give the most rapid results, but failure to detect virus particles does not exclude infection.

Obstetricians often send requests for TORCH screens on women after an intrauterine death or recurrent abortion. *Toxoplasma gondii*, rubella, cytomegalovirus, and herpes simplex do not cause recurrent abortion, although they occasionally cause spontaneous abortion if primary infection is acquired in early pregnancy. *Listeria monocytogenes*, however, may cause intrauterine death,[6] and parvovirus B19 should be considered if the mother gives a history of a rubella-like illness or contact with a person with rubella-like illness. Testing all patients who have had an intrauterine death for evidence of recent B19 infection is not useful.

Good communication between the local microbiologist and obstetrician or paediatrician is paramount. Requests for specific investigations and the use of rapid diagnostic methods will allow the correct treatment to be started and infected infants isolated if necessary. Lack of communication may lead to a delay in diagnosis and failure to implement infection control policies, resulting in the spread of infection. Enterovirus infections have, for example, closed newborn nurseries.[7] Delay in investigating urine to diagnose congenital cytomegalovirus infections may result in failure to differentiate these from perinatally acquired infections.

The need to prevent intrauterine and perinatal infections has recently been highlighted in the press. Most perinatal infections with hepatitis B virus can be prevented by giving hepatitis B specific immunoglobulin and hepatitis B vaccine at birth to the infants of mothers positive for hepatitis B surface antigen.[8] We wonder, however, how many babies of mothers infected with hepatitis B virus are not treated, either because the mothers have not been tested antenatally or because vaccine and immunoglobulin are not available at birth. A recent survey at an inner London hospital showed that only 56% of antenatal patients positive for hepatitis B surface antigen had been tested for it in 1988.[9] Similar findings have led to the recommendation in the United States that all pregnant women should be tested for hepatitis B surface antigen.[10] Should Britain also introduce unselected hepatitis B virus screening for pregnant women, at least in centres where a high percentage of the antenatal population is at risk?

Screening women for cytomegalovirus and toxoplasma infections in pregnancy has also been proposed, with a view to preventing the birth of babies with congenital malformations due to these infections. Four fifths of pregnant women in Britain are, however, susceptible to toxoplasma infection, and screening would require repeated testing throughout pregnancy to identify maternal infection as infection is usually symptomatic.[11] Additional funding would be required before laboratories could undertake this amount of testing. Such a screening programme is easier in France, where only a fifth of women are susceptible to infection. Like toxoplasmosis, cytomegalovirus infection is usually asymptomatic and primary infection in pregnancy would be identified only by repeated serological testing. Even if primary infections were identified the risk of congenital malformation is small as virus is transmitted to the fetus in only 30-40% of cases and in only 10% of these will the fetus be damaged by the virus.[12,13] Termination of infected pregnancies would result in the loss of many normal babies and is not always possible as, in contrast to rubella, congenital malformations may result from infections at any stage of pregnancy.

Human T cell leukaemia/lymphoma virus type I, a retrovirus associated with adult T cell leukaemia and tropical spastic paraparesis is found most frequently among Japanese and West Indian people.[14] One route of transmission that has been shown in Japan is from mother to child in breast milk, and this could be prevented if seropositive mothers did not breast feed.[15] The prevalence of infection among West Indians in London is only 1-4%, however, and the incidence of both adult T cell leukaemia and tropical spastic paraparesis is low in Britain. Therefore further seroepidemiological studies and cost benefit analyses are required before antenatal screening programmes for this virus are considered.

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Screening with discrimination

Arguments for a national screening body

Screening is the identification among apparently healthy people of those at sufficient risk of a specific disorder to warrant diagnostic tests and treatment. To some it has an intuitive appeal because of the potential to make substantial inroads into the burden of disease. Others perceive it as being of little or no benefit; indeed, some argue that screening may harm individuals by prompting unnecessary intervention and increased anxiety in those with positive results while falsely assuring those whose results are negative. Persuasive arguments for both views leave the lay person and health professional confused. But screening is not a single entity, and when each test is weighed separately some will be found wanting and others found to be of great importance to public health. Such a rational analysis is provided in the recently published book by Holland and Stewart.[1] The authors deal with both the scientific aspects—establishing efficacy in principle—and the practical aspects—implementation and monitoring.

Establishing efficacy is not straightforward, especially for the common diseases of adult life, such as cancer. In such progressive diseases the principal question is whether identifying people at an earlier stage in the natural history of

the disease and its consequent treatment reduces mortality. That this is necessarily true for those cancers where the survival rate is substantially higher for early stage disease is commonly believed. But counterexamples show this not to be the case. Although large studies have shown that chest radiography and sputum sampling lead to earlier diagnosis of lung cancer, they have found no effect on mortality.[2] The apparent paradox is explained by statistical bias, which accounts for at least some of the higher survival rate in early stage disease. Suppose that an abdominal cancer was diagnosed incidentally during unrelated surgery and the patient refused treatment. Though the time from diagnosis to death would be longer than if the surgery had not been done, the date of death would be no different (the "lead time" bias). Some cancers are aggressive, ending in death just a few years after initiation, whereas others at the same site are indolent and may take decades to kill. Because the indolent cancers will spend more time in a preclinical state there are more opportunities for incidental diagnosis. Therefore in a group of cancers diagnosed early there will be a disproportionate number of indolent cases with good survival (the "length" bias).

Consideration of these and similar biases that apply to other progressive diseases has led to the development of epidemiological methods of evaluation. Among these, only the randomised trial is completely without bias, but a full assessment will include studies with other designs. Screening for breast cancer provides an ideal example. There are nine large published studies: four randomised trials,[3-6] one geographically controlled study,[7] and four in which mortality in attenders for screening was compared with either national rates[8] or rates in non-attenders.[9-11] Critics of breast screening have pointed to the difference in results between the studies. Nevertheless, although only five of the studies show a significant reduction in mortality, they are all consistent with a protective effect as large as 40%. Given the differences among the nine studies in design and execution alone, the results are remarkably similar and together support the general conclusion that mammographic screening for breast cancer can reduce mortality from the disease.

Once efficacy in principle has been established for a specific disorder the practical questions of implementation need to be considered. There is no reason why the full potential should not be realised in practice, but experience with cervical cancer has shown that without proper organisation achievement can fall far short. Case-control studies and correlations between mortality from cervical cancer and the extent of screening in different geographical regions and over time show that a reduction in mortality of as much as about 90% is possible.[12] In Britain, however, despite the fact that about three to four million smears have been carried out each year over the past decade the impact is a fraction of this, mainly because those screened have been predominantly young—for example, those attending family planning clinics.[13] This problem is now being overcome by specific targeting of older women, by a more systematic call-recall scheme based on the computer records of family health services authorities, and, in many health authorities, by identifying a single person responsible for coordinating the whole programme.

To ensure that, once implemented, a screening programme fulfils its potential a system for monitoring outcome is needed, but existing systems are often inadequate. Antenatal screening for neural tube defects by testing for α fetoprotein and ultrasonography are widespread. Yet with existing routinely collected data on births and therapeutic abortions we cannot determine how much of the recent 80% fall in birth prevalence is due to screening and how much to a natural decline in incidence.[14]

Holland and Stewart conclude their analysis with a short list of recommended screening tests. Most are in the antenatal and neonatal period. In adult life, apart from screening for cancer of the cervix and breast, their recommendations are largely limited to risk factor screening by general practitioners. The authors also draw attention to more general issues, including the lack of a central body responsible for national screening policy. Because of this there is little uniformity in the availability of screening tests of proved efficacy throughout Britain. Screening is often multidisciplinary, and launching a screening programme may mean cutting across normal professional and organisational boundaries. Launching the national breast cancer screening programme demanded considerable effort in setting up national and local networks of communication and decision making. Unless a similar concerted approach is taken in other newly developing techniques, such as biochemical screening for Down's syndrome, or those that might emerge in the future, such as carrier screening for cystic fibrosis, implementation will be slow and haphazard. A national screening body could be what is needed: a bold step in preventive medicine. It would help to encourage the rational use of screening and discourage the use of tests with no proved benefit except within the context of well designed studies.

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Correction

Tanning with ultraviolet A sunbeds

We wrongly attributed this editorial (6 October, p 773) to a sole author, B L Diffey. The other members of the British Photodermatology Group listed at the end should have been shown as coauthors: P M Farr, J Ferguson, N K Gibbs, F R de Gruijl, J L M Hawk, B E Johnson, G Lowe, R M Mackie, A F McKinlay, H Moseley, G M Murphy, P G Norris, A R Young.