

Root Canal Width (RCW) patter of permanent molars: a reliable Mandibular Maturity Marker (MMM) to determine a subject's status at the 18-year threshold

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ABSTRACT

Introduction: The narrowing of the root canals of the permanent molars during normal growth follows an age-related pattern. 2,000 subjects to provided a Reference Data Set for UK Caucasians.¹ There is a gradient with the distal root canal of LL8 being wider than the distal root canal of LL7 which in turn is wider than the distal root canal of LL6 (FDI nomenclature 38, 37, & 36).

Materials and Methods: DAE legal cases from 2005 to 2015 were re-examined. RCW assessment was used to assign subjects above or below the 18-year threshold, as follows:

1. Presence of Demirjian Stage H for LL8 (FDI 38). If the LL8 was absent the LR8 was used as an alternate.
2. Then, RCW was assessed using the specified criteria¹

Results: From the total of 410 forensic age assessments there were 182 subjects with tooth 38 (or 48), at Stage H. The following probabilities were derived for both genders.

The probabilities of a subject being over 18 years using RCW are shown in the table. For both females and males subjects with RCW-C is 100%. For RCW in males the probability for RCW-B and RCW-C is 100% for the subject being over 18 years.

Discussion: The presence of RCW - C (in females) and RCW - C or D in males is a clear indicator that the subject is over 18 years old. For RCW - A and RCW - B in females and RCW - A in males there is a small chance that the subject is under 18 years old. The MMM are limited to subjects for whom the LL8 (or LR8) in Demirjian Stage H is present on the Dental Panoramic Tomograph.

Conclusion: The presence of RCW - C in females and RCW - C or RCW - D for males indicates a 100% probability that the subjects exhibiting this feature are over 18 years old.

Females	(years)	sd	p > 18 years	%-age > 18 years	%-age < 18 years	n - tds for RCW Legal Cases in females
RCW - Af	21.30	2.09	953	95.3	4.7	8
RCW - Bf	21.93	2.24	980	98.0	2.0	12
RCW - Cf	23.62	1.60	1.000	100.0	0	4
Males	(years)	sd	p > 18 years	%-age > 18 years	%-age < 18 years	n - tds for RCW Legal Cases in males
RCW - Am	20.03	2.07	962	96.2	3.8	42
RCW - Bm	21.82	2.13	1.000	100.0	0	95
RCW - Cm	23.17	1.91	1.000	100.0	0	21

References

1. Roberts GJ, Lucas VS, Andiappan M, McDonald F. Dental Age Estimation: Pattern Recognition of Root Canal Widths of Mandibular Molars. A Novel Mandibular Maturity Marker at the 18-Year Threshold. Journal of Forensic Science 2016; Dec 1st. doi: 10.1111/1556-4029.13287.
2. www.dentalage.co.uk see section Reference Data Sets.