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# Salvia Miltiorrhiza-induced Regulation of Osteoclastogenesis and the Determination of Components-Tanshinone I, Tanshinone IIA, Cryptotanshinone and Dihydrotanshinone using LC-MS/MS

채 한 정

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Tanshinone I, tanshinone IIA, cryptotanshinone and dihydrotanshinone are compounds that have been isolated from the root of Salvia miltiorrhiza (SM), which is also known as "Danshen". The SM extract has been used successfully in China for treating postmenopausal syndrome and it had inhibitory effect on osteoporosis in ovariectomized rats. Another study reported that the four components - tanshinone I, tanshinone IIA, cryptotanshinone and dihydrotanshinone prevented osteoclast function in an in vitro system. However, there are no reports of a correlation between SM and its components on osteoporosis and osteoclast function. This study was undertaken to examine the effect of SM on osteoclastogenesis and osteoblast differentiation, which are two important markers of the bone physiology. A rapid, sensitive and specific isocratic liquid chromatography/tandem mass spectrometry (LC-MS/MS) method was developed for the simultaneous quantitative determination of four diterpenoids such as tanshinone I, tanshinone IIA, cryptotanshinone and dihydrotanshinone in SM. A SM methanol and ethanol extractions with a low concentration of tanshinone IIA (1 $\mu$g/ml) had no effect on the ALPase activity-osteoblast differentiation but completely inhibited osteoclastogenesis. These results suggest that tanshinone compounds can be a good marker compound to explain the anti-osteoporotic function of SM.