

Carriers Break Barriers in Drug Delivery

<https://www.neurodegenerationresearch.eu/survey/carriers-break-barriers-in-drug-delivery/>

Principal Investigators

Dr. I.S. Zuhorn

Institution

Universitair Medisch Centrum Groningen

Contact information of lead PI

Country

Netherlands

Title of project or programme

Carriers Break Barriers in Drug Delivery

Source of funding information

NWO

Total sum awarded (Euro)

€ 800,000

Start date of award

2013-07-01

Total duration of award in years

5.0

The project/programme is most relevant to:

Neurodegenerative disease in general

Keywords

Research Abstract

The treatment of brain-related diseases is hampered by the presence of the blood-brain barrier (BBB), which actively prevents the entry of therapeutics from the blood into the brain. The main constituent of the BBB is a polarized layer of endothelial cells that physically separates the blood from the brain tissue. Consequently, there is a need for drug delivery vehicles (?nanocarriers?) that via the principle of a Trojan Horse mediate transendothelial transport of medicines.

Brain endothelial cells use transcytosis i.e., a vesicular transport pathway from one side of the

cell to the other, to transport nutrients from the blood into the brain. Transcytosis may be exploited to deliver drugs to brain tissue. In pioneering work, my group recently identified a dodecapeptide, i.e., a peptide containing 12 amino acids, that "recognizes" a transcytotic pathway in brain endothelial cells. When this peptide, named G23, was conjugated to nanocarriers, these nanocarriers crossed (in vitro and in vivo) endothelial cells and accumulated in brain tissue. This transport of intact nanocarriers across the BBB into brain parenchyma is unprecedented, and offers unique opportunities for the treatment of brain-related diseases, such as Parkinson's and Alzheimer's, but also psychiatric disorders, such as schizophrenia. We have shown the delivery of nanocarriers into the brain. Now it is time to show functional nanocarrier-mediated delivery of therapeutics. Here I propose to use our G23-nanocarriers for the delivery of therapeutics to treat neurodegeneration. This includes the generation of multilayered nanocarriers exposing sequentially a brain-targeting and a transcytotic ligand. In addition my aim is to unravel the mechanism of G23-mediated transcytosis of nanocarriers, which helps to optimize nanocarrier formulations for brain delivery, and shed light on the regulation of the process of transcytosis in polarized cell types. In conclusion, this work will lead to a breakthrough in the treatment of brain diseases.

Lay Summary

Further information available at:

Types:

Investments > €500k

Member States:

Netherlands

Diseases:

Neurodegenerative disease in general

Years:

2016

Database Categories:

N/A

Database Tags:

N/A