Hyperarousal in Space Flights

SIR,—I was fascinated by your leading articles before and after the Apollo 13 flight (11 April, p.67 and 2 May, p.249). In these you drew attention to physiological matters, but did not refer to the effects of the psychological stresses to which the astronauts were exposed. As symptoms were experienced on this flight, and have occurred on previous flights, and as these symptoms are known to occur in hyperaroused states, it is pertinent to consider the role of arousal in their aetiology.

Staggering of rest periods, unusual sleeping positions, and cold could indeed have produced insomnia; but a contribution from hyperarousal, and perhaps the major one, should not be ignored. It is noteworthy that sleep deprivation was greatest in the flight commander. Sleep deprivation is unlikely to affect life or death decisions made in a short period on a primary task—it is on vigilance tasks that mistakes (and these would be of omission) are more likely, such as in transit flight.

Weight reduction occurs when energy expenditure and water loss exceed food and water intake. You reported that fluid intake was reduced but shortage of drinking water was not emphasized as a serious problem. Anorexia is an early and marked symptom of hyperarousal, and can produce considerable weight loss rapidly. Reduced calorie intake is accompanied by increased water excretion so producing a fall in body weight of several kilogrammes. Sweating, tachypnoea, diarrhoea, and polyuria occur in hyperarousal and also lead to increased water loss. The energy expenditure of these astronauts was likely to be more than on previous similar flights, as muscle activity would have been greater in response to the more prolonged need for high alertness.

Hyperarousal produces hypertension, increased cardiac output, and a considerable shift from skin to muscle blood flow. These changes in haemodynamics will reverse on attaining normal arousal, such as is likely to occur after successful re-entry and splash-down. It is just as relevant to consider such factors in the aetiology of some momentary unsteadiness of gait as it is to consider cardiovascular adaptation to changes in gravitational forces. Hyperarousal may also lead to changes in feelings and behaviour such as irritability, altered threshold to somatic sensations, liability to perceptual abnormality, impairment of concentration, tunnelling of attention, depersonalization, hypocapnia, muscular incoordination, and deterioration of performance. Information has been released that on some previous flights disorders of behaviour occurred which jeopardized their safety; and indeed there were reasons to suspect that at least one cosmonaut was landed prematurely on account of unexpected inefficiency as a control-system operator. From my experience of working with others whose lives are exposed to danger, such symptoms occur more often when the task load is low—and that was rare on the flight of Apollo 13.

When symptoms of hyperarousal occur, they do so quite beyond an individual's control. It is a tribute to the selection and training of these astronauts that on this flight so few symptoms occurred. Only someone inexperienced in the clinical practice of medicine could dismiss the possibility

that the explanations which I have put forward are contributory to the aetiology of symptoms occurring in space flight.—I am, etc.,

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Drugs for Dysentery

SIR,—The otherwise excellent article under the heading of Today's Drugs (4 April, p. 36) unfortunately contains the strong implication that an antibiotic should be used in the treatment of all cases of dysentery. It cannot be too strongly emphasized that the great majority of cases of Sonne dysentery as seen in this country at the present time require only bed rest and an adequate fluid intake. The routine use of antibiotics in such a comparatively mild disease is a disservice both to the patients as well as to the community. It is accepted that in a few patients antibiotic or chemotherapy may be fully justified owing to the severity of the attack or because of pre-existing illness, or for some other good reason, but the majority of cases do not require any specific therapy.—I am, etc.,

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Unhopeful Signs in Lung Cancer

SIR,—Professor J. H. Burn (May 9, p. 361) appears to find some encouragement in the recent figures quoted in the Registrar General's Statistical Review of England and Wales for 1968—a view which is apparently endorsed by you in the heading to the letter "Hopeful Signs in Lung Cancer."

I find this extraordinary. May I recast his letter, but with "women" substituted for "men"? I have had to use 1967 figures¹ as the 1968 report has not yet reached Scotland. For women under the age of 50 the peak has not yet been reached. In 1953 the number was 362, in 1961 it was 442, and in 1967 it was 479. For women aged 50-59 the number rose from 524 in 1953 to 783 in 1961, and to 1,080 in 1967. For women aged 60-69 there were 807 in 1953, 1,127 in 1961, 1,519 in 1966, and 1,640 in 1967.

If one considers (a) these figures in combination with the latest report on tobacco consumption, which shows that cigarette smoking in women is still rising, and (b) that young men are smoking more, and beginning at an earlier age I see no cause for rejoicing.

Perhaps, Sir, you would care to compose a title for this letter.—I am, etc.,

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REFERENCES

- 1 General Registrar Office, *Registrar General Statistical Review of England and Wales, Part I Tables Medical*, 1953, 1961, 1966, 1967. London, H.M.S.O.
- 2 Todd, G. F., *Statistics of Smoking in the United Kingdom*, 5th ed., 1969, London, Tobacco Research Council.

Poisoning with PCP

SIR,—I was interested in the leading article "Deadly Diapers" (9 May, p. 314). It may not be generally known that there exists another source of pentachlorophenol in society—namely, certain pesticide mixtures used on roof timbers. Dr. P. Robson and I reported a case under the heading "Pentachlorophenol Poisoning from Bath-water."¹

The initial reason that my case was diagnosed was because my attention was drawn to the possibility of poisoning by wondering if there could be any connexion between my patient's condition and the simultaneous presence of plumbers, wood preserving specialists, insecticide, and old cisterns, in the hallway. At that time I had not heard of PCP.—I am, etc.,

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REFERENCE

- 1 Chapman, J. B., and Robson, P., *Lancet*, 1965, 1, 1266.

Hypothalamic Dysfunction and Antidepressant Drugs

SIR,—We have shown that some severely depressed patients do not suppress their plasma 11-hydroxycorticosteroids (11-OHCS) after a midnight dose of 2 mg. dexamethasone phosphate.¹ On recovery from the depression, this abnormality disappears. An abnormal response of 11-OHCS to hypoglycaemia has also been shown in some of these patients and correlated with resistance to dexamethasone suppression.² These tests are used in clinical research to study the integrity of hypothalamic mechanisms which control corticotrophin release.³

A relationship between this abnormality and poor short-term response to antidepressant medication has been suggested by the following investigation. Consecutive patients to the professorial psychiatric unit, Melbourne University, with a primary depressive illness were studied. Patients with persistent symptoms but not thought severe enough to merit E.C.T. after ten days of supportive care were treated in a double-blind trial with either a monoamine oxidase inhibitor—tranylcypamine (Parnate 10 mg. t.d.s.) or a tricyclic antidepressant—imipramine (Tofranil 50 mg. t.d.s.). If significant improvement occurred (as judged clinically), identical inert tablets were substituted for the active tablets and progress observed.

The aims were to define specific drug response and relate this to initial ratings of depression, anxiety, and personality measures and also the presence or absence of hypothalamic dysfunction.

Before treatment was started the midnight dexamethasone test was done.¹ Ten patients suppressed 11-OHCS normally while six patients were non-suppressors. The two groups of patients had similar mean scores of depression (Hamilton and Zung Self Rating Inventory); anxiety (Taylor), and neuroticism (Eysenck). They had the same age and sex distribution.