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SPACE MEDICINE BRANCH REPORT

Shuttle Spacelab Life Sciences-1 Mission Renews Spacelab Emphasis

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On June 5, 1991, NASA launched the initial Spacelab Life Sciences (SLS) mission and provided the first opportunity since Skylab for investigators to measure several interrelated physiological parameters. SLS-1 was the first dedicated Life Sciences Space Transportation System (STS) mission and was a collaborative effort of both the Johnson Space Center and Ames Research Center, in conjunction with many other investigators. The earlier Skylab program provided basic information of how individual physiological systems responded to weightlessness. Skylab began the ongoing research in human physiology in space and provided a basis for future research. Plans were made to study the whole body's response to spaceflight and to examine how individual parts of the body are affected by weightlessness. The SLS-1 mission brought these long-term plans to fruition. The primary scientific goals of SLS-1 were: 1) to study the mechanisms, magnitudes, and time courses of certain physiological changes that occur during spaceflight; and 2) to investigate the consequences of the body's adaptation to microgravity and readjustment to 1-gravity. The primary payload consisted of 18 experiments from 3 disciplines (i.e., cardiovascular/cardiopulmonary, metabolic, and vestibular):

Human Subjects
3 Cardiovascular
1 Cardiopulmonary
1 Renal Endocrine
1 Hematology
1 Immunology
2 Musculoskeletal
1 Vestibular

Rodent Subjects
2 Hematology
4 Musculoskeletal
1 Neurovestibular

Jellyfish
1 Neurovestibular

The human studies included autonomic cardiovascular control, cardiovascular deconditioning, pulmonary function, cardiovascular adaptation, protein metabolism during spaceflight, and fluid electrolyte regulation during spaceflight. Also included were lymphocyte proliferation in weightlessness, influence of spaceflight on erythrokinetics, and vestibular experiments.

The payload also consisted of several animal studies and verification tests of the research animal handling facility and maintenance hardware. Tests on nine additional payload elements were performed, including medical hardware to be flown on Space Station Freedom. These items included the Spacelab Middeck Experiment (SMIDEX) racks and the surgical workstation/surgical restraint system.

To date, the success of the mission can be measured only by its operational accomplishments, and these accomplishments are impressive. All the scheduled experiment activities were completed along with several unscheduled activities. Each day the investigators reported that they obtained all the usable data they had expected. However, on Flight Day 1, a minimal amount of data was lost on one experiment due to a 1.5-hour launch delay.

A 90-day Preliminary Results Workshop was completed in September 1991. This workshop provided more detail on the quality of the science and helped in planning for SLS-2, a continuation of SLS-1, currently manifested for launch in May 1992.

The Space Medicine Branch will be sponsoring a panel of invited SLS-1 principal investigators at the Aerospace Medicine Association's annual meeting in Miami. Significant findings from the SLS-1 mission will be discussed in addition to assessing their relationship to future spacelab missions.

NASA develops portable funduscope

Scientists at the Lyndon B. Johnson Space Center, Houston, TX, have developed a portable video/digital retinal funduscope. The device is a lightweight, inexpensive, electronic and photographic instrument for the detection, monitoring and objective quantification of ocular/systemic disease or physiological alterations of the retina, and blood vessels in the anterior and posterior chambers of the eye. Richard T. Meehan, M.D., an AsMA member, of the University of Colorado at Denver, along with Norwood Hunter, Michael Caputo, and C. Robert Gibson, of KRUG International, an AsMA corporate member, and Gerald R. Taylor of the Johnson Space Center, worked on the funduscope.

The instrument produces video images that can be viewed directly or digitized for simultaneous or subsequent analysis. It can also produce photographs or be fitted with adaptors to produce stereoscopic or magnified images of the skin, nose, ear, throat, or mouth to detect lesions or diseases. The portable funduscope can be operated with little training. It can be used with a human or animal subject whether seated, recumbent, inverted, in a hospital, field laboratory, or other environment.

The funduscope has a modular design with extension housing, video camera, and electronic viewfinder, all of which can be removed and replaced with a 35-mm film camera. The fundus camera can be equipped with a variety of lenses, prisms, and filters.

The instrument helps physicians compare sequential images from a patient to detect subtle disease progressions. Also, the accumulation of digital information simplifies storage, transfer, and manipulation to enhance areas of interest. It permits extensive analyses of blood vessels and the retina for changes caused by hypertension, diabetes, atherosclerosis, vasculitis, glaucoma, and infections. The funduscope can be upgraded easily as advancements are made in light, optical equipment, cameras, computers, and computer programs.

Aerospace engineering directory available

The 1991 Aerospace Consultants Directory is an information source for persons needing the services of consultants in the rapidly growing field of aerospace engineering. Over 100 professional consultants are listed, in 43 technical areas.

The 1991 Aerospace Consultants Directory is available for $24.00 from Dept. 2420, SAE, 400 Commonwealth Dr., Warrendale, PA 15096-0001 (412) 776-4970.

NASA and schools interact through video conferences

NASA's Educational Affairs Division will broadcast via satellite a series of live educational video conferences. More than 3,000 schools and other institutions in 50 states are expected to participate in the popular series, now in its sixth year.

The interactive videos are designed to update teachers on NASA programs, demonstrate aerospace activities for the classroom and announce new programs, products, and activities.

The following topics will be aired from 2:30 to 4:00 p.m. Eastern time:

Life Sciences Research	Dec. 11, 1991
Aeronautics	Feb. 19, 1992
Space Flight/ Space Station	April 15, 1992

There is no charge for participation, but schools should register in advance. Educational institutions may receive the signal through school satellite antennas or participating cable televisions systems. For more information: NASA Aerospace Education Services Program, Videoconference Series, 300 North Cordell, Oklahoma State University, Stillwater, OK 74078-0422, or call 405-744-7015.