The European Journal of Orthodontics, Volume 18, Issue 3: June 1996.

A molecular mechanism of integrin regulation from bone cells stimulated by orthodontic forces

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ABSTRACT

The purpose of this paper is to discuss a molecular mechanism in the signal transduction pathways of the regulation of integrin genes taking place in bone cells as a result of orthodontic or mechanical stimulation. Human osteosarcoma (HOS) TE-85 cells were cultured in Dulbecco's modified Eagle's medium (DMEM)/F-12 and grown to confluency in Flexercell type I dishes and orthodontic forces were applied to the cells via an intermittent strain of 3 cycles/minute using the Flexercell Strain Unit System for periods of 15 and 30 minutes, 2 and 24 hours and 3 days. Antibodies against [beta]1 and [alpha]v integrins were immunolocalized in strained and unstrained cultures. Total RNA was extracted and cDNA probes were used to measure at various mRNA expression of [beta]1 (1.2 kb) and [alpha] (1.1 kb) integrins. A cDNA probe for cyclophylin (750 b) was used for controls of gene expression. Results showed that mechanical stimulation caused a reorganization of integrin distribution in comparison with non-stimulated controls. mRNA for [beta]1 expression showed a marked increase at 30 minutes and 3 days, while mRNA levels for [alpha]v did not change with strain. The selective expression of integrins mRNA is indicative of a specific gene regulation by mechanical stimulation in the cells studied.

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