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Maternal iron absorption and iron transfer to the fetus during pregnancy in normal- weight and overweight/obese women

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Abstract

Overweight/obesity (owob) causes low-grade systemic inflammation and thereby an up-regulation of hepcidin and a reduction in fractional iron absorption (FIA) even with low iron stores. Pregnancy increases iron needs because of the expansion of maternal blood volume and fetal needs. It is unclear to what extent owob pregnancy influences FIA, iron supply of the fetus and risk of iron deficiency. Therefore, the main aim of this study was to determine the effect of maternal owob on iron absorption during pregnancy and on the iron transfer to the fetus. Secondary objectives were to investigate the development of hepcidin, plasma ferritin and inflammatory markers over the course of pregnancy dependent on weight status. In this multicenter case-control study we included 44 normal weight (nw) and 36 owob women around pregnancy week (PW) 12. We administered ⁵⁷Fe or ⁵⁸Fe labeled FeSO₄ to women during the 2nd and 3rd trimester of pregnancy. We measured FIA determining erythrocyte incorporation of iron stable isotopes 14 days after administration. From PW 12 until PW 36 iron-, inflammation and hepcidin were monitored. Iron transfer to the fetus was determined as iron stable isotope concentration in cord blood. Sample analysis is currently ongoing, all results will be available in October. Subject characteristics in PW 12 for the nw (n = 26) and owob (n = 10) were: mean BMI: 21.4 ± 2.2 and 36.7 ± 6.8 kg/m², mean hemoglobin: 12.4 ± 1.2 and 12.4 ± 0.9 g/dL and median plasma ferritin: 41.3 (29.6–83.6) and 61.6 (24.3–119.0) µg/L. Preliminary results indicate FIA increased by 2.4 fold in the nw and by 1.3 fold in the owob women between the 2nd and the 3rd trimester of pregnancy. Iron stores decreased in both groups over the course of pregnancy. Hepcidin was still significantly higher in the owob women in the 3rd trimester. Inflammation tended to be higher in owob women throughout pregnancy. Iron isotopes were highly detectable in cord blood. The ⁵⁸Fe:⁵⁷Fe-ratio determined in cord blood corresponded to the ⁵⁸Fe:⁵⁷Fe-ratio determined in the mother in the 3rd trimester. Thus, in owob women, the increase in FIA throughout pregnancy to support iron needs of mother and fetus is blunted compared to nw women. This is consistent with elevated hepcidin in the 3rd trimester and higher inflammation throughout pregnancy. Thus, even though iron demands are strongly increased, owob may prohibit an adequate iron supply to the expecting mother and the fetus due to persistent subclinical inflammation.

Conflict of Interest

There is no conflict of interest.