Equol promotes rat osteoblast proliferation and differentiation through activating estrogen receptor

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ABSTRACT. Phytoestrogens have been suggested as alternative treatment for postmenopausal osteoporosis. Equol, a metabolite of daidzein, has been shown to inhibit bone loss in ovariectomized mice and rats. However, whether or not equol influences the formation of bone has not yet been investigated. Therefore, we investigated the effect of equol on the proliferation and differentiation of rat primary osteoblasts and explored the involved mechanisms. Different equol concentrations significantly promoted the proliferation of osteoblasts after 48- and 72-h incubations. The alkaline phosphatase (ALP) activity also increased significantly in all of the equol and 17β-estradiol (E₂) groups, except for the lowest (0.01 µM) equol group. Equol also significantly elevated the
osteocalcin levels. The effects of equol on osteoblast proliferation, ALP activity, and osteocalcin levels were blocked by the estrogen receptor (ER) antagonist ICI182780. After a 24-h incubation, the expression of protein kinase C alpha (PKCα) in osteoblasts was significantly increased by equol. In conclusion, our study demonstrated that equol could promote the proliferation and differentiation of rat osteoblasts through activating the ER-PKCα-related signaling pathway, suggesting that equol could promote bone formation. These results suggest that equol could be a potential alternative agent for the management of postmenopausal osteoporosis.

**Key words:** Osteoblast; Osteoblast proliferation; Equol; Postmenopausal osteoporosis; Osteoblast differentiation