## F26 Reliability of Dental Age Determination Using Demirjian's Technique on a South Texas Hispanic Population

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Refinement in age determination is proposed by extending the Demirjian's Technique to a South Texas Hispanic population. In this way, accuracy of this technique is tested and extended beyond the statistical Caucasian sample.

Age determination is important in various situations. Organizations such as law enforcement, immigration services, and school districts routinely request verification of age for proper placement. Alternative methods must be explored when an authentic birth certificate is unavailable. The methodology for determining accurate age has evolved over the years from gross estimates such as fontanel and long bone epiphyseal plate closure, to the more accurate third molar schematic method described by Demirjian and Mincer. It is generally accepted among the forensic literature that for sub adults, dental age estimation is a more reliable estimate of chronological age than bone age evaluation. Age determination is routinely used by the INS to determine correct placement of detainees. Professionals who assist in this process are protecting the rights of both juveniles and adults.

Six hundred panoramic radiographs were selected from Cameron County, TX. The panoramic films were obtained from the Brownsville Community Health Center and several local dentists in Cameron County who provide care to patients in the lower socioeconomic strata. Brownsville, TX, is comprised of a 91.2% Hispanic population with the majority being of Mexican American decent. Brownsville Community Health Center is located about one mile from the Texas-Mexico Border and surrounded by "colonias." Many poor Hispanics, particularly new arrivals from Mexico and Central America live in the county's numerous colonias, or shantytowns, a sizable number of them without electricity or running water. Cameron County is 84.3% Hispanic of which 66.8% are classified as Mexican American. The actual percentage may be higher than this census figure, since the census does not record migrant farm workers, undocumented workers, and refugees. Poverty status is 36.5% in families with children under 18 years of age. The individual poverty rate for children under 18 years of age is 43.1%. Cameron County is one of the poorest counties in the U.S.

The subjects ranged in age from 14-22 years old. The age of each subject was verified using either NHIC – Medicaid documentation and/or by parental verification. The ethnicity was verified by documentation, surname and/or parental verification. The community has strong ties to Mexico with frequent crossover to shop, receive medical care and visit relatives. This population is similar to INS detainee from Latin America in appearance and socioeconomic make-up.

The panoramic images were scanned using a HP Scan jet 7400c at 200-600 dpi. The scanned images utilized an 8 bit grayscale that included 256 shades of gray. The computer was a Dell Inspiron 2650 Intel Pentium 4. The image were scanned into Adobe Photoshop 7.0 and the contrast and histogram where adjusted to create correct balance. All panoramic radiographs were oriented correctly and labeled (R) to reduce operator error. The images were saved in a Tiff format and saved to a CD-R for independent viewing by six examiners. Initially each examiner viewed one hundred images. The data was entered into the UT-AGE Program, which utilizes the data from 1993, H. Mincer study. The researcher then tabulated inter-examiner reliability and intraexaminer reliability by providing each examiner with one hundred additional panoramic radiographs. The second set of one hundred panoramic radiographs was comprised of eighty images previously scored by the other five examiners and twenty previously scored images by the same examiner. Each examiner reviewed a total of two hundred images.

To test accuracy, the researcher then compared the known age of the subject to the average mean age of the individual stages of tooth development. To further answer the medico legal question of likelihood of classification either as a juvenile or adult, the mean age and the standard deviation at each stage of Demirjian schematic were used to calculate the empirical likelihood of having reached his/her 18th birthday.

Although still only accurate by +/- 4.8 years when using 2 standard deviations, the technique has shown validity when cross population samples are rendered. In this study, the statistical data of the patient sample was compared to the research conducted by H. Mincer and A. Solari. The results demonstrate a close correlation; however, there are significant differences described in the current research.

Cross validation is established when the research tool that applies in one population also is valid in another population. Standardization of age determination among various cultures improves reliability and accuracy that increases validity of this method of age determination. In the present research, statistical data of a known population correlated with the determination of an unknown population. In 2000, G. Willems, DDS, PhD, created new scores to more accurately estimate dental age of a Belgian Caucasian sample. In 2001, Solari, DDS, MPH, used 679 panoramic radiographs to evaluate age determination accuracy in a Hispanic population in Houston, TX. The present study further expands the sample size to include low-income Hispanic populations. Ultimately, a sample size for each region and/or each ethnic group will create

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a more reliable method to determine the estimated age of a subject whose age is in question. Additional studies are needed for Caucasoid sub-groups, Negroid sub-groups, and for other Mongoloid sub-groups

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