AN EVALUATION OF THE TECHNIC AND RESULTS OF
THE RADIOACTIVE DI-IODO-FLUORESCIN TEST
FOR THE LOCALIZATION OF
INTRACRANIAL LESIONS*

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Radioactive di-iodo-fluorescein has been utilized in the study of 340
patients with the diagnosis of a space-occupying lesion of the central
nervous system. We have correlated our findings with the pre-
operative clinical diagnosis, electroencephalography, pneumography, angiography,
and with the surgical and autopsy findings. We have made post-
operative and post-irradiation therapy tests and, finally, we have correlated
all of these studies with the histopathological characteristics of the tumors.
The results indicate that this radioactive isotope dye test is a valuable
diagnostic aid in neurosurgical problems, not only because of its high degree
of accuracy in determining the presence of brain tumors, but also because
of its relatively precise focal localization. The possibility of prognosticating
in a general fashion the relative degree of cellularity and vascularity of the
tumor also appears to be feasible.

In view of the relative simplicity, harmlessness and accuracy of this
radiodye test, a more detailed elucidation of the technic, the advantages and
the limitations of this new radioactive isotope tracer dye test is warranted.

Just as the neuroradiologist insists on a standardized technic, regarding
milliamperage, time and kilovoltage in obtaining the best possible roentgeno-
grams, proper positioning of the head and the tube, and the necessity of
multiple and special views for adequate interpretation, so the isotopologist
must be prepared for similar precision in instrumentation and technic. He
must acquaint himself with all the ranges of normalcy at various time inter-
vals and under various conditions such as post-ictal, post-traumatic, or
post-irradiation therapy states, so that he may be able to interpret accurately
the abnormal. Though a technician may become skilled in obtaining a good
radiodye tracing, the interpreter must have an adequate background in
neuropathology and neurophysiology to interpret the various states of dys-
function of the capillary endothelium, or the anaplastic proliferation of cells,
in organic lesions of the central nervous system.

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RADIOACTIVE DI-IODO-FLUORESCEIN TEST

INSTRUMENTATION

The radiation detection equipment consists of 4 major components: (1) an end-window Geiger-Mueller tube; (2) a tube shield and allied mount; (3) an electronic indicator, scaler, or counting rate meter; and (4) a mechanical or graphic recorder (Fig. 1).

The counter tube is a commercially available Tracerlab TGG-2 mica end-window type, covered with a 250 mg./cm.2 aluminum cap which effectively eliminates most of the $^{131}$ beta radiations. It is the standard argon-alcohol filled tube operating at about 1500 volts, and has a mica window of about 2 mg./cm.2, and

![Figure 1](image)

**Fig. 1.** The shielded TGG-2 Geiger tube is connected through an amplifier to a general radio counting rate meter, and the counts per minute are recorded on an Esterline-Angus milliammeter. The tube is maintained "normal" to the skull in this LF3 position (left superior precentral or frontal area). Readings are at least of 3 minutes’ duration over each site. The most significant counting rates occur within $\frac{1}{2}$ to 2 hours after the intravenous administration of 1.1 millicuries of radioactive di-iodo-fluorescein.

an $^{131}$ gamma ray efficiency of about 0.5 per cent. The tube is calibrated with a high intensity standard before beginning the survey of the skull.

The tube sensitive diameter is 2.5 cm. The active detection area is found to be 1.2 cm. below the mica window. The tube and shield afford a resolution of 10 per cent for a 30° angle for a simulated tumor source of 25 cc. volumetric flask. The inverse square law for the source is closely followed by the end-window tube.

Other G-M tubes have been used, and have given basal radiodye concentrations which parallel the normal ranges obtained with the one described above, being either slightly above or below, but with the same general configuration on the tracing for the same site and time interval. Obviously, the numerical value of the