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## EFFECTS OF MICROGRAVITY ON MUSCULOSKELETAL PHYSIOLOGY

**Abstract**

The human body is an amazing machine that has adapted itself well to gravity and the surrounding environment on Earth, enabling it to function at optimum capacity under such conditions. Short and long-term exposure to microgravity can lead to some adverse responses from a physiological and cellular metabolic standpoint, which can have serious medical implications on the physical and mental health of humans while living in space and during the return to earth. Astronauts' exposure to microgravity results in a head ward shift of bodily fluids and the removal of weight from otherwise weight-bearing bones. These effects can result in significant changes to the cardiovascular system as well as muscle atrophy in antigravity muscles, which can ultimately increase the risk of fractures, premature osteoporosis, back pain and injuries to soft tissues both during and after the flight. Exercise is an important countermeasure to reduce the rate of deterioration in the musculoskeletal system, however, significant physiological decline still occurs. This paper reviews the physiological changes in the human musculoskeletal system that are associated with exposure to a microgravity environment and outlines practical countermeasures that can help mitigate such effects for short and long-term space flights.