

SIR,—Dr Richard Smith's valuable editorial¹ indicated some important aspects of the present state of knowledge of neutron treatment, emphasising the necessity for cost efficiency.

By contrast, it may be helpful to indicate some important aspects of the state of knowledge of a modern linear accelerator together with approximate costing.

A new technical approach whereby radiation can be guided by computer from the primary growth along the sinuous track of invasion of the lymph nodes with minimal radiation of surrounding tissues is now possible.^{2,4} The cost of treating one patient could be around £300.

A special advantage of the linear accelerator is the production of electrons to enable the efficient high dose radiation of the internal mammary nodes while avoiding significant damage to the heart beneath in the treatment of breast cancer.³

ANTHONY GREEN

Highstone, Barnet,
Hertfordshire EN5 4QA

- 1 Smith R. Radiotherapy's second setback. *Br Med J* 1988;297:1625-6. (24-31 December.)
- 2 Green A. A technical advance in irradiation technique. *Proceedings of the Royal Society of Medicine* 1959;52:344-6.
- 3 Chin LM, Kijewski PK, Svensson GK, Chaffrey JT, Levene MB, Bjarngard BE. A computer-controlled radiation therapy machine for pelvic and para-aortic nodal areas. *Int J Radiat Oncol Biol Phys* 1981;7:61-70.
- 4 Davy TJ. Physical aspects of conformation therapy using computer controlled tracking units. In: Orton CG, ed. *Progress in medical radiation physics*. Vol 2. New York: Plenum, 1985:45-93.
- 5 Kevinhagen SC. *Physics of electron beam therapy*. Bristol: Adam Hilger, 1985.

Monitoring during sedation for endoscopy

SIR,—Monitoring during sedation for endoscopy^{1,4} is not just theoretically interesting as over 60% of the deaths that occur after oesophago-gastroduodenoscopy relate to cardiopulmonary complications. Our own experience of monitoring patients undergoing oesophago-gastroduodenoscopy, published^{5,7} and unpublished, runs to well over 300 patients.

The mean minimum oxygen saturation recorded by Drs Alan Murray and Gavin C Kenny⁴ during endoscopy in the 20 patients sedated with intravenous midazolam of 82 (SEM 12.5)% was appreciably lower than that of 89 (SD 7.7)%⁵, 88.5 (SD 4.7)%⁷, or 92.2% (range 84-99).⁸ The likely explanation for the much greater fall in oxygen saturation observed by Drs Murray and Kenny is the fact that they gave their patients a combination of intravenous midazolam and narcotic (pethidine), whereas in the other studies the benzodiazepine was used alone.

We too have monitored a small group of patients undergoing endoscopy well into the recovery period (table), but, unlike in the study of Drs Murray and Kenny, most of the oxygen saturation values in our patients returned to baseline within one hour, again the difference presumably being related to our not using a narcotic such as pethidine with the intravenous midazolam. From the results shown in the table we believe that significant

resedation (and hence respiratory depression) is unlikely if the effect of midazolam is reversed by flumazenil immediately after completion of oesophago-gastroduodenoscopy.

Should the oxygen saturation fall alarmingly (as it not infrequently does if the patient gags or coughs excessively during the procedure)^{5,8} oxygen can be immediately given through nasal cannulas with rapid correction of hypoxaemia. In eight of the last 123 patients monitored by oximeter during endoscopy (mean age 61, range 40-90 years; mean baseline oxygen saturation 94.4%) we observed potentially serious falls in oxygen saturation to a mean 79.8 (SD 5.5)%. In all cases the oxygen saturation rapidly responded to the administration of 2-6 litres of oxygen per minute delivered through nasal cannulas: within a minute it was back to 95.6% of the baseline value.

As Drs Murray and Kenny point out, there is a strong correlation between periods of hypoxia and ST segment depression and arrhythmias observed at the time of endoscopy. Hypoxaemia can be reduced by keeping the dose of intravenous sedation (particularly in the elderly)⁹ to a minimum, avoiding simultaneous administration of narcotics, and using a small diameter endoscope.³ We agree with Drs Murray and Kenny that an oximeter should be more widely available for use in endoscopy units and heartily endorse the comments of Dr N J Russell⁴ that supplementary oxygen should be given throughout the procedure to all elderly and at risk patients.

ANNA S CARTER T COADY
G D BELL J LEE
A MORDEN

Departments of Anaesthetics, Medicine,
and Respiratory Physiology,
Ipswich Hospital, Ipswich IP4 5PD

- 1 Tate N. Monitoring during sedation for endoscopy. *Br Med J* 1988;297:561. (20-27 August.)
- 2 Martin D, Tweedle D. Monitoring during sedation for endoscopy. *Br Med J* 1988;297:798. (15 October.)
- 3 Russell NJ. Monitoring during sedation for endoscopy. *Br Med J* 1988;297:978. (15 October.)
- 4 Murray A, Kenny GC. Monitoring during sedation for endoscopy. *Br Med J* 1988;297:1337. (19 November.)
- 5 Bell GD, Reeve PA, Moshiri M, et al. Intravenous midazolam: a study of the degree of oxygen desaturation occurring during upper gastrointestinal endoscopy. *Br J Clin Pharmacol* 1987; 23:703-8.
- 6 Bell GD, Bown S, Morden A, Coady T, Logan RFA. Prevention of hypoxaemia during upper gastrointestinal endoscopy by means of oxygen via nasal cannulae. *Lancet* 1987;i:1022-3.
- 7 Bell GD, Morden A, Coady T, Lee J, Logan RFA. A comparison of diazepam and midazolam as endoscopy premedication assessing changes in ventilation and oxygen saturation. *Br J Clin Pharmacol* 1988;26:595-600.
- 8 Lavies NG, Creasy T, Harris K, Hanning CD. Arterial oxygen saturation during upper gastrointestinal endoscopy: influence of sedation and operator experience. *Gastroenterol* 1988;83: 618-22.
- 9 Bell GD, Spickett GP, Reeve PA, Morden A, Logan RFA. Intravenous midazolam for upper gastrointestinal endoscopy: a study of 800 consecutive cases relating dose to age and sex of patient. *Br J Clin Pharmacol* 1987;23:241-3.

*This correspondence is now closed.—ED, *BMJ*.

Differential defence rates

SIR,—Ms Clare Dyer was correct in as far as she went but like many others underestimated the wider implications of differential medical defence

subscriptions.¹ Although the Medical Defence Union and the Medical Protection Society have adopted differing policies, differential subscriptions were inevitable whatever their decisions. The repercussions will be much wider than appreciated.

There is now a differential within and between the defence societies, and whereas those in high risk specialties will remain with the defence societies future increases in subscriptions will be further exaggerated as those in low risk specialties leave after obtaining cheaper cover in the open market. As liability insurance is an obligatory expense the practical effect will be, by default, differential salaries. Given the present proposals of the Medical Protection Society the differential is likely to be over 10% at consultant level and proportionally much greater for junior staff. Differential salaries determined in this way will not be acceptable to many—for example, those in high risk specialties frequently have the heaviest on call commitment but would then have the lowest gross salary and full time staff would have no opportunity to compensate for the effective loss of salary.

There are two solutions. The first is for the NHS to assume responsibility for the subscriptions. Hitherto, the profession has resisted this option because of the implications for clinical freedom, and even if such support was agreed some conditions—that is, a consultant to see high risk cases or surgical emergencies or attend births—are bound to be imposed given the potentially infinite level of future claims.

The alternative is that this opportunity will be used to introduce other changes. Once differential salaries exist, whether by default or design, other considerations will inevitably be taken into account before determining an individual doctor's final compensation. Should those who work part time, who have the additional risk and income of private practice, receive the same compensation as those who work full time? Will those working in oversubscribed specialties or regions be compensated the same as those in which there are vacancies? Will compensation reflect the cost of living in different areas? Will universities fully compensate staff in high risk specialties for health service work? Who will determine local salary levels? Who will do the clinics presently undertaken by poorly paid research fellows unable to maintain their subscription for such a limited amount of clinical work?

This government's philosophy is that market forces alone can determine salaries; it is opposed to national pay agreements, wishes to return consultant contracts to district level, and plans that more patients be treated outside the NHS. Differential salaries produced by the sharp rise in medical insurance may "free up" the medical market place in a way that helps the government achieve all these wishes.

Differential subscriptions have arrived and differential salaries will follow. The medical profession must accept the futility of resisting inevitable market forces and prepare for the introduction of differential salaries for the implications are much wider than appreciated.

R J AITKEN

Edinburgh

- 1 Dyer C. Defence societies' price war. *Br Med J* 1988; 297:1356. (26 November.)

Effect of intravenous midazolam on oxygen saturation and minute volume in 10 patients undergoing oesophago-gastro-duodenoscopy who were observed well into recovery period

	Baseline	After midazolam	After endoscopy	Time after injection (minutes)			
				30	40	50	60
Oxygen saturation (%) (SD)	95.0 (1.9)	91.7 (2.9)	92.3 (3.0)	91.8 (2.6)	91.8 (2.8)	92.7 (2.4)	93.2 (2.4)
Oxygen saturation (% baseline) (SD)	100.0	98.4 (2.1)	97.1 (2.1)	96.6 (2.8)	96.6 (2.5)	97.5 (2.8)	98.1 (2.7)
Ventilation (l/min) (SD)*	8.1 (3.4)	4.9 (1.3)	5.4 (3.1)	5.8 (2.9)	5.9 (3.7)	6.4 (5.4)	6.1 (4.2)
Ventilation (% baseline) (SD)*	100.0	66.5 (18.7)	72.1 (34.7)	76.9 (33.0)	76.4 (47.6)	74.6 (38.9)	78.5 (50.2)

*Measured using an induction plethysmograph vest calibrated with a pneumotachygraph.⁴

SIR,—The fundamental issue in the present medical defence debate¹ is whether doctors employed by the NHS, in contrast to other NHS employees, should be responsible for their professional insurance. The crux of the argument is the nebulous concept of clinical freedom, but this issue has almost been reduced to irrelevance when many doctors in the high risk specialties are potentially faced with real financial hardship, if not bankruptcy. Furthermore, the Medical Defence