supernatant and transferred to phosphatidylcholine liposomes. The linear rate of transfer was similar to that for the transfer of phosphatidylcholine from liposome to myelin (10 nmol/h per mg of pH 5.1-supernatant protein).

It seems reasonable to suggest that the transfer of phosphatidylcholine to myelin is controlled by the amount of phosphatidylcholine already in the myelin membrane, as well as by other phospholipids. The ability to transfer phosphatidylcholine to and from mature myelin may be one of the means of maintaining the high phospholipid content in myelin while allowing the replacement of individual phospholipid molecules as observed in vivo.


A Micro-Electrophoretic Investigation of the Surface of Isolated Myelin

N. A. GREGSON

Department of Anatomy, Guy's Hospital Medical School, London SE1 9RT, U.K.

Changes in the Metabolism of High-Molecular-Weight Ribonucleic Acid in Hypothalamic and Cortical Regions of the Developing Female Rat Brain

CHRISTINE HALL and LOUIS LIM

Miriam Marks Department of Neurochemistry, Institute of Neurology, The National Hospital, Queen Square, London WC1N 3BG, U.K.

During the postnatal development of the rat forebrain there are distinctive changes in the metabolism of high-molecular-weight RNA which comprises mostly rRNA and mRNA (Lim, 1977). Proportionally more mRNA is synthesized in the newborn compared with adult forebrain (Berthold & Lim, 1976a). The mRNA appears to have a higher turnover rate in the newborn (Bondy & Roberts, 1968), since there is no increase in mRNA concentration throughout development as judged by the content of poly(A) (Berthold, 1975; Lim, 1977). There is also considerable transport of newly synthesized high-molecular-weight RNA into the cytoplasm, which is probably responsible for continued accumulation of rRNA in the newborn brain. This transport is restricted in the adult brain (Adams, 1966; Berthold & Lim, 1976b). We have extended our investigations on RNA metabolism in the developing brain to a comparison of these aspects in hypothalamic and cortical regions.

High-molecular-weight radioactive RNA was isolated by phenol extraction and precipitation with 2M-LiCl from brain preparations of rats injected intracranially with \[^{32}P\]Pi. The proportion of polyadenylated RNA was determined by oligo(dT)—cellulose chromatography. The RNA was characterized by polyacrylamide-gel electrophoresis. These techniques, as well as the preparation of nuclear and cytoplasmic fractions, have been extensively described previously (Berthold & Lim, 1976a,b). The hypothalamic region was dissected out as described by McEwen & Pfaff (1970).

In both hypothalamic and cortical regions of the young brain, polyadenylated RNA formed a larger proportion of the total cellular RNA labelled at 4 h in comparison with the adult. At this period of labelling this proportion of polyadenylated RNA was the same
as in purified nuclear fractions and has been used as an index of the proportional transcription of mRNA relative to rRNA (Berthold & Lim, 1976a). In both regions these values fell from about 23% in the 5-day-old rat to 17% in 24-day-old rats. This final value was maintained subsequently. More mRNA appears to be synthesized in both regions in the developing than in the adult rat brain.

The transport of high-molecular-weight RNA was measured, as previously described, by comparing the specific radioactivity of $[^{32}P]RNA$ in the cytoplasm (c) with that of the nuclear fraction (n) 48h after the injection of the precursor (Berthold & Lim, 1976b). The c/n ratio has been shown to be lower in the adult than in the young brain, reflecting decreased transport in the adult. This ratio was measured in the brain regions of the same animals to obtain values for the cortex relative to those of the hypothalamus, and to compare changes in the transport in these regions during development. In the newborn rat this relative ratio was high but fell gradually to unity by the end of the third week. These results indicate that more high-molecular-weight RNA is transported into the cytoplasm in the cortical than in the hypothalamic regions during the first 3 weeks after birth.

The c/n ratio in the different brain regions was then considered separately. In the cortex the changes in these values indicated a high rate of transport in the newborn rat which reached a maximum at the end of the second week post partum. Transport then fell to a constant low value by the fifth week. In contrast, in the hypothalamic region, transport of RNA appeared to be low in the newborn rat, being comparable with that of the adult. This transport of newly synthesized RNA increased only in the third week, reaching a maximum between the third and fourth week, then falling to a constant low value by the fifth week post partum. This low value is comparable with that of the cortex at the same age.

The changes in RNA metabolism in the cortex in the first 3 weeks after birth parallel other developmental changes such as the acquisition of a final number of cells, adult numbers of synapses and of enzymes involved in neurotransmitter synthesis as well as adult patterns of intermediary metabolism (Balázs, 1973; Davison, 1977). The changes in the nucleo-cytoplasmic relationships of high-molecular-weight RNA in the hypothalamus during the third and fourth weeks indicate that it undergoes a phase of development at this time which is possibly related to the process of sexual differentiation. It has been reported that, during this pre-pubertal period, adult values for nuclear binding of oestradiol are attained (Plapinger & McEwen, 1973), along with the maturation of mechanisms involved in the phasic release of gonadotropins which characterize the adult female rat (Caligaris et al., 1972).

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