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The effects of spaceflight on the heart

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Abstract

Spaceflight is one of the most important things that going to be in the future , for which can used by most people and not consider only for the astronauts that's because of all the recent finds that discovered by NASA that's there are chances for living in the other plants

But even with impatience for use it and all of its benefits its also has many hazards affect the human body

Some of these hazards affect the cardiovascular system , including the heart or either the vessels , affect the structure the function … etc.

These hazards are results of the radiation ultraviolet waves lighting light … etc.

Introduction

Gravity is not just a force, it's also a signal - a signal that tells the body how to act. For one thing, it tells muscles and bones how strong they must be.

During spaceflight astronauts are exposed to extreme environmental factors that differ dramatically from those on earth.
These factors include altered lighting light gravitational force and radiation.
spaceflight has been shown to have significant effects on numerous body systems, including the musculoskeletal, neuroendocrine, and immune systems. including severe effects on the heart and cardiovascular system. The effects of microgravity on cardiac are on its function, structure and gene expression.
Generally in the cardiovascular system , gravitational forces significantly affect venous return, cardiac output, and arterial and venous pressures.
Thus when astronaut travel to space and exposed to all these factors he has many disorders of his body and especially to cardiovascular system and as this system has an important function so any disorder of it , it will affect the whole body. (1)

Under microgravity conditions, the heart no longer needs to sustain blood flow against gravitational stresses, causing the reduction of heart rate and cardiac output according to decreased demands. The decrease of cardiac output is also manifested in terms of maximal oxygen uptake. Because pulmonary function does not limit oxygen uptake, cardiac pumping function is probably the limiting step, hence the maximal oxygen uptake reflects the cardiac output. The adaptation to microgravity also reduces the heart size and stroke volumes. The total heart size was reported to decrease according to studies in both simulated microgravity environment and real space flights and Stroke volumes of both ventricles have been observed to decrease by 20%-30% in either supine and upright postures. (2)

Discussion

1) In this study, we measured the heart rate and activity data of three Chinese astronauts on a space mission and investigated the influence of spaceflight on diurnal patterns of heart rate and activity Three Chinese astronauts (one woman and two men) on a space mission , aged 33–49yr The results showed that the mean HR levels of all three astronauts during flight were not significantly altered relative to the preflight data. the results show that the heart rate values for the astronauts were elevated after flight compared with the preflight data. The amplitudes of the heart rate rhythms decreased strikingly during flight relative to the preflight data Alterations of rhythms have also been observed under simulated

weightlessness conditions. In contrast, the rhythmicity of activity became aberrant during flight for both astronauts.(3)

2) Delp's group considered seven Apollo astronauts, 35 later astronauts whoreached low-Earth orbit and 35 astronauts who never flew, and found thatthe proportional deaths due to heart disease were equivalent for theastronauts who never flew and the ones who stayed in low-Earth orbit, butfor Apollo astronauts those deaths were four to five times more common.
(Three out of the seven died from cardiovascular disease.)
exposed to either radiation orweightlessness all showed injury to blood vessels and arteries, which couldlead to heart attacks and strokes, and those exposed to both showed even more damage.(4)

3) A March 29 study presented to the American College of Cardiology analyzed ultrasound images from 12 astronauts during their stays aboard the International Space Station and found astronauts' hearts take on an unnatural spherical shape after spending extended periods of time in space.
The study did not find any risks associated with the change of shape though, according to Dr. Chris May, lead author of the study and a cardiology fellow at the Cleveland Clinic Foundation. May said the shape shift may be due to a loss of muscle mass in the left ventricle—the heart's main pumping chamber that shuttles blood to the rest of the body.
According to May, several factors contribute to the shape of the heart while on Earth, including the pericardium—the sac that contains and protects the heart itself—and outside forces that interact with the body, such as gravity.
The study's findings do not imply that the change in the heart's shape is unhealthy, according to Dr. Paul Forfia, director of the Pulmonary Hypertension and Right Heart Failure and Pulmonary Thromboendarterectomy May said people can experience heart failure without noticeable symptoms, and seemingly small stressors such as shifting blood flow or chest pain and pressure could trigger serious problems. A highly accurate model of the functions and structures of the heart could give researchers a deeper understanding of heart disease.(5)

In my opinion the spaceflight has many factors the may effect the heart in several ways and the whole body which will lead to abnormality in its function and not working well.

Conclusion

The microgravity affect the cardiovascular system by several ways and cause really harmful disorders that would affect the whole body because of the important function of this system and its effects of the body

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