A

IBOTENATE-INDUCED STIMULATION OF MONO- AND DIACYLGLYCEROL LIPASES IN RAT BRAIN. A.A. Farquih, L. Wallace and L.A. Herrick. Dept. of Med. Biochem. and Div. Pharmacol., The Ohio State University, Columbus, Ohio 43210, U.S.A.

Direct administration of ibotenate into the nucleus basalis magnocellularis of rat brain causes extensive neurodegeneration by destroying cholinergic cell bodies and has been used to develop a potential animal model for Alzheimer’s disease (AD). A marked increase of mono- and diacylglycerol lipase activities is found in nucleus basalis and hippocampus regions of autopsied brain from AD patients (Ann. Neurol. 1985; 23:306-308). We have injected ibotenate in the nucleus basalis magnocellularis region of rat brain to study whether an elevation of lipase was associated with the degeneration of cholinergic neurons in this potential animal model of AD. Two plasma membrane fractions were prepared from different regions of ibotenate injected (right hemisphere) and control (left hemisphere) rat brain. One plasma membrane fraction was from synaptosomes (SNPs) and the other from glial cells and neuronal cell bodies (PM). Activities of mono and diacylglycerol lipase in the above plasma membrane fractions were markedly increased (3-5 fold) in the hippocampus, mid brain and frontal cortex regions of ibotenate injected rat brain after 10 days. The activity of choline acetyltransferase was decreased in frontal cortex but unchanged in hippocampus and midbrain. Our results suggest that the increase in lipase activity is much more widespread than is the decrease in cholinergic function. Supported by The Ohio Department of Aging, State of Ohio.

B

AGGREGATION PROPERTIES OF GANGLIOSIDES AND THEIR RELEVANCE TO COMPOSITION OF NEURONAL MEMBRANES L. Cantuelli, M. Corti, J. Sonnino, and G. Tottamani, Dept. of Chem. and Biochem. of University of Milan, via Savidini 50, 20133 Milan, Italy.

Gangliosides are amphipathic molecules which spontaneously aggregate in solution. A careful study of this process for different gangliosides and mixtures of them can be helpful in understanding their role in natural membranes. It is found, for instance, that the geometrical dimensions of the hydrophilic and hydrophobic parts of the molecule are important in determining site and shape of the aggregate. Larger oligosaccharide chains allow larger curvatures and vice versa. This has been experimentally verified with the ganglioside series GT1b, GD1a, GM3, GM2. They form micelles of increasing size and nonspecificity. Mixing of GT1b and GM3 gives rise to flat micelles with GM3 spontaneously segregated in the region of larger curvature, namely at the edges. Similar effects may occur in natural systems in connection with the non-uniform curvature of the membrane microenvironment. Also interesting is that GM3 forms small vesicles spontaneously with a bending rigidity much smaller than the typical one of phospholipids. This may be of relevance in the case of clustering of GM3 on the membrane. Besides, it is important to notice that hydrophobic chains in GM3 vesicles are fully interdigitated, which means that the membrane thickness is very small.

C

DECREASED FORMATION OF PHOSPHATIDYLINEOLIPPINE (PDI) IN MONOACETYLGlycerOle (MAG) IN ALZHEIMER’S DEMENTIA (AD). D.H. McCall, University of Florida College of Medicine, M.D. 1861, Jacksonville, Florida.

There is an increasing number of biochemical studies into the pathogenesis of Alzheimer’s disease (AD). Of all known, however, there is only a very limited number of studies into active enzymatic processes in these conditions. The present study investigates phospholipase A2 phospholipase (PLA2) pathways. The premise is that a decrease in brain PLA2 function might underlie the decrease in brain function with age and especially AD, and that this function is dependent upon the rapid interconversion of phospholipids. The essay system used, consists of incubation of a cytosolic fraction (containing the relevant enzymes PLA2 and PLC/P) with liposomes conditions. For short time periods with radiolabelled [1-3-23]P-I-P, we found that the reaction was decreased in AD patients compared to controls AD > 90% inhibition is a neuronal area, i.e., hippocampus, thalamic and temporal cortex and occipital cortex. In contrast, the formation of [1-3-23]P-I-P was identical in AD patients and controls in the four cortical areas tested. In a second experiment, it was investigated whether the factor "age" has any effect in addition to the factor "disease". Cerebral cortical tissue obtained from 18 subjects aged 14-40 was compared with respect to P-I-P and [23]IP formation. There was a negative correlation between age and the formation of both phospholipid species, indicating that the formation of both lipids decreases with age. Despite [23]IP formation is of no value, all brain tissue has been obtained with a short period of section within 8 hours after death (range 3.5 h & 8 h), the factor post mortem interval appeared not to have any influence on the enzyme activities measured. The results could be of substantial importance for studies into the pathological-physiological brain aging and the regulation of the phospholipid metabolism in brain membrene function.

D

LABELING OF RAT'S GANGLION CELLS PHOSPHOLIPIDS IN CHICKENS EXPOSED TO LIGHT STIMULATION. María G. Siuda, Beatriz L. Cappiello Facultad de Ciencias Químicas Universidad Nacional de Córdoba, C.C. 61, Córdoba, ARGENTINA.

We have found that light stimulation increases in vivo the labeling of phospholipids in the chick retina ganglion cells compacted to dark maintained animals (light > dark 54% / p<0.001). In its turn originated an increase in the amount of label that arrives by axonal transport to the contralateral optic tectum in light (light > dark 30% / p<0.01) No individual phospholipid accounts for the differences observed in the labeling of the total phospholipid pool. No systemic effector was found responsible of the differences observed in the labeling of these lipids between both illumination conditions. These differences are independent of the nerve endings because they are maintained even in chickens with one of their optic nerves ligated. The results are interpreted as an increase in the biosynthesis of phospholipids in the ganglion cell soma of animals in light compared to dark. In order to elucidate the mechanism that could be operating in the regulation of these phenomena, the incorporation in vivo of [3P]into phospholipids of retinal ganglion cell homogenates was determined. It was found a higher labeling of these lipids in the ganglion cells that were from light. The biochemical activity and the differences in labeling of phospholipids were observed in the microsomal fraction obtained after centrifugation of the homogenates at 200,000 x g during 45 min.