

ESTIMATION OF AGE AT DEATH FROM THE MICROSCOPIC APPEARANCE OF THE FRONTAL BONE

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The variability in the microstructure of bone is influenced by many factors, including age. The goal of this study is to examine variation due to age, sex, hyperostosis frontalis interna (HFI), side, orientation, and sample source on the microscopic appearance of the external table of the frontal bone. Frontal bone cores were extracted from a sample of 92 European-American cadavers of known ages at death. One section per bone core was examined microscopically and measurements were taken for a total area of the external table of this section. Measurements included a mix of fourteen dependent subvariables that were used to describe external table thickness, relative and absolute osteon density, osteon size, and Haversian canal size. The effects of the independent variables on these fourteen dependent subvariables were examined statistically using Pearson's correlation and ANCOVA. Age significantly affected osteon size, osteon density, and external table thickness. Side (left or right) affected osteon size while sex affected osteon density and external table thickness. The other independent variables had no significant effect on the subvariables.

Since systematic variation with age was found, age-prediction equations were developed using least-squares linear regression. External table thickness and osteon population density produced a regression line with the lowest amount of prediction error for the entire sample. Sex-specific age equations were also developed. The equation developed for females performed better than the sex-pooled equation. A sex-specific age-predictive equation was also developed for males, however, the calculated errors were less for the sex-pooled equations when used on males.

The degree to which the histological structure of the frontal bone is affected by age is much less than that of other skeletal elements. As a result, the ability to predict age from the external table of the frontal bone is not as good compared to other skeletal elements. However, in cases where the only bone available for analysis for an unknown individual is a fragmented frontal bone and no other age estimation method could be utilized, histological methods would be useful.

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