INTRODUCTION

The control and integration of bodily functions are accomplished chiefly by two systems - the nervous system and the endocrine system. In general, nervous system controls all the rapid activities of the body, such as, muscular contractions, rapidly changing visceral events and even the rates of secretion of some endocrine organs. The nervous system hence plays an important role in the maintenance of bodily homeostasis against diverse changes in the external environments within reasonable limits. This it does by reception, storage and release of informations. Between the reception of information and the response lies the organising and integrating function of the nervous system. The nervous system in man has also to perform neuronal mechanisms that are essential to consciousness in addition to many involuntary mechanism that has little or no conscious states. The nervous system subserves all these functions with the help of special neuronal circuits, the ultimate basis of which is formed by its peculiar structural and chemical organisations.
Of the various chemical constituents comprising the brain, lipids from about fifty percent of the dry matter (McIlwain, 1966). Proteins, on the other hand, make up about forty percent of the dry weight of whole brain and are present in association with lipid material as protein-lipid complexes. Lipids thus form the most important chemical constituent of brain. The most specific lipids of the brain are found at the myelin sheath and at cell membranes. Like other cells, neurones also contain lipids in their subcellular structures. Cerebrosides, cholesterol, sphingomyelin and plasmalogens constitute the chief lipids of myelin sheath. The lipid molecules of myelin sheath of peripheral nerves appear in laminated structures associated with protein molecules (Elkes & Finean, 1953). The brain cells synthesize all their lipid components by complicated processes (McIlwain, 1965; Rossiter, 1964). This synthesis depends upon the utilization of products viz., carbohydrate, phosphate, inositol, choline etc., obtained from the regional blood flow and reutilization of lipid breakdown products. Normally, energy for all these activities are derived from carbohydrate metabolism. Although lipids constitute about
10-30% of the weight of the isolated intra cellular structures, there is as yet no clear understanding as to their functional significance, excepting the fact that the phospholipids, perhaps, contribute a part of the energy requirements of resting neurones.

Very great functional significance, however, have been attached to surface membranes of neurones. This membrane is distinctly different from fibrous, glial and myelin structures. The latter simply contribute a sheath to neurone providing them with mechanical strength and electrical insulation. The myelin sheath has a peculiar disposition round the nerve fibres. This results in interrupted covering of fibres at regular intervals, the interruptions forming the nodes of Ranvier where myelin is absent. This arrangement facilitates faster conduction of impulses by the fibres concerned. The surface membrane of the neurone, on the other hand, helps to maintain its interior at a different composition from the exterior, particularly, in respect to ions viz., sodium, potassium and chlorine and is held primarily responsible for electrical behaviour of neurones.
This means that the membranes form the structural basis for such fundamental processes as conduction of impulses, excitation and inhibition of synaptic junctions etc.

Until the advent of electron microscope the surface membranes of neurones had not been observed directly. Electron microscope studies (de Robertis & Franchi, 1956; Palade & Palay, 1954) show that membrane has got a uniform thickness of about 100 Å consisting of bimolecular lipid layers sandwiched between two layers of protein. It is strongly believed that many of the properties of cell membrane originate in the presence of lipids as constituents of membranes.

Cholesterol which participates universally in the formation of cell membrane is said to change the surface properties of other lipids and has, therefore, important consequences in membrane function (Finean and Robertson, 1958). Cholesterol has also the properties of altering the behaviour of lecithin sols and films. On the other hand, it has been reported that cholesterol if present in definite proportion can go into solution in presence of lecithin. Cholesterol is also held responsible
for electrical resistance present in membranes which is reduced by choline (Saunders, 1963; McLlwain, 1966)

functions of lipids associated with membrane at different sites is, however, not yet properly understood. No specific metabolic significance could be attached to gray matter either though this portion of brain has a relatively more turnover of cholesterol. The function of phospholipids, on the other hand, is more widespread.

Their amphophilic nature is held responsible to stabilize intracellular membrane structures and their polarised head groups, between protein layers and bimolecular lipid layers help to stabilize the surface membranes (Beveridge, 1956; Van Deenan, 1965). Further, phospholipids with their attached fatty acids are said to control, at least in part, the metabolic states of membrane structures (Fleischer and Rouser, 1965). The phospholipids are also known to have a dispersing action on nonpolar hydrophobic lipids. They also play an important part in certain enzyme systems e.g., sodium and potassium activated adenosine-triphosphatase (Tanaka & Strickland, 1965). Besides, they also play important roles in the transport of lipids in blood and arterial wall (Zilversmit et al, 1963; Adams et al, 1963a; and Bryers et al, 1962).
The participation of the adult brain in lipid metabolism has always been regarded as limited in the past (Sperry, 1963; Waelsch et al, 1940). Recently, this static concept for neural metabolism of lipids has been challenged with the advent of newer evidences (McMillan et al, 1957; Nicholas and Thomas, 1959; Moser and Karnovsky, 1959; Paoletti et al, 1960; Kabara and Okita, 1959, 1961 and Kabara et al, 1957, 1958). It has been observed that if glucose and acetate incorporation data is interpreted in the light of certain correction factors the brain is found to compare even more favourably with liver as an active site of cholesterol synthesis (Kabara, 1964). Likewise, it has been reported that phosphatides of brain and peripheral nerve are in a state of constant renewal excepting in certain instances where a limit is imposed by blood brain barrier (Rossiter, 1957).

The effect of drugs on the synthesis and metabolism of lipids of brain have also been discussed in the literature (Ansell, 1964; MacGhee et al, 1951).

What effects a change in the lipid content in an otherwise normally developed brain has on cerebral function.
is a matter still largely unknown. Clinically, disorders
classified by both depletion and deposition of lipids
in brain have been encountered. The former has been
grouped under the name demyelinating diseases of the
nervous system and the latter under the general heading
lipidoses. The etiology of the demyelinating diseases is
largely obscure with many factors found to be associated
with the condition (Lumsden, 1950; Field et al, 1963;
Rose and Pearson, 1963 and Hurst, 1941). The prognosis
of most of these conditions is uncertain. Equally obscure
in etiology and prognosis is the group of disease
characterised by disordered lipid metabolism known as
lipidoses. But nevertheless, it is clear that nervous
system may be involved in any of them. Lipidoses is a
condition characterised by a disturbance in lipid
metabolism leading to an accumulation of lipid in blood
or certain organs. In the varieties of cerebromacular
degeneration brain is perhaps affected alone but in
Niemann-Pick, Gaucher's disease and in Hand-Schuler-
Christian syndrome xanthomatosis forms a part of more
general disturbance. According to Thanhauser (1958) among
other changes, Niemann-Pick disease is characterised by
accumulation of lipids in cortical ganglion cells, in Gauchers disease kerasine a cerebroside (not stained with sudan III or scarlet R) fills up the ganglion cells of cerebral cortex, basal ganglia and cerebellum, whereas, in Hand-Schuller-Christian syndrome the ganglion cells contain cholesterol and other lipids. Clinically all these start with cerebral symptoms of variable degree culminating in well established neurological manifestations.

Human body has a powerful mechanism to deal with changes in lipid metabolism. Whether there is a concurrent derangement in the above mechanism, in the conditions described above, is not certain. The evidences that pituitary gland plays a role in the regulation and transport of lipid had been known since long. A renewed interest in the subject has been shown, recently, by a number of workers (Seifter & Beader, 1954; Zarafonetis et al, 1965) resulting in identification of specific lipid mobilizing factors in the anterior and posterior pituitary. It is true that the pathophysiological significance of these factors either alone or in combination with various other hormones has still remained to be assessed properly.