

# Dental age estimation *in vitro* using extracted third molars, pre-surgical panoramic radiographs and CBCT scans

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## ABSTRACT

Dental age estimation is an anthropological procedure performed in Forensic Odontology to reconstruct a biological profile of unknown dead bodies. Most of the methods for dental age estimation rely on bidimensional (2D) information of dental development, more specifically via panoramic radiographs. However, contemporary three-dimensional (3D) imaging, such as cone-beam computed tomography (CBCT) became available in the last decades enabling a more reliable analysis of dental morphology and development. The present study aims to validate third molar (3M) developmental stages between extracted 3M, and their registrations on panoramic radiographs (2D) and their CBCT (3D) scans respectively. The sample consisted of 226 subjects, from which pre-surgical panoramic radiographs (n=226) and CBCT scans (n=100) were obtained. The panoramic radiographs were acquired with the Orthopantomograph OC200 D® (Instrumentarium Dental®, Tuusula, Finland) device with 66KVp and 9.9mAs, and time of exposure of 14.1 seconds. The CBCT scans were acquired with the iCAT Next Generation® (Imaging Sciences international®, Hatfield, EUA) device with 120KVp and 37.7mAs, field of view (FOV) of 16x13cm, resolution of 0.25 Voxel, and time of exposure of 37.7 seconds. These subjects underwent 3M extraction (n=402: 119 upper right, 117 upper left, 84 lower left, 82 lower right) for therapeutic reasons. Retrospectively, the extracted 3M were collected from the Dental Biobank of the Federal University of Paraná. The 3M registered in radiographs and CBCT, as well the 3M *in vitro*, were staged according the technique of Gleiser & Hunt (1955) modified by Kohler (1994). Associations between the 3M staged in panoramic radiographs, CBCT and *in vitro* will be analyzed statistically for inferences on the validity of this staging technique in 3D environments. The hypothesis that 3M stages registered on 2D and 3D medical images are in correspondence with their clinically observed developmental status will be tested.