As the potential of the new genetics increases it is not clear who will look after the interests of the families and undertake the explanation and counselling that must precede tests designed to probe the most intimate and socially sensitive genetic secrets. Who will insure that informed consent is obtained, arrange the family studies, keep the confidential records, and store the banks of DNA spanning whole families and several generations? This is a dangerous topic for amateurs, and if they have received no genetic training doctors may have difficulty recognising genetic risk. Litigation by older women who have produced infants with Down's syndrome showed that family doctors, obstetricians, and paediatricians in particular have an obligation to warn people when they have a high genetic risk and to arrange genetic tests.

Who then will take up the challenge of the new genetics and link laboratory work to good family medicine? The size of the task means that clinical geneticists cannot cope alone. Young found that most general practitioners were aware of this,[5] and my experience on training committees shows that some paediatric and obstetric trainees are already seeking clinical genetic training. But who will teach medical undergraduates and postgraduates and insure that what they are taught is relevant to clinical needs?

A survey of British medical schools in spring 1986 showed that some of the next generation of medical graduates may not be well prepared (unpublished data). Two medical schools reported that there was no separate preclinical teaching of genetics, and 13 reported that there was no separate clinical genetics. We have little evidence on the relevance of the teaching given by non-medical geneticists in anatomy, biochemistry, pathology, or other courses. Similarly, the General Medical Council noted 10 years ago that ad hoc clinical teaching in genetics is variable and difficult to verify.[6]

The survey of medical schools showed, however, that university departments of medical or human genetics linked with genetic clinics in the National Health Service provide a good environment for this teaching (Royal College of Physicians, unpublished data). Schools with departments of human or medical genetics did more undergraduate teaching of genetics than schools without such departments —an average of 23·5 preclinical hours and 8·1 clinical hours compared with 14·4 and 1·8 hours. Those with departments also included more scheduled visits by students to genetic clinics, where genetic counselling techniques may be observed. The departments' associations with NHS consultant clinical geneticists and regional genetic centres are valuable as they encourage clinically relevant teaching and research.

Unfortunately such combined genetic centres are few and have limited resources. Similarly, although specialist training in clinical genetics is well established, the number of clinical geneticists falls far short of the minimum required[7]: there are only seven senior registrar training posts in the NHS and about 30 consultants in the whole of Britain. Plans to increase this to about 60 consultants were conceived before the dawn of the new genetics—yet one clinical geneticist for each million of population will be hard pressed indeed.

Because genetics has important implications for all specialties priority should be given to education in medical genetics for all grades of health care professionals.[8] This is best achieved by developing NHS regional genetic centres associated with universities that will provide specialised laboratory and clinical genetic services and also coordinate genetic education of non-doctors. Fortunately the Department of Health and Social Security is well informed about medical genetics and has already contributed to evaluating new techniques. Unfortunately it has other claims on its resources and is hampered by the current central policy of non-intervention in the affairs of dilatory NHS regions. In these circumstances the DHSS and the NHS regions require unambiguous evidence of need from consumers before major developments can be approved. Ironically, patients with genetic diseases may be the least able to express their needs, and the pleas of individuals at risk of relatively rare genetic diseases will go largely unheard. If consumers want genetic services a coordinated approach from an association of all the genetic organisations is essential, and this should include factual data on the benefits of the new genetics for their members. We could not ignore such an appeal because genetic disorders are responsible for much preventable anxiety, handicap, and premature death.

RODNEY HARRIS

Professor of Medical Genetics,
University of Manchester,
St Mary's Hospital,
Manchester M13 0JH

1 Weatherall DJ. *The new genetics and clinical practice*. 2nd ed. Oxford: Oxford University Press, 1985.
2 Anonymous. Alzheimer's disease. Progress in molecular pathology. *Nature* 1987;**325**:658-9.
3 Anonymous. Molecular genetics of the mind. *Nature* 1987;**325**:755.
4 Cooper DN, Schimidtke J. Human gene cloning and disease analysis. *Lancet* 1987;i:273.
5 Young ID. Undergraduate teaching of genetics. *Med Educ* 1984;**18**:151-4.
6 General Medical Council. *Basic medical education in Britain: the report of the General Medical Council survey of basic medical education in UK and the Republic of Ireland, 1975-76*. London: Nuffield Provincial Hospitals Trust, 1977.
7 Harris R, Emery AEH, Johnston AW, Pembrey ME, Winter R, Insley J. *Role and training of clinical geneticists. Report of the Clinical Genetics Society working party*. London: Eugenics Society, 1983.
8 Davidson RG, Childs B. Perspectives in the teaching of human genetics. *Adv Hum Genet* 1987;**16**:79-119.

Correction

Use and abuse of allopurinol

An error occurred in this leading article by Professor J Stewart Cameron and Dr H Anne Simmonds (13 June, p 1504). The formula used to calculate clearance was incorrect and—for men—should have read:

$$\text{Creatinine clearance (ml/min)} = \frac{(140 - \text{age in years}) \times \text{weight in kilograms} \times 1{\cdot}23}{\text{serum creatinine concentration in } \mu\text{mol/l}}$$

For women the value should be reduced by 15%.