ISOTOPIC VARIATION IN BONE

$\delta^{13}C$ and $\delta^{15}N$ in adult femora: new data to support analysis of commingled human remains

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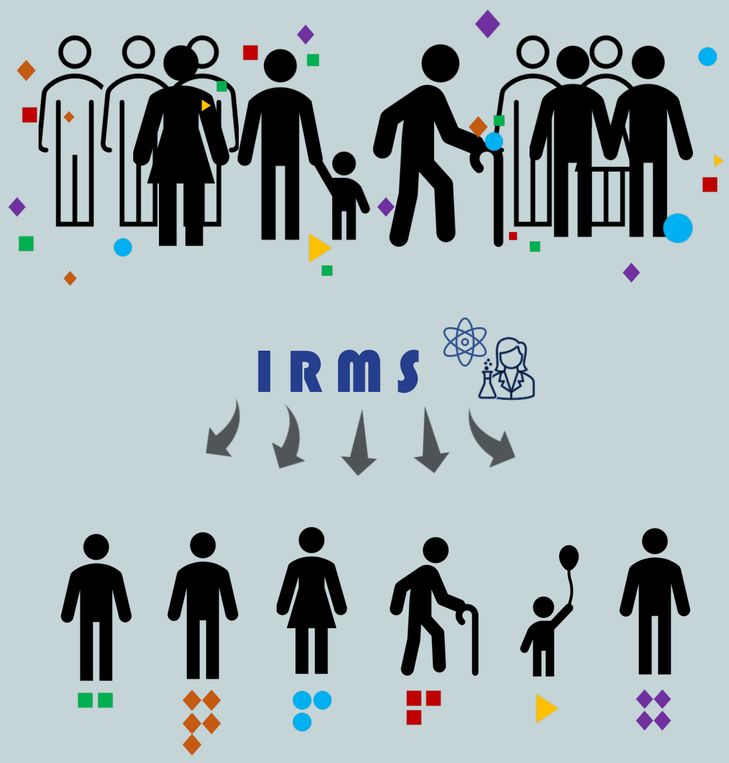
How many individuals?



Isotopic analysis of bone is a **rapid and affordable screening method** of commingled assemblages of human remains from contexts including post-conflict mass burials.

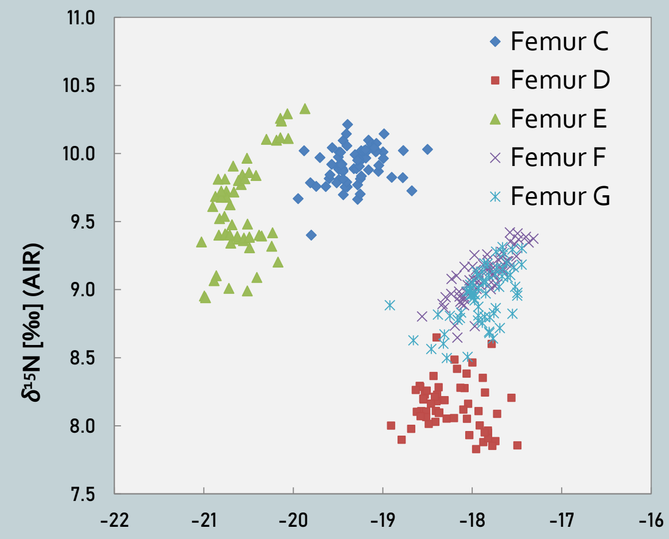
Results

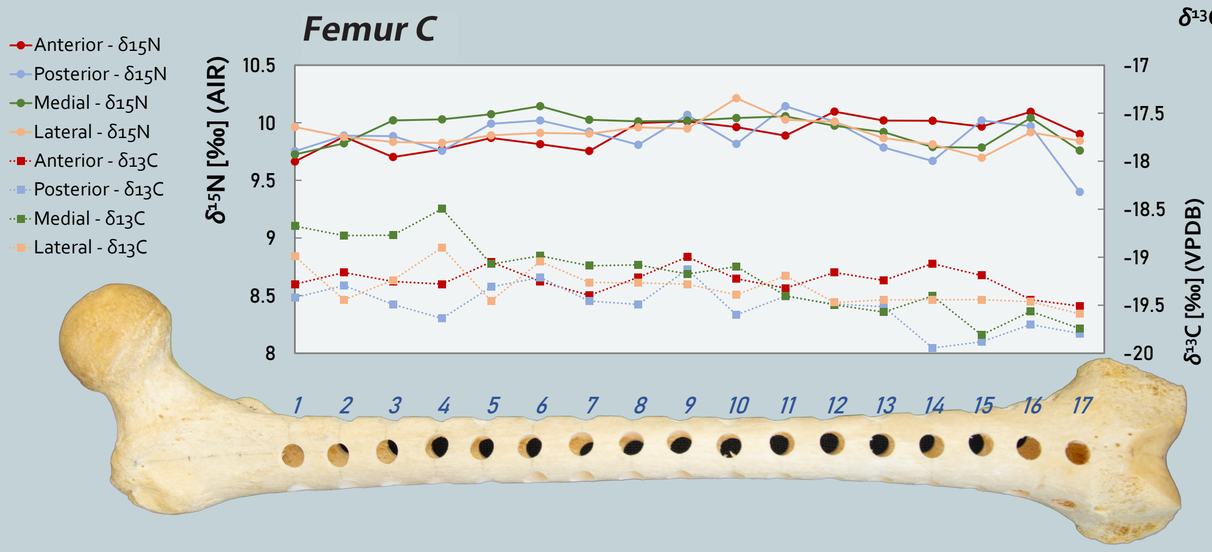
Based on **308 isotopic measurements**, the isotopic variation in each bone had the **absolute range**:

- 1.16‰ to 1.47‰ for $\delta^{13}C$,
- 0.77‰ to 1.39‰ for $\delta^{15}N$,

and the **mean range**:

- 1.35‰ (σ=0.14) for $\delta^{13}C$,
- 0.92‰ (σ=0.26) for $\delta^{15}N$.





Material and method

- **5 femora**[1] **sampled sequentially** by drilling cores on four aspects of the diaphysis (anterior, posterior, medial, lateral);
- **56 to 68 samples per bone** (308 in total) defatted and analysed for $\delta^{13}C$ and $\delta^{15}N$ using isotope ratio mass spectrometry (IRMS)[2].

[1] Modern, unprovenanced; originally part of the teaching collection at the Department of Physiology, Anatomy and Genetics, University of Oxford
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Application: Intra-person isotopic limit

The **maximum variability in carbon and nitrogen** isotope ratios in this study indicates values beyond which it becomes unlikely that two different samples came from the same individual (the 'three-standard-deviation-from-the-mean' model).

1.76‰ for $\delta^{13}C$

1.71‰ for $\delta^{15}N$

Cf.
Berg *et al.* (2022) A large-scale evaluation of intraperson isotopic variation within human bone collagen and bioapatite. *Forensic Science International* 336:111319.

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