Iron

Technical Background

• Iron (Fe) is an essential nutrient required for oxygen transport in the blood (via hemoglobin), for storage and transport of oxygen in muscles (via myoglobin) and for respiration and energy metabolism (via the cytochrome system in mitochondria). Without iron, oxygen exchange could not occur at the cellular level and tissue death would result.

• Iron is a cofactor for enzymes involved in niacin (vitamin B₃) synthesis, carnitine synthesis, DNA synthesis, the conversion of phenylalanine to tyrosine and for cell replication.¹

• Iron deficiency anemia occurs when iron stores in the body become severely depleted and hemoglobin cannot be synthesized. With anemia red blood cells become small and pale, and unable to deliver adequate oxygen to the cells. Symptoms of iron deficiency anemia include; decreased work capacity, weakness, fatigue, headache, changes in behavior, impaired development in infants, and decreased resistance to infection.²

• Iron deficiency anemia effects about 12 % of women in industrialized countries.³ Menstruating women are at a greater risk for developing iron deficiency anemia because monthly blood losses decrease iron stores. Pregnant women are also susceptible to iron deficiencies. During pregnancy additional iron is needed to support the growth and development of the growing fetus.⁴

• Iron overload is also a concern, with up to ten percent of the population suffering from iron overload. Iron overload may result in hemachromatosis, a disorder that can result in the failure of multiple organ systems, cirrhosis, diabetes and heart failure.⁵

• As such, iron supplements should be used only with the advice of a medical professional and only after iron levels have been determined by serum ferritin testing.

• Iron toxicity may occur if high levels of supplemental iron are continuously ingested over long periods of time. Iron can be extremely toxic to children and can even become fatal. Death could occur if a small child swallowed an entire bottle of iron supplements. It is important to keep all iron supplements securely sealed and out of reach of children.
Sources and Recommended Intake

- The Recommended Dietary Allowance (RDA) of iron is 10 mg a day for males and 15 mg a day for females. The RDA increases to 30 mg a day during pregnancy.6
- Best sources of iron include red meats, poultry, and fish, which contain heme iron (iron bound to hemoglobin and myoglobin). Organ meats, such as liver, are some of the richest sources of dietary iron.2
- Other foods sources include green leafy vegetables, legumes, whole or enriched grain products, nuts, and seeds.2
- Many commercially prepared foods such as breakfast cereals are iron fortified.
- Consciously eating a well-balanced diet should provide adequate amounts of dietary iron for most people.5 Absorption of iron increases when iron body stores are low.7

Abstracts

Singh K, Fong YF, Arulkumaran S. Anaemia in pregnancy--a cross-sectional study in Singapore. Eur J Clin Nutr 1998 Jan; 52(1): 65-70. To determine the prevalence and predictors of anaemia in pregnancy in Singapore. DESIGN: Hospital based case controlled study. SETTING: National University Hospital, between January-December 1993. SUBJECTS: All women delivered at the National University Hospital, Singapore in 1993 had their haemoglobin estimated. If it was less than 11 gm/dl, blood was taken to establish the cause of anaemia. Data was also collected with regard to their antenatal progress, and factors predisposing to anaemia in pregnancy. Logistic regression, Chi-square test, Fischer's exact test, Mantel-Haenszel test were used to assess the relationships between categorical variables. RESULTS: The prevalence of anaemia at delivery was 15.3%. The most common cause of anaemia in pregnancy was due to iron deficiency (81.3%). The occurrence of anaemia in pregnancy is related to the socio-economic status of the women. Multiparous women of the lower socio-economic class who tend to book late in pregnancy were found to have the highest risk of anaemia. Multivariate logistic regression analysis revealed iron prophylaxis, haemoglobin level at booking, race and previous history of anaemia in earlier pregnancy as important predictors of anaemia at delivery. The odds of anaemia for a woman not on therapy was about 11 times that of her counterpart on prophylactic iron therapy (95% CI 8.76-14.13). A 55% reduction in odds of anaemia was estimated per 1 gm% increase in haemoglobin level at booking. As compared to Chinese, Malays and Indians who experienced significant increase in odds of anaemia of 95% and 58% respectively. Further, a pregnant woman with a previous history of anaemia is 2.6 times as likely to be anaemic, as compared with one without history of anaemia. Except for a higher incidence of preterm delivery, there was no other statistically increased risk of complications in the antepartum, intrapartum or postpartum periods. There was no difference in the incidence of antepartum haemorrhage/operative deliveries, postpartum haemorrhage, low birthweight, intrauterine growth retardation and neonatal outcome. CONCLUSIONS: The study confirms that iron deficiency anaemia is the most common cause of anaemia in pregnancy and is a major health problem in developing and developed countries.

Preziosi P, Prual A, Galan P, Daouda H, Boureima H, Hercberg S. Effect of iron supplementation on the iron status of pregnant women: consequences for newborns. Comment in: Am J Clin Nutr AU: 1997 Nov; 66(5): 1178. We studied the effect of iron supplementation on the iron status of mothers and on biochemical iron status and clinical and anthropometric measures in their infants. The subjects were 197 pregnant women selected at 28 wk +/- 21 d of gestation at a mother-and-child health center in Niamey, Niger. Ninety-nine women received 100 mg elemental Fe/d throughout the remainder of their pregnancies and 98 received placebo. The prevalence of anemia and iron deficiency decreased markedly during the last trimester of pregnancy in the iron-supplemented group but remained constant in the placebo group. Three months after delivery, the prevalence of anemia was significantly higher in the placebo group. At delivery, there were no differences between the two groups in cord blood iron variables. Three months after delivery, serum ferritin concentrations were significantly higher in infants of women in the iron-supplemented group. Mean length
and Apgar scores were significantly higher in infants with mothers in the iron group than in those with mothers in the placebo group.

References