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INVOLVEMENT OF ORGANIC ANION TRANSPORTERS IN NON-ENDOCYTOTIC UPTAKE OF AMELOGENINS DURING HUMAN TOOTH DEVELOPMENT

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The organic anion transporter family is known to play an important role in the elimination of a variety of endogenous and exogenous substances from the body. A recent study on rat teeth indicated the existence of organic anion transporters (OATs) 1, 2 & 3 in the ameloblasts and other cells of the enamel organ in both secretory and maturation stages of amelogenesis, and suggested possible involvement of some OATs in non-endocytotic re-absorption of degraded enamel matrix proteins.

The aim of the study was to elucidate localization of OATs (1, 2 & 3) in developing human tooth germs. Formalin-fixed human deciduous tooth germs of stillborn (02) and aborted foetuses (05) obtained from the Teaching Hospitals of Peradeniya, Kandy and Anuradapura were decalcified with EDTA and embedded in paraffin. Deparaffinized sections were processed for immunohistochemical localization of OATs (1, 2 & 3) and some enamel matrix proteins after antigen retrieval with citrate buffer.

The tooth germs examined in this study were in early stages of crown formation (Late bellstage) where enamel matrix synthesis and deposition by secretory ameloblasts were in progress. Distinct immunoreactions for OAT2 were shown to be located exclusively along the distal cell membranes of secretory ameloblasts where Tomes' processes were developed. OAT3 was strongly positive in distal membranes but also moderately positive along the lateral membranes of secretory ameloblasts. In addition to cell membrane, weak immunoreactions for OAT3 were noted in some vesicular structures in the cytoplasm of secretory ameloblasts. However, immunoreactions for OAT1 were not observed in the observed tooth germs. Many of the OAT-positive ameloblasts showed significant immunoreactions for amelogenin in the cytosol. However, cytosolic immunoreactions were not depicted with the antibodies against ameloblastin or enamelin.

The data indicated existence of OATs 2 and 3 in the distal/lateral cell membranes of secretory ameloblasts of human tooth germs and suggested possible involvement of OATs 2 and 3 in cytosolic translocation of degraded amelogenin fragments and thus removal of enamel matrix proteins by secretory ameloblasts.

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