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### **E78 Association Between Volatile Organic Compounds and Microbes Present During the Decomposition of a Cadaver**

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After attending this presentation, attendees will better understand how Volatile Organic Compounds (VOCs) and microbe identification could be utilized in establishing the time of death of a victim and learn about correlations between these two datasets.

This presentation will impact the forensic science community by possibly providing a new means of identifying the time of death in an underutilized way. This presentation will add to the research that is being carried out in forensics, chemistry, and biology by confirming and expanding knowledge of the VOCs that are established in the literature as being released during decomposition. These compounds, along with the microbes present during decomposition, can be used as a means of establishing time of death, but the two datasets are not completely independent and important correlations between the two will be discussed.

The ability to identify VOCs from cadavers during decomposition can lead to newer advancements in forensic science. During decomposition, larger biological macromolecules are broken down into their basic components and some VOCs are intermediates of decomposition. Once the processes of the living body stop, enzymes will go unchecked, causing cells to be lysed from the inside out, a process known as autolysis. This destruction of the cells provides nutrients for the growth of microbes that are already present or are ushered in from the external environment.

VOC samples were taken from decomposing store-bought chickens and from human cadavers via Solid-Phase Microextraction (SPME); two cotton swabs were used to collect microbes. The cotton swabs were contained in two separate tubes, one for the mouth area and one for the belly region of the cadavers. The analysis of the samples was conducted by gas chromatography/mass spectrometry for the VOCs and the cotton swabs were sent to Baylor College of Medicine for sequencing via Polymerase Chain Reaction (PCR). The mass spectra of VOCs were identified and confirmed utilizing the National Institute of Standards and Technology 2008 (NIST08) database, Automated Mass Spectral Deconvolution Identification System (AMDIS), and quantified with the untargeted metabolomics tool, Metabolomics Ion-based Data Extraction Algorithm (Met-IDEA). Data for identified compounds were cross-referenced with ChemSpider or the NIST database for structures and boiling points. All statistical data discussed was calculated using R-console and Statistical Package for the Social Sciences (SPSS) to find the probability statistics between the two (VOCs and microbes). Using the relative populations of specific microbes present and time lapse as a basis, a comparative analysis was performed to identify a possible link between VOCs detected and microbes present during the decomposition process.

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#### **Microextraction, Microbe, Volatile**