62. Experimental Brain Edema using Intensed Ultrasound, especially on Effects of Urea, 20% Mannitol, Adrenocortico-Steroids and Chimotripsin

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We have reported that brain edema is to be easily and ideally produced using intensed ultrasound whose frequency was 20 kc and which is generated by horn-type irradiator. In this paper, electron-microscopic findings of such brain edema and of effect of medical therapy are presented. Rabbits were used for the experiments under general anesthesia using Uretan and were irradiated by ultrasound through the scalp at the region of cerebral hemisphere.

The cerebral cortex were used as the materials for the electron-microscopic observation. Animals were sacrificed at different periods after irradiation. Immediately after sacrifice, the cortex was fixed with the Millonig solution, then embeded in Epon resin 812 and stained using the method of Millonig. In findings of the material 4 hrs after irradiation, mitochondrias swelled and became irregular. In findings of the materials 24 hrs after irradiation, astrocytes, mitochondrias and basement-membrane of capillary were changed. No perivascular space appeared in any period after irradiation. After several medicine was administered to cure brain edema produced by intensed ultrasound, electron microscopic studies of it was performed; Group 1. Injected Urea solution; Group 2. Injected 20% Mannitol solution; Group 3. Injected Prednisolone; Group 4. Injected α -Chimotrypsin.

63. Serum Proteins in the Edematous Brain Tissue

Study with Fluorescent-Antibody Technique

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Cerebral edema was produced in dogs with the method of cold injury described by Klatzo et al. Using fluorescein-conjugated antibody against

dog whole serum proteins were examined immunohistologically in normal and edematous brain tissues.

In normal brain tissue serum proteins were present mainly within the blood vessels; outside of the blood vessels nerve, glia and endothelial cell contained serum proteins only in very little quantity. On the contrary, a large amount of serum proteins was found in the edematous brain tissue the white matter contained serum proteins in large quantity than the grey. In the markedly edematous brain tissue serum proteins of large quantity were diffusely distributed. In the boundary area, on the other hand, which was less edematous, serum proteins seemed to be confined to the glial elements the glia cells of some kind, probably astrocytes, actively took up serum proteins. Serum proteins were also found in the perivascular space of the edematous brain tissue.

It was considered that brain edema could be histologically confirmed easily by demonstration of serum proteins in the tissue using fluorescent-antibody technique.

64. Postoperative Care using Continuous Recording of Intracranial Pressure

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In order to solve the problems concerning intracranial hypertension of various causes such as brain tumors, cerebral traumas, cerebrovascular diseases, and cerebral edema caused by various pathological conditions, it is absolutely necessary to know accurate intracranial pressure dynamics. For this purpose, various methods have been tried in the past, but there has never been a satisfactory way of knowing the accurate intracranial pressure continuously for long period of time. Continuous recording of ventricular fluid pressure using a strain-gage pressure transducer satisfies our requirements to a certain extent. However, in order to transmit the intracranial pressure, the ventricular fluid must be led to the transducer head through a catheter. And therefore, the entire set up including the transducer head must be kept sterile. This is not only quite a nuisance but also sometimes dangerous. Furthermore, in order to continue the recording, free communication of cerebrospinal fluid between the ventricle and the transducer must always be