

radiography every time; consideration of whether results will really influence management; choice of the best examination and diagnostic strategy in collaboration with the radiologist; and using alternatives to ionising radiation, such as ultrasound and magnetic resonance imaging, whenever possible.

RICHARD M DAWOOD

Senior Registrar,  
Department of Paediatric Radiology,  
Hospital for Sick Children,  
London WC1N 3JH

CHRISTINE M HALL

Consultant Paediatric Radiologist,  
Hospital for Sick Children,  
London WC1N 3JH

- 1 Orr JS. Risks and benefits in radiology. *Br Med J* 1987;295:685.
- 2 Matthews IP. Prevention of radiogenic cancers through changes in procedure. *Radiography* 1988;54:3-8.
- 3 Beebe GW, Kato IP, Land CE. Studies of the mortality of A-bomb survivors. 6. Mortality and radiation dose, 1950-1974. *Radiat Res* 1978;75:138-201.
- 4 US Department of Health, Education and Welfare. *Gonadal shielding in diagnostic radiology*. Washington, DC: US Government Printing Office, 1975. (DHEW Publication [FDA] 75-8024.)
- 5 US Department of Health, Education and Welfare. *Specific area gonad shielding*. Washington, DC: US Government Printing Office, 1976. (DHEW Publication [FDA] 76-8054.)
- 6 Wall BF, Fisher ES, Rae S. *Current levels of gonad irradiation from a selection of routine diagnostic x-ray examinations in Great Britain*. Chilton, Didcot: National Radiological Protection Board, 1980. (Publication NRPB-R105.)
- 7 National Council on Radiation Protection and Measurements. *Radiation protection in pediatric radiology*. Washington, DC: National Council on Radiation Protection, 1981. (Report no 68.)
- 8 International Commission on Radiological Protection. *Recommendations of the International Commission on Radiological Protection*. Oxford: Pergamon Press, 1977. (Publication 26.)
- 9 Russell JGB. Assessment of the current use of rare-earth screens in British hospitals. *Br J Radiol* 1986;59:630.
- 10 Russell JGB. Cost and effectiveness of methods of radiation protection in X-ray diagnosis. *Clin Radiol* 1985;36:37-40.
- 11 Kogutt MS. Use of a computed radiography imaging system for low-dose digital radiography of infants and children. *Radiology* 1987;165(P):415-6.

## Departmental divisions and the crisis in undergraduate medical education

Undergraduate medical education has two paymasters, the Department of Education and Science (DES) and the Department of Health and Social Security (DHSS). The Croham committee review of the University Grants Committee<sup>1</sup> drew attention last year to some of the difficulties that thereby arise. In particular it said there was an urgent need for consultation and collaboration between the DES and the DHSS.<sup>2</sup> To set this in motion a meeting was held in November 1987 between the two permanent secretaries, attended also by representatives of the Committee of Vice Chancellors and Principals, regional health authorities, and the General Medical Council. A steering group was set up "to consider how the current arrangements for undergraduate medical education can be improved to ensure that the policies and programmes of the bodies concerned are properly co-ordinated and directed, reporting as necessary." This steering group will report to the University Grants Committee, which has shown its resolve to plan and implement change, and to the National Health Service Management Board, which has yet to get into its stride.

The DES is responsible through the University Grants Committee for funding both preclinical medical education and clinical academic staff and their university base. On the other hand, the Secretary of State for Health and Social Security is responsible for providing the clinical facilities for undergraduate medical education; he does this not by providing service for the sake of teaching but by ensuring that the needs of patients are met in such a way and with sufficient staff that service and teaching can proceed together. Academic staff are required to provide service to the NHS as part of their university duty; NHS staff have no contractual obligation to teach, but in many disciplines they do most of the clinical teaching. Failure to replace retiring consultants to save money, loss of junior hospital doctors as a result of *Achieving a Balance*, redistribution of the remainder away from the teaching districts, and reduced university funding all threaten the viability of university based medical education.

Remarkably, the lack of coordination between the DES and the DHSS has hitherto not seriously affected undergraduate medical education. So strong has been the professional responsibility to pass on knowledge and skill to the

next generation without specific payment and so mutually beneficial has been the flexible "knock for knock" agreement between universities and the NHS that the system has worked. The resulting teaching has been largely traditional, uneven in quality, variable in commitment, and lacking in coordinated educational objectives. Nevertheless, well trained doctors have emerged, better trained than educated perhaps, and bright more by nature than by nurture.

The DHSS has shown much greater concern about undergraduate medical education than the DES, possibly because of concern about the quality of its future doctors. Indeed, the DES has long seemed neither to understand this untidy activity nor to wish to do so. Several years ago the then chief medical officer of the DHSS set up an informal academic forum in which he discussed the interests and concerns of medical education with clinical academics. The exchange of ideas has continued under his successor and has proved useful. Recently the DHSS set up a small group within the department specifically to study educational issues, an initiative that was slow to meet with a response from the other side of the departmental divide.

The financial hurricane that has hit both the universities and the health service has given great urgency to the joint review of undergraduate medical education. The universities have responded centripetally, concentrating resources selectively in the most active centres of teaching and research. The DHSS, in contrast, has reacted centrifugally, redistributing from the better funded to the poorly funded. Nationally this has protected the most underprivileged regions. But redistribution within the regions has hit teaching districts countrywide, both in their teaching and in the inner city services they provide. The right hand has operated against the left, and the tension is at such a pitch that it can no longer be ignored.

The fundamental issue facing the DES-DHSS steering group is whether medicine is to remain a university based education. If so, it must continue to be centred on (but not exclusively confined to) university hospitals, and they should have enough staff (academic and NHS) to teach professionally as well as to do their service and research work. In addition, as the emphasis moves to outpatient and community clinics, primary health care, and prevention, these activities must

be provided with more accommodation and staffing. The steering group must discover how to protect the long term educational investment from the relentless demands of day to day service. If it succeeds, there should be no difficulty in persuading universities and health authorities to consult on their draft academic and financial plans and service strategies as Croham proposed. The committee may also need to spell out the dire consequences for university based medical education of a substantial move towards privatisation of health services. Would clinical facilities be fragmented beyond recall?

University centred medical education has never been more vital to the national health. Clinical academics have a special responsibility not only to pass on received wisdom but also to shake it up. Programming students for today's medicine is important but insufficient; students must also emerge able to adapt to a succession of revolutions in medicine within their working lifetime.

The future can be addressed only if teachers have thinking time. The major casualty of staff reductions in both the NHS

and the universities is education. The need is not for more educationalists but for more clinical teachers who understand the complexity of medicine to think about patterns of medical education for the future and what this means for investment in new accommodation and staffing.

University medicine in Britain had a difficult birth, a retarded wartime childhood, and an adolescence full of promise and expectation. Is it to die on the threshold of its maturity, at a time when a traditional craft education was never less fitted to prepare for the future? The one certainty in the present turmoil is that medical students are the losers. And if medical students are losing out today patients will lose out tomorrow.

PETER RICHARDS

Dean,  
St Mary's Hospital Medical School,  
University of London, London W2 1PG

1 Croham Committee. *Review of the University Grants Committee*. London: HMSO, 1987. (Croham Report.)  
2 Shaw DA. Funding the universities. *Br Med J* 1987;294, 529-30.

## Cough and angiotensin converting enzyme inhibition

The Committee on Safety of Medicines has received 365 reports of cough related to angiotensin converting enzyme inhibitors, drugs which are increasingly used to treat hypertension and heart failure. The cough is persistent, non-productive, causes an irritating sensation in the throat, and is often worse when lying down.

Cough has been reported as a side effect of at least four angiotensin converting enzyme inhibitors<sup>1-4</sup> and is likely to be caused by all drugs of this class. That the cough is a side effect may be difficult to recognise because cough is common and is not a side effect traditionally associated with drugs. Moreover, it may not become apparent for several weeks or even months after starting treatment. Published studies have not therefore sought cough prospectively. The reported frequency of cough thought to be related to angiotensin converting enzyme inhibitors varies from nil to 3% in studies of at least 250 patients,<sup>2,5-7</sup> but two smaller studies of patients attending hypertension clinics have suggested a higher incidence.<sup>8,9</sup> The cough is commoner in women (who account for about two thirds of reported cases) and non-smokers (E R Squibb and Sons Ltd, personal communication). Airflow obstruction, heart failure, and the efficacy of treatment do not appear to predispose to cough, but those patients who cough may have increased bronchial reactivity (or more "twitchy" airways) compared with those who do not cough.<sup>10</sup>

Why angiotensin converting enzyme inhibitors cause cough is not clear. Angiotensin converting enzyme has effects other than converting angiotensin I to angiotensin II. It breaks down bradykinin and other peptides participating in inflammation.<sup>11,12</sup> These substances may accumulate with inhibition of the enzyme; the angiotensin converting enzyme inhibitor enalapril augments the wheal and flare response to intradermal bradykinin.<sup>13</sup> Bradykinin stimulates the unmyelinated afferent sensory c fibres through type J receptors,<sup>14</sup> and the excitation of these receptors by inhaled bradykinin or the specific c fibre stimulant capsaicin causes a non-productive cough.<sup>15-17</sup> Angiotensin converting enzyme inhibitors increase the cough response to inhaled capsaicin,

but this response occurs both in patients who cough and in normal volunteers.<sup>16,17</sup> In addition, angiotensin converting enzyme inhibitors have indirect effects on prostaglandin production through bradykinin. Prostaglandin E<sub>2</sub> stimulates the c fibres, causing cough,<sup>18</sup> and treatment with a prostaglandin synthetase inhibitor alleviates the cough in affected patients.<sup>19</sup>

Cough may also be mediated through stimulation of the rapidly adapting airway receptors, whose responsiveness may be estimated by inhalation of citric acid. The evidence that this reflex is altered by angiotensin converting enzyme inhibitors is conflicting,<sup>10,17</sup> and it has not been shown that it is altered more in those patients who cough. Thus there are pharmacological reasons for the cough, but it is not clear why only a few patients are affected and why it should be more common in women.

It is important to recognise that a patient's cough may be a side effect of an angiotensin converting inhibitor and to attempt to confirm its relation to the drug before investigating the patient for other disorders. If the patient can tolerate the cough it may be reasonable to continue treatment. There is no evidence to suggest that the drugs alter spirometric measurements when given over several months,<sup>20</sup> and limited data on bronchial reactivity do not show alteration by angiotensin converting enzyme inhibitors.<sup>9,10</sup> Some patients may be helped by reducing the dose, but we do not advise using prostaglandin synthetase inhibitors as these drugs also have adverse effects. In many patients there will be no alternative but to withdraw the angiotensin converting enzyme inhibitor.

K E BERKIN

Senior Registrar in Respiratory Medicine,  
General Infirmary,  
Leeds LS1 3EX

S G BALL

Professor of Cardiovascular Studies,  
University of Leeds,  
Leeds LS2 9JT