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10. Assessment of the efficacy of iodine supplementation by TSH determination in Tanzania

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An iodine supplementation program was started in 1978 in an endemic goiter area in Tanzania (Uwanji and Ukinga). Iodine was given to 12,000 subjects by one single intramuscular injection of 1 ml of iodized oil (Lipiodol®). To document the efficacy of the iodine supplementation program one single TSH determination was chosen. Due to the limited resources in Tanzania the blood samples were sent to Germany for hormone analysis. TSH was measured by RIA using the filter paper method. Blood drops were collected on filter paper, dried and sent by airmail to Munich. Comparison of TSH levels measured by this method with the TSH RIA performed in frozen serum samples documented a decrease of the immunological TSH activity to 50% of the initial value, induced by the specific collection and shipment procedures involved in the filter paper method. In addition, sensitivity decreased from $< 1.0 \mu\text{U/ml}$ (TSH RIA in serum) to $< 12 \mu\text{U/ml}$ (filter paper).

In the southern highlands of Tanzania the goiter prevalence in females of reproductive age was found to be 80% with regional differences ranging from 65% to 96%. Of the 586 investigated mothers 32% had Grade I (WHO) goiter, 44% Grade II, and 4% Grade III, whereas 20%

had no thyroid enlargement. Male subjects could not be evaluated. However, there was no significant sex difference in goiter prevalence in the investigated 223 children.

TSH values were obtained in 221 babies from mothers without iodine supplementation therapy. The incidence of elevated TSH levels was 43.6% (less than 4 days old) respectively 2.7% (less than 4 months old).

In babies of mothers receiving iodine supplementation during pregnancy (n = 192) the incidence of elevated TSH levels was 20.3% (babies less than 4 days old), whereas no elevated TSH levels could be detected in babies less than 4 months old. The difference between TSH levels in children of iodine-treated or untreated mothers was highly significant ($p < 0.001$).

The incidence of elevated TSH levels was also modulated by the time of iodine injection during gestation. Iodine injection at the end of the last trimester was accompanied by 33.9% elevated TSH levels in children less than 4 days old, whereas iodine supplementation in early pregnancy resulted in only 9.2% elevated TSH levels in babies of the same age.

These data show the efficacy of the TSH filter paper method for the demonstration of severe iodine deficiency and for its control. This method has proven to be a useful tool for this purpose and will be applicable in other underdeveloped countries with a high incidence of goiter and cretinism.

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