**Blood-Brain Barrier Targeting Antibodies to Improve Drug Delivery**

**INVENTORS • Eric Shusta, Angela Jones, Charles Stutz**

WARF: P140126US02  
View U.S. Patent No. 9,629,801 in PDF format.

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing BBB-selective antibodies with enhanced binding specificity.

**OVERVIEW**

Even though therapeutic compounds have been developed for neurologic disorders such as Alzheimer's disease, these conditions remain difficult to treat in large part because of the blood-brain barrier (BBB). The BBB is a natural defense mechanism that unfortunately interferes with drug delivery, allowing few molecules 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.

One promising delivery method involves antibodies that target receptor-mediated systems at the BBB. Drug molecules can be attached to the antibodies and 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 search continues for new antibodies capable of targeting and/or transporting therapeutic payloads into the brain.

**THE INVENTION**

UW–Madison researchers have identified a pair of single-chain antibody fragments (scFv15 and scFv38) that may help drugs cross the BBB. The two promising new antibodies are capable of binding antigens expressed at the BBB in vivo.

The researchers panned a human scFv library to identify candidates that specifically bind to brain endothelial cell receptors and may pass through the BBB. Drugs or drug carriers could be attached to these fragments and then transported into the brain.

**THE WARF ADVANTAGE**

WARF: A Leader in Technology Transfer Since 1925  
Since its founding as a private, nonprofit affiliate of the University of Wisconsin–Madison, WARF has provided patent and licensing services to UW–Madison and worked with commercial partners to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.

The University of Wisconsin and WARF – A Single Location to Accelerate Translational Development of New Drugs  
UW–Madison has the integrative capabilities to complete many key components of the drug development cycle, from discovery through clinical trials. As one of the top research universities in the world, and one of the two best-funded universities for research in the country, UW–Madison offers state-of-the-art facilities unmatched by most public universities.

These include the Small Molecule Screening Facility at the UW Comprehensive Cancer Center; the Zeeh Pharmaceutical Experiment Station, which provides consulting and laboratory services for developing formulations and studying solubility, stability and more; the Waisman Clinical Biomanufacturing Facility; the Wisconsin Institute for Medical Research, which provides UW–Madison with a complete translational research facility; and the innovative, interdisciplinary Wisconsin Institutes for Discovery, home to the private, nonprofit Morgridge Institute for Research and its public twin, WID, part of the university's graduate school. The highly qualified experts at these facilities are ready to work with you to create a library of candidates for drug development.
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

• Provides a non-invasive method of specifically delivering drugs to the brain
• Selective and efficient
• 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.

STAGE OF DEVELOPMENT

The researchers have identified the two scFv antibody fragments with enhanced binding specificity for the BBB and plan further work in vivo.

ADDITIONAL INFORMATION

Related Technologies
WARF reference number P06056US describes several other antibody fragments previously identified by the researcher.
WARF reference number P130017US02 describes an improved in vitro model of the BBB for screening compounds and researching brain function.

Tech Fields
Drug Discovery - Drug delivery

CONTACT INFORMATION

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