(T1) crystals and 37 hole 10 cm focused collimators were used to obtain the scans.

A comparison of the accuracy of the brain scans on 31 cases with established diagnosis in these patients (brain tumors 22, vascular lesions 5, another 4) was made to other diagnostic tests (arteriogram, air study and electroencephalogram).

Positive cases in each diagnostic study classified to 4 grades, according to the degree of positiveness.

(卄): The localization of the space occupying lesion is indicated clearly.
(++): The localization is indicated roughly.
(+): The localization is indicated with much difficulty.
(±): The localization is not clear, but some abnormality is seen.)

Results are as follows.

The scan was superior to the air study and the EEG for knowing the clear localization of the space occupying lesion.

The arteriogram was superior to the scan for deciding the localization of the lesion. But in 5 cases in this series, the scan showed the localization of the lesion more clearly than the arteriogram. In the 22 histologically proven cases, all cases of meningiomas (4) and metastatic tumors (3) show positive scans.

There is no false positive scan in this series.

The results of the present study suggest that the brain scanning is of great diaagnostic value.

Fundamental Studies on Brain-tumor Scannig

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With a view of obtaining more helpful scan images for diagnosis in the brain scanning, which is now becoming popular as an indispensable method to detect brain tumors found method and chemical investigations were carried out. As RI served ^{131}I-HSA, ^{203}Hg-neohydrin, and ^{99m}Tc-pertechnetate, which at the present must be widely used. As the brain scanning for fundamental study a NF-sarcoma (mouse) was employed. After RI administration (intraperitoneal injection) the animals were killed and dissected at regular intervals, and the RI up-take of various organs, such as the blood, brain (the site of tumor and the normal), lung, heart, liver, spleen, kidney, intestine, muscle and others, was measured. By applying these results to brain scanning in the clinical aspect and by examining them comparatively, the following findings were obtained: As to the highest value and its time ratio of the tumor to brain (T/B ratio), it is 12.2 after 24 hours in case of ^{131}I-HSA, 12.2, 1-½ hours of ^{203}Hg-neohydrin and 11.4 hours of ^{99m}Tc-pertechnetate. Their values are found to be almost the same in any cases apart from the length of interval, this also shows that the T/B ratio has little difference among those RI examined. The highest concentration of the tumor is shown 12 hours after injection in case of ^{131}I-HSA, one hours of ^{203}Hg-neohydrin, and 15 minutes of ^{99m}Tc-pertechnetate. The time of the highest value, how even, is not always as same to the optimal scanning time.

1) ^{131}I-HSA: Although the time of the highest concentration 12 hours after injection, the tumor blood ratio and T/B ratio are highest after 24 hours. Thus, it follows that 24 hours is suit for scanning however, when the concentration is highest, from that time onward is rather suitable for scaning because of its back ground being more and more faded away. Sometimes, the scan image can be visualized up to 120 hours after injection. In other words, the time capable of brain scanning (scanning time tolerance) is long and scanning can be repeated enough.

2) ^{203}Hg-neohydrin: the highest concentration occurs with in one hours after injection, but since the tumor-blood ratio and the T/B

ratio are higher after 2 and 1½ hours respectively, it is best to start scanning 1–2 hours after injection, the attenuation of concentration is so rapid that scanning is hard 6 hours armor after (biological halftime is 3 hours) the time tolerance very short as compared with ^{131}I-HSA.

3) ^{99m}Tc-pertechnetate: the highest uptake occurs 15 minutes or so after injection, and both the tumor blood ratio and T/B ratio are highest after 4 hours, but the physical half-time is short and the amount of up-take becomes small soon, it is best to start scanning 30 minutes after injection, limit is only 3 hours and the time tolerance is shortest but since, ^{99m}Tc-pertechnetate is least exposed to irradiation, it is capable of being given in a large activity, the time tolerance is practically longer than that of ^{203}Hg-Neohydrin.

Brain Tumor Affinity and Scan Image
— with special references to surgical specimens and phantom experiments —

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Brain scanning is the most useful technic as a screening test for the detection of intracranial diseases. There have been many radioactive isotopes used for brain scanning and since short half life nuclides, such as ^{113m}In, were developed, their diagnostic value has been more recognized than ever. The higher is brain tumor lokalization of radioisotope, the clearer is a positive scan delineated in the scan. The authors measured tumor-to-brain concentration ratio (the authors call the ratio TBR) by the use of materials from the craniotomies as well as from the animal experiments, and then carried out the experiments by the use of phantoms on the basis of those measurements.

1) In the rats bearing Yoshidasarcoma, TBR resulted in 7.0 when RISA was used, whereas it resulted in 10.2 when ^{203}Hg-Neohydrin was in use.

2) TBR that was obtained by the employment of the materials from the craniotomies was approximately between 2 and 4 when RISA, ^{203}Hg-Neohydrin and ^{99m}Tc-Pertechnetate were respectively used, and was lower than expected as compared with the ratio measured by the animal experiments.

3) The results of point counting from the surface of the heads of the patients with brain tumor, that is, the ratio shown at the time when the area of tumor and that of normal brain were counted (the authors call the surface counting ratio—SCR) were about 2 on the average.

4) In the experiments by the phantoms, it was possible to visualize a sphere 6 cm in diameter as a positive scan when TBR was 2; spheres 6 cm and 5 cm when TBR 3; 6, 5 and 4 cm when TBR 4; 6, 5, 4 and 3 cm when TBR 7 or 11; and when TBR was 50 it was possible for even a sphere 1.5 cm in diameter to delineate a positive scan. These results suggest that we shall be able to make a diagnosis of an extremely small lesion if radiation detection equipments are to be improved to a better stage and new radiopharmaceutical compounds which have higher TBR are to be produced.