How to solve murders with postmortem metabolomics and artificial intelligence: *introducing a new research environment*

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ABSTRACT

We would hereby like to introduce a new research environment, funded by the Swedish Research Council, aimed at advancing death investigations through the integration of postmortem metabolomics and artificial intelligence. This collaborative effort unites expertise in forensic pathology, forensic toxicology, analytical chemistry, systems biology, and machine learning and artificial intelligence.

Currently, postmortem diagnosis of several types of murders, poisonings, and other fatalities often rely on subjective assessments or nonspecific observations, leading to indirect determinations of cause of death. Such causes of death include, but not limited to, asphyxia, anaphylactic shock, and poisonings from insulin and other atypical toxins. Postmortem metabolomics holds promise for improving diagnostic precision by revealing distinct patterns of metabolites indicative of biochemical processes in different tissues. These metabolomic fingerprints have the potential to elucidate both the cause and timing of death.

The new research environment and this presentation will encompass three major work packages:

1. Characterisation of postmortem metabolomic fingerprints in poisonings, causes of death, and time of death estimations.
2. Analytical chemistry in postmortem metabolomics.
3. Systems biology, machine learning and artificial intelligence.

The establishment of this research environment holds significant promise for advancing forensic medicine. Through ongoing collaboration and methodological advancements, we anticipate making practical contributions to the resolution of murders and the evolution of forensic medicine. The research environment is currently funded by 1.1 million Euros, which we hope will lead to numerous joint projects.