Effect of simulated weightlessness on the expression of Cbfα1 induced by fluid shear stress in MG-63 osteosarcoma cells.

Z. Yang. **S. Zhang**, B. Wang, XQ. Sun,

Department of Aerospace Biodynamics, The Fourth Military Medical University, Xi'an, 710032, P.R.China. (shuzhang@fmmu.edu.cn / Fax: +86 29 8477 4811)

Objective The role of mechanical load in the functional regulation of osteoblasts becomes an emphasis in osseous biomechanical researches recently. This study was aim to explore the effect of flow shear stress on the expression of Cbfα1 in human osteosarcoma cells and to survey its functional alteration in simulated weightlessness. Method After cultured for 72 h in two different gravitational environments, i.e. 1G terrestrial gravitational condition and simulated weightlessness condition, human osteosarcoma cells (MG-63) were treated with 0.5 Pa or 1.5 Pa fluid shear stress (FSS) in a flow chamber for 15, 30, 60 min, respectively. The total RNA in cells was isolated. Transcription PCR analysis was made to examine the gene expression of Cbfα1. And the total protein of cells was extracted and the expression of Cbfα1 protein was detected by means of Western Blotting. Results MG-63 cultured in 1G condition reacted to FSS treatment with an enhanced expression of Cbfα1. Compared with no FSS control group, Cbfα1 mRNA and protein expression increased significantly at 30 and 60 min with the treatment of FSS ($P<0.01$). And there was remarkable difference on the Cbfα1 mRNA and protein expression between the treatments of 0.5 Pa and 1.5 Pa FSS at 30 min or 60 min ($P<0.01$). As to the osteoblasts cultured in simulated weightlessness by using clinostat, the expression of Cbfα1 was significantly different between 1G and simulated weightlessness conditions at each test time ($P<0.05$). Compared with no FSS control group cultured in simulated weightlessness, Cbfα1 mRNA and protein expression increased significantly at 30 and 60 min with the treatment of FSS ($P<0.05$). The difference on the Cbfα1 mRNA and protein expression between the treatments of 0.5 Pa and 1.5 Pa FSS at 30 min or 60 min were significantly ($P<0.05$). Conclusion FSS can significantly increase the gene and protein expression of Cbfα1 in human osteosarcoma cells. And this inducible function of FSS was affected by simulated weightlessness. (Supported by NSFC:30300398)