



Anthropology Section - 2016

A98 Bone Histology Sampling Sites for the Identification of Undocumented Border Crossers Along the United States-Mexico Border

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After attending this presentation, attendees will understand the difficulties of estimating age at death of Undocumented Border Crossers (UBCs) along the United States-Mexico border, and the importance of sampling site choice for histological age estimation.

This presentation will impact the forensic science community by resolving certain issues challenging anthropologists working to identify UBCs in the growing humanitarian crisis along the United States-Mexico border.

The death of UBCs along the United States-Mexico border is an unacknowledged humanitarian crisis currently affecting the United States. The immense skeletal diversity represented within this group presents new challenges in identification as population-specific methods are lacking for this group. Since 2013, the Forensic Anthropology Center at Texas State (FACTS) has been working to identify UBCs from Brooks and surrounding counties in Texas. As part of this effort, FACTS has accepted 78 UBCs from exhumations and from the Webb County, TX, Medical Examiner's Office. Due to the nature of the UBC deaths along the border, anthropologists play a vital role in identifying these individuals and repatriating their remains to grieving families.

A critical aspect of UBC identification is an accurate age-at-death estimate to narrow the list of potential matches for repatriation. Previous studies have confirmed that combining both gross morphology and histomorphology age estimation provides a more complete picture of age-related skeletal changes. The goal of this study is to examine which bone histology sampling site is the most appropriate indicator of UBC age at death to help increase identifications and gain a better understanding of skeletal age in UBCs.

The remains of $N=29$ (15 males and 14 females) UBCs were examined using histological analysis of the femur and of the midshaft of the sixth rib.¹⁻³ The sex of each individual was determined either by soft tissue or skeletal analysis. Due to sampling constraints, only the anterior femur at the midshaft was sampled and analyzed. Gross morphology estimates were gathered from case reports and age indicators included pubic symphysis, sternal rib ends, and auricular surface.

To determine the most appropriate histological sampling site for UBC identification, the mean age for each site-specific histological method was calculated. Additionally, the femoral and rib age estimates were compared to the gross morphology age range estimates from each individual. Agreement between histology age and gross morphology age was determined by whether the histology point age estimates fell within the gross morphology age estimate ranges. Inter-observer error for each histological method was calculated.

The mean ages for the femur and rib methods were 45.7 years and 37.1 years, respectively. Results show that 2% of the femoral histology point age estimates overlap with the gross morphology age estimates, while 93% of the rib histology point age estimates overlap with the gross morphology age estimates. Inter-observer error was non-significant at $p<0.05$. Compared to the gross morphology mean age (33.7 years), both of the histology methods overaged the sample, but the rib method had a lower inaccuracy. This suggests that with current available methods, the rib is a better sampling site for UBC identification. Overall, the femur method was a poor indicator of UBC skeletal age; however, the remodeling counts of the femur show a positive trend with age ($R^2=0.51$). This suggests that although this method is not applicable to UBC age-at-death estimation, there is potential for developing new methods using the anterior femur to accurately estimate UBC age at death.

The results of this study indicate that the midshaft of the sixth rib is the most appropriate histological sampling site for UBC identification. The results also suggest that future research focusing on the anterior femur of UBC groups could prove appropriate for UBC identification if new methods are developed with appropriate demographics.



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