PROMOTION OF MOLD-INDUCED HYPERSENSITIVITY AND BRONCHIAL CONSTRICION BY RETINOID METABOLITES AND CITRAL: EVALUATION OF CLINICAL AND PATHOLOGICAL CHANGES USING THE BROWN NORWAY RAT MODEL

Carlene Holt¹, Ibrahim O. Farah¹ and Anthony Mawson²

¹Department of Biology Jackson State University, Jackson MS 39217, USA
²University of Mississippi Medical Center, Jackson, MS 39216, USA

Abstract: Asthma is chronic disease in which the lung air flow is impeded due to swelling and constriction resulting from inflammatory insults/implications to the bronchial tubes, as well as the consequent accumulation of excessive mucus within the lung airways. Asthma, affects more than 17 million Americans, including five million children. Most asthma in children is allergic in nature. Hospitalization for asthma has increased by 50% over the past 20 years, and deaths from asthma in the United States have increased to more than 5,000 per year. With regards to health disparities, death rates are proportionately higher in African American patients. The presence of mold has been linked to episodes of asthma attacks. Mold (fungi) thrives by the production and dispersal of spores through the air. The main hazardous species belong to the families: Aspergillus, Penicillium, Cladosporium, Mucor, Stachybotrys, Absidia, Alternaria, Fusarium and Cryptostrom. Various strains of two families of molds (Aspergillus and Penicillium) have been implicated as causative agents in asthma, hypersensitivity pneumonitis and pulmonary mycosis. Routes of exposure include: inhalation, intratracheal, dermal and oral. However, extensive exposure to mold may worsen conditions such as asthma, hay fever, and other allergies. Retinoids and their metabolites were not established as having a role in the causation or aggravation of asthma and their implications were not yet established in the literature. The premise is that mold will trigger the oxidation of retinoids to establish the vicious cycle of the asthma attack. The Brown Norway Rat is a special asthma model that will be used in this study to examine the clinical and pathological aspects of retinoids in asthma. Citral, a natural inhibitor of retinoid oxidation, will be used to confirm the specificity of their role in asthma. The in vivo studies are awaiting IACUC approved protocol and will be performed at the JSU Animal Core Facility and the University Medical Center. As a control, rats will be directly exposed to retinoid metabolites (ATRA and retinyl palmitate), ovalbumin (Positive control), the negative saline (vehicle) and citral (inhibitor) by intratracheal instillations. Asthma related symptoms and lung tissues will be observed/assayed in comparison to control groups. Testing measures include: ELISA, HPLC, blood parameters and histopathology. Severity of asthmatic symptoms in relation retinoic acid levels will be analyzed and linked to mold toxicity.

Keywords: Retinoids, retinoic acid, retinyl palmitate, mold, asthma, Brown Norway rat

Acknowledgements: This research is supported in part by the NIH-RISE and NIH-EXPORT-TRANSLATIONAL RESEARCH CORE at Jackson State University.