

**MARCH 1993**

*Difficulties of human space research (University of Alabama, Tuscaloosa, AL, and NASA-Johnson Space Center, Houston, TX):* "Research on humans conducted during spaceflight is fraught both with great opportunities and great obstacles... Limitations arise because opportunities to study the same astronauts in well-controlled situations on repeated spaceflights are practically non-existent. Human research opportunities are further limited by the necessity of avoiding simultaneous mutually-interfering experiments. Environmental factors, including diet and other physiological perturbations concomitant with spaceflight, also complicate research design and interpretation. Technical limitations to research methods and opportunities further restrict the development of the knowledge base. Finally, Earth analogues of space travel all suffer from inadequacies."<sup>2</sup>

*Combatting space motion sickness (NASA, Lyndon B. Johnson Space Center, Houston, TX):* "Intramuscular promethazine and its efficacy in the treatment of Space Motion Sickness (SMS) were evaluated using standardized questions administered during postflight debriefings to crewmembers immediately after their first Shuttle flight... The comparison showed that 25% of crewmembers treated with IM promethazine were 'sick' on flight day 2, compared to 50% of crewmembers who did not receive promethazine ( $p = 0.046$ ). Of crewmembers treated with IM promethazine, 90% reported immediate symptom relief as well. Untreated crewmembers typically have slow symptom resolution over 72-96 h, and those treated with oral scopolamine/dextroamphetamine show delayed symptom development."<sup>3</sup>

**MARCH 1968**

*Successful medevac (USAF School of Aerospace Medicine, Brooks AFB, TX):* "Knowledge, judgment, and skills are attributes that every member of the Aerospace Medical Team must possess in order to contribute effectively to the resolution of future aerospace health problems. Exploratory research and engineering efforts of medical equipment have the responsibility of developing special medical equipment, so that in-flight care and treatment may attain the stature of an art. Knowledge, judgment, skills, and applied research relative to development of medical equipment when exercised in concert will help in attaining this potential stature.

"Care aboard aircraft or spacecraft will be dependent on proper preparation of the aeromedical crew and availability of medical equipment that will function in the environment and meet the physiological needs of patients. Providing the best care and treatment possible to patients will depend on these two basic interdependent and inter-related elements. Continuing and continuous education will hopefully satisfy the requirements of the first; applied research and development, the requirements of the second."<sup>1</sup>

*Radiation hazards of space (Naval Aerospace Medical Institute, Pensacola, FL):* "For deep space ventures of the future involving mission times of months or even years, the accumulated exposure from galactic radiation is no longer negligible. Since the development of chronic radiation injury from extended exposure at low dose rates greatly depends on Linear Energy Transfer (LET),

galactic radiation exposure must be assessed in terms of both absorbed doses in millirads and dose equivalents in millirems. While fairly reliable data on the primary galactic radiation are available, the so-called build-up phenomenon, i.e., the local production of secondaries in the vehicle material and body tissues themselves, is not well understood at present. Using upper limit estimates where information is incomplete leads to a total body dose for man of 40 millirads/day and 120 millirems/day for 2-pi incidence of the full flux of galactic radiation at solar minimum... Applying the best available data... man's life will be shortened by one-fourth of the time spent in space."<sup>5</sup>

**MARCH 1943**

*Mental aspects of aviation (Commandant, The [U.S. Army] School of Aviation Medicine):* "At the present time, upwards of 2,000,000 individuals fly each year, exclusive of military flying. The time has come when every practising physician must of necessity have knowledge concerning the effect of flight on the human economy and be prepared intelligently to examine, advise and treat those interested in flying, from whatever standpoint. The Flight Surgeon, and this Association, must always be in the vanguard of this development..."

"An individual may fly in spite of some physical handicap, but it is inconceivable for an individual to fly with a marked handicap of psychogenic origin, a loss of stability or an improper coordination of mind and body..."

"Aeroneurosis also known as 'staleness' is a chronic functional nervous and psychic disorder occurring in aviators and is characterized by gastric distress, nervous irritabilities, minor psychic disturbances, fatigue of the higher voluntary mental centers, insomnia and increased motor activity. This may and does develop in individuals undergoing flight training but is more likely to occur in those with whom flying has become a profession and who have successfully weathered the training period."<sup>4</sup>

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