H127   Trends in Postmortem Microbiome Research Activities: A Ten-Year Review

Jennifer L. Pechal, PhD*, Michigan State University, East Lansing, MI 48824; Carl J. Schmidt, MD, Wayne County Medical Examiner's Office/University of Michigan, Detroit, MI 48207; Heather R. Jordan, PhD, Mississippi State University, Mississippi State, MS 39762; M. Eric Benbow, PhD, Michigan State University, East Lansing, MI 48824

Learning Overview: After attending this presentation, attendees will understand the advancements made in postmortem microbiome research over the past decade (2010–2020) with the goal of informing the development of scientific community standards important to future forensic practice. The postmortem microbiome is an emerging field in forensic science with broad application for death investigation (e.g., time since death, manner of death, and provenance). While the foundation for forensic microbiology began in the early 2000s, resulting from bioterrorism threats, the expansion of using entire microbial communities (the microbial organisms, their genes, and their gene functions) in a forensic context began in the early 2010s. Improvements in molecular (technical and computational) approaches over the past 20 years to study the microbiome in medical fields have revealed the power and potential use of microbial diversity as a means to explore the associations of microorganisms with human health of living individuals. Researchers within forensics adopted these technologies to determine if and how the postmortem microbiome could be used to aid death investigation.

Impact on the Forensic Science Community: This presentation will impact the forensic science community and practitioners by reviewing the sequencing technologies used by forensic researchers since 2010 until the present day. These technologies and analytical approaches will include, but are not limited to, 16S ribosomal RNA (rRNA) gene-based amplicon sequence analysis and whole genome shotgun metagenomic analysis.

A summary on the studies in postmortem human microbiome research activities will be presented. Initially reviewing the early history of forensic microbiology, this analysis will focus on the body of work that describes the postmortem microbial community compositions under a variety of death circumstances. Specifically, this presentation will describe the work completed as laboratory studies, longitudinal assessments, and surveys of routine autopsy cases, which highlights the variation and complexity of postmortem microbiomes, as well as transcriptomes of the microbiomes. Further, information regarding technical needs, funding support, and knowledge gaps that remain for this field will be covered.

The interest in high-throughput sequencing and other "-omics" technology, coupled with the ever-improving accessibility, affordability, and user-friendly analytical capacities, for forensics does not appear to be waning. Rather, an uptick in the use of postmortem microbiomes for assisting during death investigation seems inevitable. Yet, as a scientific community, standards must be established; analytical approaches, models, and data interpretation validated; error rates confirmed; and the robustness of these technologies for the field of forensics evaluated. The results from this review are important to be able to advance the field of postmortem microbiomes for forensic applications and for the outcomes of this research to be able to eventually progress to microbiome-based evidence for routine use in casework.

Forensic Science, Postmortem Microbiome, Death Investigation