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Blood-Brain Barrier Targeting Antibodies

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WARF: P06056US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new method of delivering therapeutics across the blood-brain barrier.

Overview

Even though therapeutic compounds have been developed for neurologic disorders, such as Alzheimer's disease, these conditions remain difficult to treat, largely because of the blood-brain barrier. The blood-brain barrier interferes with drug delivery, allowing only those molecules that are lipophilic and have low molecular weight (less than 500 Da) to enter the brain from the bloodstream. More than 98 percent of small molecule pharmaceuticals and nearly 100 percent of protein and gene therapeutics cannot pass through this barrier.

However, if antibodies are used to target receptor-mediated systems at the blood-brain barrier, drug molecules and carriers can be effectively transported into brain tissue. Antibodies that target the transferrin and insulin receptor systems currently are available, but these systems are expressed throughout the body, leading to the mistargeting of expensive pharmaceuticals.

The Invention

UW-Madison researchers have identified several single-chain antibody fragments (scFv) that may provide a targeting mechanism to help drugs cross the blood-brain barrier. They mined a human scFv library to identify scFv that specifically bind to brain endothelial cell receptors and may pass through the blood-brain barrier. Drugs or drug carriers could be attached to these fragments and then transported into the brain.
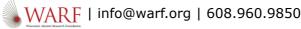
Additionally, the researchers discovered that one scFv, known as scFvJ, binds to an antigen that has been identified as the neural cell adhesion molecule (NCAM), a known endocytosing receptor. NCAM may play a role in cell adhesion, synaptic plasticity and learning and memory.

Applications

- Delivering therapeutics to the brain
- May lead to new methods of treating disorders such as Alzheimer's disease, Parkinson's disease, Huntington's disease, ALS, autism, multiple sclerosis, brain cancer and stroke

Key Benefits

- Provide a non-invasive method of specifically delivering drugs to the brain
- Potentially more efficient that current antibody-targeted delivery systems
- May minimize side effects that can result when drugs are mistargeted
- Antibody fragments are fully human, lowering the risk of immunogenic reactions that can result when non-human antibodies are used.

Additional Information

For More Information About the Inventors

- Eric Shusta

Publications

- Cho Y.K., Chen I., Wie X., Li L. and Shusta E.V. 2009. A Yeast Display Immunoprecipitation Method for Efficient Isolation and Characterization of Antigens. J. Immunol. Meth. 341, 117-126.

Tech Fields

- Drug Delivery : Other drug delivery technologies

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854