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

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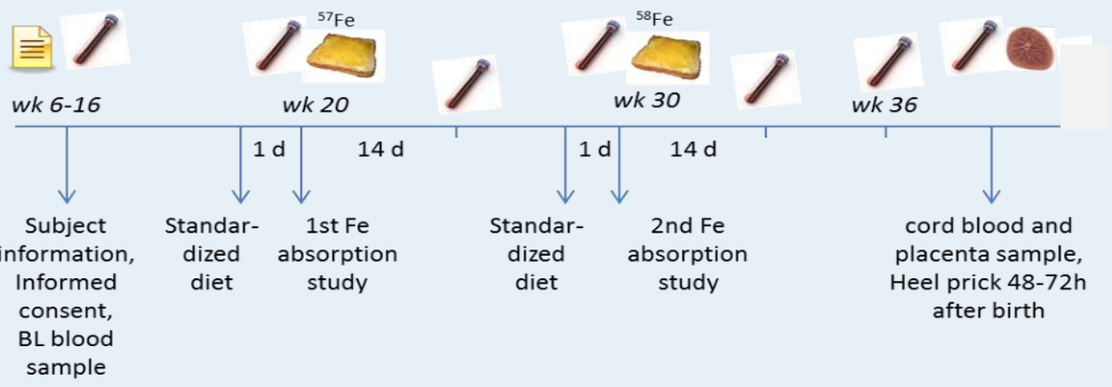
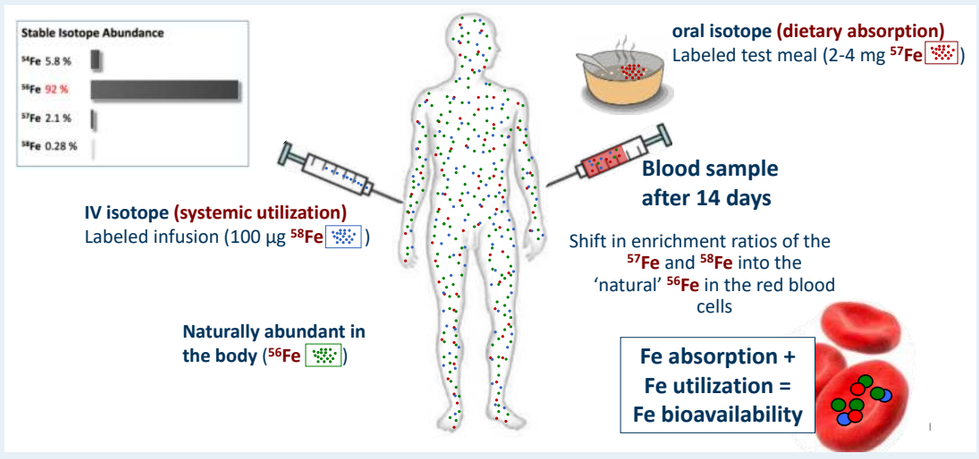
1 Introduction

Overweight/obesity (OW/OB) causes low-grad 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.

2 Method overview

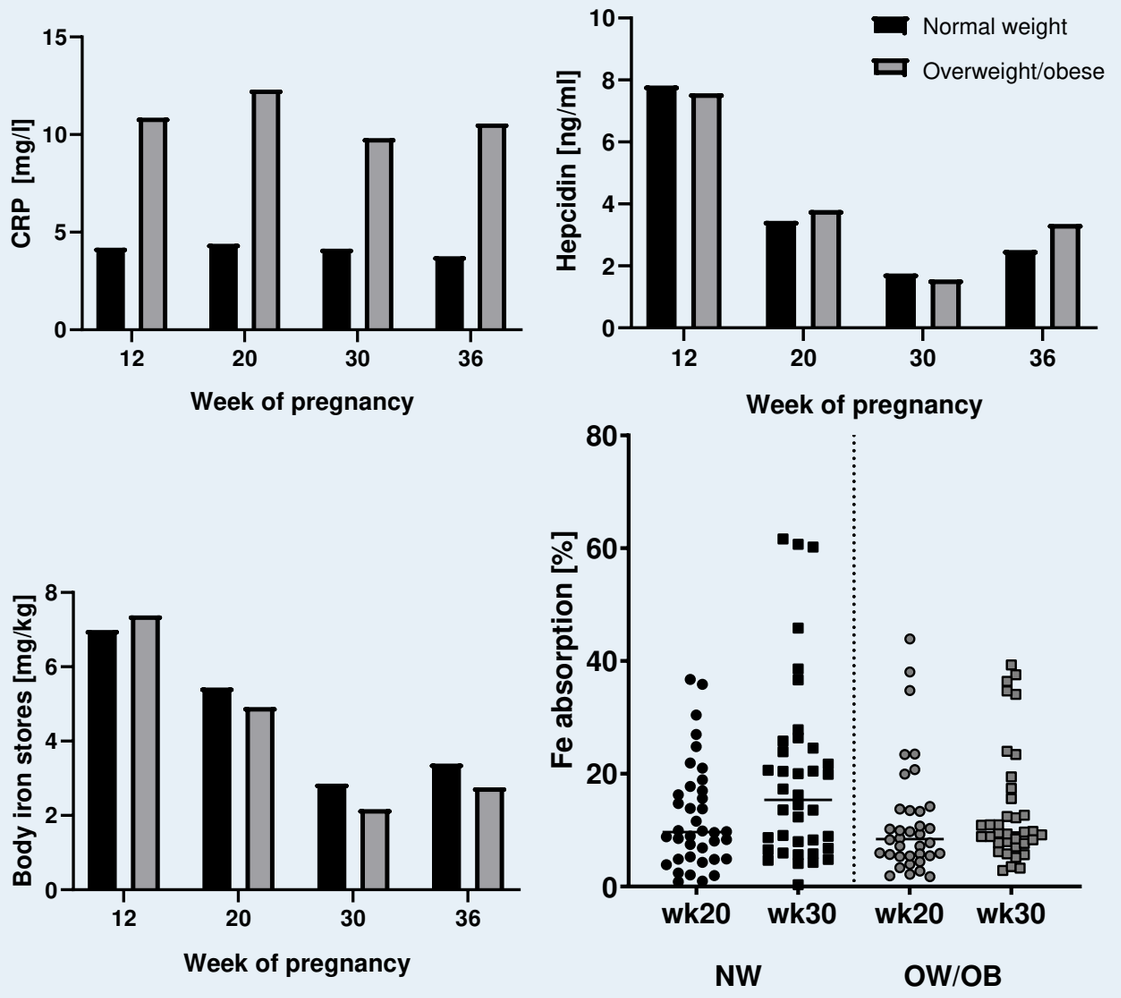
In this multicenter case-control study we included 44 normal weight (nw) and 36 owob women around pregnancy week (PW) 12. We administered ^{57}Fe or ^{58}Fe labeled $FeSO_4$ to women during the 2nd (wk 20) and 3rd (wk 30) trimester of pregnancy. We measured FIA determining erythrocyte incorporation of 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.





3 Results and discussion

We studied 39 normal weight (NW) and 37 OW/OB pregnant women. Inflammation was significantly higher in OW/OB throughout pregnancy. From the 1st to the 3rd trimester, hepcidin decreased by 68% in NW and by 56% in OW/OB, while body iron stores decreased by 52% in NW and 63% in OW/OB. From week 20 to week 30 of pregnancy, iron absorption increase from 9.6% to 15.8% in the NW women (+59%), while it increased only from 8.4% to 9.6% in the OW/OB women (+13%).



Iron isotopes were highly enriched in cord blood. The ^{58}Fe:^{57}Fe-ratios in cord blood and in maternal blood in the 3rd trimester were well-correlated.

5 Conclusion

Thus, in OW/OB 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, OW/OB may prohibit an adequate iron supply to the expecting mother and the fetus due to persistent subclinical inflammation.

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