## A18    The Identification of Undocumented Border Crossers Along the United States-Mexico Border: A Case for Bone Histology

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After attending this presentation, attendees will understand the difficulties of identification along the United States-Mexico border and the benefit of using bone histology for age-at-death estimation on Undocumented Border Crossers (UBCs).

This presentation will impact the forensic science community by serving as a guide to improve the identification of UBCs in the growing humanitarian crisis afflicting the United States-Mexico border.

UBCs found along the United States-Mexico border present 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 exhumed from Brooks County, TX, led by Drs. Lori Baker and Krista Latham. As part of this effort, FACTS has accepted 73 UBCs from the Brooks County, TX, exhumations and from the Webb County, TX, Medical Examiner's Office. These UBCs are typically in early to late stages of decomposition and are held at the FACTS outdoor decomposition facility until they can be macerated and analyzed. While some of the UBCs have soft tissue, the majority of remains require skeletal analysis to generate the biological profile. The current ancestry estimates of the Texas UBCs, due to lack of appropriate reference data from Latin America, predominantly fall into the Hispanic category. While the Hispanic classification is useful in the identification of an unknown individual as a UBC, it does not assist in differentiating among self-identified racial/ethnic categories as in the United States, which can narrow down a list of potential matches from a missing persons' list. Therefore, a critical aspect of UBC identification is an accurate age-at-death estimate, to narrow the list of potential matches for identification.

The goal of this study is twofold: (1) to examine the protocol used for identification of UBCs at FACTS to determine if the current methods provide accurate estimates; and, (2) to ascertain if the addition of bone histology can assist in creating more accurate profiles. A case study is also presented to illustrate the need for more accurate age-at-death estimation methods for UBCs.

The remains of N=19 (10 males and 9 females) UBCs were assessed using morphological and histological methods. The morphological methods included dental development, pubic symphyseal and auricular surface morphology, and sternal ribs. Bone histomorphometry of the midshaft of the left 6th rib was analyzed using osteon population density methods.[1,2] Agreement between the gross morphology and bone histology methods were assessed by recording whether the histomorphometric age ranges overlapped with the final gross morphological age ranges.

Results show that the histomorphometric estimates for all individuals overlapped with the gross morphology ranges (19/19=100%) suggesting that the microstructural age-related changes correspond with the visible morphological changes. Since many of the UBCs are unidentified, this test of agreement is necessary to support the use of bone histology for aging UBCs. When applying the two approaches to a UBC-positive Identification (ID), the morphological methods provided an age range of 20-35 years, but failed to capture the actual age of 38 years, likely due to the lack of fusion of all skeletal elements. However, histomorphometry provided an age range of 27-57 years, with a point estimate of 39.5 years. If the morphological estimate was the sole search criteria within a missing person's database, this individual may have remained unidentified. Combining the morphology with the histology estimate allows for a complete understanding of both the micro and macro skeletal age and provides a range that encompasses the known age of the UBC.

The results of this study indicate two important factors for UBC identification: (1) applying only traditional aging methods to UBC identification can fail to accurately predict age, likely due to the low socioeconomic status of these individuals and corresponding delayed development; and, (2) incorporating bone histomorphometry of the 6th rib more accurately reflects the age-at-death of the UBCs. By changing the protocol for UBC identification, the accuracy of the age-at-death estimates can be improved, the cost in time and money for identification of UBCs can be reduced, and the number of identifications could be greatly increased.

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**References:**

1. Cho H, Stout SD, Madsen RW, Streeter MA. 2002. "Population-specific histological age-estimating method: a model for known African-American and European-American skeletal remains." *J Forensic Sci* 47(1): 12-18.
2. Stout SD, Paine RR. 1992. "Brief communication: histological age estimation using rib and clavicle." *Am J Phys Anthropol* 87(1): 111-115.

**Undocumented Border Crossers, Bone Histology, Identification**