SCINTISCANNING AS A METHOD FOR LOCALIZATION OF CEREBRAL TUMORS*

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(Received for publication March 8, 1956)

Since Moore\(^5\) introduced radioactivated diiodofluorescein as an aid in the diagnosis and localization of intracranial tumors, there have been numerous attempts to perfect a method whereby such tumors may be localized with accuracy, facility, and without mortality. Belcher,\(^2\) using this labeled chemical and a similar technique, was able to localize only 1 out of 20 verified intracranial tumors. Later Peyton \(\text{et al.}\)\(^6\) as well as Dunbar and Ray\(^3\) reported the use of iodinated serum albumin (RISA). Counting rates indicative of variable uptakes in tumors were observed. The impression was gained that uptake of serum albumin was best detected in tumors in which there was increased vascularity or increased capillary permeability. Evidence indicative of radioactive substances entering the cells was not demonstrable.

For a period the procedures for localization were encumbered by multiple point counting techniques such as suggested by Langer and Loevinger.\(^4\) Subsequently Sweet and Brownell\(^7\) reported a system of scanning in a horizontal plane and localized tumors with acceptable accuracy. The disadvantages of their method were: the initial expense of equipment, complexity of operation, and the need to be near a source of \(\text{As}^{74}\). Allen and Risser\(^1\) described a refinement in technique by lowering the laboratory background count and selecting only the harder portion of the spectrum of \(\text{I}^{131}\) for analysis. This method is in need of further investigation.

In reviewing the literature on the subject of brain tumor localization with the labeled iodine technique, it became apparent that a method was needed to use material that was readily available and to employ simple technical aids. By accomplishing this, intracerebral tumors could be scanned at modest facilities and by personnel having a limited experience in electronics and physics. Toward this end a scintiscanner has been designed (Fig. 1) which has necessitated structural modification of an automatic scanning device primarily used for scanning of the thyroid gland.

The head of the scintillation detector consists of a magnetic and lead shield which is divided into two parts. The crystal is a Harshaw thallium activated sodium iodide crystal, \(3^\circ\) in diameter and \(1^\circ\) in thickness. The crystal is coupled with a suitable

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* Supported in part by a grant from the Jefferson Browder Neurosurgical Foundation.
cone of lucite to a RCA 6199 photo-multiplier tube. This tube feeds into a preamplifier, thence to a pulse amplifier which is coupled to a power amplifier which drives a cold cathode modulator tube. The glow modulator tube output may be recorded on photographic paper (Fig. 2). Collimation is selected to achieve maximum resolution.