

Stable isotopes in the human body: we are what and where we eat and drink ± a few ‰.

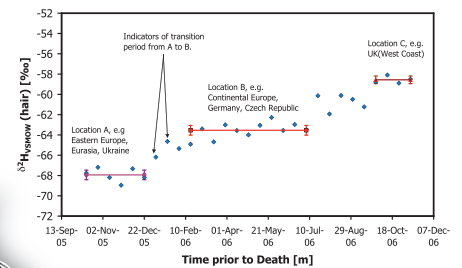
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Scalp hair

Stable isotope incorporation of ^2H into scalp hair reflects source water (as water or as water contained in fruit and vegetables) and can be used to provide a chronological record of recent geographic movement. Similarly, stable isotope incorporation of ^{13}C into scalp hair reflects diet while ^{15}N reflects diet as well as physiological / metabolic conditions (prolonged infectious disease; crash diet) and can thus provide information on recent life style / life circumstance in fortnightly time increments for up to 15 months into a person's past (depending in hair length).

Research into quantifying ^2H incorporation from water consumed as direct water and indirect water (water used for food preparation) into hair keratin forms part of a joint PhD project with the University of Dundee.

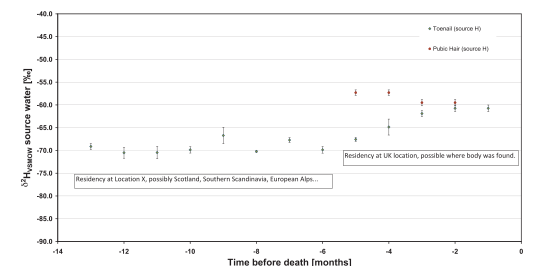
Geographic Life Trajectory based on ^2H Incorporation into Scalp Hair



Toenail keratin

Stable isotope incorporation of ^2H into toenail keratin reflects source water and can be used to provide a chronological record of recent geographic movement. Similarly, stable isotope incorporation of ^{13}C into scalp hair reflects diet while ^{15}N reflects diet as well as physiological / metabolic conditions (prolonged infectious disease; crash diet) and can thus provide information on recent life style / life circumstance in 1 monthly time increments for up to 24 months into a person's past (depending in overall nail length from nail bed to the tip).

Geographic Life Trajectory based on ^2H Incorporation into Toenail Keratin



Tooth enamel

Incorporation of ^{18}O and $^{87}\text{Sr}/^{86}\text{Sr}$ into tooth enamel of late erupting molars (2nd and 3rd molar) reflects source water (as water or as e.g. fruit water content) consumed during adolescence and can provide information where a person has lived during the period of 8 to 16 years of age. Similarly, ^{13}C incorporation into the carbonate fraction of tooth enamel provides a time averaged record of the dietary ^{13}C isotopic composition during adolescence.

Stable isotope record of ^2H , ^{13}C and ^{15}N contained in collagen extracted from tooth dentin is hypothesized to provide additional insights into life style (dietary habits), provenance and health status of a person. Research in this area and how dentin isotope record correlates with data from other tissue is the subject of a joint PhD project with the McMaster University, (Hamilton, Ontario, Canada).

Femoral bone

Incorporation of ^{18}O and $^{87}\text{Sr}/^{86}\text{Sr}$ into mid-shaft femoral bone bio-apatite reflects source water consumed (as water or comprised in one's diet) and can provide information where a person has lived during the last 20 to 25 years. Similarly, ^{13}C incorporation into the carbonate fraction of femoral bone bio-apatite provides a time averaged record of the dietary ^{13}C isotopic composition consumed during the last 20 to 25 years in a person's life. It is possible to obtain chronological information reflecting time integrals of approx. 6 to 8 years from sequential analysis of samples taken a cross section of the bone.

Research into intra-individual variability of ^{18}O and ^{13}C signals in femoral bone is part of a joint PhD project with the University of Dundee.

Geographic Life Trajectory based on ^{18}O Incorporation into Femoral Bone

