

James & Esther King Biomedical Research Program

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*Neurosurgery and Brain Repair
University of South Florida*

*2010 Program
Research Project Grant
(5-year project)*

Project Title: Blood Brain Repair in Cell Therapy for Stroke

Project Summary: Smoking can cause lung and other cancers, coronary heart disease, chronic respiratory disease, and other diseases, including stroke. This project advances the motto “you break it, we repair it.” Blood-brain barrier (BBB) breakdown negatively influences central nervous system (CNS) regenerative processes after brain injury. Intravenous administration of a heterogenous cell population containing stem or progenitor cells shows benefit in animal models of stroke. We recently ascribed this functional recovery in transplanted stroke animals to the presence of endothelial progenitor cells in the grafted cell population. Whereas cell-based technologies are largely designed to break the BBB for delivery of therapeutics into the brain, we are taking a novel approach of repairing the BBB damage in stroke. The treatment of ischemic stroke is limited to tissue plasminogen activator (tPA), which only benefits less than 3 percent of stroke patients due to the drug’s narrow 3-hour therapeutic window and its detrimental side effects related to BBB damage. That 1) stroke is accompanied by BBB damage, 2) tPA adversely contributes to this BBB damage, and 3) cell therapy can afford BBB repair, form the basis of our overarching hypothesis. Our aim is to show that a treatment regimen directed at BBB repair will restore CNS homeostasis and enhance neuronal regeneration in stroke. Our long-term goal is to advance clinical application cell therapy for stroke.