

## This Month in Aerospace Medicine History-- November 2005

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### Seventy-Five Years Ago

*Hallucinating while flying (from a Department of Commerce Medical Examiner, Jacksonville, Florida).* "[W]hen one takes up flying it constitutes a situation of the human being going into a new and strange environment and, necessarily, in this experience he is subjected to reactional experiences which are entirely new and for which no precedent in his own human experience has been laid down. I am just a little bit interested in the neurological aspect of flying, for I believe, viewing the proposition from the aspect of examination for commercial licenses, that it is entirely in the course of the examination for the examiner to arrive at a fair estimate of the neuro-psychiatric qualifications of the applicant under consideration... In connection with the more advanced phases of flying, I think as medical men we can give some serious thought to this proposition of hallucination of vision. I believe most of you who in the course of your profession or other activities have been forced to take long drives behind headlights have experienced that muscular exhaustion of ocular apparatus which in some individuals results in ocular hallucination... Mr. William Brock, in his transcontinental flight from Jacksonville Beach, Florida, to Los Angeles, tells me that in Arizona in the middle of the day he saw directly beneath him the sun. It was an ocular exhaustion resulting from a terrible situation through which they battled over mountains, expecting to jump in the parachute for a number of hours. Another tells me that in some of his long cross country flights he experienced the same thing. There is the matter of poor visibility behind a poorly illuminated instrument board, with a high powered motor, with its noises, having the effect of lulling one into a state of at least inattention, suddenly arousing him to terrific attention, with a considerable reaction of fright and physical reaction, by suddenly encountering ahead of him a pair of automobile headlights which he looms over by frantically pulling up on the stick. He suddenly realizes it is a matter of ocular apparatus. I want to impress upon you that it is not any mental upset but rather a pure illusion rather than a hallucination." (4)

### Fifty Years Ago

*Human factors and aviation safety.* "The great technological improvements in airframe and engine design, weather forecasting, air traffic control procedures, and air navigation aids have not diminished the importance of the human factor in airline flight and ground operations and maintenance..."

"It is terribly tragic when forty or sixty human lives are lost because some mechanic in a hurry for a coffee break fails to tighten a critical bolt, or some pilot is tempted to try a short-cut that is off airways and not in his manual. But such things can and do happen – not often, but often enough that they should

serve as a constant reminder to airline managements and personnel that safety is and must always be a cardinal element in airline operations.

"And there is no place in aviation for anyone who doesn't subscribe to that view." (6)

*Pilots and aging visited again: an issue not yet grown old.* "Because of its economic, safety, and retirement relationships aging is of more significance for airmen than for most other occupational groups. Functional age is the important factor rather than chronological age, but unfortunately the evaluation of functional age, is at present quite difficult. The ability of the body to maintain homeostasis and the changes of vision and hearing functions represent three areas of functional aging of particular import in determining a pilot's ability to continue flying. Age, skill, reaction to stress, and onset of fatigue are directly as well as reciprocally related functions to be considered in setting up a retirement program. The importance of all this is borne out by the fact that about 350 airline pilots are in the fifty or over age group and about forty active pilots are nearing the age of sixty." (5)

*The great hazard of military aviation.* "The great breadth of the field of aviation medicine is pointed up by the diversity of the problems incidental to successful flight operations... The most pressing medical problems, however, are connected with military aviation. The great hazard in flying is emphasized by the fact that the death rate for the military pilot in peacetime is comparable to that for the non-flying officer in wartime..."

"The important medical aspects of military aviation center around the selection and care of the flyer, the fitness of his environment, and his escape and survival in case of accident. Although these general aspects remain the same, the specific problems keep changing with the introduction of new aircraft. There are few areas of medical research today more challenging than those belonging to military aviation medicine." (3)

### Twenty-five Years Ago

*Heart rate changes, fatigue and the simulated aerial combat maneuver (Crew Technology Division, USAF School of Aerospace Medicine, Brooks Air Force Base Texas).* "Five subjects wearing standard USAF anti-G suits and seated at a 65° back angle were exposed to a simulated aerial combat maneuver (SACM) which was repeated 5 times with 4-min 1-G rests between each SACM exposure. The SACM was 122 s in duration with 10 s acceleration peaks of 10, 8, and 6 G; between these peaks, the subject was at 4 G for 15 s. This series of repeated SACM exposure fatigued four of the five subjects. Heart rate and rhythm, arterial oxygen saturation, expired gases, lactate, pyruvate, glucose, CPK enzymes and isoenzymes, blood volume, subjective fatigue measurements, and subject performance were examined relative to the development of fatigue, the energy cost of the M-1, and tolerance to the SACM. All physiologic-metabolic parameters were significantly affected by the repeated SACMs, however, only heart rate changes appeared to be correlated with developing fatigue. A significant

amount of energy is required to perform the M-1. Subjects whose energy-metabolic and cardiovascular states are least disturbed by high G exposure are those persons who will perform best and become least fatigued during repeated aerial combat maneuvers." (2)

*Level of intelligence as related to US Navy divers (Naval Medical Research and Development Command, Bethesda, Maryland).* "Using a criterion of performance effectiveness derived from actual dives made under operational conditions, comparisons were made between U.S. Navy divers identified as high and low in performance effectiveness. Comparison measures included intelligence, anxiety, disciplinary problems, professional diving recognition, sick call visits, diving accidents, and incidence of decompression sickness (DCS). As expected, the most effective divers made more frequent and more hazardous dives than the least effective divers. In addition they had fewer diving accidents and a lower incidence of DCS. While the most effective divers had lower intelligence scores than the least effective group, both groups were substantially above the Navy average. These findings indicate that intelligence appears to be a critical variable in the career retention of divers, as well as the frequency and types of dives to which divers are exposed. The higher incidence of diving accidents and complications, especially DCS, found among the least effective divers may also have been involved in the lower frequency of diving observed among the members of this group." (1)

*Possible loss of bone mineral in long-term space flight (USAF School of Aerospace Medicine, Brooks Air Force Base, Texas).* "The os calcis mineral was measured in the nine Skylab crew members and in eight control subjects, 5 years after the Skylab Program, utilizing a photon absorptiometric technique. These measurements were compared with preflight measurements in an attempt to discover any long-term effects of space flight on the skeletal system. A statistically significant loss of bone mineral was found in the crew members who flew, but caution is urged in the interpretation of this difference. A recommendation to continue studies of this type is made." (7)

### References

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