

In vitro monitoring of human tissue degradation by TD-GC×GC-TOFMS

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Human rescue dog unit are amongst the most efficient tools to locate cadaver or individuals trapped after a natural disaster. However, the dog training process is long and expensive. Dog trainers are still looking for a better understanding of the dog olfaction matching mechanism to improve their training methods (1). How does the decomposition process differ between organs? Are there specific body parts better suited for dog training? What are the major volatile compounds responsible of the dogs' match response?

In the line of these questions, this project was monitoring the headspace of various human organs during the decomposition process. Five different organs, from five different bodies, were used: heart, lung, liver, kidney, and blood. Each organs were sampled in triplicates and let to decompose in glass jar. Regularly, the headspace of the jar was sampled by dynamic pumping to sorbent tubes that were further be desorbed on a comprehensive two-dimensional gas chromatography system (GC×GC). GC×GC is a powerful analytical tool that allows the resolution of "the smell of death", i.e. the decomposition odor (2-3).

The development of an in vitro approach for decomposition monitoring provided several analytical improvements in the decomposition field. Indeed, the study of dead bodies is always limited in the number of replicates (4). The sampling process developed for this project allows intra and inter corpse comparison with at least triplicates sampling. These comparisons were conducted using advanced chemometric methods (Fisher ratio, PCA, hierarchical analysis...) that will contribute to better understand key parameters of rescue the dog training.

References

1. Hoffman et al. FSI (2009) 186, 6-13.
2. Stefanuto et al. CPC (2014) 79, 786-789.
3. Perrault et al. J. Sep. Sci. (2015) 38, 73-80.
4. Stefanuto et al. ABC (2015) 407, 4767-4778