Current Abstracts of Aeromedical Literature

Webb JT, Pilmanis AA. Decompression Sickness versus Time at 22500-30000 feet. SAFE Journal 1995;25(2):133-35.

Incidence of altitude decompression sickness (DCS) varies primarily with pre-oxygenation time, time at altitude, altitude, and exercise. With research chamber exposures of fixed length, reported incidence of DCS is typically reported as the percentage of subjects who experienced DCS during the total time of the exposures. Reporting only the final percentage of subjects with symptoms does not indicate the time-course of symptom development. Therefore, we have initiated a retrospective study of the Armstrong Laboratory Hypobaric Decompresion Sickness Research Database records and produced curves of % DCS occurrence versus time of exposure; ie., response curves. The data shown are limited to the first two hours of exposures at 22500 ft to 30000 ft following a 1-h pre-oxygenation. These limits are consistent with current recommendations of operational missions. Using these response curves, one can determine the percentage of DCS observed as a function of altitude and exposure time.

Webb JT, Pilmanis AA. Altitude Decompression Sickness Risk Prediction. SAFE Journal 1995;25(2):136-41.

Exposure to altitudes between 18000 and 25000 ft can cause decompression sickness (DCS). DCS can be prevented with sufficient denitrogenation, but excessive time spent denitrogenating can delay missions or increase the time needed for mission accomplishment. In response to frequent demands for estimates of DCS risks and the need for better definition of denitrogenation requirements, an altitude DCS computerised model based on physical and physiologic principles is being developed at the Armstrong Laboratory, Brooks AFB, TX. This model will be able to predict DCS incidence based on duration of denitrogenation time, variable altitude, and different breathing mixutres. However, until the model is completed and validated, current operational need for guidance in the altitude range of 18-25,000 ft has stimulated development of interim DCS risk prediction tables. The tables in this paper can be used to estimate the preoxygenation time periods, and for heavy exercise versus rest during altitude exposure. Application of these tables to flight operations requires caution since these tables are based on estimates using limited data from a small number of chamber research studies.

Mortimer RG. Some characteristics of US Civil Aviation, Fixed-Wing Accidents involving Spatial Disorientation: 1983-1991. SAFE Journal 1995; 25(2):143-47.

Accidents involving spatial disorientation were 2% of general aviation accidents and 1% of part 135 and part 121 operations, in 1983-1991. About 97% of spatial disorientaton accidents were in part 91

operations. They tended to occur at night, in precipitation, in low ceilings and in restricted visibility. About one-third of the pilots were instrument rated, were males rather than females were in business, law, medicine or teaching rather than professional pilots or in other occupations. The spatial disorientation accidents were very severe, accounting for about 10% of all fatal accidents. However, compared with a decade and a half earlier this represents a 26% reduction.

Voge VM. Self-reported equipment problems of US Air Force and US army rated men and women aircrew. SAFE Journal 1996;25(3):213-17.

We conducted a comprehensive anonymous questionnaire survey of all US Army and US Air Force rated female aircrew, with age and duty matched males. We are reporting on the flight gear information part of the questionnaire, which sought information on flight suits, anti-G suits, flight boots, helmet, flight gloves, torso harnesses, oxygen masks, and eyeglasses; as well as comfort and adequacy of issued flight gear. 1164 questionnaires were sent out, with a 56-57% return rate. The greatest complaint was with the fit of the flight suits from female respondents. Women also complained about the fit of the flight gloves and flight boots. Oxygen masks fit was problematic for both sexes. There were many varied problems with eye-glasses. The rated aircrew had a multitude of suggestions for better flight equipment. Some of the problems voiced can be easily rectified, others will require some difficult choices. Accepting smaller women (and men) into the program brings about some challenges related to inadequate fit because the equipment was not designed for small frames and the shape of the female. Other problems elicited affect both men and women and may not have been previously recognised.

Rimm EB, Ascherio A, Giovannucci E, Spiegelman D, Stampfer MJ, Willet WC. Vegetable, Fruit, and Cereal Fiber Intake and Risk of Coronary Heart Disease Among Men. JAMA - India 1996;19(1):23-27.

Objective - To examine prospectively the relationship betwen dietary fiber and risk of coronary heart disease.

Design - Cohort study.

Setting -in 1986, a total of 43757 US male health professionals 40 to 75 years of age and free from diagnosed cardiovascular disease and diabetes completed a detailed 131-item dietary questionnaire used to measure usual intake of total dietary fiber and specific food sources of fiber.

Main Outcome Measures - Fatal and nonfatal myocardial infarction (MI).

Results - During 6 years of follow-up, we documented 734 cases of MI (229 were fatal coronary heart disease). The age-adjusted relative risk (RR) for total MI was 0.59 (95% confidence interval (CI), 0.46 to 0.76) among men in the highest quintile of total dietary fiber intake (median, 28.9 g/d) compared with men in the lowest quartile (median, 12.4 g/d). The inverse association was strongest for fatal coronary disease (RR, 0.45; 95% CI, 0.28 to 0.72). After controlling for smoking, physical activity and other known nondietary cardiovascular

risk factors, dietary saturated fat, vitamin E, total energy intake, and alcohol intake, the RRs were only modestly attenuated. A 10-g increase in total dietary fiber correspondeed to an RR for total MI of 0.81 (95% CI, 0.70 to 0.93). Within the three main food contributors to total fiber intake (vegetable, fruit, and cereal), cereal fiber was most strongly associated with a reduced risk of total MI (RR, 0.71;95% CI 0.55 to 0.91 for each 10-g increase in cereal fiber per day).

Conclusion - Our results suggest an inverse association between fiber intake and MI. These results support current national dietary guidelines to increase dietary fiber intake and suggest that fiber, independent of fat intake, is an important dietary component for the prevention of coronary disease.

Lyons TJ, Connor SB. Commentary : Increased Flight Surgeon Role in Military Aeromedical Evaluation. Aviat Space Environ Med 1995;66:927-9.

Background - Physicians were involved in the development of aeromedical evacuation (medevac) and flight surgeons flew as crew members of the first US military medevac flights. However, since World War II flight surgeons have not been routinely assigned to operational medevac units. The aeromedical literature addressing the role of physicians in medevac is controversial. Recent contingencies involving the US Air Force (USAF) have required the augmentation of medevac units with flight surgeons.

Recent Changes in the European Theatre: Beginning in 1992, the United States Air Forces Europe (USAFE) assigned three flight surgeons to the medevac squadron between 2 February 1993 and 24 March 1994 USAFE moved 241 patients on 29 missions out of the former Yugoslavia - most of these missions had a flight surgeon on the crew. Because advance medical information on the status of these patents is often non-existent, the presence of a physician on the crew proved life saving in some instances. In Peacetime operations, there has been a recent trend in the European theatre of the USAF to move more unstable patients.

Observed Benefits of Physicians in Medevac : Dedicated medevac flight surgeons have proven to have the specific experience and training to perform effectively in the role of in-flight medical attendant. In addtion, they are effective in negotiating with referring physicians about the urgency of movement, required equipment, the need for medical attendants, etc. These flight surgeons also provide medical coverage of transiting patients in the Aeromedical Staging Flight (ASF), thus providing needed continuity in the medevac system.

Conclusion: Dedicated medevac flight surgeons fill a unique and valuable role in medevac systems. Agencies with medevac units should consider assigning flight surgeons to these units.

Keefer KM, Johnson R. Spontaneous resolution of retained renal calculi in USAF aviators. Aviat Space Environ Med 1995;55:1001-4

USAF aviators may be granted medical waivers for continued flying duties when diagnosed of having retained renal calculi in parenchymal locations or in portions of

the collecting system from which spontaneous passage is unlikely. The USAF Aircrew Medical Waiver File was reviewed in order to determine the proportion of USAF aviators with waivers for retained renal calculi whose calculi subsequently resolved. Of the 60 currently active aviators granted waivers between January 1976 and December 1990, 7 have had their retained calculi resolve following surgical intervention, and 13 (21.7%), 95% CI (11.2%, 32.1%) had "spontaneous" resolution of their retained calculi. Using the Armstrong Laboratory's Aeromedical Consultation Service clinical database, it was possible to determine how the diagnoses of retained stones were established and/or disestablished in 15 of the 60 aviators. Theories on stone formation and resolution, tools employed in diagnosis, and implications of these study findings on flight duties are discussed.

Saboe GW, Slauson JW, Leocker TH. The aeromedical risk associated with asymptomatic cholelithiasis in USAF pilots and navigators. Aviat Environ Med 1995;66:1086-9.

Background: The US Air Force (USAF) aeromedical policy regarding incidentlally discovered, asymptomatic cholelithiasis required the aicrew to undergo cholecystectomy prior to being considered for return to flying duties.

Hypothesis : The merit of continuing this USAF policy was evaluated at the request of the US Air Force Surgeon General.

Methods : A medical literature review of the natural history of cholelithiasis in the general population was completed. The USAF aircrew waiver file (1972-92) and the Ellingson Aerospace Medicine Conslutation Service (ACS) data file (1955-92) were reviewed for cases of USAF pilots and navigators with a diagnosis of cholelithiasis or cholecystectomy. Pilot and navigator annual manpower data were obtained form the Air Force Military Personnel Centre (1972-92) and used in calculations involving the USAF aircrew waiver file. Surgical morbidity and mortality information was obtained from the Division of Surgery, Wilform Hall Medical Centre.

Results : Literature review predicted a 1-4% annual rate of acute events in individuals with previous asymptomatic cholelithiasis. Based on KUB radiographs taken at ACS, the prevalence of asymptomatic cholelithiasis or cholecystectomy. Between 1972 and 1992, an estimatd 16,232 man-years of pilot/navigator exposure to asymptomatic cholelithiasis occurred; however, only 50 cases with a diagnosis of cholecystectomy or cholelithiasis were reported in the USAF waiver file. Mortality and morbidity for cholecystectomy, whether perfomed by open or laroscopic technique, were reported as 0.2% and 5% , respectively, in the general population.

Conclusion : The overall incidence of acute cholecystitis within USAF aircrew would not be changed by aeromedical cholecystectomy being performed on aviators with incidentally detected asymptomatic cholelithiasis.

Mason KT, Shannon SG, Diabetes mellitus rates and outcomes among US Army aviators. Aviat Space Environ Med 1995;66:1175-8.

The US Army Aviation Epidemiology Data Register (AEDR) was queried for Army aviators with the finding of glycosuria, hyperglycaemia, impaired glucose tolerance, diabetes mellitus (DM), use of oral hypoglycaemic agents, or use of insulin for the period 1988-92. The study tabulated the incidence and age-specific annual rates of DM, and tabulated the distribution and reasons for aeromedical dispositions of aircrew with DM. US Army aeromedical planners can expect an incidence of 0.47 cases of DM per 1000 aviator - years per year. Aviators over 35 yr old were at the greatest risk. About 78% of the aviators with DM will be removed permanently from army flying duties. This was due primarily to an inability to gain dietary control of their condition or the discovery of other significant medical conditions, such as coronary artery disease.

Voge VM, Hastings JD, Drew WE. Conclusive Syncope in the Aviation Environment. Aviat Space Environ Med 1995;66:1198-1204.

Syncope in the aviation environment can be a very difficult problem to assess. Even more difficult is the differential diagnosis between convulsive syncope and epilepsy after the first event. This paper discusses syncope in general and the differential diagnosis between vasovagal syncope and other forms of syncope. About 50% of all syncope episodes cannot be identified as to aetiology. However, benign outcome for a single syncope episode, non-cardiac in origin, is the norm. The diagnosis of syncope is disucssed, emphasising that a meticulous history from an observer of the patient, a good physical examination, and an ECG are cornerstones of diagnosis. Other diagnostic avenues are discussed. Convulsive syncope occurs in only about 12% of syncope episodes 65% of these being vaso-vagal in origin. The other 35% are due to a variety of causes. We found no good algorithm to differentiate convulsive syncope from epilepsy. We reviewed the literature to develop a differential diagnostic focus on: age, awake status, position, emotional/physiologic stressors, onset, aura, appearance, injury on falling, seizure characteristics, automatism, length of unconsciousness and subsequent confusion, pulse characterisites, blood pressure, urinary incontinence, seizure duration , recovery time post-event, post seizure sequel, amnesia, posture vs. recovery, EEG characteristics, and the value of sophisticated diagnostic procedures.