



## Physical Anthropology Section – 2008

### H70 Testing the Demirjian Method and the International Demirjian Method on an Urban American Sample

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After attending this presentation, attendees will understand how to use the Demirjian<sup>[1]</sup> dental aging method for subadults and the international Demirjian<sup>[2]</sup> dental aging method for subadults, as well as, understanding the validity of using the Demirjian method in America.

This presentation will impact the forensic community by widely introducing a validated subadult dental aging method for the biological profile that works when ancestry is unknown. It will also highlight a subadult aging method that is commonly used by forensic anthropologists in Europe,<sup>[3]</sup> but that is not well known in the United States. Hopefully, this will lead to more integration of forensic anthropology techniques in the future.

It is important to start testing the validity of the methods commonly used in forensic anthropology and begin to quantify their effectiveness. The Demirjian method<sup>[1]</sup> of subadult aging was based on a French-Canadian sample and the international Demirjian method<sup>[2]</sup> of subadult aging was developed using a sample composed of Australians, Belgians, English, Finns, French, French-Canadians, South Koreans, and Swedes. The international Demirjian method<sup>[2]</sup> was created for instances when ancestry was unknown. The international Demirjian method was also examined in this study to see if it was appropriate for the USA. The aim of this study was to test the applicability of the both the Demirjian method and international Demirjian method for estimating chronological age from dental age in a sample of multiple ancestry subadults from Detroit, Michigan.

Digital panoramic dental radiographs of 104 males and 96 females of known age and sex between the ages of 6 and 12 years were collected from the University of Detroit Mercy Dental School. Thirteen individuals were excluded from the final study due to pathology. Ancestry was not controlled for and was only provided in 90 individuals' case files. Even with limited recording, it is clear that the sample is very diverse, being made up of individuals of European, African, Latino, Middle Eastern, and Asian ancestry.

The dental age was determined for all cases using both the Demirjian and international Demirjian methods. The total sample and the sample divided by age category was statistically analyzed to determine if the methods are applicable in the USA. Age categories were defined as young (6, 7, and 8-year-olds), middle (9 and 10-year-olds), and old (11 and 12-year-olds). Paired t-tests were run to determine if the means of the chronological ages (CA) differed significantly from the dental ages (DA) for each method in the study. Significance was determined at the .01 significance level. If there was no significant statistical difference between mean CA and mean DA, the method reliably estimates age.

The results for the Demirjian method using the total sample showed that there was slight over aging of the sample as a whole, but that there was no statistically significant difference between chronological age and dental age. The result for the international Demirjian Method showed slight under aging of the sample and a significant difference between the means at the .01 significance level.

Paired t-tests used on all three categories revealed a statistical difference between CA and DA using the Demirjian method in the young category, but not the middle or old categories. Paired t-test for the international Demirjian method had the opposite results with the young category, having no significant difference between CA and DA and a significant difference in the middle and old category.

The results showed that the Demirjian method had no statistical difference between CA and DA for the total sample and could be used in America even when ancestry was not known. The method was the most appropriate in the middle and old age categories, but the international Demirjian method was more appropriate for the young category at the .01 significance level.

#### References:

- 1 Demirjian A. 1986. Dentition, 2nd edition. In: Falkner F and Tanner JM, editors. Human growth: A comprehensive treatise. New York: Plenum Press; 269-298.
- 2 Chaillet N, Willems G, and Demirjian A. 2004c. Dental maturity in Belgian children using Demirjian's method and polynomial functions: New standard curves for forensic and clinical use. *J Forensic Odontostomatol* 22(2):18-27.
- 3 Teivens A, Mörnstad H. 2001a. A comparison between dental maturity rate in the Swedish and Korean populations using a modified Demirjian method. *J Forensic Odontostomatol* 19(2):31-35.

#### Subadult Aging, Dental Radiographs, Biological Profile