53. Experimental Studies on Promotion of Cerebral Circulation

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Among various drugs presently used for head injury treatment, mannitol, prednisolone and metabolism-stimulating agents (thiamine tetrahydrofurfuryl disulfide or T.T.F.D., cytochrome C and cytidine diphosphate choline or CDP-choline) were examined as for their effects on cerebral blood flow of normal dogs, dogs having acute intracranial hypertension and dogs having brain edema. Acute intracranial hypertension was produced by McQueen's method and brain edema was produced by extradural freezing.

1) Mannitol was found to promote cerebral blood flow for fairly short period. In intracranial hypertension dogs and brain edema dogs mannitol injection was found to increase cerebral blood flow as high as 320% and 170% above the control level respectively, but then the flow dropped rapidly tending to reach a level lower than the control level.

2) Prednisolone caused no marked change in cerebral circulation in normal as well as pathological dogs.

3) T.T.F.D. increased cerebral blood flow as high as 65% above the control level in normal dogs and as high as 120% above the control level in intracranial hypertension dogs, but the increase was only 30% in brain edema dogs. The duration of increased cerebral blood flow was as long as 60 minutes in intracranial hypertension dogs, whereas it was from 20 to 30 minutes in normal and brain edema dogs.

4) Cytochrome C increased cerebral blood flow as high as 40% above the control level in normal dogs and the duration of the increase was fairly long. In pathological dogs the increase was only as high as 10%.

5) CDP-choline increased cerebral blood flow as high as 15 to 30% above the control level in normal dogs and the duration of the increase was about 40 minutes. In pathological dogs the effect was not marked and subsequently cerebral blood flow fell below the control level.

In conclusion, the results of the experimental studies on effects of various drugs on the cerebral circulation revealed that intensity and duration of the effects differed considerably among normal dogs, dogs having acute intracranial hypertension and dogs having brain edema. These facts should be taken into consideration in clinical practice.