

The Role of Bone Marrow Fatty Acids in the Early Stage of Post-Menopausal Osteoporosis

Authors : Sizhu Wang, Cuisong Tang, Lin Zhang, Guangyu Tang

Abstract : Objective: We aimed to detect the composition of bone marrow fatty acids early after ovariectomized (OVX) surgery and explore the potential mechanism. Methods: Thirty-two female Sprague-Dawley (SD) rats (12 weeks) were randomly divided into OVX group and Sham group (N=16/group), and received ovariectomy or sham surgery respectively. After 3 and 28 days, eight rats in each group were sacrificed to detect the composition of bone marrow fatty acids by gas chromatography-mass spectrometry (GC-MS) and evaluate the trabecular bone microarchitecture by micro-CT. Significant different fatty acids in the early stage of post-menopausal osteoporosis were selected by OPLS-DA and t test. Then selected fatty acids were further studied in the process of osteogenic differentiation through RT-PCR and Alizarin Red S staining. Results: An apparent sample clustering and group separation were observed between OVX group and sham group three days after surgery, which suggested the role of bone marrow fatty acids in the early stage of postmenopausal osteoporosis. Specifically, myristate, palmitoleate and arachidonate were found to play an important role in classification between OVX group and sham group. We further investigated the effect of palmitoleate and arachidonate on osteogenic differentiation and found that palmitoleate promoted the osteogenic differentiation of MC3T3-E1 cells while arachidonate inhibited this process. Conclusion: Profound bone marrow fatty acids changes have taken place in the early stage of post-menopausal osteoporosis. Bone marrow fatty acids may begin to affect osteogenic differentiation shortly after deficiency of estrogen.

Keywords : bone marrow fatty acids, GC-MS, osteoblast, osteoporosis, post-menopausal

Conference Title : ICOOMD 2023 : International Conference on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases

Conference Location : London, United Kingdom

Conference Dates : May 15-16, 2023