connected to a ground-glass socket on the chimney and the other to another glass tower (of low resistance to breathing) containing charcoal. The subject then inhales from the chimney only and exhales to the tower only; to prevent condensation, a heating element is clamped below the exhalation arm and tower. The far side of the tower is connected to a 100 ft.^{3} balloon, from which the volume of air exhaled, and therefore that inhaled, can be determined.

Preliminary experiments showed that there was no measurable decomposition of the methyl iodide, or adsorption on to particles, before inhalation occurred. During an inhalation experiment, the subject inhales from the apparatus during the 5 min in which the methyl iodide-132 is being volatilized and exhales during that time and a further 5 min through the tower and into the previously evacuated balloon. The amount of methyl iodide-132 which has been inhaled can then be calculated from a knowledge of its concentration in the main air stream and the volume of air inhaled, while the amount exhaled is determined by measuring the activity in the exhalation tower. The percentage retention is thus easily determined from the difference of these two quantities.

Because of the influence of inactive methyl iodide on the uptake of methyl iodide-132, the amounts of the former used as carrier in the U-tube are only of the order of 100 μg, that is, the amount inhaled is about 30–40 μg, which is considerably smaller than the normal daily dietary intake of iodides. Preliminary results on four volunteer subjects indicate values for the retention varying between 55 and 80 per cent. The metabolism of the retained methyl iodide is also being investigated and will be reported in detail in later papers.

I thank D. F. Atkins, Dr. A. E. J. Eggleton and A. Morgan for advice and Mrs. G. M. Arkell and G. Mitchell for support during the commissioning of the apparatus.

D. J. MORGAN

Health Physics and Medical Division,
Atomic Energy Research Establishment, Harwell.

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Tracking Cobalt Project

THIS communication describes a new and accurate method of treating malignant disease by radiation. The radiotherapeutic world is convinced that accuracy in dose delivery in adequate amounts to minimum volumes has largely been responsible for improved results in limited disease. Just as surgery has its complications and rare fatal accidents, so also does a proportion of radiation injuries have to be accepted at curative dose-levels. A high standard of accuracy in treatment does much to reduce injuries by limiting the volume of tissue exposed. This new method has been the logical sequence of development over the past twenty-five years, passing through four phases.

(1) Beam directioning, by accurate 'sighting', enabled smaller radiation fields to be used without missing the primary tumour. This was first adopted for radium beam therapy[1], and soon after applied to X-rays[2].

(2) Further developments of methods led to the practice of uniform isodose zones enclosing the tumour, that is, the use of a pre-determined shape[3].

(3) Moving-beam therapy apparatus enabled consecutive or continuous settings of radiation fields to be given with a high degree of accuracy to small zones[4]. This method produced mainly spheres or cylinders of predetermined shape into which the tumour could be fitted. To extend its versatility, it was from this method that arc moving-beam therapy with tracking was conceived[5].

(4) The cobalt tracking project will enable the spread of malignant disease from the primary growth along the lymph node chain to be irradiated with accuracy[6]. A prototype apparatus at conventional voltage[7], which has now been working for some years, has proved very encouraging in its use: the principal problems were solved, but owing to the distortion of the isodose pattern by bone, its future was limited. A public appeal has enabled a high quality apparatus to be made by T.E.M. Instruments, Ltd., of Crawley. The uniform dose zone of moving-beam therapy irradiates the sinuous track of the lymph node spread which is fed through it by moving the patient on a treatment couch which is guided along the track—its up-and-down and side-to-side movements being governed by electric motors, much as in the prototype design. In this instance, however, the movements are controlled by a black-on-white pattern giving the profile views of the track. Speed is shown by another series of black-and-white cut-outs which are followed by a series of photoelectric cells, that is, we have automation in radiotherapy.

The shape of the dose pattern is changed from a circle to an oval in cross-section at any point by slowing the speed of the arc movement. This allows more irradiation to that part. This is followed by acceleration of the speed which allows less irradiation; consequently an oval is produced.

Preliminary computer calculations and measurements arranged by Dr. W. A. Jennings have shown that a field of approximately 8 cm × 3 cm with reasonable definition can readily be obtained, hence the basis of attaining the principle of restricting the radiation to the diseased area while sparing the normal tissues around appears to be well within sight.

We are awaiting the construction of a room to house this apparatus so that the project may be commenced in earnest.

The expected spread of malignancy in lymph nodes, that is, the 'track', will be part of an exhibit at the International Radiological Congress in Rome in September 1965. This spread is based on information from surgeons of great operative experience and agreed by six senior United Kingdom radiotherapists. Such spread is in contrast to the post-mortem findings, when the disease is spread far and wide.

Work done at the Royal Northern Hospital has suggested that this lymph node track may be related to bony structures with a reasonable degree of accuracy and that repeat treatments may show a variation of only 0·5 cm. It is particularly fortunate that the fatty tissue which is largely responsible for the considerable variations of shape beyond the bones is, in the main, concentrated in the abdominal cavity and the superficial sites. These have no gross effect on the relation of blood and lymph vessels to the bones lying deeply in the body, hence the tracking method may prove to be valid and accurate.

ANTHONY GREEN

Director of Radiotherapy,
Royal Northern Hospital, London, N.7.

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BIOLOGY

A Phytochrome Mediated Effect of Light on the Hydroxylation Pattern of Flavonoids in *Pisum sativum* var. 'Alaska'

THE presence of a kaempferol triglucoside (KG) and a quercetin triglucoside (QG), and of their *p*-coumaric acid esters (KGC and QGC respectively), in white-light-grown 'Alaska' peas has been reported[1]. Evidence has also been put forward that etiolated peas contain only the