G48 Use of Volatile Organic Compounds and Chemometric Procedures to Determine Postmortem Interval

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After attending this presentation, attendees will be familiar with the use of volatile organic compounds and chemometric procedures for the estimation of postmortem interval (PMI).

This presentation will impact the forensic science community by further developing a chemical method to estimate the postmortem interval, which can be applied to death investigations, when traditional PMI estimations may fail.

An important aspect of any death investigation is to determine time since death, or postmortem interval (PMI). Establishing the PMI is important for identifying and eliminating suspects as well as helping to reconstruct the crime. However, unless eye-witnesses are known, it is difficult to establish when the death occurred. Many of the current methods that are used for PMI estimation involve gross changes to the body and are only useful for the first few days after death. However, after death, chemical changes also occur within a body. This research has focused on the chemical changes that occur in individual viscera to estimate the PMI. The purpose of this initial work was to identify biomarkers that can be useful for the estimation of the PMI.

An initial *in vitro* study was conducted on four viscera (heart, lung, liver, and kidney) harvested from two different pigs. Samples were collected from all viscera and from different areas within each viscus throughout the decomposition process. All samples were homogenized in a tissue grinder, extracted, and derivatized prior to analysis by gas chromatography-mass spectrometry (GC-MS). Total ion chromatograms (TICs) were assessed initially and, through mass spectral interpretation, major volatile organic compounds (VOCs) that are potentially important biomarkers, were identified. Principal components analysis (PCA) was then applied to identify differences in VOCs for samples collected from different areas of the same viscus, as well as differences in VOCs in different viscera. Compounds that showed minimal variation within a viscus and between viscera were selected as biomarkers for PMI estimation. It is important to identify biomarkers that do not have wide variability, in order to allow for accurate PMI estimation. The changes

in abundance of these biomarkers in each viscus, over time, were observed and used to create a model that could be used to estimate the PMI. Samples from each viscus were collected from both pigs over time and analyzed by GC-MS. The abundances of the VOC biomarkers were normalized to an internal standard and plotted as a function of accumulative degree days (ADDs) in order to estimate the PMI. The results of these studies will be presented and discussed along with the implications for PMI determinations using the developed model. **Postmortem Interval, Chemometrics, Volatile Organic Compounds**

 ** Presenting Author*