

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Science Results from Ground Based Research (4)

Author: Prof.Dr. Jufang Wang
Institute of Modern Physics, Chinese Academy of Sciences, China, jufangwang@impcas.ac.cn

Mr. He Li
China, lihe2007@impcas.ac.cn

BONE LOSS AND ITS MECHANISMS UNDER SIMULATED SPACE ENVIRONMENT

Abstract

It is well identified that microgravity in outer space can cause bone loss of the astronauts. However, the space environments are very complex. Besides microgravity, highly energized ionizing radiation is a very common factor which can induce harmful effects on the astronauts. In the present study, we found that 4 Gy of carbon ion irradiation, which was performed at the Heavy Ion Research Facility in Lanzhou (HIRFL), Institute of Modern Physics, Chinese Academy of Sciences, could enhance the bone loss caused by hindlimb suspension of Wistar rats to simulate the bone loss under microgravity. Our results showed that 4 weeks of hindlimb suspension caused about 46.5 % bone loss while 4 Gy of carbon ion irradiation caused 27.2 % bone loss when compared to the control. With the hindlimb suspension plus carbon ion irradiation, the bone mass exerted a reduction of 52.6 %, implying an interaction effect between the simulated microgravity and carbon ion exposure. On the other hand, the mechanisms and countermeasures to bone loss under the change of stresses will be investigated by observing the structurally sensitive parameters of bone bioapatite, including the stability of crystal-chemical and ultra-structural characteristics of the bone minerals. This research will be carried out by an international co-operation between the Institute of Applied Physics, National Academy of Sciences of Ukraine and the Institute of Modern Physics, Chinese Academy of Sciences.