

that some will always leach out into fluids stored or run through such plastics. What is needed is an ester of low innate toxicity such as DEHP but one for which hydrolytic esters are fairly widespread in nature. Then amounts injected into patients will not accumulate and the larger quantities from industrial waste will be rapidly degraded when they enter sewage systems.

<sup>1</sup> Handfield-Jones, R. P. C., and Lewis, H. B. N., *Lancet*, 1952, 1, 585.

<sup>2</sup> Medical Research Council, Report of a Subcommittee, *Lancet*, 1957, 1, 595.

<sup>3</sup> Jaeger, R. J., and Rubin, R. J., *New England Journal of Medicine*, 1972, 287, 1114.

<sup>4</sup> Jaeger, R. J., and Rubin, R. J., *Science*, 1970, 170, 460.

<sup>5</sup> Shaffer, C. B., Carpenter, C. P., and Smyth, H. F., *Journal of Industrial Hygiene and Toxicology*, 1945, 27, 130.

<sup>6</sup> Harris, R. S., Hodge, H. C., Maynard, E. A., and Blanchet, H. J., *Archives of Industrial Health*, 1956, 13, 259.

<sup>7</sup> Mayer, F. L., Stalling, D. L., and Johnson, J. L., *Nature*, 1972, 238, 411.

<sup>8</sup> Singh, A. R., Lawrence, W. H., and Autian, J., *Journal of Pharmaceutical Sciences*, 1972, 61, 51.

## Safer Motoring

Some years ago, when road deaths in the U.S.A. exceeded 50,000 for the first time in one year and 70% involved car occupants, the Federal authority introduced legislation governing protective design for all cars sold in that country. The need for continuous research and development was written into the specifications for design. So also is the principle that all protection shall be built into the car, thus eliminating the need for the occupants to take positive action apart from the requirement on the driver to drive the car within the limits of its crash performance. The specifications ensure a reasonable degree of integrity of the passenger compartment after all types of collisions at fairly high speeds, so that the occupants are not crushed. Having achieved the "maximum survival space," the next priority is the enforcement of a "passive restraint system." This is to become mandatory in the U.S.A. in 1975. The front runner now is the air bag system, which automatically inflates at specified crash forces and before occupants move off their seats. Its efficacy is not yet proved.

Since the introduction of the American legislation research<sup>1,2</sup> has been more generously supported. A few years ago Australia's legislators were confronted with a high rate of casualties, with car occupants as the main victims. The cars on the Australian market do not conform to U.S.A. standards. Consequently, seeking a prompt method of lessening their unenviable record, all the Australian States made the wearing of safety belts compulsory in January this year, and motorists will pay (except in the State of Victoria) a \$A20 fine if they are caught without them. The State of Victoria introduced this compulsory law in January 1971, and in the following 12 months there was a 12.5% drop in their road casualty figures compared with a 5% rise in each of the previous 10 years.

In Great Britain approximately 40% of deaths of car occupants are now due to gross deformation or penetration of the passenger compartment on to its occupants. The existing American standards for car design would lessen that risk, but the design standards of road vehicles other than cars should also be reviewed, as should roadside environment. Perhaps the most urgent need is the abolition of the rear overhang of lorries and their loose loads, which can penetrate the windscreen area of a car,<sup>3</sup> though most car deaths in Britain are now caused by occupants being thrown about within a relatively intact passenger compartment or

thrown out of it—the so-called "second collision." Effective restraint systems should prevent such deaths and lessen the incidence of serious injuries.

The value of safety belts in reducing the severity of injuries to car occupants has been proved by extensive laboratory and road studies in America, Sweden, and Great Britain, and the British design of lap-and-diagonal belts has been shown to be the most efficient. A safety belt should retain the wearer's trunk and pelvis on the seat during crash deceleration and not cause injury. To this end the diagonal component should fit snugly over the convexity of the clavicle and pass over the middle of the sternum down to the space between the great trochanter and the crest of the ilium, while the lap component should fit round the bony pelvis. The deceleration forces are then spread over the strong skeletal structures, and the safety belt should cause a minimum of injuries compared with those suffered by unrestrained occupants.

British belts anchored to pillar and floor in accord with present legislation meet the requirements of people of average size. For unusually large and small people they may not fit so well and as a consequence can result in injuries. There is some evidence that safety belts would fit more people if attached directly to the car's seat, and with further research and development they could be made to fit all shapes and sizes. This is a challenge to car designers rather than the safety belt industry. In fact protective car design should be built into the vehicle rather than added to it piecemeal. It might well start by making the car's seat incorporate efficient restraints for people of all shapes and sizes, all else being built round the safely packaged traveller.

<sup>1</sup> Annual Stapp Car Crash Conferences, U.S.A., 1959-1972.

<sup>2</sup> Huelke, D. F., and Chenning, W. A., *Crash Performance of the New Automobile Safety Features*, 12th Annual Symposium. U.S.A., The American Association for Automobile Medicine, 1969.

<sup>3</sup> Gissane, W., and Bull, J., *British Medical Journal*, 1973, 1, 67.

## A Ball in the Eye

The eye is exposed and vulnerable, but thanks to the projecting orbital rims that enclose it and its rapid blink reflex it surprisingly often escapes direct injury. But when the missile is smaller than the orbital diameter and coming so fast that the blink-reflex cannot close the lids, the eye is likely to suffer. Thus we have a sorry catalogue of ruptured eyes from fragmented windscreens in car accidents, or of insidious damage from minute foreign bodies that derive from the use of a hammer and chisel,<sup>1</sup> and even the occasional direct hit from a champagne cork.<sup>2</sup>

Damage to the eye in ball games is happily rare, for the balls we use are nearly always too large to enter the orbital aperture, and they rarely arrive at such a speed that the blink-reflex cannot anticipate them and cushion the impact. Golf balls will just fit into an orbit, and some direct hits have been described,<sup>3</sup> but the smaller squash ball, ricocheting around the enclosed court, has an even greater chance of striking the eyeball. Even so 35 cases of injuries to the eye in two years from the Royal Victorian Eye and Ear Hospital in Melbourne is a formidable total.<sup>4</sup> From hospital statistics<sup>5</sup> the frequency appears to be much less in Britain, perhaps owing to the vigour, enthusiasm, and ruthlessness of squash players in the Antipodes—an interpretation that may be thought the more acceptable since in eight cases it was the racquet rather than the ball which did the damage.

Hyphaema (haemorrhage from the iris) was the commonest finding. It sometimes reduced the vision to a bare perception of light and occasionally caused a secondary glaucoma. In a few cases there was also haemorrhage into the vitreous or retina. Occasionally the cornea was abraded, in one instance even ruptured; in another case the iris root was avulsed, and in one the retinal periphery was torn, leading to a detachment. In five cases spectacles were being worn and were broken by the injury. Happily the outcome was always satisfactory, all of the 35 patients ultimately seeing 6/9 or better.

In his summing-up the author recommends that one-eyed people should not play squash, which may be rather a fierce restriction since all his patients regained good vision, and he further suggests that squash players might protect themselves by wearing unsmashable spectacles. However, most of us would consider this remote risk of eye injury worth taking and will continue to enjoy the game with our naked eyes (or eye), only trusting that some unit as efficient as the Melbourne Eye Hospital is within reach if the worst happens. It could be added that, since all the patients in the London series were wearing glasses,<sup>5</sup> bespectacled squash players should use toughened or plastic lenses or wear contact lenses.

<sup>1</sup> Elkington, A., and Kanski, J. J., *British Medical Journal*, 1973, 1, 156.

<sup>2</sup> Archer, D., and Galloway, N., *Lancet*, 1967, 2, 487.

<sup>3</sup> Millar, G. T., *American Journal of Ophthalmology*, 1967, 64, 741.

<sup>4</sup> North, I. M., *Medical Journal of Australia*, 1973, 1, 165.

<sup>5</sup> Ingram, D. V., and Lewkonja, I., *British Journal of Ophthalmology*, 1973, in press.

## Livingstone's Example

At his death 100 years ago David Livingstone was a saintly and commanding figure to most of his countrymen. Westminster Abbey was the natural and undisputed repository of his mortal remains, while his exploits and reputation were an encouragement to young people seeking an ideal and an example to their elders bearing religion, commerce, or medicine to the wilder parts of the earth.

The records of people who knew him on his travels or at base disclose a much more complex character than the simple and heroic missionary often depicted by his admirers. There was an element of humbug in his make-up that has in an odd way infected many of the later chroniclers of his work. How could it be possible, they seem to have asked themselves, that so humane a man, so industrious a doctor, so gifted an explorer, so unfaltering a witness to the word of God could have treated his own family and colleagues so unfairly and on occasions spoken of trade as though it were part and parcel of the Christian religion. Some of what we now see as the darker side of the story has fallen into that shadow because the perspective of history has changed. Yet a recent and sympathetic biographer<sup>1</sup> can only conclude that he failed as a missionary, a geographer, and a liberator; that "it was through his fault that his wife had died untimely; through his neglect that his children were orphaned," and "there was nothing worth-while to show for it all"—except may be added, the inspiration to bring social and technical advancement to remote peoples who had not been touched by the standards of western Europe or, if they had, largely to their detriment.

Judged by the criteria of his time Livingstone did not make patronizing demands on the primitive societies through

which he moved in the central parts of southern Africa. He was an accomplished linguist who took the trouble to learn local languages so that he could communicate with the people among whom he travelled, preached, and practised medicine. Despite the rigours of an enthusiasm generated by a deeply felt sense of mission in his youth, Livingstone had the warmest affection for the Africans to whom he ministered. Indeed the contrast has often been remarked of his ability to get on well with the Africans and his acerbity in dealing with European colleagues. Of these, his colleagues and staff, it has been aptly said that "People could only be on friendly terms with him as long as they fell in with his plans."<sup>2</sup>

It was probably mainly as a medical man that Livingstone won the renown he did among the Africans. Professor M. Gelfand has documented this side of his life fully and brought out the many qualities that made the ineffectual geographer an effective doctor under appallingly difficult conditions. A strict disciplinarian in matters of health and hygiene, an accurate observer of unfamiliar diseases, and a devoted worker despite his own ill-health—Livingstone must always be an example of good doctoring to those medical men and women who continue to go out to developing countries in order to practise or teach there.

Elsewhere in the *B.M.J.* this week Professor G. Shepperson provides a memoir to recall the outlines of Livingstone's life and death. As he rightly says, Livingstone's genius lay in his "personification of the challenge of Africa." That challenge still stands today and attracts medical men to meet it. Nor does it come only from Africa: many parts of the technically undeveloped world are virtually precluded from making a real advance by the burden of disease that weighs on their peoples. The lifting of this burden is a task that Livingstone understood and took on with fortitude.

<sup>1</sup> Seaver, G., *David Livingstone: His Life and Letters*. London, Lutterworth Press, 1957.

<sup>2</sup> Gelfand, M., *Livingstone the Doctor, His Life and Travels*. Oxford, Blackwell, 1957.

## New Horizons in Medical Ethics

Confronted by codes such as the Declaration of Helsinki and the Medical Research Council document, and the existence of hospital ethical committees, the layman and the doctor outside the field of medical research might be forgiven for supposing that few ethical problems remain there. Not so: the debates on the research programme at Willowbrook hospital and on how valid so-called "informed" consent can ever be have shown that many questions remain unanswered, while new ones are constantly being posed by fresh developments in medicine. A series of tape-recorded discussions which starts at page 220 of this week's *B.M.J.* is designed to ventilate some of the more important issues in medical ethics today—though not necessarily to provide any clear-cut answers. This week's discussion centres on research investigation in adults, and future ones will cover investigations in children and on the fetus, the problem of malformed children, and changing the patient's personality—as well as more everyday problems such as the relation of doctors to the communications media and some problems of confidentiality.