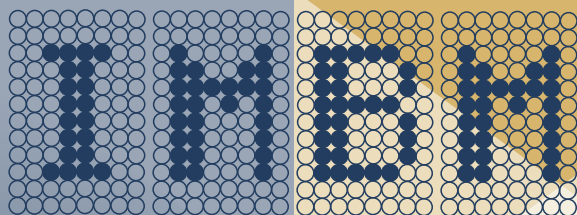


INSTITUTE OF MOLECULAR BIOMEDICINE
Faculty of Medicine, Comenius University, Bratislava



2019

IMBM 2019

1 research institute

10 years

1 professor

3 associate professors

9 postdocs

11 PhD students

13 diploma thesis students

10 bachelor students

4 APVV grants

1 KEGA grant

5 VEGA grants

4 UK grants

22 CC/IF publications

774 SCI citations



SCIENTOMETRIC DATA

NUMBER OF CC/IF PUBLICATIONS: 22
OF THESE WITH FIRST/LAST AUTHORS FROM IMBM: 15
CUMULATIVE IF: 70,94



International Journal of
Molecular Sciences



Communication

Sex, Age, and Bodyweight as Determinants of Extracellular DNA in the Plasma of Mice: A Cross-Sectional Study

Eubica Janovičová¹, Barbora Konečná¹, Lenka Vokálová^{2,3}, Lucia Lauková^{1,4}, Barbora Vítková¹ and Peter Celec^{1,5,6,*}

¹ Institute of Molecular Biomedicine, Faculty of Medicine, Comenius University, Sasinkova 4, 811 08 Bratislava, Slovakia

European Journal of
Oral Sciences

Eur J Oral Sci 2019; 127: 417–424
DOI: 10.1111/eos.12642
Printed in Singapore. All rights reserved

© 2019 Eur J Oral Sci
European Journal of
Oral Sciences

Urea and creatinine levels in saliva of patients with and without periodontitis

Gaál Kovalčíková A, Pančíková A, Konečná B, Klamárová T, Novák B, Koval'ová E, Podracká L, Celec P, Tothová L. Urea and creatinine levels in saliva of patients with and without periodontitis. Eur J Oral Sci 2019; 127: 417–424. © 2019 Eur J Oral Sci

Alexandra Gaál Kovalčíková^{1,2},
Alexandra Pančíková³, Barbora
Konečná⁴, Tatiana Klamárová⁵,
Bohuslav Novák⁶, Eva Koval'ová⁴,
Ludmila Podracká⁷, Peter
Celec^{2,8,9}, Lubomira Tothová¹⁰
¹Department of Paediatrics, National Institute
of Children's Diseases and Faculty of
Medicine, Comenius University, Bratislava;
²Institute of Molecular Biomedicine, Faculty of
Medicine, Comenius University, Bratislava,
Slovakia



Article

Maternal Consumption of a Diet Rich in Maillard Reaction Products Accelerates Neurodevelopment in F1 and Sex-Dependently Affects Behavioral Phenotype in F2 Rat Offspring

Melinda Csongová¹, Emese Renczés^{1,2}, Veronika Šarayová^{1,2}, Lucia Mihalovičová¹, Jakub Janko¹, Radana Gurecka^{1,3}, Antonio Dario Troise⁴, Paola Vitaglione^{4,5} and Katarína Šebeková^{1,*}

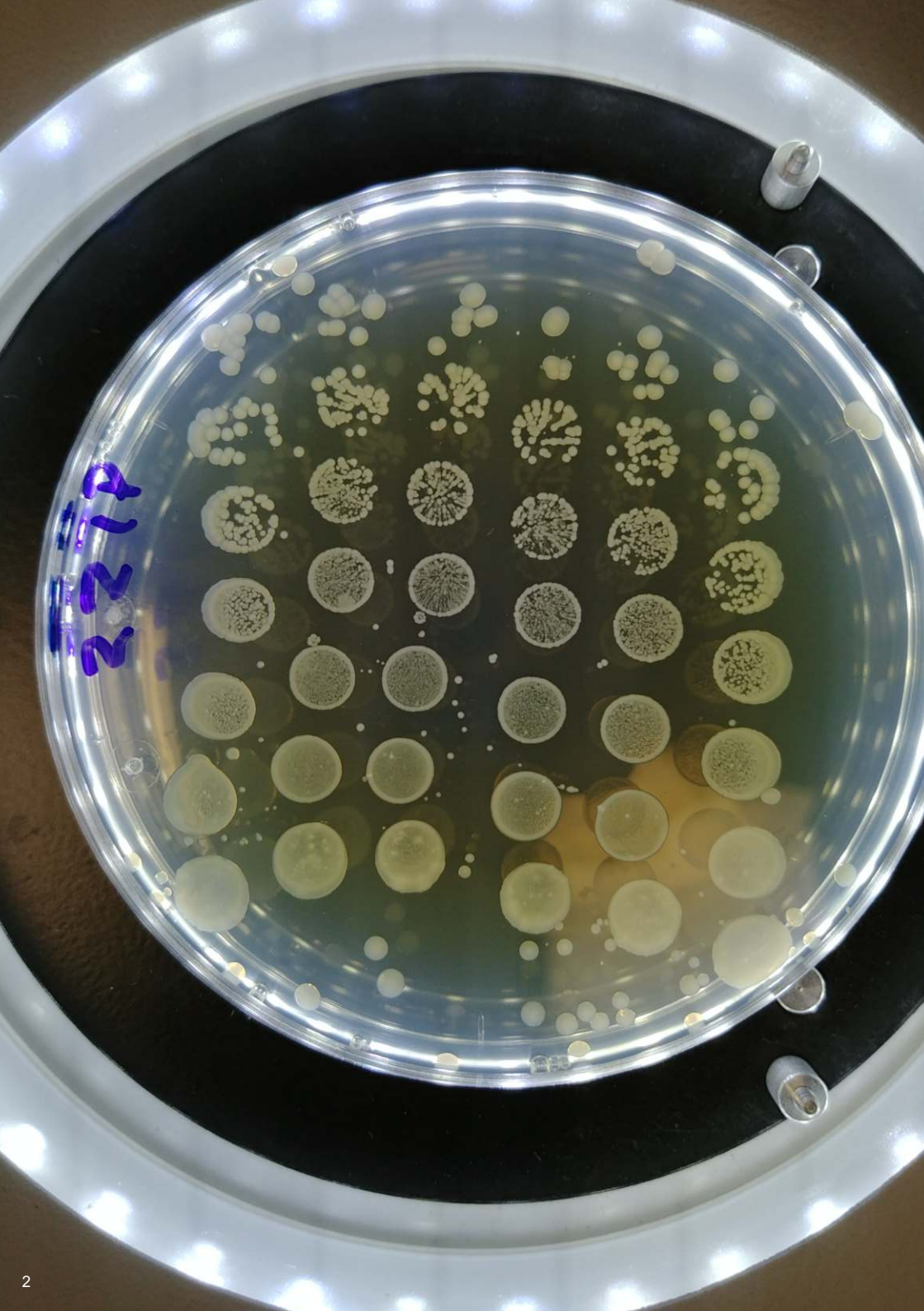
¹ Institute of Molecular Biomedicine, Medical Faculty, Comenius University, 81108 Bratislava, Slovakia;

SHOCK, Vol. 52, No. 2, pp. 257–263, 2019

EARLY DYNAMICS OF PLASMA DNA IN A MOUSE MODEL OF SEPSIS

Lucia Lauková,[†] Estera Maria Jana Bertolo,[†] Magdaléna Zelinková,[†]
Veronika Borbélyová,[†] Jozef Conka,[†] Alexandra Gaál Kovalčíková,[†]
Emese Domonkos,[†] Barbora Vítková,[†] and Peter Celec^{*,§||}

[†]Institute of Molecular Biomedicine, Faculty of Medicine, Comenius University, Bratislava, Slovakia;



THE YEAR 2019 AT IMBM

The view of the head of the institute

Tempus fugit - time flies. We have celebrated 10 years of IMBM. This means many publications and citations, enormous amounts of data and graphs... but most of all, it means people - students, postdocs, scientists... I have tried to count all the bachelor and diploma students that worked in our labs, but I failed. From the very beginnings of the institute PhD students are an integral part of IMBM. Most of them successfully defended their theses and do science somewhere. Only few of them stayed at the faculty - a pity for the faculty.

Besides feasts and jubileums, much of 2019 was routine. Introduction to Science was prepared as team work and was clearly much better, although the interest from the crowd was again very limited. The teaching activities at the Faculty of Natural Sciences seem to be much more efficient. The only PhD student to defend his thesis in 2019 was originally also from the Department of Molecular Biology. The dissertation topic of Dr. Conka should be a finalization of more than a decade of work on different models and species with the focus on coke and its intake. Unfortunately, it will take years and likely several students to truly finalize this project.

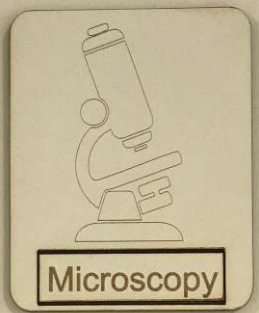
The year 2019 was the least productive for IMBM when it comes to publications. On the other hand, we have presented our data in renowned conferences throughout the world (Turin, San Diego, Copenhagen, Milano), we have co-organized the DNA day again and especially, at the end of the year we had 3 colleagues in Boston at Harvard. We do not know the direct outcomes yet, but the fact that we have established friendships and cooperations with people from the best university who accept our students and postdocs makes us very proud.

Finally, we had success at home with APVV grants for Dr. Vlková and Dr. Tóthová, grant from Ministry of Health for Dr. Gardlík and the young scientist Eset award for Dr. Tóthová. This is the best way to celebrate the 10 years of IMBM. Congratulations!

Now, let us look visionary beyond the horizon in 2020!



Peter Celec



ÚSTAV MOLEKULÁRNEJ BIOMEDICÍNY
INSTITUTE OF MOLECULAR BIOMEDICINE



RESEARCHERS AT IMBM

PROFESSORS



KATARÍNA ŠEBEKOVÁ, assoc. prof., MD, DrSc

CC/IF publications - 168, SCI citations - 2478,
h-index - 29

metabolic syndrome, diabetes mellitus, advanced
glycation end products, clinical biochemistry,
pathogenesis of renal diseases

katarina.sebekova@imbm.sk



PETER CELEC, assoc. prof., MD, Ing, MSc, DrSc, MPH

CC/IF publications - 233, SCI citations - 2633,
h-index - 30

extracellular DNA, testosterone, salivary
biomarkers, sepsis

peter.celec@imbm.sk



PETER BOOR, prof., MD, PhD

CC/IF publications - 155, SCI citations - 3557,
h-index - 34

renal fibrosis, nephropathology,
immunopathomechanisms, models of renal
diseases, imaging

boor.peter@gmail.com **pboor@ukaachen.de**



JÚLIUS HODOSY, assoc. prof., MD, MSc, PhD, MPH

CC/IF publications - 86, SCI citations - 1009,
h-index - 19

behavioral analysis, sex steroids, oxidative stress,
animal models of diseases, sleep apnea syndrome
traumatic brain injury

hodosy@gmail.com

POSTDOCS



JANKA BÁBÍČKOVÁ, MSc, PhD

CC/IF publications - 30, SCI citations - 296,
h-index - 11

phage display, sex steroids, inflammatory
Bowel disease, extracellular DNA,
experimental nephrology

jana.babickova@gmail.com



VERONIKA BORBÉLYOVÁ, MSc, PhD

CC/IF publications - 18, SCI citations - 51,
h-index - 4

animal models of autism spectrum disorder,
effects of prenatal testosterone on postnatal
behavior, metabolic syndrome, menopause

veronika.borbelyova@imbm.sk

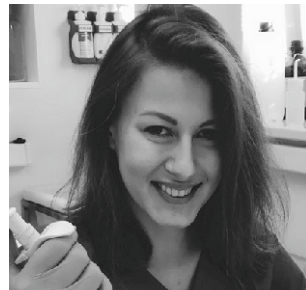


ROMAN GARDLÍK, MD, MSc, PhD

CC/IF publications - 46, SCI citations - 683,
h-index - 14

inflammatory bowel disease, animal models,
extracellular DNA, microbiome

roman.gardlik@imbm.sk



BARBORA KONEČNÁ, MSc, PhD

CC/IF publications - 16, SCI citations - 58,
h-index - 4

extracellular DNA, extracellular vesicles,
pregnancy complications,
quantitative real-time PCR

barbora.konecna@imbm.sk



MICHAL PASTOREK, MSc, PhD

CC/IF publications - 24, SCI citations - 220,
h-index - 9

neutrophil biology, autoimmune diseases,
tumor hypoxia, extracellular DNA,
molecular chaperones

michal.pastorek@imbm.sk



EMESE RENCZÉS, MSc, PhD

CC/IF publications - 14, SCI citations - 31,
h-index - 4

sex hormones,
behavioral phenotyping in rats and mice,
mental disorders

emese.domonkos@imbm.sk



MÁRIA SUCHOŇOVÁ, MSc, PhD

CC/IF publications - 4, SCI citations - 17,
h-index - 3

optics, optical spectroscopy, biomedical physics,
laser-induced breakdown spectroscopy,
imaging methods in medicine

maria.suchonova@imbm.sk



ĽUBOMÍRA TÓTHOVÁ, MSc, PhD

CC/IF publications - 62, SCI citations - 507,
h-index - 14

Salivary markers, oxidative stress, urinary tract
infections, experimental nephrology,
bacteriophages

lubomira.tothova@imbm.sk



BARBORA VLKOVÁ, MSc, PhD

CC/IF publications - 39, SCI citations - 471,
h-index - 10

extracellular DNA, non-invasive prenatal
diagnostics, pneumonia, sepsis,
molecular pathology

barbora.vlkova@imbm.sk



ACTIVITY OF SELECTED POSTDOCS

VERONIKA BORBÉLYOVÁ, MSc, PhD

My research interest is focused on the role of sex hormones in the etiology of Autism Spectrum Disorder (ASD). In 2019, I was working on the ongoing project using a genetic mouse model of ASD, the so-called SHANK3 mice and participated in behavioral phenotyping of these animals. Currently, I am a supervisor of two pre-graduate students at Faculty of Natural Sciences, Comenius University in Bratislava. Together we are working on other research topics investigating the behavioral effect of estradiol deficiency in ageing and also the role of sex hormones and ecDNA in the etiology of metabolic syndrome.

For me, it is extremely important to learn new methods and implement those at IMBM. Therefore, in 2019, I visited the Institute of Physiology, 1st Medical Faculty, Charles University in Prague to learn the analysis of neuronal degeneration and detection of apoptosis in the hippocampus of small laboratory animals and also histological staining.

In 2019, I actively presented the results of our scientific work at conferences, e.g.: 95th Physiological days (Prague, Czech Republic), 10th International meeting on: "Steroids and nervous system" (Torino, Italy), 50 Years of Psychoneuroendocrinology (Milan, Italy). Besides presenting the results of our projects, these conferences opened an opportunity for gaining new cooperation with other research teams. I met prof. Karyn Frick (University of Wisconsin-Milwaukee, Department of Psychology, USA) and prof. Annamaria Cattaneo (Università degli Studi di Brescia, Department of Molecular and Translational Medicine, Italy) who will be supervisors for our PhD students during their research stays in both, USA and Italy.

I taught at the Faculty of Natural Sciences Comenius University in Bratislava (Basics of Theoretical and Experimental Medicine). I was also involved in teaching and training of our bachelor, master and PhD students within internal courses of IMBM. In summer 2019, I was teaching both national and foreign students, who were interested in science or work in the laboratory.

MÁRIA SUCHOŇOVÁ, MSc, PhD

In my research I focus mainly on in vivo imaging. Last year I dealt with the use of bioluminescence and thermal camera to detect inflammation related to colitis, sepsis or urinary tract infections. I also worked at the bone analysis by μ CT and DEXA. In cooperation with the Faculty of Mathematics, Physics and Informatics at Comenius University (FMFI, CU) in Bratislava, I studied the antimicrobial effect of cold plasma and plasma activated water at E. Coli bacteria. The results of our study dealing with the antimicrobial effect of cold plasma were presented in 8th Young Professionals Workshop on Plasma Medicine in Greifswald (Germany). Thanks to my participation in this conference I had the opportunity to meet important scientists dealing with the use of cold plasma in medicine.

The attendance of Training School on Multimodal Optical Imaging in Trnava helped me to expand my knowledge in the field of in vivo bioimaging.

During the academic year 2018/2019 I was a supervisor of two pre-graduate students from the Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava. The topics of bachelor theses were focused on the using luminol for bioluminescence imaging of blood and inflammation in animal model of colitis and comparison of the effect of genetic transformation of bacteria by cold plasma with standard methods.

The part of my work in 2019 was also the pedagogical activity. In this area, I participated in lectures at the Faculty of Natural Sciences of Comenius University within the course Advances in Molecular Biology (Slovak students). At the Faculty of Medicine I assisted in teaching and examinations within the subject Introduction to Science (Slovak and English students). In the summer of 2019 I was working with students who worked in our laboratory during their internship at our institute.

EMESE RENCZÉS, MSc, PhD

My main research interest is focused on sex differences, aging and the role of sex hormones in the etiology and pathogenesis of several psychological disorders, including autism and anxiety. In 2019, I was mainly involved in three projects. One of them investigated the effect of estrogen deficiency on anxiety-like behavior and cognitive functions in aging female rats. Our other project examined the role of Shank3 gene in development of autism spectrum disorders. Last but not least, we investigated the expression pattern of androgen and estrogen receptors during early postnatal development.

I am contributing to establish and develop several methods at our laboratory, particularly in the field of behavioral neuroscience. In 2019, I have learned a technique to take cerebrospinal fluid in vivo from rats, which opens new opportunities to analyze brain metabolism. I elaborated a comprehensive behavioral testing to assess autistic-like phenotype in mice. Currently, I am validating a method for blood-brain barrier permeability analysis. To obtain financial support for our projects, I have successfully applied for a VEGA grant. In 2019, I published three original articles as co-author, and my publications were cited 21-times.

I have submitted three first-author publications; one of them has been accepted and published in January 2020. I presented our original results at four conferences including two international conferences, the "10th International Meeting - Steroids and Nervous System" in Torino and the "50 Years of Psychoneuroendocrinology" in Milano. At these events, I established precious collaborations, among others with Professor Karyn M. Frick (Wisconsin, US).

I was also involved in the pedagogical activities of the institute in 2019. I taught Molecular Endocrinology in 2 hours/week and had a presentation in frame of Human Behavioral Genetics at the Faculty of Natural Sciences. I participated in the general training of our students. I had courses on animal welfare and handling, behavioral phenotyping of laboratory rodents using EthoVision, data processing using Excel and Graphpad, and citation of literature sources using Mendeley. Currently, I am supervisor of a medical student, who examines the role of sex hormones in neuro-inflammation in mouse model of autism.

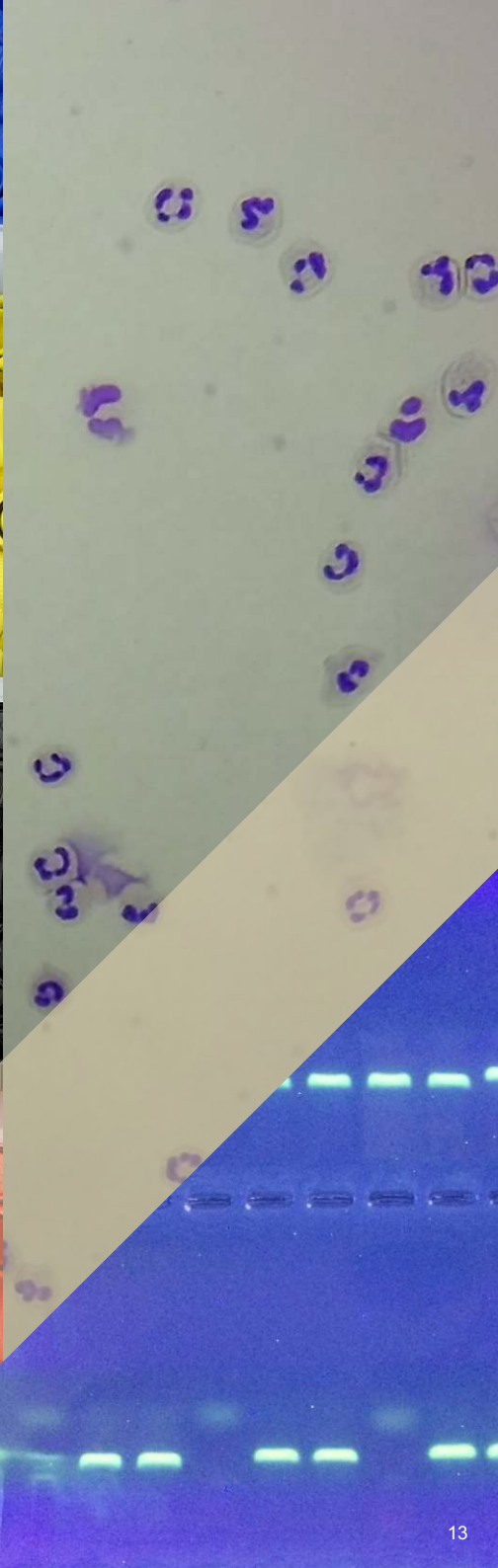
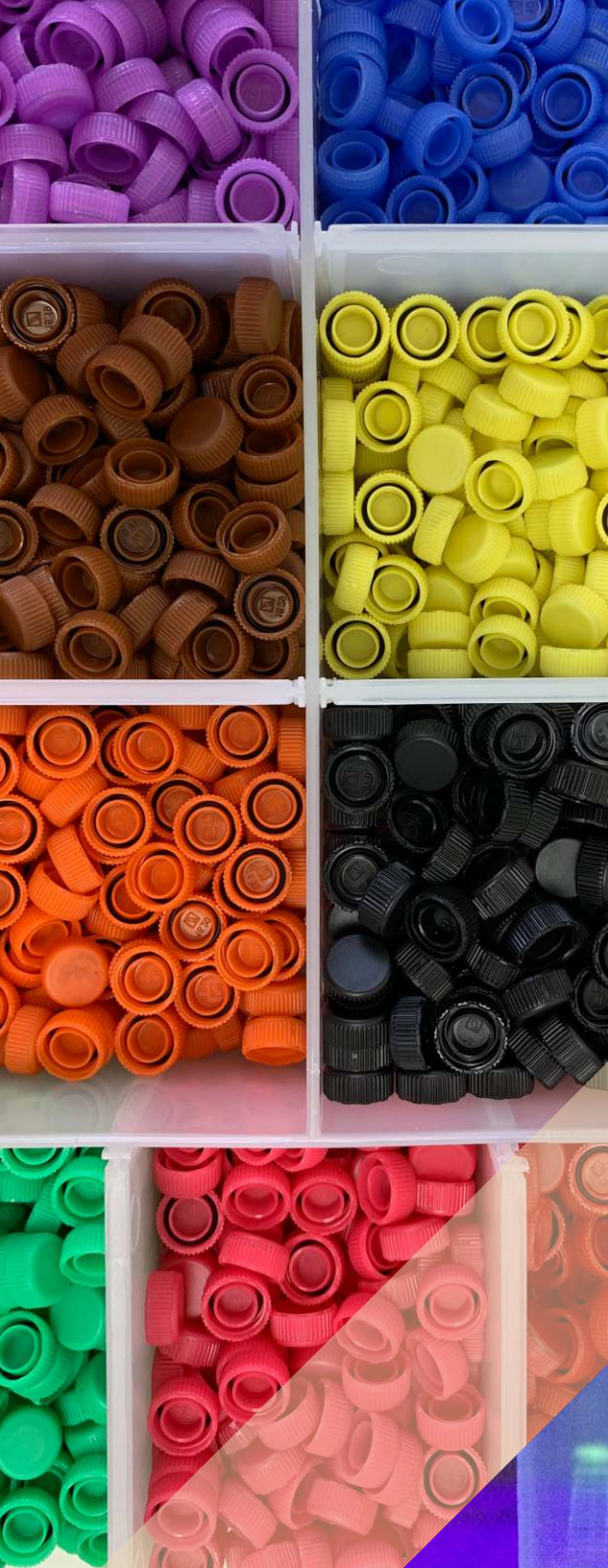
BARBORA KONEČNÁ, MSc, PhD

The biggest project I got involved in 2019 was neutrophils and their activity in relation to rheumatoid arthritis. I learned how to isolate neutrophils from human blood and mouse bone marrow. I learned how to perform different assays dealing with the activity of neutrophils.

In 2019, I focused on three minor topics. The first of them was exosomes. The biggest milestone in this field in 2019 of research was the paper published in Cell by Jeppesen et al. who published that there is no DNA in exosomes. However, according to our preliminary results, though following their protocol, our unpublished results have shown the opposite. The next topic I was focused on was defibrotide. This was, however, less successful. We have not been successful in identifying what DNA is contained in defibrotide and what are its characteristics, however, according to the patented protocol, we were able to produce our own defibrotide. 2020 will be dedicated to this research. The third topic that I focused on was low temperature plasma in cooperation with the Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava. We tried different experiments looking at the effect of plasma treated water on different bacteria under different conditions.

Beside these ongoing projects, I have started to be interested in bioinformatics and using Minion Oxford Nanopore.

Beside the experimental part, my big success was to get a scholarship to come to Beth Israel Deaconess Medical Centre, Harvard Medical School, Boston, MA for six months. I was also one of the major organizers of DNA DAY in Bratislava, the biggest event presenting the natural sciences programs at our faculties to high school students interested in studying science. I became a part of the organizing team of the 6th Central Eastern European Symposium on Free Nucleic Acids, which is going to take place in Bratislava in May 2020. I was involved in teaching at both the Faculty of Medicine, Introduction to Science, as well as at the Faculty of Natural Sciences, Basics of Theoretical and Experimental Medicine, Comenius University in Bratislava. I managed to publish four articles, one as a first author and three as a co-author. I think 2019 was good and hopefully 2020 will be even better.



MICHAL PASTOREK, MSc, PhD

In my research I focus mainly on in vivo Immunology always interested me greatly, so I was lucky enough that last year, I could participate mainly on projects focused on innate immune response. The most interesting for me was a project investigating the role of neutrophil activation in patients with rheumatoid arthritis, where I first learned how to isolate neutrophils and was involved in introducing several methods for assessment of their activation. Neutrophils, and particularly extracellular traps that they form as a response to the presence of pathogens became my main scientific interest and I am really grateful for gaining grant support from VEGA to research the causes and consequences of their formation. Luckily I am not alone on this, as we are working on this project together with my colleagues and my bachelor student, Emil Becka. During summer, I started working on another project investigating the effect of antibiotics on mitochondria and overall activity of neutrophils with an enthusiastic high school student and I am curious where it will lead us. Also, I have been accredited to tutor PhD students and I hope that our team will soon grow.

One of my biggest achievements from last year was a successful application for a Weiser professional development program and I received the opportunity for a short research stay at the laboratory of Dr. Jason Knight, MD, PhD, in the US, who is not only focused on the neutrophil extracellular traps formation, but published his results in a high-ranking journals including Nature, so I am really excited about the stay.

There is still so much that I do not know, but it was certainly useful that I also took part in teaching several classes like Introduction to Science or Basics of Theoretical and Experimental Medicine at the Comenius University. Preparing the talks really helped me to start looking at our research from a different perspective – trying to look at a bigger picture and the interconnectivity across physiological systems instead of just focusing on a single molecule. Hopefully, next year will bring not just better understanding of the phenomenons we focus on, but also interesting results and publications.

PHD STUDENTS AT IMBM

Jozef Čonka, MSc

Melinda Csongová, MSc

Ľubica Janovičová, MSc

Martin Marônek, MSc

Katarína Kmeťová, MSc

Nikola Pribulová, MSc

Lucia Mihalovičová, MSc

Miriám Pillerová, MSc

Veronika Šarayová, MSc

Alena Potočárová, DVM

Dávid Miláček, MSc

Jakub Janko, MSc

MASTER STUDENTS WHO STUDIED AT IMBM

Barbora Čechová, B.S.

Barbora Gromová, B.S.

Diana Drobná, B.S.

Marianna Hladová, B.S

Thomas Stehle

Tim Höpfner

Manuel Steinhardt

Tanzeel Ahmed

Darina Lysková

Johan Filo

Andrej Kirn

Alexander Jančuška

Zuzana Sliacka

BACHELOR STUDENTS WHO STUDIED AT IMBM

Veronika Antalová

Kristína Lichá

Daniel Truchan

Ema Laššová

Gergo Borka

Marianna Bačinská

Dana Görčiová

Andrej Feješ

Emil Bečka

Jaroslav Banovský

Michaela Budovcová

Karolína Kováčová

PHD STUDENTS WHO SUCCESSFULLY DEFENDED THEIR THESES

Jozef Čonka, MSc, PhD

MASTER STUDENTS WHO SUCCESSFULLY DEFENDED THEIR THESES

Barbora Čechová, MSc

Marianna Hladová, MSc

Thomas Stehle, MD

Tim Höpfner, MD

Manuel Steinhardt, MD

Darina Lysková, MD

BACHELOR STUDENTS WHO SUCCESSFULLY DEFENDED THEIR THESES

Veronika Antalová, B.S.

Daniel Truchan, B.S.

Kristína Lichá, B.S.

Ema Laššová, B.S.

OTHER COLLEAGUES

Lenka Libáková

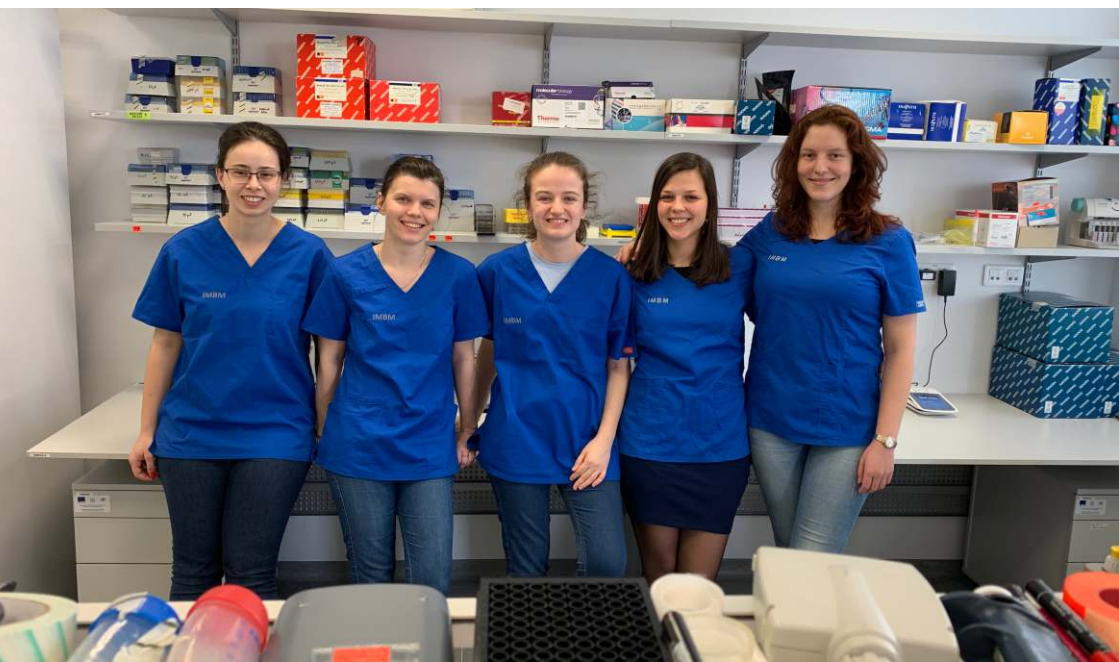
Simona Ďuržová

Ingrid Simonová

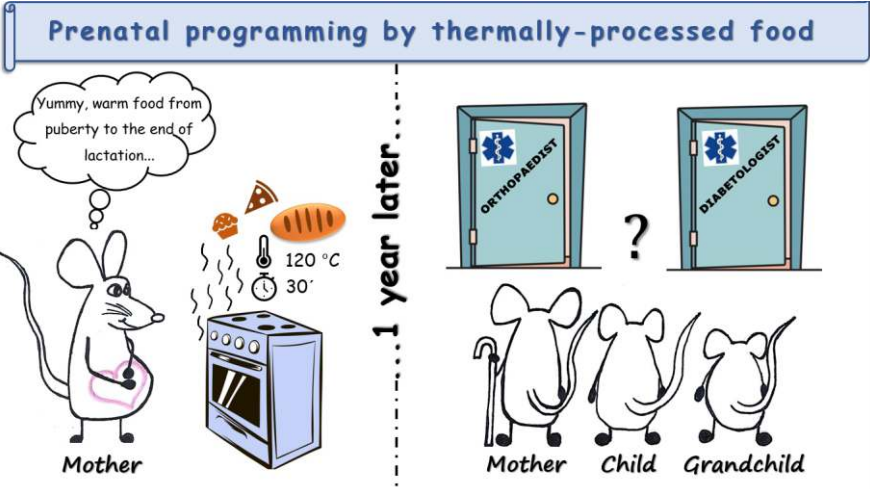
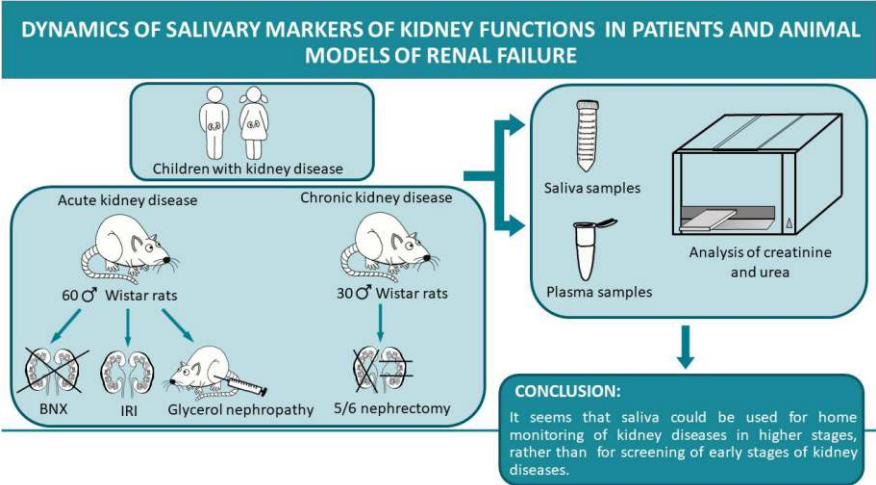
Darina Mackovičová

Mária Turoňová

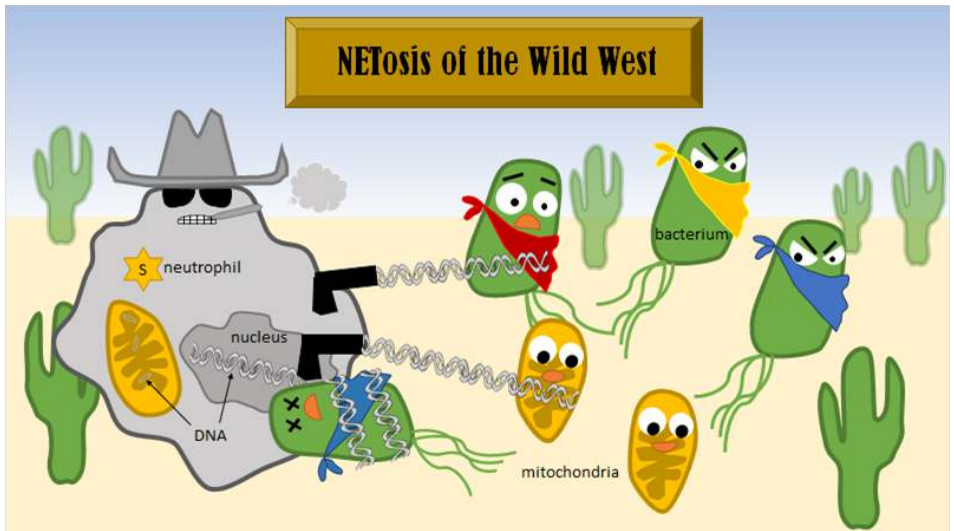
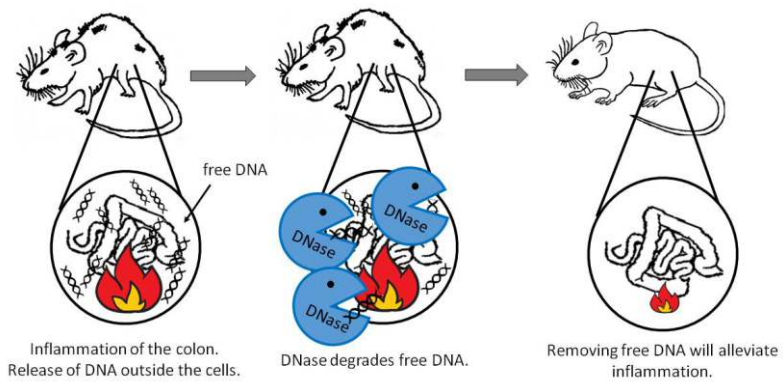
Darina Skuráková



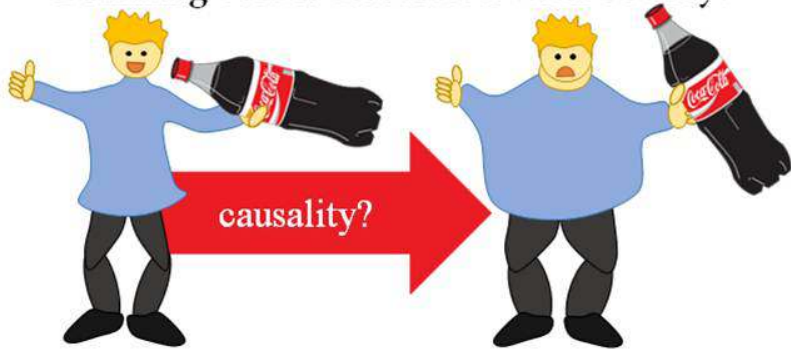
RESEARCH TOPICS AT IMBM 2019



Can DNase help in intestine inflammation?



Drinking cola is associated with obesity.

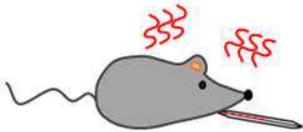


Animal experiment showed opposite result.

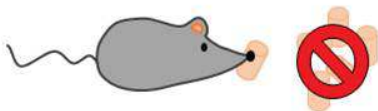


Where does the excess energy from cola go?

Higher heat expenditure?



Lower food intake?



More movement?



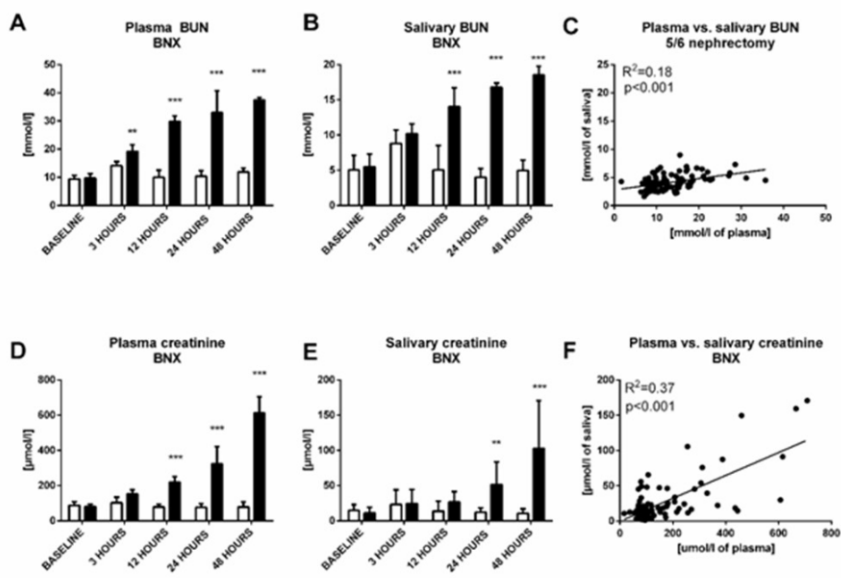
DYNAMICS OF SALIVARY MARKERS OF KIDNEY FUNCTION IN ANIMAL MODELS OF KIDNEY DISEASE

What is known?

Both creatinine and urea can be measured in saliva, but the biological variability is high, and its determinants are unknown. Animal models and experiments under controlled conditions are needed but are scarce. In addition, the association between salivary and plasma concentrations of creatinine and urea in different stages of renal failure is not clear.

What is new?

Our study analyzed the detailed dynamics of salivary creatinine and urea in renal failure. These markers in saliva followed their increase in plasma with a considerable delay in both acute and chronic models. Further studies are needed to evaluate whether this time delay can be outweighed by the diagnostic advantages of saliva in real-life screening or monitoring of kidney diseases.



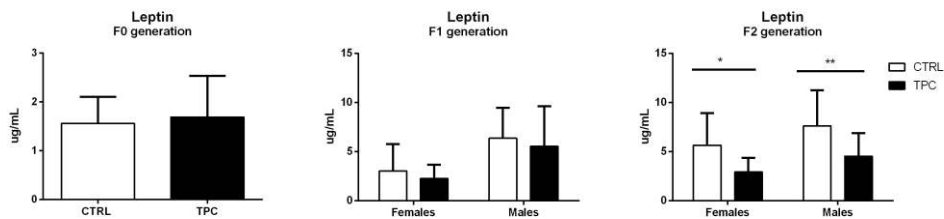
MATERNAL CONSUMPTION OF A DIET RICH IN ADVANCED GLYCATION END PRODUCTS AND ITS EFFECT ON OFFSPRING

What is known?

Thermal processing of foods at temperatures > 100 °C introduces considerable amounts of advanced glycation end-products (AGEs) into the diet. Developmental origins of health and disease hypothesis suggests that intrauterine and early postnatal stressors may increase the risk of developing chronic diseases later in life. Maternal dietary exposure might affect the offspring early neurodevelopment and metabolic health. The rat model was focused on the influence of maternal (F0) dietary challenge with thermally processed chow (TPC) during puberty, pregnancy and lactation on the offspring of F1 and F2 generation. We analyzed the leptin concentration in samples from this previously performed experiment.

What is new?

No differences in plasma leptin concentration of F0 and F1 generations were found. However, TPC group of the F2 generation was lighter than controls and also exhibited lower leptin concentrations. Since animals had ad libitum access to food, changes in orexigenic and anorexigenic hormones or in the nervous system could occur, resulting in less weight gain. Our results suggest an interesting fact that TPC group of F2 generation, which has not been in direct contact with AGEs, is lighter and has lower leptin concentrations. Our results suggest that thermally processed food with a slightly elevated AGEs content may not have the negative effects apart from direct consumption.



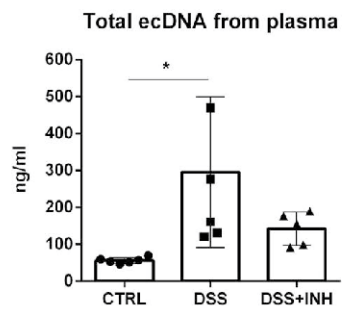
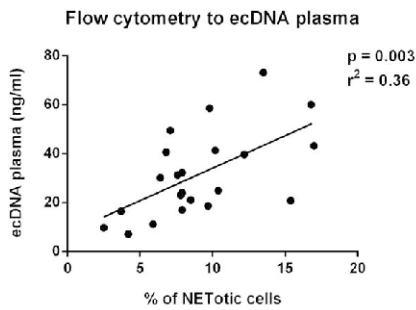
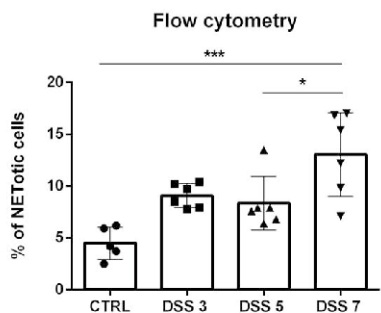
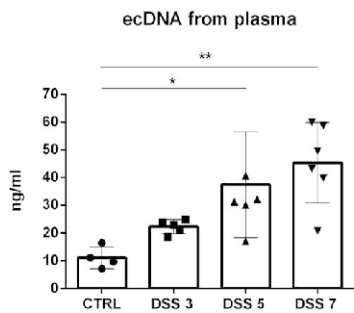
THE ROLE OF NEUTROPHIL EXTRACELLULAR TRAPS IN THE PATHOGENESIS OF INFLAMMATORY BOWEL

What is known?

A clear causality between extracellular DNA (ecDNA) and gut inflammation has not been established to this day. Furthermore, the formation of neutrophil extracellular traps (NETs) is abnormal and may lead to worse outcome of the inflammatory bowel disease. Therefore, reducing the amount of NETs may have a therapeutic potential.

What is new?

EcDNA showed an increasing concentration in experimental groups compared to control group. We found a positive correlation between ecDNA and the percentage of cells responsible for the production of NETs. Experimental group treated with an inhibitor of NET formation (INH) showed lower ecDNA concentration.



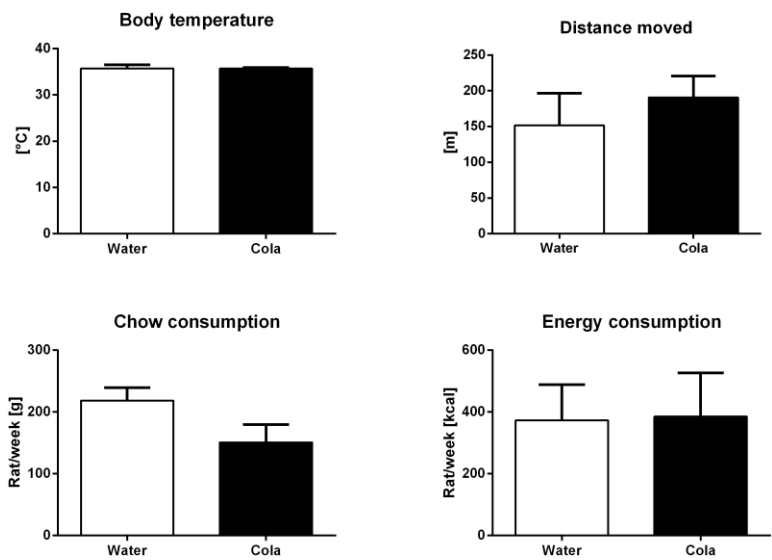
METABOLIC AND BEHAVIORAL EFFECTS OF COLA

What is known?

Observational studies have shown an association between intake of sugar-sweetened beverages and incidence of metabolic syndrome. However, there is no evidence of causality. Results of our experiments even suggest that long term cola consumption results in lower body weight and higher insulin sensitivity. Our aim was to identify where goes the excess energy from cola.

How can we move further?

Food consumption, but not body temperature was considerably lowered by Cola intake making the total energy intake comparable between the groups. Cola also slightly increased locomotor activity. These extremely interesting results should be reproduced and further investigated in humans. The underlying molecular mechanisms could be used as a therapeutic target for obesity.



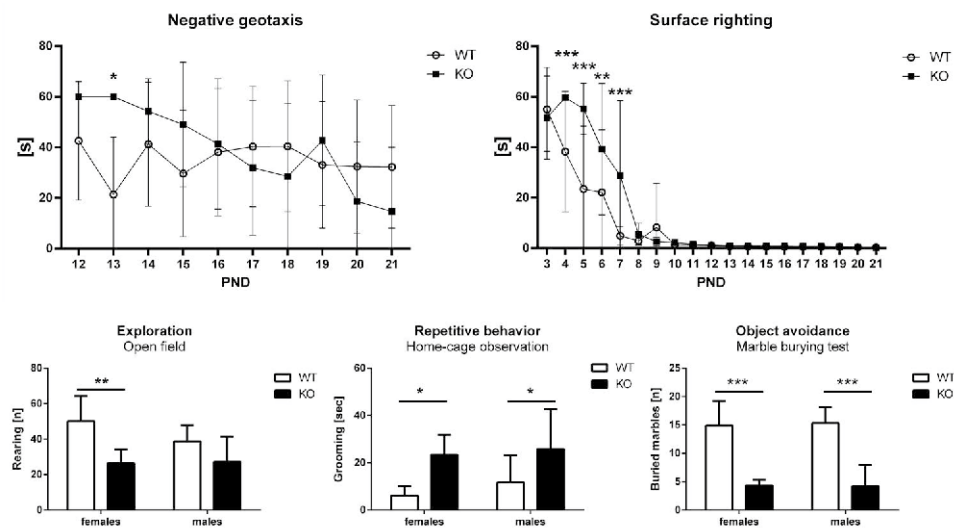
SEX DIFFERENCES AND THE ROLE OF SEX HORMONES IN NEURODEVELOPMENTAL DISORDERS

What is known?

Autism spectrum disorder (ASD) is a heterogeneous group of neurodevelopmental disorders. Although the etiology of ASD is unknown, several candidate genes have been suggested. Shank3 knock-out (KO) mice are frequently used as a genetic model of ASD. However, the behavioral phenotype of Shank3 KO mice from birth until old age has not been investigated yet.

What is new?

Mutation in the gene encoding the synaptic scaffolding protein SHANK3 causes delayed sensorimotor development, reduced exploration, excessive self-grooming behavior, avoidance and anxiety-like behavior, but does not affect sociability in mice.



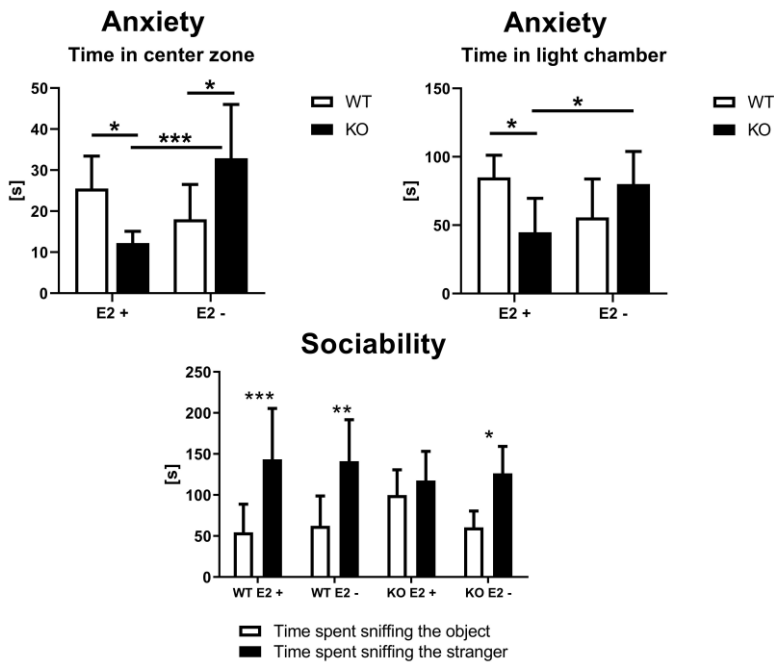
THE ROLE OF ESTRADIOL IN ETIOLOGY OF AUTISM SPECTRUM DISORDER

What is known?

The higher prevalence of ASD in boys has not been elucidated yet. Research focuses on the importance of testosterone at various stages of brain development, however, it is possible that the protective effects of female sex hormones will be crucial.

What is new?

To test this hypothesis a genetic mouse model of ASD, the so-called SHANK 3 mice, was used. These animals exhibit some autistic features and are more anxious. In addition, lack of estradiol (E2-) reduces anxiety and normalizes social behavior in KO mice. Thus, estradiol is not protective and is not responsible for the gender differences in ASD.



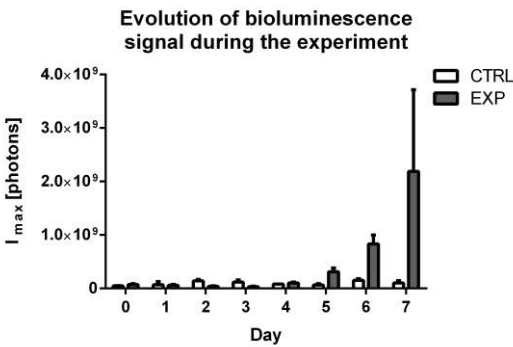
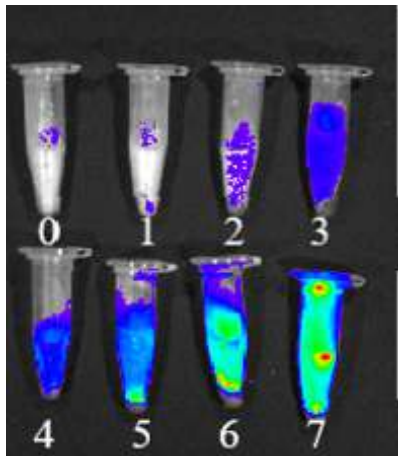
NONINVASIVE MONITORING OF FECAL BLOOD IN EXPERIMENTAL COLITIS

What is known?

Luminol is used in forensic analysis to detect trace of blood. It is also widely used for the experimental in vivo monitoring of inflammation. It has been shown that luminol might be used for detecting fecal occult blood in experimental colorectal cancer. In animal models of colitis, the visual detection of fecal bleeding is used to monitor the progress of disease severity.

What is new?

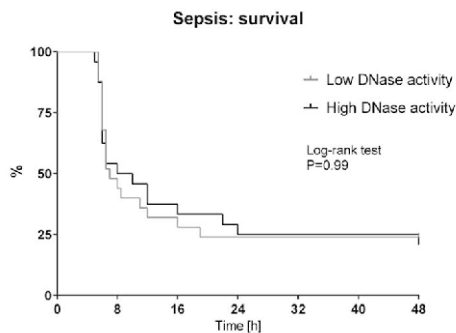
In our study, luminol based detection of blood was tested for noninvasive monitoring the fecal bleeding in experimental colitis. The positive luminescence signal was detected already on day 5th, while using visual inspection, the blood in the fecal samples was observed on day 6th. The results of our study showed that luminol based fecal blood detection is easy, cheap and could make a noninvasive monitoring of colitis in mice more sensitive.



ENDOGENOUS DNASE ACTIVITY IN SEPSIS AND ACUTE LIVER FAILURE

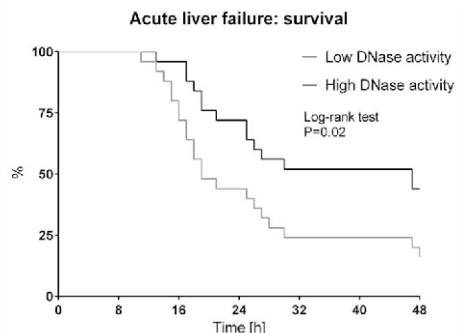
What is known?

DNA outside of cells is recognized by the immune system and can cause inflammation. Secreted deoxyribonucleases (DNases) cleave ecDNA. Administration of exogenous DNase has a protective effect in both, sepsis and acute liver failure. We have previously found that endogenous DNase varies considerably between subjects. The reasons for this variability among healthy subjects are a mystery, but the consequences as well. Whether this variability is associated with mortality in diseases causing high ecDNA and caused by high ecDNA, is currently unknown.



What is new?

The results show that higher DNase activity was protective in acute liver failure but not in sepsis. In acute liver failure, the likely source of ecDNA is necrosis of hepatocytes while in sepsis it is formation of neutrophil extracellular traps. One reason for the differences could be the protection of ecDNA by histones or microvesicles such as exosomes. It will be important to describe the structural and biological properties of ecDNA such as subcellular origin and its DNase resistance. Hopefully, we will be able to answer some of the new arising questions in the following years.



CONFERENCES

An active participation in scientific conferences is an indispensable element for our work. At conferences we have the opportunity to present the results of our experiments, to discuss with experts and to establish new cooperation. In 2019, we actively attended the following scientific conferences:

**95th PHYSIOLOGICAL DAYS,
05.-07.02.2019, Prague, Czech republic**

(Peter Celec, Barbora Vlková, Veronika Borbélyová, Emese Renczés, Jozef Čonka, Ľubica Janovičová, Nikola Pribulová, Veronika Šarayová, Lucia Mihalovičová, Miriam Pillarová)

**10th INTERNATIONAL MEETING ON STEROIDS AND NERVOUS SYSTEM,
16.-20.2.2019, Torino, Italy**

(Emese Renczés, Veronika Borbélyová)

**GENETIC CONFERENCE IN MARTIN,
06.-08.03.2019, Martin, Slovakia**

(Peter Celec, Ľubica Janovičová, Jozef Čonka)

**VIEWS INTO PSYCHIATRY,
12.-13.4.2019, Tatranská Lomnica, Slovakia**

(Peter Celec, Barbora Vlková)

**4th INTERNATIONAL MEETING ON CELL-FREE DNA,
23.-24.5.2019, Copenhagen, Italy**

(Barbora Vlková, Barbora Konečná)



47th HEPATOLOGICAL DAYS,
23.-25.5.2019, Doňovaly, Slovakia
(Peter Celec, Jozef Čonka, Ľubica Janovičová)

56th ERA-EDTA CONGRESS,
13-16.06.2019, Budapest, Hungary
(Janka Bábíčková, Ľubomíra Tóthová)

IMMUNOANALYSIS CONFERENCE,
17.-21.6. 2019, Lubochna – Vyšné Krátké, Slovakia
(Veronika Borbélyová, Emese Renczés)

50 YEARS OF PSYCHOENDOCRINOLOGY - ANNUAL CONFERENCE,
29.-31.8.2019, Milan, Italy
(Veronika Borbélyová, Emese Renczés)

50th DIGESTIVE DISEASE WEEK, 18.-21.5.2019,
San Diego, California, USA
(Roman Gardlík)

12th CONGRESS ON PEDIATRIC NEPHROLOGY,
14.-15.6.2019, Starý Smokovec, Slovakia
(Peter Celec, Roman Gardlík)

8th YOUNG PROFESSIONALS WORKSHOP ON PLASMA MEDICINE,
5.-8.8.2019, Greifswald, Germany
(Mária Suchoňová)



EUROPEAN RESEARCHERS' NIGHT,
27.9.2019, Bratislava, Slovakia
(Ľubomíra Tóthová)

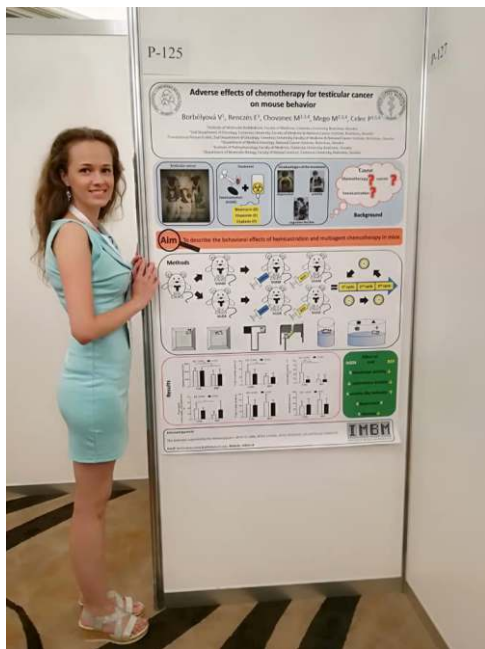
16th SLOVAK-CZECH AND 21st CZECH CONFERENCE ON SLEEP MEDICINE,
10.-12.10.2019, Senec, Slovakia
(Peter Celec, Ľubomíra Tóthová)

RUZINOV DAY OF GASTROENTEROLOGY,
8.11.2019, Bratislava, Slovakia
(Roman Gardlík, Mária Suchoňová, Ľubomíra Tóthová)

46th CZECH AND SLOVAK ETHOLOGICAL SOCIETY CONFERENCE,
7.-10.11.2019, Bratislava, Slovakia
(Lucia Mihalovičová, Miriam Pillerová, Veronika Šarayová)

MARTIN DAY OF BIOCHEMISTRY,
10.12.2019, Martin, Slovakia
(Ľubomíra Tóthová)





FOREIGN STAYS



HARVARD MEDICAL SCHOOL

BARBORA KONEČNÁ

Beth Israel Deaconess Medical Center/Harvard Medical School
Boston, MA, USA, Department of Surgery
October 2019 - April 2020
working on neutrophil activity in various conditions

BARBORA GROMOVÁ

Beth Israel Deaconess Medical Center/Harvard Medical School
Boston, MA, USA, Department of Anesthesia
June 2019 - November 2019
working on purinergic signalling in autoimmune hepatitis and inflammatory bowel disease

ĽUBICA JANOVIČOVÁ

Beth Israel Deaconess Medical Center/Harvard Medical School
Boston, MA, USA, Department of Surgery
October 2019 - August 2020
working on origin extracellular DNA in plasma and its structure



Universidad de Alcalá

KATARÍNA KMEŤOVÁ

University of Alcalá
Madrid, Spain, Department of Organic and Inorganic Chemistry
December 2019
Working on nanoparticles and their antibacterial and antifungal effect

INVITED LECTURES

Barbora Konečná

Extracellular DNA and exosomes. 8th Miniconference of PhD students. 10.6.2019, Bratislava, Slovakia

Ľubomíra Tóthová

5th Kramare day of clinical research with international participation. 4.12.2019, Bratislava, Slovakia

Roman Gardlík

59th Pediatric days, 25.-26.4.2019, Bratislava, Slovakia

Peter Celec

Views into Psychiatry, 12.-13.4.2019, Tatranská Lomnica, Slovakia

Peter Celec

Medical Dialogues, 26.-27.4.2019, Jasná, Slovakia

Peter Celec

Working Days of Pediatric Nephrology, 7.-8.6.2019, Litomyšl, Czech Republic

Peter Celec

Biochemical Days, 21.-24.9.2019, Horný Smokovec, Slovakia

Peter Celec

Czech and Slovak Congress on Sleep Medicine, 10.-12.10.2019, Senec, Slovakia

Peter Celec

Working Days of the Pediatric Clinic, 10.-11.2019, Bratislava, Slovakia

Peter Celec

Czech and Slovak Student Conference, 7.-8.-11.2019, Bratislava, Slovakia

Peter Celec

Multidisciplinary Educational Discussion for Young, 15.-16.11.2019, Žilina, Slovakia

EDUCATION ACTIVITIES 2019

IMBM is a research institute, but it is also important to participate in the educational process. Beyond institutional meetings, seminars and courses we prepared the lectures, seminars and practical courses at the Faculty of Medicine and Faculty of Natural Sciences, Comenius University in Bratislava:

FACULTY OF MEDICINE:

Physiology
Pathophysiology
Pathology
Introduction to Science



FACULTY OF NATURAL SCIENCES:

Molecular Endocrinology
Basics of Theoretical and Experimental Medicine
Progress in Molecular Biology
Advanced Methods in Molecular Biology
Behavioral Genetics
Special Genetics
Basics of Clinical Medicine



EVENTS CO-ORGANIZED BY IMBM



25.4.2019

Faculty of Natural Sciences, Comenius University in Bratislava



PRIZES

Miriam Pillerová, MSc

Scholarship of Ľudmila Sedlářová - Rabanová



Ľubomíra Tóthová, MSc, PhD

Eset Science Award (young scientists)



COOPERATIONS

22nd Department of Oncology, Faculty of Medicine, Comenius University and Translational Research Unit, National Cancer Institute, Bratislava, Slovakia
(Michal Mego, prof., MD, PhD)

Department of Dental Hygiene, Faculty of Health Care, University Prešov, Slovakia
(Eva Kovaľová, assoc. prof., MD, PhD)

1st Department of Internal Medicine, Medical Faculty, Comenius University, Bratislava, Slovakia
(Emoke Steňová, assoc. prof., MD, PhD)

National Institute of Rheumatic Diseases, Piešťany, Slovakia
(Vanda Mlynáriková, MD)

2nd Gynecology and Obstetrics Clinic, Faculty of Medicine, Comenius University, Bratislava, Slovakia
(Jozef Záhumenský, assoc. prof., MD, PhD)

Department of Environmental Physics, Astronomy, Earth Physics and Meteorology, Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava, Slovakia
(Zdenko Machala, assoc. prof., PhD)

Department of Obstetrics and Gynecology, Sahlgrenska University Hospital/Ostra, Gothenburg, Sweden
(Bo Jacobsson, prof., MD, PhD)

Department of Clinical Microbiology, Karolinska University Hospital, Stockholm, Sweden
(Milan Chromek, MD, PhD)

Department of Obstetrics and Gynaecology, University Hospital Hradec Kralove, Charles University, Hradec Kralove, Czech Republic
(Marián Káčerovský, assoc. prof., MD, PhD)

Department of Pathological Physiology, Faculty of Medicine, Masaryk University, Brno, Czech Republic
(Kateřina Kaňková, prof., MD, PhD)

Institute of Clinical Biochemistry and Laboratory Diagnostics, Charles University, Prague, Czech Republic
(Marta Kalousová, prof., MD, PhD)

1st Department of Obstetrics and Gynecology, Semmelweis University, Budapest, Hungary
(Bálint Nagy, prof., PhD)

Department of Pharmacodynamics, Semmelweis University, Budapest, Hungary
(Eva Szökő, prof., MSc, PhD)

Neuromorphological and Neuroendocrine Research Laboratory of the Semmelweis University and the Hungarian Academy of Sciences, Budapest, Hungary
(prof. Miklós Palkovits)

Department of Haemostasis and Haemostatic Disorders, Medical University of Lodz, Lodz, Poland
(prof. Cezary Watala)

Department of Internal Medicine, University of Würzburg and KfH Kidney Center, Würzburg, Germany
(prof. August Heidland)

Department of Nutritional and Physiological Chemistry, University of Vienna, Vienna, Austria
(prof. Veronika Somoza)

Department of Neurology, NYU Langone Medical Center, New York, USA
(Henrieta Scholtzova, MD, PhD)

Department of Energy Joint Genome Institute, Walnut Creek, California, USA
(Mária Džunková, MSc, PhD)

Department of Physiology, First Faculty of Medicine, Charles University, Prague, Czech Republic
(Vladimír Ríljak, assoc. prof., MD, PhD; Jaromír Mysliveček, prof., MD, PhD)



PUBLICATIONS

1. Konečná B, Sysák R, Kacerovský M, Celec P, Vlková B: Deoxyribonuclease activity in plasma of pregnant women and experimental animals. *J Matern Fetal Neonatal Med*, 31(13): 1807-1809, 2019.
2. Csongová M, Renczés E, Šarayová V, Mihalovičová L, Janko J, Gurecká R, Troise A D, Vitaglione P, Šebeková K: Maternal Consumption of a Diet Rich in Maillard Reaction Products Accelerates Neurodevelopment in F1 and Sex-Dependently Affects Behavioral Phenotype in F2 Rat Offspring. *Foods* 8(5):168, 2019.
3. Lauková L, Bertolo EMJ, Zelinková M, Borbélyová V, Čonka J, Gaál Kovalčíková A, Domonkos E, Vlková B, Celec P. Early Dynamics of Plasma Dna in a Mouse Model of Sepsis. *Shock*, 52(2): 257-263, 2019.
4. Gyurászová M, Kovalčíková AG, Renczés E, Kmeťová K, Celec P, Bábíčková J, Tóthová L. Oxidative Stress in Animal Models of Acute and Chronic Renal Failure. *Dis Markers*. 2019:8690805, 2019.
5. Suchoňová M, Borbélyová V, Renczés E, Konečná B, Vlková B, Hodossy J, Ostatníková D, Celec P: Does the 2nd and 4th digit ratio reflect prenatal androgen exposure? *Bratisl Lek Listy*, 120(9): 703-710, 2019.
6. Passakova N, Celec P, Gardlík R: The role of sex hormones and social determinants in assessment of facial attractiveness. *Bratisl Lek Listy*, 120(6): 443-448, 2019.
7. Janšáková K, Lengyelová E, Pribulová N, Somoza V, Celec P, Šebeková K, Ostatníková D, Tóthová L: Metabolic and renal effects of dietary advanced glycation end products in pregnant rats - A pilot study. *Phys Res*, 68(3): 467-479, 2019.
8. Šebeková K, Brouder Šebeková K: Glycated proteins in nutrition: Friend or foe? *Exp Gerontol*, 117: 76-90, 2019.
9. Kovalčíková A, Gyurászová M, Gardlík R, Boriš M, Celec P, Tóthová L: The effects of sucrose on urine collection in metabolic cages. *Lab Anim*, 53(2): 180-189, 2019.
10. Konečná B, Tóthová L, Repiská G: Exosomes-associated dna—new marker in pregnancy complications? *Int J Mol Sci*, 20(12): E2890, 2019.
11. Šebeková K, Gurecká R, Csongová M, Koborová I, Šebek J: Estimation of the proportion of metabolic syndrome-free subjects on high cardiometabolic risk using two continuous cardiometabolic risk scores: a cross-sectional study in 16- to 20-year-old individuals. *Eur J Pediatr*, 178(8): 1243-1253, 2019.

12. Tóthová Ľ, Celec P, Mucska I, Hodosy J: Short-term effects of continuous positive airway pressure on oxidative stress in severe sleep apnea. *Sleep Breath*, 23(3): 857-863, 2019.
13. Janovičová L, Konečná B, Vokálová L, Lauková L, Vlková B, Celec P: Sex, age, and bodyweight as determinants of extracellular DNA in the plasma of mice: A cross-sectional study. *Int J Mol Sci*, 20(17): E4163, 2019.
14. Gaál Kovalčíková A, Pancíková A, Konečná B, Klamárová T, Novák B, Kovaľová E, Podracká L, Celec P, Tóthová Ľ: Urea and creatinine levels in saliva of patients with and without periodontitis. *Eur J Oral Sci*, 127(5): 417-424, 2019.
15. Kalocayova B, Kovačicova I, Radosinska J, Tothova L, Fulop M, Slezak J, Vrbjar N: Localization dependent sensitivity of cerebral Na,K-ATPase to irradiation induced oxidative imbalance in rats. *J Physiol Pharmacol*, 70(4): 573-584, 2019.
16. Kubiritova Z, Radvanszky J, Gardlik R: Cell-free nucleic acids and their emerging role in the pathogenesis and clinical management of inflammatory bowel disease. *Int J Mol Sci*, 20(15): E3662, 2019.
17. Zmetakova I, Kalinkova L, Smolkova B, Horvathova Kajabova V, Cierna Z, Danihel L, Bohac M, Sedlackova T, Minarik G, Karaba M, Benca J, Cihova M, Buocikova V, Miklikova S, Mego M, Fridrichova I: A disintegrin and metalloprotease 23 hypermethylation predicts decreased disease-free survival in low-risk breast cancer patients. *Cancer Sci*, 110(5): 1695-1704, 2019.
18. Čonka J, Melišková V, Gardlík R, Hodosy J, Celec P, Tóthová Ľ: Beneficial effect of sugar-sweetened beverages on the risk of urinary tract infections. *Med Hypotheses*, 127: 84-87, 2019.
19. Radosinska J, Jasenovc T, Puzserova A, Krajcir J, Lacekova J, Kucerova K, Kalnovicova T, Tothova L, Kovacicova I, Vrbjar N: Promotion of whole blood rheology after vitamin c supplementation: Focus on red blood cells. *Can J Physiol Pharmacol*, 97(9): 837-843, 2019.
20. Kalocayová B, Kovacicová I, Radošinská J, Tóthová L, Jagmaševic-Mézešová L, Fülöp M, Slezák J, Babál P, Janega P, Vrbjar N: Alteration of renal Na,K-ATPase in rats following the mediastinal γ-irradiation. *Physiol Rep*, 7(3): e13969, 2019.
21. Mego M, Karaba M, Minarik G, Benca J, Silvia J, Sedlackova T, Manasova D, Kalavska K, Pindak D, Cristofanilli M, Reuben JM, Mardiak J: Circulating Tumor Cells with Epithelial-to-mesenchymal Transition Phenotypes Associated with Inferior Outcomes in Primary Breast Cancer. *Anticancer Res*, 39(4): 1829-1837, 2019.
22. Sun Q, Baues M, Klinkhammer BM, Ehling J, Djudjaj S, Drude NI, Daniel C, Amann K, Kramann R, Kim H, Saez-Rodriguez J, Weiskirchen R, Onthank DC, Botnar RM, Kiessling F, Floege J, Lammers T, Boor P: Elastin imaging enables noninvasive staging and treatment monitoring of kidney fibrosis. *Sci Transl Med*, 11(486): eaat4865, 2019.

GRANT PROJECTS

APVV GRANTS

APVV-16-0273

DEOXYRIBONUCLEASE ACTIVITY IN PLASMA AND ITS IMPORTANCE IN CLEARANCE OF EXTRACELLULAR DNA

Peter Celec

2017-2019

APVV-17-0505

BIOLOGICAL ASPECTS OF EXTRACELLULAR NUCLEIC ACIDS IN COLONIC INFLAMMATION

Roman Gardlík

2019-2021

APVV-18-0287

NON-INVASIVE YET UNUSED MARKERS OF RENAL FUNCTION: PROBLEMS, CAUSES AND OPPORTUNITIES

Ľubomíra Tóthová

2019-2022

APVV-18-0366

THE ROLE OF NETOSIS IN THE ETIOPATHOGENESIS OF RHEUMATOID ARTHRITIS

Barbora Vlková

2019-2023

KEGA GRANT

KEGA 032UK-4/2019

PRACTICAL BIOMEDICAL RESEARCH COURSES FOR PHD STUDENTS

Peter Celec

2017-2019

VEGA GRANTS

VEGA 1/0062/16

EFFECTS OF PRENATAL EXPOSURE TO UNHEALTHY DIET ON EARLY NEUROMOTOR DEVELOPMENT AND LATER METABOLIC STATUS IN RAT OFFSPRING

Katarína Šebeková

2016-2019

VEGA1/0092/17

EXTRACELLULAR DNA AND ITS IMPORTANCE IN THE PATHOGENESIS OF RENAL AND METABOLIC COMPLICATIONS OF VARIOUS DISEASES

Peter Celec

2017-2019

VEGA1/0156/17

THE ROLE OF NETOSIS IN THE PATHOGENESIS OF PREECLAMPSIA

Barbora Vlková

2017-2019

VEGA 1/0204/17

THE ROLE OF EXTRACELLULAR DNA IN PATHOGENESIS AND THERAPY OF INFLAMMATORY BOWEL DISEASE

Roman Gardlík

2017-2019

VEGA 1/0234/18

MOLECULAR MECHANISMS BEHIND THE ANTIMICROBIAL EFFECTS OF STEROIDS ON UROPATHOGENIC BACTERIA

Ľubomíra Tóthová

2018-2020

COMENIUS UNIVERSITY GRANTS

UK/424/2019

EXTRACELLULAR DNA AS A MEDIATOR OF THE IMPACT OF TRAUMA ON NEUTROPHIL FUNCTION IN AN ANIMAL MODEL OF PNEUMONIA

Nikola Pribulová

UK/375/2019

RELATIONSHIP BETWEEN SEX HORMONES AND METABOLIC STATUS IN ADOLESCENTS

Jakub Janko

UK/307/2019

ESTABLISHMENT OF GESTATIONAL DIABETES MELLITUS IN RODENTS

Veronika Šarayová

UK/426/2019

DEOXYRIBONUCLEASE ACTIVITY AND EXTRACELLULAR DNA IN ACUTE LIVER FAILURE IN MICE

Ľubica Janovičová

GRANTS FOR PREGRADUAL STUDENTS

AXA Foundation Fund at Pontis Foundation in AXA Innovator 2019:

Research Stay at Harvard for the Study of Potential Therapy of Inflammatory Bowel Diseases

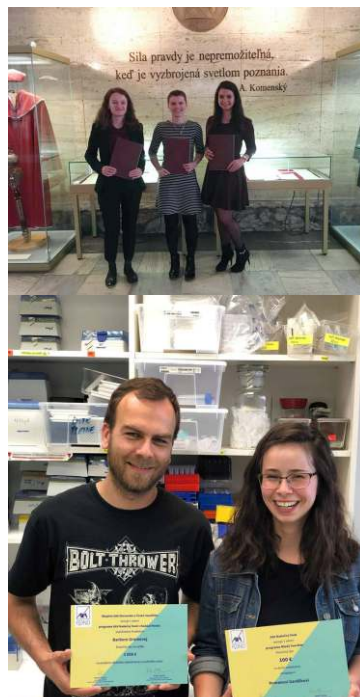
Barbora Gromová

Tatra banka Foundation:

Grant program - Students to the World 2019:

Research stay at Harvard Medical School, USA

Barbora Gromová



WHERE TO FIND US?



FACULTY OF MEDICINE COMENIUS UNIVERSITY

5th floor

SASINKOVA 4
BRATISLAVA
811 08
SLOVAK REPUBLIC

PHONE: +421 2 9011 9371

FACULTY OF MEDICINE COMENIUS UNIVERSITY PAVILION OF MEDICAL SCIENCES SLOVAK ACADEMY OF SCIENCES

6th floor

DÚBRAVSKÁ CESTA 9
BRATISLAVA
845 05
SLOVAK REPUBLIC



More information is available at the faculty web page:

www.imbm.sk

More information about us on our facebook:

www.facebook.com/IMBM



Content: Peter Celec
Graphic design: Atelier Inak