

IRON DEFICIENCY ANEMIA

TERM DEFINITION

Anemia* caused by depletion of body iron stores.

*ANEMIA DEFINED AS



Hb < 12 g/dL



Hb < 13 g/dL

CAUSES

MOST COMMON

- Increased loss of iron:**
 - Menstrual blood loss in premenopausal women.
 - Gastrointestinal blood loss in men & postmenopausal women.

LESS COMMON

- Inadequate iron intake**
- Inadequate iron absorption**
- Increased iron requirements:**
 - Growth
 - Pregnancy

FACTOIDS



~3 BILLION

people affected worldwide.



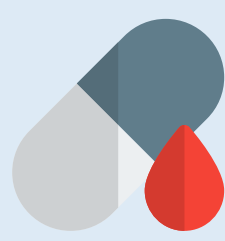
MOST COMMON

in young children & premenopausal women.



50% OF CASES

of anemia in women are caused by iron deficiency.



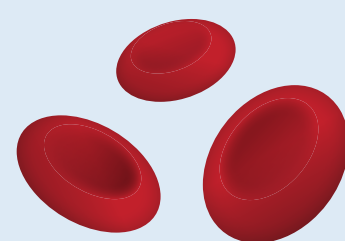
~0.5 mg

Amount of iron in each mL of blood.



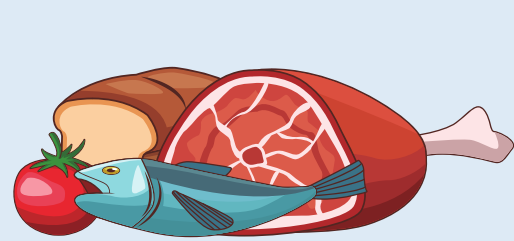
3 - 4 g

Total body iron content.



2500 mg

Iron contained in red cells.



HEME-IRON is better absorbed than **NON-HEME-IRON**



PRESENTATION

SYMPTOMS

ANEMIA

- Fatigue
- Shortness of breath
- Headache
- Palpitations

IRON DEFICIENCY

- Restless legs
- Pica*
- Hair loss
- Chipping of nails
- Sore tongue

SIGNS

ANEMIA

- Pallor
- Tachycardia

IRON DEFICIENCY

- Glossitis
- Cheilitis
- Brittle nails
- Koilonychia

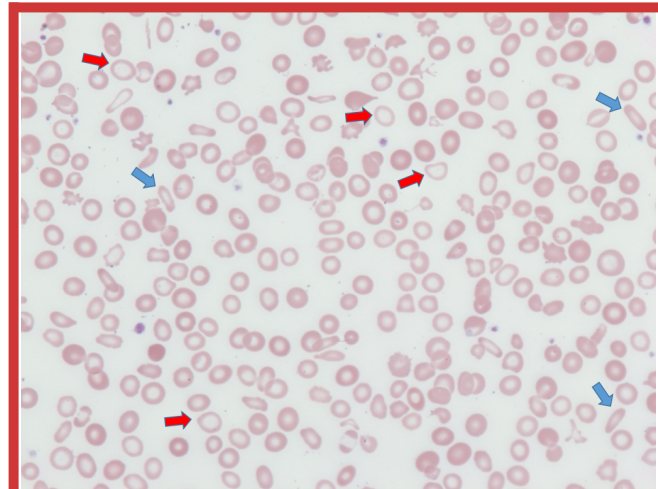
LABS

HEMATOLOGY LABS

- Microcytic hypochromic anemia
- Thrombocytosis in some
- Lymphopenia in some
- Low reticulocyte count
- Cigar-shaped red cells on peripheral smear

IRON INDICES

- Low serum iron
- High TIBC (surrogate for transferrin level)
- High soluble transferrin receptor
- Low ferritin (marker of iron stores)



Peripheral smear showing hypochromic red cells (red arrows) and cigar cells (blue arrows) in a patient with iron deficiency anemia.

*Pica is defined as the craving for non-nutritive substances

DIAGNOSIS

Iron deficiency anemia

=

Anemia* + low ferritin**

DIFFERENTIAL DIAGNOSIS

There are many causes of microcytic anemia, but the 2 most common causes other than iron deficiency are thalassemia-minor and anemia of inflammation.

THERAPEUTIC PRINCIPLES

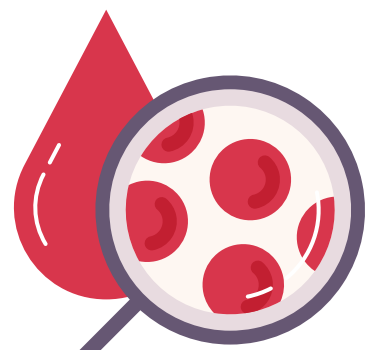
Red cell transfusion:

Only if severe, symptomatic anemia

Replenish iron stores:

- Oral iron
- IV iron

IRON DEFICIENCY ANEMIA



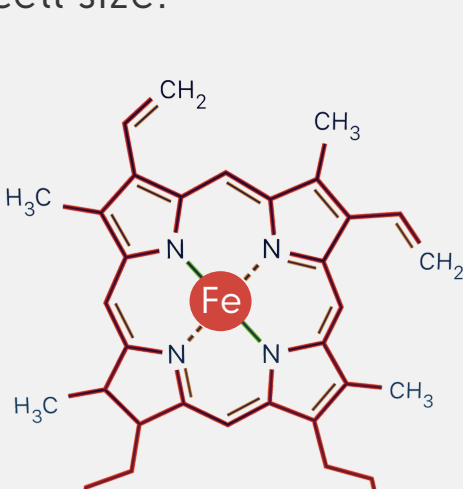
can be found in domestic and wild animals, but it is rare compared to humans, partly because females of non-primate species do not menstruate. It is often caused by inadequate dietary iron intake in rapidly growing neonates or infestations with bloodsucking parasites.

COMPARATIVE PHYSIOLOGY



PROXIMATE MECHANISMS

Iron is required for the last step of heme synthesis. Iron deficiency results in impaired heme production, leading to decreased Hb synthesis. In response to decreased intracellular Hb, erythroid precursor cells undergo additional cell divisions, resulting in progressively smaller cell size.



Iron is required for all rapidly growing cells, including hair follicles, nails and mucosal cells, thus explaining hair loss, chipping of nails and glossitis in patients with iron deficiency anemia.

EVOLUTIONARY MECHANISMS



It has been proposed that when hunting and gathering shifted to agriculture about 10,000 years ago (the Neolithic revolution), a profound change in diet from meat to cereal resulted in a dramatic decrease in dietary iron and an increase in iron deficiency anemia.



This is an example of an evolutionary mismatch whereby the genetic adaptation to a meat-based diet, honed by millions of years of natural selection, was suddenly overridden by a culturally imposed change in diet.

DID YOU KNOW?

HISTORY OF MEDICINE

Iron deficiency anemia was recognized as a condition called **chlorosis** (in which patients were described to have a green hue) until the late 1800s. While some patients with chlorosis received treatment with iron, there was no understanding that the condition was caused by iron deficiency. Chlorosis was considered a psychosocial disorder.

NOTES

ATTRIBUTIONS

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The Blood Project
 ENCYCLOPEDIA OF BLOOD