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Effect of low-level laser irradiation on osteoglycin gene expression in osteoblasts.

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Abstract Many studies have attempted to elucidate the mechanism of the biostimulatory effects of **low-level laser irradiation (LLLI)**, but the molecular basis of these effects remains obscure.

We investigated the **stimulatory effect** of **LLLI** on **bone formation during the early proliferation stage** of cultured osteoblastic cells. A mouse calvaria-derived osteoblastic cell line, MC3T3-E1, was utilised to perform a cDNA microarray hybridisation to identify genes that induced expression by **LLLI** at the **early stage**.

Among those genes that showed at least a **twofold increased expression**, the **osteoglycin/mimecan** gene was **upregulated 2.3-fold** at **2 h** after **LLLI**. Osteoglycin is a small leucine-rich proteoglycan (**SLRP**) of the extracellular matrix which was previously called the osteoinductive factor. **SLRP** are **abundantly contained** in the **bone matrix, cartilage cells** and **connective tissues**, and are thought to regulate cell proliferation, differentiation and adhesion in close association with collagen and many other growth factors.

We investigated the time-related expression of this gene by **LLLI** using a reverse transcription polymerase chain reaction (RT-PCR) method, and more precisely with a real-time PCR method, and found increases of **1.5–2-fold** at **2–4 h** after **LLLI** compared with the **non-irradiated controls**.

These results suggest that the increased expression of the osteoglycin gene by LLLI in the early proliferation stage of cultured osteoblastic cells may play an important role in the stimulation of bone formation in concert with matrix proteins and growth factors.