A23 Odontometric Variation of Male Skeletal Samples From the United States and South Africa

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Learning Overview: After attending this presentation, attendees will better understand population variation in tooth size and how odontometrics can be used as part of the biological profile.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by highlighting tooth size variation across continents and its relevance to forensic anthropology.

The utility of dental crown measurements in the estimation of ancestry has proven to be a promising approach.[1] However, more work is needed to explore global modern human variation in terms of tooth size to better understand secular change and the role of evolutionary forces (i.e., gene flow and drift). To address this deficiency in knowledge, this study compares odontometric data from modern skeletal collections representing self-identified Black and White individuals in the United States and South Africa.

The South African samples were obtained from three collections: the University of Pretoria, the Raymond A. Dart collection, and the Kristen collection. Dental data from the United States were collected from the Bass Collection at the University of Tennessee, Knoxville, and the donated collection at Texas State University, San Marcos. Only individuals with known sex and ancestry were included; due to sample size constraints, only male individuals were included in this study (n=397). Maximum crown dimensions and cervical crown dimensions were collected following Hillson et al.[2] Dental measurements were collected from the left side of the arcade using digital dental calipers. In cases of missing or damaged teeth, the right antimere was substituted. Population differences were explored using a Kruskal-Wallis test in the R statistical computing environment.

Dental measurements between South African Blacks and American Blacks differed significantly in nearly every maximum crown dimension. Differences in mesiodistal crown measurements were most pronounced, being present in all teeth except the upper and lower lateral incisors. Differences were less pronounced in measurements of the crown at the cervico-enamel junction. Overall, American Black dental dimensions were greater than those of South African Blacks. When comparing South African and American Whites, only two significant differences were present: in the buccolingual cervical measurement of the lower second molar (larger in American Whites) and in the mesiodistal cervical measurement of lower third molar (larger in South African Whites).

The results of this study suggest that American and South African Blacks differ considerably in their dental dimensions. These findings are consistent with the notion that American Blacks have been subject to considerable gene flow and may stem from a different source population in west Africa. These results are further in line with the finding that there is generally greater diversity within the African continent than the rest of the world. Conversely, the South African and United States White samples do not greatly differ and have on average smaller teeth, suggesting greater population affinity between these groups and less change over time. The impact of evolutionary forces and secular change on tooth size should be further explored and considered in ancestry estimation methods, particularly in the development of appropriate reference samples.

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Reference(s):

1. Pilloud, M.A., Hefner, J.T., Hanihara, T., and Hayashi, A. (2014). The Use of Tooth Crown Measurements in the Assessment of Ancestry. *Journal of Forensic Sciences* 59 (6):1493-1501.
2. Hillson, S., FitzGerald, C., and Flinn, H. (2005). Alternative Dental Measurements: Proposals and Relationships with Other Measurements. *American Journal of Physical Anthropology* 126 (4): 413-426.

Ancestry, Gene Flow, Tooth Size

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