

ABSTRACT OF DISSERTATION

Title	<p>The Ceramics Radiating Far Infrared Ray Energy (Rhyolite) Promote the Formation of Bone” 遠赤外線エネルギーを放射するセラミックス(流紋岩)は骨形成を抑制する</p>
Author's Name	ALDARTSOGT DOLGORSUREN
<p>Abstract: Far infrared ray (FIR) energy radiated by the natural ceramics (Rhyolite) called FIR ceramics activates water molecules and blood circulation to stimulate skin and other tissues. The aim of our study is to make clear whether the FIR ceramics radiating FIR energy affect or not on the new bone formation in vivo and in vitro.</p> <p>Methods: MC3T3-E1 cells were cultured in FIR CO2 incubator. The cell proliferation and the gene expression were analyzed by using WST-8 assay kit, RT-PCR and micro array analysis. The enzyme activities were analyzed by using the apiRZYM kit. Furthermore, titanium and natural FIR ceramics compounds were implanted under the periosteum of rat skull bone by injection method. Four weeks later, the samples were examined by the light microscope and micro CT analyses. Results: Proliferation of MC3T3-E1 cell and DNA concentrations were inhibited by FIR energy radiation. The ALP activities were accelerated and the area of calcification nodules increased on 4 weeks. The RT-PCR data showed that the genes Runx2, Osterix, BSP, OCN, Colla1 and OPN expression of MC3T3-E1 osteoblast like cells were activated. Bone mineral density (BMD mg/cm²) of implanted sites of T50-F50, T25-F75 and F100 groups was significantly enhanced after 4 weeks compared with control group. This data shows that FIR energy radiation by the natural FIR ceramics promoted bone-forming activity of osteoblasts. Significance: This study suggested that new bioactive ceramics such as natural FIR ceramics were useful for some clinically applications to repair bone defects for dental implant surgery.</p> <p>Key words: Bone formation, Far-infrared ray, Osteoblast</p> <p>Abstract of dissertation was cited in this following paper.</p> <p>Dolgorsuren A, Yamashita K, Shine-Od D, Sumida K, Seki S and Kitamura S. The Ceramics Radiating Far Infrared Ray Energy (Rhyolite) Promote the Formation of Bone. J Hard Tissue Biology 10.26.2014</p>	