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^{2}H Stable Isotope Analysis of Human Tooth Dentine: A Pilot Study

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Stable isotope analysis of biogenic tissues such as tooth enamel, bone, and hair has become a well-recognized and commonly implemented technique for determining provenance of human remains in bioarchaeological contexts and, more recently, in the forensic identification of unidentified human remains (Lee-Thorp, 2008; Meier-Augenstein and Fraser, 2008). Particularly, ^{18}O and ^{2}H stable isotope signatures are well established proxies as environmental indicators of climate (temperature) and source water and are therefore considered as indicators of geographic life trajectories of animals and humans (Hobson *et al.*, 2004; Schwarcz and Walker, 2006). While studies focusing on the isotopic analysis of mammalian tooth dentine have emerged in the literature, few if any studies have systematically investigated the multi-isotopic signatures in human tooth dentine (Stuart-Williams and Schwarcz 1997, beaver; Balasse *et al*., 2001, cattle; Kirsanow *et al*., 2008, sheep; Dupras and Tocheri 2007, humans). Since isotopic make-up of tooth enamel from late-erupting permanent teeth are a source of information on geographic origins, and the isotopic signatures in continuously forming tissues (i.e., hair) yield more recent geolocational data, we hypothesize that potentially valuable information can be obtained from the stable isotopic composition of human crown dentine related to geographic provenance and dietary intake.

This pilot study determined isotopic abundance of ^{15}N, ^{13}C, ^{18}O, and ^{2}H in human tooth dentine using continuous-flow isotope ratio mass spectrometry (IRMS). Our preliminary findings suggest that multi-isotope signatures but in particular the information locked into ^{2}H isotopic composition of tooth dentine may improve the chances of victim identification.

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