

**MAY 1996**

*Implications of postcrash fire (The Johns Hopkins University, Baltimore, MD, and Aviation Science and Technology, Bowie, MD):* "Commuter and air taxi crashes in 1983-88 that involved aircraft fire were analyzed... Aircraft fire was recorded in 17% of the 888 commuter and air taxi crashes. Factors associated with increased likelihood of fire in these crashes were non-airport location (adjusted relative risk 2.7...), twin-engine aircraft (RR 2.5...), and nighttime (RR 1.7...) The majority (59%) of fires occurred during impact sequence, and an additional 17% occurred after the aircraft came to rest. The engine was identified as the ignition source in 59% of the crashes, followed by hot surface (18%), short circuit (9%), and sparks (9%). Fire sensing and extinguishing systems were installed in only 19% of the aircraft. Rescue and firefighting efforts were hampered most commonly by terrain (48%), weather (47%), and darkness (38%)."<sup>5</sup>

*Backpain in helicopter aircrew (Royal Naval Air Station, United Kingdom):* "A questionnaire was used to establish the prevalence and nature of back pain in Naval aircrew (161) compared to a control group of randomly selected non-flying military personnel (310)... Results show that aircrew (82%) experience significantly more back pain than controls (52%) ( $p < 0.01$ ) though the nature of pain was similar in both groups. Significantly more aircrew (73%) than controls (49%) ( $p < 0.01$ ) reported a previous history of back pain and report pain in shoulders (19%), midback (42%), lower back (72%) and across the buttocks (12%). Ergonomic factors were thought to be causative. Of aircrew surveyed, 11 (8%) had been issued with personal lumbar supports which resulted in major subjective improvements in flight-related symptoms... While these findings are not new, no significant steps have been taken to redesign the crew station."<sup>6</sup>

**MAY 1971**

*Body fat and decompression (USAF School of Aerospace Medicine, Brooks Air Force Base, TX):* "Groups of men, numbering 147 in all, among whom body volume and mass had been determined took 883 exposures for as long as 4 hours at 35,000 ft in oxygen or 27,000 ft in oxygen or in 70:30::oxygen:nitrogen while performing mild intermittent exercise. Forty men with less than 12 kg of body fat suffered a low incidence of less intense decompression sickness than the 107 men with 12 or more kg of body fat. This distinction as to influence of body fat on decompression sickness applied both in the absence and in the presence of denitrogenation for periods up to 3.5 hours when completely exposed in 'shirtsleeves' to oxygen at 'ground level.' After 4 hours of such denitrogenation 99% were protected including those with more than 12 kg of fat."<sup>1</sup>

*Sinusitis in pilots (Service of Roentgenology, Hospital "Gyáliut" of the City Council Budapest, Hungary):* "The author surveyed the paranasal roentgenograms of 100 aviators serving in civil aviation for at least seven years. Infection of the facial cavities was prevalent. There was no relation between the incidence and degree of infection and the time spent in service. Circumstances of civil aviation in the role of the pilots' tasks in the development of sinusitis is not necessarily general

or exclusive. On the other hand inflammatory conditions of the paranasal sinuses may represent a predisposing factor for the barotraumatic damage of sinuses. The examination in an altitude chamber is a sensitive method for the functional evaluation. From the point of view of prevention the medical examination before takeoff is important."<sup>7</sup>

**MAY 1946**

*Pilot inaptitude and mishaps (Ninth Marine Aircraft Wing, USMC Air Station, Cherry Point, North Carolina):* "[P]re and post crash data has been accumulated on our 3,000 pilots of this command... This study has revealed three major conclusions... The incidence of death from aviation accidents in pilots with previous repeated 'pilot inaptitude' accidents is approximately four times that of pilots without repeated pilot inaptitude accidents... in pilots with below average flight training records is approximately seven times that of pilots with average or average to above flight training records... in pilots with both below average flight training records and previous repeated pilot inaptitude accidents is approximately fourteen times that of pilots with average or average to above flight training records and no previous repeated pilot inaptitude accidents."<sup>4</sup> [Note: Per editorial comment in the same issue, "As a result of this work, fatal accidents in this one command were reduced from 2.51 per 10,000 aircraft hours to 0.52 per 10,000 aircraft hours."<sup>2</sup>]

*Psychology of aircraft design (Aero Medical Laboratory, Wright Field, OH):* "A list of psychological requirements for equipment design... are based upon existing knowledge of the conditions which should be met in order for the pilot, the navigator, the radar operator, and other aircrew members to carry out their duty assignments most effectively and safely..."

"If aviation is to become a predominant factor in peacetime economy, if it is to continue to be the most effective weapon of war, if adequate provisions for safety in flight are to be achieved, then too much emphasis cannot be given to the problem of designing man's most advanced mode of transportation in relation to man's elementary requirements for perceiving and reacting."<sup>3</sup>

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### JUNE 1996

*Flying and hypercoagulation (Universiti di Cagliari and Italian Air Force):* “We were able to show increased thrombin and plasmin activity both in jet pilots compared to the control group, and after flight in the 6 pilots who were evaluated twice... We conclude that a hypercoagulable state due to flight activity is present in jet pilots after flight. Possible mechanisms involve an effect of psycho-physical stress mediated by a neuroendocrine response to flight activity, or an effect of chronic +G<sub>z</sub> exposure on cardiovascular structure and function...”

“[E]pidemiological studies should be designed to assess whether flight activity should be considered a risk factor for cardiovascular disease.”<sup>1</sup>

*Losing situational awareness (Texas Tech University, Lubbock, TX):* “Situation Awareness (SA)... errors were classified into one of three major categories: Level 1 (failure to correctly perceive the information), Level 2 (failure to comprehend the situation), or Level 3 (failure to project the situation into the future)... Of the errors identified, 76.3% were Level 1 SA errors, 20.3% were Level 2, and 3.4% were Level 3. Level 1 SA errors occurred when relevant data were not available, when data were hard to discriminate or detect, when a failure to monitor or observe data occurred, when presented information was misperceived, or when memory loss occurred. Level 2 SA errors involved a lack of or an incomplete mental model, the use of an incorrect mental model, over-reliance on default values, and miscellaneous other factors. Level 3 errors involved either an overprojection of current trends or miscellaneous other factors... [F]ailure to monitor or observe available information forming the largest single category. Many other causal factors [include]... vigilance, automation problems, and poor mental models.”<sup>4</sup>

### JUNE 1971

*Rudders with prosthetics (Walter Reed General Hospital, Washington, DC):* “Between September 1965 and May 1970 six Army aviators with below-knee amputations have been returned to flight status... The recommended guidelines are: Service need; type of lower extremity amputation and proper prosthetic fit; age of aviator; motivation and career potential; number of hours flown at time of amputation; total time in the military...”

“We plead that these are only guidelines and that experienced Orthopaedic surgeons, Flight surgeons and Personnel management people consider each case on its own merit.”<sup>6</sup>

*Sudden incapacitation in flight (Ohio State University, Columbus, OH):* “As expected, rates of career termination and death from natural causes increase with age. Coronary heart disease plays a major role in this finding. However, the age-specific incidence of coronary heart disease is significantly lower in the airline pilot population than in the U.S.

male population... Between the ages of 25 and 34, the data suggest a higher incidence of death than in the overall white male population of the same age range... The primary factor in the high death rate among younger pilots is the airplane accident...”

“The potential impact on flight safety of these events will depend in large measure on the phase of flight, command status of the affected pilot, and competency of the remaining crew...”

“Immediate recognition of the problem by the remaining pilot and competent, rapid control takeover are essential under these conditions. Airline transport crew training and cockpit design must therefore be compatible with this type of response to in-flight pilot failure.”<sup>5</sup>

### JUNE 1946

*Knock-it-off chamber flights (Aviation Cadet Center, San Antonio, TX):* “The symptoms which caused forced descents from 38,000 feet in the altitude chambers at the Altitude Training Unit, San Antonio Aviation Cadet Center, have been tabulated and analyzed for more than thirty-six thousand aircrew trainees over a period of one year from February, 1943, to February, 1944.

“The aircrew trainees were largely Preflight Aviation Cadets from eighteen to twenty-six years of age and were in excellent physical condition. Some trainees were advanced cadets, and some were experienced flyers...”

“Sudden dizziness, faintness, and collapse with no discernible pain occurred in 0.2 per cent of all trainees ascending to 38,000 feet for fifteen minutes in the low pressure chamber while using oxygen.”<sup>3</sup>

*Future of flight safety (Editorial comment):* “It is all very well to raise the physical standards for airline and commercial pilots; and of this we approve, but no matter how well selected they may be, what chance has one of them flying a jet-propelled plane from New York to Washington in less than 30 minutes, if a private pilot gets in his path—that pilot being one who is ‘negligent,’ ‘disregards orders,’ has ‘poor judgment,’ and ‘has a tendency to get excited too easily,’ or is in poor physical condition?”

“The answer is, of course, not entirely one of physical selection; but to permit individuals who have known physical handicaps or personality defects to handle aircraft, is at least one factor in keeping up the accident rate. Such procedure can hardly be claimed as furthering ‘air safety.’”

“The Civil Aeronautics Administration still seems more interested in increasing the number of flyers than it does in protecting qualified pilots or the public.”<sup>2</sup>

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