

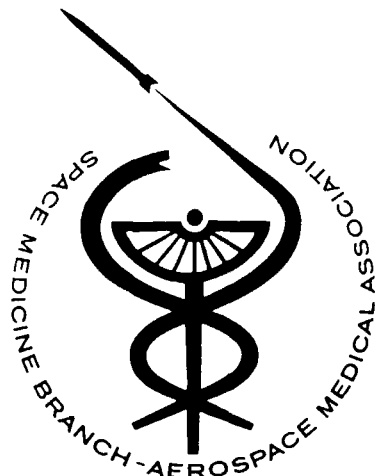
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## SPACE MEDICINE BRANCH REPORT

The following article was submitted by Michael W. Bungo, M.D., principal investigator.

During the April 1985 flight of Shuttle mission 51D, ultrasound examination of the heart was performed for the first time on a U.S. space flight. This experiment was the result of an effort by a team of NASA-Johnson Space Center investigators headed by Michael W. Bungo, M.D. A commercial echocardiograph was modified to be Shuttle-flight worthy, largely through the efforts of physician/engineer David A. Wolf, M.D. M. Rhea Seddon, M.D., a mission specialist on 51D, was responsible for collecting the inflight measurements. John B. Charles, Ph.D., a JSC co-investigator has contributed to the data reduction and interpretation.

With the uses of echocardiography in space flight, new insights into the adaptation of the human cardiovascular system to microgravity have been gained. The high spatial resolution of this technique allows direct imaging of the myocardium. This in turn permits statistical analysis on smaller sample sizes than with other non-invasive techniques. The non-invasive, benign nature of the scanning makes it ideally suited for the space flight environment. The equipment used occupied only one mid-deck Shuttle locker and weighed less than 40 pounds. Electrical power



was derived directly from the orbiter and videotape images of the data were recorded and stored in the Shuttle's flight-deck recorder system. The storage arrangement allowed subsequent ground-based image analysis and also permitted downlink capabilities on standard TV interfaces.

Two-dimensional sector and "M-mode" scans of the heart were obtained from four crewmembers daily for the duration of the 7-day orbital flight. These data were

compared to resting supine values acquired preflight and at selected intervals postflight. Right ventricular dimension was found to be 35% decreased through out the period of weightlessness and returned to baseline after flight. Left ventricular volume index (LVDVI) was 20% increased on the first day of flight and 15% decreased thereafter compared to preflight. Stroke volume tracked LVDVI. Mean blood pressure and heart rate were both 20% increased during weightlessness. Increases in both diastolic and systolic pressure contributed to the rise of mean pressure. After an 85% rise in cardiac index the first day, values returned to preflight levels for the duration of the mission, but were again 59% elevated during the postflight recovery period. Elevated trends in cardiovascular work and total peripheral resistance were noted throughout flight. Recovery from 7 days in space appeared to require a week of re-exposure to Earth's gravity.

The integration of the American Flight Echocardiograph into the Space Transportation System has brought commercial equipment into the operational flight program in support of cardiovascular research. Echocardiography has promise in future physiological experiments, in countermeasure evaluation, and in clinical medicine aboard a space station health maintenance facility.

### MASSACHUSETTS INSTITUTE OF TECHNOLOGY DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS FACULTY POSITION IN BIOMEDICAL ENGINEERING (Aerospace Medicine)

A search is being conducted for an Assistant Professor in the MIT Department of Aeronautics and Astronautics' Man-Vehicle Laboratory. The appointment could be available beginning July 1, 1986 for an initial period of three years with reappointment based on merit.

Activities in the Man-Vehicle Laboratory are primarily involved with manned space flight, particularly space motion sickness and vestibular adaptation to weightlessness. Currently, there are experiments on three Spacelab missions concerning vestibular function, and another Spacelab program investigating cognitive processing and motor control. Substantial effort is also directed toward problems of flight simulation, including motion cuing, visual displays and disorientation training.

In addition to research and thesis supervision, the duties will include developing a new course in MANNED SPACECRAFT, covering topics in aerospace medicine, human factors, life support systems, safety, habitability and operations.

The qualifications for the position include a PhD degree or MD with research experience, and a solid background in engineering. The specific research specialty of the candidate need not be aligned with the above mentioned programs, however.

**Qualified individuals may send a detailed resume to:  
Professor Eugene E. Covert, Head, Department of Aeronautics and  
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