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Editorial

Effect of recombinant human bone morphogenetic protein-2 and osteoprotegerin-Fc in MC3T3-E1 cells: beyond challenges to success

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New therapeutic options of osteoporosis and bone defect are being needed to ensure the best result and stability and decrease the surgical trauma. It is very important that stepwise and combination treatment in osteoporosis to boost osteogenic effects because the limitations of current osteoporosis treatments are clear.

Kim et al. [1] compared the osteogenic effect by recombinant human bone morphogenetic protein-2 (rhBMP-2) and osteoprotegerin-immunoglobulin Fc segment complex (OPG-Fc) and revealed the combination promoted the efficacy of the osteoblast differentiation. In particular, the results suggest serial administration of rhBMP-2 and OPG-Fc are essential for best efficacy at an appropriate time in vivo research [1].

Bone morphogenetic proteins promote bone formation by recruiting primitive mesenchymal cells and stimulate osteoblast differentiation [2,3]. However, BMPs can also enhance the catabolic activity of osteoclast [4].

Osteoprotegerin (OPG) enhances osteoclast differentiation, and its effect in osteoblastogenesis remains unclear [5].

OPG may promote bone formation in synergy with bone morphogenetic protein-2 [6] and may have anti-apoptotic effect during osteoblastogenesis [7].

The previous studies were the first to report, through bone histomorphometry, immunohistochemistry, and alkaline phosphatase (ALP) that the expression of BMP-2 is enhanced by OPG, a key factor in maintaining normal bone mass [8-10].

Meanwhile, animal experiments have already been conducted to determine the interaction between rhBMP-2 and OPG. Yao Y et al. [6] revealed that OPG enhanced recruitment of mesenchymal stem cells synergistically with BMP-2 and increased bone formation and healing significantly. Local application of rhBMP-2 promoted significant improvements of osteoblasts, and OPG increased bone density. There was significant synergistic enhancement between BMP-2 and OPG in dog model.

Most recently, in ovariectomized rat model, Eom et al. [11] reported that stepwise administration of OPG encoded minicircles and parathyroid hormone related peptide encoded minicircles enhance bone formation and inhibit bone resorption.

Therefore, it is necessary to examine the results of animal models for combined administration of BMP-2 and OPG based on cell line experiments. In addition, it is necessary to verify changes in collagen type I alpha 1 and osteocalcin, which are representative bone formation promoting indicators of osteoblast differentiation, and their effects on osteoclasts as well as osteoblasts. Furthermore, we recommend confirming that previous researchers thought that the target of OPG would be NF-κB, a major pathway for Receptor activator of nuclear factors κB ligand (RANKL) [12].

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CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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