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DIFFERENTIAL SKELETAL CLEANING PRACTICES BY FORENSIC ANTHROPOLOGISTS AND RESULTING OXYGEN ISOTOPE OFFSETS OF BONE CARBONATE

Ligia Elena Ceja

Abstract

Forensic anthropologists have adopted stable isotope analysis as a tool in forensic identification. The residential history of an individual can be inferred by comparing $\delta^{18}O$ values within human tissue, such as bone, to the water sources of specific geographic locations. As bones grow and remodel at a predictable rate, they record geographic movement during different life stages. The migration habits of an unidentified person can help investigators narrow down possible identities. What has not been studied is whether postmortem skeletal cleaning methods used by forensic anthropologists have an effect on the $\delta^{18}O$ values of bone carbonate.

In this study porcine ribs (n = 47) are cleaned using 7 maceration methods. Results of the study indicate that the boiling, simmering, heated dish detergent and meat tenderizer, and a heated detergent and sodium bicarbonate groups significantly altered $\delta^{18}O$ values of bone carbonate by approximately -3‰.

Based on these findings, I assess bone carbonate $\delta^{18}O$ values from rib samples belonging to three unidentified individuals that were cleaned using the heated detergent and sodium bicarbonate method by anthropologists at the New York City Office of Chief Medical Examiner. Initial bone carbonate isoscape predictions provided by IsoForensics did not match the individuals' hair isoscapes. However, geographical predictions matched, once $\delta^{18}O$ values were recalibrated. This research demonstrates that not all skeletal cleaning techniques are ideal for forensic casework.