



Physical Anthropology Section - 2012

H7 I'd Give My Eye Teeth for Cementum Increment Analysis

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After attending this presentation, attendees will gain an understanding of how dental cementum is deposited and how it is used to determine age and season at death in humans. Specific to this talk will be a discussion of which tooth to choose for dental cementum increment analysis for season at death.

This presentation will impact the forensic science community by marking one step in preparing a new method for use throughout anthropological and odontological forensics.

Zooarchaeologists have long used dental cementum increment analysis to estimate the season at death in mammals, yet testing the validity of using this method to determine season at death in human teeth is very limited and still on-going.^{1,2} Cementum is the tissue that binds the tooth to the periodontal ligament, and in the interest of teeth being retained throughout adulthood, cementum is deposited throughout the course of life. From seminal zooarchaeological pieces, it was learned that cementum is secreted in pairs of bands each year. Pilot work by Wedel demonstrated that the seasonal transitions of the outermost cementum band in humans change from translucent to opaque in teeth extracted in fall/winter (October - March), and from opaque to translucent in teeth extracted in spring/summer (April - September).³ Counting these pairs of bands and adding that number to the age at which the tooth erupts derives an age at death estimate. This study focuses on distinguishing the outermost increment in transverse thin sections of the middle third of the root by using transmitted polarized light microscopy.

Wedel³ took Lieberman⁴ and Wittwer-Backofen⁵ at their word, namely that “any tooth will work.” However, neither paper demonstrated the veracity of this statement by supporting it with data; they simply used all four types of teeth (incisor, canine, premolar, molar). All adult teeth that are erupted and in occlusion do exhibit increments (Wedel)³, but here is no consensus on which adult tooth derives the most repeatable and reliable results. Pinichi et al. tested the different types of teeth in predicting age and showed that premolars and third molars have the highest prediction efficiency.⁶ Kagerer and Grupe’s study supported the use of impacted third molars having very reliable precision in age determination.⁷ On the other hand, they showed that premolars have one of the highest standards of deviation when cementum increment analysis was used to determine chronological age. Moreover, very few studies are testing the use of the outermost band of cementum to determine the season-at-death in humans. Recent studies using this method have focused on animals. Wall-Scheffler and Foley tested the use of dental cementum on first molars of sheep without justifying their research subject choice.⁸

This study seeks to test the hypothesis that the cementum bands transition from light to dark on multiple teeth from the same patient at the same time, and while examining 10 teeth from any one individual, determine whether one tooth type or another is most useful for determining season at death in humans. Two sample pools containing a total of 300 samples were included in the study. Sample pool #1 contains teeth donated by the patients from a school of dentistry. Ten individuals who each had 10 teeth extracted in the normal course of dental treatment were embedded, sectioned, ground and polished, and examined under 10X magnification. Of these 100 teeth, 94 valid specimens resulted. The most precise results, where season observed matched actual season at extraction (our proxy for season-at-death) were obtained from the canines (eye teeth, cuspids). Sample pool #2 contains teeth donated by patients from a Santa Cruz doctor’s office and are being evaluated at present. The data will be presented side by side.

References:

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