B-65. A Study on Diagnosis of Brain Tumor by Means of Ultrasonotomography

—with special reference to differential diagnosis by various sensitivity levels—

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Ultrasonic tomography was performed on patients with supratentorial brain tumor to find the localization of brain tumor and the characteristic echo-patterns from the space taking lesion.

In cases of astrocytoma the echo was not sharply outlined and hemogeneous in tone, and it changed to spotty echo with decrease of sensitivity. Meningioma demonstrated a sharply outlined and homogeneous echo. The echo of astrocytoma was similar to those of glioblastoma and it is nearly impossible to differentiate between them. The calcified oligodendroglioma showed a typical sharply outlined echo. The best sensitivity to show the characteristic echo is different in each tumor: from 6 to 21 dB in glioma, 15 to 18 dB in meningioma and 24 dB in 3 out of 4 cases of calcified tumor. From these results it can be concluded that ultrasonic tomography is worth doing for the purpose of differential diagnosis of brain tumors in clinical practice.

B-66. Effects of Focused Ultrasonic Radiation on Ganglionic Transmission

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In the quest for a reliable physical method to alter nerve function selectively and differentially, the effect of ultrasonic radiation on nerve condition has been studied by numerous investigators. Lele (1963) has described differential blocking of conduction in mammalian peripheral nerve fibers by irradiation of whole nerves with focused ultra-sound. But there is yet no physiological study of effect of ultrasonic radiation on synaptic transmission which is elementary action in all nervous system. In view of the fact, special attempt was made to study the effect of ultrasonic radiation on ganglionic transmission using inferior cervical ganglion of turtles.

These experiments were performed with the nerve and the equipment in thermal equilibrium at the ambient room temperature of 24°C and water temperature of 21.5°C. Thirty nine turtles were used to obtain 78 inferior cervical ganglion. Excitatory

postsynaptic potential (EPSP) was obtained from action potential of an excised ganglionic set up by single maximal stimuli to the pre-ganglionic trunk lying in the liquid praffin of nerve chamber. A single beam of focused ultrasound subtending lense #5, irradiation head #1, at the frequency of 2.7 MC and $4{,}7 \times 10$ w/cm^2 average focal intensity was used.

1. In preliminary experiment, the conduction velocity and height of EPSP and the focal length of focused ultrasound were determined.
2. The progression of changes in EPSP with increasing pulseduration continnously was divisible into three distinct phases, phase of enchancement, phase of reversible depression, phase of irreversible depression.
3. When irradiated by differential 0.2 to 1.0 sec pulsduration and 1.0 sec constant pulseperiod. EPSP was divisible into three distinct phases and relation between the pulse duration and the number of pulses required to irreversibly block the isolated ganglion preparation can be approximated by two types of linear decrease.
4. When irradiated by differential 0.2 to 1.0 sec pulse duration and 1.0 sec constant pulse-interval, EPSP was divisible into three distinct phases and relation between the pulse duration and number of pulses required to irreversibly block the isolated ganglion preparation can be approximated by hyperbolical decrease.
5. The increase in the temperature marked immediately at 10°C and reached gradually at maximum of 42°C and continued at same degree during the ultrasonic irradiation.
6. The microscopical appearance of ganglion was related to the ultrasonic dosage with which they had been irradiated.

This experiment confirmed that the number of pulses of ultrasound needed to irreversibly block conduction in the ganglion was related inversely to the pulse duration and directly to the pulse interval.

B-67. Some Efferent Connections of Centromedian Nucleus and Magnocellular Part of Medial Geniculate Nucleus in Cat.

—With Special Reference to the Pain Comducting Pathway—

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The spinothalamic fibers and the secondary ascending fibers of trigeminal nucleus, both of which is concerned with conduction of pain, terminate in the ventral posterior nucleus and the intralaminar nucleus group including the centromedian nucleus. Moreover, some of these fibers terminate in the magnocellular part of medial