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WEARABLE EQUIPMENT: DEVELOPMENT OF NEW STRATEGIES TO INCREASE THE BONE PRODUCTION AND REDUCE THE CREW EXERCISES ROUTINE - A LASER/ULTRA-SOUND APPROACH.

Abstract

Humankind always wanted to travel and explore distant planets. Space flights have became increasingly longer and a significant change at the human body was noticed: the extreme loss of bone. As a result of microgravity long exposition, osteoporosis occurs at a rapid rate.Osteoporosis is a decrease in bone mass, and its occurrence may be due to changes in force and stress. The human body reduces the production of bone cells because there is no compression on bone to stimulate its production. Each month, astronauts can lose up to 1.5% of bone mass. It is well known that some equipments like Laser and ultra-sound, largely used in physical therapy rehabilitations, can increase the bone production. Laser is an amplified light produced by electromagnetic radiation which manifests as monochromatic light. Currently, laser draws attention to its non thermal effects, which can assist in the healing of bone tissue. The layer thickness to be pointed to the tissue will depend on the laser power used and its application time. The difference between the various types of lasers is given by the wavelength. The smaller the wavelength, the higher its penetration power. Laser is classified in three different strengths: 1) high power laser, eg CO2/Argon; 2) Medium power laser, eg Gallium/Arsenide; 3) low-power laser, eg Helium/Neon. Among the effects of low intensity Laser, It has proved that bone healing can be accelerated by the application of low-power laser. Some supporting techniques used for bone stimulation of fractures are less well known. They are are called osteoinductive for its biophysical effects. A technique called ultrasonic stimulation of bone regeneration (EURO) is available worldwide for treatment of recent fractures. It is a non-invasive treatment of fractures that uses ultrasound of low intensity (30 mW/cm2). This clinical use has been approved by the FDA in 1994 by recognizing a success rate of 86% in the treatment of nonunion fractures and a 38% reduction in the time of bone healing in recent fractures. The purpose of this study is to research a new approach that could give parameters for a wearable equipment in other to increase the bone production and reduce the crew exercises routine. Studying way of adapt them in a suit could make them part of the crew exercises set.