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Plasma Thyroglobulin (Tg) in hypothyroid children under L. Thyroxine therapy (L.T.).

In order to determine Tg value in 1) reevaluation of classification of hypothyroidism and 2) follow-up of patients under L.T, plasma Tg and FT_4 were determined in 42 blood samples obtained from 21 hypothyroid children under L.T, divided in 2 groups according to the thyroid scans ; group I: athyreosis (n=8) and group II : ectopic or hypoplastic eutopic gland (n=13). Tg concentrations were measured by RIA (lower limit of detection : 3 ng/ml ; sensitivity : 2 ng/ml) after screening for Tg antibodies.

In group I, Tg was undetectable in 11 blood samples obtained from 6 patients, but significant levels of Tg (5.5 to 34 ng/ml) were found in 5 blood samples from 2 patients with negative 123.I thyroid scan, indicating the presence of some thyroid tissue.

In group II, Tg was detected in 20 of the 26 blood samples, mean ($\pm$ S D) being statistically not different than in controls (14.32 $\pm$ 11.5 and 18.12 $\pm$ 9.9 ng/ml respectively). However, Tg levels were significantly lower (9.75 $\pm$ 7.8 ng/ml) during excess L.T (FT_4 = 43.6 $\pm$ 14.5 pmol/l) than during normal (FT_4 = 17.4 $\pm$ 2.02 pmol/l) or insufficient L.T (FT_4 = 8.18 $\pm$ 3.19 pmol/l), plasma Tg being respectively 15.18 $\pm$ 10.6 and 16 $\pm$ 13.6 ng/ml).

In conclusion, 1) Tg is of value in reevaluation of classification of hypothyroidism when significant levels are found in so-called "athyreosis" and 2) Tg is of no value in determining the accurate dosage of L.T in hypothyroid children.

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Unexpected growth response in children treated for nonnodular euthyroid goiter.

Differing views about the need for treating euthyroid goiter persist. We undertook a retrospective study of the 8 of 20 prepubertal children (4 boys and 4 girls) who grew more rapidly during suppressive treatment. All were clinically and chemically euthyroid; in one growth rate was slow for bone age. Growth velocity (GV) was analysed during pretreatment (P1,3 to 13 mos) and 2 treatment periods (P2,4 to 7 mos and P3,4 to 8 mos) and compared to velocity expected for bone age (GVexp). The ratio of GV/GVexp for P2 & P3 was greater than that for P1 (mean 1.3 vs 0.75); the range of differences between the ratios was +0.33 to +0.90 (p=0.01). GV/GVexp in P3 was not different from that in P2 (differences between ratios -0.47 to +0.62). None of the children entered puberty during the study, bone age did not advance more than height age, and there was no clinical evidence of adverse effects. These patients showed unexpected compensatory growth during treatment. The possibility of uncovering subclinical hypothyroidism could be considered one reason for treating children who have "euthyroid" goiters.

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Delay of bioelectric brain maturation in congenital iodine deficient hypothyroidism.

Since the deleterious effects of permanent hypothyroidism (PCH) on brain maturation and physical development are wellknown it was of interest to investigate brain maturation and bone age (BA) in newborns with transient goitrous hypothyroidism due to fetal iodine deficiency. The intracortical synaptic potentials contribute substantially to the bioelectric activity recorded as EEG and they have been reported to reflect a maturational delay of the hypothyroid brain in the human infant. In the present study we investigated EEG patterns during sleep in 14 newborn infants with iodine deficient goiters (euthyroid n = 4, hypothyroid n = 10). Results were compared with 36 controls. BA was retarded in 6 of 10 newborns with transient hypothyroidism. 3 of 10 infants with hypothyroid goiters exhibited BA retardation and more immature EEG patterns than expected resulting in underestimation of conceptional age. Delay in bioelectric brain maturation was similar to findings in PCH. In conclusion our findings indicate that fetal iodine deficiency not only leads to retardation of bone age but also can interfere with bioelectric fetal brain maturation which reflects structural brain development and must therefore be regarded as a potential hazard for neurophysiological development of child.

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Psychomotor development of children with congenital hypothyroidism (The greek screening programme).

Since 1979, when a national screening programme for congenital hypothyroidism (C.H.) was started in Greece, 117 newborns were diagnosed as suffering from C.H. The mean age of these children at diagnosis was 32.4 days. Treatment with L-thyroxine was started immediately after the confirmation of the diagnosis. A standardized development test (Griffiths) was given to 96 of these children and to 75 controls at the age of 6, 12, 18 and 24 months. The mean developmental quotient (D.Q.) in the C.H. children was 101, 101, 100 and 96 in the 4 different age groups and in the controls 106, 101, 106 and 105 respectively. Statistical analysis showed that at the age of 18 and 24 months the difference between the C.H. children and the control children is statistical significant ($p < 0.01$ at 18 months and $p < 0.001$ at 24 months). Although children with C.H. diagnosed through the screening programme starting treatment in the first month of life have a D.Q. within normal limits, it seems that they do not reach their full potential. Efforts for an even earlier diagnosis and treatment could eventually improve the scores.

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IODINE EXCESS AND THYROID FUNCTION IN THE NEWBORN RAT

Various experimental studies on thyroid function of newborn rats have shown, that oral application of iodine to pregnant and newborn rats may be followed by neonatal hypothyroidism, whereas cutaneous application of PVP-iodine is followed by hyperthyroidism. To elucidate the different results, PVP-iodine was applicated cutaneously to pregnant and newborn rats. Its effect on thyroid function and brain development was studied between the 1st and 26th day of life. RESULTS: T3, T4 and TSH concentrations remained within the limits of the control group on day 1, 5, 10 and 18 of life. On day 26 T4-values were significantly higher in the "iodine"-group than in controls (3.9 ± 0.4 resp. 2.9 ± 0.2 µg/dl; $p<0.05$) but remained still within the euthyroid range. T3 and TSH-values were not different between both groups. Weight gain of body and brain was similar in both groups. Histological studies of the cerebellum gave no differences. CONCLUSION: Iodine overload during gestation and newborn period does not disturb thyroid function in the newborn rat if iodine is offered on a constant high level starting with pregnancy. With regard to earlier findings it may be concluded that the iodine-dependent autoregulation of thyroid function is affected more by the set-point of iodine excess than by the amount of iodine supply.

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Effects of i.v. TRH on LH, FSH and GH serum levels in primary hypothyroid children.

The occurrence of precocious puberty in children with primary hypothyroidism is a well recognized but poorly understood phenomenon. Several mechanisms have been proposed, but exceptions can be raised for each hypothesis (Lindsay et al, Am J Dis Child 134, 588, 1980). In 9/12 off-therapy primary hypothyroid children and adolescents (aged 1-16 yrs, 9 prepubertal and 3 pubertal) i.v. TRH (5µg/kg) injection elicited an evident increase of serum LH between 15 and 30 min, which exhausted within 90 min. Mean ($\pm$ SEM) LH serum levels at 15 (2.22 ± 0.45 ng/ml) and 30 min (2.22 ± 0.43) were significantly ($p < 0.005$) higher as compared to the baseline ones (1.53 ± 0.33). In the 3 pubertal hypothyroids LH was more than 100% of the basal concentrations. No significant increase of LH titers following i.v. TRH was appreciated in a control group of 24 children with constitutional short stature. According to previous reports a paradoxical GH response to TRH ($GH\Delta > 7$ ng/ml) was also recorded in 3/12 hypothyroids. On the contrary FSH serum levels were not substantially modified by TRH bolus, either in the patient or in the control group. An overlap in the pituitary hormonal feed-back mechanism had been hypothesized to explain the occurrence of precocious puberty in primary thyroid failure (Van Wyk and Grumbach, J Pediatr 57, 416, 1960). The nonspecific LH-releasing effect of TRH in our patients especially evident in the pubertal ones supports such hypothesis.