ABSTRACTS OF CURRENT AEROSPACE MEDICAL LITERATURE

I. Acceleration Physiology

1. Recurrent + Gz induced loss of consciousness. Whinnery JE, Jones OR: Aviat Space Environ Med 1987; 58 (10): 943-947

The authors found that with very high onset rates of + Gz, G-LOC episodes increased both in number and duration of incapacitation. There is a sense of intoxication with perioral numbness and paraesthesiae in the extremities. Dream like states are seen which are described as hypnopompic hallucinations. Rapid eye movements and clonic seizures with flailing of extremities are also seen in a number of cases. Post LOC, a period of incapacitation occurs when he is slowly beginning to become aware of his surrounding but is unable to move his limbs purposefully. Most subjects are unaware of the episode and even if they are aware, they try to deny it because of embarrassment over the episode. Aircrew should be thoroughly familiar with not only the physiologic aspects of G-LOC but the psychologic aspects also.

II. Behavioural Sciences

2. Alterations in immunocompetence during stress, bereavement and depression: Focus on neuroendocrine regulation. Calabrese JR. Kling MA, Gold PW: Am J Psychiatry 1987; 144:1123-1134

It has now been clearly recognised that stress, bereavement and depression can compromise specific components of the immunologic apparatus. In the first part the authors have given a brief overview of the fundamental immunology. This is followed by a review of the patterns, possible causes and clinical implications of abnormal immunoregulation and a discussion of the immunomodulating properties of glucocorticoides. The authors conclude with an overview of the many factors that mediate between immunologic function, the brain and neuroendocrine regulation.

3. Can antidepressant cause mania and worsen the course of affective illness? Wehr TA, Goodwin FK: Am J Psychiatry 1987; 144:1403-1411

Several investigators have recently challenged the belief that antidepressants can cause or precepitate mania or rapid cycling between mania and depression. With one exception, there appear to be no placebo controlled studies of switches into mania in bipolar patients during antidepressant treatment. Patients most likely to switch into mania during antidepressant therapy have probably been excluded from maintenance treatment studies. On balance, the available evidence suggests that some bipolar patients become manic, and a few experience rapid cycling, when they are treated with antidepressants. The prevention of these responses will require further research on risk factors and on the antimanic efficacy of coadministered lithium or other mood stabilizers.

III. Clinical Aerospace Medicine

4. Lipid levels in subjects with impaired glucose tolerance. Ranga Rao KV, Seshiah V, Moses GPS: Indian J Med Res 1987; 343-346

Higher incidences of atherosclerotic vascular disease, ECG abnormalities and hypertension are known associations with abnormal glucose tolerance. Total cholesterol (TC), triglycerides (TG) and high density lipoprotein (HDL) cholesterol were estimated in 51 cases of impaired glucose tolerance (IGT), 78 non-insulin dependent diabetics (NIDD) and 52 healthy subjects acting as controls. TC and TG were not different in males with IGT from healthy subjects. In females with IGT it was found that both TC and TG were higher from the controls. There was no significant changes in HDL cholesterol levels in either sex. The HDL cholesterol percentages of total cholesterol were lowest in IGT subjects, with greater lowering in females. The presence of such lipid profiles in females with IGT might contribute to a higher prevalance of coronory artery disease, since the observed profiles are atherogenic.

5. Progression of and recovery from pulmonary oxygen toxicity in humans exposed to 5 ATA air. Eckenhoff RG, Dougherty JH, Messler AA, Osborne SF, Parker JW: Aviat Space Environ Med 1987; 58(7):658-667

It is known that 100% oxygen causes pulmonary oxygen toxicity (POT) but whether this is due to increased concentration of oxygen or due to increased partial pressure of oxygen is not clear. Subjects were exposed to air at 5 atmosphere absolute in a hyperbaric chamber for 48 h and compared the rate of development of symptoms of POT to those as seen in earlier studies using 100% oxygen at 1 atmosphere absolute. The symptoms were cough, chest tightness, dyspnoea and others, starting after 12 h of exposure and continuing for several days during recovery. Vital capacity, flow rates and DL_{co} decreased significantly. All subjects

showed complete recovery in 8 d. A control group consisting of 6 subjects were exposed to 5 atmosphere absolute breathing 6% oxygen - a partial pressure of oxygen of .3 ATA - a lower value as compared to experimental subjects. None of the control subjects developed any changes.Comparision of these data to that for pure oxygen studies reveals no significant difference in the progression or character of pulmonary oxygen toxcity.

IV. Environmental Physiology

6. Decrement in postural control during mild hypobaric hypoxia. Fraser WD, Eastman DE, Paul MA, et al: Aviat Space Environ Med 1987; 58 (8):768-772

Postural control was tested at ground level, 1,521 m (5,000 ft), 2,438 m (8000 ft), 3,048 m (10,000 ft) and 3,658 m (12,000 ft) in 39 men using a Kistler force platform. The total sway increased at the first three levels of hypoxia but no change in sway was seen in those subjects exposed to 3658 m as compared to ground level. Both SaO_2 and $PETO_2$ decreased in relation to alititude. Arguements are advanced to indicate that intervention of compensatory mechanism at higher altitude may explain the recovery of postural stability at 3658 m.

7. The influence of regional insulation on the initial response to cold immersion. Tipton MJ, Golden FSт C: Aviat Space Environ Med 1987; 58 (12):1192-1196

"Cold shock" denotes the initial reflex responses associated with cold water immersion. They are mediated by the sympathetic nervous system and include an increase in heart rate, an uncontrollable hyperventilation, intense vasoconstriction and hypertension. Such responses constitute a serious threat to survival especially in individuals with cardiovascular disease and also in healthy individuals who in order to avoid inhaling water, must voluntarily control ventilation. This study has been done to show the importance of different body surface areas in initiation of cold shock responses.

Twelve healthy male subjects performed three 10 min head-out immersions in water at 10oC. The response of the subjects were recorded under three conditions: a. Control condition (CC) - torso and limbs exposed, b. Torso protected/limbs exposed condition (TPC), and, c. Limbs protected/torso exposed condition (LPC). Results showed that LPC significantly reduced the heart rate, minute ventilation and respiratory frequency during the first minute of immersion compared to the CC. Subjects found the LPC most comfortable. TPC significantly reduced minute ventilation and respiratory frequency on immersion compared to the CC, but did not significantly lower heart rate. Comparison of LPC and TPC showed no significant difference in minute ventilation and respiratory frequency. LPC however produced significantly lower heart rates on immersion than TPC.

The authors concluded that limbs may be more important than the torso for the initiation of cardiac response to cold water immersion.

V. Ophthalmology

8. Electroretinographic findings in sickle cell retinopathy. Peachey NS, Charles HC, Lee CM, et al: Arch Ophthalmol 1987; 105:934-938

The findings in sickle cell retinopathy include neovascularisation, auto infarction, or vitreous haemorrhage. In disorders associated with retinal ischaemia there are alterations in electroretinogram (ERG). The authors compared the ERG of 10 normals with those obtained from 19 patients with sickle cell disease, of whom 8 had evidence of peripheral retinal vascularisation and 11 patients did not have neovascularisation. The normal and patient groups were age matched to avoid possible age related ERG changes. The findings showed that the ERG components (a-wave, b-wave and oscillatory potentials) of patients without neovascularisation did not differ from those of normals in either amplitude or implicit time. However, the ERG components obtained from patients with peripheral retinal neovascularisation were reduced in amplitude. The authors suggest that these reduction in amplitudes may have been due to photoreceptor dysfunction secondary to choroidal ischaemia or possibly increased oxygen demands by the inner retina. The findings point to the possible use of ERG in assessing the consequence of peripheral retinal ischaemia to retinal cell function and could be used to follow patients with sickle cell disease for the development of clinically significant peripheral retinal neovascularisation.

9. Lack of evidence for aspirin use and prevention of cataracts. West SK, Munoz BE, Newland HS, Emmett EA, Taylor HR: Arch Opthalmol 1987; 105:1229-1231

Aspirin use has been reported to be protective for cataracts in studies of patients with rheumatoid arthritis, diabetes mellitus and of patients admitted for cataract extraction. The authors carried out a study on the effects of aspirin use and prevention of cataracts. A population based cross-sectional survey of 838 men aged 30 years and above was conducted

to examine the effect of aspirin, and other potential risk factors, on the prevalence of cataracts. The lens opacities were graded on clinical examination for location (cortical, nuclear and posterior sub capsular) and severity. The results do not support the claim that large doses of aspirin, or frequent use of aspirin, protects against or retards the growth of lens opacities.

VI. Otolaryngology

10. Recovery and probable persistence of cytomegalovirus in human inner ear fluid without cochlear damage. Davis LE, Rarey KE, Stewart JA, McLaren LC: Ann Otol Rhinol Laryngol 1987; 96(4):380-383

Cytomegalo virus (CMV) was recovered from a 5 month old infant with probable congenital infection. In life, no hearing impairment had been observed. Auditory brain stem evoked responses were bilaterally intact. At necropsy, both temporal bones were morphologically normal, as demonstrated by light and electron microscopy. Sensory hair cells of the organ of Corti appeared intact. Cytomegalo virus was recovered from a mixture of perilymph and endolymph, but not from the brain, CSF, or vitreous humor. This appears to be the first report of an individual with an inner ear CMV infection in which neither structural nor functional alterations of the inner ear were apparent. This case also suggests that CMV can persist within the inner ear for prolonged periods following congenital infection.

VII. Space Medicine

11. Treatment of severe motion sickness with antimotion sickness drug injections. Graybiel A, Lacknier JR: Aviat Space Environ Med 1987; 58 (8): 773-776

Space motion sickness usually starts within 36 h in space and abates by 96 h. The authors studied the effectiveness of the use of intramuscular injections of scopolamine, promethazine, and dramamine in controlling space motion sickness in individuals participating in parabolic flight experiments. Majority of individuals received benefit with promethazine 50 mg or scopolamine 0.5 mg. There was no benefit with promethazine 25 mg or dramamine 50 mg. These drugs may provide benefit by both suppressing symptoms of space motion sickness and by allowing adaptation to the weightless environment to proceed.

12. Body volume changes during simulated weightlessness: An overview. Montgomery LD: Aviat Space Environ Med 1987; 58:A80-85

Fifty three healthy male and female adults were taken up for the study on blood volume changes during 4 hours bed rest for 7 days each. Blood volume changes were estimated by leg and arm circumference measurement at 3-5 cms intervals (similar to Skylab studies). Changes occurred are as follows :

Calf volume changes are immediate, progressive and uniform across subjects. Calf volume changes may not be indicative of other segmental changes with time or across subjects. Pelvic and torso segmental volume changes are subject dependent. A large (2-3 litres) volume is displaced into thoracic/pelvic area from the extremities. This transfer takes place within the first few hours of -6° bed rest. Torso segmental volume remains elevated during the total period when subjects are placed in a -6° anti-orthostatic position.

The pelvic segment of various subjects will respond differently to simulated weightlessness. Several of the individual subjects were found to lose volume from the legs/thighs and torso into the pelvis during short term bed rest. Others lost fluid from the leg and pelvic segments directly into the torso during the same time period.