

reading of brain scan as an aid of the diagnosis of the aged cases with neurological symptoms.

1. In cases with abnormal brain scan, serial changes of density or size is useful for evaluation of prognosis in CVD as well as differentiation of tumor from CVD.

2. In the aged people, in whom brain tumor shows also the clinical findings similar to CVD, the brain scan was very useful. Several silent brain tumors were detected by screening brain scanning.

3. In cases of subdural hematoma, the aged patients do not frequently have proved history of trauma.

4. Eventhough over all accuracy of brain scan in cases with CVD (34.1%) is lower than those with tumor (88.9%), value of brain scan was accepted by attending physicians.

5. Value of pyrophosphate brain scan to differentiate CVD from tumor was proven and presented by other paper.

### **Diagnostic Aid for the Differential Diagnosis of Brain Tumor and CVD by using $^{99m}\text{Tc}$ -pyrophosphate**

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As we reported previously, we have emphasized the value of brain scan with two  $^{99m}\text{Tc}$ -labels;  $^{99m}\text{Tc}$ -pertechnetate and  $^{99m}\text{Tc}$ -pyrophosphate. The scan with these two labels may increase diagnostic accuracy and serve for immediate differentiation of brain tumor from CVD.

The purpose of the present investigation is further to show the value of combined use of those two labels for a brain scanning.

Twenty cases of brain tumor, and twenty two cases of other brain diseases such as cerebrovascular disorder (CVD), abscess, hygroma and etc, were examined by both  $^{99m}\text{Tc}$ -pyrophosphate and  $^{99m}\text{Tc}$ -pertechnetate.

The age distribution of those patients were 13 to 87 years old, with mean age of 61 years old.

In sixteen cases out of 20, successful visualizations of brain tumors are made by both  $^{99m}\text{Tc}$ -pertechnetate and  $^{99m}\text{Tc}$ -pyrophosphate.

Ten of those fifteen were histologically diagnosed either by operation or autopsy. The histological finding of those cases were as followed: 2 meningioma, 2 astrocytoma, 1 pituitary chromophobe adenoma, 1 neurinoma, 1 chondroma, 1 hypothalamus tumor and 2 metastatic tumor of the lung cancer.

A case with suspected brain tumor and another case of possible metastatic tumor showed no accumulation of activity by these two labels, proved later by autopsy that no tumorous lesion in the brain.

Sixteen cases of CVD were also examined with  $^{99m}\text{Tc}$ -pertechnetate and  $^{99m}\text{Tc}$ -pyrophosphate.

Conventional  $^{99m}\text{Tc}$ -pertechnetate scan showed positive accumulation to the lesion in eleven cases of CVD. In these cases not appreciable accumulation of  $^{99m}\text{Tc}$ -pyrophosphate was noted to the lesion except three cases of cerebral infarction.

This fact could be used for the early differentiation of CVD from malignant brain tumor without long period following up of the case by brain scanning.

There are only three exceptional cases who showed marked accumulation of  $^{99m}\text{Tc}$ -pyrophosphate to the CVD lesions.

One of them are proved by CAG as a cerebral infarction as reported by Wenzel et al.

Brain abscess accumulated both  $^{99m}\text{Tc}$ -pertechnetate and  $^{99m}\text{Tc}$ -pyrophosphate. However, no accumulation of both labels was noted to the lesion of hygroma.

Another advantage of the use of  $^{99m}\text{Tc}$ -pyrophosphate brain scan was that this label did not concentrate into the chroid plexus or salivary gland as frequently seen by conventional  $^{99m}\text{Tc}$ -pertechnetate brain scan.

$^{99m}\text{Tc}$ -pyrophosphate was applied as brain scanning agent because of its characteristics of early blood clearance, no accumulation into chroid plexus and salivary gland, and tumor affinity of this label.

By combining those two  $^{99m}\text{Tc}$ -labels,  $^{99m}\text{Tc}$ -pyrophosphate and  $^{99m}\text{Tc}$ -pertechnetate, early differentiation of CVD and brain tumor may become possible.

### Brain Scan with $^{57}\text{Co}$ -Bleomycin

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The  $^{99m}\text{Tc}$ -Pertechnetate is a most favourable radioisotope for brain scan. That is diagnostically very useful for supratentorial cerebral tumors. But it is difficult to demonstrate the tumors with  $^{99m}\text{Tc}$ -Pertechnetate which exist at the cranial basis and in the posterior cranial fossa, because that areas are covered with temporal muscles, occipital muscles and salivary glands, which have normally strong activities with  $^{99m}\text{Tc}$ -Pertechnetate. On the other hand, the  $^{57}\text{Co}$ -Bleomycin is actively uptaked by tumor cells. The background activities of this scintigrams are very low level. Therefore, we obtain clear hot areas in malignant cerebral tumors.

Bleomycin is an antimetabolic-antibiotics, discovered by Umezawa in 1962. The  $^{57}\text{Co}$  is a pure gamma emitter (122 KeV), and has a long

physical half-life (270 days). The  $^{57}\text{Co}$ -Bleomycin was developed by Renault, et al. in 1971. In this study, the  $^{57}\text{Co}$ -Bleomycin that we used contained 10mg of Bleomycin per 1 ml with an activity of 1 mCi of  $^{57}\text{Co}$ , and were injected intravenously for 1 to 3 mCi. This was rapidly eliminated through kidneys; 85% of radioactivity was found in urine within the first 24 hours as labeled Bleomycin. Therefore, the total irradiation dose against the patients is not so large. But it is important to collect and stock the urine during the first 24 hours. Recording were made by 5-inch crystal, 85-hole collimator at 24 hours after the injection and scanning speed was 65cm/min.

In our series, from January 1973 to February 1974, 30 patients were studied in this way. In this meeting, we showed the typical