The Heart and Cardiovascular System

NASA-supported life sciences research has advanced our understanding of the heart and cardiovascular system. This knowledge benefits both the space program and patients on Earth with heart disease, abnormal blood pressure and circulatory disturbances. For example:

- Astronauts can feel lightheaded and have low blood pressure after space missions. This problem, a drop in blood pressure with standing that can lead to fainting, also affects hundreds of thousands of Americans. The recent Neurolab space shuttle missions and associated ground studies provide a comprehensive understanding of blood pressure control that can be applied to both patients and astronauts.
- Space missions promote the development of equipment to perform cardiovascular tests. For example, Spacelabs Inc., a leading supplier of medical devices, began with a NASA contract to monitor the vital signs of astronauts during the Gemini program. NASA currently supports efforts on new, non-invasive cardiac monitoring techniques.
- Weightlessness may cause the heart muscle to shrink. NASA supports research on how heart muscle cells sense and respond to the load placed upon them. Some studies investigate cardiac genes that modulate growth and these studies may have wide-ranging applications particularly to patients with heart failure, high blood pressure and heart attacks.
- Cardiovascular measurements made in space have changed the understanding of heart physiology. Pressure measurements made at the input of the heart in space provided surprising and unpredicted results. This example shows how studies done without gravity can help understand how the body works with gravity.
- Long duration exposure to weightlessness may increase the incidence of heart rhythm irregularities. The equipment and procedures to study this are also applicable to patients with irregular heart beats. One of the non-invasive techniques developed in a NASA supported center has received FDA approval for identifying patients at risk for serious cardiac rhythm disturbances.
- The cardiovascular system senses pressure changes caused by gravity when we stand or lie down. How will these sensors develop if gravity is not present? Studies on the development of the cardiovascular system in space will provide a basic understanding of how heart and blood vessels develop on Earth.
- NASA space flight and bed rest studies also have relevance to patients who are bedridden or inactive. Rehabilitation strategies used for space flight may also benefit patients who have been immobilized or bed-ridden.

The American Society for Gravitational and Space Biology asks for your support for the Life and Microgravity Sciences research programs of NASA, as we strive to keep America leading the world in utilizing space for improving life.