tionalized according to their cell constituent. The dog, weighting approximately 10 kg., were used in this study. Under I.V. anesthesia, these specimens were taken from the following two groups of the dogs; group 1) only under I.V. anesthesia and group 2) with unilateral artificially-made brain edema by inserting the rubber balloon extradurally via small burr hole. The subcellular fractions were separated to the phosphorous compounds utilizing Schneider’s method and their specific activities were also calculated according to Alleu’s method.

1) The decrease of ATPase activities was noted in the artificially compressed side of the hemisphere than that of the non-compressed side, and the control group respectively.

2) At 4 hour period following the compression, the ATPase activities of the cerebral cortex, marrow and the brain stem were noticed to be the highest among the compressed dogs, where as that of the cerebellum was noticed later 6 hour period.

3) The cell fractions among the 4 hour-compressed group there were insignificant decrease of ATPase activities compared to that of the control group, however, at 12 hour period compressed group, the decrease of the activities was significant.

4) Uptake of $^{32}P$ into the subcellular fraction was found to be the highest in the mitochondria, and then to supernatant, nuclei respectively.

5) Uptake of $^{32}P$ into phosphorous compounds was significantly high in the acid soluble P. followed by phospholipide, nucleotide, and phosphoprotein.

49. Experimental Studies on the Angioarchitectonic Changes of Brain Stem in Acute Brain Compression

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Cats was anesthetized with intraperitoneal injection of NEMBUTAL, and had been made acute epidural compression in parietotemporal region by the condom balloon method.

If up to 1.5 cc of saline was introduced rapidly, the animals tolerate the procedure well. In groupes introduced over 2.0 cc, animals sooner or later show anisocoria, loss of muscle tone after rigidity of extremities, coma respiratry arrest. Especially on respiratory arrest, the critical level for cat was introduction volume of 2.5 cc of saline. In all autopsy of these compressed brain followed by respiratory arrest, pons and/or anteror portion of medulla oblongata showed findings as petechia or liner hemorrhage.
After the cats were sacrificed, immediately 67% ultra corpuscle Barium Sulfate was introduced gradually into the bilateral carotid arteries. The brain specimens were removed from intracranial space after Formarin-perfused fixation, and it was cut in serial frontal or sagittal slices.

Each slice was radiographed by ultra soft X-ray. The radiograms showed perivascular leakage of opaque medium localized in pons and/or antrior portion of medulla oblongata.

The brain stem hemorrhage due to raised supratentorial pressure may be resulted from arterial rupture in the place corresponding to so-called respiratory center.

50. Biochemical Studies on Brain Swelling

—Correlation between brain swelling and cation active transport—

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We have already reported that ischemia resulted in a rapid decay of brain mitochondrial phosphorylation efficiency and that a potent uncoupling agent of oxidative phosphorylation is rapidly formed in brain swelling or a brief intervals after the production of ischemia.

In the present study, the isolated brain mitochondria were investigated with regard to some basic properties relevant to their functional state, such as respiration and the change of ionic concentrations.

Brain mitochondria during induced ischemia were not able to maintain concentration gradients of sodium and potassium. There was an increase of intracellular sodium, and intracellular potassium decreased, leading to a rise in extracellular potassium. This ionic change was suggested to correlate with the decrease of mitochondrial ATP synthesis and the failure of the mechanism for active cation transport in brain.

On the other hand, few mitochondria from other tissues (liver, kidney and heart) were so rigid in this regard and retain or reconcentrate normal ionic concentration during much longer periods of ischemia, probably due to the insensitivity of their mitochondrial metabolism to ischemia. These facts illustrate the extreme dependence of Na+ pump of brain upon mitochondrial phosphorylation.

From these findings, it was suggested that the depletion of a high energy intermediate that can be used for driving various cell functions, prevents the steady supply of energy for maintenance of the lipoprotein membrane across