

## II. Brain

### Experiences with Brain Scan by Means of $^{113m}\text{In}$ -Fe DTPA

H. MURAYAMA and S. OKAMOTO

*Department of Radiology, Tokyo Medical College, Tokyo*

K. TAKANASHI and T. MIWA

*Neurosurgery, Tokyo Medical College, Tokyo*

We obtained a radioisotope generator of  $^{113m}\text{In}$  and conducted brain scan and a few experiments, the results of which are reported here:

1) In phantom experiments, we could obtain good scintigrams of about the same level of quality with  $^{203}\text{Hg}$ ,  $^{99m}\text{Tc}$ ,  $^{113m}\text{In}$ , and  $^{113}\text{I}$ -RIHSA. The quality with  $^{197}\text{Hg}$  was not so good as the rest.

2) Smaller positive images could be drawn by raising the sensitivity rather than the resolution of the collimator.

3) Unless scanning was conducted under optimum conditions, small images were not drawn and good scintigram could not be obtained.

4) An additional system in which the upper and the lower values of detection were added up was more advantageous than a single system of detecting the upper part only because the former had a higher rate of detection and

a shorter scanning time on the basis of rate of detection and a shorter scanning time on basis of the two directions of brain scan that were adequate.

5) The order of the rates of correct detection of tumors by brain scan was RIHSA  $^{99m}\text{Tc}$ ,  $^{113m}\text{In}$ ,  $^{203}\text{Hg}$ ,  $^{197}\text{Hg}$ , but the differences between RIHSA and Tc and between Tc and In were small.

In view of the radiation exposure,  $^{99m}\text{Tc}$  and  $^{113m}\text{In}$  seem to be suitable for use.

6)  $^{113m}\text{In}$ , 21 out of the 26 cases with brain tumor were correctly detected (81%). Histologically classified, those correctly detected were 8 cases with meningiomas, 7 out of 8 cases with gliomas, 4 out of the 6 cases with metastatic Ca, and 2 out of the 4 cases with miscellaneous neoplasm.

7) For this brain scanning, a scintiscanner of  $5''\phi$  for two opposite directions was used.

### Clinical Evaluation of Brain Scanning

T. YAMASAKI, T. FUKUDA and M. NISHIO

*Department of Radiology, Toranomon Hospital*

K. TAKEUCHI and M. OGASHIWA

*Department of Neurosurgery, Toranomon Hospital*

T. TSUCHIYA

*National Institute of Radiological Sciences*

RISA brain scans were performed on 42 patients from July, 1966 to October, 1967.

The dose administered was  $5.5 \mu\text{Ci/kg}$ . body

weight. The brain scan was started 24 h. after injection.

Aloka pho-dot scanners with  $3 \times 2$  inch NaI

(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.

( $\equiv$ ): The localization of the space occupying lesion is indicated clearly.

( $\approx$ ): The localization is indicated roughly.

(+): The localization is indicated with much difficulty.

( $\pm$ ): 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 diagnostic value.

## Fundamental Studies on Brain-tumor Scanning

M. OZEKI, Y. FURUKAWA and N. DOKI

*Department of Radiology, Kurume University School of Medicine*

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  $^{131}\text{I}$ -HSA,  $^{203}\text{Hg}$ -neohydrin, and  $^{99\text{m}}\text{Tc}$ -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  $^{131}\text{I}$ -HSA, 12.2, 1-1½ hours of  $^{203}\text{Hg}$ -neohydrin and 11.4 hours of  $^{99\text{m}}\text{Tc}$ -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  $^{131}\text{I}$ -HSA, one hours of  $^{203}\text{Hg}$ -neohydrin, and 15 minutes of  $^{99\text{m}}\text{Tc}$ -pertechnetate. The time of the highest value, how even, is not always as same to the optimal scanning time.

1)  $^{131}\text{I}$ -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 scanning 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)  $^{203}\text{Hg}$ -neohydrin: the highest concentration occurs with in one hours after injection, but since the tumor-blood ratio and the T/B