

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

Author: Prof. Vincenzo Colucci
Italian Academy of Postural Sciences (AISPO), Italy, v.colucci@tiscali.it

Dr. Raffaele Colucci
Italian Academy of Postural Sciences (AISPO), Italy, v.colucci@tiscali.it

Mrs. Marisanta Colucci
Italian Academy of Postural Sciences (AISPO), Italy, v.colucci@tiscali.it

Dr. Roberto Vittori
ESA Astronauts, Colonel Aeronautica Militare Italiana, Rome, Italy, roberto.vittori@nasa.gov

Dr. Gennaro Russo
Associazione Italiana di Aeronautica e Astronautica (AIDAA), Italy, rino_russo@katamail.com

NEW METHOD FOR THE PREVENTION OF HUMAN DISEASES IN MICROGRAVITY

Abstract

Maintenance of orthostatic position is assured by a sequence of connective structures such as aponeurosis and fascias, coursing from skull to sacro and from pelvis to feet. Together with the phasic and tonic activity of the antigravitational muscles from occiput to tarsus, they automatically balance the slight physiological anterior imbalance of body axis. These postural oscillations in upright static position don't involve the vestibular system if they don't surpass four arch degrees. In microgravity man uses exclusively his dynamics muscles both to perform movements and settle position. Since these muscles are structured exclusively for a voluntary activity, they will be inevitably subject to easy exhaustion. On earth, man takes information to assume his own upright position in relation to the environment from two main sources: eye and foot, that represent contemporarily an exteroceptive and proprioceptive function, which positions the body axis both in statics and in dynamics. The eye provides the environmental information while the foot, by means of exteroception of skin plantar, transmits the information of the support surface. The proprioceptive information occurs through the connective tissue, so the source of information which primes this antigravity mechanism is the foot support to the ground. Owing to lack of proprioceptive activity of the phasic-tonic fascial muscular structures, an alteration of the osteo-calcic mechanism is caused by the absence of perception of load pressure and the periosteum increases in thickness proportionally to standards of physical activities. This mechanism is reversible and directly proportional to the duration of exposure to microgravity. The motor activity to which an astronaut is subjected to avoid osteoporosis is inefficient because the musculo-facial system of statics isn't active. In addition, the confused information from both eye and vestibular system worsens the energy consumption of dynamics muscles and makes it less effective and irregular. Thus, problems of orientation and visual-motor coordination are caused by upsetting of information. Astronauts tend to a condition of extreme flexion because of deactivation of the antigravitational phasic-tonic system. Therefore, the prevention of microgravity disturbances reduction needs priority through a maintenance of the dynamic postural balance during the training of the subject. The broad scientific bibliography of microgravity pathologies and wide knowledge of exteroception and proprioception spurred over the years the scientists of AISPO to experiment successfully a medical-scientific protocol that allows an activation of the antigravitational fasic tonic facial muscular structures of the statics even in absence of foot support to ground.