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## FORENSIC STUDY OF VOLATILE ORGANIC COMPOUNDS RELEASED FROM DECAYING BODIES

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The study of volatile organic compounds (VOCs) released from decaying bodies is an expanding area in the Forensic Sciences. It is a part of the thanatochemistry, “the chemistry of death”. It should permit the understanding of the decomposition process and the determination of the post-mortem interval (PMI)<sup>1</sup>.

This work represents the first bioforensic application of two-dimensional gas chromatography coupled with time-of-flight mass spectrometry (GCxGC-ToFMS). The use of this technique improves the resolution, the sensitivity and peak capacity of the analysis for very complex mixture. For this work, we study the impact of very polar second dimension column by using ionic liquid phase. This research shows the impact on the separation and detection power for the VOCs samples.

During this study, we analyze the time evolution of the VOCs emission. The sample set was composed of 12 sample-blank peers. Each sample was analyzed and compare with its witness to isolate the specific VOCs from the pig cadavers. The data was qualitatively and quantitatively treated. For the first point, we compare our specific VOCs with the bibliographic database. For the second one, we show the power of the principal component analysis (PCA) to find important biomarkers inside a very big set of data.

The preliminary results indicate that the use of GCxGC-ToFMS increase the sensitivity of VOCs analysis. This increase of detection permits to detect a lot of potential biomarkers in one analysis. Moreover, some observations indicate that the PMI should be determining from the evolution in VOCs emission.

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<sup>1</sup> Vass, A. A., Barshick, S-A., Sega, G., Caton, J., Skeen J. T., Love, J. C., Synstelién J. A., Decomposition chemistry of human remains: a new methodology for determining the postmortem interval. *Journal of forensic sciences* **47** (3), 542-53 (2002).