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Expression of cytokeratin 8, vimentin, syndecan-1 and ki-67 during human tooth development

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Development of the human tooth is very complex and includes basic cellular processes such as proliferation, differentiation and apoptosis, which occur simultaneously throughout the odontogenesis. In spite of numerous investigations on experimental animals, studies on human tooth development a scarce. In this study, expression patterns of simple epithelia marker cytokeratin 8 (CK8), mesenchymal marker vimentin, transmembrane protein syndecan-1 and proliferation marker Ki-67 were analyzed in histological sections of ten human incisors and canine tooth germs between the 7th (early bud) and 20th (late bell stage) developmental weeks, using immunhistochemistry and double immunofluorescence techniques. At early stages, CK8 was moderately expressed in the epithelial tooth parts, while it was absent or mild in its mesenchymal parts. During further development, CK8 expression increased to strong in preameloblasts, while vimentin was strongly expressed in some cells of dental lamina and at the forefront of enamel organ's ingrowth into the underlying dental papilla. Increased co-expression of both intermediate filaments characterized differentiating preameloblasts and preodontoblasts, matching the onset of proliferation and the processes of cell differentiation and mesenchymal-to-epithelial transition. Syndecan-1 showed characteristic shift of expression from epithelial to mesenchymal tooth parts, being particularly strong in the dental pulp, sac and cervical loops, while co-expression of Ki-67/syndecan-1 was strong in dental pulp. Reflecting signaling interactions between epithelial and mesenchymal parts of the tooth germ, spatio-temporal changes of syndecan-1 expression during odontogenesis were related to condensation of dental papilla mesenchyme, development of cervical loops and crown morphology, and together with CK8/vimentin in differentiation of preameloblasts and preodontoblasts.

Biography

Dr. Darko Kero done PhD from the city of Split, Croatia. Following his 5-year-long work in private dental practice as a general practicioner, he received a tenure in Study Program of Dental Medicine at School of Medicine, University of Split, Croatia, where he performs lectures and practice teaching in undergraduate courses of Dental Anatomy, Forensic Dentistry and Ethics in Dentistry. He is also a member of Laboratory for Research on Embryonic and Fetal Human Development at School of Medicine in Split, where his work resulted in several publications about the impact of various factors on embryonic and fetal development of human teeth.

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