rose to about 2.5 at 21 days, which is comparable with the value observed in the adult brain. The development of the compartmentation of glutamate in rat brain therefore coincided approximately with that of the rapid conversion of [^{14}C]glucose into glutamate.

The fate of [^{14}C]leucine in the adult brain was further investigated at 5–120 min. after intra-peritoneal administration of [^{14}C]leucine. The maximum specific radioactivity was attained at first by glutamine, then by glutamate and considerably later by aspartate. The curves for the specific radioactivities as a function of time did not intersect; the relative specific radioactivity of glutamine even at 2 hr. after the injection was about 1.5.

The present results are consistent with the entry of [^{14}C]acetyl-CoA derived from [^{14}C]leucine into a metabolic compartment containing a relatively small pool of glutamate, which is connected to a relatively large pool of glutamine in the brain (cf. reviews by Berl & Clarke, 1968; Van den Berg, 1968). Evidence was also obtained that the co-ordination of the energy metabolism develops in parallel with metabolic compartmentation in the rat brain.

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The Effect of Thyroid Hormones on the Biochemical Maturation of the Rat Brain

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The growth and maturation of the brain are associated with changes of metabolic pattern resulting from changes in the activity and the co-ordination of different enzyme systems. The rapid incorporation of glucose into the free amino acids, which is characteristic of the adult brain, has been shown to develop in the rat between the ages of 10 and 21 days (Gaitonde & Richter, 1966). The development of this metabolic pattern was used as an index of maturation in studying the action of thyroid hormones.

Rats of Sprague-Dawley strain (10–19 days old) were killed 20 min. after an injection of 10–20 μC /

100 g. body wt. of [^{14}C]glucose of specific radioactivity 10 $\mu\text{C}/\mu\text{mole}$. The amino acids in the acid-soluble fraction were separated from neutral compounds and carboxylic acids as described by Gaitonde & Richter (1966). In the control 10-day-old rats, about 25% of the acid-soluble ^{14}C was recovered in the amino acids. By the age of 19 days the value had increased to 60%, which is close to the value obtained in the adult.

Tri-iodothyronine treatment (Khamisi & Eayrs, 1966) advanced the onset of rapid incorporation of glucose carbon into amino acids in the rat brain. At 12 days the rate of incorporation in the thyroid-hormone-treated animals was 64% higher than in normal control rats, whereas in neonatal radio-thyroidectomized animals the incorporation was decreased: at 10 days it was 72% and at 19 days 54% of the normal control value.

The results give evidence that the biochemical maturation of the brain is retarded in thyroid deficiency. Conversely, tri-iodothyronine treatment results in a premature development of the adult metabolic pattern. There is an apparent correlation between the advancement of innately organized behaviour (e.g. startle response; Khamisi & Eayrs, 1966) and the biochemical maturation of brain: in animals treated with thyroid hormone. The behavioural changes observed after neonatal thyroidectomy are apparently associated with the retardation of the biochemical maturation of the brain and structural changes involving a hypoplasia of the cortical neurophil (Eayrs, 1966).

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Solubilization of Mitochondrial Hexokinase from Ox Cerebral Cortex with Triton X-100

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The mitochondrial hexokinase of rat and guinea-pig brain has been solubilized by osmotic shock in the presence of ATP (Bachelard, 1967) or glucose 6-phosphate (Rose & Warms, 1967) or by treatment with Triton X-100 in the presence of high salt concentrations (Teichgräber & Biesold, 1968). The hexokinase of purified mitochondria from ox cerebral cortex, prepared by sucrose-density-gradient centrifugation, was found to be relatively resistant to extraction by the methods involving osmotic shock, but was readily solubilized with Triton X-100, with the apparent activation observed in the previous studies. The mitochondria,