DENTIN ALTERATION OF DECIDUOUS TEETH IN HUMAN HYPOPHOSPHATEMIC RICKETS

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INTRODUCTION: The aim of the present study was to analyze the structure and mineralization of human dentin, and the composition and distribution of ECM components, associated with familial hypophosphatemic rickets.

METHODS: Hypophosphatemic and age-matched control deciduous teeth were collected. They were processed for SEM or immunohistochemistry examination. In addition, dentin blocks were prepared and immersed for 8 days in EDTA (4.13%). The supernatant was analyzed by SDS-PAGE and by Western blotting in order to visualize and to identify the proteins extracted by this procedure. Antibodies directed against SIBLINGs, osteocalcin (OC) and chondroitin /dermatan sulfate glycosaminoglycans were used.

RESULTS: Compared to the age-matched controls, the dentin of deciduous teeth from hypophosphatemic patients exhibited several differences: - presence of large interglobular spaces resulting from the lack of fusion of calcospherites in the dentin; defective mineralization in the interglobular spaces contrasting with normal Ca-P levels in the calcospherites on X-ray microanalysis; abnormal presence of low molecular weight protein complexes recognized on Western blots by antibodies against matrix extracellular phosphoglycoprotein (MEPE), dentin sialoprotein (DSP), osteopontin (OPN), and osteocalcin; accumulation in the interglobular spaces of immunolabelling with antibodies against SIBLINGs and OC, whilst chondroitin /dermatan sulfate glycosaminoglycans were associated with normal mineralization.

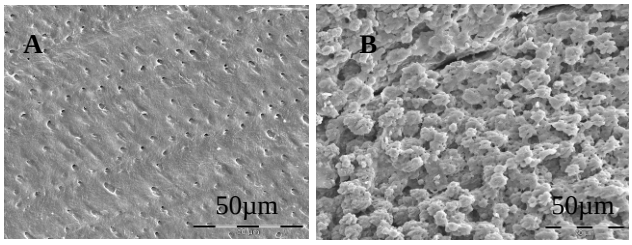

Fig.1: Large interglobular spaces between unmerged calcospherites were seen in circumpulpal dentin in XLH patients (B) whereas control teeth showed homogenous dentin (A).

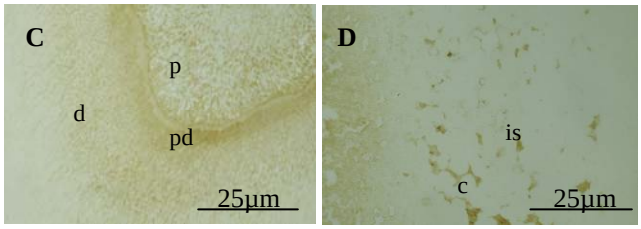

Fig.2: Indirect immunodetection of DMP-1: In the control teeth (C), inner part of dentin tubules is labelled. Interglobular spaces are exclusively labelled in XLH dentin (D). p: pulp, c: calcospherites, d:dentin, pd: predentin.

DISCUSSION AND CONCLUSIONS: These data suggest that hypophosphatemia, and/or defective PHEX function in the odontoblasts, strongly alter the dentin ECM composition and distribution. Alterations of some of the ECM molecules are key-factors in the formation of the defective hypophosphatemic dentin.

REFERENCES:

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