



Scientific research activity of doctoral students

Active participation at scientific conferences and seminars

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2024

Young Oncologists Competition 2024

On the occasion of Cancer Research Day on **12 March 2024**, the Cancer Research Foundation organised the 9th edition of the **Young Oncologists Competition**. The aim of this event is to bring together young enthusiasts in the field of cancer research and provide them with an opportunity to publicly present their interest and the results of their scientific work. Participants competed in three categories: university student, PhD students and young scientists up to 35 years of age. The competition in the PhD student category was particularly engaging this year, as a record number of 27 PhD students from all over Slovakia took part. Each participant had 10 minutes to present his/her paper and then 5 minutes for discussion, which was led by the evaluation committee.

The panel was prestigiously composed of leading experts in the field of oncology, among whom stood out prof. MUDr. Dalibor Ondruš, DrSc. as the chairman of the commission, Mgr. Gabriela Pavlíková, PhD., MUDr. Mária Rečková, PhD., RNDr. Jana Jakubíková, PhD., doc. RNDr. Zora Lasabová, PhD., and doc. RNDr. Rastislav Jendželovský, PhD. Among the participants were also two of our PhD students - RNDr. **Monika Švecová** and RNDr. **Ivana Večurkovská**. Both of them were praised for their scientific work and had beneficial debates with the committee. Monika Švecová even took **third place** in the PhD category with her paper.



Young Oncologists Competition 2024. a) (from left) Monika Švecová, Ivana Večurkovská, PharmDr. Dominik Kl'oc (Institute of Pharmacology, MF UPJŠ), MUDr. Lea Balážová (Department of Radiotherapy and Oncology MF UPJŠ), Mgr. Martina Mečiaková (Institute of Medical Biochemistry, JLF UK), Ing. Marek Bajtoš (Department of Theoretical Electrical Engineering and Biomedical Engineering, UNIZA) b) doctoral student's awards (from left) Professor Ondruš, Monika Švecová (3rd place), Mgr. Aneta Ševčíková (1st place, Institute of Experimental Oncology, BMC SAV), Mgr. Lenka Trnková (2nd place, Institute of Experimental Oncology, BMC SAV) c) group photo of the PhD section d) Ivana Večurkovská and Monika Švecová

This event, highlighting the importance of cancer research, not only supported young scientists in their career development, but also gave hope that Slovak science, despite the difficult conditions, has its capable followers. The Cancer Research Foundation is thus successfully motivating young people to scientific work and offering them an invaluable opportunity to communicate with each other and share knowledge in the field of oncology. Our doctoral students had the opportunity to listen to many important scientific works, to meet several PhD students working in the field of oncology and to network and find new collaborators.

2023

98. Physiological days

The 98th edition of the **Physiological Days conference** was held in Prague on **7-8 February 2023**, welcoming a wide range of experts from biomedical fields and offering a platform for the presentation of the latest scientific works and research. Among the distinguished participants of the conference was our PhD student Mgr. **Ivana Večurkovská** (fig), who was selected among the doctoral papers for the oral presentation of her thesis entitled "Comparative analysis of colorectal carcinoma using zymography" and was included in the youth competition, which was sponsored by the Slovak Physiological Society.





Spring school of doctoral students 2023

The ninth conference of the university-wide **UPJŠ PhD Student Spring School** took place in Stará Lesná from **June 13 to 16 of 2023**. This event has long supported the advancement of interdisciplinarity, mutual exchange of knowledge, and enhancing the standard of the PhD education at our university while taking into consideration global trends. Expert lectures from academic faculty members as well as outside experts were presented at this conference. As part of the scientific program, doctoral students presented the results of their research studies, while each PhD student had 10 minutes for presentation and 5 minutes for discussion. Four doctoral students from the Institute of Medical and Clinical Biochemistry UPJŠ LF gave oral presentations of their research findings on the following topics:

- RNDr. **Michaela Abrahamovská**: Antioxidant status of the corpus uteri endometrium in endometriosis and endometrial cancer
- Mgr. **Slavomíra Gulová**: Potential of extracellular vesicles isolated from blood plasma in osteoarthritis therapy
- RNDr. **Monika Švecová**: Comparative 3D fluorescence analysis as a prospective diagnostic tool for selected oncological diseases
- RNDr. **Ivana Večurkovská**: The role of urokinase and its inhibitor in the process of tumorigenesis of colorectal cancer
- RNDr. **Ivana Večurkovská**: Matrix metalloproteinases as potential biomarkers of pancreatic cancer (co-author, first author and presenter – PhD student MUDr. Veronika Roškovičová 1st Department of Surgery UNLP)

The presented scientific contributions were published in the peer-reviewed book of abstracts. At this event, doctoral students had a unique opportunity to gain a completely different research perspective, as well as a chance to familiarize themselves with current research in various study programs. The opportunity to network with other PhD students in many scientific fields and have fruitful discussions with them was an essential benefit of the Spring School of doctoral students 2023.



Spring school of doctoral students 2023 in Stará Lesná a) (from left) Ivana Večurkovská, Michaela Abrahamovská, Slavomíra Gulová, Monika Švecová, Veronika Roškovičová b) doctoral students with prof. MUDr. Pavol Jarčuška, PhD. c) group photo of the medical and natural sciences section



Young Scientist's Forum and 47th FEBS 2023 Congress

The 22nd edition of the **Young Scientist's Forum (YSF) conference** took place on **July 6-8, 2023** in Tours, a very historic and beautiful city between the Cher and Loire rivers in France. The Young Scientists Forum is a popular event for around 100 PhD students and post-docs from FEBS constituent societies, held in conjunction with – and just before – the FEBS Annual Congress. YSF offers opportunities for participants to present their own research work, attend careers skills seminars, hear and meet keynote speakers and enjoy a social programme. The success rate of applicants who are supported by the YSF FEBS grant is approximately 30%. This year, thanks to this grant, 2 doctoral students of the Institute of Medical and Clinical Biochemistry participated: RNDr. **Ivana Večurkovská** and RNDr. **Monika Švecová**. The scientific program of this year included a number of scientific lectures by experts, doctoral students as well as a poster section. During the career seminars, they discussed with several experts the ethical aspects of publishing, professional writing of their laboratory journal, or going through the creation of a successful CV as well as consulting their own CV. During the YSF, our doctoral students had many opportunities to build international contacts and meet doctoral students or postdoctoral fellows from different European countries.

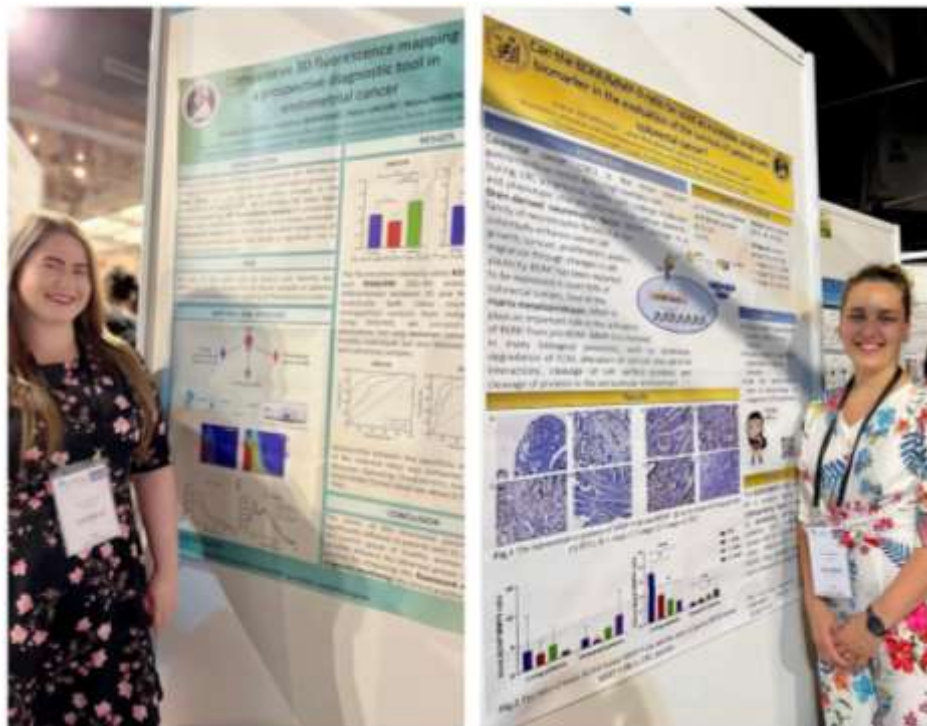


Young Scientist's Forum 2023 a) group photo of YSF participants b) (left) Monika Švecová and Ivana Večurkovská (right) c) dinner in the Tours city center with PhD students

Subsequently, doctoral students also participated in the **47th FEBS Congress** (FEBS, Federation of European Biochemical Societies) in Tours from **July 8 to 12, 2023** under the motto "Together in Bioscience for a Better Future", organized by the French Society for Biochemistry and Molecular Biology. The main scientific program was full of inspiring plenary lectures by prominent scientists working in the fields of biochemistry, molecular biology and related life sciences. FEBS congresses aim to be an exemplary interdisciplinary meeting in the molecular life sciences for research presentation, discussion, learning, inspiration and encouragement – with participants leaving with new research insights and ideas and perhaps the start of international collaborations and friendships. Both doctoral students presented the results of their work in the poster section at both of these conferences: RNDr. **Ivana**



Večurkovská with the topic "Can the BDNF/MMP-9 ratio be used as a suitable prognostic biomarker in the evaluation of the survival of patients with colorectal cancer?", RNDr. **Monika Švecová** with the topic "Comparative 3D fluorescence mapping as a prospective diagnostic tool in endometrial cancer". Abstracts of scientific results were included in the peer-reviewed abstract book within the YSF conference and published in the FEBS Open Bio magazine in a supplementary issue within the FEBS congress. The presented research was supported by the ongoing grants VEGA 1/0540/21 and VEGA 1/0435/23.



Poster session of scientific findings Monika Švecová (left) and Ivana Večurkovská (right)

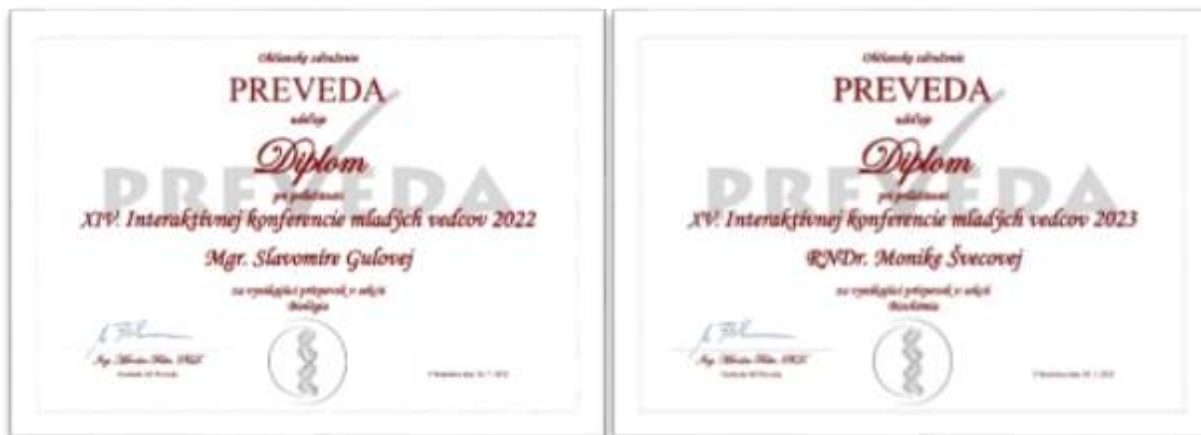
Interactive conference of young scientists

The Interactive Conference of Young Scientists is an online conference that provides young researchers with a quality space to present their studies and scientific results. In addition to the presentation of professional works, this conference also offers a scientific dialogue through discussion under individual contributions, thus providing space for consultations and the exchange of new knowledge. The following 6 doctoral students from the Institute of Medical and Clinical Biochemistry have participated in this conference with scientific theses:

- RNDr. **Michaela Abrahamovská**: Oxidative stress in endometriosis and endometrial cancer *corpus uteri*
- Mgr. **Peter Artimovič**: Oxidative stress in endometriosis and endometrial cancer *corpus uteri* (co-author)
- Mgr. **Slavomíra Gulová**: Exosomes in the pathophysiology and potential therapy of osteoarthritis
- RNDr. **Marko Morávek**: Study of the correlation between the amount of inflammation and the generation of extracellular vesicles in osteoarthritic tissues
- RNDr. **Monika Švecová**: Perspective of colorectal cancer diagnosis based on spectral fluorescence characteristics of blood serum
- RNDr. **Ivana Večurkovská**: Perspective of colorectal cancer diagnosis based on spectral fluorescence characteristics of blood serum (co-author)



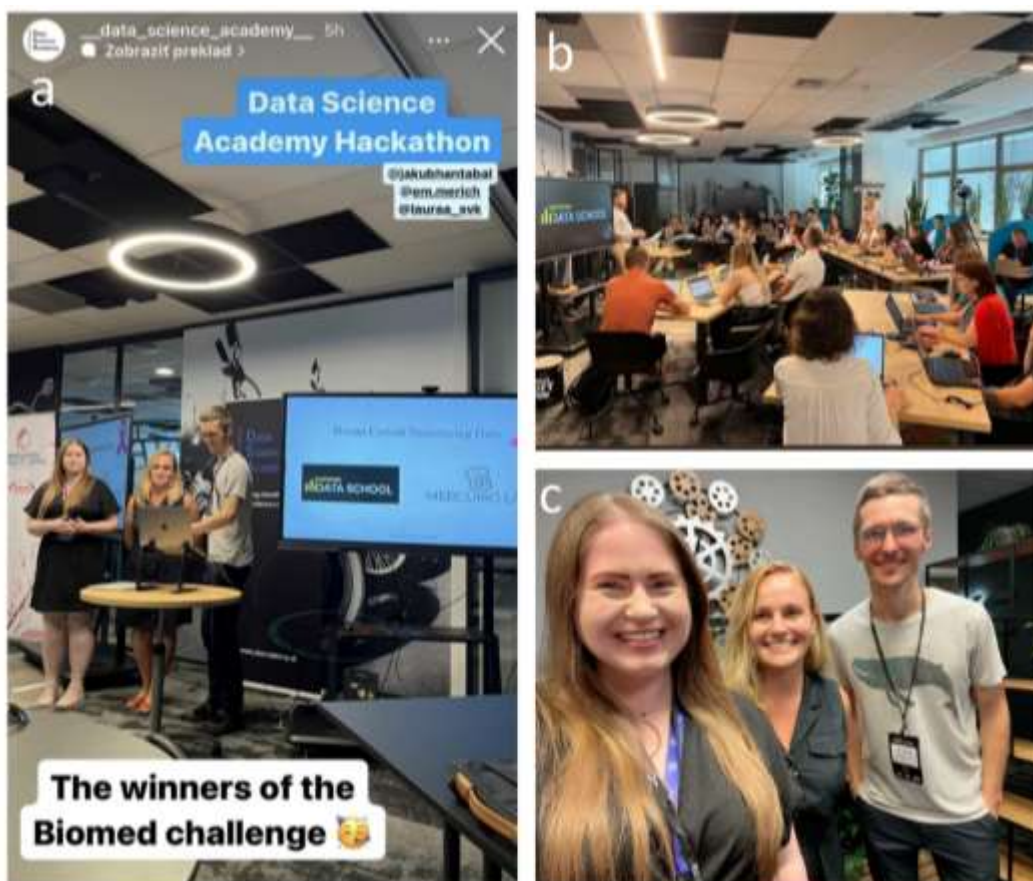
Throughout the conference, our PhD students participated actively in several discussions of their research findings. All doctoral students achieved high scores in the online evaluations, and in 2022 **Slavomíra Gulová's** work was **awarded** in the biology section and in 2023 **Monika Švecová's** study was **awarded** in the biochemistry section. The presented scientific works were included in the collection of online abstracts.



Awards for scientific contributions of Slavomíra Gulová in the biology section for 2022 and Monika Švecová in the biochemistry section for 2023

Summer data school 2023

This year, the civic association Data Science Academy organized the Summer Data School in Bratislava between **21-25 August 2023**, which our doctoral student RNDr. **Monika Švecová** attended thanks to the awarded scholarship. It is worth noting that the acceptance rate of this scholarship was 30% at the previous event, Winter Data School 2023. The goal of the data school is to mobilize and connect university students, PhD students, researchers and analysts from the private and public sectors who want to learn the fundamentals of data processing and analysis. The Data School also helps to build an interdisciplinary community capable of sharing knowledge to solve data-related problems in multiple fields. The target audience is doctoral students who need to work with data, use complicated statistical methods or build models in their research. This school consisted of 5 days of Python programming and hands-on workshops with real-world as well as biomedical datasets. The fifth day consisted of a Hackathon, during which participants could choose from three different data challenges and compete in teams – BioMed, Healthcare and Business. Our PhD student Monika was part of the **winning team** in the **biomedical challenge**, where they jointly analyzed breast cancer sequencing data set. Participating in this event allowed Monika to gain a programming foundation in bioinformatics data analysis, which advances the actual analysis of scientific results in fluorescence metabolomics as part of her PhD studies.



Summer data school 2023 a) The winning presentation of the data analysis results shared on the official Instagram of DSA b) the first day of the data school c) the winning Biomed challenge team consisting of Kristína Macáková (LF UK), Ondrej Vargovčík (PF UK) and Monika Švecová

Small New World 2.0 Conference in Graz, Austria

The second international conference focused on extracellular vesicles (EV) research called **Small New World 2.0** took place at the Medical University of Graz from **September 4th to 5th of 2023**. The conference was organized by the Austrian Society for EV (ASEV) in cooperation with the Hungarian (HSEV), Slovenian (SiN-EV) and Serbian (SrbEVs) Societies for EV. The program included dozens of plenary presentations by top scientists from the field of EV research, which were divided into several sections according to the focus of EV research (Regenerative medicine, Methodology advances in EV analysis, News from industry and development - "Rising projects", EV numbers and cargo, experiences with foreign stays in EV research through the MOVE program, Diversity of EV sources and Purity meets function). The conference also included a poster section, in which there were a total of 78 posters in various categories. Our doctoral student RNDr. **Marko Morávek** also presented the results of his ongoing research in the category Diversity of EV sources. Marko Morávek is doing his doctorate at the Department of Medical and Clinical Biochemistry and conducting his research at the experimental workplace of the Associated Tissue Bank at the Faculty of Medicine UPJŠ. He participated in the conference as the only participant from the Slovak Republic, and the title of his poster was "The effect of inflammation level on the production of osteoarthritic tissues-derived extracellular vesicles". During the breaks between the individual sections of the presentations, there was also the opportunity to get acquainted with the latest technologies in EV research, which were presented as part of a workshop by a number of scientific and technological companies (Abbelight, Beckman Coulter, HansaBioMed etc.).



Small New World 2.0 Conference in Graz. a) poster presentation of Marko Morávek's scientific results, b) meeting with MSc. Alexander Otahal, PhD. from the group dealing with research on the therapeutic effect of EV from the University of Krems, c) the illuminated name of the Medical University of Graz located in front of the entrance to the conference

The biggest advantage of such an event is, in addition to obtaining new and extremely valuable information from the field of EV research, also establishing contacts with other researchers for possible future international cooperation. It was the presentation by Martin Wolf from the Paracelsus Medical University in Salzburg about his foreign research stay in Stockholm that inspired Marko so much that he contacted Martin after the conference about a possible research stay with them in Salzburg. Therefore, Marko managed to arrange a research stay thanks to his participation in this conference. After the official end of the conference, the participants had the opportunity to take a guided tour of the city of Graz, which our doctoral student was happy to take advantage of and at the same time meet leading scientists from the EV field from all over Europe.



Tour of the city of Graz and a meeting. a) Marko Morávek at the beginning of the guided city tour of Graz, b) ongoing city tour of Graz with conference participants, c) meeting after the city tour with Delaram Kharami, EV researcher from the University of Budapest and Bernd Giebel, president of the German Society for EV



CSAC 2023

Cytometry Conference was held from September 2-5, 2023 in Prague. The event featured lectures by experts in the field of flow cytometry and microfluidics. As part of the professional program, a doctoral student from the Institute of Medical and Clinical Biochemistry of UPJŠ LF presented her scientific results in the form of a poster presentation:

- **Mgr. Eva Kriváková** – Role of hyaluronic acid in endometrial receptivity

The presented scientific contributions were published in the peer-reviewed proceedings of the conference. A huge benefit of the cytometry conference was the potential to make new contacts and have a beneficial discussion with many experts in the field. The presented results were part of the scientific projects APVV-22-0357 and VVGS-2023-2612.



CSAC2023 (A) (from left) Zuzana Badovská, Eva Kriváková **(B)** (from left) Eva Kriváková, Miroslava Rabajdová, Zuzana Badovská

Conference MEFANET 2023

The Faculty of Medicine of UPJŠ in Košice was a co-organizer of the **16th MEFANET** conference, which took place on **7-8 November 2023** at the Congress Hotel Centrum, Košice, under the auspices of the Dean of UPJŠ LF prof. MUDr. Petr Jarčuška, PhD. The conference, focused on the use of artificial intelligence and virtual reality in medical education, welcomed educators and students from medical and nursing faculties from the Czech and Slovak Republics, as well as experts in the field of electronic support for teaching. The programme included presentations of modern teaching methods and tools, as well as discussions on advances in the creation of simulation centers and the use of audiovisual aids. The first plenary lecture of the conference was given by Dr. Baba Sheba from St. George's University of London on "Generative AI in Medical Education: Beyond Tools to Strategy", where he explained in an interactive way the different aspects of generative machine learning in teaching students and drew attention to his university's guidelines on how to address the ethical issues of AI. Our PhD students also participated in the poster session of this conference, where they presented our



institute's initiatives to improve the teaching of medical biochemistry and chemistry. The presented works included in the peer-reviewed abstract book were part of the KEGA 017UPJS-4/2023 and KEGA 014UPJS-4/2023 projects:

- RNDr. **Monika Švecová**: Applying theoretical biochemistry knowledge through case studies (co-author)
- RNDr. **Ivana Večurková**: Use of audio-visual materials in the teaching of medical chemistry at UPJŠ in Košice (co-author)



MEFANET 2023. a) Poster presentation of Monika Švecová on the application of case studies in the teaching of medical biochemistry b) Poster presentation of Ivana Večurková on audiovisual teachings of medical chemistry c) Monika Švecová (left) with the principal investigator of the presented project MUDr. Anna Birková, PhD. d) poster session of the conference

The second day included many interesting presentations on the combination of technology and medicine. A prime example was the lecture of prof. Ing. Radovan Hudák, PhD., during which he explained the use of 3D printing in medicine in the production of permanent personalized implants from special materials. This application research has already improved the quality of life of thousands of patients in Slovakia and in many cases saved their lives. The end of the conference was graced by Dr. Martin Komenda's presentation on the project of the National Health Information Portal nzip.cz, which provides Czech citizens with verified health information. Doc. Ing. Jaroslav Majerník, PhD., Head of the Institute of Medical Informatics and Simulator Medicine at UPJŠ LF, noted that the conference was not only a success in sharing knowledge, but also an opportunity to test new technologies, such as the high-fidelity online USG simulator from the Spanish company WAZO technologies.



University of Miskolc Student Scientific Conference 2023

The Faculty of Health Sciences, University of Miskolc successfully organized the Annual **Student Scientific Conference** on **November 30, 2023**, bringing together diverse students and research topics in the field of health sciences. This year's event was characterized by an extraordinary participation of both high school and international students, with dedicated sessions for these groups. Due to adverse weather conditions, some presentations, including those of our PhD student Monika Švecová and medical student Alan Senderák, were held online, accommodating participants in Miskolc as well as some participants from Poland. RNDr. **Monika Švecová** presented the research of our institute entitled "Diagnostics of endometrial cancer via metabolite analysis and machine learning". In this international section 6 scientific works were included, and students had 10 minutes to present their results and 5 minutes for discussion. The presentations were in English, and the chair of this section was Assoc. MUDr. Oliver Rácz, CSc. (Department of Pathological Physiology, UPJŠ). The presentations were evaluated by the entire expert committee, which awarded first, second and third place along with special mentions for outstanding contributions. A significant achievement was the awarding of a special "Special Prize" award to Monika Švecová for her outstanding research presentation. This recognition not only underscores the quality and significance of her work, but also highlights the faculty's commitment to promoting cutting-edge research and academic excellence. The presented results are part of the VEGA 1/0435/23 project. Our colleagues also passively participated in the conference namely Ing. **Beáta Hubková**, PhD. and our PhD students Mgr. **Peter Artimovič**, Mgr. **Gabriela Sabolová** and RNDr. **Michaela Abrahamovská**.



Student Scientific Conference of the University of Miskolc. (from left) Peter Artimovič, Gabriela Sabolová, Monika Švecová, Associate Professor Oliver Rácz, Alan Senderák, Michaela Abrahamovská, Dr. Hubková in the meeting room of the Institute of Medical and Clinical Biochemistry



2022

Spring school of doctoral students 2023

The 8th year of the university-wide event Spring School of Doctoral Students of UPJŠ was held from June 14 to 17, 2023 in Liptovský Ján. After a two-year break caused by the COVID-19 pandemic, the organizers and participants of the Doctoral Spring School (JŠD) of the University of Pavol Jozef Šafárik in Košice met again in the familiar surroundings of beautiful Liptov, which is traditionally associated with this university-wide event. The pandemic caused that in the fall of 2020, JŠD was held online only for the first time, and in 2021 it was even cancelled for the first time in its short history. After the forced one-year break, also in view of the favorable feedback from the participating doctoral students and prominent domestic and foreign experts from the previous seven years, the university decided to continue the tradition of Spring Schools for doctoral students, as in previous years, in Liptovský Ján and in the proven classical format. The 8th year was held with the participation of 48 doctoral students from all faculties of the university and seven lecturers from the University of Pavol Jozef Šafárik in Košice or from abroad. Over the course of four days, six plenary lectures were given, one workshop was held, and 48 internal doctoral students presented the results of their scientific work achieved during their doctoral studies.

From the Department of Medical and Clinical Biochemistry UPJŠ FM, 3 doctoral students presented their scientific results orally in the topics they focus on during their doctoral studies:

- Mgr. **Katarína Kalinová** (<https://www.youtube.com/watch?v=qYtz1e96854>)
- Mgr. **Zuzana Klepcová** (<https://www.youtube.com/watch?v=9MJ0TvHwysM&t=1s>)
- Mgr. **Marek Morávek**



Presentation of scientific findings Katarína Kalinová (left) and Zuzana Klepcová (right)

Aurora CDS Training Event – Mentorship programme for PhDs and early stage researchers

In collaboration with Palacký University in Olomouc and Vrije Universiteit Amsterdam, the **Aurora CDS training** event took place on **26 and 27 October 2022** and contributed significantly to the development of a mentoring programme for early career researchers and



PhD students. This comprehensive event included an interactive workshop divided into three separate parts, led by Dr. Denyse Snelder and Sabina Di Prima from the Vrije Universiteit Amsterdam. Participants embarked on a journey of self-discovery and shared learning, starting with personal experiences of mentoring, continuing with mapping the integration of the programme and engaging in a critical discussion on the criteria for selecting a mentor as well as a suitable student as a mentee. This workshop was also attended by PhD students of our institute - Mgr. **Peter Artimovič**, Mgr. **Zuzana Klepcová**, Mgr. **Ivana Večurková** and Mgr. **Monika Švecová**. Doctoral students presented their ideas about the topics discussed as well as the potential qualities of a mentor and a mentored student at our department to other colleagues.



Aurora CDS Training Event. a) Mgr. Peter Artimovič presented a poster at the event to promote a potential mentoring program b) PhD students collaborate on individual characteristics of a suitable mentor c) Mgr. Monika Švecová presented an idea for institutionalizing mentoring at our university d) group photo of the event participants