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THE HEART IN SPACE ENVIRONMENT

Abstract

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Purpose: During space flight, the cardiovascular system (CVS) experiences very important changes provoked by the absence of gravity (0G). These changes substantially modify the normal cardiovascular clinical parameters as measured on Earth, so that, if they are evaluated by “terrestrial cardiology” criteria, they indicate severe pathology, but are normal at 0G and follow the process of adaptation to the space environment. Methodology: A general review was conducted over the accumulated experience gained in space medicine, particularly which related to the anatomical and functional changes that space environment conditions impress on the CVS. Results: The principal cardiovascular modifications in space are the following: migration of fluids from the inferior towards the superior body regions; facial edema; dilation of face and neck veins; homogeneous pressures (arterial, venous, capillary) in the entire organism; elevation of the diaphragm and liver (5 cm); diminution of the heart’s size (20%) and horizontalization of the same; alteration of the thorax (becomes shorter and wider); increase of intrapulmonary blood (average of 800 ml); homogeneous distribution of the circulation, ventilation and pulmonary pressures; diminution of the total blood volume (approximately one liter); diminution of pulse amplitude and collapse of the superficial veins in the lower limbs. All of these data are abnormal in a cardiological exam on Earth, but are normal in space and follow an adaptive process. Conclusions: The normal clinical cardiovascular parameters in space, if they are evaluated by “terrestrial cardiology” criteria, would result indicative of severe pathology, but are normal in 0G and obey a process of adaptation to the space environment. Learning Objectives: The normal cardiovascular examination data in space, are different of that on earth.