

## A76 Impacts of Biosocial Environment on Developmental Plasticity Among Unidentified Presumed Migrant Skeletal Remains Recovered Along the United States-Mexico Border

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**Learning Overview:** After attending this presentation, attendees will better understand the variation in Vertebral Neural Canal (VNC) asymmetry in samples of presumed migrants from Texas and Arizona, as well as how it relates to potential differences in social disparities relative to region of origin.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by highlighting the utility of incorporating skeletal indicators of stress into holistic forensic casework. Additionally, this presentation will contribute to an understanding of the skeletal variation in migrant populations that developmental plasticity has the potential to influence.

Stressors experienced during an individual's lifetime (e.g., malnutrition, illness, structural violence, and epigenetic accumulations of trauma) can modify the skeleton.<sup>1</sup> Development of the VNC anteroposterior (AP) and transverse (TR) diameters begins *in-utero* and continues through adolescence, making these structures susceptible to developmental plasticity.<sup>2</sup> While an individual may experience catch-up growth with improved conditions into early adulthood, VNC AP and TR diameters will remain stable after maturation, making them ideal indicators of these earliest stress experiences.<sup>2</sup> VNC asymmetry, the degree of fluctuation in the VNC dimensions from an expected normal, allows for analysis of these stress experiences at the individual and population levels. The continuing humanitarian crisis along the United States-Mexico border demands attention for the expansion of methods employed in the identification process. While studies indicate that unidentified presumed migrants recovered in Texas are increasingly from the "Northern Triangle Countries" and fleeing political instability, gang and drug violence, presumed migrants recovered in Arizona are primarily from Central and Southern Mexico and reflect a displaced rural demographic escaping similar forms of violence.<sup>3-5</sup> The purpose of this research is to improve understanding of the impact the biosocial environment has on developmental plasticity among presumed migrants by examining VNC asymmetry, and to consider how these interactions can inform future forensic anthropological methods employed in this humanitarian crisis.

The skeletal remains assessed in this research are comprised of willed body donations of modern Americans in the Texas State Donated Skeletal Collection (TXSTDSC) ( $n=76$ ), unidentified presumed migrant forensic cases curated at the Forensic Anthropology Center at Texas State under the Operation Identification (OpID) project ( $n=104$ ), and at the Pima County Office of the Medical Examiner (PCOME) ( $n=32$ ). VNC AP and TR diameters of available thoracic and lumbar vertebrae (T1-L5) unobstructed by pathology were recorded according to Watts' method.<sup>2</sup> Demographic information was collected via self-reported questionnaires of willed body donations in the TXSTDSC, and biological profiles were completed by forensic anthropologists at OpID and the PCOME.

These measurements were stratified by sex prior to statistical analysis, and VNC AP and TR diameters were standardized by calculating sample means and individual z-scores. *T*-Tests ( $p<0.05$ ) for vertebrae (along the T1-L5 series) indicate significant difference between the VNC AP and TR diameters of females and males in each sample, yet the vertebrae that differed varied. Analysis of Variance (ANOVA) tests ( $p<0.05$ ) for the VNC AP and TR means between samples found a significant difference between them in both the VNC AP, ( $p=2.1E-13$ ) and VNC TR diameters, ( $p=4.85E-14$ ). Patterns in the spread in variation (z-scores) of the VNC AP and TR dimensions within individuals indicate differences between early childhood and adolescent growth and stress between the samples.

Differences in developmental disruption of the VNC AP and TR diameters among unidentified presumed migrants and modern Americans indicate different early life stress experiences. These processes may inform forensic anthropological methods employed to estimate the biological profile and may indicate an additional avenue to improve population-specific identification methods for the humanitarian crisis along the United States-Mexico border, and beyond. Improved understanding of these skeletal indicators of inequality also hold potential to help the living by providing evidence of the biological repercussions of social disparity and the various forms of violence that migrants seek to escape.

### Reference(s):

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### Unidentified Migrants, Vertebral Neural Canal, Developmental Plasticity