

## James & Esther King Biomedical Research Program

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Chemistry  
University of South Florida

2010 Program  
New Investigator Research  
(3-year project)

**Project Title:** A Rapid and Sensitive Optical Spectroscopic Method for Simultaneous Determination of Cotinine, Trans-3'-hydroxycotinine and Thiocyanate In Vitro

**Project Summary:** This research intends to develop a rapid, robust, and simple method based on optical spectroscopy to determine the concentration of three tobacco-related biomarkers simultaneously: cotinine, trans-3'-hydroxycotinine, and thiocyanate. Compared with conventional methods, the technique offers several advantages: little sample preparation; simple, fast, wide concentration range; and direct detection in blood, urine, or plasma. Preliminary data showed that the method is sensitive enough for the detection of nicotine and thiocyanate in both non-smokers and smokers, but not for trans-3'-hydroxycotinine in non-smokers yet. Therefore, the aims are: 1. improve its sensitivity through the use of nanoparticles with special structures; 2. optimize it in terms of stability, reproducibility, and selectivity; 3. validate the method by investigating the effect of cotinine, trans-3'-hydroxycotinine, and thiocyanate on the survival of neuronal cells in vitro and explore their relationship with the decreased incidence of Parkinson's disease in smokers. The long-term goal of the research is to develop a multipurpose and clinically applicable tool that is useful in both molecular diagnosis and scientific research. Information obtained from such methods will shine light on the interplay between tobacco-related chemicals and many diseases including various cancers and lead to a possible therapeutic approach for such diseases.