

COMPARISON OF TOOTH DEVELOPMENT IN WILD TYPE AND PACAP-DEFICIENT MICE

*Sandor B.1, Fintor K.4, Kiss P.3, Jungling A.2, Hani E.2, Nagy P.3,
Helyes Zs. 3, Nagy A.1, Reglodi D.2, Tamas A.2*

*Depts of 1Dentistry, Oral and Maxillofacial Surgery; 2Anatomy, PTE-MTA
“Lendület” PACAP Research Team, 3Pharmacology and
Pharmacotherapy; Szentagotthai Janos Research Centre, Medical School,
University of Pecs; 4Department of Mineralogy Geochemistry and
Petrology, University of Szeged, Hungary*

Tooth buds are derived from the ectoderm of the first branchial arch and the ectomesenchyme of the neural crest, therefore, their development shows similarities with the development of the nervous system. Pituitary adenylate cyclase activating polypeptide (PACAP) is a neuropeptide with widespread distribution. It has trophic and protective effects in the CNS and periphery and it plays a role in the development of the nervous system. PACAP-immunoreactive fibers have been found in the odontoblastic and subodontoblastic layers of the tooth pulp, but there is no data about the effect of endogenous PACAP on tooth development. Earlier we found that the dentin layer of molar teeth in PACAP deficient mice was significantly thinner, using morphometric measurements on native histological sections of 7-day-old mice. In our present study structural analysis of the dentin and the enamel of the developing teeth was performed by Thermo Scientific DXR Raman microscope in the same sections of the 7-day-old wild type and PACAP deficient mice. In adults (2 months old mice) we have done morphometric measurements on the incisors with Sky Scan Micro CT. The Raman spectra of the enamel in the wild type mice demonstrated a broader range of 1240/1270 ratio, which indicates a higher diversity in secondary structure of enamel protein in contrast to PACAP deficient mice. In the dentin of PACAP deficient mice we found higher intracrystalline disordering in the hydroxyapatite molecular structure compared to wild type mice. Differences were found with micro CT in the incisors of the adult mice: the pulp chamber was significantly smaller in PACAP deficient mice. These observations suggest that PACAP plays a role in tooth development, in the dentin and enamel formation. (Support: OTKA

(K104984), TAMOP (4.2.1.B-10/2/KONV-2010-002, 4.2.2.B-10/1-2010-0029, 4.2.2.A-11/1/KONV-2012-0024), Arimura Foundation, Bolyai Scholarship, “Lendület” Program)