Anemia Lab Values

PLAY PICMONIC

Anemia is defined as the decrease in the number of red blood cells in the blood. Various conditions can lead to anemia and various lab values can be used to distinguish these conditions from one another.Iron deficiency anemia is a common anemia caused by decreased intake or increased loss of iron in the blood. Decreased intake can be due to poor diet and increase loss of iron can be due to chronic bleeding. In iron deficiency anemia, serum iron levels are decreased. When serum iron levels are low, the liver produces more transferrin, the iron binding protein. Total iron binding capacity or TIBC is a measurement used clinically to indirectly measure transferrin levels. Ferritin, the protein that stores iron, is decreased because there is less iron in the body, and because there is less iron in the body, the percent saturation of transferrin is also decreased significantly.In pregnancy or when taking birth control pills, transferrin level in the blood increases even though iron level in the blood stays normal. These patients are not really anemic but can have abnormal lab values.Anemia of chronic disease is an anemia seen in chronic conditions such as chronic infection, inflammation or malignancy. In anemia of chronic disease, serum iron levels are decreased, and transferrin levels are decreased, but ferritin levels are increased because research suggests that inflammatory cytokines can cause the liver to produce hepcidin which causes ferritin to hold onto the iron. Because the decrease in serum iron and transferrin can be proportional, the percent saturation is often normal, though it can be decreased.Hemochromatosis is a condition in which the body is overloaded with iron. Common causes are genetic hemochromatosis and frequent transfusion. In hemochromatosis, serum iron level increases significantly, and the liver responds by producing less transferrin. Ferritin increases because iron is abundant, and the percent saturation increases significantly as well because most transferrin are bound to iron.

Iron Deficiency Anemia

Broken Iron

Iron deficiency anemia is a common anemia caused by decreased intake or increased loss of iron in the blood. Decreased intake can be due to poor diet and increase loss of iron can be due to chronic bleeding.

Serum Iron Decreased

Down-arrow Serum Iron

In iron deficiency anemia, serum iron level decreases.

Transferrin Increased

Up-arrow Train-fern

In iron deficiency anemia, the liver responds to the decreased serum iron levels by increasing production of transferrin.

Ferritin Decreased

Down-arrow Ferret-tin

In iron deficiency anemia, ferritin level decreases because less iron is available for storage.

% Transferrin Saturation Decreased

Down-arrow %-Saturn

In iron deficiency anemia, the percent transferrin saturation decreases.

Pregnancy and OCP Use

Pregnant-woman with Oral-Contraceptive-Case

In pregnancy or when taking birth control pills, transferrin production from the liver increases as a response to estrogen even though iron level in the blood stays normal. These patients are not really anemic but can have abnormal lab values.

Serum Iron Normal

Normal Serum Iron

In pregnancy or OCP use, serum iron level is normal. If the serum iron level is low, then you might consider iron deficiency anemia which can occur in pregnancy.

Transferrin Increased

Up-arrow Train-fern

In pregnancy or OCP use, estrogen may cause hepatic transferrin production to increase.

Ferritin Normal

Ferret-tin

In pregnancy or OCP use, ferritin level should be normal in a healthy patient.

% Transferrin Saturation Decreased

Down-arrow %-Saturn

In pregnancy or OCP use, percent transferrin saturation decreases because transferrin level increases while iron level stays the same.

Anemia of Chronic Disease

Crone with Anemone

Anemia of chronic disease is an anemia seen in chronic conditions such as chronic infection, inflammation or malignancy. Research suggests possible involvement of production of hepcidin that leads to changes in iron storage.

Serum Iron Decreased

Down-arrow Serum Iron

In anemia of chronic disease, serum iron levels are decreased.

Transferrin Decreased

Down-arrow Train-fern

In anemia of chronic disease, transferrin levels are decreased.

Ferritin Increased

Up-arrow Ferret-tin

In anemia of chronic disease, ferritin levels are increased. Research suggests that release of inflammatory cytokines may cause the liver to produce more hepcidin which causes iron sequestration. Ferritin levels may sometimes be normal, however. Unfortunately ferritin is generally difficult to interpret since it is also used by the body as an acute phase reactant.

% Transferrin Saturation Decreased or Normal

%-Saturn or Down-arrow %-Saturn

In anemia of chronic disease, serum iron levels are decreased, and transferrin levels are decreased, and because the decrease in serum iron and transferrin can be proportional, the percent saturation is often normal. However, the percent transferrin may also be decreased depending on the

exact balance, so it is important to recognize both cases.

Hemochromatosis

He-man-chrome

Hemochromatosis is a condition in which the body is overloaded with iron. Common causes are genetic hemochromatosis and frequent transfusion.

Serum Iron Increased

Up-arrow Serum Iron

In hemochromatosis, serum iron level increases significantly.

Transferrin Decreased

Down-arrow Train-fern

In hemochromatosis, due to an increase in iron in the body, the liver produces less transferrin and the level of transferrin therefore decreases.

Ferritin Increased

Up-arrow Ferret-tin

In hemochromatosis, ferritin or iron storage increases.

% Transferrin Saturation Increased

Up-arrow %-Saturn

In hemochromatosis, because iron levels are overloaded and transferrin levels decrease, the percent transferrin saturation increases significantly.