experiments not only to record the amount of "carbohydrate" but to specify the sort of carbohydrate they have used? Sucrose produces a very wide range of abnormalities that are not produced by starch.⁵ For example, in the studies referred to in this letter our control animals, which showed no renal abnormalities, were fed exactly similar diets with exactly the same proportion of carbohydrate as were the experimental animals; the difference was only that for the former the dietary carbohydrate was starch and for the latter it was sucrose.

K R BRUCKDORFER

Royal Free Hospital Medical
School,
London WC1

S S KANG
ROBERT G PRICE
JOHN YUDKIN

Queen Elizabeth College,
London W8

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² Kang, S S, et al, *Biochemical Society Transactions*, 1977, 5, 235.

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⁵ Yudkin, J, *Trends in Biochemical Sciences*, 1976, 1, N126.

High serum concentrations of antidepressants in elderly patients

SIR,—We wish to report finding unexpectedly high serum concentrations of amitriptyline and nortriptyline in a small sample of psychiatric inpatients over the age of 60 who were given only modest doses of these drugs.

Through the kindness of Dr Braithwaite at the New Cross Hospital Poisons Unit we have been able to monitor amitriptyline and nortriptyline levels regularly on our psycho-geriatric unit in blood samples drawn at least 12 hours after drug ingestion. Of about 20 consecutive inpatients studied, five proved to have drug levels well above the therapeutic range currently suggested by this laboratory (80–200 µg/l of nortriptyline and amitriptyline combined). The table printed below gives representative drug levels in these patients, together with dosage and the results of renal function tests. It will be noted that these patients eventually required quite low doses of antidepressant to achieve therapeutic blood levels. The reason is uncertain; renal function was not especially impaired in comparison with other patients of the unit and liver function tests were normal. Ziegler *et al*¹ also observed unusually high levels in a few patients, but the ages were not given.

These results emphasise the need for caution in prescribing tricyclic antidepressants to elderly patients and once again illustrate the unsuitability of drug dosage as a parameter with which to correlate therapeutic response. Three of the five patients did not in fact suffer side effects of unusual type or severity despite the high levels, but one (B) became ataxic and another (D) suffered a toxic confusional state. Both patients recovered on a reduced dose.

A C CARR
R P HOBSON

Maudsley Hospital,
London SE5

¹ Ziegler, V, et al, *British Journal of Psychiatry*, 1977, 131, 168.

Diagnosis of hypertrophic pulmonary osteoarthropathy

SIR,—Your leading article (24 September, p 785) briefly mentions the use of bone scanning in the detection of hypertrophic pulmonary osteoarthropathy (HPOA). Since the differential diagnosis between this condition and bony secondaries cannot be made on clinical or laboratory grounds alone a test which can help to solve the issue is relevant, in particular if surgery is proposed as treatment for patients with carcinoma of the bronchus.

We have just reviewed 45 cases of carcinoma of the bronchus in which, for staging purposes at first presentation, routine liver and whole-body bone scanning was performed. Seven out of these 45 patients had a positive bone scan and on the basis of this test alone a diagnosis of HPOA was made in two patients. This was particularly useful since bone scanning in these patients helped to decide on management—in other words, on surgical versus medical treatment.

Case 1—A 68-year-old labourer was referred for bronchoscopy. He complained of pain in the left shoulder and upper dorsal spine of six weeks' duration. He had episodes of haemoptysis during the three weeks before admission. A chest radiograph showed a mass at the left hilum with a raised left hemidiaphragm. On examination he had moderate finger clubbing and two small lymph nodes palpable in the left supraclavicular fossa. Bronchoscopy revealed a tumour of the left upper lobe bronchus and histological examination confirmed this to be a type of squamous-cell carcinoma. An intravenous pyelogram was normal and so were radiographs of the shoulders and humeri. On one radiograph partial collapse of a dorsal vertebra was seen associated with osteoporosis. However, secondary bony deposits could not be excluded. Haemoglobin, serum alkaline phosphatase, and liver

^{99m}Tc-imidodiphosphate whole-body bone scan. Intense pericortical uptake is seen involving bilaterally femur and tibia as well as ulna and radius. Typical "streaking" of the radiopharmaceutical is noted. The scan is typical of HPOA and rules out the presence of multiple bony secondaries. These tend to show central rather than pericortical deposition of the radiopharmaceutical with multiple and irregular "hot spots".

enzyme levels were normal. A ^{99m}Tc-imidodiphosphate whole-body bone scan showed typical changes of HPOA. Subsequent follow-up radiographs of the hands, forearms, and tibia and fibula did not show any of the usual radiological features of this condition.

Case 2—A 54-year-old brewery worker was referred to us for bronchoscopy. He gave an eight weeks' history of painful and slightly swollen ankles. He had gross finger clubbing and a chest x-ray showed a mass at the apex of the left lower lobe. Bronchoscopy was normal. A raised alkaline phosphatase level suggested the possibility of bone involvement. Skeletal metastases were suspected and a whole-body bone scan was performed with ^{99m}Tc-imidodiphosphate. This scan showed typical features of generalised HPOA (see figure), with no evidence of secondary deposits. The patient had an uneventful pneumonectomy with all tumour and a few enlarged hilar glands removed. Alkaline phosphatase levels had not changed two weeks after surgery. Histological examination showed a squamous-cell carcinoma.

We conclude that in our series of 45 patients approximately 10% (seven patients) with carcinoma of the bronchus had a positive bone scan at the time of first presentation. Of these, two had a bone scan diagnostic of HPOA. This investigation was helpful in

Dosage and plasma concentrations of antidepressants and results of renal function tests in five patients

Patient (Sex)	Age (years)	Weight (kg)	Plasma urea (mmol/l)	Creatinine clearance (ml/min)	Single daily dose (at night) (mg)	Plasma levels (µg/l)	Final dose (mg)	Final plasma levels (µg/l)
A (F)	77	63	9.5	32–43	(Nort) 100	427–600	50	141
B (F)	76	58	6.4	34–41	(Nort) 100	250	(Amit) 75	(Amit) 61 (Nort) 39
								100
C (F)	76	55	12–19.5	13–16	(Amit) 100	(Amit) 156 (Nort) 62	(Amit) 75	(Amit) 117 (Nort) 63
						218		180
D (F)	64	43.5	3.8		(Amit) 75	(Amit) 213 (Nort) 245	(Amit) 25	(Amit) 53 (Nort) 108
						458*		161
E (M)	64	57	5.5	48	(Nort) 100	176	75	127

Nort = Nortriptyline. Amit = Amitriptyline. *Measured 9 h after preceding dose.
Conversion: SI to traditional units—Urea: 1 mmol/l ≈ 6 mg/100 ml.