

RANKL expressed by osteocytes has an important role in orthodontic tooth movement

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During orthodontic tooth movement, osteoclastic bone resorption is essential for alveolar bone remodeling. It is well known that the differentiation of osteoclasts is regulated by RANKL. However, the source of RANKL in the periodontal tissue during orthodontic tooth movement was not identified.

Now, Japanese research coordinated by Tokyo Medical and Dental University (TMDU) has revealed that osteocytes mainly express RANKL and are the key to remodeling of the bone surrounding teeth during orthodontic tooth movement.

The significance of RANKL in orthodontic tooth movement was first examined using an orthodontic tooth movement model in which open coil springs were inserted between teeth of mice to move first molars. Injection of a neutralizing antibody against RANKL reduced tooth movement.

To identify the cellular source of RANKL in periodontal tissue, they established a novel method to fractionate cells in periodontal tissue. Notably, osteocytes were revealed to express much higher levels of RANKL compared with other periodontal [tissue](#) cells.

Physiological significance of osteocyte RANKL in vivo was confirmed using osteocyte-specific RANKL deletion mice. Orthodontic tooth

movement was significantly suppressed in these mice with a decreased number of osteoclasts on the [bone](#) surface around the tooth where mechanical force was applied.

Thus, it is demonstrated that osteocytes have a crucial role as a major source of RANKL during orthodontic tooth movement.

Optimal orthodontic treatment requires not only the acceleration of tooth movement toward the right place but also the suppression of unwanted tooth movement. In the clinics, suppression of tooth movement is achieved by anchoring teeth with devices such as implants, which can damage the [oral tissue](#). Thus, pharmaceutical approaches are considered effective. Our findings suggest the efficacy of medication targeting osteocytes to regulate RANKL expression in controlling [tooth movement](#).

More information: Ayumi Shoji-Matsunaga et al, Osteocyte regulation of orthodontic force-mediated tooth movement via RANKL expression, *Scientific Reports* (2017). [DOI: 10.1038/s41598-017-09326-7](https://doi.org/10.1038/s41598-017-09326-7)

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