

phenicol and gentamicin being the most common. The preservative benzalkonium chloride was present in many of these. Patients had been taking their medication for an average of nearly three weeks.

In 87 patients the original symptoms were characteristic of the diagnosis reached in the casualty department. General practitioners had tended to overdiagnose microbial conjunctivitis.

### Comment

Forty patients (1.8%) seen over three months in an eye casualty department were suffering reactions to the drops prescribed for their original complaint. Nearly half these patients (and two thirds of the 145 taking drops on presentation to the casualty department) were taking chloramphenicol. This blanket use of chloramphenicol has been found by others<sup>1,2</sup>: overall it is used in 55% of all red eyes seen by general practitioners.<sup>2</sup>

Simple examination techniques such as lid eversion, measurement of visual acuity, fluorescein staining, and assessment of pupillary reactions would aid differential diagnosis in most cases of red eye, but many general practitioners never use such techniques.<sup>1</sup> In this survey none of the eight dendritic ulcers and only half of the corneal abrasions were correctly identified, though fluorescein staining would have indicated the diagnosis.

Steroids should also be prescribed with caution for

red eyes. Two cases of dendritic ulcers had been diagnosed as iritis, a potentially serious mistake. Another patient presented with corneal abscess secondary to steroid treatment of a contact lens ulcer. Since a wrong diagnosis is made in 43% of patients for whom general practitioners prescribe steroids<sup>1</sup> these patients should be reviewed by an ophthalmologist before treatment is started.

Untreated simple bacterial conjunctivitis is a self limiting disease that resolves in about 10-14 days. Chloramphenicol controls up to 94% of ocular pathogens,<sup>4</sup> so persistent symptoms should suggest an alternative diagnosis. Chloramphenicol itself distorts corneal epithelial microvilli, and benzalkonium chloride, present as a preservative in many eye drops, causes death and desquamation of the top layer of corneal cells,<sup>5</sup> so toxic conjunctivitis must be considered in the differential diagnosis of non-resolving red eyes.

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## Respiratory problems of air travel in patients with spinal cord injuries

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Patients with cervical spinal cord injuries have severely reduced lung function.<sup>1</sup> These patients are often transferred shortly after injury to specialised centres for further management. This may entail journeys by aeroplane if they are injured abroad. We report on one patient and give details of four others with high spinal injuries recently admitted to this hospital who developed severe respiratory complications during or shortly after transfer by aeroplane.

### Case reports

**Case 1**—A 42 year old man sustained a C6 lesion in a road traffic accident in Greece. Spontaneous respiration was adequate for 15 days. He then developed respiratory difficulties, and a tracheostomy was performed. The next day he was flown to England breathing spontaneously. On arrival in London he was severely dyspnoeic and had a respiratory arrest. He was ventilated and transferred to our unit. He required tracheal suction and physiotherapy to remove copious tenacious mucous plugs from his airway and was

ventilated for seven days. Subsequent rehabilitation was uneventful.

**Cases 2-5**—The table shows details of four other patients transferred to our unit by aeroplane who also developed respiratory problems soon after arrival.

### Comment

The air in the cabins of aeroplanes is obtained from outside, where the water content is negligible because of the altitude and temperature. This dry air is completely changed about 20 times an hour in a modern aeroplane. Although the air mixes with the moist air exhaled by passengers, the water content is still very low. Humidification systems may not be used continuously during flights as the amount of water required is considerable and the added weight reduces the aeroplane's efficiency. Normally, inspired air is warmed and humidified by the nose and oropharynx, but in patients with a tracheostomy or endotracheal tube this mechanism is bypassed. In none of the cases we report were special arrangements made to humidify inspired air.

Prolonged inspiration of dry air thickens bronchial secretions and impairs ciliary function. Inspissation may lead to obstruction and pulmonary collapse if secretions are not cleared. In patients with cervical and high thoracic spinal lesions the abdominal and intercostal muscles are paralysed and the ability to cough and clear secretions is impaired.<sup>2</sup>

The minimum barometric pressure in commercial

Details of four patients with spinal injuries who experienced respiratory problems after transfer in aeroplane

Case No	Age (years)	Level of lesion	Flight time (h)	Ventilation during flight	Time after injury	Comments
2	65	C4	26	Intermittent positive pressure ventilation through tracheostomy	5 Months	On arrival was cyanosed and needed high inflation pressures. Thick mucous plugs removed. Rapid recovery
3	24	C4	5	Spontaneous respiration	2 Days	Severe dyspnoea and hypoxia on arrival, needing intermittent positive pressure ventilation. Lobar collapse owing to thick secretions
4	54	T7	3	Spontaneous respiration through tracheostomy	7 Months	Was hypoxic and unwell on arrival. Intensive physiotherapy and intermittent positive pressure ventilation for 5 days needed
5	69	T5	4	Spontaneous respiration through tracheostomy	6 Weeks	Had multiple injuries with flail chest. Was hypoxic with collapsed left lung on arrival, needing intermittent positive pressure ventilation for 7 days

aeroplanes is 75 kPa, so that the arterial oxygen pressure in normal people is about 7.3 kPa. The condition of patients who already have hypoxia may deteriorate further during a flight if they are not given added oxygen.

For these reasons patients with high spinal injuries are at risk during journeys by aeroplane. We make the following recommendations for such patients:

- (1) Lung function should be adequate and stable before transfer.
- (2) Humidification of inspired air should be adequate before and during transport, particularly for patients with an endotracheal tube or tracheostomy. If secretions are sticky 2 ml of warm saline can be passed down the endotracheal tube or tracheostomy tube at frequent intervals.
- (3) Supplemental oxygen should be available.
- (4) Patients should be accompanied by someone trained in manoeuvres to clear secretions from patients with spinal injuries<sup>4</sup> and prepared to perform tracheal suction frequently.
- (5) Intravenous atropine should be available.

Tracheal suction in patients with high spinal injuries may precipitate life threatening bradycardia.<sup>5</sup> The incidence of such bradycardia is reduced by preoxygenation before suction and the skilful use of the suction catheter. If appreciable bradycardia develops intravenous atropine should be given. Patients prone to serious bradycardias may be treated with an oral adrenal agonist such as orciprenaline before the flight.

We believe that if these recommendations are adopted patients with high spinal injury may be transported by air more safely.

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## Plasma concentrations of tryptophan and dieting

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Mean (SD) concentrations of energy metabolites and amino acids before and during diet

	Men		Women	
	Before	During	Before	During
Glucose (mmol/l)	4.4 (0.6)	3.9 (0.6)	3.7 (0.8)	3.7 (0.2)
Lactate (mmol/l)	1.91 (0.44)	1.61 (0.22)	1.64 (0.15)	1.68 (0.30)
Butyrate (mmol/l)	0.33 (0.28)	0.35 (0.19)	0.33 (0.20)	0.41 (0.39)
Free fatty acids (mmol/l)	1.01 (0.70)	0.76 (0.47)	0.92 (0.47)	0.96 (0.30)
Branched chain amino acids (μmol/l)	405 (61.7)	455 (65.9)	344 (65.7)	336 (51.6)
Alanine (μmol/l)	339 (53.6)	245 (48.6)†	261 (59.0)	270 (50.7)
Glutamine (μmol/l)	373 (57.7)	356 (65.1)	373 (58.8)	384 (44.9)
Tryptophan (μmol/l)	57.5 (12.0)	45.2 (6.4)†	49.8 (11.8)	40.6 (4.8)*

\*p<0.05. †p<0.02.

Dieting to lose weight is commonplace in Western societies. Numerous popular publications advise on how diets can be made easy, effective, and healthy. They often speculate on the relation between food intake and subjective experience, but this has generated only one important scientific hypothesis in the past 20 years.<sup>1</sup> None of the brain enzymes that convert plasma tryptophan to serotonin approaches saturation with substrate. A fall in the plasma concentration of tryptophan should therefore reduce the rate of synthesis and hence the serotonin concentration. Serotonin is believed to be important in regulating appetite, sexual activity, and the control of impulses, and strong circumstantial evidence links abnormalities in serotonin concentration with depression. Indeed, total exclusion of tryptophan from the diet produces depression.<sup>2</sup> No systematic study has been made of changes in the plasma concentrations of key amino acids in mildly overweight subjects taking low energy diets to lose weight.

### Subjects, methods, and results

Eight men and eight women with a body mass index within the normal range for Western societies (men 21-30 kg/m<sup>2</sup>; women 21-27 kg/m<sup>2</sup>) were recruited to take a weight reducing diet of 4.18-5.02 MJ/day. The

study was approved by the local ethics committee. Blood samples were taken after an overnight fast before the diet and during the third week of dieting. The women were studied in the middle of consecutive menstrual cycles and started dieting with the onset of the menses.

The diet was designed by the department of nutrition and dietetics, Oxford University. The subjects were given information about high and low energy foods and recommended a daily dietary allowance of 0.5 l skimmed milk; 20 g polyunsaturated margarine; two servings of lean meat (60 g), white fish (120 g), cheese (30 g), cottage cheese (90 g), one egg, or one small carton of yoghurt; five slices of wholemeal bread; one serving of wholegrain breakfast cereal; and two portions of fruit.

Blood was collected in heparinised tubes and the plasma separated by centrifugation at 2000 rpm and stored at -30°C. Assays of metabolites are described elsewhere.<sup>3,4</sup> Results were compared with the paired *t* test (two tailed).

All the subjects lost weight; the men lost a mean of 5.4 kg (95% confidence interval 4.7 to 6.1 kg) and the women 2.9 kg (2.3 to 3.6 kg). Food diaries showed good compliance with dietary recommendations. Dieting had no effect on the plasma concentrations of glucose, lactate, 3-hydroxybutyrate, branched chain amino acids, glutamine, or free fatty acids (table). While dieting the men had decreased plasma concentrations of alanine and both the men and the women had lower tryptophan concentrations. The ratio of the mean plasma concentrations of tryptophan to branched chain amino acids was also reduced (0.15 (SD 0.04) before v 0.11 (0.02) during the diet; p<0.02).

### Comment

The weight reducing diet decreased the plasma concentrations of tryptophan in both the men and the women. The effect was greater in the men, but this may be explained by their greater reduction in energy intake to achieve 5.02 MJ/day. The diet aimed at decreasing carbohydrate and fat intakes; protein intake was maintained and provided 800-1200 mg tryptophan each day, which is considerably greater than either the minimum recommended amount (250 mg) or the "safe" amount (500 mg). Conventional dieting is thus likely to reduce tryptophan concentrations and hence the rate of synthesis of serotonin in the brain.