ZONULA ADHERENS AS A TRANSMITTER OF LOW CHARGE ELECTRIC CURRENT

HANNA M. ALwas-DANOWSKA
Department of Pre-Clinical Dentistry and Dental Diagnosis, Medical University of Łódź, Pomorska 251, 92-216 Łódź, Poland

During embryonic development, the odontoblast participate in the formation of the dentin. They probably take part in the nutrition and regeneration of the dentin, and are probably involved in the process of perception and conduction of pain stimuli from the tooth during stomatological procedures. The precise recognition of the structures connecting the enamel through the dentine with the dental pulp is a major aspect of dental science. Elucidating it would give us a better understanding of many physiological processes. The aim of this study is to reveal the structures responsible for the conduction of pain-sensitive impulses with regards to zonulae adherens after treatment with low charges of electric current. For the experiment, freshly extracted (for orthodontic reasons) teeth were used. Immediately after extraction (with the use of local anaesthesia), low charges of electric current were passed through the teeth. They were fixed in 2% glutaraldehyde in a cacodylate buffer, then cut, and their pulps were fixed in 2% glutaraldehyde in a cacodylate buffer, and then in 1% osmium tetroxide. After that, they were dehydrated and embedded in epoxy resin (EPON 812 with DDSA and MNA) for electron microscopic studies. Hemithin sections were made using a Tesla BS 480 ultramicrotome and stained with buffered 1% toluidine blue. Ultrathin sections were cut using an MTI ultramicrotome, and contrasted with uranyl acetate and lead citrate. They were examined and photographed using a JEOL electron microscope. The results were compared to the pictures of extracted teeth not treated with current but otherwise prepared as the experimental teeth had been. In the electron microscopic pictures, the zonulae adherens are visible on the surfaces of the cells (between the odontoblasts or between the odontoblasts and the neural fibres) as short callosities of plasmolemma. Such connections cause the so-called junctional transmission (the free ionic flow between cells – electric synapses). The results of the investigations indicate the presence of the junctions which we previously observed using a scanning electron microscope.

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