



Human Provenancing: It's Elemental...

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Forensic science already uses a variety of methods often in combination to determine a deceased person's identity if neither personal effects nor next of kin (or close friends) can positively identify the victim. While disciplines such as forensic anthropology are able to work from a blank canvass as it were and can provide information on age, gender and ethnical grouping, techniques such as DNA profiling do rely on finding a match either in a database or a comparative sample presumed to be an ante-mortem sample of the victim or from a putative relation. Chances for either to succeed would be greatly enhanced if information gained from a forensic anthropological examination and, circumstances permitting a facial reconstruction could be linked to another technique that can work from a blank canvass or at least does not require comparison to a subject specific database.

With the help of isotope ratio mass spectrometry even the very atoms from which a body is made can be used to say something about a person that will help to focus human identification using traditional techniques such as DNA, fingerprints and odontology. Stable isotope fingerprinting works on the basis that almost all chemical elements and in particular the so-called light elements such as carbon (C) that comprise most of the human body occur naturally in different forms, namely isotopes. ^2H isotope abundance values recorded by the human body through food and drink ultimately reflect averaged isotopic composition of precipitation or ground water. Stable isotope analysis of ^2H isotopic composition in different human tissue such as hair, nails, bone and teeth enables us to construct a time resolved isotopic profile or 'fingerprint' that may not necessarily permit direct identification of a murder victim or mass disaster victim but in conjunction with forensic anthropological information will provide sufficient intelligence to construct a profile for intelligence lead identification stating where a victim was from (point of origin), how old they were, what their 'life style' was and even if and where they had recently travelled. Data from several criminal investigations are presented to illustrate potential and limitation of stable isotope analysis of human tissue in aid of victim identification.