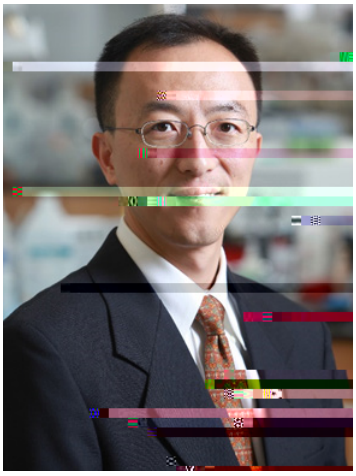
CARNEGIE MELLON UNIVERSITY
BME 2024 FALL SEMINAR SERIES

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



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(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 differentation, 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 modalites 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 interstital fow promotes lumen formaton, interconnectvity and astrocytes associaton of the bioengineered vasculature and maintains blood brain barrier (BBB) functons. Furthermore, perfused bioengineered vasculature enhances neural stem cell self-renewal and neuronal diferentaton and maturaton. We have also shown that brain vascular niche supports the infltrative behavior of glioma stem L: t

neural stem cell and brain tumor research.