GMR Genetics and Molecular Research
Online Journal
ISSN:1676-5680

Gene expression analysis of demineralized bone matrix-induced osteogenesis in human periosteal cells using cDNA array technology

S. Honsawek[1], P. Bumrungpanichthaworn[1], T. Thitiset[1] and L. Wolfinbarger Jr.[2]

[1]Department of Biochemistry, Faculty of Medicine,
King Chulalongkorn Memorial Hospital, Chulalongkorn University,
Thai Red Cross Society, Bangkok, Thailand
[2]Old Dominion University and BioScience Consultants, LLC, Norfolk, VA, USA

Corresponding author: S. Honsawek
E-mail: Sittisak.H@chula.ac.th

Genet. Mol. Res. 10 (3): 2093-2103 (2011)
Received February 15, 2011
Accepted July 12, 2011
Published September 16, 2011
DOI http://dx.doi.org/10.4238/vol10-3gmr1329

ABSTRACT. Demineralized bone matrix (DBM) has been widely investigated as a biomaterial to promote new bone formation and is utilized clinically for bone repair and regeneration. We investigated gene expression patterns of osteogenic differentiation in human periosteal (HPO) cells cultured with demineralized bone matrix, using cDNA array technology. Osteogenic differentiation of HPO cells was determined using alkaline phosphatase assay. In order to examine differential gene expression during osteogenic differentiation, total RNA was isolated from HPO cells in the absence or presence of DBM on day seven and analyzed using osteogenesis cDNA gene array. The selected genes were verified using reverse transcriptase (RT)-PCR analysis. Human periosteal cells differentiated along an osteogenic lineage after treatment of DBM. The alkaline phosphatase activity assay showed that HPO cells differentiated into an osteogenic lineage. Gene expression of HPO cells treated with DBM for seven days was analyzed with cDNA array and RT-PCR analyses. Expression of biglycan, TGF-β1, and TGF-βR1 was upregulated, whereas collagen14A1 expression was downregulated, as confirmed by RT-PCR. Human periosteal cells

expressed osteogenesis genes when treated with DBM. These findings provide new insight into the capability of demineralized bone matrix to modulate the osteogenic differentiation of human periosteal cells.

Key words: cDNA array; Demineralized bone matrix; Osteogenesis; Gene expression; Human periosteal cells

