

## SPACE MEDICINE BRANCH REPORT

### Current Plans for Space Station Freedom Medical Care

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Since President Reagan's call for a manned Space Station, medical officers at the NASA Johnson Space Center (JSC) and other locations have planned for health care capabilities that were a marked improvement from any previous manned spaceflight. Efforts to date, have resulted in plans for a comprehensive Crew Health Care System (CHeCS), composed of three parts: an Exercise Countermeasures Facility (ECF), an Environmental Health System (EHS), and a Health Maintenance Facility (HMF). Over the past 4 years, the requirements for these three systems have been developed in adequate detail to allow the prime CHeCS contractor (McDonnell Douglas Space Systems Company) to begin acquiring and evaluating prototype hardware in concert with technical expertise from JSC. These requirements specify a volume allotment of five double racks—approximately the area of a large refrigerator each—with stringent limits on resources of weight, power, operations, and other factors.

The Exercise Countermeasures Facility would allow crewmembers to counteract the deconditioning of cardiovascular and muscu-

loskeletal systems seen with long-duration spaceflight via aerobic and anaerobic exercise regimens. Two crewmembers would be able to exercise simultaneously, and would be monitored closely for performance effectiveness in the microgravity environment. Exercise "prescriptions" for individual crewmembers are currently being developed.

The Environmental Health System has the task of monitoring and evaluating the semi-closed environment of Space Station Freedom for any adverse health effects from continuous habitation of up to several months duration. Many new technologies will be used in the environmental life support system of Space Station Freedom over its 30-year life, including near-complete closure of the water and air recovery systems. These new technologies will demand similar improvements in the technology and understanding of environmental health monitoring and safety.

The Health Maintenance Facility will provide outpatient clinical medical care for the crew of four to eight, and "inpatient" care for one person for up to 10 days. Consisting of 15 subsystems, the HMF will allow basic diagnostic examinations and procedures (i.e., X-ray, blood chemistries) and relatively advanced therapeutic interventions

(i.e., mechanical ventilation, minor surgical care). Due to equipment and personnel limitations, no major surgery or extended critical care will be possible, initially.

At present, NASA is considering a requirement to have a physician as a member of the crew for missions of 90 days or longer. Another major component of crew safety presently under consideration is a "lifeboat" rescue vehicle dubbed the Assured Crew Return Vehicle. One of the primary purposes for such a vehicle would be the return of an ill or injured crewmember beyond the capabilities of the HMF, as well as rescue of the crew for Space Station Freedom contingencies. This vehicle would be supported by a ground rescue network at preplanned landing sites. Many factors will combine in the future to determine the final capabilities of the CHeCS. The basic capabilities of medical care, environmental monitoring, and exercise countermeasures will be maintained, but exact equipment configurations are as yet unknown, due to limitations from costs, power, weight, and volume. It is anticipated that the basic capabilities of the CHeCS will be augmented by a well-trained crew medical officer and a rescue vehicle such as the Assured Crew Return Vehicle.