tribute to the overall pathological changes induced by smoke in the lung parenchyma leading to emphysema. Drs M J Jarvis and M A H Russell (also 5 April, p 994) comment on the Hunter Committee's second report and rightly plead for advice on control and regulation of all harmful constituents of tobacco smoke. They specifically mention that current cigarette brands have an eightfold variation in delivery of oxides of nitrogen. Surely the industry should be paying as much attention to reducing these fume levels as to reducing tar yields?

The statement that "while emphysema occurs in non-smokers it is usually mild, almost never being of clinical importance" may be true of some communities, but does certainly not apply to foundry workers or coalminers. The incidence of postmortem emphysema in coalminers is much higher than in non-miners,^{7, 8} and there is good evidence that this occurs as the result of the high nitrous fume content of mine air.⁹

Coalminers who smoke and live in polluted urban areas may be exposed to nitrous fumes from three sources and are at special risk. In recent years the Clean Air Act and improved ventilation in mines with less shotfiring have reduced two sources of nitrous fume. However, there are still many miners with a clear history of excessive exposure to fumes who are severely disabled with emphysema yet have difficulty in getting certified as suffering from poisoning by nitrous fumes (prescribed disease No 17) in its currently prescribed form. Ten years ago I advocated in your columns a review and suitable amendment of the prescription of this disease.¹⁰ It is hoped that the Department of Health and Social Security may now do this in the light of the further evidence which has accrued.

M C S KENNEDY

Department of Respiratory Physiology,
City General Hospital,
Stoke-on-Trent ST4 6QG

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Recurrent abdominal pain in childhood

SIR,—In his letter concerning recurrent abdominal pain in childhood (7 June, p 1377), Professor J S McCormick comments on the lack of objective markers in the closely related disorders of abdominal migraine, periodic syndrome, and cyclical vomiting.

Russell¹ studied a number of these children and found that some had decreased ornithine carbamyl transferase activity. This enzyme catalyses the second of the five steps of the urea cycle. Its complete absence would be incompatible with life. A number of children with very low enzyme activity (about 5% of normal) have also been described, generally presenting in the first few months of life with episodic vomiting, psychomotor retardation, and hyperammonaemia. The identical twin of one such infant was well until the age of 9,

with normal growth and development, when she presented with headache, malaise, and lethargy. The child had mildly elevated fasting blood ammonia levels and a prolonged rise of blood ammonia following protein ingestion or an ammonia load. Her mother and mother's sister, who also had an infant with hyperammonaemia, had high fasting blood ammonia levels and disliked protein-rich food.^{2, 3} Similarly, Levin *et al*⁴ described the mother of a child with hyperammonaemia who had an ornithine carbamyl transferase activity only 50% of normal. Ingestion of protein foods induced nausea and vomiting. Her fasting blood ammonia levels were again elevated with an abnormal rise after a protein load. She was otherwise mentally and physically normal.

Liver biopsy is obviously best avoided in children. Fasting blood ammonia levels, response to a protein load, and urinary glutamine excretion may provide diagnostic clues. Reduced ornithine carbamyl transferase activity has also been found in some patients on biopsy of the jejunal mucosa.³ As the enzyme deficiency is only partial, blood urea levels are, unfortunately, normal and not decreased.

Despite Russell's findings, I am unaware of further similar studies in children with abdominal migraine or cyclical vomiting. Similar studies do not appear to have been undertaken on those young adults with the "irritable bowel syndrome" in whom abdominal pain is prominent and many of whom have a history extending back to childhood or adolescence.

D W BULLIMORE

University Department of
Medicine,
St James's Hospital,
Leeds LS9 7TF

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The liver and halothane—again

SIR,—Your correspondent Dr M E Sinclair rightly points out (28 June, p 1617) that during and after anaesthesia with enflurane less than 3% of the agent is metabolised in the body. He suggests that its breakdown to form potentially toxic fluoride might be induced by other drugs and by previous exposure to the anaesthetic itself. As evidence he cites a paper¹ in which the authors suggest that "enflurane may cause induction of hepatic microsomal enzymes." This work was carried out in six experimental subjects having very prolonged (9.5 MAC (minimum alveolar concentration) hours) anaesthetics, during which extensive investigatory procedures were undertaken. It has not, to my knowledge, been repeated or confirmed.

Your correspondent did not mention a recent prospective study² of the problem in 102 patients, some of whom had more than one exposure to enflurane, and who were submitted to a variety of surgical procedures and were under treatment with a variety of drugs, including phenobarbitone. No evidence of significant increases in serum inorganic fluoride levels due to enzyme induction was found after more than 2 MAC hours of enflurane anaesthesia. Serum inorganic fluoride

levels rose only to a mean level of 17 $\mu\text{mol/l}$ in six hours in this group.

The patient with "renal failure" mentioned by Dr Sinclair had oliguria on the second, third, and fourth days following a six-hour operation for the creation of an ileal loop bladder for bladder carcinoma under enflurane anaesthesia.³ A single high inorganic fluoride level was found in the second postoperative day's blood specimen; the third and subsequent day's blood fluoride levels were relatively low. The characteristic presentation of fluoride-induced disorder is a high-output polyuric syndrome, due to a tubular rather than a glomerular nephropathy. The exposure to enflurane during the preliminary cystoscopy and biopsy undertaken in this patient was presumably brief and occurred six weeks prior to the main anaesthetic. The suggestion that subsequent biodegradation of the anaesthetic was induced by this exposure is purely speculative. A prospective human study found no evidence that this occurs in practice following repeated exposure after one week.⁴ It is not unknown for transient periods of oliguria to occur postoperatively following abdominal surgery of the length and gravity discussed in Eichhorn's paper—particularly for a procedure involving the urinary tract and in a patient with heart disease, in whom fluid replacement on the operation day was understandably conservative. Retained fluoride was rapidly cleared when diuresis commenced; and this single case, in which rapid and full recovery occurred, can hardly be regarded as sufficient to merit Dr Sinclair's concern about repeated enflurane anaesthesia.

Although there is clinical evidence confirming that enflurane anaesthesia and the small increases in serum inorganic fluoride levels it usually produces are not harmful to patients with glomerular or tubular renal disease⁵ further confirmation from good prospective clinical studies is greatly needed. Until this work has been satisfactorily carried out, Abbott Laboratories Ltd will continue to recommend caution in the choice of this agent for anaesthesia for such cases.

FRANK E BENNETTS

Abbott Laboratories Ltd,
Queenborough, Kent ME11 5EL

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Graduated compression stockings

SIR,—It is with interest that we have read the articles on graduated compression stockings (22 March, p 818 and 820). These stockings have been available to us from an American source for two years now and while they have been advertised for use in deep venous insufficiency and are by implication useful in preventing limb ulcers, our main use has been in patients with postural hypotension.

The standard elastic stocking is seldom long enough and not specific in size for the individual patient. It is essential that some abdominal compression be applied to help with control of postural hypotension as well as in the legs. Venous pooling is prevented