

# Lincoln University

## Annual Progress Report: 2010 Formula Grant

### Reporting Period

January 1, 2011 – June 30, 2011

### Formula Grant Overview

Lincoln University received \$33,493 in formula funds for the grant award period January 1, 2011 through December 31, 2011. Accomplishments for the reporting period are described below.

### Research Project Title and Purpose

*Plasma Protein Biomarkers of Chronic Obstructive Pulmonary Disease in African Americans* – The goal of this project is to identify potential proteomic markers that may explain the differential susceptibility and increased prevalence of COPD among African American smokers. We will use protein-profiling to identify molecular pathways and targets related to COPD in an attempt to better understand the pathogenesis of this respiratory disease in African Americans.

### Anticipated Duration of Project

1/1/2011 – 12/31/2011

### Project Overview

The adverse effects of cigarette smoking impact all ethnic groups. However, the cancer incidence and mortality rates are higher among African-Americans than any other ethnic group. This is perplexing to scientists because on average African Americans smoke fewer cigarettes per day but have higher levels of plasma cotinine levels relative to white Americans. Even more perplexing is that 50-60% of African American smokers are categorized as light smokers (smoke 10 cigarettes a day). Again, the rates of cancer related deaths and deaths resulting from smoking related illnesses are higher among African Americans than white Americans. Despite the comparative data, the African American smoking population is least studied. More research is needed that examines this population more closely regarding the adverse effects of smoking and environmental tobacco smoke (ETS). A devastating outcome of smoking is Chronic Obstructive Pulmonary Disease (COPD), in some smokers but not others. The etiology underlying COPD includes inflammation, immune response, oxidative damage, tissue damage, and unfolded protein response. About 30% of smoker lung cancer patients have COPD. The significant COPD perturbation of the lung, a highly vascular tissue, suggests that biomarkers that are mechanism-specific to COPD may be released in the plasma at significant levels.

The specific aims are the following:

Specific Aim 1: To discover proteomic markers of Chronic Obstructive Pulmonary Disease (COPD) in African American Smokers to explain their differential susceptibility, increased prevalence, and morbidity related to this disease. Specifically, to compare by multidimensional

quantitative iTRAQ multiplexed mass spectrometry the plasma proteomes of African American COPD patients versus non-COPD smoker controls.

Specific Aim 2: To verify interesting protein alterations identified in Specific Aim 1 using Western blotting.

### **Principal Investigator**

Derrick J. Swinton, Ph.D.  
Associate Professor, Department Chairperson  
Department of Chemistry  
Lincoln University  
P.O. Box 179  
Lincoln University, PA 19352

### **Other Participating Researchers**

Samuel Litwin, PhD – employed by Fox Chase Cancer Center  
Anthony Yeung, PhD – employed by Fox Chase Cancer Center

### **Expected Research Outcomes and Benefits**

COPD is prevalent in only a small population of smokers and is increasing in the African American community, thus necessitating the need to understand its pathophysiologic mechanisms, genes, and their respective proteins. This project focuses on examining the plasma proteome of African Americans. By using identical conditions to the ongoing effort in COPD biomarker discovery in Caucasian populations, we hope to obtain insights to ethnic determinants of COPD susceptibility that may be investigated in greater depth in future projects at Lincoln.

To the best of our knowledge, there is no ongoing or planned research program focused on the COPD of African Americans, especially on the promising approach of defining plasma biomarkers of COPD susceptibility and prognosis. Early prediction of disease severity among smokers may allow better programs of smoking cessation, prevention and management to minimize pulmonary damage.

### **Summary of Research Completed**

The project was delayed, but we were able to enlist over two hundred candidates for our study and take blood and urine samples from these participants. We have developed a liquid chromatography (LC) and mass spectrometry (MS) technique to allow us to establish a nicotine metabolic profile of each participant. This information will be used to determine the correlation between each candidates smoking profile/nicotine metabolic profile and their susceptibility to future diseases, specifically, COPD and tobacco related cancers. The work is ongoing.