

Iron Deficiency Anemia Reduces Thyroid Peroxidase Activity in Rats

Project: 300

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Studies in animals and humans have shown that iron deficiency anemia (IDA) impairs thyroid metabolism. However, the mechanism is not yet clear. The objective of this study was to investigate whether iron (Fe) deficiency lowers thyroid peroxidase (TPO) activity. TPO is a heme-containing enzyme catalyzing the two initial steps in thyroid hormone synthesis. Male weanling Sprague-Dawley rats ($n = 84$) were randomly assigned to seven groups. Three groups (ID-3, ID-7, ID-11) were fed an Fe-deficient diet containing 3, 7 and 11 $\mu\text{g Fe/g}$, respectively. Because IDA reduces food intake, three control groups were pair-fed Fe-sufficient diets (35 $\mu\text{g Fe/g}$) to each of the ID groups and one control group consumed food ad libitum. After 4 wk, hemoglobin, triiodothyronine (T_3) and thyroxine (T_4) were lower in the Fe-deficient groups than in the ad libitum control group ($P < 0.001$). By multiple regression, food restriction had a significant, independent effect on T_4 ($P < 0.0001$), but not on T_3 . TPO activity (by both guaiacol and iodine assays) was markedly reduced by food restriction ($P < 0.05$). IDA also independently reduced TPO activity ($P < 0.05$). Compared with the ad libitum controls, TPO activity per thyroid determined by the guaiacol assay in the ID-3, ID-7 and ID-11 groups was decreased by 56, 45 and 33%, respectively ($P < 0.05$). These data indicate that Fe deficiency sharply reduces TPO activity and suggest that decreased TPO activity contributes to the adverse effects of IDA on thyroid metabolism.

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