

## James & Esther King Biomedical Research Program

### **Mohapatra, Shyam**

Department of Internal Medicine  
University of South Florida

2007 Program  
Team Science Project (2-year project)

**Project Title:** Engineered Nanoparticles for Biomarker Detection and Targeted Drug Delivery of Cancers

**Project Summary:** Smoking is the number one cause of lung cancer in the United States, but it also increases the risk of other cancers. The risk of getting cancer is now 1 in 2 for men and 1 in 3 for women over their lifetimes. The National Cancer Institute (NCI) says that each year in this country there are a million cancer surgeries, 750,000 radiation treatment visits, and 50 million cancer-related trips to the doctor. The NCI estimates that the total cost of cancer in this country is \$171.6 billion per year. Early detection of cancer is still the most important goal. Even a one percent decrease in cancer death would save nearly \$500 billion. A 10 percent reduction in cancer death rates would be worth \$4.7 trillion. Early detection, early treatment, and continuous monitoring of the disease will go a long way towards eliminating cancer. Recent advances in technology, and especially in nanotechnology, are providing novel approaches for disease detection and drug delivery which could revolutionize cancer treatment. Prof. Mohapatra's laboratory, in collaboration with the College of Engineering, has developed nanoscale fabrication methods for making novel biomedical devices. An example of this new engineering is the microfluidic gold-nanowire electrode system, which was successfully used to detect cholesterol and cortisol levels in the blood. In the area of cancer research, the Mohapatra lab has produced nanoparticles made from a derivative of crustacean shells (chitosan), which are harmless to humans but able to carry potent anticancer drugs directly to the tumor. This discovery was published in the prestigious scientific journal, *Nature*, and is expected to rapidly advance the development of new anticancer treatments. The application of nanotechnology to medicine and particularly cancer has led to the creation of a team of scientists dedicated to harnessing its unique potential for early diagnosis and effective treatment. By combining these new materials with new strategies for detection, we will soon have the most sensitive and specific tests possible. The Team Science Program will concentrate on three main projects:

Project 1: Application of the microfluidic gold nanowire system to early cancer detection

Project 2: Investigation of nanoparticle RNA interference for treatment of lung cancer

Project 3: Nanoparticle-based targeting of drugs for treatment of prostate cancer