Poster

# Cooking makes a difference: changes in raw fish isotopic signature ( $\delta^{13}C$ and $\delta^{15}N$) caused by different cooking methods

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## Abstract

Stable isotope analysis represents the principal scientific technique used in the reconstruction of ancient human diet. Characterization of human diet, based on stable isotopes, requires that the isotopic baseline, that is the isotopic signals of the consumed food groups, is established. Ideally, the isotopic baseline for mammal or fish species, consumed by humans, is based on isotopic data from bones of these species found in association with the human remains.

Different animal tissues will present varying isotopic signals (del Rio et al. 2009). The isotopic signal of fish meat will depend on its nutrient (carbohydrates, lipids, protein) and biochemical composition (e.g. amino acids or fatty acids). Fish, a major protein source, may also have high lipid content, with lipids having a significantly depleted $\delta^{13}C$ signal when compared with protein (Post et al. 2007).

Cooking may alter the isotopic signal of meat (Warinner and Tuross 2009), not only through fractionation processes, but also through selective loss of macronutrients or biochemical components possessing different isotopic signals.

We investigated the influence of cooking on the stable isotope values of meat for two fish species (mackerel, which has a very high fat content, and haddock, which is low in fat) using three potential prehistoric cooking methods. The fish were boiled in a pot, grilled beside an open fire, or wrapped in leaves and clay and baked in hot sand. Cooking times and temperatures were monitored, and the cooked fish was tasted for palatability.

Stable isotope ratios ($\delta^{13}C$ and $\delta^{15}N$) were measured on the meat of raw fish and compared with measurements obtained after cooking using the three different methods. The results demonstrated a link between macronutrient composition of each fish species and observed isotopic shifts. While cooking of low fat haddock did not result in large isotopic shifts, cooking of high fat mackerel induced significant isotopic shifts.

The obtained results clearly illustrate the need of considering the influence of cooking in paleodietary studies.

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