

AN "-OMIC" LOOK AT SOME FORENSIC SCIENCE FIELDS!

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Abstract

The term “-omic” is a neologism often used to refer to the totality of a specific thing. This term has its origins in the field of molecular biology (e.g. genomics, metabolomics, proteomics) and implies the qualification and quantification of all the molecules involved in specific biological processes. Metabolites related to the consumption of a specific drug, for instance, can be discovered comparing biological samples from individuals that have consumed the drug in question with samples from individuals that have not. Such approach requires to first detect all the compounds present in samples coming from both groups and second to search for changes and/or trends in between these two groups. Researches based on similar approaches are currently performed at the School of Criminal Justice on forensic samples. To monitor the global composition of street drugs and to detect new psychoactive substances (NPS) that may appear/disappear rapidly on the market, a non-targeted method based on liquid chromatography (LC) combined with high-resolution mass spectrometry (HRMS) was developed. Compounds detected may be identified by comparison with reference standards (e.g. common illicit drugs, impurities, adulterants) but also may be elucidated comparing the accurate mass measured with the exact mass of compounds of interest (e.g. NPS and medications). Using the same device, a method to study the lipid composition of latent fingerprints has been developed and in addition to provide fundamental understanding of the lipid content, will be used to develop a mean to estimate the age of fingerprints. In parallel, a method based on matrix-assisted laser desorption/ionization (MALDI) combined with HRMS and imaging is currently in use to gain knowledge about the molecular composition of fingermarks and to evaluate the specificity of molecular signatures (defined as a set of compounds specific to one individual, which stay constant over the time).