

Beta-catenin molecule is required for tooth root formation

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Today, the International and American Associations for Dental Research (IADR/AADR) published a paper titled " β -catenin is Required in Odontoblasts for Tooth Root Formation." The paper, written by lead authors Tak-Heun Kim and Cheol-Hyeon Bae, Chonbuk National University Korea School of Dentistry, Laboratory for Craniofacial Biology, is published in the IADR/AADR *Journal of Dental Research*.

The tooth root, together with the surrounding periodontium, maintains the tooth in the jaw. The root develops after the crown forms, a process called morphogenesis. While the molecular and [cellular mechanisms](#) of early tooth development and crown morphogenesis have been extensively studied, little is known about the [molecular mechanisms](#) controlling tooth root formation.

In this study, Kim and Bae et al show that a protein called β -catenin is strongly expressed in odontoblasts - the cells that develop the tooth dentin, and is required for root formation. Tissue-specific inactivation of β -catenin in developing odontoblasts produced molars lacking roots and aberrantly thin incisors.

At the beginning of root formation in the mutant molars, the cervical loop epithelium extended apically to form Hertwig's epithelial root sheath (HERS), but root odontoblast differentiation was disrupted and followed by the loss of a subset of HERS inner layer cells. However, outer layer of HERS extended without the root, and the mutant molars finally erupted. The periodontal tissues invaded extensively into the

[dental pulp](#). These results indicate that there is a cell-autonomous requirement for Wnt/ β -catenin signaling in the dental [mesenchyme](#) for root formation.

"The striking tooth phenotypes in this study shed light on how Wnt signaling regulates odontoblast fate and root development," said JDR Associate Editor Joy Richman.

More information: A perspective article titled "Tooth Eruption without Roots" by Xiu-Ping Wang, Harvard School of Dental Medicine, has been written to further elaborate on root development and tooth eruption.

Provided by International & American Associations for Dental Research

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