Iron Avidity: update on 2004 Report

The term "iron avid" was introduced to us by Alex Hover, M.D.; Sharon McDonnell, M.D., Ph.D; and Wylie Burke, M.D., Ph.D in a 2004 medical journal article about clinical management of hemochromatosis.

Iron avid is a state of "ardent desire or craving for iron". Iron avidity is an iron disorder where the transferrin-iron saturation percentage (TS%) remains elevated while the serum ferritin (SF) is within normal or below normal range. Ideally, TS% should be below 45%; SF should be within the ideal range of 50-150ng/mL.

People with hemochroamtosis are prone to being iron avid. Hemochromatosis (HH) is a metabolic disorder resulting in a build up of excess iron in vital organs. Type I hemochromatosis, which is called classic hemochromatosis (HHC) is inherited and can be determined by testing for mutations of the HFe gene.

Although there are many mutations of HFe, three can be tested for in clinical practice; these are C282Y, H63D and S65C. Depending upon the combination of these mutations, persons having one or more mutated copies of HFe have varying degrees of risk for absorbing abnormal amounts of iron.

A person's iron levels are determined with an iron panel, which includes hemoglobin, fasting serum iron, total iron binding capacity (TIBC) and serum ferritin.

Iron in hemoglobin is called "functional iron"; this iron fuels the metabolic processes by delivering life saving oxygen-filled red blood cells to tissues. Serum iron and TIBC serve as the basis to calculate the transferrin-iron saturation percentage (TS%). The TS% is an indirect measure of transferrin, the protein that carries iron to various sites, such as bone marrow or ferritin. We might say that this iron is "on the move". Serum ferritin (SF) reflects iron in containment to protect us, or iron in storage for the making of new red blood cells.

Transferrin iron saturation percentage (TS%) above 45% is highly predictive of classic hemochromatosis. Of the iron panel tests, TS% is the first to rise.

Sometimes an elevated TS% is transient and is naturally lowered when the demand for more iron is met. In other cases, especially for C282Y homozygotes, TS% can remain elevated while the serum ferritin is normal or low. This phenomenon frequently is seen in patients who have become iron deficient from having more phlebotomies than necessary for healthy iron reduction. The iron deficiency can be present with or without anemia (below normal hemoglobin).

Attempts to lower TS% with phlebotomy will most likely drive the TS% higher in persons with classic hemochromatosis. No one knows for certain why this occurs but some believe it is a function of the HFe gene and its modifiers such as hepcidin.

Theories about why the HFe gene mutated vary. One possible reason could be to protect us against iron deficiency and severe anemia. If this is so, chronic blood loss would trigger the HFe to hyperabsorb iron in an effort to survive. Since iron loss from ferritin is a natural event following new blood cell formation after blood loss, perhaps HFe interprets ferritin as an unreliable source of iron and therefore a threat to survival. This may explain why people experiencing iron avidity can go for long periods of time without seeing a reduction of TS% while ferritin fails to rise.

Iron avidity can perplex experts and patients alike as there seems no real therapy except to consider the hemochromatosis patient iron deficient and treat for this iron disorder. At Iron Disorders Institute (IDI) success stories have been reported by clinicians who have taken this approach and treated the iron deficiency with diet or a combination of diet and iron supplements. Although it seems counterintuitive to give iron supplements to someone with hereditary hemochromatosis, iron deficiency is just as debilitating for a HHC patient as anyone else.

See "Diet for Iron Avidity" and "Boost Your Ferritin" in the articles section of the Iron Library Resource Center.

Resources: Hover AR, McDonnell SM, Burke W. "Changing the clinical management of hereditary hemochromatosis: translating screening and early case detection strategies into clinical practice." *Archives of Internal Medicine*. 2004; 164(9):957-61.

McLaren CE, McLachlan GJ, Halliday JW, Webb SI, Leggett BA, Jazwinska EC, Crawford DH, Gordeuk VR, McLaren GD, Powell LW. "Distribution of transferrin saturation in an Australian population: relevance to the early diagnosis of hemochromatosis." *Gastroenterology*. 1998; 114(3):543-9.

Don't miss January 2011 issue: Hepcidin—Key to Iron Balance
November issue: Ferritin-an important part of the iron panel