

Conference schedule

28 September 2020. MONDAY

OPENING AND WELCOME

28 September 2020. MONDAY, 9:00 – 9:45 (Central European Time - CET)

Ageing and dementia as a global health challenge (oral session)

28 September 2020. MONDAY, 10:00 – 12:00 (CET)

- 10:00 - 10:15 **Meghna Dabur**
University of Porto
Fluorinated molecules and Nanotechnology for Alzheimer's disease therapy
- 10:15 - 10:30 **Rong Fang**
Ludwig Maximilian University of Munich
A Project on Prediction of Post Stroke Cognitive Impairment Using Neuroimaging Markers
- 10:30 - 10:45 **Zsófia Flóra Nagy**
University of Szeged
Comprehensive genetic analysis of a Hungarian amyotrophic lateral sclerosis cohort
- 10:45 - 11:00 **Bernát Nógrádi**
University of Szeged
Age-related degeneration of the motor system: from the motor end plate to the spinal cord
- 11:00 - 11:15 **Gergő Porkoláb, Anikó Szecskó**
University of Szeged
Alanine-glutathione dual-targeted nanoparticles enhance cargo delivery across the blood-brain barrier and into target cell types in the brain
- 11:15 - 11:30 **Réka Tóth**
University of Szeged
Cerebral edema induces simultaneous depolarization in response to anoxia
- 11:30 - 11:45 **Jehan Waeytens**
Paris-Saclay University
How to investigate isolated amyloid fibrils at the nanoscale: ir nanospectroscopy challenges and prospects
- 11:45 - 12:00 **Hussein Akef**
University of Szeged
SLNs VS PBNs in Nose-to-Brain Delivery of a Model Drug of Alzheimer's Disease

28 September 2020 (MONDAY)

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Alanine-glutathione dual-targeted nanoparticles enhance cargo delivery across the blood-brain barrier and into target cell types in the brain

Introduction: The treatment of neurological diseases is hindered by inefficient drug delivery across the blood-brain barrier (BBB). A promising strategy to increase the brain penetration of drugs is to encapsulate them into nanoparticles that target highly expressed transporters at the BBB. Our aim was to design nanoparticles that can both cross the BBB and interact with multiple brain cell types to reach their therapeutic targets.

Methods: Vesicular nanoparticles were prepared with a protein cargo (EBA, 67 kDa or mCherry, 27 kDa) and functionalized with the combination of alanine and glutathione as targeting ligands. Nanoparticles were characterized by their size, surface charge and shape by dynamic light scattering and atomic force microscopy. We monitored the effects of nanoparticles on the viability of cultured brain endothelial cells, pericytes, astrocytes and neurons by a real-time, impedance-based cell analysis. We utilized fluorescent spectrophotometry and confocal microscopy to quantify and visualize cargo taken up by these cell types. To test the mechanism of uptake, inhibitors of cell metabolism and endocytosis were used.

Results: Alanine-glutathione dual-targeted nanoparticles enhanced cargo delivery into all brain cell types tested compared to non-targeted particles. The cellular uptake of nanoparticles was energy-dependent and was partially mediated by endocytosis. Dual-targeted nanovesicles also increased cargo delivery into astrocytes after crossing layers of brain endothelial cells and pericytes in a co-culture model of the BBB.

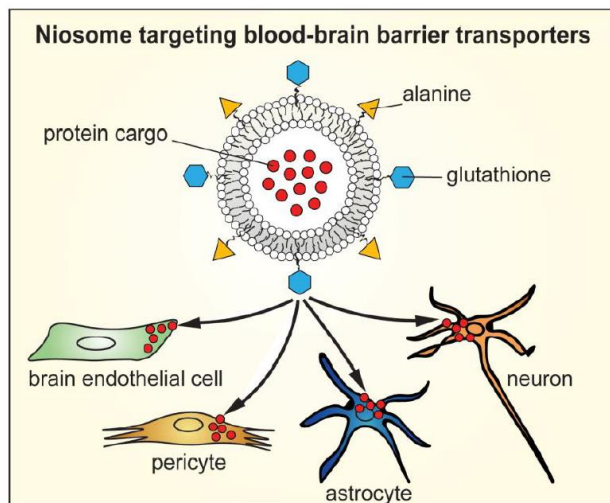
Conclusion: Our data indicate that alanine-glutathione dual-labeling of nanoparticles can potentially be exploited to deliver drugs, even biopharmaceuticals, across the BBB and into therapeutically relevant cell types in the brain.

Keywords: blood-brain barrier, drug delivery, nanoparticle, brain endothelial cell, pericyte, astrocyte, neuron, alanine, glutathione

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The first prize was awarded

to

Gergő Porkoláb and Anikó Szecskó

EUGLOH Annual Student Research Conference

September 28th – 30th 2020

Session: Ageing and dementia as a global health challenge

Organized by University of Szeged (Hungary)

with the participation of invited speakers from the member universities of the EUGLOH alliance:

Ludwig-Maximilians University München (Germany)
Lund University (Sweden)
University of Porto (Portugal)
Université Paris-Saclay (France)

Authentication on behalf of University of Szeged



Prof. Dr. Márta Széll

Vice Rector



Prof. Dr. Ferenc Peták

Academic Leader



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