SPACE MEDICINE BRANCH REPORT

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News roundup about space programs

After more than 18 years of service, NASA's first applications technology satellite (AST1) failed to respond to commands for correction of its eastward drift from geostationary position over the Gilbert Islands in the southwest Pacific. Launched in December of 1966 with an expected life span of 3 years, AST1 provided voice and data communications capabilities to several information networks in the Pacific basin. Educational, health, research, technology and community services had been transmitted through AST1 to 23 autonomous terminals located in Hawaii, Cook Islands, the Mariana and Caroline Islands, Western and American Samoa, the Marshall Islands, Melanesia, New Zealand, and Australia. A unique service provided by AST1 was its Alaskan "Doctors Call," praised by the medical world as the first innovative approach to world medicine in the United States. Through AST1, health service physicians were able to communicate daily with trained health aids in the remote Alaskan bush country.

The USAF School of Aerospace Medicine (USAFSAM), Crew Technology Division, has worked closely with the NASA-Johnson Space Center, Medical Sciences Division, to develop countermeasures to decompression sickness in astronauts who perform extravehicular activities. Since current spacesuit technology will permit the use of somewhat higher pressures, eliminating both denitrogenation and decompression sickness becomes a desirable goal. USAFSAM is currently pursuing research to establish the minimum suit pressure that will eliminate both of these undesirable contaminants of space suit operations. One of the investigations involves a 14.7 psia cabin atmosphere and a 7.8 psia spacesuit pressure which would require no prebreathe. This investigation showed significant bubble formation development in 82% of the subjects, and an incidence of 3.3% decompression sickness. These findings have led to the investigation of bubble threshold for various cabin and suit pressures. The bubble threshold is defined as the pressure at which no significant detectable bubbles are present in the subject under the conditions of the experiments. Preliminary data suggest that 9.5 psia may be the pressure at which significant bubbling does not occur.

On May 14, the Soviets announced that their space station, Salyut-7, was "mothballed, never to be used again in a manned mode." On June 6, the Soviet news agency Tass announced that the USSR launch, the Soyuz T-13, with Vladimir Dzhanibekov, Commander, and Victor Savinykh, Flight Engineer, was on a mission to rejoin the Salyut-7. Prior to docking on June 8, the two cosmonauts carefully examined the condition of the station, then executed manually both the final approach and docking. The following week was spent checking out the condition of the onboard systems of the Salyut-7, making sure that everything was still viable. Progress-24, which docked with the Salyut-7/Soyuz T-13 complex on June 23, apparently indicates that the two cosmonauts onboard the Salyut succeeded in repairing the disabled station's radar transponder, which forced an approaching spacecraft to rely on a "radar-fail" procedure. According to *Aviation Week*, the spectacular success which the cosmonauts had in repairing the various components of the station during its record-breaking 237-day flight may have contributed substantially to the decision to attempt a repair mission such as undertaken by the Soyuz T-13 and which, so far, has been highly successful.

Sam L. Pool, M.D.

Space Medicine: Getting There!

The following contribution to the Space Medicine Branch page was submitted by Dr. Paul Buchanan, the President-elect of the Space Medicine Branch.

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Until Skylab, space medicine was practiced only from the ground. True, there were some very noteworthy experiments performed in Keplerian parabolas, on Gemini 7, and by Boris Yegorov, who was but 1 year short of his medical degree when he flew on Voskhod 1 in October 1964. But prior to the flight of astronaut/physician Joe Kerwin on Skylab and his use of the specially designed and selected equipment in the Inflight Medical Support System, the flight surgeons of the space age had been unable to practice their art and science, face-to-face, with their patients in space. Aside from data collection by nonphysician crewmen, there had been no hands-on medical practice in space until late May of 1973. It was almost 10 years later, April 1983, when Dr. Story Musgrave, (selection group 1965) flew on STS-6 as a Mission Specialist. He performed as our first Shuttle EVA crewman and accumulated a fascinating array of subjective impressions on the space adaptation syndrome.

Dr. Norman Thagard, (selection group 1979) made several valuable observations during his flight as a Mission Specialist on STS-7, but Dr. William Thornton, (selection group 1965) probably established a record for Detailed Scientific Objectives during the flight of STS-8. "Dr. Bill," it should be remembered, was the Scientist Astronaut during the Skylab Medical Experiment Altitude Test (SMEAT) in 1972. This testing and refining of medical hardware for Skylab, while spending 56 days in an altitude chamber, gave Bill an appreciation for designing and building his own hardware for monitoring physiological systems in space. He was given this opportunity and took full advantage of it. He designed and developed equipment to monitor the activity of the extraocular muscles, qualitative peristaltic activity, heart rate, and blood pressure. Mission Commander Richard Truly remarked after checking Bill's progress in the mid-deck, that it "looked like an explosion in an electronics factory." While in many ways it may have seemed like a one-man show, Bill gained, as a physician, some highly valuable insights into the space adaptation syndrome and, as an engineer, valuable first-hand experience in the problems of attaching, controlling, and stowing this hardware in microgravity.

Without meaning to deprecate the work of Garriott, Parker, Merbold, and Lictenberg during the first mission of the ESA-built Spacelab, the physician's perspective on space flight would skip to Mission 51-A (STS-14) on which Dr. Anna Fisher, (selection class 1978) flew as a Mission Specialist. During the second Spacelab flight, 51-B (STS-17), Dr. Thornton and Thagard teamed up to flight test some of the equipment and experiment concepts that will be vital to the success of the first dedicated Life Sciences Spacelab or "SLS-1," scheduled to fly in late 1987.

Meanwhile, the USSR has not been inactive in space medicine. Physiologists and physicians have visited the Salyut 7 Space Station on several occasions and Cosmonaut Oleg Atkov, of the record-breaking 237-day crew, is a cardiologist. There is no doubt that both the USA and the USSR are now committed to a permanent manned presence in space. There is absolutely no doubt that as space stations become functioning realities, the crewmembers will increase and that both men and women will choose to make long periods of residence in space an integral part of their career/life plans. Colonization will follow and the need for a better understanding of the space-normal physiological base line, and clearly defined principles of space medicine will be mandatory.

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