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# Amelotin molecule plays a critical role in tooth enamel maturation

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Today, the International and American Associations for Dental Research (IADR/AADR) published an innovative developmental biology study by lead researcher Bernhard Ganss, University of Toronto, ON, Canada, that relates amelotin with tooth enamel defects and enamel formation. This study, titled "Enamel Hypomineralization and Structural Defects in Amelotin-deficient Mice," is published in the OnlineFirst portion of the *Journal of Dental Research*: the journal for dental, oral and craniofacial research.

Among the proteins necessary for enamel formation, amelotin (AMTN) is one of the more recently discovered proteins. AMTN is predominantly expressed by ameloblasts during the maturation stage of amelogenesis and present at lower levels in the junctional epithelium of erupted teeth. Previous studies have suggested a function of this protein in enamel mineralization and cell attachment. Genetic mouse models have been instrumental in defining the role of many enamel-related proteins, but a genetic mouse model lacking the Amtn gene has been lacking.

Ablation of Amtn expression resulted in weak mandibular incisor-edge enamel that fractured and chipped. Microscopic analysis revealed that enamel mineralization was delayed, resulting in retention of organic matrix below the enamel surface. During the secretory stage, the ameloblasts showed prominent Tomes' processes therefore was there was no indication of disruption of cell structures or activities. However during maturation phase, volumetric growth of enamel rods was significantly reduced which led to hypomineralization. The expression

levels of other enamel matrix proteins and enamel proteases, were not significantly altered, although the expression of an enamel protease, KLK-4, was delayed.

Although AMTN is expressed in the junctional epithelium, the knockout mice appear to have an intact dentogingival attachment. These observations indicate that AMTN plays a subtle yet critical role in enamel biomineralization, particularly during the establishment of the outer and surface enamel layers. This role appears to be largely independent of other enamel proteins.

"This is a significant study because it is the first report of a basement membrane protein playing a role in enamel mineralization," said JDR Associate Editor Joy Richman. "Through the creation of Amtn knock out mice in the Ganss lab, we learn the unique role of AMTN protein in the proper hardening of enamel."

Provided by International & American Associations for Dental Research