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STUDY OF THE EFFECTS OF MATERNAL HYPOTHYROIDISM AND THYROXIN THERAPY ON THE NEURONAL DENSITY OF SUBICULUM IN RAT NEWBORNS

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Introduction: It is well established that thyroid hormones are essential for normal development of mammalian brain. Thyroid hormone deficiency during critical period of brain development can have devastating and irreversible effects on neurological function, as well as on learning abilities and memory. On the other hand studies in mice and rats suggest that lesions of hippocampus interfere with memory for space and context and can have a significant effect on memory storage. The goal of the present investigation was to explore the effects of maternal hypothyroidism and thyroxin therapy on the neuronal structures of the subiculum in an experimental model of cretinism. **Material and Methods:** Twenty five female Wistar rats were divided into experimental groups 1 and 2 and control. The experimental groups were made hypothyroid (500mg/l PTU in drinking water). The experimental group 2 received PTU+Levothyroxin (1mg/l in drinking water). The controls only received drinking water. After two weeks they were mated. During pregnancy and lactation, the treatment regime of all groups was continued as above. The brain of 20 days old newborns were dissected and fixed for histological preparation and the numerical density (NV) of subicular neurons was estimated by applying a stereological technique "dissector". **Results:** In addition to the effects of maternal hypothyroidism on the litter size and offspring weights, the results show significant increase of subicular neuronal density in experimental group 1 when compared with control ($P<0.001$). There was also a significant difference ($P<0.001$) between the Nv of experimental groups 1 and 2. **Conclusion:** The increased of neuronal Nv of hypothyroid rats is probably due to the retardation of the neuronal normal growth and extension of their dendritic arborization. It seems that thyroxin therapy can improve the effects of hypothyroidism on the neuronal structure of subiculum. **Key words:** Hypothyroidism; Subiculum; Neuronal density; Rat

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ULTRASTRUCTURAL OBSERVATIONS ON HYPOTHALAMIC ARCULATE NUCLEUS OF AGED RATS AFTER FASTING AND REFEEDING CYCLE

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Arcuate nucleus of the hypothalamus plays an important role in the control of food intake and energy homeostasis. We, for the first time, have assessed, an ultrastructural response of arcuate neurons in aged rats after a short-term fasting and subsequent refeeding. The study was performed on 24-month-old male Wistar rats having fasted for either 48 hrs or 96 hrs and then being refeed for 24 hrs. Rats received water ad libitum. Moreover, total 8-isoprostane serum level was assayed as a reliable marker of oxidative stress induced lipid peroxidation *in vivo*. In both groups of fasting animals, refeeding induced ultrastructural transformation of the arcuate neuronal rough endoplasmic reticulum (RER) and Golgi complex, as compared with the neurons of rats undergoing fasting only with no subsequent refeeding phase. The RER was frequently found to be well organized into two- or four-layered bodies. In extensive Golgi complexes, the vesicular elements seemed more pronounced than in the fasting only rats. However, membranous whorls composed of the concentric layers of endoplasmic reticulum and Golgi complexes were characteristic of neurons in rats undergoing a fasting-refeeding cycle as well as in the fasting only animals (our previous studies). What is more, multiform lipofuscin granules were observed in close relationship with the membranous whorls and Golgi complexes. Lipofuscin granules within the neurons of the arcuate nucleus are assumed to be as a morphological manifestation of oxidative stress, which is presumably responsible for formation of membranous whorls in both fasting and fasting-refed animals.

