the outcome of an expectant policy is not demonstrably different from the immediate risk of operation.

What is the future? Drug treatments may be found to reduce or prevent the harmful effects of abnormal adrenal activity and render operation safer.¹⁴ Antifibrinolytic agents may be found which do not increase the risk of communicating hydrocephalus and cerebral ischaemia. Their place is likely to be limited, however, because the primary fault remains untreated. Mechanical factors are important. An aneurysm is a highly stressed and unstable structure, whose wall differs from that of the parent vessel; varying in thickness, at places gossamer thin, at others tough and fibrous and sometimes calcified. These factors concentrate stress at particular points in the aneurysm wall. When the strain energy stored in the wall of the aneurysm is sufficient to fracture the aneurysm it either leaks or bursts explosively, depending on the prevailing conditions. Engineers and surgeons working together will certainly add to our understanding of the mechanisms concerned, even if this line of research initially has little impact on management (A D Harman, PhD thesis, University of Reading, January 1980). Finally, Pope *et al*¹⁵ have shown that over half the patients they investigated were deficient in type III collagen, raising the possibility of identifying people at special risk of subarachnoid haemorrhage.

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Charitable organisations in medical research

The 135 000 or so charities in Britain range in size from those which spend millions of pounds each year to small funds often dedicated to meeting some limited local objective. A recent estimate¹ suggests that their total annual income is around £2600m. Indirectly, considerable sums of public money are concerned, because of the tax concessions given to charities. The question may be asked whether the state or a public non-governmental organisation could not use this money to better effect. The answer is probably no. Raising the necessary revenue by fiscal means would politically be very difficult, while individuals and corporate bodies would be unlikely to donate voluntarily to the state those sums of money which they currently give to the charities. Furthermore, the assumption of these activities by the government would also remove from donors the freedom to express most directly their individual views on priorities for the improvement of society. The trustees and administrators of charities therefore have a responsibility to show that their money is used to best advantage.

The total number of charities which include medicine and medical research among their activities is uncertain, but most of the larger ones are among the 35 members of the Association of Medical Research Charities, which in 1980 spent about £85m on medical care and research—and of this sum £55m was spent on research. Some large organisations which are not members of the association and very many smaller charities make important contributions to research at a local level; so the total provided by charities for medical research is certainly much higher than £55m. The Medical Research Council, by comparison, spent £81m* on medical research during 1980.^{2,3}

There are major differences in the ways in which the charities and the Medical Research Council use their funds. Most important, the Medical Research Council presently supports 60 research establishments (including the National Institute for Medical Research and the Clinical Research Centre) which account for 58% of its funds, leaving 42% available for shorter-term research commitments.^{2,3} The charities, by contrast, are the sole or principal supporters of 26 institutions or units, accounting for 41% of their funds, leaving 59% for other activities. As a result, in 1980 the Association of Medical Research Charities was able to make 967 new project grants and continue support for another 2004, whereas the Medical Research Council made 506 new project grants and continued 1082. Similarly, the Association of Medical Research Charities was supporting 257 programmes against the Medical Research Council's 158. The Medical Research Council, however, provided more personal support grants—1881 against 1160 by the Association of Medical Research Charities. The difference in the number of short-term projects supported is, however, much greater than would be expected from a straightforward consideration of the sums of money available. The figure for the total number of grants made by the charities includes a substantial number of project grants for periods of one to two years (by comparison with the standard three-year period for the Medical Research Council), and these contribute considerably to the total. These short-term grants serve two main purposes: they provide funds for clearly defined projects of limited duration and they also provide seed money which

*The Medical Research Council year runs from 1 April to 31 March. This figure is derived by adding 25% of the expenditure for 1979-80 to 75% of the expenditure for 1980-1.

makes it possible to test the feasibility of new ideas or techniques.

Both the charities and the Medical Research Council make considerable contributions to the training of research workers by providing personal support of limited duration to younger researchers and longer-term support for research workers in maintained institutes. Figures collected during a recent survey suggest that about 1200 science graduates receive their salaries from project and programme grants provided by the charities.⁴ The Medical Research Council project and programme grants were providing for 1666 scientific and medical salaries on 1 January 1981.³

The charities and the Medical Research Council both provide a considerable amount of indirect support for research by the provision of grants for travelling. They also provide funds for the purchase of new equipment, not directly related to funded projects; the organisation of scientific meetings; subscriptions to international bodies; and, in the case of the charities, funds for some health education projects.

Much of the charitable funds is given for specific research into a single disease or group of disorders. The relative sums raised reflect (to some extent) the public perception of the relative importance of these diseases. The foundations, which exist as a result of private or corporate philanthropy, are less restricted and can make contributions to basic medical science and support those areas which do not command public interest. The rank order of subjects for the charities and the Medical Research Council show remarkable similarities: in both cases the top four are cancer, general research, locomotor disorders, and neuropsychiatric disease, while aging comes at the bottom of both lists. Such lists should be treated with some caution. The first two categories in each list account for about 80% of the funds available. Cancer research accounts for 58% of all the funds contributed by the charities, while in the Medical Research Council list the category "general" accounts for 61% of funds. This substantial contribution to research in the sciences basic to medicine is consistent with the Medical Research Council's major financial commitment to long-term research. Another reason for caution in interpretation is that work in one category may be directly relevant to disorders in another. The apparent gross neglect of aging by the funding bodies takes no account of research on, for example, locomotor, neuropsychiatric, and cardiovascular disorders which is of particular relevance to the aging population; and work in cell biology and biochemistry in cancer research or basic science projects may be of fundamental importance in understanding the aging process.

This survey shows, then, that the activities of the charities and the Medical Research Council are complementary though overlapping. The Medical Research Council has a major commitment to research in the sciences basic to medicine and provides an appropriate environment for such research in its units and institutions. The charities retain the larger proportion of their funds for shorter-term projects and thus have more flexibility. Their activities are also determined to an extent by the community in general. The importance of the charities' role is underlined by the observation that Britain spends little more than half that of many other industrial nations on civil research (on a per caput basis).

Clearly more money could buy more medical research—but present levels of funding will not be increased in real terms in the foreseeable future. All those bodies engaged in supporting medical research (including the universities, who provide the other limb of the dual support system) will need to use these limited funds to best effect. The charities have already taken

an important step towards achieving this end by forming an association which considers strategy and organisation and by improving personal contact has provided a basis for collaboration on major projects, and, in some instances, by avoiding unnecessary duplication of effort.

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The help and co-operation of the directors and staff of the member charities of the Association of Medical Research Charities is gratefully acknowledged. It is also a pleasure to thank the staff of the Medical Research Council for their help in the collection of these data.

The Association of Medical Research Charities is staging an exhibition "Medical research today—what the charities are doing" which will be held at Fortress House, Savile Row, London W1 on Thursday 26 November from 2 30 to 6 30 pm and Friday 27 November from 10 am to 4 30 pm. Admission is free.

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Immunodiagnosis in parasitic disease

In both tropical and temperate climates the diagnosis of parasitic disease requires careful inspection of body fluids and tissues for the organisms, and for this there is no accurate substitute. When the results of these classical methods prove negative but a clinical suspicion remains of acute infection, how far do modern immunological techniques¹ help?

The high concentrations of non-specific immunoglobulin found in many parasitic infections (IgE in helminthiasis; IgM in African trypanosomiasis) are generally not of diagnostic value.² Attempts to use rising antibody titres in diagnosis have bedevilled parasite laboratories for many years. The tests are slow and require two or more samples, and they cannot distinguish with certainty between current and recent but burnt-out infection. The combination of poor antigen definition and shortage of material has led to lack of standardisation between laboratories and hence difficulties in comparing results.³ Antibody tests may also fail if the antibody being searched for is specific for one stage within the parasite life cycle (for example for infective larvae, or adult worms or their offspring). Conversely, cross-reactivity between antigens of different parasites may also cause false-positives. Indeed, when antigen is scarce, this phenomenon has been exploited by using animal parasite antigen to diagnose human infections (for example, the dog heartworm *Dirofilaria immitis* for detecting onchocerciasis). With all these drawbacks, nevertheless, antibody tests are an accepted part of routine investigation, using immunofluorescent, indirect haemagglutination, or immunodiffusion methods.

Against that background, the introduction of the enzyme-linked immunosorbent assay (ELISA),⁴ which allows rapid, multiple-sample processing using minute quantities of antigen, has been a major advance. This elegant technique can detect either antibody or antigen, depending on which is adsorbed on to the titre plate first. For developing countries, enzyme-linked immunosorbent assay has clear advantages over radio-