



### F5 Third Molar Development as an Estimator of Chronological Age in American Blacks and Whites

Jane A. Blankenship, DDS\*, Kenneth M. Anderson, DDS, Marjorie A. Woods, DDS, Eddie L. Burton, DDS, Harry H. Mincer, DDS, PhD, and Edward F. Harris, PhD, University of Tennessee College of Dentistry, 875 Union Avenue, Memphis, TN 38163

After attending this presentation, attendees will be able to assess the value of age determination based on third molar development in African Americans. This presentation will impact the forensic community by assisting in assessing the value of third molar development in age determination in African Americans.

The goal of this presentation is to describe the chronology of third molar (M3) development in an African American sample and to discuss its application as a method of forensic age determination during late adolescence and early adulthood. The tempo of M3 development in blacks (n = 635) is contrasted against a sample of American whites (n = 550). The information will assist the forensic community in assessing the value of third molar development in age determination in this ethnic group.

Stages of third molar development as depicted on dental radiographs from African American dental patients in Memphis, Tennessee, and inmates in an Arkansas state penal facility of known age and gender were used for the study. Identification of ethnicity was made according to demographic information in the patients' records. The age range was limited to between 14 and 24 years. Each M3 was scored for its stage of development using the eight-grade scheme developed by Demirjian (stages A through H, with H denoting complete root formation). Every interpretable third molar was scored, and descriptive statistics were generated for each developmental stage by race and sex. Race and sex differences were assessed using probit analysis, specifically the parametric proportional hazards model. Also evaluated for each stage was the probability of whether an individual was at least 18 years of age, which is an "adult" in most legal jurisdictions.

Within the age range studied, only M3 stages D through H were represented. When both teeth were present, left and right third maxillary molars were at synchronous stages in 91% of cases, and mandibular third molars in 83% of cases. In these African Americans, maxillary M3 development was slightly advanced over mandibular M3 development. Blackwhite differences are substantial and highly significant in this study, with each developmental stage occurring in blacks a year or so ahead of whites. Of note, however, sex differences in M3 development vary significantly, both with increasing age and between blacks and whites, so age estimation depends considerably on knowing the race, sex, and stage of M3 development.

The empirical likelihood that an individual is at least 18 years old is 91% for African American males with fully developed third molars (stage H). This likelihood for an African American female is 79%. Corresponding risks for American whites are 85% and 92%.

As with studies of other populations, determination of chronological age of African Americans by assessing M3 development radiographically seems to be an inaccurate exercise because of the substantial ranges of variation. Rather than discrete age groupings, we found that examples of M3 grades D, E, F, G, and H occurred for each group (blacks, whites, males, females) throughout the 14-to-24 age range. While there are highly significant modal differences, the age ranges of each grade overlap considerably.

This study indicates that third molar development is not particularly useful for forensic estimation of chronological age in adolescents or young adults of African descent or, more specifically, in differentiating whether an individual is legally an adult. The ethnic make-up, the sex, and the stage of M3 development significantly affect the likelihood of a person being an "adult," even discounting the observed ranges of variability within each M3 stage.

#### Age Determination, Third Molars, African Americans