

Testing the presence of sexual dimorphism in radicular dentine thickness and topographic distribution in modern human upper permanent canines

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Sexual dimorphism has been revealed in the permanent canines of modern humans, with males showing larger crowns than females. The study of tissue proportions also showed absolutely and relatively greater volumes of coronal dentine in males, whereas a greater proportion of the crown is constituted by enamel in females. Differences in physiological and genetic control of tooth development could explain this sexual dimorphism. The aim of the present study is to test whether the pattern of sexual dimorphism seen in coronal dentine can be extended to the radicular dentine of upper permanent canines, both in its absolute and relative proportions but also in its local topographic variation. Absolute and relative volumetric variables expressing tissue proportions were measured on a microtomographic record of 50 upper permanent canines (voxel size ranging from 18 to 51 μm) of 30 males and 20 females from two South African contemporary identified osteological collections and two French medieval cemeteries. To assess the distribution of radicular dentine thickness, we virtually unrolled a region of interest comprised between 50% and 90% of the total root length (0% being at the apex of the root, and 100% at the cervix) by applying a new R package, morphomap, for two- and three-dimensional morphometric mapping. Results from the Wilcoxon rank tests show that males and females statistically differ ($p\text{-value} < 0.05$) in their absolute volumes of radicular dentine at the level 50-90%, whereas no statistical difference is observed when the volume of dentine is calculated relative to the pulp cavity. The standard Principal Component Analysis based on the 2D morphometric maps of dentine thickness shows a complete overlap between males and females, indicating similar patterns of dentine distribution along the root in both sexes.