

**31 JAN
2023**

HuNDoC

6th Hungarian Neuroscience
Meeting for Undergraduate
Students, Graduate students and
Young Postdocs



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ELKH TTK Research Centre for Natural Sciences
(Budapest, Magyar Tudósok Körútja 2, 1117)

**6th Hungarian Neuroscience Doctoral Conference for Undergraduate Students,
Graduate Students and Junior Postdocs
31 January 2023, Budapest**

DETAILED PROGRAM

08:00 – 09:00 - Registration

09:00 – 09:15 - Welcome speech

09:15 – 10:00 - Invited speaker

Dr. Éva Mikics (Institute of Experimental Medicine)

Prefrontal mechanisms transmitting behavioral consequences of early-life social adversities

10:00 – 10:20 - Coffee break

10:20 – 11:35 - Oral presentations and elevator speeches I

10:20 - Dávid Keller: Control of social grooming by a thalamo-preoptic neuronal pathway

10:35 - Maissa Ben Mahmoud: Morphological and electrophysiological maturation of human neurons derived from induced pluripotent stem cells

10:50 - Zsófia Pálffy: What and how affects the perception of bistable visual stimuli in a volatile environment?

11:05 - Anikó Szecskó: Investigation of viral PepH3 peptide-functionalized nanoparticles on a culture model of the Blood-Brain-Barrier

11.15. Elevator speeches

- Petra Kovács: Speech processing in multi-talker situations: The role of speaker similarity
- Ákos Babiczky: Interconnectivity of the segregated cortico-thalamo amygdalar pathways
- Melinda Rácz: PlatypOUs—A Mobile Robot Platform and Demonstration Tool Supporting STEM Education
- Réka Bod: Automated detection of spontaneous population activity on human in vitro recordings

11:35 – 12:45 - Lunch

Investigation of viral PepH3 peptide-functionalized nanoparticles on a culture model of the
Blood-Brain-Barrier

Anikó Szecskó^{1,2}, Mária Mészáros¹, Gergő Porkoláb^{1,2}, Vera Neves³, Marco Cavaco³, Beatriz Simões³,
Catarina Chaparro³, Miguel A.R.B. Castanho³, Mária A. Deli¹, Szilvia Veszélka¹

1 Biological Research Centre, Institute of Biophysics, Biological Barriers Research Group,
Szeged, Hungary

2 University of Szeged, Doctoral School of Biology, Szeged, Hungary

3 Universidade de Lisboa, Instituto de Medicina Molecular, Faculdade de Medicina, Lisbon,
Portugal

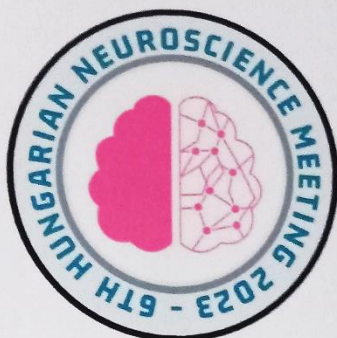
Drug delivery to the CNS is limited by blood-brain barrier (BBB), which is mainly composed of the endothelial cells of brain capillaries. Nanoparticles (NPs) are promising new tools to increase the transfer of drugs across the BBB. The advantage of vesicular NPs is that they increase the penetration of cargo molecules across biological barriers and by decorating their surfaces with appropriate ligands they are suitable for targeted drug delivery. The aim of this study was to investigate the PepH3 peptide, isolated from the capsid protein of Dengue virus alone, and as a targeting ligand of NPs to elevate the cargo penetration across the BBB.

In our experiments, we used Quasar570 labeled PepH3 and prepared PEGylated PepH3-targeted NPs loaded with the Texas-Red bovine serum albumin (TR-BSA) or single-domain antibody (sdAb) against amyloid beta peptide as cargo. The physico-chemical properties of NPs, such as particle size, polydispersity index and surface charge were measured by dynamic light scattering. The encapsulation efficiency was detected by spectrofluorimeter or western blot. The effect of PepH3 alone and PepH3-targeted NPs on the viability of primary rat brain endothelial cells was monitored by impedance measurement. The cellular uptake of PepH3 and PepH3-targeted NPs were visualized by confocal microscope. We investigated the entry of the peptide and peptide-targeted nanovesicles into cells and their penetration across the culture model of the BBB with spectrofluorimeter.

The mean diameter of untargeted and N-PepH3 particles was between 100-120 nm, respectively. The NPs have slightly negative surface charge and relatively narrow size distribution. The encapsulation efficiency of TR-BSA cargo was ~35 %, in the case of sdAb loaded NPs it was ~70%. PepH3 had no effect on the viability of RBEC and was rapidly taken up by RBEC cells supported by the visualization and cellular uptake studies. PepH3 peptide alone and PepH3-targeted NPs with TR-BSA cargo had significantly higher penetration across the BBB model compared to marker molecule or non-targeted NPs. Although, the penetration of sdAb cargo across the model was not measurable, high amount of sdAb was detected in primary rat brain endothelial cells after the permeability measurements.

Our results proved that PepH3 is a good candidate to be used as a peptide for targeted brain delivery of therapeutic biomolecules.

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CERTIFICATE OF ATTENDANCE

Anikó Szecskó

This is proudly given for delivering an **oral presentation**
at the **6th Hungarian Neuroscience Meeting for**
Undergraduate Students, Graduate students and
Young Postdocs the 31st of January 2023

Christina
Miskolczi

Emília
Bősz

Paula
Mut-Arbona