International Conference on
METABOLOMICS AND DIABETOLOGY
May 23-24, 2018 | New York, USA

Metabolomic profiling enables the rapid detection of antimicrobial resistant (AMR) human pathogenic bacteria

Fatima Zaidi, Allyson Dailey, Jessica Saha and **Robin Couch**
George Mason University, USA

Statement of the Problem: Rapid diagnosis of AMR strains of human pathogenic bacteria enables informed decisions regarding therapeutic options and can be critical to the effectiveness of clinical treatment. Techniques such as Polymerase Chain Reaction (PCR), Microbial Culturing, and/or Enzyme-Linked Immunosorbent Assays (ELISA) are well established, however can be time consuming, laborious, and costly. The purpose of this study was to develop a very rapid detection method for the identification of AMR strains of pathogenic bacteria, using Yersinia pestis (the causative agent of the plague) as a model organism.

Methodology & Theoretical Orientation: Microbial volatile organic compounds (mVOCs) are a family of structurally diverse, microbial-derived metabolites, generally related by their volatility at room temperature. Here, we employed headspace solid phase microextraction (hSPME), coupled with gas chromatography (GC), for the extraction and analysis of mVOCs emanating from bacterial cultures of wild type and kanamycin resistant strains of *Yersinia pestis.* To ensure broad chemical diversity in the derived mVOC profiles, while still enabling a rapid analysis time, we employed a technique referred to as simultaneous multi-headspace SPME (simulti-hSPME).

Findings: Using simulti-hSPME with diverse sorbent types, we generated mVOC profiles that serve as metabolomic fingerprints that readily differentiate wild type (kanamycin sensitive) and kanamycin resistant strains of *Yersinia pestis.* The complete analysis can be completed within 15 minutes.

Conclusion & Significance: Rapid diagnosis of AMR strains of human bacterial pathogens is crucial for effective therapeutic intervention. Our mVOC metabolomics profiling approach quickly and effectively differentiates wild type (kanamycin sensitive) and kanamycin resistant strains of *Yersinia pestis.* Application of this method to other bacteria and other types of AMR is ongoing and holds promise as an effective clinical diagnostic technique.

Biography

Fatima Zaidi is a Pharmacist by training. She has completed her Master of Molecular Biology from George Mason University, USA. She is currently pursuing her Doctoral degree (Cell and Molecular Biology) at George Mason University and is affiliated with Mason Metabolomics facility operated in the Couch Lab at Chemistry and Biochemistry Department, GMU. She has completed her Biosafety level 3 (BSL-3) and Animal Biosafety level 3 (ABSL-3) training. She has been awarded Elaine Joyce Outstanding Graduate Teaching Assistant Award by GMU in May 2017. Her research interests include but not limited to understanding general health and well-being, including metabolic and infectious diseases. To this end, her research focuses on the development and application of metabolomics-based *in vitro* diagnostics (IVDs).

szaidi9@masonlive.gmu.edu

Notes: