H34 Refining the Isotopic Fingerprint in Modern Mexican Populations: Using Strontium, Carbon, Nitrogen, and Oxygen to Determine Region of Origin for Deceased Undocumented Border Crossers

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After attending this presentation, attendees will understand the incorporation of stable isotopes into human teeth and bone, the importance of sampling methodology on isotopic mapping and the varying rates of precision possible during isotopic mapping of modern populations.

This presentation will impact the forensic community and/or humanity through its pioneering application of stable isotopic analysis to deaths within a forensic context.

The goal of this presentation is to present the progress on the expansion of a mass spectrometry-based method for the identification of region of origin in modern Mexican populations through analysis of strontium, carbon, nitrogen and oxygen isotopes in human tooth enamel. Previously, this project had presented data on the success of strontium isotopes in the region of origin determination of these populations. Through the inclusion of carbon, nitrogen, and oxygen isotopes the project has expanded and refined the isotopic fingerprint of these populations.

After attending this presentation attendees will understand the incorporation of stable isotopes into human teeth and bone, the importance of sampling methodology on isotopic mapping and the varying rates of precision possible during isotopic mapping of modern populations. This study will impact the forensic community through its pioneering application of stable isotopic analysis to deaths within a forensic context.

Background: Strontium isotope ratios and strontium concentrations collected in teeth and bones have been analyzed by archaeologists to investigate patterns of residential mobility and migration in prehistoric peoples. In this study a similar methodology is applied to forensic material to determine the region of origin for Mexican individuals that died while crossing the border into the United States. Every year approximately seven-hundred immigrants die while crossing the border between Mexico and the United States. The tragedy of this situation is compounded by low success rates in identification and repatriation of these individuals to their countries of origin. For forensic anthropologists, much of the difficulty of identifying and repatriating deceased immigrants found in border areas stems from an inability to narrow their regions of origin. Because studies estimate that approximately 86% of undocumented immigrants who cross the U.S. border are Mexican nationals this project focuses on advancing identification within that population. In order to employ identification technologies such as DNA, or dental analysis, investigators must first determine a searchable region in which to locate family, personal records and or legal documents. The aim of this project is to develop a tool for identifying region of origin in modern Mexican populations. The data discussed here are the latest stage of research on the creation of a region of origin map derived from dental enamel analysis of donated teeth from persons born in various Mexican states and regions. The map is being created from the donated teeth of Mexican-born individuals of known origin and will be used for cross-comparison with deceased border- crossers of unknown origin.

Methodology: The teeth used for this project came from clinics in Mexico and California that donated the extracted teeth of their Mexican born patients. This investigation utilized the permanent molar teeth of 50 individuals. These tooth samples retained the accompanying information on the individuals region of origin within Mexico, their age, and sex. Each tooth was washed with dilute acetic acid to ensure the removal of any depositional contamination and analyzed using TIMS and MC-ICPMS.

Results and Discussion: The goal of this project is to provide the most accurate pathway to identification possible. The initial results of this isotopic expansion are promising and build upon the previous presented research, revealing the formation of five clearly distinct separate and identifiable isotopic populations that correspond to five specific geographical regions. The presence of these new and more clearly defined ranges strongly supports previous research and brings this study one step closer to working identifications.

Isotopes, Region of Origin, Border Death

 ** Presenting Author*