

**31 JAN
2023**

HuNDoC

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



 <https://www.facebook.com/HunDoc23>

 <https://hundoc2023.mitt.hu/>

 **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**

PROGRAM OVERVIEW

8.00-9.00	Registration
9.00-9.15	Welcome speech
9.15-10.00	Invited speaker Dr. Eva Mikics (Institute of Experimental Medicine)
10.00-10.20	Coffee break
10.20-11.35	Oral presentations and elevator speeches I
11.35-12.45	Lunch
12.45-13.35	Workshop I Career Forum
13.35-15.05	Miniposter session
15.05-15.35	Coffee break
15.35-16.50	Oral presentations and elevator speeches II
16.50-17.40	Workshop II What makes you bulletproof? - How to cope with stress using resilience?
17.40-18.00	Closing remarks
20.00	Social event at Grund

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.

This work was funded by research grant 2018-2.1.15-TÉT-PT-2018-00013. A.S. was supported by ÚNKP-22-3-SZTE-458, Gedeon Richter Plc Centenaral Foundation. S.V. was supported by Premium-2019-469 and OTKA-FK 143233. M.M. was supported by PD 138930, Richter Plc Centenaral Foundation and NTP-NFTÖ-21-B-0228. G.P. was supported by the National Academy of Scientist Education (FEIF/646-4/2021-ITM_SZERZ), Stephen W. Kuffler Research Foundation, Richter Plc. Centennial Foundation and ÚNKP-22-3-SZTE-446.



CERTIFICATE OF ATTENDANCE

Anikó Szecskó

This is proudly given for presenting a **miniposter** 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