A Comparison of ^{203}Hg Mercury Chlormerodrin and ^{99m}Tc Pertechnetate in Clinical Brain Scanning

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The comparison of ^{203}Hg and ^{99m}Tc in 206 patients reveals a higher percentage of positive scans using ^{203}Hg (69.2%) compared to ^{99m}Tc (58.0%). ^{99m}Tc appeared somewhat less effective for localizing the lesions than ^{203}Hg. Thirty-nine patients with suspected intracranial lesions were scanned with both ^{203}Hg and ^{99m}Tc. The former agents correctly localized 76.9 percent and the latter 69.2 percent. It was our overall impression that the scans ^{203}Hg were more informative than ^{99m}Tc in the lesion near the superior sagittal sinus, brain basis, posterior fossa, metastasis, head injury and cerebrovascular disease.

After removal of the tumor, ^{203}Hg scans showed diffuse positive at the side of the lesion and follow-up scans usually revealed gradual loss of uptake within two months, while ^{99m}Tc scans retained a high concentration along the region of the craniotomy for at least 6 months or more. ^{99m}Tc scan, therefore, might be unsuitable for the detection of recurrence of the tumor.

Experiments were done to clarify the cause of such a difference in the two agents. As previously reported, ^{203}Hg accunulated in the cold induced edema 4 times more than ^{99m}Tc, cold induced edema 4 times more than ^{99m}Tc. Three hours after the injection of ^{203}Hg and one hour after the injection of ^{99m}Tc, (suitable time for scanning of each agent), the counts in the venous blood were measured. Ten percent of injected ^{203}Hg and 40 percent of injected ^{99m}Tc remained in the venous blood in each case. The limitation of isotope localization of ^{99m}Tc appears to be governed by higher background activities, by less uptake into the edematous brain tissue and by the position of the lesions.

Since the radiation dose to the kidney is higher with ^{203}Hg, it seems reasonable as a general screening procedure to choose ^{99m}Tc first to reduce scanning time and the radiation dose. However, ^{203}Hg scan must be preceded by ^{99m}Tc in the lesions of the regions mentioned in the last part of the first paragraph.

It also has been suggested that a more convincing result would be obtained by using both ^{203}Hg and ^{99m}Tc on the same patient.

A Follow up Observation of the Intracranial Lesions by Brain Scans

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We have performed 177 brain scans with ^{99m}Tc on 132 patients at our department between July, 1967 and July, 1968.

Thirty-five patients of 132 was performed brain scan more than two times.

In this series, we often observed effects of intracranial operation on brain scintigrams. And it was diffcult to determine in some cases whether the obtained positive scan resulted from the postoperative effects or rest of tumor.

Therefore we estimated the differentiation of brain scan between operation effects and brain tumor.

Fourty-one of our 132 patients was performed surgical procedure and the postoperative effects on brain scintigram was detected in 35 patients without regard to operation method.

The effects of operation may be summerized

as following.

1. The area of increased activity is detected in the site and side of the operation.
2. Isotope accumulation is slightly higher than sorrounding normal area in most of case.
3. The border of the area is indefinitive and indeterminable in lateral view.

Characteristically they give an asymmetrical crescent-shaped peripheral area of increased activity on the anterior view.

We showed two representative cases, which were followed up by brain scan over three times.

Because brain scan is a simple technique without danger or discomfort to the patient than other neuroradiological examination, repeated examination can be performed easily following the course of intracranial lesion. Brain scan has a merit in this point.