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RESEARCH AREA

Pharmaceutical treatment of most disorders of the central nervous system, including neurodegenerative diseases and brain tumors, is restricted due to the poor penetration of drugs across the *blood-brain barrier*, the major entry route for therapeutic compounds to the central nervous system. The great majority of neuropharmaceutical candidates, hydrophilic molecules, biopharmaceuticals, and efflux transporter ligands have a low permeability across the blood-brain barrier. Biocompatible and biodegradable drug targeting systems, so-called *nanocarriers* hold a great promise. Nanovesicles which can encorporate drug cargos and present on their surfaces ligands for blood-brain barrier endogenous nutrient transporters achieve increased specificity and efficacy for drug delivery across the blood-brain barrier. Combination of such ligands is a novel and innovative idea which could contribute to develop systems for better treatment of central nervous system diseases.

TECHNIQUES AVAILABLE IN THE LAB

In vitro cell culture works, isolation of brain endothelial cells (rat/mouse), toxicity measurements (MTT/LDH tests, double cell nuclei staining, real-time cell monitoring assay), resistance measurement, cell uptake and blood-brain barrier transport experiments, immunohistochemistry, confocal microscopy, scanning electron microscopy, spectrofluorometer measurements. Preparation of nanoparticles, zeta potential and size measurements.

SELECTED PUBLICATIONS

Veszelka, S., Mészáros, M., Porkoláb, G., Szecskó, A., Kondor, N., Ferenc, G., Polgár, T.F., Katona, G., Kóta, Z., Kelemen, L., Páli, T., Vigh, JP., Walter, FR., Bolognin, S., Schwamborn, J.C., Jan, J.S., Deli, M.A. (2021) A Triple Combination of Targeting Ligands Increases the Penetration of Nanoparticles across a Blood-Brain Barrier Culture Model. **Pharmaceutics 14:** 86.

Fekete, T., Mészáros, M., Szegletes, Z., Vizsnyiczai, G., Zimányi, L., Deli, M.A., **Veszelka, S.***, Kelemen, L.* (2021) Optically Manipulated Microtools to Measure Adhesion of the Nanoparticle-Targeting Ligand Glutathione to Brain Endothelial Cells. **ACS Appl Mater Interfaces 13:** 39018-39029.

Topal, G.R., Mészáros, M., Porkoláb, G., Szecskó, A., Polgár, T.F., Siklós, L., Deli, M.A., **Veszelka, S.***, Bozkir, A.* (2020) ApoE-Targeting Increases the Transfer of Solid Lipid Nanoparticles with Donepezil Cargo across a Culture Model of the Blood-Brain Barrier. **Pharmaceutics 13:** 38.

Porkoláb, G., Mészáros, M., Tóth, A., Szecskó, A., Harazin, A., Szegletes, Z., Ferenc, G., Blastyák, A., Mátés, L., Rákhely, G., Deli, M.A., **Veszelka, S.** (2020) Combination of Alanine and Glutathione as Targeting Ligands of Nanoparticles Enhances Cargo Delivery into the Cells of the Neurovascular Unit. **Pharmaceutics 12:** 635.

Mészáros, M., Porkoláb, G., Kiss, L., Pilbat, A.M, Kóta, Z., Kupihár, Z., Kéri, A., Galbács, G., Siklós, L., Tóth, A., Fülöp, L., Csete, M., Sipos, Á., Hülper, P., Sipos, P., Páli, T., Rákhely, G., Szabó-Révész, P., Deli, M.A., **Veszelka, S.** (2018) Niosomes decorated with dual ligands targeting brain endothelial transporters increase cargo penetration across the bloodbrain barrier. **Eur J Pharm Sci 123:** 228-240.