NASA Facts

National Aeronautics and
Space Administration

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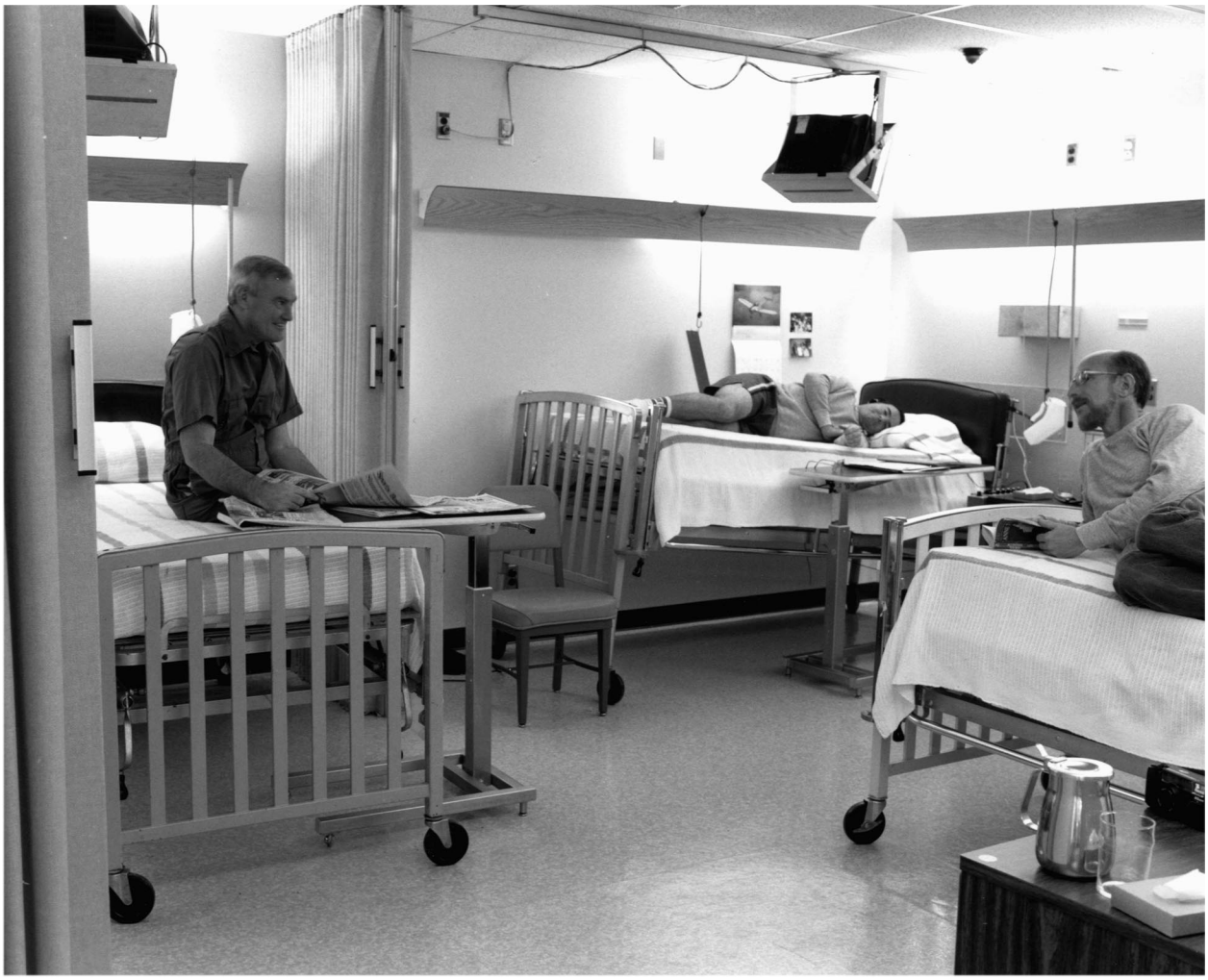
HUMAN RESEARCH FACILITY

NASA Ames Research Center's Human Research Facility (HRF) is a specially designed, technically sophisticated research area that is unique within NASA. Because space is a new environment for humans, there is much to learn about the effects on the human body of prolonged exposure to microgravity. Since 1971, investigators from the United States, France, Germany and the former Soviet Union have used the HRF to conduct ground-based simulation studies of astronauts during space flight. The HRF is managed by a registered nurse with extensive aerospace experience.



Facility Arrangements

The Human Research Facility provides a highly controlled environment with temperature, The light intensity and day length automatically controlled. It is suitable for studies on both ambulatory and bed-rested volunteer subjects.

The HRF contain 4,100 square feet of floor space divided into two separate areas, the subject living area and the test and administrative area. These area are separate, but readily accessible to each other if necessary. TheHRF can house up to 12 people in a pleasant, non-hospital environment, on either an 8-hour or a 24-hour basis, for weeks or months, with all their living requirements provided.

The Living Area

The subject living area has a large recreation/dining room, four bedrooms and three bathrooms with showers. A special horizontal shower is available for use when test subjects are bed-rested. Two of the bedrooms are sound-proofed and have two-way hatches and adjoining bathrooms, for use in confinement or group interaction studies.

The staff prepares meals in a fully equipped kitchen on the premises, and it strictly adheres to the dietary requirements of each project.

Ambulatory subjects dine and relax in a combination lounge, recreation and dining area. Each person has a color television and a stereo at bedside. Games, books, daily newspapers and magazines also are provided.

Test and Administrative Area

The administrative area includes the HRF manager's office and a secretarial office. Sophisticated test equipment and other testing facilities are nearby. These include a lower-body negative-pressure device used in studies of fluid shifts; upright and horizontal bicycles, treadmill and other exercise testing devices; a water-immersion tank to simulate the effects of microgravity; the man-rated centrifuge (a rotating device used to expose humans to high degrees of gravitational force); other rotating devices and a tilt table for testing the body's ability to respond to an upright position after being weightless or in the head-down position for an extended time.

Representative Studies

Studies in the HRF have used healthy volunteers from various backgrounds and ranging in age from 21 to 65. For varying periods, volunteers lie in beds tilted head-down at a six-degree angle. Continuous head-down bed rest is used to simulate the effects of prolonged microgravity on the human body, such as cardio-vascular deconditioning, muscle atrophy, decreased bone strength, and shifts in fluid and electrolyte balance.

This method of simulating the effects of weightlessness has enabled extensive study on the ground of the changes responsible for the physiological effects of space-flight.

Scientists also study exercise, diet, fluid loading and drugs for their effectiveness in preventing these changes. Physiological responses to a space shuttle re-entry acceleration profile have been tested on a man-rated centrifuge. The HRF also is equipped for isolation, group interaction, human performance and physiological rhythm studies.

Other studies allow volunteers to live at home and continue their usual activities, reporting to the facility for tests.

The Ames Human Research Experiments Review Board must review and approve The Ames Human Research Experiments Review Board must review and approve each proposed study. This board, which includes medical professionals and an attorney, reviews all proposals for research on humans to ensure the safety and welfare of the study's participants. In addition, each participant must pass a comprehensive physical examination and attend a thorough briefing on the study before giving consent to participate.

The Human Research Facility's Role

With the anticipated creation of the international Space Station, a better understanding of how prolonged microgravity affects the human body becomes increasingly important. The Human Research Facility plays an important role in discovering how a lack of gravity affects us and how to minimize those effects.

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