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International Journal of Biomedical Imaging
Volume 2006 (2006), Article ID 21304, 6 pages
doi:10.1155/IJBI/2006/21304

Mechanical Strains Induced in Osteoblasts by Use of Point Femtosecond Laser Targeting

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Received 11 May 2006; Revised 3 September 2006; Accepted 17 September 2006

Academic Editor: Lizhi Sun

Abstract

Full-Text PDF

Linked References

How to Cite this Article

Abstract

A study demonstrating how ultrafast laser radiation stimulates osteoblasts is presented. The study employed a custom made optical system that allowed for simultaneous confocal cell imaging and targeted femtosecond pulse laser irradiation. When femtosecond laser light was focused onto a single cell, a rise in intracellular Ca²⁺ levels was observed followed by contraction of the targeted cell. This contraction caused deformation of neighbouring cells leading to a heterogeneous strain field throughout the monolayer. Quantification of the strain fields in the monolayer using digital image correlation revealed local strains much higher than threshold values typically reported to stimulate extracellular bone matrix production in vitro. This use of point targeting with femtosecond pulse lasers could provide a new method for stimulating cell activity in orthopaedic tissue engineering.