S2. The Circulatory and the Metabolic Characteristics of the Cortical and the Thalamic Regions Observed by Application of the Oxygen Electrode to the Dog Brain

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1) Polarographic measurements of cerebral oxygen tensions in dogs by using an enamelled Cu-wire as the oxygen electrode were attempted.

These dogs were anesthetized with Mintal (pentobarbital sodium) 30 mg per kg B.W., treated under the artificial respiration, immobilized intermittently or continuously with intravenous administrations of Relaxin (synthetic muscle relaxant, succinyl choline chloride), and controlled at 33° to 39°C of body temperatures by means of electric lamps 1-2 x 100 watt.

Concurrent recordings were made of the cerebrospinal fluid pressure through the cisternal puncture, the blood pressure of the femoral artery, and the EEG of the cortical and the thalamic regions. In addition, the arterial blood oxygen tensions were checked by means of the oxygen electrode.

2) The currents in the electrical circuit for the oxygen electrode, representing the polarographic tissue oxygen tensions, may well reflect the blood flows of local tissues in so steady states as the arterial blood oxygen tensions are not changed.

The cerebral circulation seemed apparently to be made so constant that, when the blood flow in one region as the thalamus continued to increase or decrease, the circulation in the other as the cortex continued to decrease or increase.

The cerebral blood flows well responded to the changes of rather the cerebrospinal fluid pressure than the blood pressure, decreasing and increasing accompanied with rising and falling of the pressures, respectively. However, the thalamic circulation, in contrast with the cortical, could not follow changes of the pressures so fast as the cardiac and respiratory.

Since this push-pull relation between the cerebral tissue oxygen tension and the cerebrospinal fluid pressure occurred remarkably and typically when dogs were suffering from anoxic anoxia, these facts seemed to imply that the cerebral tissues, of which the thalamic region having a greater capacitance hemodynamically must be provided with much more amounts of blood streams than the cortical having a greater resistance hemodynamically, could not be sufficiently satisfied with oxygen from the blood streams flowing into the cerebral tissues steadily.
When the administration of KCN caused the $O_2$ supplies to suffice for the brain, the cerebral blood flows became to increase and decrease, responding to rising and falling of rather the blood pressures than the cerebrospinal fluid pressures, that is to say, when cerebral tissues became to be made histotoxic, the push-pull relation between changes of the cerebral blood flow and the cerebrospinal fluid pressure disappeared. Especially in the thalamic region, this push-pull relation tended to disappear in the restoring course of the cerebral tissue $O_2$ tension after anoxic anoxia, more remarkably when glucose was administered previously. This fact seemed to suggest that in the thalamus the metabolic rate must be mainly dependent upon the glycolytic reactions which are not consuming so much oxygen and also not so fast as the oxidative reactions predominant in the cortex.

3) It seemed expectedly that the various wave-forms of the EEG in the dog brain, especially suffering from anoxia, could be illustrated significantly to some extent, according to the circulatory and the metabolic characteristics of the various cerebral regions as mentioned.

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S3. Histochemistry of the Brain

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1. Five autopsy cases complicated with cerebral circulatory disturbances due to both pulmonary and cardiac arrests have been examined neuropathologically.
2. The antecedent disease processes in those cases comprized; schizophrenia, lung tuberculosis, mitral stenosis, negative and gynecologic disease, respectively. The trigger agents for the cerebral complications were electric shock, extripation of drainage after pulmonary lobectomy, narcosis with "Lachgas" for commissuromomy, coal mine explosion and narcosis with lumbar-punctured

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