

James & Esther King Biomedical Research Program

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*Neurology
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*2009 Program
Florida Research Challenge
(2-year project)*

Project Title: Slowing Degenerative Processes by Bolstering Cellular Bioenergetics

Project Summary: In aerobic conditions, most energy produced by eukaryotic cells is generated by the mitochondrial respiratory chain and oxidative phosphorylation system (OXPHOS). A defect in OXPHOS leads to diseases involving degeneration of affected organs. In most cases, mitochondrial disorders are of genetic origin. However, they can also result from exposure to chemical pollutants such as those present in tobacco leaves and smoke. Chronic smoking produces inhibition of cytochrome c oxidase (COX), a crucial enzyme of the OXPHOS system, and increased generation of reactive oxygen species (ROS). COX disturbance and ROS contribute to the deleterious cellular oxidative processes common in cardiovascular disease and favor mutagenic events leading to cancer development. Tobacco smoking is also a known risk factor for certain mitochondrial disorders. Currently, there is not effective treatment for mitochondrial disorders of either genetic or environmental origin. Our hypothesis is that impaired OXPHOS activity can be boosted to improve energy output and cellular health. The purpose of this grant is to develop an effective therapeutic intervention for these disorders.