

Effects of simulated weightlessness on the kinase activity of MEK1 induced by bone morphogenetic protein-2 in rat osteosarcoma cells.

S. Zhang, B. Wang, XS. Cao, Z. Yang.

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 mRNA expression of $\alpha 1$ chain of type I collagen (COL-I $\alpha 1$) in rat osteosarcoma (ROS17/2.8) cells induced by bone morphogenetic protein-2 (BMP-2) was reduced under simulated microgravity. The protein kinase MEK1 of MAPK signal pathway plays an important role in the expression of COL-I $\alpha 1$ mRNA. The purpose of this study is to investigate the effects of simulated weightlessness on the activity of MEK1 induced by BMP-2 in ROS17/2.8 cells. **Methods** ROS17/2.8 cells were cultured in 1G control and rotating clinostat simulated weightlessness for 24 h, 48 h and 72 h. BMP-2 (500 ng/ml) was added into the medium 1 h before the culture ended. There was a control group in which ROS17/2.8 cells were cultured in 1G condition without BMP-2. Then the total protein of cells was extracted and the expression of phosphated-ERK1/2 (p-ERK1/2) protein was detected by means of Western Blotting to show the kinase activity of MEK1. **Results** There were no significant differences in the expression of total ERK1/2 among all groups. The expression of p-ERK1/2 was unobvious in the control group without BMP-2 but increased significantly when BMP-2 was added ($P < 0.01$). The level of p-ERK1/2 in simulated weightlessness group was much more lower than that in 1G group in every time point ($P < 0.01$). The expression of p-ERK1/2 gradually decreased along with the time of weightlessness simulation ($P < 0.01$). **Conclusions** The kinase activity of MEK1 induced by BMP-2 in rat osteosarcoma cells was reduced under simulated weightlessness.