concentration on either side of brain hemisphere but the localization was not definite and a negative scan indicates no abnormal concentration of isotope. Thus including equivocal scan, the scanning was positive in about 80% of cases.

When these results were compared with histological findings, there was a tendency of higher rate of positive scan in meningioma, glioblastoma or oligodendroglioma. The scan was negative in astrocytoma or heman-glioblastoma.

In non neoplastic cases, a case of chronic subdural hematoma showed an equivocal scan was all negative.

Although our cases are yet small in number, these findings were quite similar to those which have been reported on literature. And the brain scanning was considered to be quite useful in the decision of operative approach to the tumor or in clinical follow up of various neurological conditions.

V. Circulation

Studies on the Permeability and Absorption of the Pulmonary Lesions


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Studies on the permeability and absorption of the pulmonary lesions is important to clarify the mechanism of the lesion formation, natural history of the lesion and best therapy of the pulmonary diseases.

As for this problem, we have already reported the permeability of the pulmonary cavities.

Pulmonary tuberculosis, candidiasis, suppuration and Brown-Pearce cancer were made in the lung of male rabbits weighing around 2 Kg. Under fluorography, $^{32}$P solution—100 µC/0.3 ml—was directly and transdermally injected into cavity and other lesions. Aqua destillata, physical saline solution and 5, 25, 50% glucose solution were used as solvent of $^{32}$P.

Animals were killed after certain period of time—60-90 minutes—and macro- and microautoradiogram were obtained. ml of blood was drawn from the femoral artery in periodic intervals—1-5 minutes—and radiographic analysis of these samples was made.

Results

1. Macroautoradiogram showed a relatively quick passage of intracavitary injected radioisotopes through the cavitary wall into the pericavitary tissues and outer normal tissues. This fact probably showed the permeability of the cavitary wall.

Difference in the mode of passage among these diseases—tuberculosis, suppuration, candidiasis—was not clarified, but activity of Brown-Pearce cancer lesion was remarkable.

2. Similar finding were obtained by microautoradiogram. Gradually decreasing activities of radioisotopes were seen in the necrotic area, cavitary wall and around the cavity, in that order. Also considerable difference in $^{32}$P—uptake of the cells were noted among tuberculosis, candidiasis and suppuration and especially microautoradiogram of the tuberculous lesion showed much activities in small, round, clear cells which seems to be histiocytes.

3. Analysis of blood radioactivity curves revealed slight differences in decrease of absorption of isotopes to 60% of the original.—tuberculosis, with cavity, $3^{32}$P; without
There was considerable differences in the pattern of blood radioactivity curves, depending on solvent of radioisotope and history of the pulmonary diseases.

**Travel of Oxygen in the Body as Studied by the Use of $^{15}\text{O}_2$**

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How the oxygen travels in the body after it enters into the blood through lungs, how long does it take to complete for to be metabolized oxygen in the tissue mitochondria as a hydrogen acceptor to produce water, is one of the most interesting problems in the physiology. Oxygen-15 is supposed to be a very convenient isotope for this purpose.

A dog was made to respirate air containing oxygen-15. Specific activity of the oxygen-15 in the blood and the serum was pursued.

The dog was anesthetized with Nembutal and endotracheal intubation was performed. The dog used, weighed from 10 to 20 Kg. Before and after the experiments the functional residual capacity, a single breath ventilation, oxygen consumption, nitrogen clearance curve and difference of oxygen concentration in the artery and the vein were measured. From these data we can calculate the specific activity of oxygen-15 in the alveolar space, hemoglobin and the total amount of oxygen-15 which enters into the body.

A endotracheal tube was attached with the valve separating the inspiratory and the expiratory gas. The dog was allowed to breathe normally a constant amount of oxygen-15 continuously through the open circuit of the 26' cyclotron.

After the inhalation of air containing oxygen-15, the blood was taken from the femoral vein. The blood was centrifuged and then the red blood cell and the serum were separated. The specific activity was counted by the welltype scintillation counter.

The specific activity of blood were reached to a constant height after 10 minutes. Appearance of oxygen-15 occurred in the serum after about 40 seconds. It was checked that the isotope in the serum came from water and not from the oxygen-15 physically dissolved. Oxygen-15 in the serum was determined by distillation method.

The specific activity of water in the serum before and after distillation were the same.

When oxygen-15 entered into the body, it was metabolized in the mitochondria of the tissue, returned into the blood as water. Specific activity of carbon dioxide in the expiratory gas was too minute to detect. So that the action of carbonic anhydrase was negligible.

Travel of oxygen in the body is carried out as follows, oxygen in the air is combined with hemoglobin in the lung, oxygen with the hemoglobin is transferred into mitochondria of the tissue. The metabolically derived water is produced in the respiratory chain by catalysis of cytochrome oxidase. A part of the produced water enters rapidly into the blood.