AUGUST 1997

Human research subjects (74th Medical Group and Armstrong Laboratory, Wright-Patterson AFB, OH): "The U.S. Air Force has enjoyed the luxury of having dedicated human volunteer subjects for sustained and impact acceleration research for over 50 yr. However, with today's world economy and budgetary cutbacks, this may no longer be a viable option. The onslaught of advanced medical technology, combined with an increasing performance envelope for aircraft and their ejection systems, have created an environment where the validity of research data and the ethics of human-use research are being challenged. Now is an opportune time to reevaluate the way human-use aeromedical research is conducted. The validity of using nonpilots in lieu of pilots in aeromedical research is discussed in light of the following: a) the increased emphasis on performance metrics within sustained acceleration; b) the matching of human subjects (nonpilots) to pilots in the appropriate attributes to ensure validity of data; c) degree of medical screening required given the ethics of human-use research and concerns of pilots; and d) the challenge of evaluating the 'value added' of new technology for medical screening. It is concluded that volunteer panels should be maintained with nonpilots matched with pilots physically and psychologically such that operational performance characteristics are similar."[3]

AUGUST 1972

Fasting and hypoxia (Defense and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada): "Blood pressure response to moderate hypoxia was compared in a fasting and a control (non-fasting) state in 10 seated subjects. End-tidal gas tensions were monitored continuously in the tests. In the control state the mean BP (MAP) was 98% ($P < 0.2$) of its resting value after 45 minutes of exposure to a simulated altitude of 17,000'. When exposed to the same stress after fasting for 18 hours, the MAP fell to 87% ($P < 0.01$) of its resting value. The mean end-tidal P_{O2} was significantly lower in the fasting state…

"We conclude that acute fasting significantly increases the orthostatic, hypotensive response to moderate hypoxia. This synergistic effect was sufficient to induce a syncopal attack in one normal individual during stress by moderate hypoxia while fasting, and this subject's recovery was delayed for more than 20 minutes after return to breathing room air."[1]

Medical aspects of airport design (Office of Aviation Medicine, Federal Aviation Administration, Washington, DC): "The flight surgeon and other aviation medicine specialists are being involved to an increasing extent in the design and operation of major aircraft terminals. Accordingly, a series of biologically supported design features are suggested for incorporation in terminal design. Especially involved are considerations of physically handicapped persons, chronically ill persons, small children, the elderly and infirm and the emotionally disturbed. Specific principles are incorporated in the design guide for accommodating the above groups."[2]

AUGUST 1947

Illusions in flight (University of Hawaii and Naval School of Aviation Medicine, Pensacola, FL): "The illusions reported in the study [reviewing 67 pilots with 77 instances] are of five general types which, in practice, are not always separable; namely, visual, non-visual, conflicting sensory cues, dissociational or recognitional, and emotional. Visual illusions include confusion of lights, splitting of lights (diplopia), autokinesis, depth perception, relative motion, and perspective illusions. There is also evidence that visual hallucinations occasionally occur. Non-visual illusions include failure to perceive rotation itself, or the after-effects of rotation, or both, false sensations, after-effects of rotation, and correct perception with wrong reference point. There may also occasionally be non-visual hallucinations. Illusions resulting from conflicting sensory cues may occur in the visual field, in the non-visual field, or in combinations of the two. Dissociational or recognitional illusions include phenomena of *jamais vu*, *déjà vu*, loss of sense of direction, and loss of the sense of time. General emotional disturbance is non-specific and results in generalized disorientation, including perceptual, rather than in specific illusions occurring in flight affords insight into the environment of the aviator, and the adjustment of the aviator to that environment. Adjustment to the flight environment has two aspects, erroneous response to environmental cues (such as illusions), and the psychological, or emotional and cognitive state of the aviator."[4]

My bubbles! (Ohio State University, Columbus, OH): "Animals subjected to explosive decompression and subsequent exposure to reduced barometric pressures were examined for evidence of intravascular gas bubbles. Of thirteen guinea pigs which died during such exposure, seven showed intravascular gas bubbles after recompression and autopsy. No bubbles were found in animals surviving the exposure. It is believed that the bubbles observed may have been the result rather than the cause of the fatalities. Intravascular bubble formation is considered to be a negligible hazard in explosive decompression."[5] *[Editor's note: Oh, how our knowledge has changed.]*

REFERENCES

1. Hartzell WG, Newberry PD. Effect of fasting on tolerance to moderate hypoxia. Aerosp Med. 1972; 43(8):821–826.
2. Mohler SR, Sirkis JA. Airport medical design guide. Aerosp Med. 1972; 43(8):903–911.
3. Popper SE, Morris CE. Are human subject volunteers still players in aeromedical research as we enter the 21st century? Aviat Space Environ Med. 1997; 68(8):746–750.
4. Vinacke WE. Illusions experienced by aircraft pilots while flying. J Aviat Med. 1947; 18(4):308–325.
5. Whitehorn WV, Lein A, Hitchcock FA. The effect of explosive decompression on the occurrence of intravascular bubbles. J Aviat Med. 1947; 18(4):392–394.

This column is prepared each month by Walter Dalitsch III, M.D., M.P.H. Most of the articles mentioned here were printed over the years in the official journal of the Aerospace Medical Association. These and other articles are available for download from Mira LibrarySmart via https://submissions.miracd.com/asmaarchive/Login.aspx.

DOI: https://doi.org/10.3357/AMHP.6121.2022