Reverse engineering the blood-brain barrier

Peter Searson
Professor, Institute for Neurobiotechnology

CURRENT RESEARCH

Solving complex problems through engineering to produce effective therapies

The blood-brain barrier (BBB) consists of more than 600 km of small vessels that are responsible for delivering the fuel needed to power the brain while at the same time regulating entry of non-essential molecules that could disrupt brain function. Although the blood-brain barrier was discovered more than 100 years ago, it remains the major roadblock in developing therapies to treat central nervous system diseases, such as Alzheimer's disease and Parkinson's disease. Advances in this field have been few and far between, in large part due to the limited range of tools and techniques. This is a complex problem where new ideas and non-traditional approaches could have a significant impact. Dr. Peter Searson, Professor at the Institute of Nanobiotechnology at Johns Hopkins University, is using a reverse engineering – a concept widely used to extract fundamental knowledge and design information from man-made devices – to build a functional brain microvessel in the laboratory.

Dr. Season's team are identifying and creating the individual building blocks, and are learning how they are organized into a functional, three-dimensional tissue. Beginning with the smallest number of components, his team has assembled artificial brain microvessels that mimic those in the BBB. This model allows scientists to study how the BBB works, and to test new therapies to treat diseases of the brain, such as neurodegenerative diseases, brain infections, inflammatory diseases, and brain cancer.

Current research includes:

- Building an Artificial BBB: Combining microfabrication techniques and tissue engineering concepts, Dr. Searson is developing an artificial microvessel platform to recreate the...

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AFFILIATION

Johns Hopkins University

EDUCATION

- Ph.D., 1983 , University of Manchester

AWARDS

- Fellow of the American Physical Society
- Fellow of the American Association for the Advancement of Science
- IBM Distinguished Faculty Award (2003, 2004)

RESEARCH AREAS

Life Science, Circulatory, Neurological / Cognitive, Regenerative Medicine

FUNDING REQUEST

Your contributions will support the continued research of Dr. Peter Searson, of Johns Hopkins University, as he develops new tools and techniques to accelerate the development of therapies to treat diseases of the brain. Donations will fund the necessary $670K required for equipment with donations as small as $1K helping to purchase a set of pipettes and larger donations of $500K for a laser scanning confocal microscope. Additional funding will support personnel including graduate students and postdoctoral fellows. Help unlock the mysteries of the blood brain barrier; fund Dr. Searson's research to improve drug therapies.