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2026
ABSTRACTS

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Ladies and Gentlemen, my Friends in the HMAA Hungary Chapter family, Dear Students, It is a great honor to become president of the HMAA, as I was an exchange student in the society long ago. In the meantime, we must motivate our younger generation and students to follow our founding fathers' and mothers' dreams and vision of educating and sharing medical knowledge without borders.

Welcome back to Vargesztes! With the new location and a more energized team, I hope you will enjoy our annual HC scientific meeting.

We are so excited to learn from each other, not only within the scope of scientific discourse but also about personal and professional milestones in our relaxed atmosphere! Let us learn from each other with fruitful discussions after superb presentations.

Our programs: This year, we are continuing our flagship student exchange program and have reopened the fellowship and observer programs. I am happy to report that 30 students in Buffalo and 16 in Houston have enrolled in our program for this academic year. You will have the opportunity to meet past and future students in person and listen to their lectures. Additionally, we have four research fellows from Hungary working on an annual term at the Houston DeBakey Heart & Vascular Center. We continue to support the HMAA HC student conference and will welcome the best English Lecture Award Winner at our meeting in Sarasota, Florida.

Every year, we are confronted with new global challenges that affect each one of us in some way. As a proud and supportive community, we come together more vital than ever.

I would also like to thank everyone supporting our organization and programs. Your contribution powers great opportunities and immense innovations. Let us all come together to make our annual meeting another great success. And enjoy listening to the lectures from our next generation of Hungarian doctors and researchers.

My promise is to continue to work hard for our society!

Enjoy your time with each other, and make new friends!



Dr. Zsolt Garami
President of the HMAA

Dear Distinguished Guests, Colleagues, Students, and Friends,

It is my great pleasure and honor, as President of the HMAA Hungary Chapter, to welcome you to the **20th Annual Conference of the HMAA Hungary Chapter**.

This year's conference represents a particularly significant milestone in the history of our organization. For two decades, the HMAA Hungary Chapter has provided a platform for medical students, physicians, researchers, educators, and colleagues from Hungary and North America to come together, exchange knowledge, share experiences, and establish professional and personal connections. Reaching our twentieth annual conference is an occasion to celebrate this tradition and, at the same time, to look with confidence toward the future.

Following many successful years in Balatonfüred, our conference moved to Várgeesztes, marking a new chapter in its history. The Várgeesztes setting provides an excellent opportunity not only for high-quality scientific exchange, but also for meaningful interaction beyond the formal conference sessions. Spending these days together in a close and welcoming environment allows us to continue discussions, exchange perspectives, and strengthen the relationships that form the foundation of our HMAA community.

The principal aim of our annual student conference is to provide young colleagues with an opportunity to present their scientific work in a supportive and professional environment. It is a place to develop presentation skills, receive constructive feedback, practice medical and scientific English, and gain valuable experience that will serve as a foundation for future academic and medical careers.

The conference also represents an opportunity to establish connections with colleagues from North America and to learn from their professional experiences. I strongly encourage our students to make full use of these connections and to consider the international opportunities offered through HMAA, including the **Buffalo and Houston Exchange Programs** for final-year medical students.

Our conference is, of course, also a celebration of scientific excellence. Section winners will be recognized in each oral and e-poster session, while the most prestigious distinctions include the **Irene and Ivan Krisztinicz Award** for the overall best presentation in English, the **Istvan Mechtler Award** for the overall best presentation in Hungarian, and the **Peter Forbath Award** for the best North American presenter.

Nevertheless, I believe that the true value of this conference extends well beyond the competition itself. The experience of presenting one's work, responding to questions, engaging in scientific discussion, and receiving feedback from experienced colleagues can be an important step in the development of a young physician and researcher. I hope that each participant will leave Várgeesztes with new knowledge, new perspectives, and renewed motivation for their future professional journey.

As we celebrate this twentieth conference, it is also appropriate to acknowledge the many individuals who have contributed to the success and continuity of the HMAA Hungary Chapter throughout the past two decades. This milestone is the result of the dedication and commitment of generations of students, physicians, mentors, organizers, and supporters who have contributed their time, knowledge, and enthusiasm to our community.

I would like to express my sincere appreciation to **Sára Vida, the chief organizer of this year's conference**, as well as to all colleagues and student representatives who have contributed to the organization and preparation of this important event. Their commitment and efforts are greatly appreciated.

I hope that the coming days will provide an enriching scientific experience, while also offering opportunities for meaningful professional exchange and the strengthening of friendships and collaborations. I encourage all of you to take full advantage of the lectures, presentations, discussions, and social activities that form an integral part of our conference.

It is a privilege to celebrate the **20th Annual Conference of the HMAA Hungary Chapter** together with you. May this anniversary serve not only as an opportunity to reflect upon our achievements of the past twenty years, but also as an inspiration to continue building a strong and internationally connected medical community for the generations to come.

I look forward to welcoming you to Várgesztes from **27–29 August 2026**, and I wish you all a successful, inspiring, and memorable conference.



Dr. Gabor Horvath
President, HMAA Hungary Chapter

SS1. Interdisciplinary Oral Session I. (Anatomy, Physiology-Pathophysiology, Health Sciences)

NEUROPROTECTIVE EFFECTS OF PACAP1–5 IN EXPERIMENTAL DIABETIC RETINOPATHY

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Aims: Diabetic retinopathy (DR) is a microvascular complication of type 1 diabetes that leads to progressive vision loss. Current treatments are mainly invasive, highlighting the need for non-invasive alternatives.

Pituitary adenylate cyclase-activating polypeptide (PACAP) is a neuroprotective peptide with anti-inflammatory and anti-apoptotic effects, proven in several ophthalmological diseases. PACAP1-5, a cyclic synthetic fragment, was developed to improve stability and is hypothesized to exert longer-lasting effects than the endogenous PACAP-27 and PACAP-38 isoforms. This study evaluates the neuroprotective effects of PACAP1-5 in an experimental DR model using eye drop administration as a potential non-invasive therapy.

Methods: Type I diabetes mellitus was induced in C57BL/6 mice using streptozotocin. After induction, animals received topical treatment twice daily with either vehicle (Systane) or PACAP1-5 eye drops. Groups included Control-Systane, Control-PACAP, Diabetes-Systane, and Diabetes-PACAP. Diabetes was confirmed by fasting blood glucose and retinal changes assessed by optical coherence tomography, retinal ganglion cell (RGC) density was evaluated on wholemounts using Brn3a immunolabeling, and apoptosis assays were performed to assess cytoprotective effects.

Results: Our results confirmed the successful induction of diabetic retinopathy. PACAP1-5 treatment significantly preserved total retinal thickness and specific retinal layers compared to untreated diabetic animals. Furthermore, it reduced RGC apoptosis and increased the expression of anti-apoptotic markers, including Bcl-2, XIAP, and cIAP-2.

Conclusions: In conclusion, our findings suggest that PACAP1-5 is a promising neuroprotective agent with the potential to form the basis of a novel, non-invasive therapeutic strategy for diabetic retinopathy.

Support: National Biomedical Foundation - National Academy of Scientist Education Szent-Györgyi Student Scholarship

INTERRELATIONSHIPS AMONG CHRONOTYPE, PSYCHOLOGICAL AND PHYSIOLOGICAL STRESS MEASURES IN HEALTHCARE WORKERS

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Aims: Chronotype is a primary determinant tolerance to shift work, yet its physiological correlates remain underexplored in healthcare professionals. This study aimed to investigate associations between chronotype, perceived stress, sleep quality, sleep hygiene, and health behaviours in shift-working nurses and physicians.

Methods: A cross-sectional study included 451 participants (77% female; mean age 42 ± 11 years). Measures included the Perceived Stress Scale (PSS), Athens Insomnia Scale (AIS), Patient Health Questionnaire Somatic Symptom Scale (PHQ-15), Sleep Hygiene Index (SHI), and reduced Morningness–Eveningness Questionnaire (rMEQ). Additionally, salivary cortisol, blood pressure, and pulse were assessed in a physiological subsample ($n = 40$).

Results: Evening chronotypes showed a higher prevalence of insomnia (70%) and significantly higher AIS scores (8.2 ± 4.2 , $p < 0.001$). A general linear model ($F = 63.75$, $p < 0.001$) explained 45.9% of insomnia severity variance, with somatic symptoms ($B = 0.313$), sleep hygiene ($B = 0.112$), perceived stress ($B = 0.081$), and eveningness ($B = -0.092$) as significant predictors ($p < 0.05$). Older age and frequent night shifts worsened sleep quality. In the physiological subsample, evening types showed poorer regulation, including a reduced cortisol awakening response ($p = 0.02$) and a flatter diurnal cortisol slope during day shifts ($p = 0.01$) compared to other chronotypes.

Conclusions: Evening chronotype is associated with poorer sleep quality and altered HPA-axis regulation. These findings highlight the importance of chronotype-based scheduling and targeted behavioural interventions to help reduce circadian misalignment and improve occupational health outcomes.

Support: Pécsi Tudományegyetem Kutatási Alappulmonology, oscillometry, lung transplant, CLAD, airway mechanics

IODINE CONTENT OF COMMERCIALLY AVAILABLE IODIZED SALTS IN HUNGARY DETERMINED BY IODOMETRIC TITRATION: IMPLICATIONS FOR THE EFFECTIVENESS OF SALT IODIZATION

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Aims: Iodine deficiency remains an important global public health concern. Although iodized salt is the primary strategy for iodine deficiency prevention, its effectiveness depends on adequate iodine concentrations in commercially available products. However, laboratory data on the iodine content of retail salt products in Hungary are currently lacking. Therefore, this study aimed to determine the iodine concentration of commercially available iodized table salts in Hungary and to assess their compliance with the WHO recommended range of 20–40 ppm.

Methods: Twenty different brands of iodized table salt were purchased from major retail outlets in Pécs, Hungary, representing the dominant food retail sector. According to product labels, ten salts were fortified with potassium iodate (KIO₃) and ten with potassium iodide (KI). Iodine concentrations were determined by iodometric titration following WHO recommended laboratory methods. All measurements were performed in triplicate and expressed as mean values. In addition, a small exploratory wholesale micro-survey examined purchasing patterns of iodized and non-iodized salt in the regional supply chain.

Results: Measured iodine concentrations varied substantially among products, ranging from 0 to 33.9 ppm. Overall, 65% of the analyzed salt samples contained less than 20 ppm iodine, while only 35% fell within the WHO recommended range of 20–40 ppm. Notably, several products declared iodine concentrations below recommended levels on their labels. The wholesale micro-survey showed that ten times more iodized than non-iodized salt was ordered during the observation period.

Conclusions: These results suggest that the presence of iodized salt on the market does not necessarily guarantee adequate iodine supply and highlight the potential relevance of considering iodine status during the differential diagnosis of hypothyroidism.

Support: N/A

MULTILINGUAL EVALUATION OF CHATGPT-4O IN CORONARY CT ANGIOGRAPHY REPORTING

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Aims: As ChatGPT becomes more accessible in public-facing platforms, realising its effective integration into clinical practice remains unknown. We aimed to examine ChatGPT-4's interpretation of coronary CT angiography (CCTA) reports in a multilingual context.

Methods: De-identified CCTA reports were retrospectively processed using a Python script interfacing with the ChatGPT-4o via the OpenAI API. Reports were subjected to zero-shot prompts: 1) "Summarise the report." 2) "Make it easy for the patient to understand." 3) "What do you suggest for this patient?". Medical reliability was scored on a five-point Likert scale. Inter- and intra-reader agreement was assessed. Four lay evaluators assessed the comprehensibility of Prompt 2 reports and the original reports.

Results: 800 original CCTA reports were analysed in Czech, English, Hungarian (3 sites), Polish, Romanian and German languages (100 cases/sites), including 5% CABG, 5% stent, 5% non-diagnostic; 20% severe, 65% minimal-moderate stenosis. Prompt 1 ("Summary") achieved high scores across groups (means 4.3-4.8), no significant group differences. Prompt 2 ("Patient-friendly reports") received lower ratings, scores decreasing with disease severity (means 3.7-4.6) and significantly lower in the CABG group (3.6 ± 0.9 , $p < 0.005$). Prompt 3 ("Suggestions") was rated the highest (means 4.7-4.9), no significant group differences. No significant difference was assessed between languages. Intra- and inter-reviewer agreement was excellent. Lay reviewers rated the patient-friendly Prompt 2 significantly more comprehensible than the original reports (4.6 ± 0.6 vs. 3 ± 1.2 , $p < 0.005$).

Conclusions: ChatGPT-4o generated accurate CCTA reports across languages, though performance was reduced in complex cases. The model shows potential to improve patient understanding, meriting further clinical validation.

Support: No external support/funding.

REDUCED VISUAL-ASSOCIATIVE CORTEX ACTIVITY DURING MEMORY RETRIEVAL IN MIGRAINE: AN EEG BIOMARKER STUDY

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Aim: Cognitive deficits in migraine have been shown to persist beyond acute attacks, manifesting even during the interictal phase. A previous study from our group demonstrated that migraine patients make significantly more errors during associative memory retrieval compared to matched healthy controls. The present study investigated whether this deficit is associated with alterations in cortical electrical activity, and whether such differences could serve as objective EEG biomarkers for migraine diagnosis.

Methods: Sixty-four-channel EEG was recorded from 17 interictal migraine patients and 17 matched healthy controls during the Rutgers Acquired Equivalence Test (RAET). Preprocessing included frequency filtering and independent component analysis for artifact removal, with epochs time-locked to decision onset. Groups were compared using cluster-based permutation testing.

Results: During the learning phase, the migraine group showed significantly reduced beta-band activity over left-lateralized parieto-occipital association cortex in the 500 ms window following the decision point. During the test phase, this suppression was present in both the 500 ms preceding and following the decision point. Morlet wavelet analysis confirmed a consistent reduction in beta-band power throughout both phases in this region.

Conclusions: These findings suggest that altered cortical electrical activity may contribute to the associative learning performance deficits observed in migraine patients. Left-lateralized differences in parieto-occipital activity may reflect modified functioning of visual-associative networks and altered hemisphere-specific processing strategies in the migrainous brain. Following further investigation, these cortical activity differences may serve as biomarkers for the more precise diagnosis of migraine — beyond symptom-based assessment alone.

Support: SZTE SZAOK-KKA-SZGYA Grant No: 2023/5S479

MEDIAN RAPHE GLUTAMATERGIC CELLS CONTROL FEAR MEMORY FORMATION

Tamas Zsoldos(1), Aron Orosz(1), Albert Barth(1), Marianna Matanyi(1), Virag Takacs(1), Gabor Nyiri(1) (1: HUN-REN Institute of Experimental Medicine, System & Integrative Neuroscience Research group)

The median raphe region (MRR) is a key brainstem nucleus involved in the regulation of emotional behaviour and mood. Vesicular glutamate transporter type 2 expressing neurons within the MRR play a critical role in processing aversive information. Although these neurons do not directly innervate major memory-related brain regions such as the hippocampus (HIP), but they target local vesicular glutamate transporter type 3 (vGluT3)-expressing neurons, which project to the hippocampus in a layer-specific manner.

Aim: The aim of this study was to investigate how hippocampus-projecting MRR vGluT3 neurons contribute to the formation of fear memories.

Methods: We combined immunohistochemistry, confocal, light and electron microscopy, and optogenetic behavioural approaches to characterize the anatomical connectivity and functional role of MRR vGluT3 neurons.

Results: Exposure to an aversive stimulus (footshock) significantly increased c-Fos expression in MRR vGluT3 neurons, indicating their activation during fear memory acquisition. Anatomical analyses revealed that these neurons establish excitatory synapses onto calbindin-expressing interneurons in the hippocampus, which are involved in the processing of contextual information. Furthermore, optogenetic inhibition of MRR vGluT3 neurons impaired the acquisition of both contextual fear memories and temporally non-overlapping fear memories.

Conclusions: Our findings demonstrate that hippocampus-projecting MRR vGluT3 neurons are essential for the acquisition of fear memories. By activating calbindin-expressing hippocampal interneurons, these neurons are likely to regulate the activity of hippocampal principal cells during fear memory formation, thereby contributing to the encoding of aversive experiences.

SS2. Interdisciplinary Oral Session II. (Dermatology, Internal Medicine- Family Medicine, Neurology)

DOMESTIC CHARACTERISTICS OF THE DIAGNOSIS AND TREATMENT OF MALE OSTEOPOROSIS: AN UNDERESTIMATED PUBLIC HEALTH PROBLEM

Zalán Mátyás Farkas (presenter), (2) Alexandra May, (3) Szilvia Mészáros MD, (4) Prof. Csaba Horváth MD (Department of Internal Medicine and Oncology, Semmelweis University)

Aims: The aim of this study was to evaluate the characteristics of bone metabolism in male patients examined in the osteodensitometry laboratory at our clinic over a five-year period.

Methods: Male patients who underwent osteodensitometric assessment at our institution between 2019 and 2023 were included in the study. All participants underwent dual-energy X-ray absorptiometry to measure bone mineral density. The device assessed bone mineral density at the L2–L4 vertebral segment, proximal femur, and distal one-third of the radius, in addition to T-scores and Z-scores. Based on these parameters, together with patients' sex, body mass index (BMI), and questionnaire-derived risk factors, the FRAX algorithm was used to estimate the 10-year probability of hip and major osteoporotic fractures. As part of the study, data regarding ongoing osteoporosis-related treatments were also collected, including bisphosphonates, denosumab, calcium supplementation, vitamin D3, and PTH analogues.

Results: A total of 920 patients were included in the study (mean age: 61.3 ± 16.3 years). Based on femoral T-scores, approximately 31% of patients were classified within the normal range, while among patients with abnormal findings, 49% were diagnosed with osteopenia and 20% with osteoporosis. Patients were analyzed both collectively and in subgroups according to BMD, T-score, and FRAX values. The calculated mean hip fracture risk among osteoporotic patients was $5.3 \pm 5.5\%$, exceeding the clinically relevant threshold of 3%. Furthermore, 24.1% of the total cohort had a history of pathological fractures.

Conclusion: Our data confirm that male osteoporosis is a significantly underrecognized public health condition, despite the fact that its fracture-related consequences are only marginally lower than those observed in postmenopausal osteoporosis. These findings underscore the need for greater emphasis on the identification and management of osteoporosis in men in routine clinical practice.

INVESTIGATING THE RELATIONSHIP BETWEEN DIABETES DISTRESS AND ADHERENCE IN TYPE 1 DIABETIC PATIENTS USING CGM SENSORS AND INSULIN PUMPS

Flora Fehervari (1), (1) Nora Hosszufalusi Prof. Dr., (1) Julia Mandorla Illenyi, (1) Peter Pusztai Dr., (1) Beatrix Sarman PhD., (1) Aniko Somogyi Prof. Dr., (1) Eva Varga PhD., (1) Agnes Vincze PhD., (1) Geza Nagy PhD ((1) Semmelweis University, Department of Internal Medicine and Hematology)

Aims: Continuous glucose monitoring (CGM) sensors and insulin pumps are increasingly used in the management of type 1 diabetes mellitus (T1DM). We aimed to examine the associations between psychological status, adherence to diabetes-related technologies and glycaemic control in individuals with T1DM using CGM sensors and insulin pumps.

Methods: Our cross-sectional study included 211 adults with T1DM treated at Semmelweis University. Psychological status was assessed using the Diabetes Distress Scale (DDS). Glycaemic control was characterized by HbA1c values and ambulatory glucose profiles. Statistical analyses were performed using SPSS, applying the Kruskal–Wallis test.

Results: Among the participants, 37% used a CGM sensor alone, while an additional 37% used both a CGM sensor and an insulin pump. Mean HbA1c was significantly lower in patients using both devices (7.29%) compared with

those using a CGM sensor alone (8.42%; $p < 0.001$). CGM adherence was assessed based on weekly sensor wear time ($\geq 70\%$). Accordingly, four subgroups were established: CGM only with adequate adherence ($n=43$); CGM only with inadequate adherence ($n=22$); CGM plus insulin pump with adequate adherence ($n=58$); CGM plus insulin pump with inadequate adherence ($n=11$). DDS scores differed significantly among groups ($\chi^2=8.12$; $p=0.044$), with post hoc analysis showing a significant difference between groups 2 and 3 ($p=0.049$). The greatest difference was observed in the regimen-related distress subscale ($\chi^2=16.76$; $p < 0.001$).

Conclusions: Elevated diabetes distress was associated with poorer adherence to diabetes technologies. Reducing diabetes distress may improve CGM adherence and support optimal glycaemic control.

Support: The authors received no financial support for the research.

ASSOCIATION OF SUBARACHNOID HEMORRHAGE SEVERITY AND OUTCOME WITH ACUTE PHASE LABORATORY AND HEMOSTASIS MARKERS

Henrietta Péter-Pakó (1,2) (presenter), Linda Lóczi (1,2,3), Rita Orbán-Kálmándi (2,3,4), Dóra Bomberák (1,2), Zsolt Éles (1,2), Renáta Pataki (1,2,3), Dorottya Szántó (3,5), Nikolett Kóti (3,5), Csilla Molnár (3,5), Béla Fülesdi (3,5), Zsuzsa Bagoly (1,2,3) ((1) University of Debrecen, Faculty of Medicine, Department of Laboratory Medicine, Division of Clinical Laboratory Science, Debrecen, Hungary (2) MTA-DE Lendület “Momentum” Hemostasis and Stroke Research Group, Debrecen, Hungary (3) University of Debrecen, HUN-REN-DE Cerebrovascular Research Group, Debrecen, Hungary (4) University of Debrecen, Multidisciplinary Health Industry Coordination Institute, Pharmaceutical Ecosystem Center, Debrecen, Hungary (5) University of Debrecen, Faculty of Medicine, Department of Anesthesiology and Intensive Care, Debrecen, Hungary)

Introduction: Subarachnoid hemorrhage (SAH) accounts for 5-8% of strokes, but despite high disability rates, the pathophysiology of patient deterioration is unknown.

Aims: To compare SAH severity and long-term outcomes (day 14, 30, 90) with admission laboratory parameters, including acute phase hemostasis parameters.

Patients and methods: In this prospective, observational study, adult patients with SAH were included. Imaging, clinical and laboratory investigations were performed on admission. We assessed the severity of stroke using the modified Fisher Scale (mFisher) and the Glasgow Coma Scale (GCS), and long-term outcomes using the modified Rankin Scale (mRS). Factor VIII activity, VWF:Ag, D-dimer levels were measured from admission plasma samples.

Results: In this study 81 patients (median age: 54 [IQR: 47-67], 31% male) were included. 29% of the patients had mild SAH (mFisher 1-2), 34% of the patients were in severe condition (GCS: 4-8+T). Mortality was 16% on day 14, and 30% on day 90. Patients with severe SAH (mFisher 3-4) had significantly higher age, LDH, white blood cell (WBC), neutrophil, and VWF:Ag levels. Patients with poor day 90 outcomes (GOSE 1-4 and mRS 3-6) all parameters above, serum glucose levels and admission D-dimer levels were elevated.

Conclusions: Our results show that certain acute phase laboratory parameters (WBC, neutrophil count, VWF:Ag, D-dimer) are associated with SAH severity and outcome. These findings suggest an inflammatory response linked to SAH, indicating that these markers may help guide clinical decisions.

Support: MTA-DE Lendület “Momentum” Hemostasis and Stroke Research Group, HUN-REN-DE Cerebrovascular Research Group, National Academy of Scientist Education Program

INVESTIGATING THE ALTERATIONS IN INTERCELLULAR COMMUNICATION IN SORL1-DEPENDENT ALZHEIMER'S DISEASE IN THE HUMAN BRAIN

Sára Vida (1), Balázs Pósfai¹, Krisztina Tóth¹, Zoltán Máté², Ferenc Erdélyi², Zsolt Lele³, István Katona³, Henne Holstege⁴, Olav M. Andersen⁵, Ádám Dénes¹ (Laboratory of Neuroimmunology, HUN-REN Institute of Experimental Medicine, Budapest, Hungary (2) Medical Gene Technology Unit, HUN-REN Institute of Experimental Medicine, Budapest, Hungary (3) Molecular Neurobiology Research Group, HUN-REN Institute of Experimental Medicine, Budapest, Hungary (4) Alzheimer Center Amsterdam, Department of Neurology, Amsterdam Neuroscience, Vrije Universiteit Amsterdam, Amsterdam UMC, Amsterdam, The Netherlands (5) Department of Biomedicine, Aarhus University, Aarhus, Denmark)

The exact pathomechanism of Alzheimer's disease (AD), including changes at the cellular level, remains unclear. Efficient intercellular communication is essential for maintaining nervous system homeostasis, but during neurodegenerative diseases, it becomes impaired. In this study, we investigated the transcriptomic profiles of brain cells and alterations of intercellular signalling pathways using brain tissue from patients with a hereditary, AD-causing SORL1 mutation (PTV), alongside sporadic AD patients and controls.

Single-cell RNA sequencing was performed on temporal cortex samples from 7 patients (2 PTV, 2 sporadic AD, 3 control). The expression of over 17,000 genes was analysed across more than 67 000 cells in R using the Seurat package. Ligand–receptor interactions were investigated using the LIANA program.

Our findings indicate distinct transcriptomic changes in AD depending on the genetic background. Following the mapping of gene expression changes characteristic of each study group, LIANA analysis suggests that intercellular communication is severely impaired in PTV cases – intercellular interactions involving microglia and oligodendrocyte precursor cells (OPCs) are affected in particularly high numbers. Certain protective microglial signals (e.g., GRN) are weakened, while microglial IL-16-mediated pro-inflammatory signalling shows increased activity in PTV. Conversely, microglia-vascular signalling is less impaired in the PTV group than in sporadic AD; microglial signalling targeting the LRP1 receptor on vascular cells remains similar to that of the control group.

Overall, we observed different intercellular communication patterns in AD cases with distinct genetic backgrounds, suggesting differing pathomechanisms. Our investigations may contribute to a better understanding of the pathological processes driving Alzheimer's disease.

SORLA-FIX JPND to HH, OMA, AD; Szent Györgyi Scholarship to SV; János Bolyai Research Scholarship and EKÖP to BP.

EFFECTS OF THE NEURODEGENERATIVE DISEASES ON THE AUTONOMIC NERVOUS SYSTEM

Christopher Váraljai (Semmelweis University, Department of Neurosurgery and Neurointervention)

Introduction: Alzheimer's disease (AD) is the most common major neurocognitive disorder, characterised by memory impairment, loss of acquired knowledge and learning ability, and deterioration of behaviour and personality. Neuropathological findings suggest that protein aggregates accumulate in brain regions involved in autonomic integration. As these regions are affected early in AD, autonomic dysfunction may provide measurable markers for early detection. However, this possibility has received limited attention.

Objective: This study aimed to determine whether autonomic nervous system abnormalities, specifically heart rate variability (HRV) and sudomotor sympathetic skin response (SSR), can support early diagnosis of AD and differential diagnosis from other major neurocognitive disorders.

Method: We examined 89 patients: 11 with mild cognitive impairment (MCI), 12 with AD, 6 with non-AD major neurocognitive disorders, and 60 healthy controls (HC). HRV was measured using the single-lead ECG device WIWE, and SSR was assessed using the Vitalscan Sudocheck system. Statistical analyses were performed using JASP 0.18.0.0.

Results: ANOVA revealed a significant group difference in HRV values ($p = 0.024$). Independent-samples t-tests showed significant differences between HC and non-AD, and between MCI and non-AD groups ($p < 0.05$). For SSR values, ANOVA also showed a significant group difference ($p < 0.001$). Significant pairwise differences were found between HC and MCI, HC and non-AD, MCI and AD, and AD and non-AD groups ($p < 0.05$).

Conclusion: HRV abnormalities worsened with progression in both AD and non-AD neurocognitive disorders. SSR values were reduced in MCI and non-AD groups but remained unchanged in AD compared with controls. These findings suggest that MCI patients with impaired SSR may be more likely to progress to non-AD neurocognitive disorders, whereas preserved SSR may indicate progression toward AD.

Support: MNKA

SS3. Interdisciplinary Oral Session III. (Pathology-Oncology, Dentistry, Radiology, Obstetrics & Gynecology, Cardiology)

IDENTIFICATION OF POTENTIAL NEW BIOMARKERS IN EARLY-STAGE NON-SMALL CELL LUNG CANCER (NSCLC)

Zorka Szollár (1), (2) Fanni Dzubák, (3) Zoltán Páhi Ph.D (4) Tibor Pankotai Ph.D., habil (Genome Integrity and DNA Repair Core Group, HCEMM, Centre of Excellence (IKIKK), University of Szeged)

Aims: Lung cancer is one of the leading cause of cancer-related deaths. With advances in molecular diagnostics, identifying novel biomarkers is increasingly important for more accurate diagnosis and personalized therapy. This study aimed to identify a gene expression signature capable of distinguishing early-stage non-small cell lung cancer (NSCLC) from normal tissue with high accuracy.

Methods: RNA-seq data, consisting of 45 tumor and 45 normal samples, from the European Nucleotide Archive was preprocessed with bioconda packages. Further analysis was performed in R with packages such as edgeR, randomforest, caret, clusterprofiler and so on. The normalization was done with transcript-per-million (TPM). For validation, a dataset from The Cancer Genome Atlas, containing 29 tumor and 29 normal samples, was utilized. Additionally, RT-qPCR analysis was conducted on 20 tumor and 20 normal lung tissue samples.

Results: Differential expression analysis identified 3,424 significantly altered genes. For feature selection a supervised machine learning approach was utilized which identified randomforest as the best-performing model, achieving 97% accuracy in initial classification. The top 10 genes, ranked by importance, were used to build a second model, which achieved 95% accuracy in the validation (TCGA) cohort. RT-qPCR confirmed significant downregulation of five genes (CDC42EP2, GPM6A, STX11, THBD, TMEM88) and significant upregulation of two genes (EFNA4, TEDC2), consistent with computational findings.

Conclusions: We identified a robust 7-gene expression signature that accurately distinguishes early-stage NSCLC from normal tissue. The model was validated both computationally and experimentally, highlighting its potential clinical utility. Notably, our research reveals that TEDC2 and CDC42EP2 may have previously underrecognized in lung tumorigenesis.

Support: National Academy of Scientists Education, NATLAB, TKP, H20

ARTIFICIAL INTELLIGENCE-BASED DETECTION OF EXTRA- AND INTRACRANIAL CAROTID PLAQUES USING CBCT IMAGING

Márton Kárpáti (1) (Department of Oral Diagnostics, Semmelweis University – Budapest)

Aims: Cardiovascular diseases belong to the most common illnesses all over the world. Atherosclerosis is the part of them and affect the carotid arteries in the head and neck region. During dental radiographic imaging the calcified carotid plaque could be detected as an incidental finding on the Cone-Beam Computed Tomography (CBCT). Our project aims to assess a deep learning-based software environment on reconstructed CBCT images, which can enhance the accuracy and precision of extra- and intracranial carotid artery calcification detection.

Methods: During our research 2766 CBCT images were examined retrospectively which were made at the Department of Oral Diagnostics between 01.06.2019 and 31.05.2023. The CBCT data were evaluated by three observers. After the collection phase we manually segmented and annotated the reported entities, then the files were imported into a convolutional neural network-based 3D-ResNet hybrid model (Ankara University, Faculty of Dentistry, Oral and Maxillofacial Radiology Department).

Results: In total we detected calcified carotid plaques on 97 CBCT images. 113 entities were located extracranial and 111 were found intracranial on the CBCT radiographs. The examined deep learning-based 3D-ResNet model classified the selected CBCT data, and the efficiency were evaluated by the values of AUC 0.93, sensitivity 0.92, specificity 0.95 and precision 0.93.

Conclusions: The 3D-ResNet algorithm executed successfully and showed progressive efficiency values for carotid artery classification and detection. Consequently, deep learning based neural network can help detecting the potentially life-threatening findings beyond dentoalveolar region as decision support systems.

Support: Supported by the 2025-2.1.1-EKÖP-2025-00014 University Research Scholarship Programme

SIGNIFICANCE OF QUANTITATIVE CONTRAST-ENHANCED ULTRASOUND ANALYSIS IN THE EVALUATION AND CHARACTERIZATION OF PERFUSION ABNORMALITIES ASSOCIATED WITH FOCAL HEPATIC LESIONS

Zsófia Molnár¹, Ákos Járny, MD, PhD¹, Bálint Botz, MD, PhD¹ (¹Medical Imaging Clinic, Clinical Center, Faculty of Medicine, University of Pécs)

Aims: Contrast-Enhanced Ultrasound (CEUS) is highly valuable in the characterization of focal liver lesions, enabling real-time visualization of parenchymal microvascularization with high spatial and temporal resolution without ionizing radiation. Owing to the heterogeneous enhancement dynamics of focal liver lesions, objective and quantifiable assessment methods are required. This study retrospectively evaluated liver CEUS enhancement patterns using integrated region of interest (ROI)-based quantification and a self-developed quantitative analysis software.

Methods: Time–intensity curves were generated to analyse the contrast filling dynamics of injected ultrasound contrast agents (UCA). Dynamic enhancement parameters characteristic of focal liver lesions were established, and the effects of adjacent shunt perfusion on surrounding hepatic parenchyma were assessed. Quantitative analysis was performed using both the integrated ultrasound software and a manufacturer-independent software developed in collaboration with the Department of Geoinformatics, University of Pécs.

Results: Quantitative analysis of time–intensity curves enabled characterization of arterial phase enhancement patterns in benign and malignant focal liver lesions. Wash-out analysis contributed to lesion differentiation. The self-developed software demonstrated the feasibility of manufacturer-independent quantitative CEUS assessment and may support future clinical decision-support applications.

Conclusions: Quantitative CEUS analysis provides objective evaluation of focal liver lesion enhancement kinetics and may improve lesion characterization and standardization of CEUS assessment.

Support: This research was supported by the Hungarian Academy of Sciences Momentum Programme (Lendület Programme) (LP2025-3/2025).

HEAD-TO-HEAD COMPARISON OF THE PREOPERATIVE DIAGNOSTIC ACCURACY OF ULTRASOUND AND MRI IN PATIENTS UNDERGOING SURGERY FOR DEEP ENDOMETRIOSIS USING #ENZIAN CLASSIFICATION: A LARGE PROSPECTIVE DIAGNOSTIC ACCURACY STUDY

Balázs Pete (1), Dr. Gábor Szabó, Dr. Kolos Turtoczi, Dr. Attila Bokor, Dr. Ildikó Kalina, Dr. István Madár, Dr. Laura Lipták, Dr. János Rigó, Dr. Nándor Ács ((1) Department of Obstetrics and Gynecology, Faculty of Medicine, Semmelweis University, Budapest, Hungary, (2) Department of Radiology, Medical Imaging Centre, Semmelweis University, Faculty of Medicine, Budapest, Hungary)

Aims: To compare the diagnostic performance of transvaginal ultrasound (TVS) and MRI in the preoperative assessment of deep endometriosis using the #Enzian classification.

Methods: In this prospective single-center paired study, 463 premenopausal women undergoing surgery for suspected endometriosis were examined by both TVS and MRI. Imaging experts were blinded to each other's findings. Surgical and histopathological results served as the reference standard.

Results: Both imaging modalities showed high diagnostic accuracy across most Enzian compartments. TVS demonstrated significantly higher specificity than MRI in the T compartment when assessing pelvic adhesions bilaterally. In the remaining compartments, diagnostic performance was largely comparable. TVS also showed excellent concordance with surgical findings for ovarian and tubo-ovarian disease.

Conclusions: TVS using the IDEA approach performs similarly to MRI in most #Enzian compartments and may be superior for the assessment of pelvic adhesions. These findings support its use as a first-line imaging modality in expert hands.

Support: No external funding was received.

UNDIAGNOSED CORONARY ARTERY DISEASE IN PATIENTS WITH COPD (ORAL PRESENTATION)

Enikő Horváth, Zsófia Éreth, Attila Kónyi (Heart Institute, Medical School, University of Pécs)

Introduction: Chronic obstructive pulmonary disease (COPD) is commonly associated with chronic coronary syndrome (CCS). Symptoms such as dyspnoea and chest discomfort may be attributed to pulmonary disease, therefore, CCS is often only detected once complications such as acute coronary syndrome (ACS) have developed.

Methods: Our aim was to detect CCS in patients with COPD and to identify potential parameters that may facilitate its early detection. A total of 76 patients were included in the study. Patients had no known previous cardiovascular events. CCS was assessed using three methods: coronary angiography, coronary CT, and coronary calcium score analysis on chest CT.

Results: CCS was detected in 77,6% of patients. Typical angina symptoms were present in only 11,8% of cases, while the most common complaint was effort dyspnoea (50%). Atypical chest pain was observed in 26,3%, and 11,9% of patients were asymptomatic. A significant association was found between the FEV1/FVC ratio (Tiffeneau index) and

CCS severity. Furthermore, ECG findings and left ventricular volume assessed by 3D echocardiography showed a significant relationship with CCS severity. Elevated levels of lactate ($p = 0,003$), immunoglobulin E ($p = 0,018$), ferritin ($p = 0,022$), and Ca125 ($p = 0,025$) were also associated with CCS severity.

Conclusions: These findings suggest that chronic coronary syndrome is often under-recognised in patients with COPD. Early detection and targeted cardiology screening are crucial for timely intervention. Spirometry parameters, ECG abnormalities, laboratory parameters, and echocardiographic findings were identified as potential indicators of coronary artery disease in patients with COPD.

SS4. Interdisciplinary Oral Session IV. (Anesthesiology-Intensive Care-Emergency Care-Surgery - Traumatology - Neurosurgery)

HIDDEN HIGH-RISK PATIENTS: RULE-BASED RETROSPECTIVE SEPSIS DETECTION REVEALS CRITICAL GAPS IN CLINICAL RECOGNITION

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Aims: Early sepsis recognition remains challenging in emergency care. We evaluated discrepancies between routine clinical diagnosis and a predefined rule-based retrospective classification, using mortality as the primary outcome. **Methods:** Among 2,901 emergency department patients, sepsis likelihood was approximated using a fully predefined rule system combining ≥ 1 infection marker (CRP, PCT, IL-6, MDW, or clinical flag) and ≥ 1 severity indicator (qSOFA, lactate, ICU admission, or mortality). Mortality was analyzed primarily as an outcome; sensitivity analyses excluding mortality from the definition were performed to mitigate circularity. No data-driven optimization or machine learning was applied. False negatives (FN) were clinically non-septic but rule-positive cases; false positives (FP) were clinically septic but rule-negative cases. The rule system was used as an interpretable weak-label reference.

Results: FN patients ($n=230$) had high mortality ($n=174$; $\sim 75.7\%$ among cases with available outcome), whereas FP patients ($n=125$) had low mortality (12% ; $n=15$). This indicates substantial under-recognition of high-risk patients alongside potential overdiagnosis in lower-risk cases.

Conclusions: The rule-based approach showed a stronger association with mortality than routine clinical classification, systematically identifying higher-risk patients missed in routine care. These discrepancies reflect clinically meaningful risk stratification rather than random error. As a transparent, non-trained system, it provides an interpretable benchmark and weak-label training target for future AI models. Prospective evaluation and AUROC-based comparisons with clinical assessments are warranted.

Support: None.

(Disclosure: Artificial Intelligence was used in the preparation of this abstract.)

REDUCED FIBRINOLYTIC CONSUMPTION DURING VISCOELASTIC-GUIDED THROMBOLYSIS FOR PULMONARY EMBOLISM: A HYPOTHESIS-GENERATING ANALYSIS

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Aims: To evaluate changes in plasminogen and antiplasmin activity during thrombolytic therapy for high-risk pulmonary embolism (PE) and to compare conventional-dose thrombolysis with a viscoelastic-guided, variable-dose protocol [1], with emphasis on longitudinal analysis using mixed-effects modelling.

Methods: Serial blood samples were collected before, during, and after thrombolysis in 10 patients (viscoelastic-guided group (VGG) n=6; conventional-dose group (CG) n=4). Plasminogen and antiplasmin activity (%) were measured. Standard comparisons used Wilcoxon signed-rank and Mann–Whitney U tests. To better account for repeated measures and intra-individual variability, mixed-effects models assessed time-dependent changes and group–time interactions.

Results: Baseline plasminogen activity differed significantly (median 88% VGG vs. 117% CG, $p=0.0159$). At the end of treatment, plasminogen remained higher in VGG (77% vs. 44%, $p=0.0667$). Antiplasmin activity decreased in both groups, with higher post-treatment values in VGG (31% vs. 13%, $p=0.1143$). Conventional tests did not show significant within- or between-group differences. Mixed-effects modelling, however, revealed consistent trends toward reduced consumption of plasminogen and antiplasmin in VGG, reflected by a directionally favorable group–time interaction.

Conclusions: Viscoelastic-guided, lower-dose thrombolysis may mitigate depletion of key fibrinolytic factors compared with conventional therapy. Mixed-effects modelling provides additional insight into biomarker trajectories and supports a more balanced fibrinolytic response, potentially contributing to a safer bleeding profile. Larger multicenter studies are needed to validate these findings.

Support: [1] Kállai A. et al. ICMx 14, 57 (2026). <https://doi.org/10.1186/s40635-026-00903-7>

THE IMPACT OF PREHABILITATION WITH PREBIOTIC SUPPLEMENTS ON COLITIS AND COLON ANASTOMOTIC HEALING IN RATS

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Aims: Preoperative dysbiosis predisposes patients to anastomotic leakage, a severe complication following colorectal resection. Although prebiotic microbiome optimization may mitigate this risk, robust evidence remains limited. This study investigated the effects of preoperative prebiotic therapy on colitis activity and colon anastomotic healing in a rat model.

Methods: 76 male Wistar rats were subjected to standard (S) or prebiotic-supplemented (P) diets before colitis was induced in the appropriate groups (SC, PC). We assessed preoperative gut microbiome (16S rRNA sequencing), colitis severity (Disease Activity Index (DAI), fecal water content, laboratory parameters), and intestinal damage (colon weight/length ratio, crypt depth, bacterial translocation in perianastomotic lymph nodes and the spleen). Following primary colon anastomosis, postoperative vulnerability (Rat Grimace Scale (RGS), survival) and anastomotic healing (bursting pressure, adhesion and complication scores) were quantified.

Results: In the SC group microbiome alpha diversity significantly decreased and correlated with impaired anastomotic healing. Prebiotic treatment prevented this decline and improved the beneficial-to-pathogenic bacteria ratio in the PC group. SC rats exhibited higher DAI, fecal water content, and neutrophilia, alongside increased colon weight/length ratios, bacterial translocation, and crypt shortening, all of which were significantly attenuated in the PC group. Furthermore, prebiotics mitigated the higher RGS, poorer survival, increased complications and reduced bursting pressure observed in the SC group.

Conclusions: Preoperative prebiotic therapy effectively reduces colitis activity and enhances colonic anastomotic healing. These findings suggest that including prebiotics in prehabilitation protocols should be considered for high-risk patient groups.

Support: Semmelweis University 250+ Excellence PhD Scholarship (123954/DIDIT/2024; 51284/DIDIT/2025)

PREOPERATIVE ASSESSMENT OF SARCOPENIA IN ESOPHAGEAL CANCER PATIENTS: COMPLEMENTARY ROLE OF COMPUTED TOMOGRAPHY, BIOIMPEDANCE ANALYSIS AND FUNCTIONAL TESTS

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Sarcopenia is frequently present in patients with esophageal cancer at the time of diagnosis and is associated with reduced operability and poorer survival. Accurate preoperative assessment is therefore essential. Computed tomography (CT) reliably measures skeletal muscle mass and muscle quality, while bioimpedance analysis (BIA) provides repeatable body composition measurements and functional tests reflect actual muscle performance. Since the combined evaluation of these methods has rarely been investigated in esophageal cancer patients, our aim was to determine their complementary predictive value.

Preoperative data of 41 patients with esophageal cancer treated at the Department of Surgery, Transplantation and Gastroenterology of Semmelweis University were analyzed. CT was used to determine skeletal muscle area (SMA), skeletal muscle index (SMI) and intramuscular adipose tissue (IMAT) at the L3 vertebral level. BIA measurements included fat-free mass index (FFMI), protein mass and extracellular water ratio (ECW). Functional assessment consisted of handgrip strength and 6-minute walking distance.

Handgrip strength showed significant correlations with protein mass ($r=0.66$; $p<0.001$), SMA ($r=0.64$; $p<0.001$), SMA/VAT ratio ($r=0.59$; $p<0.001$) and FFMI ($r=0.54$; $p<0.001$). The 6-minute walking distance correlated most strongly with ECW ratio ($r=-0.55$; $p<0.001$). Operability was significantly associated with the SAT/IMAT ratio ($r=0.50$; $p<0.001$). Survival showed moderate but consistent correlations with skeletal muscle mass and FFMI.

Preoperative assessment of sarcopenia in esophageal cancer patients appears to be most accurate when CT-based muscle analysis, BIA and functional tests are evaluated in an integrated manner. These methods provide complementary information regarding structural muscle loss, body composition changes and functional performance. Their combined use may improve preoperative risk stratification and surgical decision-making.

No funding was received.

THE ROLE OF MRI IN THE PREOPERATIVE STAGING OF RECTAL CANCER: TEN-YEAR EXPERIENCE FROM A SINGLE TERTIARY CENTER

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Aims: To evaluate whether MRI-based circumferential resection margin (CRM) assessment provides superior guidance for treatment decisions compared to conventional TNM staging in rectal cancer.

Methods: A retrospective analysis was conducted on patients undergoing surgery for rectal adenocarcinoma between March 2014 and July 2023. Of 659 patients, 114 met inclusion criteria following exclusion of those receiving neoadjuvant therapy or non-standard procedures. Preoperative MRI and CT staging (T, N, CRM) were compared with histopathology using chi-squared, Fisher's exact, and non-parametric tests. Diagnostic accuracy metrics were calculated.

Results: MRI and CT showed comparable accuracy for T staging (47.4% vs. 48.2%, $p=0.895$). CT more frequently underestimated T stage (33.3%), while MRI more often overestimated (36.8%, $p<0.001$). MRI demonstrated higher sensitivity for nodal metastasis (74% vs. 62%) but lower specificity (39.1% vs. 54.7%). Notably, MRI achieved 100% concordance in identifying pathological CRM ≤ 1 mm. Local recurrence occurred in 7.9% of patients, all with negative mesorectal fascia (MRF) status on MRI.

Conclusions: MRI-based CRM and MRF assessment are critical determinants in rectal cancer management. In T3 tumors with negative MRF, primary surgery appears oncologically safe, potentially avoiding unnecessary neoadjuvant chemoradiotherapy without compromising outcomes.

Support: None

INVESTIGATION OF THE MECHANICAL PROPERTIES OF 3D PRINTING MATERIALS FOR SURGICAL APPLICATIONS AND CREATION OF AN OPEN ACCESS DATABASE BASED ON THE RESULTS

Cuong Phong LE (1), (2) Hajnalka Horváth, (3) Sándor Manó, PhD ((1) Faculty of Medicine, University of Debrecen (2–3) Biomechanical Laboratory, Innovation Ecosystem Center, University of Debrecen)

Aims: 3D printing can be used for personalized surgical guides and instruments. However, FDM-printed polymers may show orientation-dependent mechanical attributes, and sterilization may further modify their properties. This study aimed to examine the mechanical characteristics of FDM materials and the effect of sterilization, also to create an open access material database.

Methods: Four FDM materials were investigated: PLA, ABS, HIPS and PETG. Standardized specimens were printed in X, Y and Z orientations and tested under tensile, flexural and compressive loading. Sterilized samples underwent H₂O₂ gas sterilization. Mechanical properties were evaluated using mean values and standard deviations.

Results: Tensile and flexural tests demonstrated pronounced orientation dependence. X- and Y-oriented specimens generally showed higher strength, while Z-oriented samples were substantially weaker, especially in tensile loading, where the differences were in between 35-75%. In regard flexural test, the Y-direction layering gave the best result for several materials. Compression tests showed less pronounced orientation dependence, PLA and PETG even

demonstrated higher compressive strength in Z orientation. Sterilization had material- and orientation-specific effects. PETG showed increased tensile strength in X orientation (+18.78%), and approximately 31% in Z orientation. HIPS decreased in Y-oriented tensile strength (-20.75%). In flexural testing, PLA showed a significant increase in Z orientation (+126.92%), while ABS and HIPS decreased. In compression testing, the changes remained mostly moderate.

Conclusions: FDM materials used for surgical applications should be selected with careful consideration of printing material, orientation and sterilization response. A structured mechanical database may support safer material selection for 3D-printed medical applications.

Support: The research project was supported by NKFIH (ID: OTKA PD 135124).

PS1. Poster Session I. (Anatomy-Biochemistry-Biophysics-Physiology-Pathophysiology)

CA²⁺-INDUCED MITOCHONDRIAL PERMEABILITY TRANSITION PORE OPENING IN ALPHA-KETOGLUTARATE DEHYDROGENASE E3 HETEROZYGOUS KNOCKOUT MITOCHONDRIA IN VITRO

Gergely Bíró, Rebeka Sára Orova, Márton Kokas, Tímea Komlódi, László Tretter (Department of Biochemistry, Semmelweis University, Budapest, Hungary)

Aims: Opening of mitochondrial permeability transition pore (mPTP) leads to cyt c release and ultimately cell death. During ischemia, succinate accumulates in mitochondria, while upon reperfusion succinate oxidation drives reverse electron transport (RET), resulting in enhanced reactive oxygen species (ROS) formation. Our aim was to investigate substrate-dependent Ca²⁺-induced Ca²⁺-release via mPTP opening and compare wild-type (WT) mitochondria with alpha-ketoglutarate dehydrogenase complex E3 heterozygous knockout (DLD) mitochondria.

Methods: Brain mitochondria were isolated from WT and DLD mice. Extramitochondrial Ca²⁺ levels were followed on PTI fluorimeter using Calcium Green-5N fluorescence dye, and free Ca²⁺ concentration was calculated from the fluorescens signals. Oxygen consumption was measured with a high-sensitivity Clark-type oxygen electrode after anoxic incubation was performed. ROS production was detected using spectrophotometer by measuring aconitase activity, which is inactivated by generated ROS.

Results: Mitochondrial Ca²⁺ uptake capacity differed markedly depending on the respiratory substrate. In both types of mitochondria, mPTP opening occurred at lower free Ca²⁺ concentrations in the presence of succinate than with pyruvate-malate. Compared with WT mitochondria, DLD mitochondria showed delayed Ca²⁺-induced mPTP opening, requiring higher free Ca²⁺ concentrations. Following succinate incubation, aconitase activity was better preserved in DLD mitochondria.

Conclusions: Succinate-driven RET contributes to increased ROS formation, thereby reducing mitochondrial Ca²⁺ tolerance and promoting earlier mPTP opening. The delayed mPTP opening and preserved aconitase activity observed in DLD mitochondria support the role of E3 subunit in mitochondrial ROS metabolism related pathological conditions.

Support: OTKA grant 143627 and TKP2021-EGA-25 grant

INVESTIGATION OF HYPOTHALAMIC OREXIGENIC NEUROPEPTIDES IN A CHRONIC VARIABLE MILD STRESS MODEL IN RATS

Máté Tamás Szabó (1), (2) Zsombor Sándor Márton, (3) Balázs Gaszner (Department of Anatomy, University of Pécs)

Aims: The chronic variable stress (CVMS) model is a widely used method for studying depression in basic research. One of the minor diagnostic criteria for depression is body weight change. We hypothesized that alterations in orexigenic neuropeptides, specifically hypocretin (Hcrt) / orexin-1 in the perifornical area of the lateral hypothalamus and neuropeptide Y (NPY) in the arcuate nucleus, may contribute to this. This study aimed to investigate Hcrt / orexin-1 and Npy / NPY content at mRNA and protein levels in the CVMS model and to describe the effect of antidepressant therapy on these changes.

Methods: Rats were divided into stress-exposed and control groups. Half of the stressed animals received subcutaneous fluoxetine treatment, while the other half remained untreated. Mood state was assessed via the sucrose preference test. We utilized RNAscope in situ hybridization for Hcrt / Npy mRNA and immunolabeling for orexin-1 / NPY, followed by detailed morphometric measurements.

Results: CVMS-exposed animals exhibited increased anhedonia, which was attenuated by fluoxetine. In the stressed group, Hcrt mRNA levels decreased; however, fluoxetine therapy was unable to reverse this change. Regarding NPY, no significant differences were found between any of the groups at either the mRNA or peptide levels.

Conclusions: The reduced expression of orexin-1 neuropeptide mRNA in the lateral hypothalamus may play a role in the body weight loss observed in the CVMS model. Importantly, fluoxetine therapy does not appear to be suitable for treating or reversing this specific neurobiological alteration.

Support: University of Pécs, Medical School, Department of Anatomy; Supervisors: Zsombor Sándor Márton and Balázs Gaszner

MECHANOBIOLOGY OF THE BLOOD-BRAIN BARRIER: HOW BARRIER TIGHTENING AND DISRUPTION AFFECT KEY FORCE-BEARING SYSTEMS

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The human blood-brain barrier (BBB), formed by endothelial cells of brain capillaries, regulates the environment of the CNS. The endothelial cells are exposed to biomechanical stress to which they respond through their two main force-bearing systems, the tight junctions and focal adhesions (FA). Understanding their structure and interaction are important for understanding CNS diseases associated with BBB damage. We have identified a pharmacological combination (cARLA) enhancing BBB properties in human stem cell-differentiated endothelial cells via increased expression and reorganization of tight junction protein claudin-5. In cARLA treated endothelial cells perinuclear actin cytoskeletal structures were also observed, which were hypothesized to be focal adhesions. In our experiments, we studied morphological and functional changes in mechanical properties of FA in mature and damaged BBB.

Human endothelial cell culture model was used. Proteins (claudin-5, vinculin, zyxin, p-FAK) were immunostained, the actin cytoskeleton and nuclei were fluorescently labeled, and studied by confocal microscopy. FluidFM was applied for functional studies. Immunohistochemistry was performed on epileptic ex vivo human brain tissue as well.

cARLA induced a time-dependent reorganization of FA structure. FA in a diffuse pattern and along actin filaments were mostly subnucleated and colocalized with perinuclear actin structures at 48 hours. While the overall adhesion energy and the cell-cell adhesion forces were increased, the cell-extracellular matrix adhesion forces, reflecting focal adhesion function, did not change as measured by FluidFM. It was demonstrated that in parallel to a reduction of BBB integrity, cell adhesions increased in epileptic condition.

We described for the first time how tightening of the paracellular barrier affects focal adhesion structure and function in human brain endothelial cells, contributing to a better understanding of cell mechanobiology at the BBB.

BIOPHYSICAL CHARACTERIZATION OF A MUTANT SODIUM CHANNEL FOUND IN BREAST CANCER CELLS

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Aims: The NaV1.5 voltage-gated sodium channel is highly expressed in invasive, triple-negative breast cancers. We aimed to investigate how the E346K mutation—identified in breast cancer samples via the COSMIC database and linked to tumor invasiveness—affects channel gating and its pH dependence, potentially acting as an adaptation to the acidic tumor microenvironment.

Methods: We generated the E346K mutant channel using site-directed mutagenesis and transiently expressed it in CHO cells. Whole-cell patch-clamp electrophysiology was performed to compare the gating properties of the wild-type and mutant channels under both physiological and acidic pH conditions.

Results: While the voltage threshold for channel opening remained unchanged, the steady-state inactivation curve of the mutant channel shifted significantly to the right at both pH levels. This shift provides a broader window for channel activity, aligning with the more positive resting membrane potential typically observed in cancer cells. Furthermore, regardless of pH, the mutant channel recovered faster from inactivation and exhibited less cumulative inactivation compared to the wild type.

Conclusions: The E346K mutation enhances NaV1.5 channel activity even under acidic conditions. This adaptation likely contributes to the increased viability, invasiveness, and metastatic potential of breast cancer cells.

Support: This research work was conducted with the support of the National Academy of Scientist Education Program of the National Biomedical Foundation under the sponsorship of the Hungarian Ministry of Culture and Innovation.

NANOMETER-SCALE QUANTIFICATION OF ER-MITOCHONDRIA DISTANCE USING STED AND MINFLUX SUPER-RESOLUTION MICROSCOPY

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Introduction: The mitochondria and endoplasmic reticulum contact sites (MERCs) are areas where the organelle distance is typically 10-30 nanometers (nm). Maintaining this distance is essential for the regulation of cell processes, including Ca²⁺ signaling, lipid exchange, and autophagy; dysregulation has been linked to pathologies. Accurate imaging of MERCs with a light microscope has been challenging due to the nanometer resolution needed. Alternatives, such as electron microscopes, have other drawbacks, including sample preparation artifacts.

Aim: The use of state-of-the-art super-resolution microscopies, stimulated emission depletion (STED), and minimal fluorescence photon flux (MINFLUX), to accurately resolve MERCs using immunofluorescently labeled cardiac rat cells.

Methods: The H9c2 cells were cultured on coverslips, fixed, and immunofluorescently labeled. Mitochondria were targeted using Timm8a. The endoplasmic reticulum was labeled using PDI. The samples were incubated with the primary, then fluorescently labeled secondary antibodies. Analysis of the cultures with confocal-, STED-, and MINFLUX microscopy was performed.

Results: The results showed that confocal imaging was insufficient to resolve single MERCs. STED provided better resolution of around 70 nm. The MINFLUX microscopy resolution was in the range of 5 nm, allowing for the

visualization of individual epitopes of labeled proteins at the MERCS. Additionally, organelle distance could be resolved, and preliminary measurements showed distances less than 50 nm.

Conclusions: The study demonstrated that STED was able to identify the MERCS of high interest; however, the resolution is insufficient for distance measurement. With MINFLUX microscopy, the distance measurement can be analyzed due to superior resolution, allowing nanometer-scale quantification; however, the samples and analyzing techniques require further optimization.

HYPERCHOLESTEROLEMIA-INDUCED LIPIDOMIC ALTERATIONS IN THE HEARTS OF MALE AND FEMALE RATS

Gergő Zalán Biró (Department of Biochemistry, University of Szeged)

Aims: Our previous results demonstrated that a cholesterol-enriched diet induces diastolic dysfunction in male rats, whereas no significant functional impairment was observed in females. Our aim was to investigate whether hypercholesterolemia induces lipidomic alterations in the heart, and whether sex-related differences exist.

Methods: Previously, 8-week-old male (n=9) and female (n=9) Wistar rats were fed either a cholesterol-enriched (HChol) or a standard diet (NChol) for 12 weeks. Following pressure-volume catheterization, the hearts were excised and the left ventricles snap-frozen in liquid nitrogen. After pulverization, our collaborative partner performed total lipid extraction followed by high-performance liquid chromatography coupled with mass spectrometry (HPLC-MS). Results were expressed as percentages relative to total polar lipids.

Results: The diet induced hypercholesterolemia in both sexes and significantly increased cardiac tissue cholesterol content (male NChol: $10.1 \pm 0.19\%$, HChol: $11.2 \pm 0.26\%$; female NChol: $11.3 \pm 0.21\%$, HChol: $12.7 \pm 0.39\%$). Cardiac cholesteryl ester content increased significantly only in females ($0.482 \pm 0.06\%$ vs. $0.901 \pm 0.08\%$). Total tissue cardiolipin was significantly higher in both HChol groups versus controls. Tetralinoleoyl cardiolipin, the most abundant species, was elevated only in males ($6.78 \pm 0.16\%$ vs. $7.94 \pm 0.22\%$), whereas in females other cardiolipin species increased significantly ($1.12 \pm 0.06\%$ vs. $1.6 \pm 0.09\%$). In males, serum and tissue cholesterol levels, as well as total cardiolipin content, correlated significantly with left ventricular end-diastolic pressure.

Conclusions: A cholesterol-enriched diet induces distinct lipidomic alterations in male and female rat hearts. These differences may contribute to the sex-related functional disparities observed under hypercholesterolemic conditions.

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FUNCTIONAL CHARACTERIZATION OF TANKYRASE 1 AND TANKYRASE 2 ENZYMES IN ADIPOCYTE DIFFERENTIATION

Nakayi Murahwa (1) 2) Prof Dr Peter Bay (Deptment of Medical Chemistry, University of Debrecen)

Aim: To better understand the TNKS1 and TNKS2 mediated effects governing the differentiation of white adipocytes. We would like to establish the TNKS mediated features in white adipose tissue and, subsequently, assess the applicability of TNKS inhibitors in regulating adipocyte differentiation.

Methods: Differentiated 3T3-L1 preadipocytes were applied as a model. Our research group generated TNKS1 and TNKS2 single and TNKS1/TNKS2 double knockout 3T3-L1 cell lines using the CRISPR/Cas9 method. We characterised the knockout clones by qPCR. In prior experiments we performed an RNAseq analysis on the differentiated clones.

During my research work, we performed functional analysis with Western blot method to confirm the RNAseq results.

Results: We observed that the mRNA expression of TNKSs increased in the terminal differentiation phase. Additionally, TNKS knockout altered the expression of genes related to energy sensor pathways, such as AMPK, as well as protein degradation pathways such as ubiquitination. We have identified TNKS-related effects in adipocyte differentiation.

Conclusion: TNKS 1 and TNKS2 appear to play a regulatory role in white adipocyte differentiation. Ongoing studies with TNKS inhibitors may clarify whether their enzymatic activity can be targeted and modulate adipocyte differentiation.

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INVESTIGATING THE ROLE OF HEMOKININ-1 IN THERMOREGULATION

Dávid Vince Simon (1) (Department of Pharmacology and Pharmacotherapy, Medical School, University of Pécs, Pécs)

Introduction: Hemokinin-1 (HK1) is a tachykinin-family neuropeptide known to exert several functions in the central nervous system. While some studies have suggested its involvement in nociceptive pathways, its potential role in thermoregulation has received limited attention. Based on its high expression in the thalamus—a key region in temperature regulation—HK1 represents a strong candidate for a regulatory role in thermal homeostasis. Therefore, our study aimed to elucidate its potential involvement in thermoregulatory mechanisms.

Materials and methods: Experiments were conducted on adult male and female HK1 gene-deficient (HK1 KO) and wild-type (WT) mice. We compared core temperature responses of HK1 KO and WT mice following intraperitoneal administration of low (120 µg/kg) and high (5 mg/kg) doses of lipopolysaccharide (LPS). Additionally, in a polymicrobial sepsis model induced by cecal ligation and puncture (CLP), we examined body temperature, survival, and tissue cyclooxygenase-1 (COX-1) expression via PCR in HK1 KO and WT mice.

Results: Our findings show that under physiological conditions, there was no difference between HK1 KO and WT groups in response to either cold or heat exposure. However, under pathophysiological stress, i.e., systemic inflammation, we found significant differences. In the late phase of the multiphasic febrile response following low-dose LPS, the temperature rise was significantly attenuated in the HK1 KO group. Furthermore, in response to high-dose LPS, HK1 deficiency prevented the development of hypothermia.

Conclusion: These results suggest that HK1 may have both pyrogenic and cryogenic properties. Further studies are warranted to elucidate the precise mechanisms underlying its role in thermoregulation.

PS2. Poster Session II. (Behavioral Sciences-Microbiology-Oncology-Pathology)

EMERGENCE AND CLONAL SELECTION OF AN IDH WILD-TYPE PIK3CA-MUTANT SUBPOPULATION IN IDH-MUTANT ASTROCYTOMAS

Szonja Boróka Kovács (1), (2) Hajnalka Rajnai (Department of Pathology and Experimental Cancer Research, Semmelweis University)

Aims: Our aim was to investigate the histopathological and molecular genetic characteristics of newly diagnosed and recurrent high-grade astrocytomas harboring IDH mutations.

Methods: We analyzed the recurrence characteristics of IDH-mutant high-grade astrocytic tumors diagnosed at our institution between 2022 and 2025. Loss of the activating IDH mutation was observed in two cases originally

diagnosed as IDH-mutant gliomas. Comprehensive genomic analysis was performed on these two recurrent gliomas with confirmed IDH loss and evidence of clonal selection using the Illumina TruSight Tumor 170 next-generation sequencing panel. In addition, DNA methylation profiling was conducted using the Heidelberg Epignostix CNS Tumor Classifier v12.8 (0.4).

Results: Among 832 astrocytomas diagnosed during the study period, 117 were IDH mutant, including 20 recurrent cases. Ten recurrent tumors retained their original grade, while ten showed clear progression. Two recurrent tumors demonstrated a change in IDH immunophenotype, confirmed by immunohistochemical and molecular diagnostic methods. Genetic analysis revealed deletion of the 2q chromosomal arm as the underlying mechanism of IDH mutation loss. Furthermore, alterations involving the PIK3CA gene were identified in both cases.

Conclusions: As IDH inhibitors continue to be evaluated for high grade astrocytic gliomas, detailed molecular characterization of recurrent IDH mutant tumors may be essential for predicting therapeutic response. The presence of PIK3CA alterations in both cases suggests a selective advantage for IDH negative clones, highlighting the importance of monitoring clonal evolution during tumor progression.

Support: Boróka, Kovács Szonja: IDH mutáns astrocytomák transzformációja: IDH vad típusú PIK3CA mutáns szubpopuláció megjelenése és klonális szelekciója. Orvoscézés, 2026, v. 101, n. 1, p. 342

POTENTIAL APPLICATIONS OF 3D BIOPRINTED BREAST CARCINOMA MODELS IN DRUG PRESELECTION TESTS

Gelencsér Rebeka, Moldvai Dorottya, Varga Viktória, Gábrriel Zsófia, Szalai Fatime, Sebestyén Anna (Department of Pathology and Experimental Cancer Research)

One of the biggest challenges in drug development is the selection and application of appropriate model systems. Our goal was to model breast tumors and to perform a comparative analysis of different models (traditional cell cultures, spheroids, 3D bioprinted cell cultures, in vivo syngenic and xenograft models).

In the development of in vitro 3D bioprinted breast carcinoma models, we performed comparative studies using the 4T1 mouse breast carcinoma cell line. The results of drug susceptibility studies in various model experiments (conventional two- dimensional cell cultures, in vitro spheroids and in vivo syngenic - BALB/c mice – and xenograft -SCID mice) with the cell line and cells isolated from tumors growing in mice were compared with the sensitivity observed in the 3D bioprinted in vitro model.

The tumor growth inhibitory effects of 72-hour in vitro and 3-week in vivo treatments with doxorubicin, rapamycin, and cisplatin were examined (Alamar Blue and SRB proliferation tests, tumor size). The morphology and tissue heterogeneity of the tumor cells and tumors were also examined after H&E and immunostaining.

Based on our results, tumor cells in conventional 2D and spheroid cultures show extraordinary sensitivity to chemotherapy treatments (>50% inhibition), while in vivo only rapamycin had a significant inhibitory effect on tumor growth (syngenic model - 30-40% growth inhibition), doxorubicin and cisplatin resistance were observed. This effect was only reflected in the results obtained in 3D bioprinted models in vitro. The results of our in situ protein expression studies performed in parallel also confirmed the more pronounced similarities of 3D bioprinted models, tumor heterogeneity.

According to our results, three-dimensional bioprinted models best approximate the drug sensitivity results obtained in the syngenic model (BALB/c mice), which is the closest situation to modeling relapses and metastases observed in patients.

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IDENTIFICATION OF CATECHOLAMINE-INDUCED PRO-PROGRESSION PATHWAYS IN BREAST CARCINOMA

István Révész (1), (1) Emese Tóth, (1) Péter Bay((1) Department of Medical Chemistry, University of Debrecen)

Breast cancer is one of the most prevalent malignancies worldwide and remains a leading cause of death among women. Advanced, metastatic cases pose the greatest clinical challenge, where inhibiting tumor progression and cell migration is essential for therapeutic success. Elevated catecholamine levels in breast cancer patients may contribute to tumor aggressiveness; therefore, our study investigates this phenomenon via inhibition of catecholamine biosynthesis.

Metyrosine, a specific inhibitor of tyrosine hydroxylase, was used to block catecholamine production. Cell proliferation was assessed using an SRB assay, while tumor progression and migratory capacity were examined using a scratch (wound healing) assays in the MDA-MB-231 and MCF-7 cell lines. Additionally, a database-based analysis was performed to evaluate the expression of catecholamine biosynthesis and signaling components and their association with survival in breast cancer patients using GEPIA2.

Metyrosine treatment did not significantly affect proliferation in the SRB assay. However, in scratch assays, it showed a trend toward slower wound closure in the early hours in both cell lines, indicating reduced migratory capacity. These findings are consistent with database results suggesting that the catecholamine pathway primarily influences progression-related processes rather than proliferation. GEPIA2 analysis revealed limited association with overall survival but a correlation with progression-free survival.

Overall, targeting the catecholamine axis may represent a promising strategy by modulating tumor progression rather than inhibiting proliferation, offering potential for drug repurposing and novel therapeutic targets.

STAGED SUICIDES: FORENSIC ASPECTS AND INDICATORS REVEALING HOMICIDAL DEATHS, ORAL PRESENTATION

Antónia Nagyová (Department of Forensic Medicine)

This work focuses on the forensic aspects of staged suicides and the identification of indicators revealing homicidal deaths disguised as suicides. Staged suicides represent a complex issue in Forensic Medicine, as perpetrators may intentionally manipulate the death scene in order to imitate self-inflicted death and conceal criminal activity. The presentation analyzes common methods of staging, including alteration of body position, manipulation of the surrounding environment, and placement of weapons or ligatures to simulate suicidal behavior. Particular attention is paid to forensic indicators such as atypical wound characteristics, defensive injuries, inconsistencies between autopsy findings and the presumed mechanism of death, and discrepancies identified during death scene investigation. A careful and systematic forensic approach is essential for correct differentiation between suicide and homicide. Thorough documentation of the death scene, detailed autopsy examination, and effective cooperation between forensic experts and investigators are crucial in identifying staged suicides. As part of the presentation, several forensic cases involving staged suicides will be presented to demonstrate the practical importance of careful forensic examination, proper documentation of the death scene, and multidisciplinary cooperation in distinguishing homicide from suicide. The presentation is supported by published forensic literature and selected case reports.

INVESTIGATION OF THE ROLE OF NEUTROPHIL GRANULOCYTES IN THE IMMUNE RESPONSE INDUCED BY NUCLEOSIDE-MODIFIED MRNA-LNP VACCINES

Márton Mészáros 1, Stella Márta Sági 1, Gábor Kovács 1, Kornél Molnár 1, Éva Kovács-Kemecsei 1, Zoltán Lipinszki 2, Attila Mócsai 1, Norbert Pardi 3, Zoltán Jakus 1 (1 Department of Physiology, Semmelweis University, Budapest, Hungary; 2 Institute of Biochemistry, HUN-REN Biological Research Centre, Szeged, Hungary; 3 Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA)

Aims: Our aim is to investigate the role of neutrophils in the immune response elicited by nucleoside-modified mRNA-LNP vaccines in experimental mouse models.

Methods: To identify cells involved in mRNA-LNP uptake and expression, fluorescently labelled empty LNPs (Dil-LNP) and eGFP-encoding mRNA-LNPs were injected into the hind limb of wild-type and transgenic neutropenic mice. The injection site and draining lymph nodes were analyzed by stereomicroscopy and flow cytometry. To evaluate humoral responses, neutropenic and control mice were injected with influenza hemagglutinin-encoding mRNA-LNP, and serum anti-hemagglutinin IgG, IgM and neutralizing antibody titers were measured.

Results: In wild-type mice, Dil-LNP and eGFP mRNA-LNP induced pronounced neutrophil infiltration in the draining lymph nodes. Neutrophils took up Dil-LNP to a greater extent than they expressed eGFP. Neutropenic mice displayed significantly fewer Dil- and eGFP-positive dendritic cells compared with littermate controls. Anti-hemagglutinin IgG titers were significantly lower in neutropenic animals, while specific IgM titers were elevated following vaccination.

Conclusions: Our results indicate that injection of the mRNA-LNPs triggers significant neutrophil recruitment. Neutrophils may influence antigen presentation via dendritic cells. Our results suggest that isotype switching is impaired in the absence of neutrophils. Taken together, these findings indicate that neutrophils may play an important role in the development of an effective adaptive immune response to mRNA-LNP vaccines. Our study enhances the understanding of mRNA-LNP vaccine mechanisms and may support platform optimization.

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BALANCED HLA-I AND HLA-II PRESENTATION IS ASSOCIATED WITH BETTER SURVIVAL IN UROTHELIAL BLADDER CANCER

Zsolt Ferenc Nagy (presenter), (1) Dóra Alexandra Gyémánt, (1) Máté Manczinger, (1) Benjamin Tamás Papp ((1) HUN-REN Biological Research Center Szeged, Institute of Biochemistry)

Aims: Bladder cancer (BLCA) is the tenth most common malignancy worldwide, with rising incidence rates, particularly in developed countries. One of the main functions of the immune system is to surveil the body for malignant cells and initiate an immune response upon detection. HLA-I, expressed on all nucleated cells, presents intracellular peptides, including neoantigens, whereas HLA-II is primarily expressed on antigen-presenting cells and presents extracellular antigens. HLA-I has long been recognized as an important mediator of anti-tumor immunity, while HLA-II has recently gained increasing attention. Elevated HLA-I and HLA-II expression have both been associated with improved survival in BLCA, but their combined role remains poorly understood. We hypothesized that HLA-I and HLA-II genotypes may serve as prognostic biomarkers in BLCA.

Methods: In the TCGA BLCA cohort, we matched HLA genotypes with somatic mutations and calculated HLA-I and HLA-II neoantigen presentation scores for each patient. Presentation ratios were defined as the proportion of presented missense mutations among all missense mutations. Patients were classified as “high” or “low” for each pathway based on median presentation ratios, generating four combined groups. Survival analyses were performed using clinical data.

Results: Patients with elevated HLA-II presentation, both with and without high HLA-I presentation, showed improved survival. In contrast, HLA-I-dominant or generally low HLA presentation was associated with poorer survival. RNA-seq analyses characterizing the tumor microenvironment and molecular subtypes are ongoing.

Conclusions: HLA genotype-based neoantigen presentation analysis represents a promising prognostic approach and correlates with patient survival in bladder cancer.

Support: Horizon Health consortium “ID-DarkMatter-NCD”; Hungarian Scientific Research Fund; Lendület Programme; Bolyai János Research Fellowship; National Academy of Scientist Education Program

IMPACT OF IMMUNODEFICIENCY ON MULTIPLE MYELOMA PROGRESSION AND DISSEMINATION IN A MURINE MODEL

Budai János Mátyás (1), (1) Zoltán Kellermayer ((1) Department of Immunology and Biotechnology, University of Pécs Medical School, Pécs, Hungary)

Aims: To investigate Multiple Myeloma (MM) progression and dissemination in the 5TGM1-GFP murine model across mouse strains with varying degrees of immunodeficiency to elucidate the specific contributions of innate versus adaptive immunity.

Methods: Immunocompetent (C57Bl/6), T- and B-cell deficient (Rag1^{-/-}), and T-, B-, and NK-cell deficient (NSG) mice were injected intravenously with 10⁶ 5TGM1-GFP myeloma cells. After 21 days, bone marrow and spleen tumor burden and dissemination were quantified using flow cytometry and validated by fluorescence microscopy, combined with staining for granulocytes (Gr1), macrophages (F4/80), and plasmacytoid dendritic cells (CD317).

Results: WT mice showed a 50% bone marrow tumor incidence (1.12% mean burden) with rare splenic dissemination. Rag1^{-/-} mice exhibited 100% incidence, a moderate bone marrow burden (16.96%), and consistent splenic involvement (1.26%). NSG mice presented the most severe phenotype, featuring high-grade bone marrow tumors (36.04%) and massive splenic infiltration (67.4%). Histologically, granulocytes were excluded from tumor foci, whereas macrophages and pDCs persisted in close contact with myeloma cells.

Conclusions: Immune status critically determines MM progression. The severe tumor burden and rapid extramedullary dissemination in NSG mice compared to Rag1^{-/-} mice underscore the vital role of NK cell-mediated surveillance in controlling myeloma engraftment and spread.

Support: OTKA FK-146541 (to ZK).

THE IMMUNOLOGICAL BACKGROUND OF SUICIDE ATTEMPTS

Fanni Napsugár Major (1), (1) Viktor Vörös, (1) Szonja Venczák, (1) Csenge Lovig, (1) Borbála Pethő, (1) Csilla Molnár, (1) Márton Áron Kovács, (1) Sándor Fekete, (1) Tamás Tényi, (1) Péter Osváth, (2) Diána Simon ((1) Department of Psychiatry and Psychotherapy, University of Pécs (2) Department of Immunology and Biotechnology, University of Pécs Presenter's university: University of Pécs Medical School)

Aims: Psycho-neuro-immunological research highlights the link between mental disorders and peripheral immune alterations. Chronic low-grade inflammation may contribute to depression and suicidal behavior, although findings remain inconsistent. This study aimed to examine whether peripheral inflammatory markers are associated with recent suicide attempts in patients with depressive disorders.

Methods: Clinical and laboratory data from 100 psychiatric inpatients with depressive disorders were analyzed. Participants were categorized based on the presence of a recent suicide attempt. Demographic variables, depression severity, suicide risk, and routine inflammatory markers were recorded. Descriptive statistics and logistic

regression models were applied to compare groups and identify immunological variables independently associated with recent suicidal behavior.

Results: No significant differences were observed between recent and non-recent suicide attempters in age, gender, or depression severity. However, patients with a recent suicide attempt had significantly higher leukocyte, neutrophil, eosinophil, and monocyte counts, as well as elevated Neutrophil-to-Lymphocyte Ratio (NLR) and Monocyte-to-Lymphocyte Ratio (MLR). These remained significant after adjusting for confounders. Positive correlations were found between NLR, MLR, Platelet-to-Lymphocyte Ratio (PLR), and platelet counts, while CRP showed no association. Depression severity correlated negatively with PLR, NLR, and MLR.

Conclusions: Elevated inflammatory markers, particularly NLR and MLR, may serve as state markers of recent suicide attempts in depressed patients, independent of demographic and clinical factors. Routine monitoring may support more comprehensive suicide risk assessment.

Support: Nemzeti Laboratórium, TINL Project Identification Number: RRF-2.3.1-21-2022-00011

HLA-II PROMISCUITY SHAPES ANTITUMOR IMMUNITY IN MELANOMA AND LUNG CANCER

Dóra Alexandra Gyémánt (1), (2)Gergely Koppány, (3) Máté Manczinger ((1) Synthetic and Systems Biology Unit, Institute of Biochemistry, HUN-REN Biological Research Centre, Szeged, Hungary (1,2,3),(2) Albert Szent-Györgyi Medical School, University of Szeged (1), (3) National Academy of Scientist Education, Szeged, Hungary(1), (4)Doctoral School of Biology, University of Szeged (2), (5) Department of Dermatology and Allergology, University of Szeged (3))

Antigen presentation is essential for antitumor immunity, yet peptide-binding capacity varies markedly across HLA alleles. HLA promiscuity reflects the breadth of peptide presentation. While HLA-I promiscuity has been linked to antitumor immunity, the role of HLA-II promiscuity remains unclear. We investigated the impact of HLA-II promiscuity in lung cancer and melanoma.

HLA-II promiscuity was quantified using mean Kullback–Leibler divergence, which measures differences between distributions. This captured how much the amino acid distribution of peptides bound by each HLA-II allele differed from that of human proteins. Patient-level mean HLA-DRB1 promiscuity scores were calculated by averaging the scores of each patient’s two HLA-DRB1 alleles. Associations with lung cancer and melanoma incidence were assessed in the UK Biobank. The Cancer Genome Atlas survival and RNA-seq data were analyzed to evaluate clinical outcome and tumor microenvironment composition. Immune checkpoint blockade (ICB) cohorts were used to assess associations with ICB response in melanoma and lung cancer. Cancer epitope binding was predicted using NetMHCIIpan.

Higher HLA-DRB1 promiscuity was associated with reduced melanoma and lung cancer risk; whereas in already developed tumors with an effective antitumor microenvironment. Highly promiscuous alleles showed stronger predicted binding to lung cancer and melanoma epitopes. Patients with higher HLA-II promiscuity showed improved response to ICB therapy and longer overall survival.

HLA-DRB1 promiscuity may enhance antitumor immunity by broadening tumor epitope presentation, supporting immune surveillance, shaping the tumor microenvironment, and improving immunotherapy responsiveness.

Support:

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PS3. Poster Session III. (Internal Medicine-Family Medicine-Rheumatology- Prevention-Anesthesiology-Intensive Care-Emergency Care-Interdisciplinary (other))

CARDIOVASCULAR RISK ASSESSMENT IN PATIENTS WITH METABOLIC DYSFUNCTION-ASSOCIATED STEATOTIC LIVER DISEASE

Flóra Túri (1), (2) Dr. Karina Kővágó, (3) Dr. Bálint Drácz, (4) Dr. Klára Werling (Department of Surgery, Transplantation and Gastroenterology, Sermmelweis University, Budapest, Hungary)

Metabolic dysfunction-associated steatotic liver disease (MASLD), formerly known as non-alcoholic fatty liver disease, is strongly associated with higher cardiovascular (CV) risk and consequently cardiovascular complications. To date, there are limited data available about CV risk scores in MASLD. Therefore, we conducted a multicenter retrospective study of 251 adults with MASLD recruited between March 2007 and May 2025 to assess cardiovascular risk and liver disease severity. Cardiovascular risk was estimated using the Framingham Risk Score (FRS) and the Atherosclerotic Cardiovascular Disease (ASCVD) Risk Score, while liver fibrosis was evaluated by FIB-4 and APRI indices. Each fifth patient (n=23) was associated with higher CV risk, fifteen patients among them developed cardiovascular events, most commonly stroke (n=6). Median ASCVD (14%) was significantly associated with higher rate in CV complications compared to FRS (12%). Comparing the median values of liver fibrosis scores in low CV risk population (ASCVD<10%), FIB-4 > 1,36 MASLD patients were significantly associated with higher CV complications ratio related to median APRI. ASCVD was found to be the most sensitive prognostic marker in MASLD. However, FIB-4 > 1,36 could trigger the onset of CV complications in patients with MASLD, regardless of ASCVD. No extended funding was received.

THE EFFECT OF PACAP ON THE DIFFERENTIATION OF CHONDROPROGENITOR STEM CELLS UNDER HYPOXIC CONDITIONS

Lili Sarolta Kovács (Department of Anatomy, Histology and Embriology, University of Debrecen)

Aims: The aim of our study was to investigate the effect of PACAP1–38 treatment on the differentiation of CPC cells maintained under hypoxic conditions.

Methods: CPC cells were cultured in a specialized incubator providing low oxygen tension and treated with PACAP1–38. Cell viability was assessed using the MTT assay, while proliferative capacity was monitored by PCNA immunocytochemistry. Apoptosis induced by PACAP and/or hypoxia was evaluated using the TUNEL assay. After hematoxylin–eosin staining, the short and long diameters of the cells were measured, while the presence of metachromatic cartilage matrix was assessed using dimethylmethylene blue (DMMB) staining. The expression and intracellular localization of the transcription factors P-Sox9 and P-CREB were examined by immunocytochemistry. In addition, PACAP1–38-induced changes in the extracellular matrix were analyzed by evaluating the presence of type II collagen and hyaluronic acid.

Results: Our results showed that PACAP treatment did not induce apoptotic processes, but reduced cell proliferation. PACAP1–38 promoted cell rounding and the formation of nodules, which in some cases exhibited metachromasia. Nuclear localization of phosphorylated Sox9 increased in the presence of PACAP, while nuclear presence of P-CREB showed a slight decrease. In the extracellular matrix, the presence of both type II collagen and hyaluronic acid was enhanced.

Conclusions: These findings suggest that PACAP influences the differentiation of CPC cells under hypoxic conditions and may contribute to the development of future in vivo therapeutic strategies for the treatment of osteoarthritis.

Support: NKFIH K139396

FACTORS INFLUENCING PATIENT PARTICIPATION – INTEREST IN PLACEBO-CONTROLLED CLINICAL TRIALS

Barbara Tivadar (1), Dr. Lili Száraz, Dr. Réka Sebestyén-Dósa, Dr. István Csulak, Dr. Barnabás Baksa, Dr. Kristóf Nagy, Dr. Sámuel Beke, Prof. Dr. Pál Maurovich-Horvat (Department of Radiology, Medical Imaging Centre, Semmelweis University)

Aims: Clinical trials (RCTs) are essential for medical advancement; however, patient recruitment and retention remain major challenges. This study aimed to investigate factors influencing participation in a placebo-controlled RCT and evaluate experiences within the INTENSE Trial.

Methods: In this prospective, double-blind, single-center study at the Medical Imaging Centre, patients undergoing coronary CT angiography between July 2025 and April 2026 were randomized 1:1 to intensified statin therapy or placebo. Motivation questionnaires and 36-Item Short Form Survey (SF-36) were collected in anonymized digital format.

Results: 57 patients were enrolled (mean age: 58.8 ± 7.6 years; 12 females). 92% of participants had no previous clinical trial experience. 94% made their decision to participate within one day. Participation was influenced by self-motivation (57%), physicians (28%), and acquaintances (15%). 87% of participants stated that their expectations were fully met during follow-up. Self-perceived health also improved, at baseline, 67% of patients reported their health was similar to one year earlier, while 21% perceived it as worse. After three months, most patients reported improved health status.

SF-36 showed the greatest improvements in physical role functioning (+9.20), general health perception (+9.80), and mental health (+7.55), while smaller improvements were seen in physical functioning (+2.58), bodily pain (+3.50), social functioning (+1.33), emotional well-being (+0.76), and energy levels (+0.31).

Conclusions: Participation in placebo-controlled RCTs is primarily influenced by internal motivation, trust in healthcare professionals, and physician-patient communication. Favorable mental health indicators suggest that psychological well-being and supportive communication may improve both participation and retention in clinical trials.

Support: Semmelweis University

CELL BASED THERAPIES IN NEUROVASCULAR AGING-RELATED PROCESSES

István Tóth (Biological Research Centre Szeged, Department of Biophysics)

Introduction and Objectives: The vascular endothelium of the brain plays a critical role in maintaining neuronal function. The blood-brain barrier (BBB), formed by endothelial cells, protects the central nervous system while facilitating bidirectional communication with the circulation. Age-related impairment of these functions is a key factor in the pathogenesis of various neurological disorders. Our research aims to slow or prevent age-related cerebral microvascular dysfunction using endothelial progenitor cells (EPCs). We investigated the dynamics of EPC–capillary interactions and the communication between EPCs and cells of the neurovascular unit under VEGF pretreatment and hypoxic conditions.

Methods: EPCs were injected into the circulation of mice via the common carotid artery. In vivo two-photon imaging was performed through a cranial window, and hypoxic injury was induced by bilateral carotid occlusion. EPC–capillary interaction dynamics were monitored using in vivo two-photon microscopy. To study cellular communication, Cre-recombinase-expressing EPCs were injected into Cre-dependent reporter mice, and activated reporter cells were identified using immunofluorescence staining and confocal microscopy.

Results: In vivo studies revealed that hypoxia did not increase the number of adhered cells but did increase their persistence at the site of adhesion. Conversely, VEGF pretreatment increased both the number of adhered cells and the likelihood of them remaining at the site of initial observation. Communication experiments showed that both hypoxia and VEGF pretreatment increased the number of activated reporter cells, with the combined treatment exhibiting an additive effect and some degree of cell specificity.

Discussion: Our findings suggest that VEGF pretreatment can enhance the efficacy of EPC therapy and that cells remain at their adhesion sites longer following hypoxic injury, thereby contributing to regeneration.

EVOLVING MANAGEMENT STRATEGIES IN INSULINOMAS — A CASE SERIES

Boglárka Tóth (1), (2) Ádám Zoltán Farkas, (3) Attila Doros, (4) Judit Tőke, (5) Miklós Tóth, (6) András Bibok ((1) Semmelweis University (2) Department of Interventional Radiology, Semmelweis University (3) Department of Internal Medicine and Oncology, Semmelweis University)

Aims: To review the role of interventional radiology in the management of insulinomas and to present the clinical outcomes of minimally invasive therapies in a single-center case series.

Methods: We retrospectively reviewed 46 patients diagnosed with insulinoma at our institution over a 25-year period. Six patients underwent minimally invasive interventional radiology procedures. Tumor localization was performed using cross-sectional imaging modalities. Patients without metastatic disease were treated with transarterial embolization (TAE), radiofrequency ablation (RFA), or cryoablation, while patients with liver metastases underwent TAE.

Results: Five patients presented with symptomatic hypoglycemia, and three had extrapancreatic liver metastases. Technical success was achieved in all procedures, with rapid resolution of hypoglycemic symptoms and no major procedure-related complications. Sustained clinical improvement was observed in five patients during follow-up. One patient demonstrated radiological disease progression after two years without recurrence of hypoglycemic symptoms.

Conclusions: Interventional radiology techniques represent effective and safe alternatives to surgery in selected patients with insulinoma. Minimally invasive procedures may provide durable symptom control with low procedural morbidity, supporting their growing role in multidisciplinary insulinoma management.

Support: No external financial support was received for this study.

BEYOND SURVIVAL: LONG-TERM EXERCISE CAPACITY AFTER PULMONARY EMBOLISM ACROSS TREATMENT STRATEGIES

Adam Gyenge (1), Zsófia Imre (1) ((1) Department of Anaesthesiology and Intensive Therapy, Semmelweis University)

Aims: To evaluate long-term exercise capacity after pulmonary embolism (PE) and compare functional recovery between different therapeutic strategies.

Methods: Patients were enrolled in a prospective randomised interventional trial at the Department of Anaesthesiology and Intensive Therapy, Semmelweis University (ethical approval no. 65187-5/2021/EÜIG). 1 Follow-up examinations at 1, 3, and 12 months included a 6-minute walk test (6MWT), expressed as percentage of predicted values. Patients were assigned to ClotPro®-guided thrombolysis (TCP), conventional thrombolysis with 100 mg rt-PA (TnCP), or no thrombolysis (NT). Statistical analysis was performed using a mixed-effects model with Geisser–Greenhouse correction.

Results: Twenty-three patients contributed 60 follow-up measurements. Median 6MWT values improved over time in all groups: TCP 68.75%→83.43%→94.09%; TnCP 64.84%→74.71%→79.18%; NT 68.74%→76.54%→82.82%. A significant effect of time was observed ($F(0.79,10.62)=12.76$; $p=0.0065$), demonstrating progressive functional recovery after PE. No significant differences were found between treatment groups or for time-treatment interaction.

Conclusions: Exercise capacity improved significantly during follow-up after PE regardless of treatment strategy. Recovery appeared primarily time-dependent within the studied cohort. The absence of intergroup differences may partly reflect the limited sample size and incomplete follow-up.

Reference: 1: Kállai, A. et al. Personalised viscoelastometry-guided systemic thrombolysis for high- and intermediate-high-risk acute pulmonary embolism in the ICU: a single-centre randomised controlled interventional feasibility trial. ICMx 14, 57 (2026). <https://doi.org/10.1186/s40635-026-00903-7>

COMPETITIVE DYNAMICS OF POLYMYXIN-RESISTANT KLEBSIELLA PNEUMONIAE IN A GALLERIA MELLONELLA INFECTION MODEL

Léna Mészáros (1,2), (2,3) András Zoltán Vonyó (presenter), (4) Milán Csernyák ((1) Faculty of Medicine, University of Szeged, (2) Hungarian Centre of Excellence for Molecular Medicine, Szeged (3) Faculty of Science and Informatics, University of Szeged, (4) Faculty of Pharmacy, University of Szeged)

In antibiotic resistance research, particular attention is paid to the impact of different resistance-conferring mutations on the reproductive ability of bacteria referred to as fitness cost. Fitness cost influences whether a given mutation can persist or spread in natural bacterial populations, as bacteria with higher fitness can outcompete their less fit counterparts. However, widely used in vitro fitness and competition assays may provide a misleading picture of antibiotic-resistant bacteria that are rapidly spreading in clinical settings, as well as of the fitness cost of certain mutations that only have a competitive disadvantage under laboratory conditions.

The study utilized wild-type and mutant *Klebsiella pneumoniae* strains. To evaluate fitness and competitive advantages, the following experimental approaches were employed:

- In vitro fitness assays
- Virulence measurement in a *Galleria mellonella* infection model
- In vitro competition assays
- In vivo competition in *Galleria mellonella*

Conventional in vitro experiments indicated higher fitness for the wild-type strain, which consistently outcompeted the mutant under laboratory conditions. However, the in vivo competition experiments in the *G. mellonella* model revealed the opposite outcome: the mutant strain demonstrated a clear competitive advantage over the wild type. The fitness cost of resistance-conferring mutations varies significantly depending on the environment. Because pathogenic bacteria evolving in clinical environments face a wide range of pressures, conventional in vitro assays can provide a misleading picture of mutational disadvantages. Utilizing in vivo competition models is crucial for providing a more nuanced, accurate understanding of the competitive advantages these resistant mutants might exhibit in clinical settings.

Support National Academy of Scientist Education Program of the National Biomedical Foundation.

THE EFFECT OF THE NON-IONIC DETERGENT TRITON X-100 ON THE STRUCTURE OF THE MYOSIN II MOLECULE

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The aim of our study was to investigate how the structural stability varies along the rod domain of myosin II by exposing the molecule to the perturbing effect of the nonionic detergent Triton X-100.

For our experiments, we used myosin II, that was isolated from rabbit back. The samples were diluted in “Myosin II” buffer (0.6 M KCl, MOPS, pH 7.2) containing different concentrations (0.03–30 mM) of Triton X-100. A 20 µL aliquot of the solution was deposited onto a mica surface, incubated for 1 minute, then rinsed with distilled water and dried. To reveal the molecular structure, the samples were scanned using atomic force microscopy (AFM) with an AC160 cantilever. AFM image processing and quantitative analysis were performed using the Gwyddion and ImageJ, while statistical analyses were done using Microsoft Excel and GraphPad Prism.

Triton X-100 treatment induced loop-like expansions at multiple sites along the rod domain of myosin II. The treated molecules were shorter compared to the control samples, and both the number and size of the loops increased significantly ($p < 0.0001$ in all three cases). These changes were most pronounced at concentrations below the critical micelle concentration (CMC). Interestingly, the loops occurred more frequently at distances of 20, 50, and 80 nm from the head region.

The appearance of loops in the rod domain of myosin II at sub-CMC concentrations of Triton X-100 may be explained by local dissociation of the α -helices caused by the inhibition of hydrophobic interactions. The molecular shortening induced by loop formation may be attributed to the elasticity of the α -helices. The preferred loopforming positions along the rod domain suggest the presence of structurally unstable loci that may play a role in the physiological disassembly and assembly of myosin II.

This research was funded by grants from the Hungarian National Research, Development and Innovation Office (K143321 and 150826 to M.K.) and from the Erasmus+ Programme.

PS4. Poster Session IV. (Surgery - Traumatology - Neurosurgery-Obstetrics & Gynecology)

DIFFERENTIAL EFFECTS OF RESISTANCE AND ENDURANCE PREHABILITATION ON POSTOPERATIVE RECOVERY AND ANASTOMOTIC HEALING IN A RAT MODEL OF COLORECTAL SURGERY

Kinga Anett Drótos (1), (1) Szabina Kovacs, (1) Klara Levay, (2) Ildiko Horvath, (2) Noemi Kovacs, (2) Domokos Mathe, (2) Krisztian Szigeti, (3) Balint Hofmeister, (3) Eszter Ostorhazi, (4) Andras Budai, (1) Balazs Banky, (1) Attila Szijarto, (1) Andras Fulop ((1)Department of Surgery, Transplantation and Gastroenterology, Semmelweis University, Budapest, Hungary, (2)Department of Biophysics and Radiation Biology, Semmelweis University, Budapest, Hungary, (3)Institute of Medical Microbiology, Semmelweis University, Budapest, Hungary, (4)Department of Pathology, Forensic and Insurance Medicine, Semmelweis University, Budapest, Hungary)

Aims: To compare the effectiveness of preoperative endurance and resistance exercise-based prehabilitation in reducing postoperative complications in high-risk colorectal surgery.

Methods: Male Wistar rats (n=123) were assigned to sedentary (S), endurance prehabilitation (EP), and resistance prehabilitation (RP) groups, further subdivided after 4 weeks of exercise into low-risk (LR) and colitis-induced high-risk (HR) anastomotic models. Preoperative body composition was assessed using MRI and histological analysis. Colitis severity was characterized by the Disease Activity Index (DAI), inflammatory laboratory markers, crypt depth, and colon length. Intestinal barrier function was evaluated based on mucosal Claudin-1 level and splenic bacterial load. Anastomotic healing was assessed via bursting pressure, hydroxyproline content, and matrix metalloproteinase (MMP) levels and activity.

Results: RP improved body composition more effectively than EP, increasing lumbar muscle mass, muscle-to-fat ratio, and fiber cross-sectional area. Both exercise modalities reduced colitis severity, with reduced DAI, neutrophil and monocyte counts, and improved colon length and crypt depth in EP-HR and RP-HR groups compared to S-HR. No significant differences were found among LR groups regarding surgical outcomes. However, under high-risk conditions, RP significantly enhanced anastomotic healing, while EP didn't. This was supported by increased Claudin-1 expression, reduced bacterial translocation, higher bursting pressure, elevated hydroxyproline content, and decreased MMP levels and activity in the RP-HR group compared to S-HR.

Conclusions: Preoperative exercise improves anastomotic healing under high-risk conditions. Therefore, identifying appropriate target populations is essential, as resistance training may represent a more effective risk-reducing strategy in colorectal surgery.

Support: Semmelweis University 250+ Excellence PhD Scholarship(123954/DIDIT/2024; 51284/DIDIT/2025)

ARTIFICIAL INTELLIGENCE–AUGMENTED TRISS: IMPROVING MORTALITY PREDICTION IN THE HUNGARIAN NATIONAL POLYTRAUMA REGISTRY (NPTR-H)

Botros Mekhael (1), Kurokawa T. (1), Watanabe R.(1), Kobayashi K.(1) ((1) Department of Traumatology, University of Szeged, Szeged, Hungary)

Aims: The Trauma and Injury Severity Score (TRISS) remains the global reference for trauma outcome prediction, yet its logistic regression coefficients — derived from the MTOS cohort over three decades ago — are known to miscalibrate in modern European polytrauma populations. We evaluated whether a machine-learning layer applied to the Hungarian National Polytrauma Registry (NPTR-H) can improve mortality discrimination and calibration compared with classical TRISS.

Methods: A retrospective cohort of 234 consecutive polytrauma patients from the NPTR-H (mean ISS, age, mechanism distribution as registered) was analysed. After data cleaning (correction of INR/PT% encoding, lactate unit harmonisation, and ISS=0 artefacts), classical TRISS probability of survival was computed. A gradient-boosted model was then trained on the same admission variables (RTS components, ISS, age, mechanism) plus admission lactate, base excess and INR, using stratified five-fold cross-validation. Discrimination (AUROC), calibration (Brier score, Hosmer–Lemeshow), and net reclassification were compared against TRISS.

Results: Observed mortality was 27.9%. Classical TRISS achieved AUROC 0.81 with overestimation of survival in the high-ISS subgroup. The AI-augmented model reached AUROC 0.89, reduced Brier score from 0.14 to 0.09, and correctly reclassified 11.5% of misclassified TRISS cases, particularly haemodynamically unstable patients with elevated lactate.

Conclusions: A machine-learning extension of TRISS, trained on cleaned NPTR-H data, meaningfully improves mortality prediction in a Central European polytrauma cohort. AI augmentation offers a pragmatic route to recalibrating legacy trauma scores without abandoning their clinical interpretability.

Support: No external funding was received for this study.

PUSHING THE LIMITS OF RESECTABILITY: S4-MONOSEGMENT ALPPS FOR EXTENSIVE COLORECTAL LIVER METASTASES

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Aims: The purpose of this study is to present the surgical treatment of a young patient with multiple bilobar metastases using monosegment ALPPS technique as the last curative therapeutic option.

Method: A 29-year-old female presenting with multiple colorectal liver metastases a staged, multidisciplinary treatment plan was established. The patient received neoadjuvant therapy, followed by a robot-assisted left hemicolectomy to resect the primary tumor. For the hepatic disease, an S4-monosegment ALPPS was planned guided by computed tomography (CT) volumetry. Stage 1 involved right portal vein branch ligation, in situ parenchymal split along the Cantlie line, and resection of metastatic segments (S2, S3). Stage 2 was scheduled pending adequate hypertrophy of the future liver remnant (FLR).

Result: The patient showed significant regression of multiple liver metastases after 11 cycles of neoadjuvant therapy. Following primary tumor resection, she received an additional 10 cycles of adjuvant treatment. Preoperative CT volumetry showed a total liver volume (TLV) of 1069 ml, with the preserved segment 4 measuring 211 ml (19.7% of the TLV). On postoperative day 15 following ALPPS stage 1, S4 showed volume increase to 826 ml, bringing the FLR to 70.6% of the new 1170 ml postoperative TLV. Stage 2 of ALPPS was safely executed. The patient recovered without complications and remains disease-free 3 months postoperatively.

Conclusions: For carefully selected patients with multiple liver metastases who demonstrate a good response to systemic oncological treatment, monosegment ALPPS provides a safe, feasible, and curative surgical therapeutic option, even when alternative strategies are exhausted.

Support: No supports.

AQUATIC HIGH ENERGY TRAUMA: A CASE SERIES OF WATERSLIDE RELATED APC2 PELVIC RING INJURIES

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Introduction: Anterior–posterior compression type II (APC2) pelvic ring injuries are classically linked to high-energy trauma, yet water slide accidents represent an emerging cause. Although pelvic fractures comprise only 3% of skeletal injuries, unstable patterns may result in 8–10% in-hospital mortality. High-velocity aquatic impacts with forced hip abduction and abrupt deceleration can induce “open-book” symphyseal disruptions and posterior instability. This study summarizes injury patterns, management, and outcomes of four patients sustaining APC2 fractures during water slide incidents.

Methods: Four adults (aged 38–72 years; mean BMI 29.6) with confirmed APC2 injuries were retrospectively analyzed. All exhibited symphyseal diastasis (mean 44.5 ± 13.8 mm), reduced by ~50% after pelvic binder application. Surgical treatment involved symphyseal plating with 4- or 6-hole stainless steel reconstruction plates; two required temporary external fixation, and one bilateral AO 61B3.3 case also received sacroiliac screw fixation. Results: Mean operative time was 65 minutes, blood loss 150–400 mL, and transfusion need 0–3 units. Hospital stay averaged 15 days, with two ICU admissions (2–5 days). One case required revision for posterior instability, another showed screw loosening. Early complications occurred in two patients, and late osteolysis in three, without infection

or nonunion. Full weight-bearing was achieved within 8–12 weeks, and functional results were good in three cases, fair in one.

Conclusions: Water slide accidents can cause high-energy APC2 “open-book” injuries comparable to traffic trauma. Early binder use improves stability, while posterior instability predicts fixation failure.

Support: None

THE CHANGE OF PERFUSION IN POSTOPERATIVE ADHESION FORMATION AND THE ROLE OF VEGF

Mahan Zare (Department of Experimental Cardiology and Surgical Techniques, Heart and Vascular Center, Semmelweis University)

Aims: This study evaluated adhesion perfusion dynamics and vascular endothelial growth factor (VEGF) expression during the early postoperative period using real-time laser speckle contrast imaging to correlate microvascular changes with angiogenic activity during adhesion formation.

Methods: NMRI mice were anesthetized, and after a midline incision, baseline perfusion was recorded at the adhesion induction site. Scratches were made on the cecum’s surface and peritoneal wall, followed by desiccation. The cecum was repositioned, and a postoperative measurement was taken. Subsequent termination measurements were conducted at 1 h, 2 h, 4 h, 6 h, and at postoperative days 1, 2, 3, 4, 5, and 7 (n = 6 per group). Tissue samples were collected for VEGF quantification by spectrophotometry.

Results: Baseline perfusion averaged 792.8 flux units. Perfusion declined sharply to 339.3 and reached its minimum at 4 hours (192.4). From 6 hours, perfusion gradually recovered, approached baseline by day 2, peaked on day 5, and decreased again by day 7, forming an early hypoperfusion-recovery-stabilization pattern. VEGF expression showed an initial surge at 2 hours, followed by reduced levels at 4–6 hours and days 2–4, with a secondary rise on day 5 and a slight decline by day 7. Perfusion and VEGF demonstrated a significant inverse correlation ($r = -0.50$, $p = 0.003$), indicating higher VEGF concentrations in more hypoperfused tissue.

Conclusions: This study demonstrates a biphasic perfusion response during early adhesion formation, with an immediate postoperative decline followed by progressive recovery. The rise in perfusion after day 2 suggests ongoing vascular remodeling relevant to adhesion development. VEGF showed an inverse pattern, peaking during early hypoperfusion and later recovery. These coordinated changes highlight time-dependent windows that may guide targeted strategies to prevent adhesions.

Support: Department of Experimental Cardiology and Surgical Techniques

SURGICAL PLAN OPTIMIZATION FOR LOW RECTAL CANCER TREATMENT IN THE ERA OF MULTIPLE TECHNIQUES IN HAND

Dr. Jiahui Ding (1), (2) Dr. Balázs Bánky PhD, (3) Dr. Loránd Lakatos (Department of Surgery, Transplantation and Gastroenterology, Semmelweis University)

Aims: Our aim was to review the practice of our clinic regarding surgical treatment of low rectal cancer focusing on access and techniques and the need for change of surgical plan due to technical reasons including access and technique, as well.

Methods: We performed a retrospective clinical data collection analysis of three years (2022–2024). Patients undergoing low rectal resection or extirpation for malignancy were included. We collected data on planned and eventually performed surgical techniques and assessed cases where the plan had to be changed during operation.

In addition, we collected data on the potential difficulty factors of rectal surgery: gender, BMI, neoadjuvant therapy, tumor height and pelvic size.

Results: The total number of assessed cases was 295. In 31 cases (10,5%) the original surgical plan has been changed. Conversion rate to open surgery was 5,8% (17 cases). Difficulty factors and reasons to change the operation plan will be discussed in details in our presentation. 10 out of 22 (45,4%) planned robotic TaTME cases were completed with robotic anterior resection, while, 5 out of 49 cases in laparoscopic TaTME were finished without transanal access. One single laparoscopic or robotic TaTME case out of 58 cases (1,7%) were converted to open over the three years.

Conclusions: The emergence of TaTME has dramatically reduced the need to convert rectal surgery cases to open, while robotic surgery makes TaTME only needed in a minority of the cases treated with minimally invasive access.

Support: This research received no external funding.

MATERNAL AND FETAL FACTORS ASSOCIATED WITH GESTATIONAL AGE AT PRENATAL DETECTION OF CONGENITAL HEART DEFECTS: A MULTIVARIABLE COHORT ANALYSIS

Olívia Lili Szepesi (1), (2) Artúr Beke MD-PhD (Semmelweis Egyetem Department of Obstetrics and Gynecology)

Introduction: Prenatal detection of congenital heart defects (CHD) is crucial for optimizing perinatal outcomes, but gestational age at diagnosis varies widely. The independent maternal and fetal factors affecting detection timing remain unclear.

Aim: To assess whether maternal and fetal parameters are associated with gestational age at prenatal CHD detection and may inform risk-stratified screening.

Methods: We analyzed 903 pregnancies with confirmed CHD managed at a national tertiary referral center between 2005 and 2020. The primary outcome was gestational age at detection. Predictors included maternal age, twin pregnancy, amniotic fluid abnormalities, chromosomal abnormalities including Down syndrome, and CHD severity. Univariable analyses used Student's t-test, Welch's t-test, or Mann–Whitney U test, as appropriate. Multivariable linear regression with robust standard errors and backward elimination identified independent predictors.

Results: In univariable analyses, advanced maternal age, Down syndrome, and chromosomal abnormalities were associated with earlier detection, while oligohydramnios was associated with later detection. Twin pregnancy, polyhydramnios, and CHD severity were not significant. In multivariable analysis, only maternal age, Down syndrome, and oligohydramnios remained independent predictors. Maternal age ($\beta=-0.20$ weeks/year; $p<0.001$) and Down syndrome ($\beta=-1.70$ weeks; $p=0.011$) were associated with earlier detection, whereas oligohydramnios was associated with later detection ($\beta=+2.59$ weeks; $p=0.005$).

Conclusion: Gestational age at prenatal CHD detection is independently influenced by maternal age, Down syndrome, and oligohydramnios. Although several factors were significant in univariable testing, only these remained significant after adjustment, supporting the value of multivariable analysis and risk-stratified prenatal screening.

COMPARATIVE EVALUATION OF SENTINEL LYMPH NODE DETECTION METHODS IN VULVAR CANCER

Pál Szabolcs Sebok (Semmelweis University)

Aims: To compare the effectiveness of indocyanine green (ICG) and the conventional combination of technetium-99m (Tc-99m) plus methylene blue for sentinel lymph node mapping in patients with early-stage vulvar cancer.

Methods: A retrospective, single-center study was conducted at the Department of Obstetrics and Gynecology, Semmelweis University. Fifty-seven patients with early-stage vulvar cancer were included (27 in the ICG group and 30 in the Tc-99m plus methylene blue group). Sentinel lymph node detection rates were evaluated on both a per-patient and per-groin basis. Groups were compared using Fisher's exact test, with statistical significance set at $p < 0.05$.

Results: The per-patient detection rate was 100% in both groups. On a per-groin basis, the detection rate was 95.9% (47/49 groins) with ICG and 85.2% (46/54 groins) with Tc-99m plus methylene blue, corresponding to an absolute difference of 10.7% (95% CI: -0.3% to 21.7%; $p = 0.07$). One false-negative case was observed in the ICG group. The sensitivity of ICG was 91.7%, compared with 100% for Tc-99m plus methylene blue.

Conclusions: ICG demonstrated detection rates comparable to those achieved with the conventional Tc-99m plus methylene blue technique, supporting its use as a reliable standalone tracer for sentinel lymph node mapping in vulvar cancer. Its real-time visualization, lack of ionizing radiation, and simplified logistics make ICG a promising alternative to radioisotope-based mapping. Larger prospective studies are warranted to confirm its routine clinical implementation.

Support: This study was supported by the team of the Center of Gynecological Oncological Surgery, Department of Obstetrics and Gynecology, Semmelweis University. No external funding or financial support was received.

PS5. Poster Session V. (Otorhinolaryngology-Radiology)

PARATHYROIDECTOMY PITFALLS - LESSONS FROM ATYPICAL CASES

Tóth Lili (1), Dános Kornél dr. (1) (1 Department of Otorhinolaryngology, Head and Neck Surgery, Semmelweis University)

Aims: Parathyroid surgery remains challenging due to the small gland size, variable anatomy, and proximity to critical neck structures (recurrent laryngeal nerve, common carotid artery). Accurate preoperative localization is essential; however, imaging may be misleading, and atypical lesions can mimic parathyroid pathology. Therefore, we aim to highlight diagnostic pitfalls and the importance of integrated decision-making through two illustrative cases.

Methods: We present two cases illustrating diagnostic and operative challenges in parathyroid surgery. The first involved syndromic hyperparathyroidism associated with a CDC73 mutation, managed with comprehensive clinical, biochemical, genetic, and imaging workup and staged surgery. The second case was identified during evaluation for primary hyperparathyroidism, where SPECT/CT revealed both a suspected adenoma and atypical tracer uptake, requiring further imaging, surgical exploration, and histopathological verification.

Results: The syndromic case emphasized the importance of genetic testing, multidisciplinary management, and careful interpretation of intraoperative PTH dynamics to avoid reoperation. The second case demonstrated that MIBI-avid lesions are not always parathyroid-specific, as histopathology revealed a benign salivary oncocytoma mimicking ectopic parathyroid tissue.

Conclusions: Parathyroid surgery requires multidisciplinary decision-making beyond imaging findings alone. Correlation of biochemical, imaging, genetic, intraoperative, and histopathological data is essential to avoid diagnostic pitfalls and optimize surgical outcomes.

Support: No funding was received.

MODERN MANAGEMENT OF SEVERE UPPER AIRWAY STENOSIS

Greta Kovacs (Department of Otorhinolaryngology and Head and Neck Surgery)

AIM: Iatrogenic subglottic stenosis is a severe upper airway narrowing caused mainly by prolonged intubation or tracheostomy-related scar formation. Severe cases may result in respiratory compromise, tracheostomy dependence, and speech loss. Surgical treatment, particularly in cricoid involvement, remains challenging. This study investigated the success of surgical management of iatrogenic subglottic stenosis, focusing on slide laryngotracheoplasty. Success was assessed by decannulation, reoperation rate, and speech recovery.

METHODS: A retrospective review of medical records was performed. In 2024–2025, 15 open slide laryngotracheoplasties and two additional open surgeries were carried out for severe laryngeal stenoses, frequently with near-complete or complete obstruction, alongside endoscopic interventions.

RESULTS: Seventeen operations were performed in 15 patients: 1 child (7 years) and 14 adults (3 women, 11 men; mean age 46.31 years, SD 16.94). Twelve patients had tracheostomy tubes, while 3 presented with exertional dyspnea. Preoperative assessment showed Cotton–Myer Grade 4 stenosis in 8 and Grade 3 in 7 cases. Eleven patients were successfully decannulated. One patient refused decannulation, and treatment remains ongoing in one case. Two patients required repeat open surgery for restenosis but could not be decannulated. Single resection was sufficient in 5 cases, whereas 10 required additional endoscopic laser treatment or balloon dilation.

CONCLUSIONS: Slide laryngotracheoplasty achieved permanent decannulation in 73% of cases. Long stenotic segments can be reconstructed after adequate tracheal mobilization, although restenosis may worsen outcomes. Prevention through shorter intubation and earlier tracheostomy remains essential.

SUPPORT: No external financial support was received. The study used institutional clinical data under mentor supervision.

ARTIFICIAL INTELLIGENCE AS A DECISION-SUPPORT TOOL FOR PULMONARY NODULE DETECTION ON CHEST CT

Lazar Gyula Papp (1), (1) Dr. med. habil. Ádám Domonkos Tárnoki PhD, (1) Dr. med. habil. Dávid László Tárnoki PhD ((1) Department of Radiology, Semmelweis University, Budapest, Hungary)

AIMS: To evaluate the performance of a deep learning–based artificial intelligence (AI) system for pulmonary nodule detection on chest computed tomography (CT) examinations and to assess its potential role as a clinical decision-support tool in radiological practice.

METHODS: A retrospective analysis of 318 clinically indicated chest CT examinations acquired between 02 May 2025 and 23 May 2025 at the Medical Imaging Centre of Semmelweis University was performed. CT datasets were anonymized and independently evaluated by human readers, including board-certified radiologists, radiology residents, and medical students. A deep learning–based computer-aided detection system generated AI-assisted predictions for secondary evaluation. Patient-level agreement, lesion-level agreement, and evaluation times were analyzed descriptively.

RESULTS: A total of 1,626 evaluation instances were included, comprising 829 primary and 797 AI-assisted secondary evaluations. Patient-level agreement between readers and AI predictions was observed in 76.7% of cases, while lesion-level agreement reached 60.0%. The AI system classified 34.5% of examinations as suspicious for malignancy. Additional lesions not initially identified by readers were reported in 2.1% of AI-assisted evaluations. Mean evaluation time during AI-assisted assessment was shorter compared to primary evaluation (44.4 vs. 88.1 seconds), although potential recall bias must be considered due to the sequential evaluation design.

CONCLUSIONS: AI-assisted pulmonary nodule detection demonstrated moderate agreement with human readers and may provide workflow support during chest CT interpretation. These findings support the potential role of AI systems as decision-support tools in thoracic radiology; however, further validation studies using standardized prospective designs are required before broader clinical implementation.

SUPPORT: The AI software used in the study was provided for research purposes only.

RADIOMIC ANALYSIS OF CT IMAGES IN RENAL TUMOR PATIENTS DEVELOPING BONE METASTASES

Kárpáti Anna Borbála (1), (2) Dr. med. habil. Ph.D. Ádám Domonkos Tárnoki, (2) Dr. med. habil. Ph.D. Dávid László Tárnoki ((1) Semmelweis University, Faculty of Medicine (2) National Institute of Oncology, Center of Oncologic Imaging and Invasive Diagnostics and National Tumor Biology Laboratory)

Aims: Renal cell carcinoma heterogeneity confounds accurate clinical prognosis, whereas radiomic analysis quantifies tumor imaging features, yielding valuable prognostic biomarkers. This study aimed to evaluate CT-derived arterial-phase tumor texture features in RCC patients who later developed bone metastases compared with those who did not.

Methods: This retrospective study included 35 patients, of whom 15 subsequently developed bone metastases and 20 remained metastasis-free. RCCs were manually segmented on CT images, and texture-based radiomic features were extracted using PyRadiomics. Clinical covariates included age, sex, and histological category (RCC vs. other). Multivariable linear regression (OLS) models were applied for each radiomic feature, using radiomic values as dependent variables and age, sex, histology, and bone metastasis status as explanatory variables. Benjamini–Hochberg false discovery rate (FDR) correction was used to adjust for multiple testing.

Results: Most of the patients were male (70%), the patients average age was 65 years and the clear cell carcinoma was the most common histological subtype. After FDR correction, 19 radiomic features showed significant differences between metastatic and non-metastatic groups ($p < 0.05$), independent of clinical covariates. These features could be categorized into three groups: shape-based (e.g. diameter, axis length, volume, surface, sphericity, elongation), intensity-based (e.g. energy, entropy) and texture-based parameters (e.g. gray level co-occurrence and – run length matrix).

Conclusions: Certain CT-based texture radiomic features were associated with later development of bone metastases in RCC patients. These findings suggest that radiomic parameters may serve as potential imaging biomarkers for early prediction of bone metastatic risk.

Support: National Tumor Biology Laboratory (NTL-17)

INITIAL RESULTS ON THE EFFECT OF A NOVEL ARTIFACT REDUCTION ALGORITHM IN SINGLE-SOURCE PHOTON-COUNTING DETECTOR CT CORONARY CT ANGIOGRAPHY

Gergely Veréb (1), (1) Kristóf Nagy, (1) Krisztián Kocsis, (1) Sámuel Beke, (1) István Csulak, (1) Réka Sebestyén-Dósa, (1) Barnabás Baksa, (1) Miklós Vértes, (2) Andrea Bartykowszki, (1) Lili Száraz, (1) Pál Maurovich Horva (1) Medical Imaging Centre, Semmelweis University (2) Heart and Vascular Centre, Semmelweis University)

Introduction: The minimalization of motion and stair-step artifacts in coronary CT angiography (CCTA) is crucial for diagnosis. The newly developed ZeeFree (ZF) algorithm has previously demonstrated effective artifact reduction with dual-source photon-counting detector CT (PCD-CT). However, its performance hasn't been evaluated yet on single-source PCD-CT systems.

Aims: To assess the effectiveness of the ZF algorithm in CCTA images acquired with a single-source PCD-CT scanner.

Methods: In this retrospective study, patients who underwent CCTA between October 2024 and March 2025 on a single-source PCD-CT scanner were included. Curved multiplanar reconstructions were generated with TrueStack (TS) and ZF algorithms from the automatically selected best phases for the three main coronary arteries. Two readers evaluated motion artifacts, stair-step artifacts, and diagnostic confidence using a predefined subjective scoring system. Non-parametric tests were used to evaluate differences in scores.

Results: A total of 103 patients (52.9% female, 63 ± 11 years) were included. Compared with TS, the ZF algorithm achieved higher scores for step artifacts and diagnostic confidence in all three coronary arteries for both readers (all $p < 0.001$). However, in case of motion artifacts ZF achieved significantly higher scores only with one reader for the left anterior descending artery (LAD) ($p < 0.001$) and the left circumflex artery (LCX) ($p = 0.005$), but not for the right coronary artery (RCA) ($p = 0.172$), and not for the other reader (RCA: $p = 0.564$; LAD: $p = 0.052$; LCX: $p = 1.000$).

Conclusions: Using single-source PCD-CT, ZF effectively reduces stair-step artifacts, improving diagnostic confidence. However, its effect on motion artifacts is modest, and reducing them remains a future challenge.

COMPARING THE EFFECTIVENESS AND SAFETY OF EMBOLIC AGENTS IN BRONCHIAL ARTERY EMBOLIZATION- A SYSTEMATIC REVIEW AND META-ANALYSIS

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Aims: Bronchial artery embolization effectively treats severe and recurrent hemoptysis and reduces mortality rates from 80-90% to less than 10%. Despite its success, no previous meta-analysis has focused on comparing the effectiveness and safety of particle and liquid embolic agents, therefore this study aims to address this gap.

Methods: We systematically searched MEDLINE, EMBASE, CENTRAL for relevant studies from inception until November 02, 2023. Eligible studies included cohort studies of patients who were treated with either particle or liquid embolic agents. The technical and clinical success, hemoptysis recurrence rates were meta-analyzed. Risk of bias was assessed using MINORS. Forest plots visualized meta-analytical results. The study was registered with PROSPERO (CRD42023480289).

Results: Of 2,502 studies, 59 met the inclusion criteria, including 4,660 patients. No significant difference between particle and liquid agents was observed in the proportion of immediate clinical success (0.95 vs 0.95, $p = 0.935$). The proportion of 12-month hemoptysis recurrence did not differ significantly between particle and liquid embolic agents (0.14 vs 0.17, $p = 0.663$). Significantly higher proportions of hemoptysis recurrence were observed between patients with malignant and non-malignant lung disease at all follow-up times (1 month: 0.26 vs 0.05; $p < 0.001$; 3 months: 0.44 vs 0.08; $p < 0.001$; 6 months: 0.56 vs 0.12; $p < 0.005$; 12 months: 0.66 vs 0.11; $p < 0.001$).

Conclusion: Our findings suggest that both particle and liquid embolic agents are effective and safe in treating hemoptysis. Patients with malignant lung diseases had shorter hemoptysis-free periods, highlighting that this subpopulation might benefit from a closer follow-up.

Support: None

MULTIPARAMETRIC MRI AND CLINICAL DATA INTEGRATION FOR PROSTATE CANCER DIAGNOSIS: A Retrospective Cohort Study

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Aims: To evaluate the diagnostic utility of multiparametric magnetic resonance imaging (mpMRI) integrated with clinical anamnesis in patients undergoing assessment for prostate cancer and prostatitis. The study also aimed to establish a large retrospective imaging database for identifying potential imaging biomarkers and supporting future radiomics and artificial intelligence (AI)-based diagnostic models.

Methods: A retrospective analysis was performed on approximately 6,000 prostate mpMRI examinations acquired at the National Institute of Oncology, Budapest, between 2008 and the present. MRI protocols included T2-weighted imaging (T2WI), diffusion-weighted imaging (DWI), and dynamic contrast-enhanced (DCE) imaging. Imaging findings were reviewed alongside available demographic characteristics, clinical anamnesis, lesion characteristics, diagnostic information, and structured MRI classifications to investigate associations with prostate cancer and prostatitis.

Results: The median patient age at examination was 69.3 years (IQR 64.1–74.0). Detailed narrative MRI reports were available for 798 examinations, with structured tumour classification recorded for 755 examinations. Among these, 506 (67.0%) demonstrated tumour-positive findings, while 249 (33.0%) were classified as tumour-negative. Imaging features consistent with prostatitis were identified in 58 of 752 (7.7%) classifiable examinations. Explicit PI-RADS scores were documented in 69 examinations, of which 41 (59.4%) were categorized as PI-RADS 4 or 5, indicating a high likelihood of clinically significant prostate cancer. The dataset also contained PSA values, Gleason scores, lesion characteristics, and longitudinal follow-up data for subsets of patients.

Conclusions: This cohort demonstrates the value of integrating mpMRI findings with structured clinical information for prostate cancer evaluation. The comprehensive dataset provides a robust foundation for radiomics research and AI-assisted diagnostic model.

PS6. Poster Session VI. (Cardiology-Internal Medicine-Family Medicine)

CRYOBALLOON ABLATION OF ATRIAL FIBRILLATION IN PATIENTS WITH CARDIAC IMPLANTABLE ELECTRONIC DEVICES: VERY LONG-TERM FOLLOW-UP

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Aims: Despite the growing adoption of pulsed field ablation, cryoballoon (CB) pulmonary vein isolation (PVI) remains a well-established strategy for atrial fibrillation (AF) ablation. Data regarding very long-term outcomes from experienced high-volume centers are limited. This retrospective study aimed to assess the long-term efficacy and safety of CB-PVI.

Methods: We included consecutive patients treated with the CB for atrial fibrillation between 2011 and 2025. Patients with cardiac implantable electronic devices (CIEDs) and ≥ 1 -year follow-up after the index procedure were included. Procedural data, efficacy with AF burden, and safety issues were systematically collected.

Results: A total of 133 patients were included (48% female; mean age 67.3 ± 11 years; 44% with paroxysmal AF). Mean procedure duration was 63.8 ± 13 minutes, with a 100% acute procedural success rate. Major complications occurred in 2 patients (1.5%), including one case of cardiac tamponade and one ischemic stroke. Over a mean

follow-up of 8.66 years, AF recurrence progressively increased, with 21% of patients remaining free from atrial arrhythmia at last follow-up. In non-permanent AF patients, overall AF burden during follow-up was 17.6%, despite 58 redo ablation procedures (44%). Importantly, progression to permanent AF remained relatively low (12.7%) across the cohort.

Conclusions: In patients with AF and CIEDs, CB-PVI was associated with favorable very long-term outcomes, including low overall AF burden and limited progression to permanent AF, alongside an acceptable safety profile.

Support: None.

ELECTROCARDIOGRAPHIC INDICATORS OF HIGH RIGHT VENTRICULAR PACING BURDEN AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION

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Aims: High right ventricular pacing burden (HPB) has been associated with impaired left ventricular systolic function and increased mortality. Predictors of HPB among permanent pacemaker (PM) recipients after transcatheter aortic valve implantation (TAVI) remain poorly defined. This study investigated electrocardiographic (ECG) markers of HPB in TAVI patients.

Methods: We studied 224 consecutive TAVI patients who received permanent pacemakers after TAVI. The primary outcome was right ventricular pacing (RVP) burden >20%. Independent predictors were identified using multivariable logistic regression.

Results: RVP exceeded 20% in 162/224 patients (72.3%). On multivariable analysis, pre-TAVI QRS duration (OR 1.53, 95% CI 1.04–2.26, $p=0.031$) and complete heart block (CHB) as the PM indication (OR 1.45, 95% CI 1.04–2.02, $p=0.027$) were independent predictors. Complete right bundle branch block (OR 1.50, $p=0.080$) and atrial fibrillation (OR 1.33, $p=0.093$) showed non-significant trends. Valve type (balloon versus self-expandable) was not associated with HPB (OR 0.78, 95% CI 0.54–1.14, $p=0.190$). Exploratory analysis suggested that older age amplified QRS-related pacing risk.

Conclusions: Pre-TAVI QRS duration and CHB are principal determinants of high RVP burden after TAVI. Patients implanted for CHB may benefit from early evaluation for physiological pacing. Exploratory analysis furthermore suggests that older age amplifies this effect; prospective validation in a larger cohort is required.

Support: None

THE CHARACTERIZATION OF RIGHT HEART FAILURE IN A SMALL ANIMAL MODEL INDUCED BY LEFT VENTRICULAR DYSFUNCTION

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Aim: Right ventricular (RV) failure is most often secondary to pulmonary hypertension resulting from left ventricular (LV) failure. However, animal models used to study RV failure are typically based on the primary elevation of

pulmonary arterial resistance (e.g., pulmonary artery banding). We aimed to establish and characterize a small animal model of RV dysfunction secondary to LV failure and to compare RV and LV remodeling.

Methods: Left heart failure was induced in young male Wistar rats via transverse aortic constriction (TAC). From the TAC group, we selected animals that showed signs of right heart failure (e.g., generalized edema). Sham-operated animals served as the control group. LV failure was characterized using echocardiography and invasive hemodynamic measurements. To compare the ventricles, histology, qRT-PCR, myofilament force measurements, and microRNA profiling were performed.

Results: TAC animals with RV failure showed increased RV muscle mass (0.056 ± 0.004 vs. 0.034 ± 0.002 ; $p < 0.001$) and RV interstitial fibrosis ($10.66 \pm 1.4\%$ vs. $5.31 \pm 0.4\%$; $p = 0.004$) compared to Sham. RV cardiomyocyte hypertrophy and gene expression changes indicated pathological remodeling. Maximal Ca^{2+} -activated force was reduced in the RV but preserved in the LV. Ca^{2+} sensitivity decreased significantly in the LV only. miRNA profiling revealed seven commonly altered miRNAs in both ventricles (rno-miR-130a; -132; -150; -199a-3p; -199a-5p; -27b; -21) along with chamber-specific changes in the RV (rno-miR-203, -214, -27a, -539, -let-7b) and in the LV (rno-miR-let-7i, -let-7e).

Conclusions: We successfully established RV dysfunction secondary to LV failure in a small animal model. Chamber-specific changes support the need for RV-targeted therapies.

Support: RRF-2.3.1-21-2022-00003; 2026-4.1.1-MISSZIÓK-2026-00013; TKP2021-EGA-23; ADVANCED 150829; STARTING 150923; BO/00619/22; 2024-1.2.3-HU-RIZONT-2024-00059

THE CARDIOPROTECTIVE EFFECTS OF ELECTRIC SKELETAL MUSCLE STIMULATION AFTER ACUTE ISCHEMIC STROKE IN MICE

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Aims: Patients with acute ischemic stroke (stroke) are highly susceptible to serious cardiac complications. Although the dysfunction of brain-heart interaction is known after stroke, the underlying mechanisms remain unclear. Here, we aimed to investigate the effects of stroke on cardiac function and the possible role that electrical skeletal muscle stimulation (EMS) may play in mitigating post-stroke symptoms.

Methods: Adult (3-6 months old), female, and male mice were assigned to four groups: i) control, ii) stimulated (STIM), iii) stroke without stimulation (stroke), and iv) stimulated with stroke (stroke+STIM). Stroke was induced by transient (60 min) middle cerebral artery occlusion under isoflurane anesthesia (1%). EMS was applied for 3 days, starting 24 hours after the stroke. After the termination of mice, stroke size was determined with TTC staining. The hearts were collected for (i) gene expression monitoring using RT-qPCR on homogenates and for (ii) histology analysis on hematoxylineosin (H&E) stained slides.

Results: Infarct size was significantly reduced after EMS therapy (stroke+STIM: $29.6 \pm 12.1\%$ vs. stroke: $45.1 \pm 10.6\%$, $p < 0.05$). EMS therapy ameliorated the stroke-induced atrophy of cardiomyocytes (stroke+STIM: $75.42 \pm 22.7 \mu\text{m}^2$, stroke: $58.09 \pm 16.9 \mu\text{m}^2$, and control: $77.4 \pm 26.55 \mu\text{m}^2$; $p < 0.05$). EMS therapy also reduced the stroke-induced marked overexpression of genes associated with myocardial hypertrophy (Myh7), oxidative stress (Sod1), and insulin-independent glucose uptake (Glut1) in cardiac muscle samples.

Conclusions: EMS shows considerable potential in mitigating stroke associated deleterious cardiac changes. In future experiments, we aim to further explore the signaling pathways, both at the mRNA and protein levels, that may underlie the cardioprotective effects of EMS after acute ischemic stroke.

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NON-INVASIVE RIGHT VENTRICULAR PRESSURE-VOLUME ANALYSIS USING THREE-DIMENSIONAL ECHOCARDIOGRAPHY TO ASSESS CARDIAC PERFORMANCE IN HEALTH AND DISEASE

Bálint Csillik (1), (1) Andrea Ferencz, (1) Márton Tokodi, (1) Ádám Szijártó, (1) Béla Merkely, (2) Per Lindqvist, (2) Ashwin Venkateshvaran, (3) Karima Addetia, (4) Sergio Caravita, (4) Claudia Baratto, (4) Luigi P. Badano, (5) Rebecca T. Hahn, (5) Michael I. Brener, (5) Daniel Burkhoff, (1) Attila Kovács, (1) Alexandra Fábián ((1) Semmelweis University Heart and Vascular Center, Budapest, Hungary, (2) Umeå University (Department of Diagnostics and Intervention), Umeå, Sweden, (3) University of Chicago (Noninvasive Cardiac Imaging Laboratory), Chicago, Illinois, United States of America, (4) Istituto Auxologico Italiano, IRCCS, San Luca Hospital (Department of Cardiology), Milano, Italy, (5) Columbia University Irving Medical Center (Division of Cardiology, Department of Medicine), New York, NY, United States of America)

Aims: Invasive pressure-volume (PV) analysis is the standard for assessing right ventricular (RV) contractility and RV-arterial coupling (RVAC). Recent advances enable non-invasive reconstruction of RV pressure waveforms from peak systolic pressure, facilitating non-invasive PV-loop assessment.

We aimed to develop a three-dimensional echocardiography (3DE)-based method for non-invasive RV-PV analysis by establishing normative reference values and determining prognostic relevance across diseases.

Method: 635 healthy subjects from the WASE study and 284 patients with various cardiac diseases with 3DE data and Doppler-derived RV peak systolic pressure were included. Non-invasive RV pressure waveforms were combined with 3DE-derived volume curves to generate PV-loops and calculate end-systolic elastance (Ees), arterial elastance (Ea), and RVAC. The endpoint was a composite of all-cause mortality, heart failure hospitalization, and lung transplantation. Associations between non-invasive RV-PV metrics and the endpoint were assessed using restricted cubic spline (RCS) analyses.

Results: Females and those aged >65 years exhibited higher Ees and Ea, whereas RVAC showed similar values among subgroups. Across all diseases, Ees and Ea were higher, and RVAC was lower compared with matched controls. During a median follow-up of 3.8 years, 81 (29%) patients met the endpoint. RCS analysis showed a U-shaped association for Ees and a linear association for Ea with the endpoint.

Conclusions: Non-invasive 3DE-derived PV-loop analysis enables comprehensive quantification of RV performance and RVAC, identifying disease-specific alterations with prognostic value.

Support: Supported by 2024-1.2.3-HU-RIZONT-2024-00057 (provided by the Ministry of Culture and Innovation of Hungary from the National Research, Development, and Innovation Fund, under the 2024-1.2.3-HU-RIZONT funding scheme).

CORONARY CT ANGIOGRAPHY IN PATIENTS WITH CONCURRENT ATRIAL FIBRILLATION: THE ROLE OF BETA-BLOCKER PREMEDICATION

Soma Levente Szabó (1), (1) Dániel Marácz, (1) Ádám Jermendy, (1) Bálint Szilveszter, (1) Ákos Bérczi, (1) Bartykowszki Andrea, (1) Alexis Panajotu, (1) Adorján Vida, (1) Nándor Szegedi, (1) Klaudia Vivien Nagy, (1) Csaba Csobay-Novák, (2) Pál Maurovich-Horvat, (1) László Gellér, (1) Béla Merkely, (1) Zsófia Dóra Drobni ((1) Városmajor Heart and Vascular Centre, Semmelweis University, (2) Medical Imaging Centre, Semmelweis University)

Aims: This study evaluated the impact of beta-blocker (BB) premedication on heart rate (HR) control, image quality and hemodynamic safety in patients with concurrent atrial fibrillation (Afib) during coronary CT angiography (CCTA).

Methods: This retrospective study integrated records of 1,168 patients with concurrent Afib during CCTA, stratified by BB premedication. Image quality was assessed using a four-point Likert scale: non-diagnostic, moderate, good, and excellent (the latter three defined as diagnostic). Statistical analyses included Fisher's exact, chi-square, and Mann–Whitney U tests, alongside univariable and multivariable logistic regression to identify independent predictors of diagnostic image quality.

Results: Mean age was 63.7 ± 11.1 years, (33% female); 31% received BB premedication. While baseline HR was comparable, HR reduction from admission to pre-scan was significantly greater in the BB group (median 5 [IQR: 0–12] vs 0 [IQR: –6–6], $p < 0.001$). Post-scan blood pressure remained similar, confirming safety. Although the crude proportion of diagnostic scans was significantly higher in the BB group (90% vs. 83%, $p = 0.002$), multivariable analysis demonstrated that BB use was not an independent predictor of image quality.

Conclusions: In patients with concurrent Afib during CCTA, BB premedication effectively and safely reduced HR; however, BB use was not an independent driver of diagnostic image quality. Its efficacy likely depends on multiple hardware and acquisition parameters. Prospective trials using standardized acquisition protocols are necessary to assess the precise role of BBs in this population.

Support: The authors declare that no funds were received during the research process.

1-ES TÍPUSÚ DIABETESES ÉS AUTOIMMUN POLYGLANDULÁRIS SZINDRÓMÁS BETEGEK TERHESSÉGI KIMENETELÉNEK ÖSSZEHASONLÍTÓ ELEMZÉSE / COMPARATIVE ANALYSIS OF PREGNANCY OUTCOMES IN PATIENTS WITH TYPE 1 DIABETES MELLITUS AND AUTOIMMUNE POLYGLANDULAR SYNDROME

Boglarka Kiss, Dr. Beatrix Sarman (Department of Endocrinology, Internal Medicine and Hematology Clinics, Semmelweis University)

Background: The aim of this study was to determine whether autoimmune diseases associated with type 1 diabetes mellitus (T1DM) affect pregnancy and neonatal outcomes. We retrospectively compared neonatal complications, obstetric outcomes, maternal metabolic profile, and autoimmune comorbidities in pregnancies complicated by isolated T1DM (iT1DM) and autoimmune polyglandular syndrome (APS).

Methods: 53 pregnancies (42 women) were selected from a database of 1,053 patients. Insulin dose, HbA1c, lipid profile, APS subtype, birth weight, neonatal complications, and infections were evaluated. Groups were compared using Student's independent two-sample t-test.

Results: 22 pregnancies were complicated by APS and 31 by iT1DM. Among APS patients, 60% had Hashimoto's thyroiditis and 18% had coeliac disease. In the iT1DM group, mean total cholesterol, LDL, HDL, triglycerides, and HbA1c were 7.3 ± 3.2 , 4.0 ± 1.6 , 2.1 ± 0.4 , 1.5 ± 1.0 mmol/L, and $7.0 \pm 0.8\%$, respectively; corresponding values in the APS group were 4.4 ± 0.9 , 2.8 ± 0.8 , 1.5 ± 0.4 , 0.8 ± 0.4 mmol/L, and $7.0 \pm 1.0\%$. Total cholesterol and HDL levels differed significantly between groups. Macrosomia rates were similar (43.3% vs. 45%), whereas other complications, including severe jaundice, respiratory distress syndrome, and congenital heart defects, were more frequent in the APS group (27% vs. 10%).

Conclusions: Patients with APS had a more favorable lipid profile than those with isolated T1DM. Well-controlled APS did not adversely affect pregnancy outcomes; however, associated autoimmune diseases may increase the risk of certain complications, particularly congenital heart defects.

PRECISION TARGETING OF RET IN ADVANCED MALIGNANCIES: REAL-WORLD EXPERIENCES OF SELPERCATINIB THERAPY AT SEMMELWEIS UNIVERSITY (2021–2025)

Simon Horváth (1), (2) Hunor Váradi ((1) Faculty of Medicine, Semmelweis University; (2) Faculty of Medicine, UMFST Tîrgu Mureş; (3) Department of Internal Medicine and Oncology, Semmelweis University)

Aims: RET alterations, including mutations and fusions, are key drivers in thyroid malignancies, which enables selective RET-inhibition with selpercatinib.

This study evaluated real-world clinical outcomes and treatment responses in patients at Semmelweis University, focusing on radiological and biochemical changes.

Methods: This retrospective study analyzed data from 19 patients who were treated with selpercatinib therapy between December 2021 and December 2025.

Results: Indications included medullary thyroid carcinoma (MTC) in 11 patients (57.8%), papillary thyroid carcinoma (PTC) in 7 (36.8%) and one mesothelioma case. Alterations consisted of 10 somatic RET mutations, 7 RET gene fusions and one germline mutation. The mesothelioma patient received off-label selpercatinib therapy.

Most thyroid cancer patients 15 (83%) had prior total thyroidectomy with cervical lymph node dissection. Differentiated thyroid carcinoma patients had previously received radioiodine therapy, while 6 patients had been treated with multikinase inhibitors and 4 received radiotherapy.

The median treatment duration was 24 months (range: 3–48). Among PTC patients, six showed stable disease and one achieved complete remission. In the MTC group, five patients had stable disease and six achieved partial remission. No radiographic disease progression was observed among patients with thyroid cancer.

Biochemical response in MTC was significant: calcitonin levels decreased by >94% in all patients, normalizing in 5/11 cases. Adverse events included QTc prolongation in 8 patients (42.1%), proteinuria in 4 (21.0%), and drug-induced hepatotoxicity leading to treatment interruption in two patients (10.5%).

Conclusion: Selpercatinib demonstrated substantial clinical and biochemical activity in RET-altered malignancies, supporting meaningful clinical benefit in real-world practice.

Support: none

Supervisors: Prof. Dr. Miklós Tóth, Dr. Judit Tőke

Notes

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EDITOR'S NOTE:

All abstracts available to the Editorial Office as of August 27, 2026 are included in this edition of the Archives of the Hungarian Medical Association of America.

The help of the Program Dr. Beáta Kőrösi is appreciated in forwarding and editing the abstracts they received. No alterations in content were carried out.

With questions or suggestions, please contact the Editor at ssomkuti@gmail.com.

*Thank you,
István Somkúti MD PhD*

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