

## Scanning electron microscopic investigation of dentinal tubules in monkey dentin

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The dentin is a mineralized tissue that surrounds the dental pulp and the odontoblasts processes. On average, the dentin contains approximately 50% of mineral volume (hydroxyapatite crystals), 30% of organic components (mostly type I collagen), and 20% of fluid. The main dentin feature is the presence of dentinal tubules, which are the responsible for the dentin permeability. The dentinal tubules allow a direct communication between the dentin and the pulp, and as a result of this pathway, various therapeutic agents may affect the pulp if they are directly applied to the exposed dentin. The rate of transport and subsequent effect of such agents depend on the number and size of the dentinal tubules. The material consisted of 8 canines with completed root development from adult animals. Two skulls of adult *Cebus apella* were obtained from the postmortem room of the Institute of Research Evandro Chagas (Pará, Belém, Brazil). The extracted teeth were immediately stored in distilled water. Within 24 hours after extraction, the teeth were sectioned at the cementum-enamel junction with a high-speed hand-piece. The crowns were discarded and the roots were fractured mesiodistally. Each specimen was placed in an ultrasonic with 0.5% sodium hypochlorite for 5 minutes to remove soft tissue debris. Next, the specimens were placed into a vacuum and the surface was gold sputter-coated. With the use of a scanning electron microscope, the dentin of each specimen was examined in three areas of the root structure (apical, middle and cervical third). A magnification of 3000 was used to facilitate the counting of dentinal tubules and to help differentiate tubules from artifacts. The number of tubules was calculated according to the following formula:  $X = 1.000.000 \times n / (l / i)^2$ , Where: X = number of tubules/mm<sup>2</sup>, n = number of tubules on the picture, l = length of side of picture(im) and i = magnification. Photomicrographs were taken of each examined surface and the diameter of the tubules was also measured on the pictures. Only the tubules that showed an almost circular lumen were selected. The present study calculations, obtained from the measure of the dentinal tubules number, revealed that the average number of the dentinal tubules for each of the three locations was the following: apical root dentin, 74.800 tubules/mm<sup>2</sup>; mid-root dentin, 90.000 tubules/mm<sup>2</sup>; cervical root dentin, 91.600 tubules/mm<sup>2</sup>. Concerning to the tubular diameter, the average number one each location was the following: apical root dentin, 4.30 μm; mid-root dentin, 4.37 μm; cervical root dentin, 5.23 μm. The dentinal tubules of the investigated species dentin do not differ much from the human dentin. These results suggest that the *Cebus apella* teeth are a suitable substitute for human teeth in endodontics studies. Further studies are required to clarify this animal.

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