Seventy-five Years Ago

Comparing civilian and military aviation medical examinations (Captain 37th Division Air Service, Consulting Flight Surgeon, United Air Lines and American Air Lines): "In comparing the military and commercial aviation medical examinations as carried out in the United States, we wish to review only the more interesting aspects of the tests rather than to give a detailed comparison which might serve to be only confusing. There are basic differences in the background which are more evident now than they have been in the past. The function of the entrance examination given to candidates for training in the Army and Navy is concerned primarily with eliminating all those who show the slightest physical abnormality. It costs a large sum of money to train a cadet in his first year of military flying. The cost rises proportionately with the number who are accepted but are later found wanting and discharged before their training is complete. The coöperation of the medical department is essential in keeping this cost down and the extreme meticulousness observed in these examinations of cadets is well justified when the reasons are understood…

"Safety is most important in the advance of aviation and is one factor concerning which we as physicians must play an increasingly important role…

"The standards of visual acuity for military and commercial transport pilots are similar and essentially those in use in all countries. In making these tests it is most important that proper lighting be correctly used…

"The commercial standard for transport pilots diverges from the military in the more lenient issuance of waivers for defects in visual acuity in pilots of experience. We are inclined to agree with this attitude when his flying ability is demonstrable by flight tests. The need for 20/20 vision is not nearly so great in those who have had thousands of hours of experience and fly over familiar terrain almost daily…

"Our standards in regard to private and amateur pilots in allowing the correction of grossly defective visual acuity is of course allowed by no military service and approached by only a few foreign countries…

"Both the military and the commercial standards of the judgment of distance depend on the use of the Howard depth perception apparatus. A suggestion made by Major Simpson of the Army Air Corps to effect that the lighting of the apparatus be confined to the background of the instrument is pertinent. It is true that with the source of illumination placed above and in front of the sticks, the intensity of the illumination on the movable stick varies as the square of the distance from the light source, thereby rendering changes in the position of the stick more apparent…

"The general physical examination is conducted by the military services in the manner usual in all really thorough physical examinations with a few points of exception. Temperature, chest and abdominal measurements are recorded carefully. Abnormalities of size and weight render men unfit for military service in many instances and specific regulations in this regard are adhered to. It must be borne in mind that this group should be of such a type and in such physical condition as to be prepared at any time to participate in a rigorous campaign and to withstand long periods of physical stress.

"The examination of the circulatory system is supplemented in the military services by the Schneider test, concerning which considerable has been said at previous meetings of this society. The examination of air line pilots as at present conducted by most companies also includes this test. Care must be taken that the numerical score is not taken too much to heart by serious minded or apprehensive pilots. There are many factors which influence the Schneider test, and it is truly a test of neurocirculatory efficiency rather than of general physical condition. It is especially influenced by nervous tension, apprehension of the examination or the examiner, the intake of food just prior to the examination, etc." (3).

Fifty Years Ago

Risk of phlebitis in air travel: "The modern aerial traveler is well protected from many of the hazards and stresses of flight – hypoxia, dysbarism, temperature change, turbulence, noise and vibration. He now flies higher, smoother, faster and *farther*. This report describes a series of eight cases of venous thromboembolism which are believed to be related to long distance flight. Three factors have been implicated in the pathogenesis of venous thrombosis: (1) damage to the endothelial wall (mechanical, chemical, bacterial), (2) stasis of blood in the veins and (3) alterations in the coagulability of the blood. In many cases of thrombosis more than one factor is responsible…

"In 1940, Simpson reported a sixfold increase in deaths due to pulmonary embolism accompanying the aerial bombardment of London. Twenty-one of twenty-four cases, died suddenly after a stay of one or more nights in air raid shelters…

"Naide reported a series of six cases of spontaneous, venous thrombosis in the legs of tall men. In three, the first symptom was pulmonary infarction. In none could the usual causes of phlebitis be implicated. It was speculated that the greater vein length predisposed to stasis…

"Four of the following eight cases were seen at the U. S. Air Force Hospital, Wiesbaden, Germany between December, 1957 and September, 1958; four were observed at other Air Force hospitals. Similar examples have been encountered in the past few years to strengthen the belief that 'passenger phlebitis' is more common than generally recognized. One patient died of pulmonary embolism. All traveled in military aircraft with variable seat configurations, four in 'high-density seating' aircraft. The flights all were of long duration, often transoceanic. Without exception, prolonged immobile sitting occurred…

"Clinically, the thrombophlebitis observed in these patients differed in no way from that encountered in the nontraveller. In each instance it developed following long flights usually more than ten hours in duration. Most of the flights were transoceanic and some were repetitive…

"Significantly, five of the eight patients had a past history of venous or thromboembolic disease. At least four were smokers…

"Of the current eight episodes of thrombophlebitis, three patients had manifest pulmonary embolic complications. In another, chest pain occurred without clinical or x-ray evidence of pulmonary infarction. Pulmonary embolism was presumed. One patient died of massive pulmonary embolism and acute cor pulmonale.

"Lower extremity symptoms and signs occurred early, usually within the first twenty-four hours after deplaning…

"Prolonged sitting and immobility played dominant roles in causation. The occurrence of previous thrombovenous disease in five of the cases indicated predisposition and the need for caution when these passengers fly. 'Passenger phlebitis' should be suspected whenever calf pain or tenderness, lameness, painful walking, persistent or recurrent edema, chest pain or hemoptysis, follow long flights. Passengers should be briefed regarding prolonged immobility in flight, particularly where previous venous disease or thrombosis has occurred" (1).

Twenty-five Years Ago

Does muscle fiber type affect G-tolerance? (Dept. of Aerospace and Environmental Medicine, Karolinska Institutet and National Defense Research Institute, Stockholm, Sweden): "The relationship between sustained G-tolerance and muscle fiber type composition was studied in 28 fighter pilots and 10 nonpilots. The G-tolerance, as assessed by the aerial combat maneuver (ACM) acceleration profile and modifications of it, was measured in a human centrifuge. Percutaneous muscle biopsies were obtained from *m. vastus lateralis* at rest. Histochemical analyses were carried out to identify and calculate the percentage of fast twitch (FT) and slow twitch (ST) fiber types. Additional analyses were performed for determination of muscle fiber size and capillary density. Mean (± SD) muscle fiber type composition in pilots and nonpilots, respectively, were 60 ± 5 and 52 ± 10% FT. There was no correlation of fiber type composition, fiber size, or capillary supply with G-tolerance. It is concluded that muscle fiber type composition and associated metabolic characteristics do not modify sustained G-tolerance to any significant extent" (2).

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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 under the titles *The Journal of Aviation Medicine* (1930-1959), *Aerospace Medicine* (1960-1974), and finally, *Aviation, Space, and Environmental Medicine* (1975-present). These and other articles will be available for download from LibrarySmart in the near future.

DOI: 10.3357/ASEM.22010.2009