عنوان مقاله:

Effects of Isoproterenol (beta-adrenergic agonist) on in vitro differentiation of human mesenchymal stem cells into osteoblasts

محل انتشار:

مجله علمی پژوهشی دانشگاه علوم پزشکی زنجان, دوره 23, شماره 98 (سال: 1394)

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خلاصه مقاله:

Background and Objective: The importance of β-adrenergic signals in bone formation and resorption has been well investigated. However, little is known about the role of β -adrenergic signals in osteoblastic differentiation of mesenchymal stem cells (MSCs), which is critically important in bone physiology and pharmacology. In this study, RUNX۲ and Osteocalcin gene expression were quantified in MSCs differentiated by osteoblastic differentiation medium (ODM) and Isoproterenol (ISO). Materials and Methods: In this experimental study, human mesenchymal stem cells were treated by osteoblastic differentiation medium and ISO. RNA extraction was carried out from both osteoblastic differentiation medium at ۴ and ۲۱ days of differentiation and from undifferentiated MSCs. RUNX۲ and osteocalcin gene expression were quantified by quantitative Real Time-PCR. Results: Isoproterenol decreased the expression of RUNX۲ and osteocalcin genes at ۴ and ۲۱ days of osteoblastic differentiation. Statistically significant difference was found at ۲۱ days of differentiation (P<۰.۰۵). Conclusion: Isoproterenol negatively affects MSC osteogenesis. These findings suggest that human mesenchymal stem cell is also a target for β-adrenergic and may provide valuable treatment option in bone diseases. References ۱- Serre CM, Farlay D, Delmas PD, Chenu C. Evidence for a dense and intimate innervation of the bone tissue, including glutamate-containing fibers. Bone. ۱۹۹۹ ۲۵: ۶۲۳-۹. ۲- Togari A, Mogi M, Arai M, Yamamoto S, Koshihara Y. Expression of mRNA for axon guidance molecules,such as semaphorin-III,netrins and neurotrophins,in human osteoblasts and osteoclasts. Brain Res. ۲۰۰۰ ۲۹ ۸۷۸: ۲۰۴-۹. ۳- Cuscito C, Colaianni G, Tamma R, et al. Adrenergic stimulation decreases osteoblast oxytocin synthesis. Ann N Y Acad Sci. ۲۰۱۱ ۱۲۳۷: ۵۳-۷. ۴- Bonnet N, Pierroz D, Ferrari L. Adrenergic control of bone remodeling and its implications for the treatment of osteoporosis. J Musculoskelet Neuronal Interact. ۲۰۰۸ ۸: ۹۴-۱۰۴ ۵- Takeda S, Elefteriou F, Levasseur R, et al. Leptin regulates bone formation via the sympathetic nervous system. Cell. ۲۰۰۲ ۱۱۱: ۳۰۵-۳۱۷. ۶- Kondo H, Takeuchi S, Togari A. Beta-adrenergic signaling stimulates osteoclastogenesis via reactive oxygen species. Am J Physiol Endocrinol Metab. ۲۰۱۳ ۳۰۴: E۵۰۷-۱۵. ۷- Qin W, Bauman WA, Cardozo CP. Evolving concepts in neurogenic osteoporosis. Curr Osteoporos Rep. ۲۰۱۰ ۸: ۲۱۲-۸. ۸- Rejnmark L, Vestergaard P, Mosekilde L. Treatment with beta-blockers, ACE inhibitors,and calciumchannel blockers is associated with a reduced fracture risk: a

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کلمات کلیدی:

Keywords: Mesenchymal stem cells, Osteoblastic differentiation Medium, Beta adrenergic, Isoproterenol, RUNX۲, Osteocalcin

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