MAY 1991

Could modafinil be the next miracle performance sustainment pharmaceutical? (Headquarters USAF Human Systems Division and USAF School of Aerospace Medicine, Brooks Air Force Base, TX): "Modafinil, a novel stimulant which has several remarkable features that distinguish it from other stimulants, has been developed by Lafon, a French pharmaceutical company. Unlike the amphetamines, for example, modafinil is reported to have minimal peripheral side effects at therapeutic doses. It also appears to have a low abuse potential, does not interfere with normal sleep, and does not seem to produce tolerance. It improves vigilance especially in sleep-deprived subjects. It has been used clinically for up to 3 years in the treatment of narcolepsy and idiopathic hypersomnia. It could be an ideal replacement for amphetamine in short-term operations in which fatigue might threaten the successful completion of a mission. We recommend that military laboratories experienced in studying sustained performance include modafinil or perhaps a more selective alpha 1 receptor agonist in their investigations."[4]

An inflated case study (Extremadura University, Badajoz, Spain; 23rd Wing of Spanish Air Force, Talavera AFB, Badajoz, Spain; Infanta Cristina Hospital, INSALUD, Badajoz, Spain): "This paper reports a case of left hemidiaphragmatic paralysis in an instructor pilot and his later recuperation. This incident was provoked by a failure in the anti-G suit, which remained inflated after the aircraft completed the maneuver that had originated the inflation. The spontaneous recuperation of both the respiratory functional test and the neurophysiological pattern are consistent with a Type II Seddon's axonotmesis of the phrenic nerve. Considering the short time of regeneration (6 months), this lesion must have involved the distal portion of the phrenic nerve."[5]

MAY 1966

Are dry suits really better than wet suits? (U.S. Army Research Institute of Environmental Medicine, Natick, MA, and the U.S. Naval Medical Research Institute, Bethesda, MD): "Immersion protection flight clothing can be of either a skin diver, 'wet' suit type or waterproof, 'dry' suit. A waterproofed copper manikin was used to study the insulative properties of both types of suits, in air and also during water immersion. The bulkier characteristics of the dry suit studied, the Mark 5A, provided greater insulation in air than either a 1/4" or 3/16" unicellar sponge, neoprene wet suit. However, during water immersion, compression of the 'dry' suit by the water reduced the insulation by 75%. The insulation of the 'wet' suits was also reduced but these suits are less compressible and thus during water immersion provide significantly more insulation than the 'dry' suit."[2]

Fractures through the roof…or canopy (U.S. Naval School of Aviation Medicine, Pensacola, FL): "Vertebral fracture rate analysis of U.S. naval aircraft accidents in the period fiscal years 1959 through 1963 showed that the highest rates were found in jet aircraft ejections. The F-3 and TF-9J aircraft with multiple catapult seats had significantly higher ejection fracture rates than all other aircraft seat combinations, the sitting height accommodations of both aircraft are below the 70th percentile, and over 94 per cent of all ejections from both aircraft were through the canopy. The combination of the sitting-height disparity between man and aircraft, and high through-the-canopy ejection rate would appear to be a major factor in production of vertebral fracture in the accidents studied."[1]

MAY 1941

Hypoxia…close call! (Vice President in Charge of Engineering, Transcontinental and Western Air, Inc., Kansas City, MO): "It was necessary [when developing and testing high altitude aircraft], when cruising for any length of time above 30,000 feet, for the crew to breathe practically pure oxygen in order for them to maintain body efficiency and normal mental alertness. No masks were used. A rubber tube, which was carried between the teeth on one side of the mouth, was employed for breathing the oxygen. After a little practice, it became very easy to breathe pure oxygen in this manner. After completing an inhalation, the oxygen was cut off by closing the tube with the teeth and exhaling through the nose. On one flight to Wright Field the observing personnel had a very close call. The flight was commenced with two gaseous oxygen liters of 39 cubic feet capacity which were hooked up in parallel. One bottle was turned on at a time. Mr. Hiestand, research engineer and observer, had instructions to pass a note to the pilot when the first bottle was nearly empty in order that final descent could be made well before the second bottle would become empty. While the plane was cruising at 30,000 feet above Terre Haute, Indiana, at night, the oxygen supply suddenly failed. I nosed the plane down at a rate of descent of 2,500 fpm, which was the maximum due to limiting airspeeds. At 25,000 feet, I felt that I would be able to retain consciousness until the altitude was reached where enough oxygen would be available to keep me from passing out. At about 22,000 feet the oxygen supply came back on and assuming that Mr. Hiestand had simply forgotten to check the first bottle and had failed to turn the second bottle on, I climbed back to 32,000 feet and continued the flight. Upon arriving at Wright Field a serious state of affairs was found to have existed in the observer's compartment, where Mr. Reeves of the General Electric Company was riding with Mr. Hiestand. What had really happened was that when Mr. Hiestand had turned around in the cockpit to check the amount of oxygen remaining in the first bottle, he had pulled the oxygen tube off the nipple to the oxygen line. Before he could get it back on he was unconscious. Mr. Reeves did everything possible to bring him to. He put the oxygen tube in one nostril as he was unable to get it into his mouth after reconnecting the tube. He also shook him and slapped his face in an attempt to bring about some signs of life, but to no avail. While in the process of attempting to revive Mr. Hiestand, the first bottle failed, but fortunately Mr. Reeves was sufficiently familiar with the installation

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AEROSPACE MEDICINE HISTORY, *continued*

Fig. 1. An illustration from the original article of the vibrator with attachment.

to turn on the second bottle after several minutes had elapsed. Mr. Hiestand did not regain consciousness until the plane had descended to about 5,000 feet going into Wright Field. As we continued after this incident to fly at 32,000 feet for about 30 minutes, it is entirely probable that Mr. Hiestand would have died had not Mr. Reeves had the presence of mind to insert the oxygen tube in Mr. Hiestand's nose. Unquestionably oxygen masks would have been desirable for this type of flying but at the time there were none of any merit available."[6]

An improved technique for applying electrode jelly (Eastern Air Lines, Inc., Coral Gables, FL): "The use of a vibrator for the application of electrode jelly in the production of electrocardiographic tracings has been found to be more satisfactory than the usual method of applying the same with a towel or piece of gauze. Experience demonstrates that applying the jelly with the rubber finger-like vibrator attachment [**Fig. 1**] results in a saving of two-thirds of the amount of electrode jelly formerly required when applied with gauze or towel. Skin resistance seems to be broken down more quickly and effectively by the use of the vibrator."[3]

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