

Oral Presentations

► Oral Presentation 1

Deep Learning-Based MRI Sequence Synthesis Using Imaging Data from Patients with Glioma: A Preliminary Quantitative Evaluation

 **Burcu Yağcıoğlu¹**,  **Ertan Kucuksayan²**,
 **Aslinur Sircan Kucuksayan³**

¹Department of Health Physics, Graduate School, Alanya Alaaddin Keykubat University, Antalya, Türkiye

²Department of Medical Biochemistry, Faculty of Medicine, Alanya Alaaddin Keykubat University, Antalya, Türkiye

³Department of Biophysics, Faculty of Medicine, Alanya Alaaddin Keykubat University, Antalya, Türkiye

ABSTRACT

Incomplete or unavailable MRI sequences may limit multiparametric neuroimaging assessment and motivate the development of methods capable of synthesizing missing image contrasts from existing acquisitions. This study aimed to investigate the feasibility of synthesizing T2-weighted brain magnetic resonance images from T1-weighted images using a deep learning-based image synthesis model. The BraTS 2020 training dataset was used, including 369 glioma cases, consisting of 259 high-grade glioma and 110 low-grade glioma cases. Each case contained T1, contrast-enhanced T1, T2, and T2-FLAIR MR volumes. In this study, T1-weighted images were used as input and corresponding T2-weighted images were used as target data. Seventy slices were selected from each 3D volume, yielding 25,830 paired slice samples for image synthesis.

A Pix2Pix-based conditional generative adversarial network with a generator incorporating nine ResNet blocks was implemented. Training was performed in Google Colab with a batch size of 8 for 19,500 iterations. No independent validation or test dataset was used; instead, structural similarity index measure, VGG perceptual loss, and edge loss were incorporated into the generator loss function during training.

The model generated visually coherent synthetic T2-

weighted images from T1-weighted inputs during training. SSIM values showed increased stability in the final training stage, and the maximum observed SSIM reached 0.9078 on training-set batches. However, this value should be interpreted as a training-phase indicator rather than an independent or generalizable performance metric. These preliminary findings suggest that deep learning-based MRI sequence synthesis may support reconstruction of missing MR sequences, but further evaluation using independent test data and expert clinical assessment is required before diagnostic use.

Keywords: Deep learning; MRI sequence synthesis, Glioma, Pix2Pix, cGAN

REFERENCES

1. Conte GM, Weston AD, Vogelsang DC, et al. Generative Adversarial Networks to Synthesize Missing T1 and FLAIR MRI Sequences for Use in a Multisequence Brain Segmentation Model. *Radiology*. 2021;299(2):313-323. <https://doi.org/10.1148/radiol.2021203786>
2. J. Liu, S. Pasumathi, B. Duffy, E. Gong, K. Datta and G. Zaharchuk, "One Model to Synthesize Them All: Multi-Contrast Multi-Scale Transformer for Missing Data Imputation," in *IEEE Transactions on Medical Imaging*, 2023;42(9):2577-2591. <https://doi.org/10.1109/TMI.2023.3261707>
3. M. M. S, S. M. K and T. Santhanakrishnan, "T1W MRI to T2W MRI Image Synthesis Using SSIMCycleGAN," 2024 11th International Conference on Advances in Computing and Communications (ICACC), Kochi, India, 2024;1-6, <https://doi.org/10.1109/ICACC63692.2024.10845374>
4. Menze BH, Jakab A, Bauer S, Kalpathy-Cramer J, Farahani K, Kirby J, et al. The Multimodal Brain Tumor Image Segmentation Benchmark (BRATS). *IEEE Transactions on Medical Imaging*. 2015;34(10):1993–2024. <https://doi.org/10.1109/TMI.2014.2377694>
5. Bakas S, Akbari H, Sotiras A, Bilello M, Rozycki M, Kirby JS, et al. Advancing The Cancer Genome Atlas Glioma MRI Collections with Expert Segmentation Labels and Radiomic Features. *Scientific Data*. 2017;4:170117. <https://doi.org/10.1038/sdata.2017.117>

► Oral Presentation 2

**Network-Based Early Markers in Parkinson's Disease:
A Functional Connectivity Review** **Sinan Eliacık**

Department of Neurology, Faculty of Medicine, Hitit University,
Çorum, Türkiye

ABSTRACT

Parkinson's disease (PD) is increasingly conceptualized as a disorder of large-scale brain network dysfunction rather than an isolated dopaminergic deficit [1]. In this review, we aim to synthesize current evidence on functional connectivity alterations in early and prodromal Parkinson's disease and to outline a potential multimodal network framework for early identification [1,2].

A structured literature review with a network-based synthesis approach using PubMed, Scopus, and Web of Science databases, covering studies published between 2005 and 2026 [3]. Studies focusing on early-stage and prodromal PD were analyzed, integrating findings from fMRI-based default mode network (DMN) connectivity, frontostriatal circuits, graph theoretical measures, and EEG-derived metrics [3,4,5].

The reviewed studies suggest a relatively consistent pattern in early PD, including reduced DMN connectivity [4,6]. Impaired frontostriatal integration has also been consistently reported [7,5], and disruption of basal ganglia–thalamo–cortical circuits. Graph-based analyses indicate decreased global efficiency and altered network organization [8], while EEG findings show diffuse slowing and reduced signal complexity [3,9]. These alterations are associated with non-motor symptoms, particularly cognitive impairment and sleep disturbances, suggesting a potential preclinical network phenotype [2,10].

This review goes beyond summarizing existing findings by integrating multimodal evidence into a conceptual coherent network-level model of early Parkinson's disease [1]. We propose a multimodal network-based framework integrating fMRI and EEG findings into a unified early PD model [1,3]. Such an approach may improve early identification of individuals at risk and support longitudinal disease monitoring [2,10]. Future standardization and integration into advanced analytical approaches, including AI-based methods, will be

essential for clinical translation [1].

Keywords: Parkinson's disease, EEG findings

REFERENCES

1. Shine JM, Bissett PG, Bell PT, Koyejo O, Balsters JH, Gorgolewski KJ, et al. The dynamics of functional brain networks in Parkinson's disease. *Nat Neurosci*. 2016;19(3):1–9.
2. Baggio HC, Segura B, Sala-Llanch R, Marti MJ, Valldeoriola F, Compta Y, et al. Cognitive impairment and resting-state network connectivity in Parkinson's disease. *Hum Brain Mapp*. 2015;36(1):199–212.
3. Boon LI, Geraedts VJ, Hillebrand A, Tannemaat MR, Contarino MF, Stam CJ, et al. A systematic review of EEG in Parkinson's disease: from diagnosis to clinical application. *J Neurol Neurosurg Psychiatry*. 2019;90(5):1–9.
4. Tessitore A, Esposito F, Vitale C, Santangelo G, Amboni M, Russo A, et al. Default-mode network connectivity in cognitively unimpaired patients with Parkinson disease. *Neurology*. 2012;79(23):2226–2232.
5. Helmich RC, Derikx LC, Bakker M, Scheeringa R, Bloem BR, Toni I. Spatial remapping of cortico-striatal connectivity in Parkinson's disease. *Cereb Cortex*. 2010;20(5):1175–1186.
6. Hou Y, Luo C, Yang J, Ou R, Liu W, Gong Q, et al. Default-mode network connectivity in cognitively normal drug-naïve patients with Parkinson's disease. *J Neurol*. 2017;264(6):1191–1198.
7. Hacker CD, Perlmutter JS, Criswell SR, Ances BM, Snyder AZ. Resting state functional connectivity of the striatum in Parkinson's disease. *Brain*. 2012;135(12):3699–3711.
8. Olde Dubbelink KTE, Hillebrand A, Stoffers D, Deijen JB, Twisk JWR, Stam CJ, et al. Disrupted brain network topology in Parkinson's disease: a longitudinal magnetoencephalography study. *Brain*. 2014;137(1):197–207.
9. Stoffers D, Bosboom JLW, Deijen JB, Wolters EC, Stam CJ, Berendse HW. Slowing of oscillatory brain activity is a stable characteristic of Parkinson's disease without dementia. *Brain*. 2007;130(7):1847–1860.
10. Olde Dubbelink KTE, Hillebrand A, Twisk JWR, Deijen JB, Stam CJ, Berendse HW. Predicting dementia in Parkinson disease by combining neurophysiologic and cognitive markers. *Neurology*. 2014;82(3):263–270.

► Oral Presentation 3

Distribution and Clinical Characteristics of Tibial Nerve A-Waves Across Different Electrophysiological Diagnostic Groups

 **Aysel Çoban Taşkın**

Health Sciences University İzmir Tepecik Education and Research Hospital, Neurology and Neurophysiology Department, İzmir, Türkiye

ABSTRACT

A-waves are reproducible late motor responses that may be observed during routine F-wave studies and can occur both in individuals with normal nerve conduction studies (NCS) and in various peripheral nervous system disorders. This study aimed to evaluate the frequency of tibial nerve A-waves across different clinical and electrophysiological diagnostic groups and to investigate clinical characteristics associated with their presence.

Clinical and electrophysiological data of 59 adult patients in whom the presence of A-waves was assessed during tibial nerve F-wave studies in the electromyography laboratory were analyzed. Patients were classified into groups with normal NCS, axonal polyneuropathy, radicular involvement, Guillain–Barré syndrome (GBS)/previous GBS, and other electrophysiological diagnoses. The presence of diabetes mellitus (DM) was also recorded. Patients exhibiting more than one distinct A-wave were classified as having multiple A-waves. The frequency of A-waves was compared across diagnostic groups, and the association between A-wave presence and age was also evaluated.

Tibial nerve A-waves were identified in 23 of 59 patients (39.0%). The frequency of A-waves was 26.7% (8/30) in patients with normal NCS, 50.0% (5/10) in those with axonal polyneuropathy, 42.9% (3/7) in those with radicular involvement, and 80.0% (4/5) in patients with current or previous GBS. The difference among the normal NCS, radicular involvement, and axonal polyneuropathy groups was not statistically significant ($p=0.349$). Among patients with normal NCS, A-waves were detected in 41.7% (5/12) of those with DM compared with 16.7% (3/18) of those without DM; however, the difference did not reach statistical significance ($p=0.210$). The frequency of A-waves among patients with DM and axonal polyneuropathy was 44.4% (4/9). Patients with A-waves

were older than those without A-waves (58.3 ± 15.8 vs. 47.7 ± 14.8 years; $p=0.010$). This association was also evident among patients with normal NCS (64.9 ± 13.1 vs. 46.3 ± 14.7 years; $p=0.007$). Multiple A-waves were identified in four patients, all of whom had current or previous GBS.

Tibial nerve A-waves may be observed even in patients with otherwise normal NCS and appear to be associated with older age. The higher frequency of A-waves observed in patients with DM despite normal NCS may indicate peripheral nerve alterations preceding abnormalities detectable by routine nerve conduction studies; however, this finding requires confirmation in larger cohorts, particularly considering the lack of statistical significance and the potential confounding effect of age. The clustering of multiple A-waves among patients with current or previous GBS suggests that multiple A-waves may have greater pathological significance than isolated A-waves.

Keywords: A-wave, F-wave, Tibial nerve, Diabetes mellitus, Polyneuropathy, Guillain–Barré syndrome

► Oral Presentation 4

Etiological Spectrum and Diagnostic Pitfalls of Sensory Neuronopathy: A Single-Center Case Series **Nur Türkmen**

Department of Neurology, Division of Clinical Neurophysiology,
Ankara Bilkent City Hospital, Ankara, Türkiye

ABSTRACT

Sensory neuronopathy reflects dorsal root ganglion dysfunction and has heterogeneous acquired or genetic causes [1-3]. We characterized the shared clinical-electrophysiological phenotype and etiological spectrum of affected patients.

We retrospectively reviewed 11 patients evaluated electrophysiologically for sensory neuronopathy/-ganglionopathy. Demographics, clinical phenotype, etiological context, and nerve conduction findings were assessed descriptively. A patient with marked sensorimotor overlap was retained to represent the full clinical-electrophysiological spectrum.

Eleven patients were included (seven men, four women), with a median age of 60 years (range, 33-78). Etiological contexts were malignancy/systemic anticancer therapy (n=5), metabolic or nutritional disorders (n=3), Sjögren syndrome (n=1), autoimmune features without a definitive diagnosis (n=1), and a possibly hereditary background (n=1). Median and ulnar sensory nerve action potentials were absent or unobtainable in the studied limb in ten patients and reduced in one; sural responses were absent or unobtainable in ten and reduced in one. Motor conduction was fully preserved in eight patients, showed limited abnormalities in two and demonstrated marked sensorimotor involvement in one. Documented imbalance or ataxic gait occurred in four patients; four-limb sensory symptoms were recorded in four.

Recognition of dorsal root ganglion involvement is clinically crucial because neuronal cell-body injury produces a distinctive, often irreversible, non-length-dependent sensory syndrome and redirects evaluation toward paraneoplastic, autoimmune, and toxic causes [1-3]. In our cohort, concurrent upper- and lower-limb sensory response loss with motor preservation in most patients supported a reproducible ganglion-level phenotype across heterogeneous mechanisms, consistent with recent series.

Keywords: Sensory neuronopathy, Sensory ganglionopathy, Dorsal root ganglion, Nerve conduction studies, Chemotherapy-induced peripheral neurotoxicity.

REFERENCES

1. Uzunçakmak-Uyanık H, Temuçin ÇM, Tan E, Göçmen R, Yıldız FG. Retrospective review of 56 patients with sensory ganglionopathy. *Arch Neuropsychiatry*. 2026;63:129-136.
2. Moritz CP, Tholance Y, Borowczyk C, et al. Cytokine signature unveils subgroups of patients with immune-mediated sensory neuronopathies. *J Peripher Nerv Syst*. 2025;30:e70008.
3. Maniyar A, Ojha PT, Chheda A, et al. Sensory neuronopathies: clinical presentation, management, and outcome. *Ann Indian Acad Neurol*. 2024;27(5):506-511.

► Oral Presentation 5

Histopathological Evaluation of Exosome Application in an Experimental Alzheimer's Model

 Gökçen Gökçe Tepeli¹,  Sevim Aydın²

¹Department of Histology and Embryology, Faculty of Medicine, Adnan Menderes University, Aydın, Türkiye

²Department of Histology and Embryology, Faculty of Medicine, Ankara University, Ankara, Türkiye

ABSTRACT

Exosome application in Alzheimer's disease has been increasingly used in recent years to investigate the pathogenesis and treatment of the disease. The use of this method for therapeutic purposes is quite important [1]. This study aimed to determine the steps for introducing exosomes obtained from human umbilical cord blood mesenchymal stem cells (UC-MSC) into clinical use for therapeutic purposes [2]. The results obtained within this objective were also confirmed by histological and immunohistochemical staining. In our study, it was shown that exosomes could reach brain tissue. However, it was evaluated that the intranasal (IN) exosome application method reached brain tissue less frequently and had lower efficacy in treatment. Nevertheless, the ease of application of the IN exosome application method and the good results obtained in some animals are important findings [3]. Therefore, we recommend long-term applications to increase the efficacy of exosomes in new research.

Keywords: Alzheimer's, Rat, Amyloid beta, Exosome, UC-MSC.

REFERENCES

1. Evangelopoulou E, Mitka S, Faculty of Medicine Consortium. Exosome-Based Therapeutics in Alzheimer's Disease: Translational Perspectives Beyond Conventional Therapies. *Biomedicines / MDPI*, 2026;48(8):808.
2. Wiley-Blackwell Scientific Publishing. Therapeutic and Diagnostic Roles of MSC-Derived Exosomes in Alzheimer's Disease. *Brain and Behavior*, 2025;15(12):e3.
3. Frontiers in Aging Neuroscience Research Group. Intranasal administration of stem cells and their derivatives for central nervous system disorders: Delivery challenges and barriers. *Frontiers in Aging Neuroscience*, 2026;18:1834543.

► Oral Presentation 6

Investigation of the Efficacy of Supernatants Derived from UV-Induced Adipose-Derived Mesenchymal Stem Cells in an in vitro Parkinson's Model

 **Yasemin Aslanyürek¹**,  **İrem Yağmur Gök²**,
 **Esin Akbay Çetin¹**

¹Department of Biology, Faculty of Science, Hacettepe University, Ankara, Türkiye

²Department of Bioengineering, Hacettepe University, Ankara, Türkiye

ABSTRACT

Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the loss of dopaminergic neurons [1]. This study aimed to evaluate the neuroprotective effects of the supernatant obtained from UV-stimulated adipose-derived mesenchymal stem cells (ADMSCs) in a rotenone-induced in vitro PD model through the assessment of PINK1 and PARK2 gene expressions.

In this study, SH-SY5Y cells were initially differentiated with 10 µM retinoic acid (RA) for 5 days [2]. Neuronal differentiation was verified by immunocytochemistry (ICC), while MAP2 gene expression was evaluated via RT-qPCR. To establish the PD model, 0.1–1 µM rotenone was administered to the differentiated SH-SY5Y cells, and the appropriate dose was determined using MTT and ROS assays [3]. To identify the optimal UV condition for ADMSCs, UVA doses of 25, 50, and 100 mJ were applied for 24 and 48 hours; simultaneously, IL-10 and IGF-1 levels in the supernatants of UV-treated and untreated ADMSCs were analyzed using ELISA [4]. Based on the MTT and ELISA results, the 100 mJ UVA dose for 48 hours was selected. Subsequently, these supernatants were applied to the rotenone-induced PD model, and both cell viability via MTT assay and PINK1 and PARK2 gene expressions via RT-qPCR were evaluated [5].

In conclusion, the findings demonstrate that neuronal differentiation with RA was successfully achieved, as evidenced by the increase in MAP2 expression, and that the UV-stimulated ADMSC supernatant modulated PINK1 and PARK2 gene expressions in a manner that supports a neuroprotective effect. These results are promising for the development of cell-free, stem cell-based therapeutic

approaches in PD.

Keywords: Ultraviolet, Mesenchymal stem cell, In vitro, Parkinson disease, Supernatant.

Acknowledgement: This study was supported by the Scientific and Technological Research Council of Türkiye (TÜBİTAK) under the 2209-A University Students Research Projects Support Program (Project No. 1919B012512446).

REFERENCES

1. Chang YL, Chen SJ, Kao CL, Hung SC, Ding DC, Yu CC, Chen YJ, Ku HH, Lin CP, Lee KH, Chen YC, Wang JJ, Hsu CC, Chen LK, Li HY, Chiou SH. Docosahexaenoic acid promotes dopaminergic differentiation in induced pluripotent stem cells and inhibits teratoma formation in rats with Parkinson-like pathology. *Cell Transplant*. 2012;21(1):313-32. <https://doi.org/10.3727/096368911X580572>.
2. Kamacı İ. Sars-CoV-2 spike/s1 proteini, nöropilin-1 ve toll benzeri reseptör 4 inhibitörlerinin sinir sistemindeki farklı fizyolojik süreçlerde etkilerinin araştırılması (Tez No. 896551) [Yüksek lisans tezi, Hacettepe Üniversitesi]. Ulusal Tez Merkezi. 2024.
3. Betarbet R, Canas AM, Greenamyre JT. Systemic inhibition of complex I reproduces the histopathological and biochemical features of Parkinson's disease. *Nature Neuroscience*. 2020;3(11):1147-1151. <https://doi.org/10.1038/81834>. PMID: 11100151
4. Göncü B, Öztürk D. HT29 hücre hattında sirkadiyen ritme bağlı gen ifadesinin kontrolünde referans gen farklılığının senkronizasyondaki rolü. *Erzincan Üniversitesi Fen Bilimleri Enstitüsü Dergisi*. 2019;12(3):1370-1380. <https://doi.org/10.18185/erzifbed.523088>
5. Geisler S, Holmström KM, Treis CR, Ryan MT. The Parkinson disease-associated proteins PINK1 and Parkin define a common pathway for mitochondrial quality control. *Proceedings of the National Academy of Sciences*. 2010;107(18):8382-8387. <https://doi.org/10.4161/auto.6.7.13286>

► Oral Presentation 7

A Novel Cell Death Model in the Pathogenesis of Neurodegenerative Diseases: Pyroptosis

 Hilal Gelberi¹,  Saime Sürmen¹

¹Department of Molecular Medicine, Hamidiye Institute of Health Sciences, University of Health Sciences, İstanbul, Türkiye

ABSTRACT

Cell death is critically important in embryonic development and maintaining homeostasis in multicellular organisms. Recently, pyroptosis has been identified as a novel death model exhibiting some common features with programmed cell death, apoptosis and necroptosis, and a significant number of studies have focused on it. As a pro-inflammatory, programmed, lytic cell death, pyroptosis defends against endogenous and exogenous threats by activating immune cells. However, pyroptosis can cause various diseases through excessive inflammation and tissue damage. Four distinct mechanisms explain this death mode: canonical inflammasomal (caspase-1 dependent), non-canonical, caspase-3/8, and granzyme-mediated. The executive molecules in these mechanisms are members of the gasdermin family. As the best-known family member, Gasdermin-D (GSDMD) activation significantly involves inflammasome complex formation and caspase-1 activation [1].

In some neurodegenerative diseases, excessive activation of inflammasomes has been reported to fuel chronic neuroinflammation. Recent studies targeting gasdermins inhibition, caspase-1, and inflammasomes are providing important data for Alzheimer's (AD) and Parkinson's diseases (PD) therapy. These studies suggest that amyloid- β (A β) activates NLRP3 inflammasomes in AD. However, when NLRP3 inflammasome-mediated pro-inflammatory release is inhibited, a significant reduction in A β aggregation, tau hyperphosphorylation, neuroinflammation, and pyroptosis is demonstrated [2,3]. Furthermore, A β treatment triggers pyroptosis via the caspase-3/GSDME pathway, whereas suppression of GSDME leads to a decrease in inflammatory response and improvement in cognitive dysfunction [4]. PD studies report that GSDMD contributes to dopaminergic neuron death and microglial activation, and that inhibiting NLRP3/GSDMD pathways reduces damage to dopaminergic neurons [5,6].

Consequently, targeting pyroptosis pathway molecules offers a promising therapeutic strategy to advance clinical neurodegenerative disease treatments.

Keywords: Cell death, Pyroptosis, Gasdermin, Inflammasome, Neurodegeneration

REFERENCES

1. Liu Y, Pan R, Ouyang Y, Gu W, Xiao T, Yang H, Tang L, Wang H, Xiang B, Chen P. Pyroptosis in health and disease: mechanisms, regulation and clinical perspective. *Signal Transduct Target Ther.* 2024;9(1):245.
2. Tang T. Pyroptosis in Alzheimer's Disease: Mechanisms and Therapeutic Potential. *Cell Mol Neurobiol.* 2025;45(1):57.
3. Cai Y, Chai Y, Fu Y, Wang Y, Zhang Y, Zhang X, Zhu L, Miao M, Yan T. Salidroside Ameliorates Alzheimer's Disease by Targeting NLRP3 Inflammasome-Mediated Pyroptosis. *Front Aging Neurosci.* 2022;13:809433.
4. Wang Q, Guo S, Hu D, Dong X, Meng Z, Jiang Y, Feng Z, Zhou W, Song W. Enhanced Gasdermin-E-mediated Pyroptosis in Alzheimer's Disease. *Neuroscience.* 2024;536:1-11.
5. Zhang X, Zhang Y, Wang B, Xie C, Wang J, Fang R, Dong H, Fan G, Wang M, He Y, Shen C, Duan Y, Zhao J, Liu Z, Li Q, Ma Y, Yu M, Wang J, Fei J, Xiao L, Huang F. Pyroptosis-mediator GSDMD promotes Parkinson's disease pathology via microglial activation and dopaminergic neuronal death. *Brain Behav Immun.* 2024;119:129-145.
6. Zhang H, Song L, Zhou L, Li X, Xuan M, Liu C, Zhao H. α -Lipoic acid alleviates Parkinson's disease by suppressing S100A9-mediated pyroptosis. *Int Immunopharmacol.* 2025;155:114539.

► Oral Presentation 8

From Molecular Advances to Primary Care: Awareness and Preparedness of Family Physicians for Neurodegenerative DiseasesÖzge Özen Gökmuharremoğlu¹, Gülşah Çelik²¹Department of Neurology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye²Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye**ABSTRACT**

Rapid advances in neurodegenerative biomarkers, disease-modifying therapies, and the recognition of early non-motor manifestations are reshaping clinical pathways [1–3]. This study evaluated family physicians' awareness of these developments and their perceived preparedness to translate them into primary care.

A cross-sectional questionnaire study was conducted among 56 family physicians. The survey assessed awareness of early clinical manifestations, emerging diagnostic biomarkers and therapies, perceived clinical preparedness, and educational needs. A study-specific Emerging Science Awareness Score (0–17) was generated. Internal consistency was assessed using Cronbach's alpha, group comparisons were performed with the Mann–Whitney U test, and associations were evaluated using Spearman correlation.

Only 21.4% of participants had attended a neurology-, dementia-, or neurodegeneration-related educational activity within the previous two years. Awareness of blood-based Alzheimer's disease biomarkers was 19.6%, while 39.3% had heard of amyloid-targeting therapies. Only 21.4% felt confident in recognizing non-motor manifestations of Parkinson's disease, and 12.5% felt confident counseling patients about emerging biomarkers or disease-modifying treatments. The Emerging Science Awareness Score showed good internal consistency (Cronbach's $\alpha=0.812$) and was significantly higher among physicians who had recently received relevant education (10.08 vs. 6.66; $U=400$; $p=0.0066$). Overall, 83.9% expressed interest in short professional educational programs.

Family physicians were more familiar with established clinical concepts than with emerging biomarker-based diagnostic and disease-modifying therapeutic approaches.

Recent relevant education was associated with higher scientific awareness, whereas perceived clinical preparedness remained limited. These findings suggest that targeted continuing medical education may help bridge the translational gap between advances in molecular neuroscience and their integration into primary care practice.

Keywords: Family physicians, Neurodegeneration, Biomarkers, Disease-modifying therapy, Awareness, Primary care.

REFERENCES

1. Palmqvist S, Tideman P, Mattsson-Carlsson N, et al. Alzheimer's Association Clinical Practice Guideline on the use of blood-based biomarkers in the diagnostic workup of suspected Alzheimer's disease. *Alzheimer's Dement.* 2025. doi:10.1002/alz. 70535
2. Khanna A, Beck J, Poston K, Schwarzschild MA, Jones GB. The potential of distributed diagnostics for the early detection of Parkinson's disease. *J Parkinsons Dis.* 2025;15(3):646-653.
3. Zhang Y, Chen J, Li Y, Jiao B, Luo S. Disease-modifying therapies for Alzheimer's disease: clinical trial progress and opportunity. *Ageing Res Rev.* 2025;103:102595.

► Oral Presentation 9

Therapeutic Potential of GLP-1 Receptor Agonism in Neurodegeneration: A Systematic Analysis of Exenatide-Induced BDNF/TrkB ModulationID Perihan Gürbüz¹, ID Oktay Şener¹¹Vocational School of Health Services, İnönü University, Malatya, Türkiye

therapeutic target for managing neurodegenerative conditions.

Keywords: Exenatide, BDNF, GLP-1, Neuroprotection, Synaptic Plasticity**ABSTRACT**

Type 2 Diabetes Mellitus and metabolic disorders constitute critical risk factors for neurodegenerative diseases, including Alzheimer's and Parkinson's disease. Exenatide (Exendin-4), a glucagon-like peptide-1 (GLP-1) receptor agonist that successfully crosses the blood-brain barrier, exhibits substantial neuroprotective effects. The objective of this study is to comprehensively examine the molecular modulation exerted by Exenatide on the Brain-Derived Neurotrophic Factor (BDNF) and its receptor TrkB signaling axis through a holistic approach.

A systematic literature review was conducted in PubMed, SpringerLink, and Scopus databases employing the keywords "GLP-1" and "neurotrophins." Adhering to PRISMA guidelines, 541 records were retrieved. Following full-text screening of 84 articles, 11 studies specifically addressing Exenatide and BDNF interactions were selected for systematic synthesis. In vitro and in vivo parameters involving cellular viability, protein and mRNA expressions, synaptic trafficking, and behavioral cognitive tests were thoroughly analyzed.

Exenatide significantly stimulates BDNF transcription through CREB phosphorylation mediated by cAMP/PKA/ERK intracellular pathways. This elevation accelerates the membrane translocation of GluR1 and PSD-95 synaptic proteins, while concurrently suppressing p75NTR and caspase-dependent pro-apoptotic cascades to preserve synaptic plasticity. Although the compound effectively reverses cognitive decline in aging and diabetic models, its behavioral recovery capacity appears limited in severe neurodegenerative states, despite successfully reducing neuroinflammation and restoring BDNF signaling. Furthermore, brainstem BDNF-expressing nucleus tractus solitarius neurons were identified as a key central pathway governing metabolic regulation.

Exenatide exerts robust neuroprotection by activating the BDNF-TrkB-CREB axis, establishing a valuable

► Oral Presentation 10

The Effect of Glp-1 Agonist Semaglutide in Valproic Acid-Induced Rat Model of Autism Spectrum Disorder

 **Ebru Alkan**¹,  **Yasemin Tekşen**¹,  **Meliha Koldemir Gündüz**²,  **Nihal Yurteri**³

¹Department of Pharmacology, Faculty of Medicine, Kütahya Health Sciences University, Kütahya, Türkiye

²Department of Basic Sciences of Engineering, Faculty of Engineering and Natural Sciences, Kütahya Health Sciences University, Kütahya, Türkiye

³Department of Child and Adolescent Psychiatry, Faculty of Medicine, Kütahya Health Sciences University, Kütahya, Türkiye

ABSTRACT

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by impairments in social interaction and repetitive behaviors. Since current treatments are symptomatic, novel therapeutic approaches are required. Glucagon-Like Peptide-1 (GLP-1) receptor agonists are known for their anti-inflammatory and neuroprotective effects. This study aimed to investigate the behavioral effects of semaglutide, a long-acting GLP-1 agonist, in a prenatal valproic acid (VPA)-induced rat model of ASD.

Pregnant Wistar rats were treated with a single dose of 400 mg/kg VPA (i.p.) on gestational day 12.5 (G12.5) to induce the ASD model. The control group received saline. Male pups, weaned on postnatal day 21 (P21), were randomized into 4 groups (n=7): Control, VPA, VPA+Semaglutide 20 µg/kg (SEMA20), and VPA+Semaglutide 40 µg/kg (SEMA40). SEMA administrations were performed once daily (i.p.) for 4 weeks post-P21. At the end of the treatment period, animals were subjected to the three-chamber sociability, open field, marble burying, and elevated plus maze behavioral tests.

No significant difference was found between the groups in terms of body weight and blood glucose levels ($p>0.05$). In behavioral tests, prenatal VPA administration significantly reduced the sociability index and social novelty preference compared to the control group ($p<0.001$), while increasing locomotor activity and repetitive marble-burying behaviors. The 4-week semaglutide treatment significantly improved the impaired

sociability index and anxiety-like behaviors in the VPA group in a dose-dependent manner. Notably, the SEMA40 dose significantly reduced repetitive behaviors in the marble burying test ($p<0.05$).

Our findings demonstrate that semaglutide possesses strong anxiolytic and behavioral recovery potential in reversing social deficits, anxiety, and stereotyped repetitive behaviors induced by prenatal VPA in rats. These outcomes support that the GLP-1 pathway could be a novel therapeutic target for the treatment of ASD.

Keywords: Autism spectrum disorder, Valproic acid, Semaglutide, GLP-1, Behavioral tests.

REFERENCES

1. Aishworiya R, Valica T, Hagerman R, Restrepo B. An update on psychopharmacological treatment of autism spectrum disorder. *Neurotherapeutics*. 2022;19(1):248-262.
2. Baronio D, Castro K, Gonchoroski T, de Melo GM, Nunes GD, Bambini-Junior V, Gottfried C, Riesgo R. Effects of an H3R antagonist on the animal model of autism induced by prenatal exposure to valproic acid. *PLOS ONE*. 2015;10(1):e0116363.
3. Davinelli S, Medoro A, Siracusano M, Savino R, Saso L, Scapagnini G, Mazzone L. Oxidative stress response and NRF2 signaling pathway in autism spectrum disorder. *Redox Biology*. 2025;83:103661.
4. Eddy NB, Leimbach D. Synthetic analgesic. II. Dithienyl butenyl and dithienyl butylamines. *Journal of Pharmacology and Experimental Therapeutics*. 1953;107(3):385-393.

► Oral Presentation 11

In Vitro Investigation of the Antiproliferative Potential of the *Achyranthes aspera* Dichloromethane (DCM) Extract in SH-SY5Y Neuroblastoma Cells **Melike Bakırcı¹**,  **İrfan Çınar²**¹Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye²Department of Pharmacology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye**ABSTRACT**

Neuroblastoma is the most common extracranial solid tumor of childhood and arises from the sympathetic nervous system. Even with intensive, multimodal treatment, resistance, relapse, and treatment-related toxicity remain major problems in high-risk cases. Here we examined how the dichloromethane (DCM) extract of *Achyranthes aspera* affects SH-SY5Y neuroblastoma cells. Cells were treated with the extract at 31.25, 62.5, 125, 250, and 500 µg/mL, and measurements were taken at 24, 48, and 72 h. Metabolic activity was assessed with the MTT assay. Untreated cells served as the control and cells exposed to 100 µM cisplatin as the positive control. Wound-healing images were followed qualitatively from D0 to D3. The clearest time-dependent decrease occurred in the 125 µg/mL group, where MTT activity was $92.2 \pm 24.3\%$, $69.5 \pm 5.2\%$, and $61.3 \pm 10.5\%$ at 24, 48, and 72 h, respectively. The reduction in the 250 µg/mL group was more limited. At 500 µg/mL the MTT signal stayed close to the control, yet microscopy showed disrupted cells and a loss of monolayer integrity; we considered that this mismatch might reflect MTT interference. Taken together, our findings suggest that the *A. aspera* DCM extract may have antiproliferative potential in SH-SY5Y cells and that the 125–250 µg/mL range in particular warrants closer study.

Keywords: *Achyranthes aspera*, SH-SY5Y neuroblastoma, Antiproliferative activity, MTT assay, Wound-healing assay

REFERENCES

1. Kafoud A, Salahuddin Z, Ibrahim RS, Al-Janahi R, Mazurakova A, Kubatka P, et al. Potential Treatment Options for Neuroblastoma with Polyphenols through Anti-Proliferative and Apoptotic Mechanisms. *Biomolecules*. 2023;13(3):563. <https://doi.org/10.3390/biom13030563>
2. Sinan KI, Zengin G, Zheleva-Dimitrova D, Etienne OK, Fawzi Mahomoodally M, Bouyahya A, et al. Qualitative Phytochemical Fingerprint and Network Pharmacology Investigation of *Achyranthes aspera* Linn. Extracts. *Molecules*. 2020;25(8):1973. <https://doi.org/10.3390/molecules25081973>
3. Baskar AA, Al Numair KS, Alsaif MA, Ignacimuthu S. In vitro antioxidant and antiproliferative potential of medicinal plants used in traditional Indian medicine to treat cancer. *Redox Rep*. 2012;17(4):145–56. <https://doi.org/10.1179/1351000212Y.0000000017>
4. Arora S, Tandon S. *Achyranthes aspera* Root Extracts Induce Human Colon Cancer Cell (COLO-205) Death by Triggering the Mitochondrial Apoptosis Pathway and S Phase Cell Cycle Arrest. *ScientificWorldJournal*. 2014;2014. <https://doi.org/10.1155/2014/191456>

► Oral Presentation 12

The Effect of Electrode Implantation on Peripheral Innate and Adaptive Immune Cell Populations in Wistar Rats

 Elif Büşra Gökçen¹,  Sabriye Karadenizli Taşkın¹,
 Yusufhan Yazır²,  Tülin Burhanoğlu³,  Müge Sarper⁴,  Nurbay Ateş¹

¹Department of Physiology, Faculty of Medicine, Kocaeli University, Kocaeli, Türkiye

²Department of Histology and Embryology, Faculty of Medicine, Kocaeli University, Kocaeli, Türkiye

³Department of Medical Biochemistry, Faculty of Medicine, Kocaeli University, Kocaeli, Türkiye

⁴Faculty of Sport Sciences, Department of Physical Education and Sports Teaching, Kocaeli University, Kocaeli, Türkiye

ABSTRACT

Electrode implantation is an invasive procedure that induces local tissue injury and neuroinflammation and may also influence peripheral immune responses associated with neural implants [1–4]. This study aimed to investigate whether intracranial electrode implantation alters peripheral B-cell and natural killer (NK) cell populations and NK cell activity in adult Wistar rats.

Adult male Wistar rats were assigned to either an electrode-implanted group or a non-implanted control group (n = 5 per group). Peripheral blood samples were analyzed by flow cytometry. B cells were identified as CD45RA⁺CD3⁻ cells, whereas NK cells were identified as CD161⁺CD3⁻ cells [5]. NK cell function was evaluated using an IFN- γ release assay, and activity was normalized to NK cell number to calculate NK cell activity per cell [6]. Statistical analyses were performed using GraphPad Prism version 9.3.1. Group comparisons were conducted using the two-tailed Mann–Whitney U test. P values < 0.05 were considered statistically significant. Electrode implantation significantly increased the proportion of peripheral B cells (p = 0.0079), whereas the NK-cell population was significantly reduced compared with the control group (p = 0.0079). Although NK cell activity per cell was higher in the implanted group, the difference did not reach statistical significance (p = 0.0519).

These findings suggest that electrode implantation is associated with an increased peripheral B-cell population and a reduced NK-cell population. The higher NK-cell

activity per cell observed in the implanted group may indicate enhanced functional activity of the remaining NK cells despite their reduced numbers. The concomitant increase in the B-cell population may reflect early activation of adaptive immune responses following surgical trauma and suggests that innate and adaptive immune responses may exhibit distinct temporal dynamics following electrode implantation.

Keywords: Electrode implantation, Flow cytometry, Natural killer cell, B cell, Peripheral immunity.

REFERENCES

1. Polikov VS, Tresco PA, Reichert WM. Response of brain tissue to chronically implanted neural electrodes. *J Neurosci Methods*. 2005;148(1):1–18.
2. Kozai TDY, Jaquins-Gerstl AS, Vazquez AL, Michael AC, Cui XT. Brain tissue responses to neural implants impact signal sensitivity and intervention strategies. *ACS Chem Neurosci*. 2015;6(1):48–67.
3. Bedell HW, Schaub NJ, Capadona JR, Erefej ES. Differential expression of genes involved in the acute innate immune response to intracortical microelectrodes. *Acta Biomater*. 2020;102:205–219.
4. Micera S, Ceto S, D'Anna E, et al. Biomedical and tissue engineering strategies to control foreign body reaction to invasive neural electrodes. *Front Bioeng Biotechnol*. 2021;9:659033.
5. Grembecka B, Glac W, Listowska M, et al. Subthalamic Deep Brain Stimulation Affects Plasma Corticosterone Concentration and Peripheral Immunity Changes in Rat Model of Parkinson's Disease. *J Neuroimmune Pharmacol*. 2021;16(2):454–469. doi:10.1007/s11481-020-09934-7.
6. Özçelik F, Hacımustafaoğlu F, Tanoğlu A. Modulatory effect of resveratrol and melatonin on natural killer cell activity and adrenomedullin in diabetic rats. *Turk J Med Sci*. 2022;52(1):258–267. doi:10.3906/sag-2104-380.

► Oral Presentation 13

Cancer Neuroscience in Laryngeal Squamous Cell Carcinoma: A Mechanistic Framework Integrating Perineural Invasion, Neuroregulatory MicroRNAs, and Neuroimmune Remodeling **Sinem Gökçe Kütük**

Department of Otolaryngology, Faculty of Medicine, Adnan Menderes University, Aydın, Türkiye

ABSTRACT

Laryngeal squamous cell carcinoma (LSCC) has traditionally been considered an epithelial malignancy driven by genetic and environmental factors. However, emerging evidence indicates that neural and neuroimmune mechanisms significantly contribute to tumor progression. Objective: This study proposes an integrated cancer neuroscience framework for LSCC by synthesizing meta-analytic evidence on perineural invasion (PNI), neuroregulatory microRNAs, and neuroinflammatory biomarkers. Methods: A structured narrative review of published meta-analyses and systematic reviews was conducted using PubMed, Scopus, and Web of Science databases. Evidence was critically analyzed within a cancer neuroscience conceptual framework. Results: Perineural invasion is consistently associated with reduced overall survival, increased recurrence, and aggressive tumor behavior, indicating active tumor–nerve crosstalk. Neuroregulatory microRNAs (including miR-21, miR-34 family, miR-155, miR-195, and miR-196b) demonstrate dual roles in oncogenic signaling and neural regulation. Neuroinflammatory markers, particularly neutrophil-to-lymphocyte ratio, further support the role of immune–neural interactions in tumor progression. Conclusion: LSCC should be conceptualized as a neuro-oncological disease rather than a purely epithelial malignancy. The integration of cancer neuroscience provides a novel framework for biomarker discovery and therapeutic development.

Keywords: Laryngeal cancer, Cancer neuroscience, Perineural invasion, microRNA, Neuroinflammation, Tumor microenvironment, Biomarkers.

REFERENCES

1. Monje M. Neural regulation of cancer. *Nature*. 2020;580:467–474.
2. Hanahan D. Hallmarks of cancer: new dimensions. *Cancer Discov*. 2022;12:31–46.
3. Amit M, et al. Neural reprogramming in head and neck cancer. *Nature*. 2020;578:449–454.
4. Saloman JL, et al. Peripheral nerves in cancer progression. *Nat Rev Cancer*. 2016;16:573–586.
5. Quail DF, Joyce JA. Microenvironmental regulation of tumor progression. *Nat Med*. 2017;23:137–148.
6. Entschladen F, et al. Neurotransmitters in cancer. *Nat Rev Cancer*. 2019;19:293–305.
7. Zou W, et al. miRNA in laryngeal cancer prognosis. *Curr Cancer Drug Targets*. 2020.
8. Huang Y, et al. MicroRNA biomarkers in LSCC. *Cancer Cell Int*. 2021.

► Oral Presentation 14

Development, Characterization, and Biological Evaluation of Juglone-Loaded PLGA Nanoparticles in HeLa Cells** Duygu Elif Yilmaz**

Department of Molecular Biology and Genetics, Yildiz Technical University, İstanbul, Türkiye

ABSTRACT

Juglone is a naturally occurring naphthoquinone with promising anticancer properties; however, its clinical application is limited by poor aqueous solubility and low bioavailability. This study aimed to develop juglone-loaded poly (lactic-co-glycolic acid) (PLGA) nanoparticles and evaluate their anticancer potential in HeLa cervical cancer cells [1, 2].

Juglone-loaded PLGA nanoparticles were prepared using the single-emulsion solvent evaporation method and characterized in terms of particle size, zeta potential, encapsulation efficiency, drug loading, and in vitro drug release. Their biological activity was assessed by comparing the effects of free juglone and nanoparticle-encapsulated juglone on cell viability using the MTT assay. Apoptotic activity was further evaluated by measuring caspase-3 activity, BCL-2 expression, TUNEL staining, and immunocytochemical analyses [2].

The developed nanoparticles exhibited a mean particle size of approximately 207 nm, a zeta potential of -24 mV, and an encapsulation efficiency of 90.1%. Juglone-loaded PLGA nanoparticles demonstrated dose-dependent viability comparable to that of free juglone while enhancing apoptosis, as evidenced by increased caspase-3 activation, decreased BCL-2 expression. The results were also in line with immunocytochemical staining. These findings indicate that PLGA nanoencapsulation improves the therapeutic performance of juglone by enhancing its solubility and apoptotic activity while maintaining its antiproliferative effect in HeLa cells [2].

The developed nanosystem represents a promising drug delivery platform for improving the anticancer efficacy of juglone and warrants further investigation in preclinical cancer models [1].

Keywords: Juglone, PLGA, Nanoparticle, HeLa, Anticancer.

REFERENCES

1. Yilmaz DE, Gumus B and Demirci H. Juglone encapsulation in PLGA nanoparticles improves solubility and enhances apoptosis in HeLa cells. *Cell Biochem Biophys*. 2025;83(3):3081-3092.
2. Erisen S, Arasoğlu T, Mansuroğlu B, Kocacaliskan İ and Derman S. Cytotoxic and mutagenic potential of juglone: a comparison of free and nano-encapsulated form. *Arh Hig Rada Toksikol*. 2020;71(1): 69-77

► Oral Presentation 15

The Effect of Luteolin on Hyperglycemia-Induced Cytotoxicity in Human Retinal Pigment Epithelial Cells: Investigation of Changes in TRPV1 and TRPM2 Channel Expression

 **Nurkan Yanık**¹,  **Kenan Yıldızhan**²

¹Medical Student, Faculty of Medicine, Van Yüzüncü Yıl University, Van, Türkiye

²Department of Biophysics, Faculty of Medicine, Van Yuzuncu Yil University, Van, Türkiye

ABSTRACT

Hyperglycemia contributes to the development of diabetic retinopathy by disrupting redox balance in retinal pigment epithelial cells. TRPV1 and TRPM2 channels are important regulators of oxidative stress-related Ca²⁺ signalling [1,2]. The aim of this study was to determine the cytoprotective effect of luteolin, a naturally occurring flavonoid, on ARPE-19 cells under hyperglycemic conditions and to investigate changes in TRPV1/TRPM2 channel expression.

ARPE-19 cells were divided into four groups: control, luteolin, hyperglycemia, and hyperglycemia+luteolin. A hyperglycemic environment was created by exposing cells to 30 mM glucose for 48 hours. The appropriate concentration of luteolin was determined by dose-response analysis. Cell viability was assessed using the CCK-8 assay, and TRPV1 and TRPM2 protein levels were quantified by ELISA.

High glucose exposure reduced the viability of ARPE-19 cells while increasing TRPV1 and TRPM2 protein levels. Luteolin treatment significantly preserved cell viability and suppressed the hyperglycemia-induced increase of both channels. The reduction in TRPM2 levels, in particular, suggested that luteolin may regulate redox-sensitive Ca²⁺ signalling under hyperglycemic conditions. The findings were consistent with luteolin's antioxidant properties and the roles of TRP channels in hyperglycemic cell damage [2,3].

Luteolin regulates TRPV1 and TRPM2 levels while maintaining viability in hyperglycemic ARPE-19 cells. This bidirectional modulation of TRP channels may be one of the mechanisms underlying luteolin's cellular protective effect against diabetic retinal damage.

Keywords: Diabetic retinopathy, luteolin, ARPE-19, TRPV1, TRPM2.

*This study was supported by the Scientific Research Projects Coordination Unit of Van Yüzüncü Yıl University under the project code [TLO-2026-13246].

REFERENCES

1. Shen YR, Cheng L and Zhang DF. TRPV1: A novel target for the therapy of diabetes and diabetic complications. *Eur J Pharmacol.* 2024;984:177021.
2. Daldal H and Nazıroğlu M. Carvacrol protects the ARPE-19 retinal pigment epithelial cells against high glucose-induced oxidative stress, apoptosis, and inflammation by suppressing the TRPM2 channel signaling pathways. *Graefes Arch Clin Exp Ophthalmol.* 2022;260(8):2567-2583.
3. Chen L, Zhu Y, Zhou J, Wu R, Yang N, Bao Q and Xu X. Luteolin alleviates epithelial-mesenchymal transformation induced by oxidative injury in ARPE-19 cell via Nrf2 and AKT/GSK-3 β pathway. *Oxid Med Cell Longev.* 2022;2022:2265725.

► Oral Presentation 16

The Regulatory Role of Glioblastoma-Derived Exosomes on Tumor Microenvironment and Angiogenesis; Literature Review**Gökçen Gökçe Tepeli**

Department of Histology and Embryology, Faculty of Medicine,
Adnan Menderes University, Aydın, Türkiye

ABSTRACT

Glioblastoma (GBM) is a tumor characterized by intense angiogenesis and aggressive invasion of surrounding tissues [1, 2]. Tumor cells transmit signaling molecules via exosomes to manipulate the surrounding normal cells and microenvironment to their advantage [3, 4]. I aimed to elucidate the effects of exosomes secreted from glioblastoma cells on endothelial cell behavior and angiogenic processes in the tumor microenvironment, based on information obtained from literature reviews [1-4].

This study, based on data obtained from literature reviews, shows that glioblastoma cells reprogram endothelial cells via exosomes and trigger angiogenesis, which is critical for tumor growth. Blocking this exosome-mediated communication may be a novel anti-angiogenic strategy in the treatment of GBM [5, 6].

Keywords: Glioblastoma, Tumor microenvironment, Exosome, Angiogenesis, Intercellular communication.

REFERENCES

1. Mastantuono S, Manini I, Di Loreto C, Beltrami AP, Vindigni M, Cesselli D. Glioma-Derived Exosomes and Their Application as Drug Nanoparticles. *International Journal of Molecular Sciences*. 2024;25(23):12524. <https://doi.org/10.3390/ijms252312524>
2. Schmidt R, et al. Role of extracellular vesicles in immune modulation and angiogenesis within the glioblastoma multiforme microenvironment. *ScienceDirect / TME Journal*. 2025;12(2):100011.
3. Skog J, et al. Glioblastoma microvesicles transport RNA and proteins and promote angiogenic processes in brain endothelial cells. *Nature Cell Biology*. 2008;10(12):1470-1476.
4. Liu Y, Nie Y, Cheng Q. Exosomes in Glioma: Integrating Molecular Mechanisms with Diagnostic and Therapeutic Potential. *Small*. 2026;22(1):e73721.
5. Aghajani M, et al. Controlling Biogenesis and Engineering of Exosomes to Overcome Therapy Resistance in Glioblastoma. *Discover Nano / Springer*. 2026;21(2):12524.

6. Hasan M, et al. Exosomes in glioma: Mechanistic insights on biological, therapeutic, and diagnostic uses. *Europe PMC / Biomedicine & Pharmacotherapy*. 2025;45(1):12135692.

► Oral Presentation 17

Investigation of TRPV1 Cation Channel-Mediated Effects of Estrogen and Raloxifene in Breast Cancer Cells

 **Betül Yazğan¹**,  **Yener Yazğan²**,  **Mustafa Nazıroğlu³**

¹Kastamonu University, Faculty of Medicine, Department of Physiology, Kastamonu, Türkiye

²Kastamonu University, Faculty of Medicine, Department of Biophysics, Kastamonu, Türkiye

³Süleyman Demirel University, Faculty of Medicine, Department of Biophysics, Isparta, Türkiye

ABSTRACT

Intracellular calcium (Ca^{2+}) homeostasis is a fundamental regulator of cell cycle progression, proliferation, invasion, and apoptosis. TRPV1, a Ca^{2+} -permeable cation channel, is expressed in both estrogen receptor-positive (MCF-7) and hormone receptor-negative triple-negative (MDA-MB-231) breast cancer cell lines. This study aimed to investigate the role of TRPV1 calcium channel modulation and its interaction with raloxifene in cellular stress and cytotoxicity pathways in MDA-MB-231 cells, which do not respond to conventional endocrine therapies, and in receptor-positive MCF-7 cells.

MCF-7 and MDA-MB-231 cells were investigated under 9 distinct experimental conditions: Control, Control+CPZ, Control+CAP, Estrogen (10 nM, 24 h), Estrogen+CPZ, Estrogen+CAP, Raloxifene (160 nM, 24 h), Raloxifene+CPZ, and Raloxifene+CAP. For acute TRPV1 channel modulation, the specific agonist capsaicin (CAP, 0.1 mM, 10 min) and the antagonist capsazepine (CPZ, 0.1 mM, 10 min) were administered. Cell viability was determined using the MTT metabolic activity assay (490/650 nm), while apoptotic cell death was evaluated via fluorometric measurement of Caspase-3 and Caspase-9 activities (360/460 nm).

While estrogen administration enhanced viability and suppressed apoptosis in MCF-7 cells, the addition of the TRPV1 opener CAP triggered uncontrolled Ca^{2+} influx, leading to mitochondrial depolarization and significantly attenuating this estrogen-induced proliferative effect. Notably in MCF-7 cells, pharmacological activation of TRPV1 (CAP) synergistically enhanced the antitumor and pro-apoptotic efficacy of raloxifene, leading to a

significant reduction in cell viability and maximizing caspase-dependent apoptosis. Conversely, in MDA-MB-231 cells, estrogen exposure elicited no significant alteration in cell viability, confirming their hormone-refractory characteristics. In these cells, the pronounced reduction in viability (MTT) and the upregulation of caspase-dependent apoptosis induced by CAP and raloxifene were partially counteracted by the TRPV1 blocker CPZ, demonstrating that the observed cytotoxic and apoptotic effects are mediated through functional TRPV1 channel activation.

Our findings demonstrate that pharmacological activation of TRPV1 channels enhances the antitumor efficacy of raloxifene, a standard adjuvant SERM, and suggest that TRPV1 may serve as an independent and critical therapeutic target in MDA-MB-231 cells, where targeted therapeutic options are limited due to the absence of hormone receptors. TRPV1 channel modulation provides a foundation for novel preclinical therapeutic strategies by engaging distinct molecular pathways that trigger cell death in resistant phenotypes.

Keywords: Breast Cancer, MCF-7, MDA-MB-231, TRPV1, Raloxifene, Calcium dynamics,

*This study was supported by the Scientific Research Projects Coordination (BAP) Unit of Kastamonu University under the project code [KÜ-BAP01/2021-45].

REFERENCES

- Lozano C, Córdova C, Marchant I, Zúñiga R, Ochova P, Ramírez-Barrantes R, González-Arriagada WA, Rodríguez B, Olivero P. Intracellular aggregated TRPV1 is associated with lower survival in breast cancer patients. *Breast Cancer* (Dove Med Press). 2018;15;10:161-168.
- Pegah Mirzapour, Mohammad Rasool Khazaei, Mohammad Taher Moradi, Mozafar Khazaei. Apoptosis induction in human breast cancer cell lines by synergic effect of raloxifene and resveratrol through increasing proapoptotic genes. *Life Sci*. 2018;15;205:45-53.
- Yazğan B, Yazğan Y, Övey İS, Nazıroğlu M. Raloxifene and Tamoxifen Reduce PARP Activity, Cytokine and Oxidative Stress Levels in the Brain and Blood of Ovariectomized Rats. *Journal of Molecular Neuroscience*, 2016;60(2):214-222.
- Yazğan Y, Nazıroğlu M. Ovariectomy-Induced Mitochondrial Oxidative Stress, Apoptosis, and Calcium Ion Influx Through TRPA1, TRPM2, and TRPV1 Are Prevented by 17 β -Estradiol, Tamoxifen, and Raloxifene in the Hippocampus and Dorsal Root Ganglion of Rats. *Mol Neurobiol*. 2017;54(10):7620-7638.
- Ye JY, Chen ZY, Huang CL, Huang B, Zheng YR, Zhang YF, Lu BY, He L, Liu CS, Long XY. A Non-Lipolysis Nanoemulsion Improved Oral Bioavailability by Reducing the First-Pass Metabolism of Raloxifene, and Related Absorption Mechanisms Being Studied. *Int J Nanomedicine*. 2020;26;15:6503-6518.

► Oral Presentation 18

UCOEs as Potential Tools for Durable Gene Replacement in Post-Mitotic Brain Disorders

 **Hassana Adamou Ali**

Master student, Bolu Abant Izzet Baysal University, Bolu, Turkiye

ABSTRACT

Gene therapy in general is subject to many challenges, for neurological disorders particularly, its prominent obstacle is the post-mitotic nature of neurons making them extremely resistant to sustained transgene expression due to epigenetic silencing mechanisms.

Ubiquitous Chromatin Opening Elements (UCOEs), particularly the A2UCOE derived from the human HNRPA2B1-CBX3 locus, has been recognized as a promising tool to counteract this silencing mechanism by keeping an open chromatin configuration through methylation-free CpG islands and dual divergent promoters. The A2UCOE acts through two principal molecular pathways: DNA methylation resistance, wherein the CpG Island prevents methyltransferase recruitment and subsequent gene silencing, and chromatin remodeling, via which divergent promoter activity maintains a euchromatic state by blocking the spread of repressive histone marks notably H3K9me3.

Given the proven efficacy the proven efficacy of UCOEs in hematopoietic stem cells and neural progenitor cell lines where they prevent differentiation induced silencing, this study navigates the critical question of whether the unique chromatin environment of post-mitotic neurons is compatible with UCOE-mediated protection, or if the neuronal epigenetic scenery presents an insurmountable barrier to this approach. It is argued the upholding of substantial promise for durable gene replacement in neurological disorders by UCOEs and what is required for successful translation in mechanism-focused research, next-generation element engineering.

Keywords: Gene therapy, Neurological disorders, DNA methylation, UCOEs.

► Oral Presentation 19

Morphometric Evaluation of the Styloid Process in The Healthy Population: A CT-Based Cross-Sectional Study

 **Abdalla Ahmed Eldaw Elamin**

Department of Anatomy, RAK College of Medical Sciences,
RAK Medical & Health Sciences University, Ras Al Khaimah,
UAE

ABSTRACT

The styloid process is a protrusion from the temporal bone, protected by the tympanic plate, which plays a role in cranial nerve relations and muscle attachment. An elongated styloid process may lead to pain and dysphagia due to nerve compression. It acts as an important surgical landmark for cranial nerves, internal carotid arteries, and the parotid gland.

A study evaluated the morphometric characteristics of the styloid process using CT images, analyzing its length in relation to age, gender, and side comparison.

A cross-sectional study was conducted at Kassala Advanced Diagnostic Centre in Kassala, Sudan, measuring the styloid process (SP) bilaterally using Syngo software. Multiplanar reconstruction (MPR) facilitated measurement in axial and coronal views, with the SP length quantified from the base to the apex. Data were analyzed using SPSS version 26.0.

The study involved 138 participants (55.8% female and 44.2% male). The average lengths of the right and left styloid processes were 2.49 cm and 2.55 cm, respectively. Significant correlations were observed between gender and left styloid process length ($p=0.04$), while no significant correlation was found for the right side ($p=0.09$). Age groups showed significant variation in the right styloid process length ($p=0.03$), but not for the left ($p=0.4$). No significant bilateral asymmetry was detected in either gender ($p=0.109$).

The styloid process typically measures 2–3 cm in length, showing correlation with gender on the left side and age on the right. Length increases with age, and the process is bilaterally symmetrical, with no lateral dominance observed between sexes.

Keywords: Temporal bone, Styloid process, Measurement, CT scan

► Oral Presentation 20

Evaluation of Routine Complete Blood Count Parameters and Exploratory Artificial Intelligence Models in Predicting the Clinical Severity of Drug-Induced Skin Rashes **Murat Ali Çiçekler**

Department of Medical Pharmacology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye

ABSTRACT

Adverse cutaneous reactions from drug use are common toxicological complications of pharmacological treatments, where progression from localized to generalized rashes serves as a primary indicator of clinical severity. This study investigated the clinical decision-support potential of routine complete blood count (CBC) parameters and derived inflammatory ratios: the neutrophil-to-lymphocyte ratio (NLR), the basophil-to-lymphocyte ratio (BLR), and the eosinophil-to-lymphocyte ratio (ELR) to distinguish generalized from localized drug rashes using statistical and explainable artificial intelligence (XAI) models [1, 2].

We retrospectively included 44 patients (18 with generalized and 26 with localized rashes) followed for drug-induced skin rashes. Demographic characteristics and hematological data (WBC, absolute neutrophil and basophil counts, NLR, and BLR indices) upon admission were extracted from the hospital automation system. Intergroup differences were analyzed using the Mann-Whitney U test. For multivariate exploratory analysis, class-weighted logistic regression and decision tree algorithms were employed, while the importance of variables was assessed via SHAP (SHapley Additive exPlanations) analysis.

Patients with generalized rashes were significantly older (median 62 vs. 42.5 years, $p=0.012$). Hematological evaluations revealed that the (BLR) (0.023 vs. 0.009, $p=0.003$), absolute neutrophil count (7.12 vs. $5.48 \times 10^3/\mu\text{L}$, $p=0.043$), and absolute basophil count (0.045 vs. $0.025 \times 10^3/\mu\text{L}$, $p=0.048$) were significantly higher in the generalized rash group. The decision tree model integrating CBC and demographic data achieved the highest performance in stratified cross-validation (mean AUC: 0.725). Furthermore, SHAP analysis confirmed that patient age and WBC count provided the strongest signals

for identifying generalized rashes [3].

In managing cutaneous toxicity of pharmacological treatments, absolute neutrophil and basophil counts from routine blood counts—particularly indices such as the BLR—provide an early, cost-effective prediction of the systemic extent of the rash. These biomarkers create a suitable foundation for integrating automated alert algorithms into database-driven hospital automation systems.

Keywords: Adverse cutaneous reactions, Hematological biomarkers, XAI

REFERENCES

1. Ekinçi A, Altın S. Blood Leukocyte Ratios: Equivocal Parameters for Allergic Diseases. *Ankara Üniversitesi Tıp Fakültesi Mecmuası*. 2025;78(1):13–19.
2. Yalçın B, Babademez MA. Systemic Inflammatory Indices as Predictors of Treatment Response in Allergic Rhinitis: A Prospective 6 Month Cohort Study. *Ear Nose Throat J*. 2026;. 1455613251413545.
3. Wang M. Explainable machine-learning-based cardiovascular disease prediction in patients with hypertension: Algorithm comparison and SHapley Additive exPlanations (SHAP) analysis. *Arch Cardiovasc Dis*. 2026;119(4):273–282.

► Oral Presentation 21

Blastocystis SPP. and Cardiometabolic Health: Current Evidence and Potential Mechanisms **Leyla Gündüz**

Siirt Training and Research Hospital, Siirt, Türkiye

ABSTRACT

Blastocystis spp. is one of the most frequently detected eukaryotic microorganisms in the human gastrointestinal tract; however, its role in human health remains controversial. Traditionally considered an intestinal parasite, *Blastocystis* spp. has increasingly been recognized as a component of the gut ecosystem, and its potential association with metabolic health has emerged as an important area of research. This study aimed to evaluate the current evidence regarding the association between *Blastocystis* spp. and cardiometabolic health and to discuss potential underlying mechanisms.

Recent studies published between 2024 and 2026 investigating the association between *Blastocystis* spp., gut microbiota, and cardiometabolic health were evaluated through a literature review. Associations between *Blastocystis* spp. carriage and dietary patterns, obesity, blood pressure, lipid metabolism, and other cardiometabolic parameters were assessed. Potential mechanisms involving gut microbiota composition, short-chain fatty acids (SCFAs), tryptophan metabolism, and immune responses were also reviewed.

A large-scale study published in 2024, including metagenomic data from 56,989 individuals across 32 countries, reported that *Blastocystis* spp. carriage was associated with healthier dietary patterns and a more favorable cardiometabolic profile. *Blastocystis*-positive individuals were reported to have lower obesity-related measures and more favorable levels of several cardiometabolic markers, including diastolic blood pressure, triglycerides, C-peptide, and GlycA. Furthermore, improvements in dietary quality were associated with increased *Blastocystis* prevalence and abundance. Recent studies published in 2025 have proposed that these associations may involve alterations in gut microbiota composition, short-chain fatty acid production, tryptophan metabolism, and immune-cell differentiation. However, mechanistic evidence remains limited, and the causal relationship between *Blastocystis*

spp. and cardiometabolic health has not yet been established.

Current evidence suggests that *Blastocystis* spp. should not be considered solely as a potential intestinal pathogen and may represent an important component of the gut ecosystem involved in host–microbiota interactions. The observed association between *Blastocystis* spp. carriage and a more favorable cardiometabolic profile may provide a new perspective on the relationship between intestinal microorganisms and metabolic health. Nevertheless, further prospective, experimental, and multi-omics studies are required to clarify causality and determine the potential roles of different *Blastocystis* subtypes in these interactions.

Keywords: *Blastocystis* spp., Gut microbiota, Cardiometabolic health, Obesity, Short-chain fatty acids, Intestinal parasites.

REFERENCES

1. Deng L, Tan KSW. Decoding Blastocystis-driven mechanisms in gut microbiota and host metabolism. *Advanced Science*. 2025A;12(17).
2. Deng L, Tan KSW. From parasite to partner: Unravelling the multifaceted role of Blastocystis in human health and disease. *The Lancet Microbe*. 2025b;6(9).
3. Piperni E, Nguyen LH, Manghi P, et al. Intestinal Blastocystis is linked to healthier diets and more favorable cardiometabolic outcomes in 56,989 individuals from 32 countries. *Cell*. 2024;187(17).
4. Shaw D, et al. Microbial and metabolic signatures among Blastocystis subtypes ST1–ST9 in xenic cultures. *Current Research in Parasitology & Vector-Borne Diseases*. 2025;100317.

► Oral Presentation 22

Bioinformatic Evaluation of miRNA-Mediated Neurodevelopmental Regulation in Autism Spectrum Disorder** Akif Can Taş¹,  Elif Burcu Tüzemen Bayyurt¹**¹Sivas Cumhuriyet University, Faculty of Medicine, Department of Medical Biology, Sivas, Türkiye**ABSTRACT**

Autism spectrum disorder (ASD) is a multifactorial neurodevelopmental condition characterized by deficits in social communication and repetitive behavioral patterns, and is associated with deviations occurring during neural development. MicroRNAs (miRNAs) are non-coding RNAs that regulate neuronal differentiation, synaptogenesis, and axonal development through post-transcriptional gene silencing, achieved by binding to the 3' untranslated regions of target mRNAs. The aim of this study is to review current bioinformatic findings on differentially expressed miRNAs identified in ASD within the context of neurodevelopmental and synaptic target gene networks, and to critically evaluate the level of tissue-specific evidence.

PubMed and Gene Expression Omnibus databases were searched, and ASD-specific miRNA expression studies, systematic reviews, and meta-analyses were reviewed by the authors. A systematic review and bioinformatic analysis covering 34 studies reported that miR-23a-3p, miR-106b-5p, miR-146a-5p, miR-7-5p, miR-27a-3p, miR-181b-5p, miR-486-3p, and miR-451a were consistently altered in ASD across studies; in the brain-tissue-specific subgroup analysis, miR-146a-5p, miR-155-5p, miR-1277-3p, miR-21-3p, and miR-106b-5p were reported to be consistently upregulated. The validated target genes of these miRNAs were shown to be enriched in cellular signaling pathways indirectly associated with neurodevelopment, most notably the FoxO and TGF- β signaling pathways. A ceRNA network study using the brain-tissue-derived GSE59286 dataset integrated differentially expressed miRNAs with ASD-associated mRNAs and lncRNAs, proposing a regulatory network enriched in 208 biological processes — including “glial cell fate commitment” and “cell-cell communication via electrical coupling” — and identified candidate diagnostic markers.

The evidence reviewed suggests that specific miRNAs may contribute to the pathophysiology of ASD by regulating neurodevelopmental and synaptic target genes; however, tissue-specific heterogeneity and inconsistencies across studies necessitate cautious interpretation of findings derived from a single tissue or study. Supporting future research with validation studies conducted in larger, age-balanced sample cohorts using standardized methods will be decisive for reliably elucidating miRNA-mediated neurodevelopmental regulation in ASD.

Keywords: Autism spectrum disorder, miRNA, Neurodevelopment, Bioinformatics

REFERENCES

1. Huang ZX, Chen Y, Guo HR, Chen GF. Systematic review and bioinformatic analysis of microRNA expression in Autism Spectrum Disorder identifies pathways associated with cancer, metabolism, cell signaling, and cell adhesion. *Front Psychiatry*. 2021;12:630876.
2. Sun JJ, Chen B, Yu T. Construction of an immune-related ceRNA network to screen for potential diagnostic markers for autism spectrum disorder. *Front Genet*. 2022;13:1025813

► Oral Presentation 23

The Epigenetic Regulatory Role of Micrnas in Synaptic Plasticity and Neural Genome Expression: A Systematic Review

 Merve Göztepe¹,  Esmanur Niğde²

¹Bilecik Şeyh Edebali University, Medical Services and Techniques Department, Bilecik, Türkiye

²Bilecik Şeyh Edebali University, Department of Medical Pharmacology, Bilecik, Türkiye

ABSTRACT

MicroRNAs (miRNAs) are short non-coding RNAs that regulate gene expression post-transcriptionally and serve as key modulators of synaptic plasticity. This systematic review synthesizes current evidence regarding the epigenetic regulatory functions of miRNAs in synaptic plasticity and neural genome expression, with particular focus on their interactions with DNA methylation and chromatin modifications.

A systematic search of PubMed identified 1509 records. Title-level screening was performed using predefined keyword criteria (miRNA, synaptic plasticity, epigenetic regulation), and duplicate preprint-publication pairs were excluded. Records meeting all criteria were classified as primarily relevant, and their abstracts were reviewed in full.

Of the 1509 screened records, 17 were identified as directly relevant. These studies indicate that activity-regulated miRNAs, such as miR-92, miR-219, miR-455-3p, and miR-3473e, modulate dendritic spine morphogenesis and synaptic remodeling via post-transcriptional mechanisms. Notably, miR-29 was shown to regulate hippocampal DNA methyltransferase (Dnmt3a) levels and DNA methylation, thereby influencing memory stability and providing direct evidence of miRNA-DNA methylation crosstalk. Dysregulation of this network has been associated with Alzheimer's disease, Parkinson's disease, depression, and schizophrenia.

MicroRNAs form a multilayered epigenetic network that connects rapid local translational control with enduring genome-wide expression changes underlying synaptic plasticity. However, the certainty of this evidence is limited, as most studies rely on animal and cell culture models. Only one study directly demonstrated miRNA-DNA methylation crosstalk, and a single clinical trial

reported no significant difference in miRNA expression between active and sham stimulation. These factors constrain the strength of causal inferences that can currently be drawn.

Keywords: microRNA, Synaptic plasticity, Epigenetic regulation, DNA methylation, Neural gene expression

REFERENCES

1. Aavula K, Heggeness H, Yokokura T, Van Vactor D. Regulation of miR-219 and its target RalGPS dictates acute synaptic plasticity at the Drosophila neuromuscular junction. *bioRxiv*. 2025.
2. Gong X, Chen L, Guo X, Jiang A, He Y, Yan C, Zhang B. LncRNA THUMP3-AS1 Regulates Behavioral and Synaptic Structural Abnormalities in Schizophrenia via miR-485-5p and ARHGAP8. *Advanced Science*. 2026;13(3), e08867.
3. Moe SM, Taylor A, Robertson AP, Van Vactor D, McNeill EM. MiR-92 Controls Synaptic Development Through Glial Vha55 Regulation. *Biomolecules*. 2025;15(9), 1330.
4. Mansour RM, Rizk NI, Abdel Mageed SS, Alam-Eldein KM, Fahmy HA, Lutfy RH, ... & Doghish AS. miRNA dysregulation in depression: unraveling the interplay between neuroplasticity, HPA axis dysfunction, and neuroinflammation. *Metabolic Brain Disease*. 2025;40(8), 308.
5. Ogwo MN, Sharma B, Goyal G, Lakshmanaswamy R, Kumar S. MicroRNAs and synaptic dysfunction in Parkinson's disease. *Molecular Therapy Nucleic Acids*. 2025.
6. Pradeepkiran JA, Bandaru M, Islam MA, Kshirsagar S, Alvir RV, Mukherjee U, Reddy PH. Overexpression of miR-455-3p enhances mitophagy, synaptic and mitochondrial proteins in Alzheimer's disease. *Mitochondrion*. 2026;102151.
7. Tong X, Tong Z, Wu W, Yang J, Wang J, Wang Y, ... & Liu W. Aerobic exercise rescues synaptic plasticity in early-stage Alzheimer's disease by suppressing miR-3473e to activate EphB2-dependent NMDA/AMPA receptor signaling. *Neurochemistry international*. 2025;106023.
8. Viglione A, Giannuzzi C, Putignano E, Mazziotti RM, Bagnoli S, Tognini P, ... & Pizzorusso T. MicroRNA-29 acutely regulates memory stability, expression of synaptic genes, and DNA methylation in the mouse adult hippocampus. *Cellular and Molecular Life Sciences*. 2026

► Oral Presentation 24

Reprogramming Interorgan Communication: The Liver–Brain Immunometabolic Axis as a Metabolite-Centered Paradigm **Seda Keskin**

Department of Medical Histology and Embryology, Faculty of Medicine, Van Yuzuncu Yil University, Van, Türkiye

ABSTRACT

The liver–brain axis has traditionally been understood through endocrine, neural, and inflammatory pathways. However, accumulating evidence suggests that these mechanisms alone cannot fully account for the complexity of interorgan communication. We propose an emerging conceptual framework in which immunometabolism serves as the central regulatory interface linking hepatic metabolism to neuroimmune homeostasis via metabolite-mediated signalling. Within this paradigm, the liver functions as a dynamic metabolic sensor that continuously integrates nutritional, microbial, and environmental cues to generate a repertoire of bioactive secondary metabolites, including bile acids, short-chain fatty acids, tryptophan derivatives, ketone bodies, and other microbiota-associated metabolites. Rather than acting solely as metabolic intermediates, these molecules serve as systemic signalling mediators capable of reshaping immune-cell metabolism, microglial phenotypes, blood–brain barrier function, and neuronal bioenergetics. We further propose a four-stage model of liver–brain immunometabolic communication comprising hepatic metabolic sensing, metabolite encoding, systemic immune decoding, and neurofunctional adaptation. This framework integrates recent advances in metabolomics, neuroimmunology, systems biology, and microbiome research into a unified model of organ crosstalk. Importantly, it shifts the current perspective from cytokine-centred communication towards metabolite-driven immunological regulation and provides a mechanistic basis for understanding how metabolic signals coordinate brain homeostasis under physiological and pathological conditions. Elucidating these interconnected metabolic communication networks may facilitate the identification of novel biomarkers and therapeutic strategies while establishing the liver–brain immunometabolic axis as a central paradigm in precision medicine and translational neuroscience.

Keywords: Liver–brain axis, Immunometabolism, Secondary metabolites, Interorgan communication, Neuroimmunology

REFERENCES

1. Baker SA, Rutter J. Metabolites as signalling molecules. *Nature reviews molecular cell Biology*. 2023;24(5):355-374.
2. Hsu CL, Schnabl B. The gut–liver axis and gut microbiota in health and liver disease. *Nature Reviews Microbiology*. 2023;21(11):719-733.
3. Yan M, Man S, Sun B, Ma L, Guo L, Huang L, Gao W. Gut liver brain axis in diseases: the implications for therapeutic interventions. *Signal transduction and targeted therapy*. 2023;8(1):443.
4. Cryan JF, O'Riordan KJ, Cowan CS, Sandhu KV, Bastiaanssen TF, Boehme M, ... & Dinan TG. The microbiota-gut-brain axis. *Physiological reviews*. 2019;99(4):1877-2013.

► Oral Presentation 25

Increased Neutrophil-to-Lymphocyte Ratio in Intracerebral Hemorrhage: A Comparative Analysis with Ischemic StrokeID Idris Kocatürk¹, ID Sedat Gülten²¹Department of Neurology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye²Department of Biochemistry, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye**ABSTRACT**

The neutrophil-to-lymphocyte ratio (NLR) is a practical marker, easily calculated from routine hemogram parameters, that provides information on systemic inflammation [1-3]. This study aimed to compare NLR values in patients with intracerebral hemorrhage (ICH) and acute ischemic stroke (AIS).

Data on patients diagnosed with ICH or AIS at Kastamonu Training and Research Hospital between January 2025 and June 2026 were retrospectively evaluated. Patients who presented with ICH or AIS were included in the study and were divided into two groups based on their diagnoses. The groups were compared for NLR.

A total of 410 patients were included in the study. Of these, 69 patients were in the ICH group, and 341 were in the AIS group. Female patients accounted for 53.6% (n=37) of the ICH group and 46.9% (n=160) of the AIS group. No statistically significant difference was observed between the groups regarding sex distribution (p=0.414). The median age was 71 (62–82) years in the ICH group and 73 (64–81) years in the AIS group, with no significant difference between the groups (p=0.410). The median NLR was 4.96 (2.5–9.8) in the ICH group and 3.20 (2.0–5.6) in the AIS group. NLR was significantly higher in the ICH group (p=0.015).

The higher NLR observed in patients with ICH compared with those with AIS suggests that the inflammatory response may be more pronounced during the acute phase of ICH. However, further comprehensive studies are warranted to determine the clinical and prognostic implications of this difference.

Keywords: Neutrophil-to-lymphocyte ratio, Intracerebral hemorrhage, Acute ischemic stroke.

REFERENCES

1. Song SY, Zhao XX, Rajah G, et al. Clinical Significance of Baseline Neutrophil-to-Lymphocyte Ratio in Patients With Ischemic Stroke or Hemorrhagic Stroke: An Updated Meta-Analysis. *Front Neurol.* 2019;10:1032.
2. Zhang R, Wu X, Hu W, et al. Neutrophil-to-lymphocyte ratio predicts hemorrhagic transformation in ischemic stroke: A meta-analysis. *Brain Behav.* 2019;9(9):e01382.
3. Giede-Jeppe A, Bobinger T, Gerner ST, et al. Neutrophil-to-Lymphocyte Ratio Is an Independent Predictor for In-Hospital Mortality in Spontaneous Intracerebral Hemorrhage. *Cerebrovasc Dis.* 2017;44(1-2):26-34.

► Oral Presentation 26

Advanced Imaging Techniques in Animal Health (CT, MRI, and Ultrasonography): Research and Clinical Implications**Abdulkaki Demir¹, Mahmut Yardımcı¹**

Muş Alparslan University, Bulanık Vocational High School, Muş, Türkiye

ABSTRACT

Radiological imaging techniques have become increasingly important in veterinary medicine for methods such as disease detection, characterization, clinical decision-making, and monitoring of the disease process. This review aimed to evaluate the clinical and research effects of computed tomography (CT), magnetic resonance imaging (MRI), and ultrasonography (US) in animal health [1,2].

The literature on veterinary diagnostic imaging was reviewed, and CT, MRI, and US were comparatively evaluated in terms of their main clinical applications, strengths, limitations, and research potentials. CT provides high-resolution and rapid sectional imaging and plays a much more important role, especially for bone structures, thoracic diseases, trauma, and anatomically complex regions. MRI supports detailed evaluation of neurological, musculoskeletal, and other soft tissue disorders by providing superior soft tissue contrast and multiplane capabilities. Ultrasonography offers real-time, radiation-free, and portable imaging and remains an important method for abdominal, cardiac, reproductive, vascular, and superficial soft tissue evaluation [1-3].

Beyond imaging, these radiological images offer opportunities for quantitative image analysis in veterinary research by determining the course of disease progression and therapeutic response. Recent advances in artificial intelligence, machine learning, automated segmentation, and radiomics further expand the potential of veterinary diagnostic imaging, although data quality, validation, and clinical integration remain significant challenges [4-6].

Therefore, CT, MR, and US should be considered complementary rather than competing methods. Selecting the most appropriate technique according to the clinical or research question, along with different imaging techniques when necessary, can improve diagnostic accuracy, strengthen clinical decision-making, and contribute to

animal health and welfare.

Keywords: Animal health, Computed tomography, Magnetic resonance imaging, Ultrasonography, Veterinary diagnostic imaging.

REFERENCES

1. Yitbarek D, Dagnaw GG. Application of Advanced Imaging Modalities in Veterinary Medicine: A Review. *Vet Med (Auckl)*. 2022;13:117–130. doi:10.2147/VMRR.S367040.
2. Labruyère J, Schwarz T. CT and MRI in veterinary patients: an update on recent advances. In *Practice*. 2013;35(10):546–563. doi:10.1136/inp.f6720.
3. Hayashi R, El-Husseiny HM, Tanaka R. Editorial: Outstanding advances in veterinary diagnostic ultrasonography: novel milestones in disease detection, prediction, and treatment. *Front Vet Sci*. 2025;12:1675622. doi:10.3389/fvets.2025.1675622.
4. Hennessey E, DiFazio M, Hennessey R, Cassel N. Artificial intelligence in veterinary diagnostic imaging: A literature review. *Vet Radiol Ultrasound*. 2022;63(Suppl 1):851–870. doi:10.1111/vru.13163.
5. Burti S, Banzato T, Coghlan S, Wodzinski M, Bendazzoli M, Zotti A. Artificial intelligence in veterinary diagnostic imaging: Perspectives and limitations. *Res Vet Sci*. 2024;175:105317. doi:10.1016/j.rvsc.2024.105317.
6. Barillaro G, Minniti S, Mezzatesta S, Macri F, Torino C, Vilasi AD. Artificial intelligence in veterinary diagnostic imaging: A narrative review of the state of the art and its applications. *Vet J*. 2026;318:106762. doi:10.1016/j.tvjl.2026.106762

► Oral Presentation 27

Human *Acanthamoeba* Keratitis Cases Reported in Türkiye: A Review of Case Reports and Case Series Sedat Kavak¹,  Selahattin Aydemir²¹Department Ardahan University Vocational School of Health Services, Ardahan, Türkiye²Van Yüzüncü Yıl University Faculty of Medicine, Department of Medical Parasitology, Van, Türkiye**ABSTRACT**

Acanthamoeba species, which are naturally found in sources such as soil, seawater, swimming pools, and tap water, can be transmitted to humans through various routes and cause significant infections, including skin lesions, granulomatous amebic encephalitis (GAE), and *Acanthamoeba* keratitis (AK). AK is a protozoan infection that is particularly associated with contact lens use, is difficult to diagnose, and may result in vision loss [1–11]. This study aims to evaluate the clinical, epidemiological, and molecular characteristics of case reports dealing with AK and clinical presentations mimicking AK in Turkey [1–14].

AK cases originating from Turkey were searched in the PubMed, Scopus, and Web of Science databases. Demographic data (age, sex, province), contact lens history, risk factors, clinical diagnosis, diagnostic methods, medical/surgical treatments administered, and clinical outcomes of patients across a total of 14 studies—comprising case reports and case series evaluated in light of the inclusion criteria—were analyzed using a standardized data collection form. Additionally, clinical presentations mimicking AK were analyzed separately [1–14].

A total of 18 cases within the 14 reviewed publications were evaluated. It was reported that 14 of these were AK, while 4 were clinical presentations exhibiting symptoms similar to AK. The age range of the true AK population, which mostly consisted of young adults (mean ~30 years), varied between 5 and 52. Contact lens use stood out as the most significant risk factor for AK with a rate of 78.6% (11/14) [1–3,5,8–11]. In non-lens wearers, corneal microtraumas—such as sand or plant debris entering the eye—and contact with seawater/tap water were considered potential transmission routes [4,6,7]. Along with clinical findings, the most frequently used diagnostic methods were confocal microscopy and culture [1–11]. In PCR-based molecular diagnosis targeting the 18S rDNA region, the T4 genotype was identified most frequently [2,4,6,9]. Various antiamebic agents, primarily propamidine isethionate and chlorhexidine, were administered in treatment, and keratoplasty was required in resistant or advanced cases [1–11]. In addition to typical signs such as severe pain and ring infiltrates in the clinical picture, rare complications such as dacryoadenitis, extraocular muscle

involvement, bilateral involvement, and corneal perforation were also reported in some cases [1,3,8,9]. Among the cases mimicking AK, it was observed that toxic keratopathy due to topical anesthetic abuse and recurrent corneal erosions were most frequently misevaluated as AK [12–14].

An examination of the reported AK cases in Turkey reveals that risk factors related to contact lens use are predominant, confocal microscopy and molecular methods contribute significantly to early diagnosis, and delayed diagnosis increases the need for surgery. Educating contact lens wearers, adopting appropriate hygiene practices, and expanding early molecular diagnostic methods will make a significant contribution to reducing the morbidity of the disease [1–11].

Keywords: *Acanthamoeba* keratitis, Contact lens, Review, Case report, Turkey

REFERENCES

1. Sengor T, Kurna S, Altun A, Irkeç M, Aki S, Aksoy S. Contact Lens–Related *Acanthamoeba* Keratitis and Accompanying Dacryoadenitis. *Eye Contact Lens*. 2015;41(4):204-209.
2. Alver O, Baykara M, Yuruk M, Tuzemen NU. *Acanthamoeba* Keratitis and *Acanthamoeba* Conjunctivitis: A Case Report. *Iran J Parasitol*. 2020;15(2):272-277.
3. Sengor T, Yuzbasioglu E, Aydin Kurna S, Irkeç M, Altun A, Kokcen K, Yalcin NG. Dacryoadenitis and extraocular muscle inflammation associated with contact lens-related *Acanthamoeba* keratitis: A case report and review of the literature. *Orbit*. 2017;36(1):43-47.
4. Ertabaklar H, Turk M, Dayanir V, et al. *Acanthamoeba* keratitis due to *Acanthamoeba* genotype T4 in a non-contact-lens wearer in Turkey. *Parasitol Res*. 2007;100(1):241-246.
5. Cubuk MO, Al FD, Usluca S, Bilgihan K. *Acanthamoeba* Keratitis Associated with Scleral Contact Lens Use in a Keratoconus Patient. *Beyoglu Eye J*. 2020;5(1):53-56.
6. Ozkoc S, Tuncay S, Delibas SB, Akisu C, Ozbek Z, Durak I, Walochnik J. Identification of *Acanthamoeba* genotype T4 and *Paravahlkampfia* sp. from two clinical samples. *J Med Microbiol*. 2008;57(Pt 3):392-396.
7. Demirci G, Ay G, Karabas L, Altintas O, Tamer G, Caglar Y. *Acanthamoeba* Keratitis in a 5-Year-Old Boy Without a History of Contact Lens Usage. *Cornea*. 2006;25(3):356-358.
8. Korkmaz I, Eratilgan NF, Simsek C, Yaman B, Egrilmez S, Barut Selver O. A Rare Intervention in a Rare Disease: Simultaneous Bilateral Keratoplasty in Bilateral *Acanthamoeba* Keratitis. *Turk J Ophthalmol*. 2025;55(1):49-52.
9. Ertabaklar H, Dayanir V, Apaydin P, Ertug S, Walochnik J. Olgu sunumu: *Acanthamoeba* keratiti [Case report: *Acanthamoeba* keratitis]. *Turkiye Parazitoloj Derg*. 2009;33(4):283-285.
10. Dogan AS, Gurdal C, Kabatas EU, Kabatas N, Celikay O. Unilateral Painful Red Eye with Corneal Cysts Assessed with Corneal Confocal Microscopy: A Case Mimicking *Acanthamoeba* Keratitis. *Beyoglu Eye J*. 2020;5(3):234-237.
11. Gumus K. Topical Coenzyme Q10 Eye Drops as an Adjuvant Treatment in Challenging Refractory Corneal Ulcers: A Case Series and Literature Review. *Eye Contact Lens*. 2017;43(2):73-80.
12. Kurna SA, Sengor T, Aki S, Agirman Y. Ring keratitis due to topical anesthetic abuse in a contact lens wearer. *Clin Exp Optom*. 2012;95(4):457-459.
13. Dayanir V, Kirikkaya ET, Coskun F. Topical anesthetic abuse keratopathy and its clinical progression. *Turk J Ophthalmol*. 2013.
14. Demirci G, Ozdamar A. A case of medication-resistant *Acanthamoeba* keratitis treated by corneal crosslinking in Turkey. *Case Rep Ophthalmol Med*. 2013;2013:608253.

► Oral Presentation 28

The Significance of *Trichomonas vaginalis* in Türkiye

 **Naziye Yıldız Deniz**

Department of Parasitology, Faculty of Medicine, Van Yüzüncü Yıl University, Van, Türkiye

ABSTRACT

Trichomonas vaginalis (*T. vaginalis*) is a flagellated protozoan parasite that causes one of the most common sexually transmitted infections worldwide [1]. The infection can lead to various clinical conditions such as urethritis, vaginitis, cervicitis, pelvic inflammatory disease, and tubal infertility, and is also associated with cervical cancer. 10–50% of infected women are asymptomatic, and clinical signs may develop in approximately half of these individuals during the six-month follow-up period [2]. The primary route of transmission for trichomoniasis is sexual contact with an infected individual; low education level, poor hygiene, low socioeconomic status, and having multiple sexual partners are among the risk factors associated with increased prevalence [3,4]. Apart from sexual contact, indirect transmission has also been reported, as *T. vaginalis* trophozoites can remain viable on bath sponges, underwear, towels and gynaecological examination instruments [5,6]. In a systematic review evaluating 65 studies conducted in the Turkish population between 2002 and 2020, the average prevalence of *T. vaginalis* was reported as 5.94 per cent (2.87 per cent in men and 6.17 per cent in women); it was found that this rate rose to 28.3 per cent among patients presenting with gynaecological complaints and to 15.37 per cent among those with vaginal discharge; the highest regional prevalence was observed in the Black Sea (8.76 per cent) and Eastern Anatolia (8.12 per cent) regions; These findings demonstrate that *T. vaginalis* remains a significant public health problem in Turkey and that its prevalence varies according to the region's socio-economic structure, the diagnostic method used and the patient population [7]. In a molecular study conducted using isolates obtained from south-western Turkey, microsatellite-based genotyping identified 23 different microsatellite types and eight genetic groups amongst 30 *T. vaginalis* isolates; *T. vaginalis* virus (TVV) was detected in 16.6 per cent of the isolates, whilst *Mycoplasma hominis* endosymbiosis was detected in 20

per cent; this study represents the first demonstration of the genetic diversity of isolates in our country and the identification of endosymbionts that may be of clinical significance, thereby shedding light on *T. vaginalis*'s. It has contributed to molecular epidemiology in Turkey [8]. When these data are considered together, it becomes apparent that *T. vaginalis* is not only a common sexually transmitted infection in Turkey, but also a significant public health issue in terms of reproductive health. In particular, the high proportion of asymptomatic cases, the lack of routine screening programmes and the fact that diagnostic methods are not standardised across centres may lead to the actual prevalence in our country being underestimated. For this reason, the widespread adoption of sensitive diagnostic methods (including molecular tests) for women in at-risk groups in regions with high prevalence (such as the Black Sea region and Eastern Anatolia), and the development of regular screening strategies, are of great importance for both individual and public health.

Keywords: *Trichomonas vaginalis*, Trichomoniasis, Molecular epidemiology, Prevalence.

REFERENCES

1. Urbanski LJ, Di Fiore A, Azizi L, Hytönen VP, Kuuslahti M, Buonanno M, Parkkila S. Biochemical and structural characterisation of a protozoan beta-carbonic anhydrase from *Trichomonas vaginalis*. *Journal of Enzyme Inhibition and Medicinal Chemistry*. 2020;35(1):1292-1299.
2. Perazzi BE, Menghi C, Coppofillo EF, Gatta C, Eliseth MC, De Torres RA, Famiglietti AM. Prevalence and comparison of diagnostic methods for *Trichomonas vaginalis* infection in pregnant women in Argentina. *The Korean Journal of Parasitology*. 2010;48(1):61-65.
3. De Waaij DJ, Dubbink JH, Ouburg S, Peters RP, Morré SA. Prevalence of *Trichomonas vaginalis* infection and protozoan load in South African women: a cross-sectional study. *BMJ Open*. 2017;7(10):e016959.
4. Asmah RH, Agyeman RO, Obeng-Nkrumah N, Blankson H, Awualh-Mensah G, Cham M, Ayeh-Kumi PF. *Trichomonas vaginalis* infection and the diagnostic significance of detection tests among Ghanaian outpatients. *BMC Women's Health*. 2018;18(1):1-10.
5. Unat EK, Yücel A, Altaş K, Samastı M. Unat'ın Tıp Parazitolojisi. *Cerrahpaşa Tıp Fak. Vakfı Yayınları*, 1995;15(5).
6. Östan İ, Sözen U, Limoncu ME, Kilimcioğlu AA, Özbilgin A. Manisa'da vajinal akıntılı kadınlarda *Trichomonas vaginalis* sıklığı. *Türkiye Parazitoloji Dergisi*. 2005;29:7-9.
7. Beyhan YE. A systematic review of *Trichomonas vaginalis* in Turkey from 2002 to 2020. *Acta Tropica*. 2021;221:105995. doi: 10.1016/j.actatropica.2021.105995
8. Ertabaklar H, Malatyalı E, Özün Özbay EP, Yıldız İ, Sinecen M, Ertuğ S, Bozdoğan B, Güçlü Ö. Microsatellite-Based Genotyping, Analysis of Population Structure, Presence of *Trichomonas vaginalis* Virus (TVV) and *Mycoplasma hominis* in *T. vaginalis* Isolates from Southwest of Turkey. *Iranian Journal of Parasitology*. 2021;16(1):81-90. doi: 10.18502/ijpa.v16i1.5515

► Oral Presentation 29

Effects and Complications of Leech Therapy Applied to the Facial Region: A Review in Light of Case ReportsAsım Özbek¹, Abdurrahman Ekici²¹Vocational School of Health Services, Department of Medical Services and Techniques, Medical Laboratory Techniques Program, Siirt University, Siirt, Türkiye²Faculty of Medicine, Department of Basic Medical Sciences, Department of Medical Parasitology, Van Yüzüncü Yıl University, Van, Türkiye**ABSTRACT**

Hirudotherapy is a complementary treatment modality that utilizes the anticoagulant, antiplatelet, vasodilatory, and anti-inflammatory effects of bioactive substances found in the saliva of medicinal leeches. In the facial region, this practice may be used to support venous circulation, reduce edema, alleviate certain dermatological conditions, and for cosmetic purposes. However, because the face has a dense vascular network and includes sensitive anatomical structures such as the periorbital area, the procedure carries a range of potential complications in addition to its possible benefits.

This review evaluates published case reports describing complications following hirudotherapy applied to the facial and periocular regions. Mild-to-moderate complications reported in these cases include local bleeding, ecchymosis, pain, pruritus, erythema, edema, contact dermatitis, and allergic reactions. In contrast, prolonged bleeding and secondary infections represent clinically more serious concerns. *Aeromonas* species, which are present in the gastrointestinal flora of leeches, may cause infections such as cellulitis, orbital cellulitis, and keratitis after treatment. In particular, orbital infections and corneal involvement resulting from applications around the eye may lead to outcomes that threaten visual function.

In conclusion, patient selection, indication for treatment, sterilization conditions, and the risks of bleeding and infection should be carefully evaluated in facial hirudotherapy. The procedure should be avoided in individuals with coagulation disorders, those receiving anticoagulant therapy, immunocompromised patients, and individuals with active skin infections. Facial and particularly periocular hirudotherapy should be performed

by qualified healthcare professionals under appropriate clinical conditions.

Keywords: Hirudotherapy, Medicinal leech, Facial region, *Aeromonas*, Orbital cellulitis

► Oral Presentation 30

The Effects of Leech Therapy on Chronic Pain Syndromes: A Review in Light of Case Reports **Meryem Gümüş**

Bilecik Training and Research Hospital, Bilecik, Türkiye

ABSTRACT

This review examines the therapeutic effects and reported complications of leech therapy (hirudotherapy) in chronic pain syndromes such as fibromyalgia (FMS) and complex regional pain syndrome (CRPS), where conventional treatments have proven inadequate.

Databases were searched using keywords including "hirudotherapy," "leech therapy," "fibromyalgia," "chronic pain," and "case report," and relevant publications were evaluated.

In a 54-year-old male with chronic CRPS, five sessions of hirudotherapy on the right hand produced a marked reduction in pain intensity, improved skin temperature asymmetry, and better range of motion [1]. In a retrospective analysis of 24 patients by the same group, a single session reduced joint pain for up to 12 months and increased local mobility, but not systemic pain [2]. A narrative review emphasized that hirudotherapy is supported by randomized controlled trials and case reports in various painful conditions [3]. A woman with chronic fibromyalgia developed widespread cutaneous pseudolymphoma on her back after leech therapy, regressing with corticosteroids [4]. Similar cases have been reported with leeches used for indications other than fibromyalgia (low back pain, uterine fibroids) [5, 6], suggesting this risk may extend beyond fibromyalgia. Treatment-related bilateral hemarthrosis has also been reported [7].

In conclusion, leech therapy is a complementary option for alleviating pain and functional limitation in chronic pain syndromes, particularly localized or joint-related pain. However, the rare but serious complications underscore the importance of screening patients for medication use and bleeding risks and ensuring the procedure is performed by experienced personnel under sterile conditions. Fibromyalgia-specific studies are needed.

Keywords: Fibromyalgia, Chronic pain syndrome, Complex regional pain syndrome, Hirudotherapy, Leech therapy.

REFERENCES

1. Kulbida R, Mathes A and Loeser J. Beneficial effects of hirudotherapy in a chronic case of complex regional pain syndrome. *J Integr Med.* 2019;17(5):383-386.
2. Loeser J, Layer B, Plata C, Perrar KM, Hucho T and Kulbida R. Hirudotherapy attenuates arthritic pain in patients with various chronic pain syndromes: a retrospective analysis. *J Integr Med.* 2020;18(5):425-433.
3. Rajfur K, Rajfur J and Fras-Labanc B. Does the use of hirudotherapy reduce pain? A narrative review. *Med Sci Pulse.* 2024;18(2):22-27.
4. Altamura D, Calonje E, Li Liao J, Rogers M and Verdolini R. Diffuse cutaneous pseudolymphoma due to therapy with medicinal leeches. *JAMA Dermatol.* 2014;150(7):783-784.
5. Khelifa E, Kaya G and Laffitte E. Cutaneous pseudolymphomas after leech therapy. *J Dermatol.* 2013;40(8):674-675.
6. Tupikowska M, Woźniak Z, Wojciechowska-Zdrojowy M, Maj J and Jankowska-Konsur A. Hirudotherapy - a rare cause of pseudolymphoma. *Postepy Dermatol Alergol.* 2018;35(2):225-226.
7. Kavaklı HŞ and Tanrıverdi F. Bilateral hemarthrosis due to hirudotherapy: case report. *J Emerg Med Case Rep.* 2010;1(2):20-22.

► Oral Presentation 31

The Role of Ferroptosis in the Central Nervous System: Molecular Mechanisms, Interaction with Neuroinflammation, and Therapeutic ApproachesID Musa Tatar¹, ID Kübra Kıymet Tüfekci²¹Department of Histology and Embryology, Faculty of Medicine, Karabük University, Karabük, Türkiye²Department of Histology and Embryology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye**ABSTRACT**

This study aims to evaluate the molecular mechanisms of ferroptosis in the central nervous system, its interaction with neuroinflammation, and its therapeutic potential in various neurological diseases in light of current literature. Ferroptosis is a form of regulated cell death that occurs as a result of the iron-dependent peroxidation of phospholipids containing polyunsaturated fatty acids in the cell membrane. Unlike apoptosis, it is not characterized by caspase activation and prominent nuclear changes, but rather by mitochondrial shrinkage, reduced cristae, and accumulation of lipid-reactive oxygen species. High oxygen consumption, an abundance of iron and polyunsaturated fatty acids, and specifically the limited antioxidant capacity of neurons make the central nervous system (CNS) vulnerable to ferroptotic damage [1, 2].

In the CNS, ferroptosis is not limited solely to neurons. While astrocytes protect neurons with their strong antioxidant capacities, oligodendrocytes are more susceptible to ferroptotic damage due to their high iron and lipid content. Ferroptotic stress developing in microglia can impair phagocytosis, thereby increasing the production of inflammatory mediators; meanwhile, ferroptosis in brain endothelial cells and pericytes can disrupt the integrity of the blood-brain barrier. As a result of the bidirectional relationship between ferroptosis and neuroinflammation, oxidized lipids and damage signals activate microglia and astrocytes. At the same time, inflammatory cytokines and reactive oxygen species reinforce neuronal and glial ferroptosis. Therefore, rather than being a death mechanism specific to a single cell type, ferroptosis in the CNS is considered a tissue-level process shaped by intercellular metabolic and immune interactions [3, 4, 5].

Ferroptosis may play a role in the pathogenesis of many neurological diseases, such as Alzheimer's and Parkinson's

diseases, amyotrophic lateral sclerosis (ALS), multiple sclerosis (MS), epilepsy, stroke, traumatic brain injury, and spinal cord injury. Iron chelators, ferrostatin-1, liproxstatin-1, N-acetylcysteine, NRF2 activators, and lipid peroxidation inhibitors have demonstrated neuroprotective effects in experimental models. However, a single variable, such as a decrease in GPX4, an increase in ACSL4, or iron accumulation, is not sufficient to establish ferroptosis. To validate ferroptosis, iron metabolism, lipid peroxidation, antioxidant defense, mitochondrial morphology, and the response to ferroptosis inhibitors must be evaluated together. Although current findings present ferroptosis as a promising therapeutic target, most existing evidence relies on cell culture and animal studies [2, 5].

Keywords: Ferroptosis, Central nervous system, Neuroinflammation

REFERENCES

1. Ratan RR, The chemical biology of ferroptosis in the central nervous system. *Cell Chemical Biology*, 2020;27(5):479–498. <https://doi.org/10.1016/j.chembiol.2020.03.007>
2. Huang Q, Zhang H, Chen S, Wang Y, and Zhou J. Ferroptosis in central nervous system injuries: molecular mechanisms, diagnostic approaches, and therapeutic strategies. *Frontiers in cellular neuroscience*, 2025;19:1593963.
3. Li Y, Xiao D, and Wang X. The emerging roles of ferroptosis in cells of the central nervous system. *Frontiers in Neuroscience*, 2022;16:1032140. <https://doi.org/10.3389/fnins.2022.1032140>
4. Xu Y, Jia B, Li J, Li Q, and Luo C. The interplay between ferroptosis and neuroinflammation in central neurological disorders. *Antioxidants*, 2024;13(4): 395. <https://doi.org/10.3390/antiox13040395>
5. Winneberger J, Raich L, Potthast T, and Woo MS. Non-neuronal ferroptosis in the central nervous system. *Ferroptosis & Oxidative Stress*, 2026;2:202609. <https://doi.org/10.70401/fos.2026.0030>

► Oral Presentation 32

Beyond a Vehicle: Biological Effects of DMSO on Ethanol-Induced Endoplasmic Reticulum Stress in PC12 Cells

 Sabriye Karadenizli Taşkın¹,  Candan Yılmaz Özdoğan^{2,3},  Deniz Şahin¹,  Halime Kenar^{2,4},  Nurbay Ateş¹

¹Department of Physiology, Faculty of Medicine, Kocaeli University, Kocaeli, Türkiye

²Department of Medical Biology, Diabetes and Obesity Research Laboratory, Faculty of Medicine, Kocaeli University, Kocaeli, Türkiye

³Department of Medical Microbiology, Molecular Research and Antibody Laboratory, Faculty of Medicine, Kocaeli University, Kocaeli, Türkiye

⁴Department of Biomedical Engineering, Faculty of Engineering and Natural Sciences, Acıbadem University, İstanbul, Türkiye

ABSTRACT

Dimethyl sulfoxide (DMSO) is widely used as an experimental vehicle and is generally considered biologically inert at low concentrations. However, growing evidence suggests that DMSO can influence cellular signaling pathways [1]. This study investigated the biological effects of 0.1% DMSO on ethanol-induced endoplasmic reticulum (ER) stress, cell viability, and membrane potential in PC12 cells [2].

PC12 cells were exposed to 0.1% ethanol, 0.1% DMSO, or a combination of both. ER stress was assessed by measuring CHOP and GRP78 expression using Texas Red fluorescence normalized to DAPI fluorescence [3]. Cell viability was assessed using the WST-1 assay, and changes in membrane potential were monitored by fluorescence-based measurements [4]. Statistical analyses were performed using the Kruskal-Wallis test followed by the Dunn multiple comparison test.

Ethanol induced the activation of ER stress pathways by increasing CHOP and GRP78 expression. Co-treatment with DMSO attenuated the ethanol-induced increase in ER stress markers while preserving cell viability. Interestingly, fluorescence-based membrane potential analysis revealed that, despite reduced ER stress markers, the DMSO+ethanol group exhibited greater depolarization than the DMSO-only group. These findings indicate that DMSO exerts multiple biological effects beyond its

modulation of ER stress.

The current findings demonstrate that the 0.1% DMSO concentration, routinely used as an experimental vehicle, is not biologically inert under these experimental conditions; DMSO modulated ER stress, cell viability, and membrane responses in distinct ways. This situation has highlighted the importance of considering DMSO's biological activity when interpreting studies in which it is used as a vehicle control [5].

Keywords: DMSO, PC12 Cells, ER stress, Membrane potential

REFERENCES

1. Verheijen M, Lienhard M, Schrooders Y, et al. DMSO induces drastic changes in human cellular processes and epigenetic landscape in vitro. *Sci Rep*. 2019;9(1):4641. doi:10.1038/s41598-019-40660-0
2. Németh M, Brandt B, Les H, et al. Role of the Transcription Factor CREB in Ethanol-Induced Endoplasmic Reticulum Stress and Apoptosis in PC12 Cells. *Biology (Basel)*. 2025;14(9):1277. doi:10.3390/biology14091277
3. Yi S, Shi W, Zuo M, et al. Endoplasmic Reticulum Stress Is Involved in Glucocorticoid-Induced Apoptosis in PC12 Cells. *Anal Cell Pathol (Amst)*. 2021;2021:5565671. doi:10.1155/2021/5565671
4. Xia S, Di Paola M, Jones NL, Bear CE. A Fluorescence-based Assay of Membrane Potential for High-throughput Functional Study of Two Endogenous Ion Channels in Two Epithelial Cell Lines. *J Vis Exp*. 2022;(184):10.3791/63528. doi:10.3791/63528
5. Tamagnini F, Scullion S, Brown JT, Randall AD. Low concentrations of the solvent dimethyl sulphoxide alter intrinsic excitability properties of cortical and hippocampal pyramidal cells. *PLoS One*. 2014;9(3):e92557. doi:10.1371/journal.pone.0092557

► Oral Presentation 33

The Molecular Lock of Neurodegeneration: TRP Channels and Phytotherapeutic Approaches in Alzheimer's Disease

 **Tahire Yurdakul¹**,  **Fevzi Özgökçe²**,  **Kenan Yıldızhan³**

¹Department of Biology, Faculty of Science, Van Yüzüncü Yıl University, Van, Türkiye

²Department of Molecular Biology and Genetic, Faculty of Science, Van Yüzüncü Yıl University, Van, Türkiye

³Department of Biophysics, Faculty of Medicine, Van Yüzüncü Yıl University, Van, Türkiye

ABSTRACT

The pathogenesis of Alzheimer's disease (AD) is not limited to amyloid-beta (A β) accumulation and tau hyperphosphorylation; instead, it is driven by an interconnected molecular network encompassing impaired calcium (Ca²⁺) homeostasis, oxidative stress, mitochondrial dysfunction, neuroinflammation, endoplasmic reticulum stress, impaired autophagy, and synaptic regression. At the center of this complex network are Transient Receptor Potential (TRP) channels, which function not only as ion channels that sense cellular stress but also as key molecular regulators that define the balance between neuronal survival and death. Functional dysregulation of TRP channels disrupts intracellular Ca²⁺ homeostasis, exacerbating neuroinflammation, oxidative damage, and apoptotic pathways, ultimately becoming a critical determinant of disease progression.

The aim of this presentation is to comprehensively evaluate the pathophysiological role of the TRP channel family in Alzheimer's disease in the light of current molecular evidence and to provide an integrative perspective on the neuroprotective effects of plant-derived bioactive compounds targeting these channels. In this context, the roles of TRPV, TRPM, TRPA, TRPC, and endolysosomal TRP channels in cellular signalling networks, as well as the antioxidant, anti-inflammatory, anti-apoptotic, and synaptic protective effects of numerous phytochemical agents mediated through these channels, are assessed. This review redefines TRP channels as a unified molecular axis linking the multidimensional pathology of Alzheimer's disease and highlights phytotherapeutic compounds as innovative therapeutic candidates that

modulate multiple pathological mechanisms simultaneously rather than targeting a single one. In conclusion, it is expected to provide a solid scientific foundation for future preclinical and clinical research on phytotherapy targeting TRP channels.

Keywords: Alzheimer's Disease, TRP Channels, Phytotherapeutic compounds, Calcium homeostasis, Oxidative stress

REFERENCES

1. Guo D, Cai M, Xian Y, Chen Y, Feng Y, Hu C, Zeng L, Shi L, & Zhang S. Transient Receptor Potential Channels as Key Regulators of Neuroinflammation in Neurological Disorders: Mechanistic Insights, Therapeutic Potentials, and Future Directions. *CNS neuroscience & therapeutics*. 2025;31(12):e70700.
2. Hardy J, Selkoe DJ. The amyloid hypothesis of Alzheimer's disease: progress and problems on the road to therapeutics. *science*. 2002;297(5580):353-356.
3. Baranowska-Wójcik E, Gajowniczek-Ałasa D, Pawlikowska-Pawłęga B, & Sz wajgier D. The Potential Role of Phytochemicals in Alzheimer's Disease. *Nutrients*. 2025;17(4):653.

► Oral Presentation 34

Keywords: Insulinoma model, Calcium, LDH, TOS, TAS**Evaluation of Metabolic and Molecular Alterations in Brain Tissue of Nude Mice in Which an Insulinoma Model Was Established** **Ayşe Karatug Kacar**

Istanbul University, Faculty of Science, Department of Biology,
Istanbul, Türkiye

ABSTRACT

This study aimed to investigate the metabolic, apoptotic, and molecular alterations induced in brain tissue by different tumor dissemination patterns in an INS-1-induced insulinoma model.

Nude mice were randomly divided into three groups: 1- control, 2- subcutaneous (SC) INS-1-induced tumor, 3- intraperitoneal (IP) INS-1-induced tumor. Analyses were performed using whole-brain homogenates and total RNA. Calcium, LDH, caspase-3/7, caspase-8, caspase-9, total oxidant status (TOS), total antioxidant status (TAS), and oxidative stress index (OSI) were measured in tissue homogenates. Gene expression and protein levels in membrane and cytosolic fractions were analyzed by qRT-PCR and manual ELISA, respectively.

Brain calcium levels decreased in the SC group. Caspase-3/7, caspase-8, and caspase-9 activities increased in the IP group, whereas caspase-3/7 and caspase-8 increased in the SC group. LDH and TOS decreased in both groups, while TAS increased in the IP group. In the SC group, *Dapk3* and *Smad3* expression increased, whereas *GRPR* and *Sparc* decreased. In the IP group, *Igsf10* increased, while *Calca* and *Sparc* decreased. *KCND3* increased in both the membrane and cytosolic fractions in the IP group, whereas *KCNK1* decreased in the cytosolic fraction. In the SC group, *KCND3*, *KCNK1*, and *PTH1R* increased in the cytosolic fraction, while membrane *PTH1R* decreased.

The findings demonstrate that apoptotic processes, redox balance, and ion channel-related molecular regulation are altered in the brain tissue of nude mice in which an insulinoma model was established. Furthermore, the observed alterations may reflect distinct biological responses associated with different tumor dissemination patterns.

► Oral Presentation 35

Comparative Analysis of Antiseizure Medication Profiles in Adults with Epilepsy According to the Presence of Molecular Genetic Findings

 **Islamkhan Doszhanov**¹,  **Nigara Yerkhojayeva**¹,
 **Nursultan Nurdinov**²,  **Baimakhanova Gulzira**¹,
 **Yerbolat Saruarov**²,  **Nazira Zharkinbekova**³

¹Faculty of Medicine, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan

²Faculty of Dentistry, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan

³Department of Neurology, Psychiatry, Rehabilitation and Neurosurgery, South Kazakhstan Medical Academy, Shymkent, Kazakhstan

ABSTRACT

Antiseizure medication selection in adults with epilepsy is usually based on seizure type, electroencephalographic findings, neuroimaging data, and clinical treatment response. However, in a proportion of patients, epilepsy may have an underlying genetic basis, and molecular diagnosis can inform clinical care [1, 2]. Recent adult and regional cohort studies indicate that genetic findings, seizure burden, and drug resistance may define clinically relevant subgroups with differing therapeutic profiles [3, 4]. Therefore, comparison of antiseizure medication profiles according to molecular genetic findings may provide additional information for personalized epilepsy care.

To compare antiseizure medication profiles in adults with epilepsy according to the presence or absence of molecular genetic findings.

This observational cohort study included 78 adults with epilepsy who underwent clinical assessment and phenotype-guided exome sequencing. Molecular genetic findings were identified based on exome sequencing results and subsequent variant interpretation. Patients were stratified into two groups: those with detected molecular genetic findings and those without detected molecular genetic findings. The analyzed therapeutic variables included seizure frequency, monotherapy and polytherapy, number and type of antiseizure medications, drug-resistant epilepsy, treatment regimen, therapeutic drug monitoring, and adverse effects when available.

Molecular genetic findings were identified in 28 of 78 patients, while 50 patients had no detected molecular genetic findings. The two groups demonstrated broadly comparable antiseizure medication profiles. Monotherapy predominated in both groups, whereas polytherapy was used in approximately one-third of patients. The frequency of drug-resistant epilepsy was also similar between patients with and without molecular genetic findings. Carbamazepine was the most frequently used antiseizure medication in both groups, followed by valproic acid, levetiracetam, and lamotrigine. Despite the presence of molecular genetic findings in a substantial proportion of the cohort, medication patterns did not indicate a clearly genotype-guided treatment approach. Therapeutic drug monitoring was not performed in either group. Detailed comparative therapeutic characteristics are presented in

Table 1.**Table 1.** Comparative antiseizure medication profile according to the presence of molecular genetic findings.

Variable	Genetic findings present, n=28	Genetic findings absent, n=50
Age, median years	32	30
Female sex	17/28 (60.7%)	26/50 (52.0%)
Monthly or more frequent seizures	23/28 (82.1%)	44/50 (88.0%)
Weekly seizures	14/28 (50.0%)	22/50 (44.0%)
Monotherapy	20/28 (71.4%)	35/50 (70.0%)
Polytherapy	8/28 (28.6%)	15/50 (30.0%)
Drug-resistant epilepsy	8/28 (28.6%)	15/50 (30.0%)
Carbamazepine use	20/28 (71.4%)	32/50 (64.0%)
Valproic acid use	7/28 (25.0%)	16/50 (32.0%)
Levetiracetam use	5/28 (17.9%)	6/50 (12.0%)
Lamotrigine use	1/28 (3.6%)	6/50 (12.0%)
Therapeutic drug monitoring not performed	28/28 (100%)	50/50 (100%)

Adults with epilepsy demonstrated a high seizure burden and a substantial frequency of drug-resistant epilepsy regardless of the presence of molecular genetic findings. The overall similarity of antiseizure medication profiles between the two groups suggests that treatment strategies in this cohort remained mainly phenotype- and seizure-based rather than genetically guided. These findings highlight the need to integrate molecular genetic results, seizure burden, medication history, drug resistance, and therapeutic drug monitoring into personalized epilepsy management.

Keywords: Epilepsy, Molecular genetic findings, Antiseizure medications, Drug-resistant epilepsy, Personalized epilepsy care.

Funding: Supported by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant no. AP23489425).

REFERENCES

1. Krey I, Platzer K, Esterhuizen A, et al. Current practice in diagnostic genetic testing of the epilepsies. *Epileptic Disord.* 2022;24(5):765-786.
2. Krenn M, Wagner M, Trimmel K, et al. Holistic exome-based genetic testing in adults with epilepsy. *Neurol Genet.* 2025;11(3):e200260.
3. Doszhanov I, Rustemova S, Yerkhojayeva N, et al. Whole-exome sequencing utility and drug resistance in a real-world epilepsy cohort from Southern Kazakhstan. *Int J Transl Med.* 2026;6(3):30.
4. Baimakhanova G, Nurdinov N, Nuskabayeva G, et al. Factors associated with drug-resistant epilepsy in adults from Southern Kazakhstan. *Future Sci OA.* 2026;12(1):2665757.

► Oral Presentation 36

Quantitative Analysis of Axonal Endoplasmic Reticulum in Mouse Sciatic Nerve by Three-Dimensional Electron MicroscopyID **Ayşe Server Sezer**

Research Institute for Health Sciences and Technologies (SABITA), Regenerative and Restorative Medicine Research Center (REMER), Istanbul Medipol University, Istanbul, Türkiye

ABSTRACT

To establish an imaging workflow for quantitatively assessing injury-induced spatial reorganization of the axonal endoplasmic reticulum (ER) in mouse sciatic nerve using serial electron microscopy and three-dimensional segmentation.

Adult mice underwent sham surgery or sciatic nerve transection, and tissues were collected after 72 hours. Confocal imaging was used to pre-identify and coordinate regions of interest for electron microscopic tracking. Following Karnovsky fixation, heavy-metal contrasting, and epoxy embedding, 60-nm serial sections were acquired with a backscattered electron detector. Images were aligned in Fiji, and intra-axonal ER profiles were segmented using ilastik. Three-dimensional reconstructions were generated in Imaris to measure the total ER-to-axon volume ratio, individual ER segment volume, ellipticity, and ER number per unit volume. Six axonal volumes were evaluated per group.

Volumetric reconstruction of serial sections revealed thin, dispersed tubular ER profiles throughout the axoplasm. ER ellipticity was higher after injury than in controls (0.5035 ± 0.2073 versus 0.4509 ± 0.1904 ; $p < 0.0001$). The total ER-to-axon volume ratio increased from 0.5959 ± 0.2683 to 1.111 ± 0.2683 , while ER number per unit volume increased from 260 ± 25.30 to 371.7 ± 66.46 ; neither comparison reached statistical significance. Individual ER segment volume was largely preserved.

Combined measurement of volume, number, and shape identified injury-associated elongation and reorganization patterns that could not be captured by total ER abundance alone.

Integrating confocal pre-identification, array tomography, and three-dimensional segmentation provides a practical methodological framework for quantitative volumetric investigation of axonal ER dynamics in injury

models.

Keywords: Axon, array tomography, Endoplasmic reticulum, Sciatic nerve, Three-dimensional segmentation

► Oral Presentation 37

Ultrastructural and Elemental Characterization of Mutant Huntingtin Aggregates in Vitro Models of Huntington's Disease**Olgu Enis Tok^{1,2}**¹Department of Histology and Embryology, Faculty of Medicine, İstanbul Medipol University, İstanbul, Türkiye²Research Institute for Health Sciences and Technologies (SABITA), İstanbul Medipol University, İstanbul, Türkiye**ABSTRACT**

Huntington's disease (HD) is caused by CAG-repeat expansion in the HTT gene, producing mutant huntingtin (mHtt) with an expanded polyglutamine tract that misfolds and forms intracellular inclusions [1]. Disturbed metal homeostasis, particularly involving copper (Cu) and iron (Fe), contributes to HD pathogenesis [2,3]. Energy-dispersive X-ray spectroscopy (EDX) coupled with TEM/STEM enables nanoscale elemental mapping and characterization of the elemental microenvironment of Htt aggregates [4].

Primary striatal neurons isolated from P0–P3 BALB/c mice were cultured for 7 days and transduced with AAV encoding an empty vector for control and wild-type Htt-Q23 to establish an in vitro model of Huntington's disease. Neurons were fixed with Karnovsky fixative, processed using an en-bloc staining protocol, dehydrated, and embedded in Epon. Serial 60-nm ultrathin sections were collected on glass coverslips. Htt aggregates and adjacent lysosomes and mitochondria were localized by TEM, and corresponding regions were subjected to EDX elemental analysis.

Compared with controls, neurons in the HD model exhibited marked Cu enrichment within cytoplasmic aggregates. Electron-dense lysosomes adjacent to aggregates showed pronounced Fe accumulation, whereas nearby mitochondria displayed lower Fe signals. Ca-P-rich electron-dense deposits were also detected within the nanoscale microenvironment surrounding Htt inclusions.

These findings indicate spatial redistribution of Cu, Fe, and Ca-P associated with Htt aggregation. Cu enrichment is consistent with reported Cu-Htt interactions [2], while lysosomal Fe accumulation parallels previous HD observations [3]. Because neuronal Ca-P deposits can produce aggregate-like electron density [5], EDX should

complement molecular Htt identification rather than serve as a stand-alone aggregate marker.

Keywords: Huntington's disease, Mutant huntingtin, Protein aggregation, EDX

REFERENCES

1. Riguet N, Mahul-Mellier AL, Maharjan N, Bartscher J, Croisier M, Knott G, et al. Nuclear and cytoplasmic huntingtin inclusions exhibit distinct biochemical composition, interactome and ultrastructural properties. *Nature Communications*. 2021;12:6579. doi:10.1038/s41467-021-26684-z.
2. Fox JH, Kama JA, Lieberman G, Chopra R, Dorsey K, Chopra V, et al. Mechanisms of copper ion mediated Huntington's disease progression. *PLoS One*. 2007;2(3):e334. doi:10.1371/journal.pone.0000334.
3. Chen J, Marks E, Lai B, Zhang Z, Duce JA, Lam LQ, et al. Iron accumulates in Huntington's disease neurons: protection by deferoxamine. *PLoS One*. 2013;8(10):e77023. doi:10.1371/journal.pone.0077023.
4. Scimeca M, Bischetti S, Lamsira HK, Bonfiglio R, Bonanno E. Energy Dispersive X-ray (EDX) microanalysis: a powerful tool in biomedical research and diagnosis. *European Journal of Histochemistry*. 2018;62(1):2841. doi:10.4081/ejh.2018.2841.
5. Anderson ED, Cronkite CA, Baldwin PR, Abella CP, Duman JG, Simmonds AN, et al. Primary cortical neurons precipitate and extrude large mitochondria-associated calcium-phosphate sheets with a bone-precursor-like ultrastructure. *Molecular Brain*. 2026;19:11. doi:10.1186/s13041-025-01272-0.

► Oral Presentation 38

Machine Learning-Based Classification of Cell Type-Resolved Transcriptomic Profiles in Parkinson's Disease and Identification of Discriminative Gene Features
 **Hazal Bozyel**¹,  **Ahmi Öz**²
¹Faculty of Medicine, Süleyman Demirel University, Isparta, Türkiye²Department of Biophysics, Faculty of Medicine, Süleyman Demirel University, Isparta, Türkiye**ABSTRACT**

Cell type-resolved transcriptomic data enable molecular alterations associated with Parkinson's disease (PD) to be evaluated in a cellular context and may support disease classification. We analyzed 2,096,155 nuclei samples from 73 patients with PD and 24 healthy donors of "A multi-region single nucleus transcriptomic atlas of Parkinson's disease" dataset [7]. Six major cell types, comprising approximately 97% of nuclei samples, were converted into donor–cell type profiles. Five donors who did not meet the 6 cell type criteria were excluded, leaving 73 development donors (56 PD/17 control) and 19 holdout donors (14 PD/5 control). 26 machine-learning algorithms were screened; the six best-performing classifiers were compared using 5×4 nested cross-validation, with preprocessing and feature selection performed only within training partitions [9]. Performance was assessed using balanced accuracy (BA), ROC-AUC and macro-F1 metrics. NearestCentroid was selected as the final classifier and achieved BA=0.714, ROC-AUC=0.843, and macro-F1=0.578 in the holdout cohort. The top 60 cell type–gene features ranked by Cohen's d were used, most of which were oligodendrocyte-derived. The highest absolute Cohen's d values were observed for C8orf89, LIMA1, UBE3A, HS1BP3, and COL27A1. MFN1 and SLC25A46 are associated with mitochondrial dynamics [3,8], ATG14 with autophagy [6] and SLC1A3 with glutamate transport [5]. Similar oligodendrocyte proportions in disease and healthy groups (53.85% vs. 53.53%) suggest that this pattern may not be explained by cell abundance alone.

These findings are consistent with reported oligodendroglial/glial transcriptional alterations in PD [1,2,4]. Independent and experimental validations are required.

Keywords: Parkinson's disease, Single-nucleus RNA sequencing, Machine learning, Oligodendrocyte, Transcriptomic signature

REFERENCES

1. Adams L, Song MK, Yuen S, Tanaka Y, Kim YS. A single-nuclei paired multiomic analysis of the human midbrain reveals age- and Parkinson's disease-associated glial changes. *Nat Aging*. 2024;4(3):364–378.
2. Bae EJ, Pérez-Acuña D, Rhee KH, Lee SJ. Changes in oligodendroglial subpopulations in Parkinson's disease. *Mol Brain*. 2023;16(1):65.
3. Chen W, Zhao H, Li Y. Mitochondrial dynamics in health and disease: mechanisms and potential targets. *Signal Transduct Target Ther*. 2023;8(1):333.
4. Fiorini MR, Li J, Fon EA, Farhan SMK, Thomas RA. Neural networks reveal novel gene signatures in Parkinson disease from single-nuclei transcriptomes. *NPJ Parkinsons Dis*. 2025;11(1):304.
5. Gorostiola González M, Sijben HJ, Dall'Acqua L, Liu R, IJzerman AP, Heitman LH, et al. Molecular insights into disease-associated glutamate transporter (EAAT1/SLC1A3) variants using in silico and in vitro approaches. *Front Mol Biosci*. 2023;10:1286673.
6. Ohashi Y. Activation mechanisms of the VPS34 complexes. *Cells*. 2021;10(11):3124.
7. Prashant NM, Fullard JF, Clarence T, Mathur D, Casey C, Hennigan E, et al. A multi-region single nucleus transcriptomic atlas of Parkinson's disease. *Sci Data*. 2024;11(1):1274.
8. Schuettelpelz J, Janer A, Antonicka H, Shoubbridge EA. The role of the mitochondrial outer membrane protein SLC25A46 in mitochondrial fission and fusion. *Life Sci Alliance*. 2023;6(6):e202301914.
9. Varma S, Simon R. Bias in error estimation when using cross-validation for model selection. *BMC Bioinformatics*. 2006;7:91.

► Oral Presentation 39

The Trigeminal System in Migraine Pathophysiology: Nociception and Therapeutic Approaches

 **Adem Ahlatcı**¹,  **Mehmet Hafit Bayır**²,  **Ferit Çeliker**³

¹Vocational School of Health Services, Van Yuzuncu Yil University, Van, Türkiye

²Department of Histology and Embryology, Faculty of Medicine, Van Yuzuncu Yil University, Van, Türkiye

³Department of Biophysics, Faculty of Medicine, Van Yuzuncu Yil University, Van, Türkiye

ABSTRACT

Migraine is a complex neurological disorder in which dysregulated nociceptive processing within the trigeminal system plays a central role in headache generation, sensory hypersensitivity, and disease chronification. Activation of meningeal trigeminal afferents initiates trigeminovascular signalling and promotes the release of neuropeptides, particularly calcitonin gene-related peptide (CGRP) and pituitary adenylate cyclase-activating polypeptide (PACAP), amplifying neurovascular responses and peripheral sensitisation [1]. Persistent nociceptive input subsequently recruits the trigeminocervical complex and higher-order thalamocortical networks, contributing to central sensitisation and cutaneous allodynia. At the molecular level, transient receptor potential (TRP) channels provide a critical interface between inflammatory, oxidative, metabolic, and environmental stimuli and trigeminal excitability. In particular, TRPV1 and TRPA1 facilitate Ca²⁺-dependent neuronal activation and neuropeptide release, while other TRP channels may further modulate nociceptive signalling. Oxidative stress, mitochondrial dysfunction, neuroinflammation, and neuron–glia interactions can reinforce these pathways, lowering nociceptive thresholds and sustaining trigeminal sensitisation. Advances in understanding of trigeminal nociception have enabled mechanism-based therapies targeting CGRP signalling, including monoclonal antibodies and gepants [2], as well as 5-HT_{1F} receptor agonists and neuromodulatory strategies. Recent advances in PACAP biology further suggest that partially distinct CGRP- and PACAP-dependent pathways may provide complementary molecular targets for migraine therapy [3]. This review integrates current evidence on trigeminal

nociceptive circuitry, neuropeptide signalling, TRP channel regulation, oxidative stress, and neuroinflammation, and critically evaluates their therapeutic implications.

Keywords: Migraine, trigeminal system, Inflammatory mediators, Oxidative stress, TRP channels,

REFERENCES

1. Caronna E, Alpuente A, Torres-Ferrus M and Pozo-Rosich P. CGRP monoclonal antibodies and CGRP receptor antagonists (Gepants) in migraine prevention. *Handb Clin Neurol.* 2024;199:107-124.
2. Jakubowska B and Sowa-Kućma M. Gepants: targeting the CGRP pathway for migraine relief. *Front Pharmacol.* 2025;16:1708226.
3. Della Pietra A, Kuburas A and Russo AF. PACAP versus CGRP in migraine: From mouse models to clinical translation. *Cephalalgia.* 2025;45(9):3331024251364242.

► Oral Presentation 40

Protective Effects of Astragalin on H₂O₂-Induced Skeletal Muscle Atrophy in C2C12 Myotubes: A Morphological and Molecular Study

 Ayşe Şirin¹,  Deniz Beril Ataş¹,  Uğur Akpulat²

¹Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye

²Department of Medical Biology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye

ABSTRACT

Skeletal muscle atrophy is a debilitating condition characterized by an imbalance between protein synthesis and degradation, often triggered by oxidative stress [1, 2]. This study aimed to evaluate the protective efficacy of Astragalin, a natural flavonoid with potent antioxidant properties [3], against hydrogen peroxide (H₂O₂)-induced atrophy in an in vitro C2C12 myotube model.

C2C12 myoblasts were differentiated into mature myotubes using low-mitogen medium. The optimal non-toxic dose of Astragalin was determined via MTT assay. Atrophy was induced by exposing myotubes to 300 µM H₂O₂ for 48 hours. Morphological integrity was assessed using phase-contrast inverted microscopy. Molecular analysis of muscle-specific E3 ubiquitin ligases, MAFbx (Atrogin-1) and MuRF1, was performed using quantitative Real-Time PCR (qPCR).

MTT analysis identified 10 µM as the safe therapeutic dose of Astragalin. While H₂O₂ treatment caused significant myotube shrinkage, fragmentation, and reduced network density, co-treatment with 10 µM Astragalin successfully preserved myotube morphology. Molecularly, H₂O₂ significantly upregulated MAFbx (1.63-fold) and MuRF1 (1.39-fold) expression (p < 0.01). Astragalin treatment effectively suppressed this proteolytic activation, reducing expression levels to 1.31-fold and 1.21-fold, respectively (p < 0.01).

Our findings demonstrate that Astragalin exerts significant anti-atrophic and cytoprotective effects by maintaining cellular morphology and suppressing the ubiquitin-proteasome pathway at the transcriptional level. These results suggest that Astragalin is a promising candidate for developing targeted therapies against oxidative stress-related muscle wasting.

Keywords: Astragalin, Skeletal muscle atrophy, Oxidative stress, C2C12 myotubes, MuRF1, MAFbx.

Acknowledgement: This scientific work was supported by the TÜBİTAK 2209-A University Students Research Projects Support Program (Project Title: Astragalin Antioksidanının İskelet Kası Atrofisi Üzerine Etkileri).

REFERENCES

1. Argilés JM, et al. Skeletal Muscle Regulates Metabolism via Interorgan Crosstalk, Roles in Health and Disease. *JAMDA*. 2016;17(9):789-796.
2. Bodine SC, Baehr LM. Skeletal muscle atrophy and the E3 ubiquitin ligases MuRF1 and MAFbx/atrogin-1. *Am J Physiol Endocrinol Metab*. 2014;307(6):E469-84.
3. Sun MY, et al. Astragalin ameliorates renal injury in diabetic mice by modulating mitochondrial quality control via AMPK-dependent PGC1α pathway. *Acta Pharmacol Sin*. 2023;44(8):1676-1686.

► Oral Presentation 41

Investigation of the Antiproliferative Effects of Nivolumab and Ipilimumab in an in Vitro Model of Neuroblastoma

 Maide Sena Civelek¹,  Betül Sena Uyanık¹,
 Zekai Halıcı¹

¹Department of Medical Pharmacology, Research Hospital, Ataturk University, Erzurum, Türkiye

ABSTRACT

Neuroblastoma is a high-risk pediatric solid tumor prone to therapeutic resistance, highlighting the need for novel targeted strategies [1, 2]. This study aimed to evaluate the in vitro antiproliferative effects of the PD-1 inhibitor nivolumab and the CTLA-4 inhibitor ipilimumab, both as monotherapies and in combination, on the SH-SY5Y neuroblastoma cell line.

SH-SY5Y cells were exposed to varying concentrations of nivolumab and ipilimumab (1, 3, 5, 10, 20, and 50 µg/mL). Cell viability and growth inhibition levels were quantitatively measured following a 24-hour incubation period [3].

Preliminary findings indicated that single-agent ipilimumab exerted noticeable inhibitory effects only at the highest dose tested (50 µg/mL). Similarly, the combination treatment demonstrated maximal growth inhibition at the highest concentration pair, suggesting a potential dose-dependent response.

High-concentration exposure to nivolumab and ipilimumab induces short-term in vitro growth inhibition in SH-SY5Y cells. Given their primary immune-mediated mechanisms of action, further validation in immune co-culture models and assessment of checkpoint expression dynamics are warranted.

Keywords: CTLA-4, Ipilimumab, Neuroblastoma, Nivolumab, PD-1, SH-SY5Y.

REFERENCES

1. Pringsheim T, Jette N, Frolkis A and Steeves TD. The prevalence of pediatric neuroblastoma and therapeutic targets. *Mov Disord.* 2014;29(13):1583-1590.
2. Pereira GM, Teixeira-dos-Santos D, Soares NM, Marconi GA. Immune checkpoint inhibition in solid pediatric malignancies. *npj Precision Oncol.* 2024;10(1):181.

3. Selby MJ, Engelhardt JJ, Johnston RJ, Lu L-S, Han M, Thudium K, et al. Preclinical Development of Ipilimumab and Nivolumab Combination Immunotherapy: Mouse Tumor Models, In Vitro Functional Studies, and Cynomolgus Macaque Toxicology. *PLoS ONE.* 2016;11(9):e0161779. doi:10.1371/journal.pone.0161779

► Oral Presentation 42

***In Vitro* Evaluation of the Cytotoxic Effects of Methylergonovine Maleate on the SHSY-5Y**

 **Saliha Sena Karcioğlu¹**,  **Aylin Aydin²**,  **Büsra Halici³**,  **Elif Cadirci¹**

¹Department of Medical Pharmacology, Faculty of Medicine, Atatürk University, Erzurum, Türkiye

²Department of Pharmacology, Faculty of Pharmacy, Atatürk University, Erzurum, Türkiye

³Faculty of Pharmacy, Atatürk University, Erzurum, Türkiye

ABSTRACT

This study aimed to evaluate the effects of methylergonovine maleate on SH-SY5Y cell viability at different concentrations and exposure times under in vitro conditions using the MTT assay [1,2].

Cells were treated with methylergonovine maleate at concentrations of 1.56, 3.125, 6.25, 12.5, 25, 50, and 100 µg/mL for 24, 48, and 72 hours. Cell viability was calculated relative to the untreated control group, which was accepted as 100%.

According to the MTT assay results, cell viability varied depending on concentration and exposure time. After 24 hours, cell viability was 89.95% at 100 µg/mL, while the values at the other concentrations were close to or above the control level. After 48 hours, cell viability was 77.48% at 100 µg/mL. At concentrations ranging from 1.56 to 25 µg/mL, cell viability values were above the control level, with the highest value observed at 1.56 µg/mL (129.15%).

After 72 hours, cell viability was 76.80% at 50 µg/mL and 47.18% at 100 µg/mL. At concentrations between 1.56 and 12.5 µg/mL, the values remained above the control level. The highest cell viability value was observed at 1.56 µg/mL after 72 hours (131.64%).

In conclusion, methylergonovine maleate was associated with lower cell viability values at high concentrations, particularly after 72 hours of exposure. Further cellular studies are required to confirm these preliminary findings.

Keywords: SH-SY5Y, Methylergonovine maleate, Cytotoxicity, MTT assay

REFERENCES

1. Balki M, Wong CA. Refractory uterine atony: still a problem after all these years. *Int J Obstet Anesth.* 2021;48.
2. Dalberto D, Nicolau CC, Garcia ALH, Nordin AP, Grivicich I, Silva JD. Cytotoxic and genotoxic evaluation of cotinine using human neuroblastoma cells (SH-SY5Y). *Genet Mol Biol.* 2020;43(2):e20190123

► Oral Presentation 43

Evaluation of the Dose- and Time-Dependent Cytotoxic Effects of Palonosetron in SH-SY5Y Neuroblastoma Cells

 Aysegul Tavacı-Ozcelik¹,  Cihad Ozcelik²,
 Aylin Aydin³,  Zekai Halıcı¹

¹Ataturk University Faculty of Medicine, Department of Medical Pharmacology

²Erzurum Provincial Health Directorate

³Ataturk University Faculty of Pharmacy, Department of Pharmacology

ABSTRACT

Palonosetron is a highly selective 5-HT₃ receptor antagonist widely used for the prevention of chemotherapy-induced nausea and vomiting [1]. Although its antiemetic effects are well established, recent evidence suggests that palonosetron may also influence cancer cell proliferation and survival; however, its effects on neuroblastoma cells remain poorly characterized [2,3].

This study aimed to investigate the dose- and time-dependent effects of palonosetron on the viability of SH-SY5Y neuroblastoma cells using the MTT cell viability assay.

SH-SY5Y neuroblastoma cells were exposed to palonosetron at concentrations ranging from 0.3125 to 30 µg/mL for 24, 48, and 72 hours. Cell viability was assessed using the MTT assay, and IC₅₀ values were calculated from dose-response curves.

Palonosetron reduced SH-SY5Y cell viability in a concentration- and exposure time-dependent manner. After 24 hours, cell viability at 30, 15, 10, and 7.5 µg/mL was 9.45%, 44.73%, 64.12%, and 82.86%, respectively. After 48 hours, viability decreased to 8.08%, 19.07%, 61.95%, and 67.08%, respectively. Following 72 hours of treatment, viability was 6.93%, 11.20%, 47.30%, and 53.32%, respectively. The IC₅₀ values were 14.92 µg/mL at 24 hours, 11.19 µg/mL at 48 hours, and approximately 8.5 µg/mL at 72 hours.

Palonosetron decreases SH-SY5Y neuroblastoma cell viability in a dose- and time-dependent manner. The progressive decrease in IC₅₀ with prolonged exposure suggests an increasing cytotoxic effect over time. These findings support further molecular and mechanistic studies to elucidate the biological effects of palonosetron on

neuroblastoma cells.

Keywords: SH-SY5Y, Neuroblastoma, Palonosetron.

REFERENCES

1. Yamaguchi A, Saito Y, Takekuma Y, Sugawara M. Palonosetron for prevention of delayed chemotherapy-induced nausea and vomiting in pediatric patients: a meta-analysis. *Support Care Cancer*. 2024;32(1):58.
2. Lee JS, Park SY, Kim NY, Kim DW, Oh JE, Heo E, et al. Anti-tumor potential of a 5-HT₃ receptor antagonist as a novel autophagy inducer in lung cancer: A retrospective clinical study with in vitro confirmation. *J Clin Med*. 2019.
3. Yoo YC, Lin L, Lee S, Shin YR, Oh JE, Kim NY. Palonosetron, a 5-HT₃ Receptor Antagonist, Induces G1 Cell Cycle Arrest and Autophagy in Gastric Cancer Cells. *Int J Mol Sci*. 2025.

► Oral Presentation 44

Investigation of the Potential Use of Rivanol as A Pool Disinfectant Against Free-Living Amoebae: Preliminary Study Findings** Zehra İrem Parlak¹,  Selahattin Aydemir²**¹Van Yuzuncu Yıl University Faculty of Medicine, Van, Türkiye²Van Yüzüncü Yıl University Faculty of Medicine, Department of Medical Parasitology, Van, Türkiye**ABSTRACT**

Free-living amoebae (FLA) are unicellular protists commonly found in aquatic and soil ecosystems in nature. Species of *Acanthamoeba* spp., which are included in this group, are known as opportunistic pathogens that can cause serious infections such as amoebic keratitis and granulomatous amoebic encephalitis in humans. It has been reported that *Acanthamoeba* strains detected especially in swimming pool waters and biofilms may be resistant to the chlorine concentrations routinely used in pools. This situation necessitates the investigation of effective alternative disinfection agents against FLA. Ethacridine lactate (Rivanol) is a highly water-soluble acridine derivative known for its antiseptic activity against Gram-positive bacteria. Its mechanism of action involves intercalating binding to bacterial DNA; however, its effect on FLA has not been adequately studied in the literature. Within the scope of this project, it is aimed to investigate the effect of Rivanol on the viability of *Acanthamoeba castellanii* cysts and to evaluate the potential of the substance as an alternative agent in swimming pool water disinfection. In this report, the preliminary findings obtained at the initial phase of the ongoing project are presented. In the preliminary study, Rivanol was dissolved in water to obtain Rivanol solutions at concentrations of 5 mg/ml, 2.5 mg/ml, and 1.25 mg/ml. These concentrations were applied to *A. castellanii* cysts that had been cultured on Non-nutrient Agar and transferred into PBS solution. In the control group, pure water was used instead of Rivanol. After two hours of incubation at room temperature, the viability of the cysts was evaluated under a light microscope using the trypan blue exclusion method with the help of a Thoma slide; cysts that did not take up the dye (transparent) were recorded as viable. After two hours of incubation, a marked decreasing trend in the number of viable cysts was observed between the groups. In the group

containing the highest concentration of Rivanol, 83.7% inhibition was observed, and as the concentration of Rivanol decreased, the inhibition rate also decreased. The preliminary findings obtained indicate that Rivanol may exhibit a concentration-dependent inhibitory effect on *A. castellanii* cysts. These results support the project hypothesis that Rivanol may be considered as an alternative agent for swimming pool water disinfection.

Keywords: Rivanol, *Acanthamoeba*, Disinfection, Pool Water, Preliminary Study

This study is supported by the Van Yüzüncü Yıl University Scientific Research Projects Coordination Unit (Project Code: TLO-2026-13300).

► Oral Presentation 45

Synergistic Anticancer Effects of *Cannabis sativa* L. (Narlı variety) Seed Oil Combined with Doxorubicin through Modulation of Apoptosis in SH-SY5Y Neuroblastoma Cells
 Sedat Gökmen^{1*},  İrfan Çinar²
¹Department of Pharmacology and Toxicology, Faculty of Veterinary, Kastamonu University, Kastamonu, Türkiye²Department of Pharmacology, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye**ABSTRACT**

This study aimed to investigate the synergistic and additive anticancer effects of *Cannabis sativa* L. (Narlı variety) seed oil (CSSO) in combination with doxorubicin (DOX) on SH-SY5Y human neuroblastoma cells, with a particular emphasis on apoptosis.

Cell viability was evaluated using the MTT assay to determine the IC₅₀ values of CSSO and DOX. Drug combination effects were analyzed using the SynergyFinder platform, and the most favorable synergistic combination was evaluated using reverse transcription-quantitative PCR (RT-qPCR) to assess the expression of apoptosis-related genes.

SH-SY5Y cells were treated with CSSO (1–800 µg/mL) and DOX (1–50 µg/mL) for 24 h. The IC₅₀ values were determined to be 96.84 µg/mL for CSSO and 1.84 µg/mL for DOX, respectively. SynergyFinder analysis revealed synergistic interactions at various concentrations. Among all tested combinations, 0.92 µg/mL DOX in combination with 48.42 µg/mL CSSO showed the most favorable synergistic interaction (CI = 0.88) and was selected for further analyses. At this concentration, the corresponding ZIP synergy score was 5.1, with a 54% growth inhibition. Furthermore, this combination significantly increased the mRNA expression of Caspase-3 and Bax to 1.28 ± 0.05-fold and 1.19 ± 0.11-fold of the DOX group, respectively, corresponding to 28% and 19% increases, respectively, while reducing Bcl-2 mRNA expression to 0.68 ± 0.07-fold of the DOX group (32% reduction) (p < 0.05).

These findings suggest that CSSO may enhance the anticancer activity of DOX by inducing apoptosis, indicating its potential as an experimental adjuvant strategy for combination therapy in neuroblastoma.

Keywords: *Cannabis sativa* L. Seed oil, Doxorubicin, SH-SY5Y, Synergy, Apoptosis

► Oral Presentation 46

***In Vitro* Evaluation of the Antiproliferative and Anticancer Effects of Enoxaparin Sodium on SH-SY5Y and HepG2 Cell Lines**

 **Muhammed Bugday¹**,  **Aylin Aydin¹**,  **Edanur Boz¹**,  **Rustem Anil Ugan¹**,  **Elif Cadirci²**

¹Department of Pharmacology, Faculty of Pharmacy, Atatürk University, Erzurum, Türkiye

²Department of Medicinal Pharmacology, Faculty of Medicine, Atatürk University, Erzurum, Türkiye

ABSTRACT

The aim of this study is to determine the IC₅₀ value of enoxaparin sodium using the MTT assay and to investigate its potential anticancer and antiproliferative effects on SH-SY5Y neuroblastoma and HepG2 hepatocellular carcinoma cell lines under in vitro conditions.

The effects of enoxaparin sodium on HepG2 and SH-SY5Y were evaluated in vitro. The study was conducted using standard cell culture techniques, and experimental procedures were performed accordingly. Cell viability was assessed by MTT analysis at 24 and 48 hours following treatment with different concentrations of enoxaparin sodium [1, 2]

According to the MTT analysis, enoxaparin sodium significantly increased SH-SY5Y cell viability at low concentrations (1–40 IU/mL) at the 24th hour, while this effect was observed to decrease at high concentrations. Enoxaparin sodium significantly increased cell viability in HEPG2 cells at low and medium concentrations (1–60 IU/mL) at the 24th hour, while this effect was observed to decrease at high concentrations. At the 48th hour, the increase in viability continued at low concentrations (1–10 IU/mL), while a decrease in cell viability was observed at medium and high concentrations (60–1000 IU/mL), and these decreases were found to be statistically significant.

Enoxaparin sodium was found to increase cell viability at the low concentrations applied to the cells, suggesting that its effects may vary depending on concentration. In contrast, the results indicate that enoxaparin sodium reduces cell viability at the high concentrations applied to the cells.

Keywords: Anticancer, Antiproliferative, Enoxaparin sodium, HepG2, SH-SY5Y.

REFERENCES

1. Abu Arab W, Kotb R, Sirois M, Rousseau E. Concentration-and time-dependent effects of enoxaparin on human adenocarcinomic epithelial cell line A549 proliferation in vitro. Canadian journal of physiology and pharmacology. 2011;89:705-711.
2. Balzarotti M, Fontana F, Marras C, Boiardi A, Croci D, Ciusani E, Salmaggi A. In vitro study of low molecular weight heparin effect on cell growth and cell invasion in primary cell cultures of high-grade gliomas. Oncology research. 2006;16:245-250.

► Oral Presentation 47

The Ferroptotic Basis of Alzheimer's Disease Pathology **Kaan Erbakan**

Department of Neuroscience, Institute of Health Sciences,
Suleyman Demirel University, Isparta, Türkiye

ABSTRACT

This study aims to examine the role of ferroptosis -an emerging area of interest in the pathogenesis of Alzheimer's disease (AD)- in light of current literature.

To investigate the relationship between these two phenomena, existing literature indexed in PubMed, Scopus, and Web of Science was reviewed.

AD is a neurodegenerative disease that is considered the primary cause of dementia, leading to progressive memory loss and decline in cognitive function [1]. Neuritic plaques, formed by the extracellular accumulation of amyloid- β (A β) peptides, and the presence of hyperphosphorylated tau proteins as intracellular neurofibrillary tangles can be considered the main neuropathological manifestations of AD at the cellular level [2]. In addition, several mechanisms, such as mitochondrial dysfunction, neuroinflammation, oxidative stress, and metal ion imbalance, are being investigated in relation to the pathophysiology of AD [3]. Ferroptosis, a non-apoptotic and regulated cell death mechanism, is characterized by intracellular iron imbalance, lipid peroxidation, depletion of cellular antioxidants such as glutathione peroxidase 4 (GPx4) and glutathione (GSH), and morphological degradation in mitochondria [4,5]. Iron ion accumulation, lipid peroxidation byproducts, and decreased GPx4 activity are examples of ferroptosis fingerprints that can be seen in association with AD [6,7]. Studies have shown that high extracellular iron exposure accelerates amyloid pathology, while A β 42 accumulation disrupts iron homeostasis, leading to neurotoxic and ferroptotic consequences [8,9]. Furthermore, ferroptosis has been directly linked to tau pathology, with ferroptotic stress promoting tau hyperphosphorylation and aggregation [10].

It can be said that ferroptosis may be related to the pathophysiology of AD through various mechanisms.

Keywords: Alzheimer's disease, Ferroptosis, Amyloid-beta, Tau, Iron

REFERENCES

1. Lane CA, Hardy J, Schott JM. Alzheimer's disease. *Eur J Neurol*. 2018;25(1):59–70.
2. Long JM, Holtzman DM. Alzheimer disease: An update on pathobiology and treatment strategies. *Cell*. 2019;179(2):312–339.
3. Hein ZM, Karikalan B, Gopalakrishna PK, Dhevi K, Alkatiri A, Hussan F, et al. Toward a unified framework in molecular neurobiology of Alzheimer's disease: Revisiting the pathophysiological hypotheses. *Mol Neurobiol*. 2025;63(1):282.
4. Jiang X, Stockwell BR, Conrad M. Ferroptosis: mechanisms, biology and role in disease. *Nat Rev Mol Cell Biol*. 2021;22(4):266–282.
5. Dixon SJ, Olzmann JA. The cell biology of ferroptosis. *Nat Rev Mol Cell Biol*. 2024;25(6):424–442.
6. Sharma V, Sharma P, Singh TG. Ferroptosis and Alzheimer's: unveiling new avenues for the treatment and prevention. *Metab Brain Dis*. 2025;40(4):167.
7. Quan Y, Liu H, Zhang M, Li M, He B, Wang K, et al. Ferroptosis and Alzheimer's disease: a new insight into neurodegeneration. *Front Immunol*. 2026;17(1701767):1701767.
8. Gong L, Tian X, Zhou J, Dong Q, Tan Y, Lu Y, et al. Iron dyshomeostasis induces binding of APP to BACE1 for amyloid pathology, and impairs APP/Fpn1 complex in microglia: Implication in pathogenesis of cerebral microbleeds. *Cell Transplant*. 2019;28(8):1009–17.
9. Quansah DNK, Halcrow PW, Kumar N, Liang B, Geiger JD. Role of endolysosome iron in amyloid- β protein-induced increases in reactive oxygen species, mitochondrial depolarization, and cytotoxicity. *J Alzheimers Dis*. 2026;112(1):224–42.
10. Wang S, Jiang Y, Liu Y, Liu Q, Sun H, Mei M, et al. Ferroptosis promotes microtubule-associated protein tau aggregation via GSK-3 β activation and proteasome inhibition. *Mol Neurobiol*. 2022;59(3):1486–501.

► Oral Presentation 48

Investigation of the Protective Effects of Niacinamide Against UV-Induced Cellular Damage in L929 Fibroblast Cells

 **Edanur Boz**¹,  **Aylin Aydin**¹,  **Muhammed Bugday**¹,  **Rustem Anil Ugan**¹,  **Elif Cadirci**²

¹Department of Pharmacology, Faculty of Pharmacy, Atatürk University, Erzurum, Türkiye

²Department of Medicinal Pharmacology, Faculty of Medicine, Atatürk University, Erzurum, Türkiye

ABSTRACT

The aim of this study was to evaluate the potential protective effect of niacinamide against ultraviolet (UV)-induced cellular damage in the L929 fibroblast cell line under in vitro conditions.

L929 cells were cultured under appropriate culture conditions and seeded into 96-well plates. The non-cytotoxic dose of niacinamide was determined using the MTT assay. To evaluate the UV-protective effect, control, niacinamide (20, 10, and 1 mM) [1,2], UV, and niacinamide + UV groups were established, with avobenzone used as the positive control [3,4]. Cell viability was analyzed using the MTT assay, and absorbance values were measured using a microplate reader.

According to the MTT analyses, the IC₅₀ value of niacinamide at 24 hours was determined to be 78.53 mM. Treatment of UVA-exposed L929 cells with 1 mM niacinamide significantly increased cell viability (95.62%), whereas treatment with 20 mM niacinamide resulted in a significant decrease in cell viability (66.36%). Treatment of UVC-exposed L929 cells with 1 mM niacinamide significantly increased cell viability (80.15%), whereas treatment with 20 mM niacinamide resulted in a significant decrease in cell viability (56.39%).

These findings indicate that the protective effect of niacinamide on the viability of UV (UVA and UVC)-exposed L929 cells decreases with increasing concentrations, whereas at lower concentrations, niacinamide exerts a protective effect against UV-induced damage.

Keywords: L929, MTT, Niacinamide, UVA, UV Protection.

REFERENCES

1. Scatozza F, Moschella F, D'Arcangelo D, Rossi S, Tabolacci C, Giampietri C, Proietti E, Facchiano F, Facchiano A. Nicotinamide inhibits melanoma in vitro and in vivo. *Journal of Experimental & Clinical Cancer Research*. 2020;39:211.
2. Sereno D, Alegre AM, Silvestre R, Vergnes B, Ouaisi A. In vitro antileishmanial activity of nicotinamide. *Antimicrobial agents and chemotherapy*. 2005;49:808-812.
3. Ahn S, An S, Lee M, Lee E, Pyo JJ, Kim JH, Ki MW, Jin SH, Ha J, Noh M. A long-wave UVA filter avobenzone induces obesogenic phenotypes in normal human epidermal keratinocytes and mesenchymal stem cells. *Arch Toxicol*. 2019;93:1903-1915.
4. Vatan Ö, Sevinç D, Yılmaz Çelik D, Aurelie Allounan AC, Teksoy Ö, Oral N, Huriyet H, Çavaş T, Çinkılıç N. Evaluation of Cytotoxic and Genotoxic Potential of Avobenzone and Octocrylene on Human Skin Fibroblast Cells. *All Life*. 2023;16:2270171

► Oral Presentation 49

Clinical and Molecular Evaluation of a Novel *PEX6* Deletion Variant in Peroxisome Biogenesis Disorder

 Cüneyd Yavaş¹,  Yunus Emre Arvas²,  Serdar Bozlak³,  Elif Yaman²

¹Department of Molecular Biology and Genetics, Biruni University, Istanbul, Türkiye

²Department of Molecular Biology and Genetics, Van YüzüncüYıl University, Van, Türkiye

³Basaksehir Cam and Sakura City Hospital, Genetic Diseases Assessment Center, Istanbul, Türkiye

ABSTRACT

We report a novel homozygous *PEX6* frameshift variant in a severely affected infant with Peroxisome Biogenesis Disorder 4A (Zellweger Syndrome) and present a systematic literature comparison of 42 published *PEX6*-variant patients across 16 studies.

Clinical data were collected prospectively. WES and Sanger sequencing confirmed the variant and segregation. AlphaFold2 and RMSD assessed structural divergence. A systematic literature review was performed. This study was supported by Van Yüzüncü Yıl University Scientific Research Projects Coordination Unit (TLO-2026-13398). Written informed consent was obtained from the patient's legal guardian.

A male infant of consanguineous parents presented prenatally with arthrogryposis. Postnatal evaluation revealed bilateral cataract, cleft palate, syndromic facies, hypotonia, foot inversion, polycystic kidneys, a small perimembranous ventricular septal defect, and patent foramen ovale. Brain MRI demonstrated global absence of myelination, thin corpus callosum, cavum septum pellucidum et vergae, inferior vermian hypoplasia, and bilateral caudothalamic cysts. Tracheostomy was performed at four months; the infant died at approximately ten months. WES identified a novel homozygous variant NM_000287.4: c.1314_1315delGGinsC, p.(Glu439Argfs-Ter11), classified as likely pathogenic (PVS1, PM2). The mutant protein (449 aa) lacks both AAA1 and AAA2 ATPase domains relative to wild-type (980 aa). AlphaFold2 structural comparison revealed substantial conformational divergence (RMSD = 13.153 Å).

Complete loss of both AAA ATPase domains abolishes *PEX5* recycling, explaining the severe and lethal

phenotype. Variant clustering at codon 439 — also reported in compound heterozygous Heimler cases with milder outcomes — confirms the functional criticality of this locus. Systematic review demonstrated that biallelic truncating *PEX6* variants cause early-lethal Zellweger Syndrome, reinforcing a strict genotype-phenotype correlation.

Keywords: Peroxisome biogenesis disorder, *PEX6* frameshift variant, Genotype-phenotype correlation, Zellweger Spectrum Disorder

REFERENCES

1. Smith CE, Bhatt DL, Bhatt M et al. Spectrum of *PEX1* and *PEX6* variants in Heimler syndrome. *Eur J Hum Genet.* 2016;24(11):1565-1571.
2. Galarreta CI, Grange DK, Bhatt M et al. A homozygous Gly470Ala variant in *PEX6* causes severe Zellweger spectrum disorder in a Mixtec indigenous cohort. *Am J Med Genet A.* 2023;191(5):1245-1258.
3. Braverman NE, Raymond GV, Rizzo WB et al. Peroxisome biogenesis disorders in the Zellweger spectrum: an overview of current diagnosis, clinical manifestations, and treatment guidelines. *Mol Genet Metab.* 2016;117(3):313-321.
4. Daich Varela M, Arno G, De Silva SR et al. The peroxisomal disorder spectrum and Heimler syndrome: deep phenotyping and review of the literature. *Am J Med Genet C Semin Med Genet.* 2020;184(3):618-630.
5. Jumper J, Evans R, Pritzel A et al. Highly accurate protein structure prediction with AlphaFold. *Nature.* 2021;596(7873):583-589

► Oral Presentation 50

Histopathological Characterization of Central Nervous System Lesions Associated with Neurological Symptomatology in RuminantsID Ömer Faruk Keleş¹, ID Çiğdem Doğru²¹Department of Pathology, Faculty of Veterinary Medicine, Van Yüzüncü Yıl University, Van, Türkiye²Faculty of Veterinary Medicine, Van Yüzüncü Yıl University, Van, Türkiye**ABSTRACT**

In ruminants, neurological signs such as head pressing, ataxia and circling represent a common final pathway in aetiologically distinct parasitic, bacterial, viral, metabolic and toxic diseases, limiting the reliability of clinical differential diagnosis. This study aimed to characterize central nervous system lesions in ruminants submitted for necropsy with neurological signs.

Thirty ruminants (25 sheep, 4 goats, 1 bovine) that died or were euthanized with neurological signs were examined at necropsy; brain samples from the cerebral cortex, cerebellum and brainstem were processed by routine histopathological methods and stained with haematoxylin and eosin.

Coenurosis was identified in 13 cases (43.4%; 11 sheep, 1 goat, 1 bovine); five showed subarachnoid fibrinopurulent exudate and suppurative meningoencephalitis extending into the parenchyma, consistent with the early migratory phase, whereas mature *Coenurus cerebralis* cysts containing protoscolices were observed in eight. Rhombencephalitis consistent with listeriosis was diagnosed in seven cases (23.3%), characterized by microabscesses with central neutrophils and peripheral glial proliferation in the medulla oblongata and pons, purulent leptomeningitis and vasculitis. Laminar cerebrocortical necrosis was detected in five cases (16.7%), with flattening of the gyri, cerebellar herniation in four, and vacuolar degeneration of neurons and astrocytes in the inner cortical laminae. Three lambs (10%) had congenital enzootic ataxia with bilaterally symmetrical gelatinous softening, cavitation, astrogliosis and demyelination. One ram (3.3%) showed nonsuppurative encephalitis with perivascular lymphoplasmacytic cuffing and Negri bodies in Purkinje cells, histopathologically consistent with rabies, and one sheep (3.3%) showed fine granular yellow-

green pigment in brainstem neurons attributable to Phalaris toxicosis.

Parasitic and bacterial aetiologies accounted for two-thirds of the series, and differentiation was achievable through lesion localization and inflammatory pattern, demonstrating the indispensable diagnostic role of post-mortem neuropathological examination in clinically indistinguishable neurological conditions.

Keywords: Ruminant, central nervous system, Histopathology, Necropsy.

Acknowledgement: This study was supported by the Van Yüzüncü Yıl University Scientific Research Projects Coordination Unit (Project No: TLO-2026-13451).

► Oral Presentation 51

Comparison of Limbic Cortex Structure Volumes and Hemispheric Asymmetry Index by Sex**Demet Ünalımsı Aykar¹, Erdal Kurtoğlu²**¹Department of Anatomy, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye²Department of Pediatric Nursing, Faculty of Health Sciences, Kastamonu University, Kastamonu, Türkiye**ABSTRACT**

This study investigated whether the total, right, and left volumes (absolute and normalized) and asymmetry indices of the limbic cortex structures (entorhinal cortex, anterior cingulate gyrus, middle cingulate gyrus, posterior cingulate gyrus, parahippocampal gyrus) differ by sex.

A total of 50 healthy participants (25 females, 25 males) were included. Volumetric measurements from MRI data via the volBrain platform were compared by sex in SPSS 23.0. $p < 0.05$ was considered significant.

Total limbic system volume was $40.71 \pm 8.01 \text{ cm}^3$ in females and $44.21 \pm 8.97 \text{ cm}^3$ in males, being significantly higher in males ($p = 0.005$); right ($p = 0.005$) and left ($p = 0.003$) volumes were also significantly greater in males. In the same direction, significant sex differences were found in entorhinal cortex total ($p = 0.008$) and left ($p = 0.006$) volume; anterior cingulate gyrus total ($p = 0.018$) and right ($p = 0.012$) volume; middle cingulate gyrus total ($p = 0.014$) and left ($p = 0.007$) volume; and posterior cingulate gyrus total ($p = 0.002$), right ($p = 0.012$), and left ($p = 0.003$) volume. No significant difference was found in any parahippocampal gyrus variable. No significant sex difference was found in any normalized (%) variable or in the asymmetry index of any structure ($p > 0.10$).

The findings indicate that sex has a widespread effect on the absolute (particularly total and left) volume of limbic system structures. But this effect disappears after normalization to intracranial volume and at the level of hemispheric asymmetry. This suggests the observed differences may stem from cranial/brain volume differences rather than structure-specific growth, with the parahippocampal gyrus being the exception to this pattern.

Keywords: Cingulate gyrus, Entorhinal cortex, Neuroimaging

► Oral Presentation 52

Association Between Basophil-to-Lymphocyte Ratio and Cognitive Performance in Patients with Alzheimer's Disease: A Retrospective Study **Sedat Gülten**

¹Department of Medical Biochemistry, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye

ABSTRACT

Neuroinflammation plays an important role in Alzheimer's disease (AD). We aimed to investigate the association of the basophil-to-lymphocyte ratio (BLR) with cognitive performance and dementia severity and to compare its discriminatory performance with other inflammatory indices.

This retrospective single-center study included 98 patients with AD, classified as severe dementia (n=50) or mild-to-moderate dementia (n=48) according to Mini-Mental State Examination (MMSE) scores. NLR, PLR, SII, SIRI, and BLR were evaluated. Mann–Whitney U, Spearman correlation, ROC curve, and binary logistic regression analyses were performed.

Age and sex did not differ significantly between groups. BLR was significantly lower in patients with severe dementia than in those with mild-to-moderate dementia [0.018 (0.013–0.024) vs 0.021 (0.015–0.030), $p=0.004$], whereas NLR, PLR, SII, and SIRI showed no significant differences. BLR correlated positively with MMSE scores ($p=0.366$, $p<0.001$). BLR showed significant discriminatory ability for dementia severity (AUC=0.665, 95% CI: 0.569–0.772; $p=0.005$). In logistic regression adjusted for age and sex, lower BLR remained significantly associated with severe dementia ($p=0.006$).

Lower BLR is associated with greater cognitive impairment and severe dementia in AD. BLR may represent a simple and accessible peripheral biomarker reflecting disease severity.

Keywords: Alzheimer's disease, basophil-to-lymphocyte ratio, BLR, MMSE, neuroinflammation.

► Oral Presentation 53

Determination of the Reference Interval for the Neutrophil-to-Lymphocyte Ratio in Adults Aged 18–65 Years Using an Indirect Method** Yasemin Taşkiran¹,  Rana Şimşek¹,  Sedat Gülten¹**¹Department of Medical Biochemistry, Faculty of Medicine, Kastamonu University, Kastamonu, Türkiye**ABSTRACT**

The neutrophil-to-lymphocyte ratio (NLR) is an easily obtainable hematological parameter reflecting the balance between inflammation and immune response. Establishing population- and laboratory-specific reference intervals is important for the appropriate interpretation of laboratory results.

This retrospective study included laboratory data from adults aged 18–65 years collected between 2020 and 2026. Data were obtained from Internal Medicine outpatient clinics and Family Health Centers. After predefined exclusions and data cleaning, 42,568 valid NLR results were included. NLR values were calculated from absolute neutrophil and lymphocyte counts. Following logarithmic transformation and iterative outlier exclusion, the need for sex-specific partitioning was evaluated using the Harris–Boyd method. The reference interval was determined using the nonparametric percentile method, with the 2.5th and 97.5th percentiles defining the lower and upper reference limits, respectively. Ninety-percent confidence intervals were calculated for both limits.

The median NLR was 1.71 (Q1–Q3: 1.35–2.15). The central 95% reference interval was 0.87–3.07. The 90% confidence intervals were 0.86–0.87 for the lower reference limit and 3.06–3.09 for the upper reference limit. According to the Harris–Boyd method, sex-specific reference intervals were not required.

An NLR reference interval of 0.87–3.07 was established for adults aged 18–65 years using an indirect approach. This interval may contribute to the interpretation of NLR results obtained using the Sysmex XN-1000 analyzer.

Keywords: Neutrophil-to-lymphocyte ratio, NLR, reference interval, indirect method, Harris–Boyd method.