MOLECULAR BASIS OF NEURAL FUNCTION

By

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One of the most complex and challenging problem to-day in biological research is enigma of brain function. It is also amongst the least understood subjects and is likely to the major research endeavour in the coming years.

The nerve tissue possesses the same genetic information as other cells in the body, the range of cistrons expressed in the neurone are different from those transcribed in other c of the body. This trait manifests itself in highly differentiated characteristics and proper of the neurons and glial cells, besides those common to several other tissues.

Brain is a very active organ from the metabolic point of view. In basal states it c sumes 1/5th of the total oxygen utilised by the body. The neurons of the neocortex have highest respiratory quotient of all other cells of the body. The neurons are also very rich basophilic material. Their RNA content is very high and is equivalent to the cells of hig active secretory glands such as pancreas. It has also a rapid rate of turn-over of prote The neurons resemble thus in some respects the secretory cells, a concept that is helpful in study of several functions, i.e. the synthesis, storage, transport, axoplasmic flow, release a uptake of neurohumours. Similarly, the central nervous system performs one of its import functions viz., regulation of the constancy of 'milieu interieur' by a co-ordinated secretion appropriate release factors controling the secretion of pituitary hormones. Some of the rele factors have been purified and characterised. They are all short length polypeptides. Curr information on these aspects will be briefly presented in the symposium.

Another important function performed by the brain is the ability to learn, and sto experiences. Elegant cryobiology experiments have demonstrated that the long term memo has a molecular basis. The most favoured hypothesis at the moment ascribes to RNA an or associated proteins the role of storing experiences and memory. There is some indire but suggestive experimental evidence supporting this belief, which is also inspired by an an logy, that of the known ability of these macromolecules to store genetic and immunologi information.

We have employed chemically and electrically induced convulsions as an experiment approach to amplify the chemical changes taking place in the brain as a consequence of ele trical activity. Some results on the content and metabolism of RNA during convulsions will be presented.

Our current work is centered on the changes in the RNA and proteins of the occipital cortex (areas 17, 18, 19) of rabbits and monkeys in response to the exposure of the animal to rhythmically flickering light of known intensity. Some of the results will be discussed in the symposium presentation.