

INTEGRATING HEALTH**● Exercise in Space**

When the human body adapts to weaker gravity during long spaceflights, it loses muscle mass, bone minerals, and some coordination between the nervous system and the muscles. After spaceflight, astronauts may find that they cannot exercise in an upright position on Earth until their body readapts to Earth's gravity.

According to research, the way to counter the effects of reduced gravity is to have astronauts exercise in space in ways that stress muscles while maintaining normal blood-pressure distribution. Astronauts also need to experience the nerve and muscle patterns that are normally experienced during walking or running.

A Device to Help Astronauts Exercise

The lower-body negative pressure (LBNP) device was developed to help astronauts exercise. The LBNP device is a treadmill with a partial-vacuum chamber, which is sealed around the exerciser's lower body. The partial vacuum pulls blood and other fluids away from the heart and creates a gravity-like force on the feet. The device is designed for upright use during spaceflight. A version used on Earth for testing and training has cables and pulleys that support subjects in a horizontal position.

Your Turn to Think

1. Why is more attention paid to exercising lower-body muscles and bones than upper-body muscles and bones during spaceflight?
2. Why is the version of the LBNP device for use during flight designed to keep people in a vertical position?
3. Why is the version of the LBNP device for use on Earth designed to keep people in a horizontal position?
4. How might the LBNP device help people on Earth who are bedridden?