develop the disease when old: crudely, we now have six annual cohorts of 1 year olds but only one annual cohort of 6 year olds. Assuming that the diagnoses for cows born after the ban were made between January 1990 and October 1995, I have calculated the number of annual cohorts of calves implicit in each age group of such diagnoses (table 1). The final column of the table then lists by age the number of diagnoses per annual cohort. These figures are thus equivalent to the column for the single year 1989.

The age structure of diagnoses can indeed be seen to have changed little. What is surprising, however, is that the incidence of the disease increased substantially after the ban. Among 5 year olds, for example, 1874 of those born in 1984 were affected; this figure increased to roughly 4353 of those born in 1989. Perhaps the Ministry of Agriculture, Fisheries and Food could supply the exact figures.

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Magnetic resonance imaging is not a sensitive test for Creutzfeldt-Jakob disease

EDITOR,—Terence Featherstone asks whether the prevalence of signal abnormalities in the basal ganglia seen on magnetic resonance imaging in Creutzfeldt-Jakob disease is being studied.¹ We have been conducting systematic surveillance of Creutzfeldt-Jakob disease in Britain since 1990 and have collected data, including reports of magnetic resonance imaging, on 256 definite and probable cases (as defined by Masters *et al*). We are also currently involved in a study to ascertain radiological and pathological correlations, using post-mortem magnetic resonance imaging of the brain before histological processing.

Ninety six people are known to have undergone magnetic resonance imaging of the brain during their illness. Of these, eight had iatrogenic and four familial disease. Only four patients (all with histologically confirmed disease; three sporadic cases and one related to treatment with growth hormone) were reported to have high signal abnormalities of the basal ganglia on imaging. The remainder of the scans were either normal (41) or showed atrophy (29), scattered areas of high signal (6), or non-specific changes. Of the 61 patients referred to our unit with suspected Creutzfeldt-Jakob disease but with another histological diagnosis, six are known to have had magnetic resonance imaging. None of the scans were reported as showing the high signal abnormalities of the basal ganglia.

Only one of the four patients with high signal abnormalities of the basal ganglia presented with an extrapyramidal syndrome. This patient and two of the others had extensive and characteristic histological features of Creutzfeldt-Jakob disease in the basal ganglia. The final (sporadic) case was diagnosed on frontal biopsy, and results of postmortem histological examination are awaited. Our three sporadic cases were unusual in two other respects: the characteristic electroencephalographic pattern seen in Creutzfeldt-Jakob disease was absent, and the duration of their illness was relatively prolonged (10, 14, and 17 months compared with the median duration of sporadic Creutzfeldt-Jakob disease of 5 months). Cases of long duration without the typical electroencephalographic pattern can present diagnostic

difficulty, and we agree that for these patients the appearance on magnetic resonance imaging might be useful diagnostically.

In the correct clinical context high signal abnormalities in the basal ganglia on magnetic resonance imaging may be a relatively specific (although not sensitive) sign of Creutzfeldt-Jakob disease; in younger people rare conditions, such as Wilson's disease² and mitochondrial cytopathies,⁴ may cause similar appearances, but the clinical presentation of these conditions distinguishes them from Creutzfeldt-Jakob disease. In older patients high signal in the periventricular white matter is common and senile changes may affect the basal ganglia, but the changes are usually asymmetric and patchy. The characteristic electroencephalographic pattern of generalised repetitive triphasic periodic complexes remains the most sensitive non-invasive diagnostic test of Creutzfeldt-Jakob disease.

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GPs decide not to countersign applications for gun licences

EDITOR,—In the wake of the atrocity in Dunblane, in which many young children were killed and injured by a man who entered their school with a gun,¹ as a practice we have decided not to act as countersignatories to any application for a gun licence until a satisfactory legislative review has taken place. We hope that colleagues in the profession will consider doing the same.

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Acute sports injuries

Way in which sports are played is important factor in injury

EDITOR,—Like Urho M Kujala and colleagues in their study of injuries sustained in six sports commonly played in Finland,¹ in a study in England and Wales we found that the risk of an incident that resulted in a non-trivial injury (one that needed treatment or restricted participation in usual activities) was higher in the martial arts than in soccer (table 1).² Of 13 popular sports played in

Table 1—Rates of non-trivial injury*/1000 occasions of participation in popular sports among population aged 16-45 in England and Wales, 1989-90

Activity	Rate	Activity	Rate
Rugby	57.7	Horse riding	5.2
Martial arts	22.3	Tennis	5.0
Soccer	19.5	Other running	4.5
Hockey	13.9	Weight training	4.2
Cricket	13.7	Keep fit	1.5
Badminton	7.1	Swimming and diving	2.3
Squash	5.6		

*New non-fatal injuries needing treatment or affecting participation in daily activities.

England and Wales, however, rugby easily carried the greatest risk.

In our extensively piloted and validated³ study 17 564 people aged 16-45 responded to a questionnaire asking about their frequency of participation in sport and injuries in the previous four weeks. In contrast to the Finnish study, our study found no evidence that the risk of injury, however minor, differed among three age groups (16-25, 26-35, and 36-45). Furthermore, there was no epidemiological evidence to justify the need for mouthguards as claimed by Kujala and colleagues. Despite an explicit prompt (based on the fact that cricket and hockey had resulted in one of us (JN) being on his fourth set of front teeth), among 543 reported incidents that had resulted in non-trivial injuries during 78 772 occasions of participation in vigorous activities, there was only one mouth injury that had resulted in the person attending a dentist.

Our study differed in several important ways from the Finnish study. For example, we recorded all injuries (however minor) and how they were treated, rather than only injuries seen by a doctor. This was partly because in the pilot study one fracture was reported as treated "by grandad" and another "by a bone setter."³ The national study found numerous incapacitating injuries not seen by doctors.² Indeed, in total, more non-trivial sports injuries are seen only by nurses, physiotherapists, chiropractors, non-orthodox medical practitioners, and other non-medically qualified therapists than are seen in accident and emergency departments. Furthermore, as our study was population based we asked about occasions of participation, rather than merely recording person years as a registered competitor.

Finally, we found that in 12 of 13 popular sports in Britain the estimated risks were 50% higher in club players than non-club players, and the risk in club players increased further in those who did not participate regularly. These findings prompted our conclusion that the way in which some sports are played may matter as much as the games themselves or the use of protective equipment.

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Data on leisure accidents and injuries should be collated centrally

EDITOR,—We welcome Urho M Kujala and colleagues' paper on acute sports injuries in Finland.¹ The data that the authors present are also collected in 18 British hospitals by the national leisure

accident surveillance scheme.² Last year we reviewed the data for 1991; we estimate that there were roughly 285 000 new attendances at accident and emergency departments for accidental injuries sustained during leisure activities and 82 000 for sporting injuries in Scotland. These represented 24% and 7%, respectively, of all new attendances at accident and emergency departments. The annual direct patient costs associated with sporting injuries were therefore roughly £85 000–155 000 per 100 000 population.³ The specific pattern of sporting injuries in Britain is different from that in Finland, with rugby and cricket associated with the highest injury rates⁴ and basketball, volleyball, and ice hockey less important causes of injury.³

Other data on sport and leisure accidents and injuries are incomplete and found in disparate sources. Most importantly, they are not readily accessible to sporting organisations, sports safety bodies, and accident prevention agencies that could use them to review sports safety regulations and develop strategies to prevent injury. Nor are they readily accessible to health professionals, who have to deal with a changing pattern of sports injury as sports change and new activities such as roller blading are introduced.

We suggest that three particular areas merit attention. Firstly, a strategy should be formulated to collate all existing data on leisure accidents and injuries. Individual sports safety organisations and both statutory and voluntary agencies involved in preventing or responding to accidents currently invest substantial resources in gathering such data. These data, however, are currently not brought together to produce a detailed picture. Secondly, much better linkages (healthy alliances) need to exist between national sports organisations and health agencies and health professional bodies to facilitate a better understanding of the causation of leisure accidents and injuries and to promote joint action. Thirdly, although the Finnish insurance registries' data¹ and the data from the British leisure accident surveillance scheme give a broad picture of sports accidents and injuries, epidemiological research exploring these issues in greater depth⁵ is necessary to give the detailed information required for the formulation of strategies to promote safety and prevent leisure accidents and injuries.

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Adverse life events and breast cancer

Other studies have found no association

EDITOR,—The latest interview study about adverse life events and breast cancer, by C C Chen and colleagues, reports a positive link,¹ but wider review of the literature shows a contradictory picture.² Retrospective interview studies on this topic are hampered by unavoidable problems.

A diagnosis of cancer has often been correctly predicted by the patient or interviewer before the results of biopsy are known, which increases the likelihood of overreporting of stress in an effort to explain the illness. The temporal relation of previous life events to the onset of cancer is impossible to assess because the onset of cancer cannot be dated. Furthermore, patients with benign breast disease may not be a suitable comparison group.

These limitations can be overcome by large population record studies in which the focus of interest is restricted to two major adverse life events—widowhood and divorce—which can be objectively verified and dated. Such studies yield little or no evidence that widowhood or divorce is related to the onset or outcome of breast cancer.^{3,5}

Interactions among external stress, psycho-neuroimmunological responses, and the breast cancer process are complex and fascinating, but their clinical importance remains in doubt. Chen and colleagues have carried out a careful study, but their claim to have shown "a significant aetiological association between life events and development of breast cancer" goes beyond their data and could be misleading and unhelpful for the patients concerned.

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Association may be due to imbalance in ratio of adrenal androgens to glucocorticoid

EDITOR,—C C Chen and colleagues report convincing evidence for an association between life stress and breast cancer but suggest that it would be a formidable task to account for this association with a biologically plausible mechanism.¹ Recent studies carried out by my group into the regulation of the synthesis of oestrogen in breast tumours from postmenopausal women have indicated a possible mechanism by which adverse life events could enhance this synthesis.

Oestrogens are the most potent mitogens available to support tumour growth, and it has recently been established that the activities of several of the enzymes that are involved in tumour oestrogen synthesis—for example, aromatase, oestrone sulphotase, and oestradiol dehydrogenase—are regulated by cytokines such as interleukin 6 and tumour necrosis factor α .² Most of the cytokines that are available to stimulate tumour oestrogen synthesis result from the infiltration of lymphocytes into tumours. Some of these cells, the T helper cells, are now known to exist as two main subsets, Th1 and Th2 cells; each subset secretes a different profile of cytokines. Interleukin 6 is secreted by Th2 cells, and there is now good evidence that the progression of T helper cells to either the Th1 or the Th2 phenotype is governed by the ratio of adrenal androgens and their metabolites (for example, dehydroepiandrosterone and androstenediol) to glucocorticoids.³ Whereas plasma concentrations of adrenal androgens decrease with advancing age, production of glucocorticoid remains relatively constant.

A series of adverse life events would result in an increase in the production of glucocorticoid, which would alter the balance of the progression of T helper cells in favour of a Th2 response and secretion of cytokines that stimulate tumour oestrogen synthesis. Interestingly, some years ago Bulbrook and Hayward showed that the excretion of a low ratio of androgen metabolites to glucocorticoid metabolites (the discriminant function test) indicated women at risk of breast cancer and was also associated with an unfavourable outlook in women with the disease.⁴ The discriminant function test has recently been postulated to act as a marker of the production of Th1 and Th2 cytokines and oestrogen synthesis in breast tumours.⁵

If this postulated mechanism is correct then it is worth exploring the possibility of using adrenal androgen replacement therapy to prevent breast cancer.

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Reservations about conservative surgery for early breast cancer

EDITOR,—Several points need to be made before there is a wholesale switch to conservative surgery for breast cancer.¹

I find the proposal that tumours up to 4 cm in diameter are suitable for conservation surgery extremely worrying. Whenever new and apparently less radical treatment becomes available it is important that patients should be carefully selected. Experience in Nottingham suggested that tumour size of over 2 cm was a risk factor for local recurrence after conservation surgery,² and I would therefore be reluctant to treat tumours much larger than 2 cm by such surgery. It goes without saying that the tumour must be unifocal, and surgical excision margins must be clear of tumour if local recurrence rates equivalent to those associated with mastectomy are to be achieved.

Removing all invasive carcinoma is not usually particularly difficult technically, but I find it much more difficult to ensure that all resection margins are clear of associated ductal carcinoma in situ. I have the feeling that pathologists are increasingly reporting associated in situ change, and radiotherapy cannot be expected to salvage inadequate surgery.

It is a moot point whether patients with high tumour grade and lymphatic and vascular invasion should be treated by conservation surgery.³ While the grade of the tumour may be known pre-operatively from fine needle aspiration cytology or biopsy, this is by no means always the case. Furthermore, the grade is not always accurately identified on cytology or biopsy, and lymphatic