Breath-Based Volatile Organic Compound Profiling as a Noninvasive Approach to Detect Eosinophilic Esophagitis

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Eosinophilic Esophagitis (EoE) is a chronic, immune-mediated esophageal disorder that currently requires repeated invasive endoscopic biopsies for diagnosis and disease monitoring. The absence of reliable non-invasive biomarkers presents a significant challenge for early detection and long-term management. Volatile organic compounds (VOCs), metabolic byproducts detectable in exhaled breath, have shown promise as biomarkers in other inflammatory and allergic conditions. This study investigates the potential of using breath VOC profiling to differentiate individuals with EoE from non-EoE controls. Exhaled breath samples are collected using Tedlar bags under controlled conditions to minimize contamination. Additionally, control samples acquired from the air will be evaluated. Samples will be analyzed using gas chromatography coupled with quadrupole time-of-flight mass spectrometry (GC-qTOF) to generate high-resolution VOC chromatograms based on compound retention times and relative peak intensities. VOC patterns from EoE and control participants will be compared using statistical methods, such as pattern analysis across multiple variables. It is anticipated that breath samples from individuals with EoE may show distinct VOC patterns in comparison to controls, reflecting underlying inflammatory and metabolic differences. The primary objective of this study is to evaluate the potential of using VOCs as a biomarker and to establish preliminary trends rather than to fully prove it, as we have moderate cohort size. Results from this study are intended to be explored further in larger scale studies, establishing a novel methodology for breath VOC collection and GC analysis in EoE.

Awards Won:
Third Award of $1,200