

The link between hair disorders and susceptibility to dental caries

14 March 2015

Today at the 93rd General Session and Exhibition of the International Association for Dental Research, researcher Olivier Duverger, National Institutes of Health-National Institute of Neurological Disorders and Stroke, Bethesda, Md., USA, will present a study titled "Hair Keratins as Structural Organic Components of Mature Enamel: The Link Between Hair Disorders and Susceptibility to Dental Caries." The IADR General Session is being held in conjunction with the 44th Annual Meeting of the American Association for Dental Research and the 39th Annual Meeting of the Canadian Association for Dental Research.

Hair and teeth are ectodermal appendages that share common developmental mechanisms. However, the major structural components making up [hair](#) and teeth are very distinct. The hair shaft is essentially made of keratin filaments that are highly cross-linked. Tooth enamel matrix is primarily composed of enamel proteins (amelogenin, ameloblastin) that are degraded and replaced by minerals during enamel maturation. Fully mineralized enamel contains a small fraction of cross-linked organic material that has not been fully characterized. In this study, researchers assessed the presence and functionality of a specific set of hair keratins in this organic fraction of enamel.

Transcriptomic analysis was performed on the enamel organ from conditional knockout mice lacking the transcription factor distal-less homeobox 3 (DLX3), previously shown to regulate hair keratin expression in the hair follicle. Immunolocalization of hair keratins was performed on mouse enamel organ and mature human enamel. Utilizing data from genetic and intra-oral examination, the researchers tested the association of polymorphisms in hair keratins with [dental caries](#) susceptibility. Functional impact of hair keratin mutations on the structural and mechanical properties of [tooth enamel](#) was assessed on extracted teeth using transmission

and scanning electron microscopy, micro-computed tomography and micro-hardness testing.

The researchers found that several hair-specific epithelial keratins are expressed in murine enamel organ and are significantly downregulated in the absence of DLX3. Several of these epithelial hair keratins are produced by ameloblasts in mouse and are constituents of the organic material present in mature human enamel. We further determined that polymorphisms in hair keratins, associated with hair disorders, are also associated with increased susceptibility to caries. Functional analyses revealed that mutations in hair keratins result in altered enamel structure and reduced [enamel](#) micro-hardness. At the conclusion of the study, the researchers' findings determined that epithelial [hair](#) keratins are crucial components of tooth [enamel](#) and mutations in these keratins increase the risk for dental defects and caries.

More information: This is a summary of abstract #3419 titled "Hair Keratins as Structural Organic Components of Mature Enamel: The Link Between Hair Disorders and Susceptibility to Dental Caries," to be presented by Olivier Duverger on Saturday, March 14, 2015, from 10:45 a.m. - 11 a.m. as part of the session titled "Regeneration of Dental and Craniofacial Tissues" in Meeting Room 203 of the Hynes Convention Center.

Provided by International & American Associations for Dental Research

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