

O2. Microscopic structure and blood microcirculation of spleen

Investigators
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Prof. Ivan Varga, RNDr, PhD
Paulína Gálfiová, MD, PhD
Simona Polakovičová, MD, PhD
Renáta Mikušová, MD, PhD
Ján Liška, MVD, PhD
Michal Miko, MD, PhD
Mária Csöbönyeiová, RNDr, PhD
Michaela Vrabcová, MSc, PhD
Martin Klein, MD

Topic
Our research is focused on the morphological description on human splenic blood microcirculation, and on the microscopic structure of human spleen and thymus during prenatal and postnatal period via methods of light and electron microscopy.

Plans for future research
• Detailed description of the “enigmatic” blood microcirculation of human spleen
• Association between microscopic changes of human thymus and congenital anomalies of heart, nutritional status of child or sudden infant death syndromes
• Evolutionary view on the immune system
• The role of thymic Hassall’s bodies in the development of immunity
• Clinical anatomical aspects of congenital anomalies of human lymphatic organs
• Determination of the role of enteric nervous system in the development of immune system, especially in cases of gut aganglionosis (e.g., Hirschsprung disease)

Devices and methods
• Light microscopes
• Fluorescent microscopes
• Electron microscope - transmission and scanning with EDAX analysis

Grants and Funding (in the last 10 years)
• VEGA 1/4252/07: The structure of blood microcirculation of human spleen (2007-2009)
• VEGA 1/0902/11: Thymus in human ontogenesis - changes in microscopic structure and ultrastructure of thymus in children with congenital heart defects (2011-2013)
• APVV-0434-12: Morphologic characterization of reparative and regenerative processes in myocardium during chronic diseases (2013-2017)
• VEGA 1/0086/17: Congenital gut motility disorders: histological and molecular biological study of aganglionar parts of colon of pediatric patients with Hirschsprung disease (2017-2021)

Selected publications


• Klein M, Varga I. Microenvironment of immune cells within the visceral adipose tissue sensu lato vs. epicardial adipose tissue. What do we know? Inflammation. 2018; 41(4): 1142-1156.


P. Hereditary ciliopathies, RASopathies and tubulopathies

Investigators
Prof. Ľudovit Danihel, MD, PhD
Katarína Skalická, RNDr, PhD
Anna Hlavatá, MD, PhD, MPH
Viktor Jankó, MD, PhD
Gabriela Hrčková, MD
Pavol Janega, MD, PhD
Ágnes Baranyaiová, MSc
Anita Vaská, MSc

Plans for future research
• NGS mutational analysis of genes affecting structure and function of cilia and their relationship to human diseases including polycystic kidney disease and primary ciliary dyskinesia. Pathogenesis of interstitial inflammation at the molecular level and identification of genetic changes along key signal pathways influencing cystic growth and progression of the disease to terminal renal failure. Building and extension of Slovak patient registries for ciliopathies.
• Molecular analysis of causal genes responsible for various inherited forms of diabetes insipidus and renal tubular defects. Development of patient registry for renal tubulopathies.

Devices and methods
• ABI PRISM 3100 Avant genetic analyzer (Applied Biosystems), MiSeq (Illumina),
• Bioanalyzer 2100 (Agilent technologies), AriaMX real-time PCR system (Agilent technologies)
• Covaris ultrasonificator with AFA technology (Covaris), CentriVap DNAVacuum Concentrator (Labconco), Blotting equipments

Projects realized in the last 10 years
• APVV 14/0234: Mutational analysis of genes affecting structure and function of primary cilia and their importance in polycystic kidney disease (2014-2017)
• VEGA 1/0955/11: Mutational analysis, long-term clinical follow-up and therapeutics of autosomal dominant polycystic kidney disease in Slovak children and their family members (2011-2013)
• VEGA 1/0497/08: Obesity in children and metabolic syndrome (2009-2011)
• VEGA 1/4314/07: Screening and mutational analysis of Fabri disease and hyper-IgD syndrome in Slovak population (2007-2009)
• Grant Slovak Ministry of Health 2005/4-DFNsPBA-02: Mutational analysis, early DNA diagnosis and prevention of frequent and severe hereditary diseases of childhood (2005-2008)
Selected publications


Q. Extracellular DNA

Investigators
Assoc. Prof. Peter Celec, MD, Dipl Eng, RNDr, DSc, MPH (petercelec@gmail.com)
Assoc. Prof. Katarína Šebeková, MD, DSc
Assoc. Prof. Július Hodosy, MD, MSc, PhD, MPH
Roman Gardlík, MD, RNDr, PhD
Michal Pastorek, MSc, PhD
Ľubomíra Tóthová, RNDr, PhD
Barbora Vlková, RNDr, PhD

Topic
The Institute of Molecular Biomedicine (IMBM) is currently focusing on extracellular DNA. DNA outside cells is used as a source of genetic information for non-invasive prenatal diagnosis and cancer screening, but it also recognized as a damage-associated molecular pattern and induces inflammation. We are analyzing this DNA in plasma, urine and saliva especially in various animal models of sepsis, colitis and urinary tract infection. In addition, researchers IMBM in collaboration with other research institutes around the globe are studying the role of deoxyribonucleases, either exogenous or endogenous, that cleave extracellular DNA in the etiopathogenesis of diseases in clinical samples and animal experiments. Besides acute and chronic inflammatory diseases, liver and kidney injury as well as trauma complications might be associated with quantitative changes of extracellular DNA. Especially mitochondrial DNA is under investigation at IMBM as a potential determinant of metabolic risk in obesity. Sex differences in deoxyribonuclease activity could cause the higher risk for autoimmune disorders in women, but also potentially the behavioral differences and risk for autism.

Plans for future research
• Plasma deoxyribonuclease activity and extracellular DNA in the pathogenesis of inflammatory diseases such as sepsis, colitis and urinary tract infection
• Metabolic effects of prenatal dietary advanced glycation end products
• Pathomechanisms of neurodevelopmental disorders in animal models
• Molecular biomarkers for point of care testing

Devices and methods
• Animal models of human diseases
• Quantification and characterization of plasma DNA
• Behavioral phenotyping of experimental rodents
• Analysis of markers of oxidative and carbonyl stress

Grants and Funding (in the last 10 years)
• APVV-16-0273: Deoxyribonuclease activity in plasma and its role in the cleavage of extracellular DNA (2017-2020)
• VEGA 1/0092/17: Extracellular DNA and its role in the pathogenesis of renal and metabolic complications of various diseases (2017-2019)
• VEGA 1/0156/17: The role of NETosis in the pathogenesis of preeclampsia (2017-2019)
• VEGA 1/0234/18: Molecular mechanism of the antimicrobial effects of steroids on uropathogenic bacteria (2018-2020)
Selected publications

R. Novel biomarkers in chronic kidney disease

Investigators
Assoc. Prof. Katarína Šebeková, MD, DSc (kata.sebekova@gmail.com)
Prof. Ludmila Podracká, MD, PhD
Assoc. Prof. Peter Celec, MD, Dipl Eng, RNDr, DSc, MPH
Kristina Simon Klenovics, MD, PhD
Ľubomíra Tóthová, RNDr, PhD
Alexandra Kovalčíková, MSc, PhD

Plans for future research
• Analysis of salivary markers of renal functions
• Pathogenesis of complications of renal insufficiency
• Non-invasive measurement of advanced glycation end-products (AGEs)
• Metabolic consequences of renal diseases
• New potential biomarkers of detecting kidney damage prior to the currently used markers
• Renal and metabolic consequences of changes in diet during the prenatal development

Devices and methods
• Salivary diagnostics in nephrology
• Non-invasive measurement of oxidative and carbonyl stress
• AGE reader for skin autofluorescence
• Metabolic cages for urine collection from experimental rodents
• Experimental models of renal diseases

Grants and Funding (in the last 10 years)
• VEGA 1/3362/06: Polymorphism of 5,10 MTHR gene and deficiency of folic acid in Slovak pediatric population – incidence and role in multifactorial diseases (2007-2009)
• Norwegian found SJK0017-GOL-00143-H-V2(1):The research of glucocorticoid influence on pediatric diseases - children`s health improvement (2007-2010)
• VEGA 1/0525/10: Defects of folate metabolism in patogenesis of multiple malformations (2010-2011)
• 7FP EC EU, Health-F5-2008-201335, NANOtest - Alternative testing strategies for the assessment of the toxicological profile of nanoparticles used in medical diagnostics (2008-2012)
• VEGA 01/0715/11: Molecular and genetic diagnosis of nephrotic syndrome in children (2012-2014)
• VEGA 1/0172/14: Saliva as a potencial diagnostic fluid in monitoring of oxidative and carbonyl stress in relation to cardiovascular risk in children with chronic nephropaties (2014-2016)
• VEGA 1/0613/17: Early diagnosis of osteoporosis in children and adolescents with mental anorexia (2017-2019)
• VEGA 1/0062/16: Influence of prenatal exposure to unhealthy diet on early neuromotor development and later metabolic status of rat offspring (2016-2018)

Selected publications


• Koborová I, Gurecká R, Csongová M, Šebek J, Šebeková K. Plasma markers of oxidative status were associated with increasing continuous cardiometabolic risk scores in healthy students aged 16-20 years without central obesity. Acta Paediatr 2018; 107: 2137-45.


S. Bioenergetics and anti-oxidative systems

Investigators
Prof. Anna Gvozdjáková, RNDr, DSc (anna.gvozdjakova@fmed.uniba.sk)
Jarmila Kucharská, PharmDr, PhD
Olga Uličná, RNDr, PhD
Olga Vančová, MEng
Zuzana Sumbalová, RNDr, PhD
Zuzana Rausová, MSc, PhD
Assoc. Prof. Viliam Mojto, MD, PhD, MHA, MPH

Topic
At present we are devoting ourselves to the development and perspectives of Mitochondrial Medicine. An invasive approach to the determination of mitochondrial functions in human medicine - skeletal muscle biopsy is commonly used. In 2018, we introduced a new non-invasive methodology for the examination of mitochondrial bioenergetics in isolated platelets (using the High-Resolution Respirometry, OROBOROS, Austria). The aim of these research activities is the development of Mitochondrial Medicine. The application of a new non-invasive methodology of mitochondrial bioenergetics in clinical and experimental medicine belongs to the current development direction of Mitochondrial Medicine in terms of diagnosis and targeted supportive therapy of diseases associated with dysfunction of mitochondria. We performed these investigations in healthy young people (collaboration with Slovak Academy of Sciences), in elderly people and in patients with nephropathies. Determination of coenzyme Q10 concentrations (using HPLC) in isolated platelets, whole blood, and plasma is part of the research.

We have been working with the Institute of Molecular Biomedicine, Faculty of Medicine, on a study where has been monitored how Western-type diet containing large amount of advanced glycation end products (AGEs) during pregnancy can predict metabolic and behavioral disorders in the progeny in later life. The results show that if mothers receive AGE-rich diet during pregnancy, it may accelerate the aging of reflexes in progeny, predestinate male offspring to weight gain, and affect glucose homeostasis. We will continue in this research and cooperation. We also participate in ongoing grant projects mentioned above.

Plans for future research
• New diagnostic methods for determination of mitochondria features in isolated thrombocytes and lymphocytes in patients with different alteration of mitochondria
• Build up unit of Mitochondrial Medicine

Devices and methods
• Oxygraph-2k (Oroboros Instruments) high resolution respirometry enabling to measure parameters of mitochondrial respiration and complexes of respiratory chain of mitochondria
• Oxygraph 5/6 H Gilson enabling measurement of parameters of oxidative phosphorylation in mitochondria
• High-performance liquid chromatograph with programmed UV detector
• Programmed UV-VIS spectrophotometer Biochrom 4060
• Cooled centrifuges

Grants and Funding (in the last 10 years)
• VEGA 2/0083/09: Cerebral energy metabolism studied by magnetic resonance spectroscopy as a basis for studying mechanisms of hypoxia-ischemic damage of the neonatal brain (2009-2011)
• VEGA 1/0328/10: Inhibitors of HMG-CoA reductase and their possible side effects: the role of mitochondria and coenzyme Q (2010-2011)
• VEGA 1/0272/10: Neurodegenerative diseases in animal models including therapeutic effect monitored by means in vivo magnetic resonance imaging and spectroscopy (metabolic profile and brain bioenergetics) (2010-2011)
• VEGA 1/1133/11: Biomodulative effects of natural substances in experimental diabetes and liver cirrhosis (2011-2013)
• VEGA 2/0045/11: Study of combination of immunosuppressive treatment and substances affecting redox balance of organism on animal models of rheumatoid arthritis (2011-2014)
• VEGA 2/0101/12: The role of mitochondria in adaptation of cardiac energetics to various pathological stimuli and noxae: ischemia, diabetes, hypertension (2012-2014)
• VEGA 1/0614/12: Role of oxidative stress and antioxidants in the pathogenesis of urothelial carcinoma (2012-2014)
• VEGA 2/0133/15: Bioenergetic aspects of myocardial protection by means of remote ischemic preconditioning. The role of cardiac mitochondria (2015-2017)
• APVV-15-0308: Molecular pharmacological approaches to innovative therapy for rheumatoid arthritis evaluated under experimental conditions in vivo and in vitro (2016-2020)
• Project supported by the EU grant from the CBC programme Interreg V-A SK-AT VO14: Nutriaging: Nutrition and healthy aging (2018-2021)

Selected publications


• Mikulecký M, Gvozdjaková A, Kucharská J, Mojto V, Mikulecký M, Singh RB, Cornelissen G. Are mitochondrial energetics in the rat under control of the solar (24 hours) and/or lunar (24.8 hours) day? World Heart J 2015; 7: 119-27.


T. Epidemiology of non-communicable diseases

Investigators
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Jana Perželová, RNDr, PhD
Jana Korcová, RNDr, PhD
Petra Vadovičová, PhDr, MSc, PhD
Veronika Sivčová, MSc

Topic
• Epidemiology of non-communicable diseases – collection and processing data of Epidemiology of Myastenia gravis, Global Burden of Disease Study by participation in the international work group for assessment of the global premature mortality and global disability burden of diseases
• Epidemiology of traumatic brain injury, epidemiology of mental health and mental disorders
• Prevalence of risk factors in cardiovascular diseases-study in healthy population

Plans for future research
• Epidemiology of Myastenia gravis - Cooperation with Centre for neuromuscular diseases Neurologic Clinic of Slovak Medical University in Bratislava
• Global Burden of Disease Study - Participation in the international work group for assessment of the global premature mortality and global disability burden of diseases
• Epidemiology of traumatic brain injury - Epidemiology of traumatic brain injury in Europe: incidence, mortality, disability, prognosis.
• Mental Health and Epidemiology of Mental Disorders - Epidemiology of mental health and mental disorders: population survey of mental disorder prevalence, use and unmet need of care, use of pharmacotherapy in psychiatry and general practice, International Study of Medical students’ attitudes towards people with mental illness
• Risk factors of cardiovascular diseases - Description and analysis of data collected in Health Counseling offices in Regional Public Health Authorities in the Slovak Republic in 1993-201
• Metabolic syndrome in clients of Health Counseling offices in Regional Public Health Authorities in the Slovak Republic in 1993-2017
• Efficiency of counseling in Health Counseling offices in Regional Public Health Authorities in the Slovak Republic in 1993-2017

Devices and methods
• Data collection, description and analysis in software STATA, r project

Grants and Funding (in the last 10 years)
• 7th Framework Programme of European Commission – Theme (Health. 2013.2.2.1.-1) Prospective longitudinal data collection and comparative effectiveness research for traumatic brain injury (CENTER-TBI study) (2013-2020)
Selected publications
