present knowledge, we could take 6·5 mmol/l as the upper limit for primary prevention of ischaemic heart disease and 4·9 mmol/l as the lower limit to avoid the possibility of developing cancer of the colon. Reduction in serum cholesterol concentration should be achieved initially by modification of the fat content of the diet complemented by an adequate intake of β-carotene and fibre supplied by liberal additions of vegetables, cereals, and fruit.

KENNETH G TAYLOR

Consultant Physician,
Department of Diabetes, Endocrinology,
and Lipid Metabolism,
Dudley Road Hospital,
Birmingham B18 7QH

[1] Hjermann I, Byre KV, Holme I, Leren P. Effect of diet and smoking intervention on the incidence of coronary heart disease. Report from the Oslo study group of a randomised trial in healthy men. *Lancet* 1981;ii:1303-10.
[2] Lewis B, Hammett F, Katan M, *et al.* Towards an improved lipid-lowering diet: additive effects of changes in nutrient intake. *Lancet* 1981;ii:1310-3.
[3] Rose G, Blackburn H, Keys A, *et al.* Colon cancer and blood-cholesterol. *Lancet* 1974;i:181-3.
[4] Williams RR, Sorlie PD, Feinleib M, McNamara PM, Kannel WB, Dawber TR. Cancer incidence by levels of cholesterol. *JAMA* 1981; **245**:247-52.
[5] Lewis B. Metabolism of plasma cholesterol. In: *The hyperlipidaemias. Clinical and laboratory practice.* London: Blackwell, 1976:93-119.
[6] Cruse P, Lewin M, Clark CG. Dietary cholesterol is co-carcinogenic for human colon cancer. *Lancet* 1979;i:752-5.
[7] Hill MJ. Metabolic epidemiology of dietary factors in large bowel cancer. *Cancer Res* 1975;**35**:3398-402.
[8] Hill MJ. Steroid nuclear dehydrogenation and colon cancer. *Am J Clin Nutr* 1974;**27**:1475-80.
[9] Burkitt DP. Epidemiology of cancer of the colon and rectum. *Cancer* 1971;**28**:3-13.
[10] Burkitt DP, Walker ARP, Painter NS. Dietary fiber and disease. *JAMA* 1974;**229**:1068-74.
[11] Graham S, Mettlin C. Diet and colon cancer. *Am J Epidemiol* 1979;**109**: 1-20.
[12] Liu K, Stamler J, Moss D, Garside D, Persky V, Soltero I. Dietary cholesterol, fat, and fibre, and colon-cancer mortality. An analysis of international data. *Lancet* 1979;ii:782-5.
[13] Enig MG, Munn RJ, Keeney M. Dietary fat and cancer trends—a critique. *Fed Proc* 1978;**37**:2215-20.
[14] Wald N, Idle M, Boreham J, Bailey A. Low serum-vitamin A and subsequent risk of cancer. Preliminary results of a prospective study. *Lancet* 1980;ii:813-5.
[15] Shekelle RB, Lepper M, Liu S, *et al.* Dietary vitamin A and risk of cancer in the Western Electric Study. *Lancet* 1981;ii:1185-9, 90.
[16] Oliver MF. Serum cholesterol—the knave of hearts and the joker. *Lancet* 1981;ii:1090-5.

Antivivisection

The Cruelty to Animals Act[1] was passed in its present form in 1876 mainly as a result of pressure from the medical profession led by Dr James Paget. Doctors were well aware of the importance of animal work in advancing medical knowledge but were equally determined to keep out of Britain the horrible practices occurring in some other European countries in the middle of the last century.[2 3] They wanted legislation which would eliminate cruelty, keep the infliction of pain to a minimum by the use of anaesthetics, and ensure licensing and surveillance of animal experiments.

The Act was passed against the wishes of many antivivisectionists for whom nothing less than a total ban of all animal experiments was satisfactory. Their leader at that time was a formidable woman, Frances Power Cobbe, described by a contemporary as being "entirely impervious both to ridicule and reason" and having "inextinguishable eloquence especially in the direction of vituperation," qualities of great value in the leadership of any campaign.[4]

Miss Cobbe's present day successors share with her the ability to stir the emotions of the British public, as is evident from the nationwide campaign by the contemporary antivivisectionists. This is trying to create such a degree of sympathy against animal work among the public that Members of Parliament will be encouraged to introduce highly restrictive measures when debating the Government's proposals for new legislation set out in its white paper *Scientific Procedures on Living Animals* (Cmnd 8883).

The propaganda is documented by photographs of miserable cats and dogs, by statements that such animals are subjected to cruel, unnecessary, and agonising experiments without anaesthetics, and by misleading accounts of experimental work. Unfortunately responsible organisations such as the Royal Society for the Prevention of Cruelty to Animals are able to quote a few reports from scientific and medical journals of research that seems to have caused unacceptable suffering to animals—examples which give spurious respectability to the whole range of allegations. For example, claims are made that medical schools purchase stolen animals. Such allegations are not only lies but lies that cause great misery to children, families, or old people who may have lost a much loved pet and imagine it cowering in a cage awaiting some atrocious torture.

Each year in Britain 360 million animals are killed for food. The total number of animals used for experimental work in the whole of Britain in a year (1980 Home Office figures[5]) is 4·6 million, and most of the animals are mice (2·7 million) and rats (1·0 million). Dogs and cats, the animals most frequently referred to in antivivisectionist propaganda, represent 0·4% of the total.

Most animal experiments (3·7 million, or 80%) are done without anaesthesia because feeding experiments, taking venous blood, or giving injections, do not require anaesthetics in animals any more than in man. In more extensive procedures anaesthetics are used and are as effective in animals as in man.

The 40 universities in Britain with medical, dental, veterinary, and pharmacy schools or biology departments are responsible for less than one fifth of animal experiments. Commercial concerns and governmental institutions are responsible for most of the others—which are often required by legislation passed by Parliament to protect the public. These requirements may well need to be re-examined—but it is the legislation requiring the tests to be done that needs modification, not the 1876 Act by which the animal work is controlled. Tests on cosmetics have been greatly criticised, but they account for less than 0·7% of all animal work, and because cosmetics are so bland they seldom cause anything more than transient discomfort when applied to the skin or even the conjunctivae. The justification for these tests is that such materials may be applied with great frequency over months or years to the skin of infants or the faces of adolescents.

A frequent assertion of some antivivisectionists is that animal work could be entirely replaced by work on tissue culture. They ignore the difficulty that the function of an organ or the response of an organism to infection, a malignant growth, or drugs cannot be investigated by studying isolated cells. No culture of mammalian kidney cells can produce urine. A culture of nerve cells tells us little about the complex functions of the brain.

Medical research owes a great deal to animal experiments and so do our patients, both human and veterinary. Every diabetic receiving insulin, everyone who has had a renal transplant, every leukaemic child treated with modern cytotoxic drugs, and, indeed, all who benefit from modern medicines owe a debt to animals. Doctors need not be apologetic

about animal work. The surveillance by Her Majesty's inspectors and, just as important, the personal qualities of research workers and animal house technicians ensure that no unnecessary suffering is inflicted on animals and that they are handled with care and kindness.

Many antivivisectionists seem sadly ignorant of the suffering and misery caused by disease to their fellow citizens and of the benefits which have been derived and will continue to be derived from animal work. Some of their claims are part of the current vogue of antiestablishment campaigning supported, too often sensationally, by journalists: conventional medicine is castigated as inferior to acupuncture, nature cures, homoeopathy, and anthroposophic medicine which have the added advantage that they do not require support from animal experiments. Claims that cancer research is unnecessary and that scientists want the public to contribute to cancer research funds merely so that they can go on enjoying the pleasures of vivisection would be ludicrous except that they are taken seriously.

The threat of the antivivisectionists to medical research is not insubstantial: many wish to modify the 1876 Act so that animal work is abolished, and some of the more extreme are prepared to break into buildings, release animals, smash equipment, and send letter bombs to research workers or prominent medical men.

Experience in Birmingham in the past few weeks has shown, however, that the public welcomes authoritative statements that answer the allegations made by the antivivisectionists, does appreciate the benefits derived from animal work, and discounts the hysterical claims that such work is senseless, unnecessary, barbaric, inhuman, and immoral. The profession must argue against the exaggerated claims of the antivivisectionists: an important freedom to pursue justifiable ends to advance scientific knowledge is otherwise threatened.

O L WADE

Dean of the Faculty of Medicine and Dentistry,
University of Birmingham,
Birmingham B15 2TT

[1] HM Government. *Cruelty to animals Act 39 and 40.* Ch 77. London: HMSO, 1876.
[2] Anonymous. Vivisection at Alfort. *Lancet* 1860;ii:395-6.
[3] Anonymous. Justifiable vivisection. *Br Med J* 1864;i:71.
[4] Adams C. The antivivisection movement and Miss Cobbe. *Verulam Review* 1892;3:201. (Quoted by French.[6])
[5] Home Office. *Statistics of experiments on living animals, Great Britain.* London: HMSO, 1980. (Cmnd 8306.)
[6] French RD. *Antivivisection and medical science in Victorian society.* Princeton, New Jersey: Princeton University Press, 1975:62.

Psychosocial factors in the cause and prevention of relapse in schizophrenia

Schizophrenia is a recurring or chronic condition, and its course is no longer thought to be one of progressive deterioration.[1] Most patients either have frequent episodes of florid psychosis with hallucinations and delusions or have these symptoms as a permanent feature, but those more severely affected are also vulnerable to the social poverty and understimulation that may occur in large institutions such as mental hospitals or living alone in the community. A consistent line of research by social psychiatrists and sociologists over 25 years has improved our understanding of the role of psychosocial factors in determining the course of schizophrenia and its treatment.

That schizophrenics may be particularly susceptible to "total institutions"[2] was shown by Wing and Brown in a controlled study.[3] They found that chronic symptoms, such as social withdrawal and poverty of speech, varied from one hospital to another according to the severity of ward restrictiveness, absence of personal belongings, and the length of time that patients were left to do nothing. Acute symptoms of hallucinations and delusions were provoked when patients with chronic schizophrenia were stressed by attempts at too rapid rehabilitation.[4] These early findings suggested that schizophrenics had heightened sensitivity to social deprivation, leading to withdrawal and regression, and to social stress, which provokes an acute exacerbation of symptoms.[3]

The main thrust of this research came from the MRC Psychiatry Unit in London, though it has since been extended and confirmed elsewhere. In subsequent studies Brown and colleagues noticed that relapse was more common among schizophrenics who were discharged to live with a spouse or parent than among those living alone or in a hostel,[5] and they therefore devised a systematic means of rating blindly, from recorded interviews, the relatives' expressed emotion.[6] Two prospective studies showed that a high rating for hostility, critical comments, or overinvolvement in the relative most in contact with the patient strongly predicted relapse during the nine months after discharge from hospital.[7 8]

Of 128 acute schizophrenics, 57 had relatives with high ratings for expressed emotion (high EE). Twenty nine of the 57 (51%) relapsed in the nine months after discharge compared with 13% of patients returning to low EE environments. Nearly identical results have been reported in California.[9] Moreover, in the British studies those patients in contact with high EE relatives for more than 35 hours a week had twice the relapse rate of those with little contact. Maintenance treatment with neuroleptics had as strong an effect in reducing the relapse rate as had the amount of contact between the patient and his high EE relative, and the two effects were independent. Almost all patients in high contact with high EE relatives and off medication relapsed, but only 15% relapsed among patients in low contact and on medication. In the group which had one protective factor but not the other—low contact or maintenance medication—about half relapsed. None of the 14% of patients living with low EE relatives who relapsed were taking neuroleptics, and in Leff and Vaughan's cohort there were no relapses among patients taking medication and living with relatives rated low for expressed emotion.[10] Thus living with unprovocative relatives or living with provocative relatives but having a low level of contact with them while taking neuroleptics are good prognostic factors with about a 15% chance of relapse in the nine months after discharge.

The occurrence of arousing life events is another independent variable which may provoke relapse. If such life events provoke an exacerbation of symptoms or a relapse in schizophrenia they would be expected to be more common in patients just before an acute episode than in a control population. Brown and Birley found just this in a study of 50 consecutive admissions to the Maudsley Hospital.[11] Life events had, however, recently occurred more commonly among patients on medication when they relapsed. A similar observation emerged from two studies of chronic patients. These found that almost all those who relapsed on medication