**Topic:** IRON DEFICIENCY AND MATERNAL THYROID STATUS

**Title:** Iron deficiency predicts poor maternal thyroid status during pregnancy.

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**Reference:** Journal of Clinical Endocrinology & Metabolism 92: 3436-3440, 2007

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**SUMMARY**

**Context:** Pregnant women are often iron deficient, and iron deficiency has adverse effects on thyroid metabolism. Impaired maternal thyroid function during pregnancy may cause neurodevelopmental delays in the offspring.

**Objective:** Aim of study was to investigate whether maternal iron status is a determinant of TSH and/or total T4 (TT4) concentrations during pregnancy.

**Design and outcome measures:** In a representative national sample of Swiss pregnant women (N = 365) in the 2nd & 3rd trimester, samples of urine and blood were collected. Data on maternal characteristics and supplement use were also recorded. Concentrations of TSH, TT4, hemoglobin, mean corpuscular volume, serum ferritin, transferrin receptor, and urinary iodine were measured. Body iron stores were calculated and stepwise regressions performed to look for associations.

**Results:** Median urinary iodine was 139 µg/L (range: 30 – 433 µg/L). In the 3rd trimester, nearly 40% of women had negative body iron stores, 16% had a TT4 less than 100 nmol/liter, and 6% had a serum TSH more than 4.0 mU/L. Compared with the women with positive body iron stores, the relative risk of a TT4 less than 100 nmol/L in the group with negative body iron stores was 7.8 (95% C.I.: 4.1-14.9). Of the 12 women with TSH more than 4.0 mU/L, 10 had negative body iron stores. Serum ferritin, transferrin receptor, and body iron stores were highly significant predictors of TSH (standardized β: −0.506, 0.602, and −0.589, respectively; all \( P < 0.0001 \)) and TT4 (standardized β: 0.679, −0.589, and 0.659, respectively; all \( P < 0.0001 \)).

**Conclusion:** Poor maternal iron status predicts both higher TSH and lower TT4 concentrations during pregnancy in an area of borderline iodine deficiency.

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**COMMENT**

A group of 365 women from 23 obstetric clinics in Switzerland were included in this study. All women with a prior history of thyroid diseases (or taking thyroid medication) were excluded from the study. Concerning the iron status, serum ferritin concentrations were significantly lower and serum transferring receptor significantly higher in 3rd trimester, compared with the 2nd trimester, indicating a decline in iron status in the later part of pregnancy.

Concerning the thyroid status, total T4 concentrations were significantly lower in the 3rd, compared with the 2nd trimester, with 16% of the women having a total T4 level below 100 nM/L. The iodine intake level, extrapolated from urinary iodine concentrations (UIC), was at the limit of iodine sufficiency, with a median value of 139 µg/L (the lower normal limit being 150 µg/L). To note, 59% of these women had a UIC below 150 µg/L. Finally, a few women had a serum TSH above 4 mU/L (although below 6 mU/L), specifically one
woman in the 2nd and eleven women in the 3rd trimester. Taken together, these findings suggest an association between a low-defective iron status (negative iron balance) near the end of pregnancy and a risk of iodine deficiency with reduced total T4 levels and, rarely, increased TSH. Comments are as follows. In an attempt to explain their findings, the authors suggested that a deficient iron status might have impaired thyroid function (or vice versa), but they admitted that this causative hypothesis is entirely speculative and, therefore, that their observations remain presently without good explanation. For instance, a poor social status could constitute a confounder to explain both a poor iron status and an inadequate iodine supplementation in these women. Another criticism is that while the authors showed a positive correlation between body iron stores and serum total T4, as well as a negative correlation between body iron stores and serum TSH, they failed to show a direct association between iron metabolism and iodine excretion levels. Finally, it is unfortunate that free T4 measurements were not included in present study: it might have helped us explain (perhaps?) what the cause of isolated hypothyroxinemia (i.e. without TSH elevation) during pregnancy might be. (Daniel Glinoer, M.D.; Ph.D.)

See Figures below