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A Message from the President

The planning for the Annual Scientific Meeting of the Aerospace Medical Association and the Space Medicine Branch (SMB) luncheon are well underway. I would like to encourage each SMB member to attend and participate in the annual meeting in Miami Beach.

There were a record number of abstracts submitted to the program committee this year, and 26 papers on space medicine have been scheduled. The AsMA program committee, chaired by Russell Rayman, M.D., has sponsored a panel on the biomedical results of SLS-1. Another panel on the evolution of medical capabilities for spaceflight should also interest our members.

All of the committees of the Branch have been busy, and our luncheon, scheduled for Thursday, promises to be exciting. We have arranged for an outstanding speaker, and the historical committee chaired by Stan White, M.D., has planned a short perspective on our heritage. The awards committee has invited all of the young investigators to the luncheon, and this will be a good opportunity to meet the aerospace leaders of tomorrow. Periodically throughout the annual meeting, the membership committee will be manning a table to disseminate information about the SMB and encourage Branch growth.

When I became president of the SMB, I knew that this year would be significant for life sciences in the space program, and this has proven to be true. SLS-1, the first Shuttle mission dedicated principally to life sciences, was successfully completed. The payload commander, mission specialists, and payload specialists for SLS-2 were also named. There have been multiple commissions and studies done to provide insight and direction to the space program, but it seems that in this year a solid plan is emerging for exploration of low-Earth orbit, the Moon, and Mars. NASA is also undergoing some minor reorganization to carry out that mission. Space Station Freedom (SSF) has been redesigned and downsized, but appears very close to the hardware construction stage and still retains most of the originally planned capabilities. Life sciences research has been designated as one of the primary missions. First element launch could occur as early as 1995 with Manned Tended Capability (MTC) reached by 1997. As part of this program, NASA is investigating the possibility of joint Shuttle and SSF missions of up to 90 days. Also, plans are currently underway for a return to the Moon by the end of this decade. Each of these programs should help develop the understanding of human physiology, hardware, operations, and training to the point where the goal of the Space Exploration Initiative to place humans on Mars can be accomplished.

The important message for members of the SMB is that from the Extended Duration Orbiter Medical Program of today to the Mars mission of tomorrow, life sciences considerations are becoming more critical to the success of the space program. Our organization can continue to be a vital part of meeting this challenge.

During this year, the various committee chairs have done an outstanding job in moving the SMB forward, and I would like to thank them for their efforts. A more active role in the future is possible. I would also like to thank all those who contributed to the SMB reports that have been published in this journal. This type of activity is critical in educating our membership and keeping the branch visible between annual meetings. Again, I would like to see you in Miami Beach, and appreciate your continued efforts during the remainder of the year, and later in assisting the president-elect, Karl Klein, M.D.

Richard T. Jennings, M.D.
President, 1991–92

Cell Culture Vessel to Fly on Shuttle

Johnson Space Center's (JSC) Biotechnology Program has developed a device, called the rotating wall vessel, which emulates space. The instrument helps cell cultures to defy gravity and to grow, approximately, as they might in the microgravity environment of space. The rotating wall vessel nurtures the cell cultures in a horizontal cylinder that slowly rotates, bathing the cells and nutrients and oxygen as it keeps them gently suspended in a liquid medium.

Tissues grown during the development and testing of this device already have been put to work in attempts to create drugs, grow tissue for transplantation and understand malignancies. The rotating wall vessel, developed as a cell culture growth tool for Space Station Freedom, has pioneered research in lung tissue growth, skin growth, cartilage growth, colon cancer proliferation, brain tumor growth, and therapeutics.

Research done with NASA's rotating wall vessel over the past 2 years has produced cell cultures more like human tissue than those produced by earlier-model culture devices. However, gravity still poses a problem, for as the tissue becomes larger, it settles to the bottom of the growth chamber and becomes damaged. Researchers hope that spaceflight will nullify this problem. Cultures could be grown on Earth for the first 3 months, then flown in space, where gravitational effects are minuscule, for the remainder of their development. According to Glenn Spaulding, Manager of JSC's Space Biotechnology Program, "The longer certain cells grow, the larger and more well-developed they become, the more meaningful the medical application."

The rotating wall vessel was conceived when researchers developing a plan to grow tissue cultures in space began wondering how to suspend the cells on the Space Shuttle in order for the tissue not to suffer damage on the Shuttle's ascent, orbit, and entry. The investigators conceived the idea of keeping the cells delicately suspended by maintaining them in a state of continual motion.

The rotating wall vessel hardware received its first test and equipment checkout in space during the Space Shuttle Atlantis mission. There are also plans to fly cell cultures on future shuttle flights and Space Station Freedom. Access to the microgravity environment of space will only enhance the research begun with the rotating wall vessel in laboratories on Earth. Spaulding says, "We need microgravity for an extended time period. Without space station, there would be no opportunity to exploit the potential of this fascinating important tool."

Focus on Members:

Roberta L. Bondar Flies on Shuttle

Roberta L. Bondar, M.D., Ph.D., an AsMA member, served as a Payload Specialist aboard Discovery, Space Shuttle Mission STS-42. This mission, a concerted worldwide research effort involving scientists from the U.S., Canada, France, Germany, and Japan, concentrated on studying the behavior of materials and life in weightlessness. More than 200 scientists from 16 countries contributed to experiments flown on board International Microgravity Laboratory-1 (IML-1) contained in Discovery's cargo bay.

Bondar was born in Sault Ste. Marie, Ont., Canada, and joined the Canadian Space Agency in 1984. She received a bachelor's degree in zoology and agriculture from the university of Guelph in 1968; a master's degree in experimental pathology from the University of Western Ontario in 1971; a doctorate in neurobiology from the University of Toronto in 1974; and a doctor of medicine degree from McMaster University in 1977. She was admitted as a Fellow of the Royal College of Physicians and Surgeons of Canada in neurology in 1981.

Bondar, a neurologist and clinical and basic science researcher, was appointed Assistant Professor of Medicine and Director of the Multiple Sclerosis Clinic for the Hamilton–Wentworth Region at McMaster University in 1982.

She was named chairperson of the Canadian Lifesciences Subcommittee for Space Station Freedom in 1985. She is a civil aviation medical examiner and member of the scientific staff at Sunnybrook Hospital where she is conducting research into blood flow in the brains of stroke patients and of subjects working in microgravity aboard NASA's KC-135.