GRAPHIC INTERPRETATION OF ISOPORE LOCALIZATION OF INTRACRANIAL LESIONS*

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This report presents a new method of interpretation of data obtained by isotope encephalometry. The method, graphic analysis, makes possible more accuracy in localization of mid-line and deeply seated lesions and also helps to prevent misinterpretation of the data used in localizing cortical and subcortical lesions. This is accomplished by comparing counts of radioactivity obtained over specific areas of the two sides of the head with an established normal range for those sites.

In a normal individual there is a fairly even distribution of radioactivity in the brain after injection of a radioactive tracer substance. In the presence of an intracranial lesion in which the uptake of the tracer is either greater or less than the normal, an asymmetry in the counts recorded from comparable areas of the two sides of the head may be present. In the usual method of isotope interpretation reliance is placed upon an asymmetry of approximately 10 per cent. Obviously the most ideal situation for localization by asymmetry is one in which the lesion is in the cortex or immediately below the cortex. Such a lesion would be extremely close to the detector on one side and, therefore, yield an unequivocal focus. For lesions in the mid line the prospect is entirely different because any increased radioactivity in the lesion would be distributed equally to both sides of the cranium with no apparent asymmetry of activity. Conversely, benign cystic lesions with low uptake of tracer, especially if located peripherally in the brain, might afford an incorrect localization as a focus of increased activity on the opposite side. For these reasons the method of interpretation by graphic analysis was devised. The technique is based upon a graphic presentation of the relationship of specific activity encountered between each position in a given case as compared with that in a series of normal cases. Thus, disturbance of a normal relationship in the form of either a bilateral increase or a unilateral decrease of activity can be detected.

ESTABLISHMENT OF A “NORMAL GRAPH”

An analysis was made of 27 isotope encephalometric records that were considered normal. All 27 patients had been given a dose of radioactive

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iodinated serum albumin (RISA) in the amount of 5 μc./kg. Measurements of the routine 24 cranial positions were made 24 hours later. An arithmetical mean of the total counts as well as that for each position was obtained. A graph was made by plotting the specific activity for each position against cranial positions arbitrarily arranged numerically in series (Fig. 1). This graph presents the following features:

A) There are four high peaks of activity corresponding to positions 2, 5, 8, and 11. They are basally situated positions where thick layers of muscles and soft tissue are present.

B) Lowest activity is over positions 1, 6, and 9. These are areas of the cranium where very little soft-tissue covering is present.

C) Positions 4, 7, and 10 over the vertex are isometric. They are, as a group, higher than positions 1, 6, and 9 because the background is increased when the detector is positioned vertically against the head.

D) As these positions were calculated out individually in the normal series, they represent the arithmetical mean of each position. The symmetry of activity as measured over the corresponding positions of both sides is apparent. This is true also with respect to the variation from the mean of any case in the series of 27 “normals.”

E) If the graph is separated into three zones, much like those in the colloidal gold curve for examination of cerebrospinal fluid, and a normal variation of each zone is studied, it is seen that the last zone corresponding to the occipital areas has the widest range of variation. The first and middle zones have equally little variation from the normal. This is again because of the variation in the amount of soft tissue over different positions in general and of that over the occipital region in particular. Therefore in any