weeks. Pregnancy must obviously be avoided by women who have just been treated with radioiodine; and iodine is secreted in milk at about 30 times the plasma concentration.

The two alternatives to radioiodine are surgery and antithyroid drugs. The risks of surgery depend on the skill and experience of the surgeon and, to a less extent, the anaesthetist, as well as the physician who prepares the patient for operation. In the best hands mortality is between 0·1%, and 0·5%, and there is a 0·5% risk of damage to the laryngeal nerve. These are immediate risks from the first thyroidectomy to be contrasted with lifetime radiation risks and are likely to be higher if thyroidectomy becomes less common. Antithyroid drugs will usually not be a definitive treatment but will also carry risks, of agranulocytosis especially (possibly also about 0·1%), and will commonly not lead to a long term remission.

On the other hand, radioiodine is said to cause more long term hypothyroidism, with a continued incidence of 2-3% a year. There is nearly the same incidence after surgery, however, and indeed the initial chances of remission and of hypothyroidism are related to the dose of $131I$ or the proportion of thyroid removed by the surgeon. The main disadvantage of hypothyroidism is delay in diagnosis, its treatment by thyroxine being surely one of the most trouble free treatments in medicine.

What can we conclude? Individual decisions will still have to be made by the physician concerned, who will also have to consider exophthalmos and cardiac and other risks, but since their lethal or serious risks are not dissimilar both surgery and radioiodine may now be seen as reasonable first treatments (after suitable preparation) for thyrotoxicosis at all ages. A recurrence after surgery will usually be more safely treated by radioiodine. The small mortality from good surgery is probably comparable with the long term risk of radiation carcinogenesis, yet to be shown from radioiodine. Finally, when radioiodine is used it remains very important to make quite sure that the patient is not pregnant (and women should be advised to avoid pregnancy for about 12 months—on general medical grounds) and is not lactating.

How far do these comments apply to children, in view of their long expectation of life and of the known low but definite incidence of non-lethal thyroid carcinomas after low dose x ray treatment? Thyrotoxicosis is uncommon in children, but its successful treatment is difficult and hazardous by surgery or by antithyroid drugs, and high dosage radioiodine treatment is not comparable with low dose x ray treatment. Even more careful consideration of the alternatives will have to be made than for adults, but radioiodine should have a place; results from it (in small numbers) have been good.10

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The treatment of myopia

Although myopia very occasionally derives from an acquired disturbance of the eye's anatomy or refraction (as from diabetes or displacement of the lens), mainly all shortighted people have simply inherited too long an eyeball—and many resent their dependence for clear distance vision on clumsy or unsightly spectacles or exasperating contact lenses. So it is hardly surprising that "remedies" for short sight date back to prehistory, with a new "cure" (or an old one in new clothes) reaching the headlines every few years.

By the end of the last century most of the zanier herbs and nostrums of our forebears had yielded to treatments which could make a pretence of a scientific justification (calcium "to harden up a distensible sclera"; vitamins B, D, and E; proteins; thyroid extracts; placental implants; and so on). About the same time the emphasis was shifting to a more functional approach, and (since myopia normally increases during the growing years) shortsighted schoolchildren were encouraged to avoid reading (lest this should "strain" their focusing muscles) or were obliged to give it up by neutralising the accommodation with either atropine drops or convex spectacles. Indeed, the use of convex lenses is still recommended in the Far East,1 where some 60% of the population is myopic compared with 15% in Britain. These harsh restrictions along with "myope schools" (where teaching was primarily oral or on distant blackboards) had largely been abandoned in the West before the last world war, but occasional spirited advocates are still heard on the home front, such as Professor Montagu Ruben,2 who reckons that "bigger print and good lighting can help stop myopia."

Meanwhile other voices were being heard, declaring that myopia could actually be cured, either by the constant wearing of corrective concave spectacles or else by contact lenses, whose pressure would prevent the eye elongating (they do transiently reduce the myopia by flattening the cornea, as the ancient Chinese discovered when they took to sleeping with sandbags weighing on their closed eyelids). In the 1920s this functional approach took a more positive form, when "Dr" Bates3 declared that myopia could be arrested by exercising rather than by resting the extraordinary muscles and accommodation, a technique that had a substantial boost from the testimony of Aldous Huxley.4 (Alas, he had spoken too soon, as his sight steadily worsened after his book was published.)

Since myopia is essentially the result of an anatomical defect surgery might seem to be the most straightforward solution. This approach began in Vienna in the 1890s with Fukub4 advocating removal of the lens from highly myopic eyes (considerable hypermetropia was known to follow cataract extraction), followed by Muller5 advising a shortening of the overlong eyeball by resection of equatorial strips of sclera (as had already been done for retinal detachment); but with both procedures retinal detachment was usually the sorry outcome.
Then came “scleral reinforcement,” implanting slings around the eyeball to stop it elongating. These early blunderbuss approaches were soon abandoned, yet both extraction and reinforcement have made a cautious comeback in the past year or two.

Then, with the rapid deployment of corneal grafting techniques after the second world war, came “keratomileusis” (quick freezing of an excised corneal layer, grinding it to a predetermined shape, and suturing it back in position) and “keratophakia” (inserting a piece of appropriately tailored donor cornea over or within the cornea, or inlaying an equivalent piece of acrylic). All of these methods have their advocates today, especially when there is a gross anisometropia (which can thus be neutralised) along with intolerance of contact lenses.

The latest, and most popular, operation for correcting myopia is radial keratotomy, consisting of eight or more deep cuts into the corneal substance radiating around a central clear area of 2½ to 4 mm diameter, with the aim of so weakening the stroma of the cornea that its periphery becomes more curved and its central area flatter. This operation was devised by Sato et al in 1953,7 and interest rather lapsed until dramatic reports of its benefit came from Russia,8 in which a profusion of accounts relayed by our lay press sought to compensate for a lack of any detailed assessment. More controlled reports (especially from America) have now established, however, that (at any rate, in the short term) there is a genuine reduction of the myopia by about 4D.9 The main reservation is the risk of permanent damage to the corneal endothelium, which has a strictly limited population of cells that gradually die and cannot be replaced. Once these have been reduced to about half irreversible oedema of the cornea follows. Since the cuts may well penetrate the endothelium even in the most expert hands, any direct injury will then be aggravated by further cuts buckling the cornea in an already softened eye.

Clearly radial keratotomy can benefit low myopes (though not without ultimate risk) but such persons are rarely among the patients who are desperate for a “cure.” Low myopes are usually content to keep their “driving glasses” in the car and manage well enough without glasses indoors (if necessary, like the ancient Greeks, half closing their eyes for a momentary distant view), secure in the knowledge that by middle age they will have reason to be grateful for a myopic eye, which will allow them to read blithely without spectacles till they die.

Myopes are indeed rather an elite; they have a relatively high IQ, they preponderate in the higher educational and income levels10 and in the higher Indian castes; they are also more numerous in art schools,11 where they generally prefer to paint with their myopia uncorrected or undercorrected. Is some of this all round success due to a myopia which led them to study harder and read more, rather than the other way round? Youthful enthusiasts for the healing knife might well have second thoughts.

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Polioymelitis vaccine precautions

Eradication of poliomyelitis is already technically feasible by the use of either oral attenuated poliovaccine or intramuscular inactivated poliovaccine, though various economic, organisational, and cultural problems militate against this being achieved by the year 2000. An historic international symposium on poliomyelitis control attended by both Drs Salk and Sabin held in Washington, DC, earlier this year1 discussed improvements in vaccines, including development of a much more potent intramuscular inactivated poliovaccine which may be combined with diphtheria, tetanus, and pertussis antigens and give good protection after only two injections, thus fulfilling the objectives of earlier workers.2 Current research may lead to the identification and production of specific immunogenic polypeptides, and other studies may find a way to delete from polioviruses the virulence genes so that future live vaccines may be completely free of even the tiniest risk of causing paralysis.3

Although the Sabin type oral attenuated poliovaccine is still one of the safest vaccines in use,4 even rare adverse effects become of concern once the natural disease has been brought under such good control as in Britain. Contraindications should be scrupulously observed, particularly the need to avoid giving live vaccines such as oral attenuated poliovaccine to patients with natural or artificial immunodepression. Non-living intramuscular inactivated poliovaccine may be given to these immunodeficient people. The progeny of oral attenuated poliovaccine excreted by someone given the vaccine may revert slightly towards virulence, putting some non-immune contacts at risk: these include not only unvaccinated immunodeficient contacts but also normal adult close contacts, particularly unimmunised parents of vaccinated children, since the risk of paralysis complicating poliovirus infection is much higher in adults than in children. Unvaccinated parents should, therefore, be given the opportunity of correcting their susceptibility by receiving oral attenuated poliovaccine straight from the bottle at the same time as their child.

Pregnancy is generally considered a contraindication to any live vaccine and, though oral attenuated poliovaccine has not been found to cause damage in pregnancy, intramuscular inactivated poliovaccine is to be preferred if immunisation is essential. In the United States, intramuscular inactivated poliovaccine is recommended for the primary immunisation of any adult.

What about such factors as recent tonsillectomy, vigorous exercise, and “provocation” by injections of bacterial vaccines or other irritants—all of which were found to increase the risk and severity of paralysis by poliovirus in the prevaccine

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1 BRITISH MEDICAL JOURNAL VOLUME 287 17 DECEMBER 1983
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