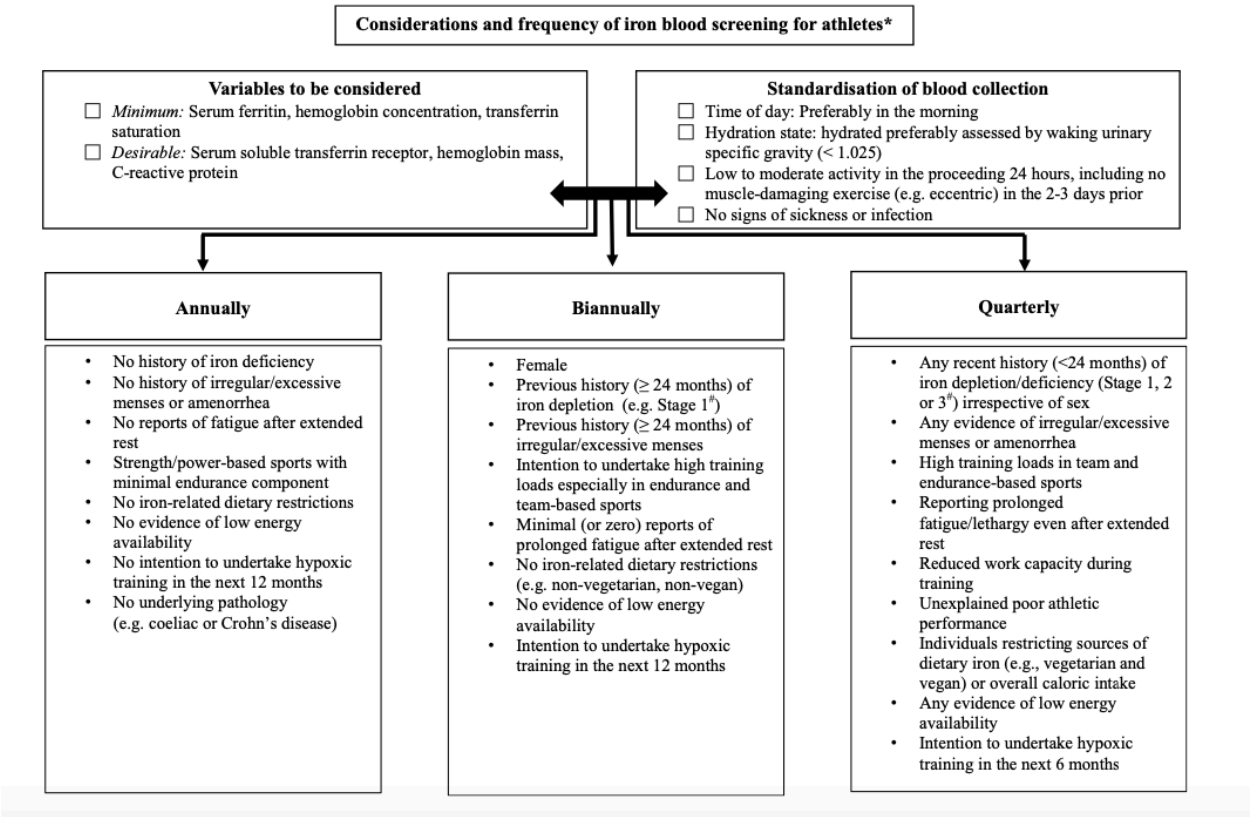
Core Diet/QT2 LLC Iron Guidelines

1) Who is at risk/should be screened?



Sim M, Garvican-Lewis L, Cox GR, Govus A, McKay AKA, Stellingwerff T, Peeling P (2019) Iron considerations for the athlete: a narrative review. Eur J Appl Physiol 119:1463-1478

2) What does it look like (lab values)?

3 stages of iron deficiency:

- Stage 1—iron deficiency (ID): iron stores in the bone marrow, liver and spleen are depleted (ferritin < 35 µg/L, Hb > 115 g/L, transferrin saturation > 16%)

- Stage 2—iron-deficient non-anemia (IDNA): erythropoiesis diminishes as the iron supply to the erythroid marrow is reduced (ferritin < 20 µg/L, Hb > 115 g/L, transferrin saturation < 16%)
- Stage 3—iron-deficient anemia (IDA): Hb production falls, resulting in anemia (ferritin < 12 µg/L, Hb < 115 g/L, transferrin saturation < 16%)

3) What does it look like (signs/symptoms)?

The hallmark symptoms of iron-deficiency anemia are fatigue, lack of energy, and apathy. Apathy can be very telling in a usually motivated and caring athlete. If that athlete also has several of the risk factors (from above table), getting iron parameters assessed would be an appropriate measure.

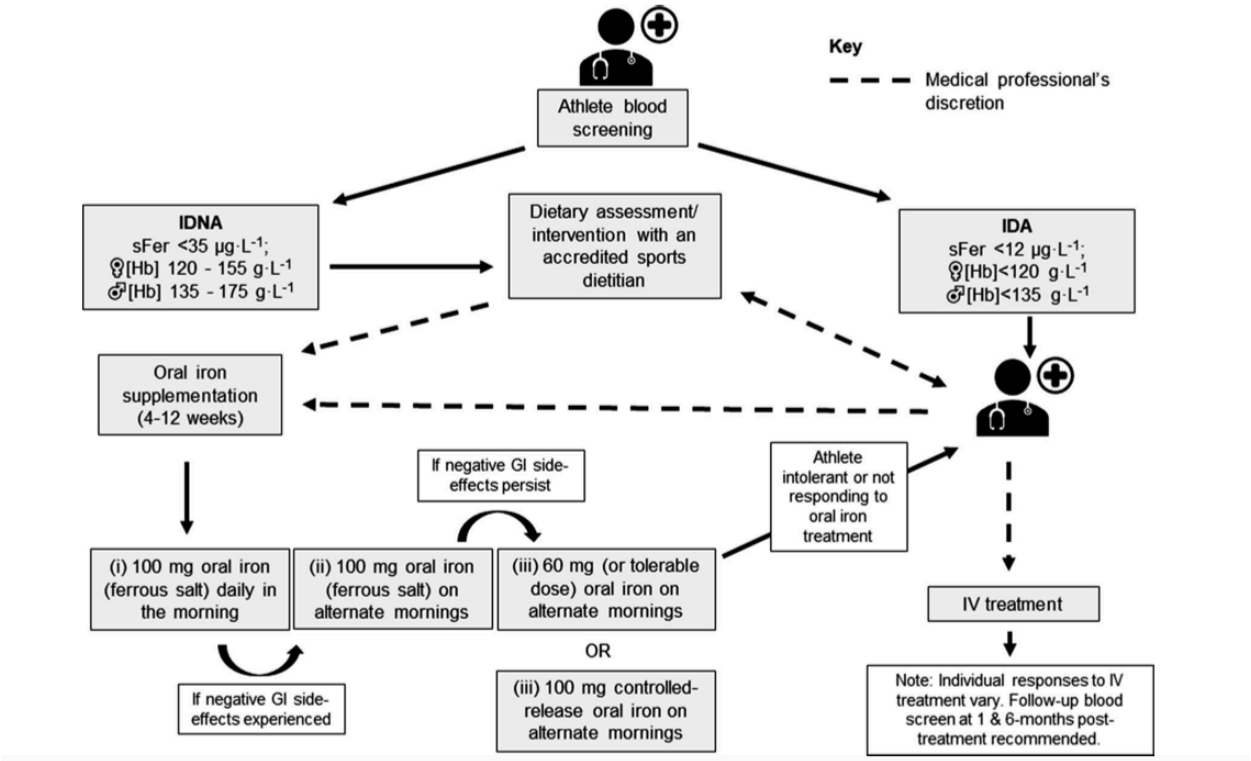
Early detection of low iron stores and subsequent supplementation may reverse (or limit) further declines in iron status (e.g. the progression to IDA), where a range of other negative effects (e.g. compromised immune function, lethargy, weakness) can worsen performance declines. In other words, catching it early, is key.

4) Iron and diet.

- RDI for males: 8 mg
- RDI for females: 18 mg
- It is likely that athletes have a higher iron requirement than the general population because of greater iron loss AND great iron demand that occurs as a result of training. Currently athlete specific RDIs do not exist, however.
- Heme iron sources (from meat) exhibit greater absorptive capacity than non-heme sources (ie: whole grain/fortified cereals).
- Vitamin C, meat and poultry can enhance non-heme absorption if consumed at the same time
- Polyphenols, phytates (tea, coffee, legumes, whole grains) and calcium can decrease the amount of non-heme iron absorbed from a meal
- Low carbohydrate availability can also impair iron absorption and metabolism (training with low muscle glycogen stores) therefore ANY nutritional approach that limits CHO should be very carefully considered in high risk populations (females, endurance athletes, those living/training at altitude, vegetarians, absorptive issues such as Crohns or celiac disease, etc…)

5) Strategies for repletion (see figure below).

a. Increasing dietary iron intake
b. Supplemental oral intake (tablet or liquid form) – generally in the form of a ferrous salt (fumarate, sulphate or gluconate); chelated iron could potentially result in better absorption as well as fewer GI symptoms but is more costly
    i. 8-12 week time frame
    ii. 100 mg/day
    iii. Morning is optimal timing for oral supplementation, to coincide with lower hepcidin concentrations
    iv. Most recent recommended strategy: alternate day supplementation (every other day) with absorption enhancers like vitamin C
    v. Potential downside: GI distress - if this occurs consider lowering the dose of ferrous salt to 60 mg on alternate days OR switching to 100 mg of a chelated iron on alternate days
c. Parenteral iron administration (intramuscular or IV)
    i. The magnitude of the effect and the speed at which repletion occurs is much improved over oral intake, generally without any GI side effects
    ii. Should be considered hemoglobin < 115 g/L or if no response from oral supplementation after 8-12 weeks
    iii. Must be physician approved/administered (often in outpatient settings)
d. Repletion schedule example as based on stage of deficiency:
    i. Stage 1: 3-4 oz of red meat twice weekly + daily multivitamin with iron
    ii. Stage 2 or no response to above treatment: 100 mg oral ferrous salt or chelated iron every other day, with vitamin C, as well
    iii. Stage 3 or no response to above treatment: consider parenteral iron administration



McCormick R, Sim M, Dawson B, Cox GR, Peeling P (2020) Refining Treatment Strategies for Iron Deficient Athletes. Sports Med https://doi.org/10.1007/s40279-020-01360-2

6) Special considerations.

a. Altitude

i. Altitude training places a large demand on an athlete's iron stores, since, in addition to the iron required to replenish exercise-related iron losses, altitude exposure increases erythroid iron demand by 3-5 fold
ii. Low iron availability during prolonged altitude exposure may blunt hematological adaptations in turn decreasing the potential performance benefits that may be gained from altitude exposure
iii. Consider blood screening (hematological parameters) 3-6 weeks prior to altitude exposure.
iv. Recommended oral iron supplementation for 2-6 weeks prior to exposure and throughout duration of exposure to ensure adequate iron balance and to maximize potential performance gains
v. Perform blood screening in this high risk population quarterly