

## James & Esther King Biomedical Research Program

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*2006 Program  
New Investigator (3-year project)*

**Project Title:** The Role of Nicotine in Smoking-Related Vascular Diseases

**Project Summary:** Cigarette smoking accelerates vascular diseases, the number one cause of death in America. The diseases include macular degeneration (the most common cause of adult blindness), as well as complications of diabetes and aging (the most common cause of retinopathy, strokes, heart attacks, aneurysms, and kidney disease). Vascular diseases claimed 960,592 lives in the United States in 1995, or 41% of all causes of death. Vascular diseases now claim more lives than the next seven leading causes of death (including cancer) combined, and has long been the number one killer in America. About one-sixth of people killed by vascular diseases are under the age of 65. The cost of vascular diseases was estimated to be \$274 billion in 1998, and it affects over 58 million Americans. While it was once thought that vascular diseases are mainly a disease of males, more than ten times as many women died of vascular diseases than of either breast or lung cancer in 1995. Atherosclerosis and restenosis are the most common vascular diseases. These diseases narrow the blood vessels, thus cutting blood flow to vital organs.

Cigarette smoking has been identified as a major risk factor for the development of vascular diseases. Cigarette smoking increases not only the rate of vascular diseases but also the pace at which the blood vessel becomes occluded. To date it is unknown how components of tobacco smoke affect the circulatory system. It is possible that cigarette smoking hastens the growth of tissue in the wall of the blood vessel. As a result, arteries of smokers will be blocked at a faster rate than those of non-smokers. The objective of this application is to find out how one of the main components of cigarette smoke, nicotine, contributes to increase the development of vascular diseases. Through a series of experiments that involves the application of molecular techniques to cells grown out of blood vessels, and to the actual injured blood vessels, we seek to understand how nicotine accelerates the development of vascular diseases. Results from these studies will help us understand how cigarette smoke alters the biological behavior of blood vessels. Once we understand how cigarette smoking accelerates the development of vascular diseases, we will be able to design better strategies to treat vascular diseases, a devastating killer of modern time.