Space Medicine Branch Report

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President's Message:

The year 1981 promises renewed hope for the rejuvenation of the U.S. manned space exploration program. After the period of NASA's spectacular achievements during the 1960's and mid-1970's, which included landing men on the Moon, the Skylab orbital missions, and the international Apollo-Soyuz flight, we had a loss of momentum in our manned space program. Meanwhile, since 1975 the Soviet Union launched 19 manned missions and pushed the endurance record of manned presence in space to 185 days, a little over 6 months. Finally, after many delays and repeated testings, the Shuttle "Columbia," our hope for the future, was rolled out Jan. 29, 1980, from the Vehicle Assembly Building at the Kennedy Space Center to the launch pad for final test verification and a planned launch in early spring of 1981. The Space Shuttle is the most technologically advanced reusable space vehicle ever built. The launch of "Columbia" will herald the beginning of a new era of the Space Transportation System. The economic and technological changes which will occur with this new vehicle will be much the same as those brought about in aviation through the arrival of the DC-3 aircraft 40 years ago. The beginning thrust of the space program was based on the pioneering spirit; the Space Shuttle will have a more practical orientation, with emphasis on the development and utilization of new technologies.

Since the Space Transportation System is being developed as one of maximum utility and practical benefit, the current philosophy is that most individuals with an approved experiment or other legitimate basis will have an opportunity to fly on the Shuttle, provided there is no reason to suspect that such flight will jeopardize his/her health and well-being or threaten the success of the mission. To date the biomedical information accumulated as a result of previous missions has given us only a peripheral glimpse at the problems which might confront future space medicine specialists and researchers. Many important scientific questions still remain unanswered, and many areas of research have been neglected. Thus, to provide for the health and well-being of Shuttle crews and future workers at space stations, more precise information about the physiological effects accompanying space flight is needed. Health maintenance concepts for the future space travelers require further refinement of safety standards and environmental requirements, and better definitions of human factors in space flight, especially in the areas of human behavior and habitability. In addition, significant research will be required in the area of zero-G-compatible therapeutic modalities, surgical techniques, and the utilization of counter-measures. Needless to say, research activities should also be directed toward a better description of human capabilities and limitations to function in the space environment, predictions and estimations of risk factors to assure maximum career longevity, and development of protective means to permit useful function in near Earth orbit, beyond, and upon return to Earth's environment.

The membership of the Space Medicine Branch has undoubtedly the talent and the capability to play a major role in shaping the future of biomedical research and operations during the Shuttle era. Many members have already contributed significantly to our knowledge in space biology, physiology, and medicine, and are considered leaders in this field of aerospace medicine. I have discussed with Dr. Douglas, the President-Elect, the potential activities that our branch can and should undertake to maintain our leadership in the coming decade and beyond. We both felt that there is a need to establish a forum for our membership in order to produce cross-fertilization of ideas and stimulate dialogue among individual investigators and specialists in the area of space medicine. A decision was made to begin a periodic editorial or newsletter page in our journal. Dr. Rufus Hessberg and Fred Stoffel have graciously agreed. Dr. Adrienne Whyte from BioTechnology, Inc., has agreed to help as Managing Editor of this page. We have requested several U.S. and foreign leaders in space medicine to contribute to this newsletter. In addition, we have encouraged Dr. Thora Halstead to put together an international session on "Space Biology" during the 52nd Annual Scientific Meeting of the AsMA.

I do hope that you will help us in formulating new ideas on how to enhance our involvement in stimulating research and education in the area of space medicine and to better define the future role to be played by our organization. If you would like to contribute to this newsletter, please contact Dr. Whyte at BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, VA, 22042, phone (703) 573-3700.

Arnauld Nicogossian, M.D.
President
Space Medicine Branch

NASA working on energy problems

NASA is playing a leading role in the development of new ways to use energy more efficiently, to convert one form of energy to another, to store energy for future use, and to create energy from waste materials.

Items:

- A steam generating plant funded jointly by NASA, the USAF, and the city of Hampton, VA, is being used to incinerate trash from the city and nearby federal installations to create steam for heating and air conditioning Langley AFB, Va.

- By 1984 NASA hopes to have a 20 M W high-sulphur coal gasifier and cogeneration plant at its Lewis Research Center, Cleveland, OH. The $50-$70 million plant would use proven technology to extract twice as much energy from coal as conventional methods, burning 200 tons of coal a day in place of 1,000 barrels of oil for a saving of $4-$7 million per year in fuel bills. The process involves gasifying the coal, a technology known since the turn of the century, removing the sulphur, and burning gas to drive an electrical generator. The cogeneration comes in with the secondary use via heat exchangers of various exhaust gases and waste heat, a technology known since the 1900s.

- Within the last 6 months, NASA has brought its 1kW REDOX storage battery to the scale-up point. A multikilowatt unit is expected to be ready for testing by 1984. The battery, using membrane and electrode technology, converts chemical energy into electrical energy while discharging and converts electrical energy back to chemical energy while charging. The difference is that REDOX does all this by pumping two reactant fluids—chromium chloride and iron chloride—through a stack of flow cells. Each cell contains a highly-selective ion exchange membrane which, while keeping the fluids separate, allows the transfer of an electrical charge.

- NASA has already been operating for a year a 2 MW wind turbine at Boone, NC, using computers to keep its 200-ft rotor automatically aligned with the wind for maximum efficiency.

- Since 1978, the Papago Indian village at Schuchuli, AZ—with a population of 95—has been using a NASA-installed 3,500 W photovoltaic array to power homes and community buildings.