



A29 Age Estimation on Two Mediterranean Populations Using Rib Histomorphology

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Learning Overview: After attending this presentation, attendees will better understand histological methods, both protocols and anthropological applications. A discussion on bone remodeling and its use for estimating age at death will provide a comprehensive understanding of bone at the histological level.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a deeper understanding of the microscopic approach, which is not a common practice but is the only option for the identification of fragmented remains.

One of the crucial steps for the creation of the biological profile of an individual is the estimation of age at death. The choice of the method depends on the nature of the remains, the equipment available and the expertise of the forensic anthropologist, among others. In cases of very fragmented remains, microscopic methods remain one of the only approaches that can be applied. This study presents the results obtained from a histological analysis of rib thin-sections from two Mediterranean populations.

The sample consists of 88 standard ribs from two Modern samples (Cretan and Greek-Cypriot Collections, N=88, Mean age=60, SD=17.90). The costal elements were processed histologically according to standard protocols. Thirteen variables (both qualitative and quantitative parameters) were assessed. Technical Error Measurement (TEM) analysis was performed to test the repeatability of the histological parameters. A validation study was performed by applying four existing microscopic methods to verify whether a formula is required for the sample at hand. The correlation between the variables and age was examined through different statistical approaches. The results were used for the generation of linear models using the whole sample and the sample divided by sexes and populations.

Intra- and inter-observer errors demonstrated that the variables presented different levels of agreement. Three out of four of the methods exhibited a systematic underestimation of the individuals producing high error rates. Most of the variables demonstrated a significant correlation with age and some differences were observed between sexes and samples (Cretans and Greek-Cypriots). A total of 41 models were generated and 12 were selected as the most accurate with a standard error of the estimate ranging from 12 to 8 years. A comparison between the Mediterranean samples and other populations exhibited different patterns on bone remodeling, with the Cretan sample having the lowest Osteon Population Density (OPD) among others.

This research demonstrates the use of quantitative histology for the estimation of age at death, producing accuracy rates similar to those provided by macroscopic methods. The poor results obtained by the existing histological formulas confirmed the need for a population-specific equation for Cretans and Cypriots. Possible intrinsic and extrinsic factors may be the cause of the observed inter-population variation, with differences in nutrition and genetics being considered as the potential causes. Thus, interesting patterns on remodeling rates provided a new insight on bone histological parameters for the sample under study.

Bone Histology, Age Estimation, Mediterranean Populations