

James & Esther King Biomedical Research Program

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Anesthesiology
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2010 Program
Postdoctoral Research Fellowship
(1-year project)

Project Title: Tobacco Smoke, Stem Cells and Impaired Lung Repair: An Emerging Paradigm in COPD

Project Summary: Chronic obstructive pulmonary disease (COPD) is the fourth leading cause of death worldwide. Currently, there is no effective cure for the disease. Tobacco smoke is the greatest risk factor for COPD. It is estimated 80-90 percent of COPD patients are current or past smokers. Recent evidence suggests that tobacco smoke not only causes lung injury, but also harms stem cells thereby hindering lung repair. Our preliminary data suggest that the inflammatory mediator interleukin-1 (IL1) may mediate the effects of the tobacco smoke on lung tissues and stem cells. To better understand how the IL1 pathway may impact lung injury and repair after tobacco smoke, we will use specially developed mice that are genetically deficient in IL1 receptor antagonist (IL1RA) that protects against the inflammatory and scarring actions of IL1; have additional IL1RA, or are deficient in IL1 productions. We will expose these mice to chronic tobacco smoke to quantify the effects on lung injury and stem cells' responses. At the end of this one-year Project, we will have determined the relationship between the IL1 pathway, stem cell functions, and the promotion of lung disease by tobacco smoke. In summary, this project will deepen our understanding of how cigarette smoking may hamper the repair process associated with lung disease leading to new therapeutic approaches for tobacco-related lung disease.