

EDITORIAL

RADIATION HAZARDS AND THEIR CONTROL*

The press, the radio, and journals have all contributed to arousing the interest of the public to the useful, and perhaps more forcibly, to the harmful effects of ionising radiations. The use of ionising radiations is increasing from day to day, and it would appear that man's ultimate survival in the future may have to depend on the useful applications of ionising radiations. There appears nothing more that one can do except devise to the utmost protective measures to minimise the danger of ionising radiations.

Little indeed did Professor Roentgen dream of the vast implications his discovery of X-rays in 1895 would have on the world. We have hardly recovered from the first blast of the atomic bomb; and we cannot predict what is yet to come.

The first useful application of X-rays is in the field of medicine, and it still largely is. The first workers in medical radiography were unaware of the invisible hazards of ionising radiations, and many paid with their lives for it — tragically, but true martyrs of science.

Awareness to radiation hazards was slow to develop at the turn of this century, but the pace has been accelerated with the passage of years, and the pendulum might be said to have swung to the other extreme. Considering the many benefits to be derived from the useful applications of ionising radiations, it would appear best not to be panicked but to assume an unimpassioned stand and adopt a sensible attitude towards the whole problem.

This does not mean that one can belittle the baneful effects of excessive amounts of ionising radiations. Perhaps, the best way of tackling the problem is general enlightenment of the public to the nature of ionising radiations, to their profound effects on biological systems — to their usefulness as well as to their hazards to mankind. Workers dealing with ionising radiations must realise this and exercise their prerogative with care and discretion. But the final step, as in so many ultimately recognised professions, is needed some form of legislation limiting the control

and use of ionising radiations, both in medicine and in industry, only to those properly trained and qualified in these specialised fields. This includes adequate measures of shielding and disposal of stray radiations so as to protect workers and others around. Actually, this idea of legislation over the use of ionising radiations is not new, for it has been in force for some years in some countries.

It may be of interest at this juncture to point out that mankind has also been subjected to naturally occurring ionising radiations from times immemorial. These come from various sources — cosmic rays, radiations emitted from the earth's crust, radiations coming from radioactive elements occurring in minute amounts in man's food. These are the background radiations that cannot be avoided, but fortunately the amount received is not great, and an average person may not receive more than 100 mr per year. Similarly, radiations from fall outs also adds but little more to the background radiation — at least for the time being, unless tests become excessive.

But conditions are quite different when one comes to radiation received from medical X-rays. Here, relatively high doses of radiation may be delivered to localised portions of the human body within a short period of time. Those handling ionising radiations employed in medicine, industry, and in atomic plants may be accidentally subjected to high, and occasionally lethal doses, of ionising radiations. It is therefore obvious that the greatest danger of ionising radiations to man comes not from natural but ironically enough from man-made sources.

Intensive studies on the effect of ionising radiations on man is being carried on, but no definitive answer is yet to be found. The question is also complicated by the fact that it will probably require observations over many generations of man before even an inkling of the overall effects on a human being can be assessed by geneticists.

Nevertheless, the general consensus of opinion is that excessive doses of ionising radiations are

* For a general survey of the problem of ionising radiations, the reader is referred to an article which appeared in an earlier issue of the Alumni Journal (1). In this current issue is a brief account of ionising radiations, with emphasis on fall out problems (2).

(1) Hoe, J. and Lim, K.L. (1959) Radiation Hazards. Proc. Alumni Assn., 12. 78.
(2) Chia Kim Boon (1962) Fall Out. Present issue, S.M.J.

in general harmful to any organism, although various species of animals vary in their sensitivity to such radiations. It is also accepted that although the local effect of ionising radiations on the somatic tissues of the body may wear off, the dose on the genes is cumulative, and this in turn may lead to the development of undesirable mutations. The dangers of ionising radiations, not only to individuals, but also to populations as a whole, must also be considered in their proper perspective. Unanswered is still the question of what constitutes a minimum safe daily, monthly, or yearly dose of radiation; the present tendency is to regard the upper safety limit of body radiation as 0.1 r per week.

Seeing that the greatest danger to ionising radiations comes from man-made sources, it is understandable why it is necessary for legislation to be passed limiting the handling and siting of equipment producing ionising radiations to properly qualified persons. In the field of medicine, the quack who palms out radiographs to his clients may not only expose others to unnecessary risks of harmful radiations, but often supplies

unreliable "diagnoses" with disastrous results to his "patients".

More immediately, because of the relatively high local radiation dosage delivered to patients in medical radiography, it is the bounden duty of every physician to exercise care and restraint in the use of X-rays. Patients must needs to be radiographed when it is essential to diagnosis, but the rule must be to cut radiation down to the minimum.

It is not the intention of this little essay to be alarmist, or to draw a pessimistic picture over the harmful effects of radiation. Rather, to be forewarned is to be forearmed. Prevention is better than cure. The best way for man to combat ionising radiations is therefore to try to minimise unnecessary exposure to radiation. It behoves that not only must those who are in a position to do so should exercise constant care and vigil in the handling of ionising radiations, but in the final count, only legislation regulating the use of ionising radiations can more properly ensure that abuses and malpractices do not occur.
