



## G5 Dental Age Estimation: Root Pulp Visibility (RPV) and Periodontal Ligament Visibility (PLV) at the 18-Year Threshold

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After attending this presentation, attendees will establish more effective use of a single Dental Panoramic Tomography (DPT) for age assignment of individuals either below or above the 18-year threshold.

This presentation will impact the forensic science community by the use of both RPV and PLV as additional methods to improve the accuracy of age assignment at the 18-year threshold.

**Introduction:** A balanced DPT sample of 1,000 females and 1,000 males in the 16.00 year-25.99 year age range was used to assess the 18-year threshold using the eight-stage tooth development scheme devised by the Anglo-Canadian research team.<sup>1</sup> The results demonstrated that approximately 50% of females and males in the age range of 17 years-19 years may be incorrectly assessed as either less than or more than 18 years of age.<sup>2</sup> It is ethically and socially unacceptable for individuals to be treated as adults when they are younger than 18 years of age. Therefore, it was proposed that better analysis of a single DPT might overcome this problem.

**Materials and Methods:** A modification of the four-stage method described by Olze et al. was used to assess RPV and PLV for LL8 exhibiting Stage H.<sup>3,4</sup> The data were censored at 21.64 years (males) and 22.79 years (females). Inter-rater agreement was achieved for both RPV and PLV.

**Results:** The inter-examiner Kappa scores for RPV and PLV were 0.9637 and 0.9391, respectively. For males and females, the numbers of 3<sup>rd</sup> molars at Stage H used in the analysis, after censoring, were 205 and 266, respectively. The presence of 3<sup>rd</sup> molars at Stage H with RPV-4 and PLV-4 in both males and females is a strong indicator that the individual is at least 18 years old.

<b>Root Pulp and Periodontal Ligament Visibility: LL8, Stage H, Censored Data</b>				
	<b>Males</b>		<b>Females</b>	
	n	Min (years)	n	Min (years)
RPV-1 100% visible	9	17.87	8	16.33
RPV-2 75%-50% visible	85	17.62	138	17.34
RPV-3 25%-50% visible	93	17.16	106	17.50
RPV-4 0% visible	18	18.67	14	18.58
PLV-1 100% visible	9	17.87	8	16.33
PLV-2 50%-75% visible	85	17.62	138	17.34
PLV-3 25%-50% visible	93	17.16	106	17.50
PLV-4 0% visible	18	18.67	14	18.58

**Conclusions:** The use of both RPV and PLV in LL8H for males and females is an important development in age estimation for individuals with no known birth date or birth records. Using these human biological growth markers should prevent individuals younger than 18 years of age from being treated as adults.

**Reference(s):**

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2. Lucas V.S., McDonald F., Roberts G.J. Dental age estimation at the 18 year threshold a road test. Proceedings of the American Academy of Forensic Sciences, 66th Annual Scientific Meeting, Seattle, WA. 2014.
3. Olze A., Solheim T., Schultz R., Kupfer M., Schmeling A. Evaluation of the radiographic visibility of the root pulp in the lower third molars for the purpose of forensic age estimation in living individuals. *International Journal of Legal Medicine*. 2010. 124: 183-186.
4. Olze A., Solheim T., Schultz R., Kupfer M., Pfeiffer H., Schmeling A. Assessment of the radiographic visibility of the periodontal ligament in the lower third molars for the purpose of forensic age estimation in living individuals. *International Journal of Legal Medicine*. 2010. 124: 445-448.

**18-Year Threshold, Pulp, Periodontal**