

## Introductory Remarks to Symposium 23

### Extracellular matrix alterations in aging and neurological diseases

Egor Dzyubenko and Alexander Dityatev, Essen and Magdeburg

Emerging evidence indicates the pivotal role of the extracellular matrix (ECM) in neuroplasticity and brain homeostasis, presenting a promising yet underexplored target for innovative therapies. This symposium will explore the role of ECM changes during aging and neurological disorders, including Alzheimer's disease (AD), epilepsy, and stroke.

The brain ECM is a network of polysaccharides, proteoglycans, and link proteins that regulates synaptic plasticity, axonal guidance, and neuroinflammatory signaling. Dysregulation of ECM components underlies pathology in aging and neurological diseases. Egor Dzyubenko will present superresolution microscopy data revealing how transient ECM reorganization supports inhibitory synapse remodeling and motor recovery after stroke in mice. He will also discuss how ECM affects astrocytic and microglial cell function.

Federico Soria will demonstrate how aging- or pathology-induced ECM upregulation affects microglia motility, showing recent evidence from *in vivo* two-photon microscopy and 3D cultures with tunable ECM stiffness. Alexander Dityatev will further discuss the role of ECM in microglial modulation and mechanosensitive signaling. His team found that ECM is involved in complement-mediated synapse elimination by microglia in aged mice. In addition, he will present a novel ECM-dependent mechanism of synaptic plasticity involving mechanosensitive Piezo1 receptors, p38 kinase, and NMDA receptors.

ECM also critically regulates cognition and brain homeostasis in humans. Constanze Seidenbecher will present her research on perisynaptic ECM molecules as potential factors in neurological disorders, showing recent findings in human CSF and AD postmortem brains as well as from animal models of epilepsy.

Interestingly, extracellular A $\beta$  protein that is central for AD exhibits antimicrobial activities through binding to viral glycoproteins. Anna Sophie Tiefenbacher will show her recent data demonstrating the role of A $\beta$  in the autophagy-mediated cellular defense against viral infection.

This symposium will deepen current understanding of ECM-mediated mechanisms in aging and disease, fostering collaborations and innovative therapeutic approaches.

## Symposium 23

Friday, March 28, 2025  
11:30 - 13:30, Lecture Hall 105

Chairs: Egor Dzyubenko and Alexander Dityatev, Essen and Magdeburg

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| 11:30 | <b>Opening Remarks</b>  |
| 11:35 | Egor Dzyubenko, Essen<br>INTERACTIONS BETWEEN THE EXTRACELLULAR MATRIX, GLIA, AND SYNAPSES IN STROKE RECOVERY (S23-1)   |
| 12:00 | Federico N. Soria, Leioa, Spain<br>MICROGLIA DYNAMICS ARE AFFECTED BY HYALURONAN STRUCTURE AND DISTRIBUTION IN HEALTH AND DISEASE (S23-2)   |
| 12:25 | Alexander Dityatev, Magdeburg<br>INTERPLAY BETWEEN NEURAL EXTRACELLULAR MATRIX, MICROGLIA AND SYNAPSES IN ADULT AND AGED MICE (S23-3)   |
| 12:50 | Constanze Seidenbecher, Magdeburg<br>DYSREGULATION OF HYALURONAN-BASED ECM IN EPILEPSY, ALZHEIMER'S DISEASE, AND ALS (S23-4)  |
| 13:15 | Anna Sophie Tiefenbacher, Heidelberg<br>ROLE FOR AMYLOID BETA AS AN ANTIMICROBIAL PEPTIDE THAT ENHANCES AUTOPHAGY IN RESPONSE TO HSV1 INFECTION IN A 3D-NEURONAL CELL CULTURE MODEL (S23-5) |
| 13:25 | <b>Concluding Remarks</b>   |