were performed on a polygraph. A balloon was placed and expanded gradually either in the supratentorial space or in some instances in the posterior fossa where the effects of pressure more directly influenced the brain stem. Cushing phenomenon associated with the inhibitory response of respiration, was more clearly observed at the earlier stage in the case of infratentorial compression, and it started with a sudden decrease in cerebral blood flow of the brain stem.

Several mechanisms have been proposed to explain the etiology of Cushing phenomenon; namely, the medullary anoxia, mechanical baroreceptor and axial distortion of the brain stem. It was concluded from the serults of this experiment that the decrease in cerebral blood flow of the brain stem was one of the most responsible factors for the production of Cushing phenomenon.

g-11. Effects on Cerebral Circulation and Cerebral Metabolism of Various Kinds of Treatment for Head Injury

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At this meeting last year we reported the results of our experimental investigation on the effects on cerebral circulation (CBF) and cerebrospinal fluid (CSF) pressure of normal and brain edema dogs, of various drugs currently used for treatment of head injury, including 20% mannitol, thiamine tetrafurfuryl disulfide (T. T. F. D.), cytochrome C, cytidine diphosphate choline (CDP-choline) and prednisolone.

This time we reported the results of our investigation on the effects of these drugs on CBF, cerebral oxygen consumption (CMRO₂) and CSF pressure of brain edema dogs. It was found that 20% mannitol, among those drugs, was most potent in promoting CBF and CMRO₂ and reducing CSF pressure. Then we tried to find the effects on CBF, etc., of the cerebral metabolism stimulating drugs after CSF pressure of brain edema dogs had been rendered approximately normal by previous infusion of 20% mannitol.

When 7 cc/kg of 20% mannitol was administered intravenously during 30 minutes, CBF and CMRO₂ showed a marked rise (by about 150%), together with a fall in CSF pressure during the infusion, but on finishing the infusion CBF and CMRO₂ showed a rapid fall for the first 15 minutes, continuing to fall gradually thereafter. Ten minutes after ending the mannitol infusion either 4 mg/kg of T. T. F. D., 0.5 mg/kg of cytochrome C, or 10 mg/kg of CDP-choline was given intravenously. Administration of T. T. F. D. caused prolongation of the period of increased CBF and CMRO₂, but the prolongation was only

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for 20 minutes. Cytochrome C was found to have little effect on prolongation of increased CBF, but prolongation of increased $CMRO_2$ was fairly marked. The prolonging effect of CDP-choline on increase of CBF and $CMRO_2$ was insignificant.

g-12. A Study on the Neurogenic Factors Affecting the Autoregulatory Mechanism of Cerebral Blood Flow

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Although some studies have been made on the chemical factors affecting the autoregulation of cerebral blood flow (CBF), there are few on the neurogenic factors.

In order to investigate, therefore, how the neurogenic factors regulate CBF changes of blood flow in the internal carotid artery (obtained from measurement of the common and external carotid artery blood flows by means of two pairs of electromagnetic flowmeters) was compared between "denervated" and "intact" group of dogs as blood pressure was varied by bleeding and re-transfusion of own blood.

The values of the internal carotid flow did not differ significantly between the two groups, the flows being kept well in the normal range as far as blood pressure varied from 80 to 160 mmHg. However, the ratio of the internal carotid blood flow to common carotid was greater in the intact group, although in both groups the ratio gradually increased as the blood pressure decreased.

From the data obtained, we can conclude that the neurogenic factors do contribute to some extent to maintenance or autoregulation of CBF by increasing the ratio of the internal carotid blood flow when blood pressure declines.

g-13. Experimental Studies on Hypothermic Asanguineous Perfusion in the Decorporated Canine Brain

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Bloodless operative field induced by temporary circulatory arrest under hypothermia has brought much benefit in surgery. Even under hypothermia,

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