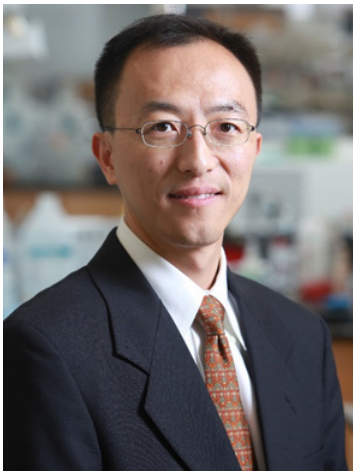
CARNEGIE MELLON UNIVERSITY
BME 2024 FALL SEMINAR SERIES

Bioengineered perfused human brain microvasculature to model brain tumor and neurodegenerative diseases



PRESENTED BY

Guohao Dai, PhD
Professor, Fellow AHA AIMBE, BMES
Department of Bioengineering
Northeastern University

SCHEDULE

Porter Hall (PH) 100

Thursday,
November 21, 2024
(9:30-10:30AM)

Blood vessels play an increasingly important role in most human tissue and organ systems. Importantly, vascular niche was found to be a key element of many stem cell environments such as neural stem cells and cancer stem cells. Vascular cells not only form conduits to deliver nutrient and oxygen, but also provide instructive signals to control stem cell self-renewal and differentiation, therefore, is critical for tissue regeneration. The mission of Vascular Bioengineering Laboratory is to integrate bioengineering approaches with stem cells and vascular biology to understand blood vessel regeneration and vascular disease processes, and to develop novel therapeutic modalities to treat vascular-related disorders such as cardiovascular, neurovascular and cancer. Toward this goal, our lab has developed the method to bioengineer human brain microvascular network consists of human brain endothelial cells, pericytes and astrocytes. We have shown that interstitial flow promotes lumen formation, interconnectivity and astrocytes association of the bioengineered vasculature and maintains blood brain barrier (BBB) functions. Furthermore, perfused bioengineered vasculature enhances neural stem cell self-renewal and neuronal differentiation and maturation. We have also shown that brain vascular niche supports the infiltrative behavior of glioma stem cells, and glioblastoma dormancy, which contributes to chemo resistance. In this talk, I will present research projects on the bioengineer 3D human brain vascular network and its application in neural stem cell and brain tumor research.

BIOMEDICAL ENGINEERING
Carnegie Mellon University