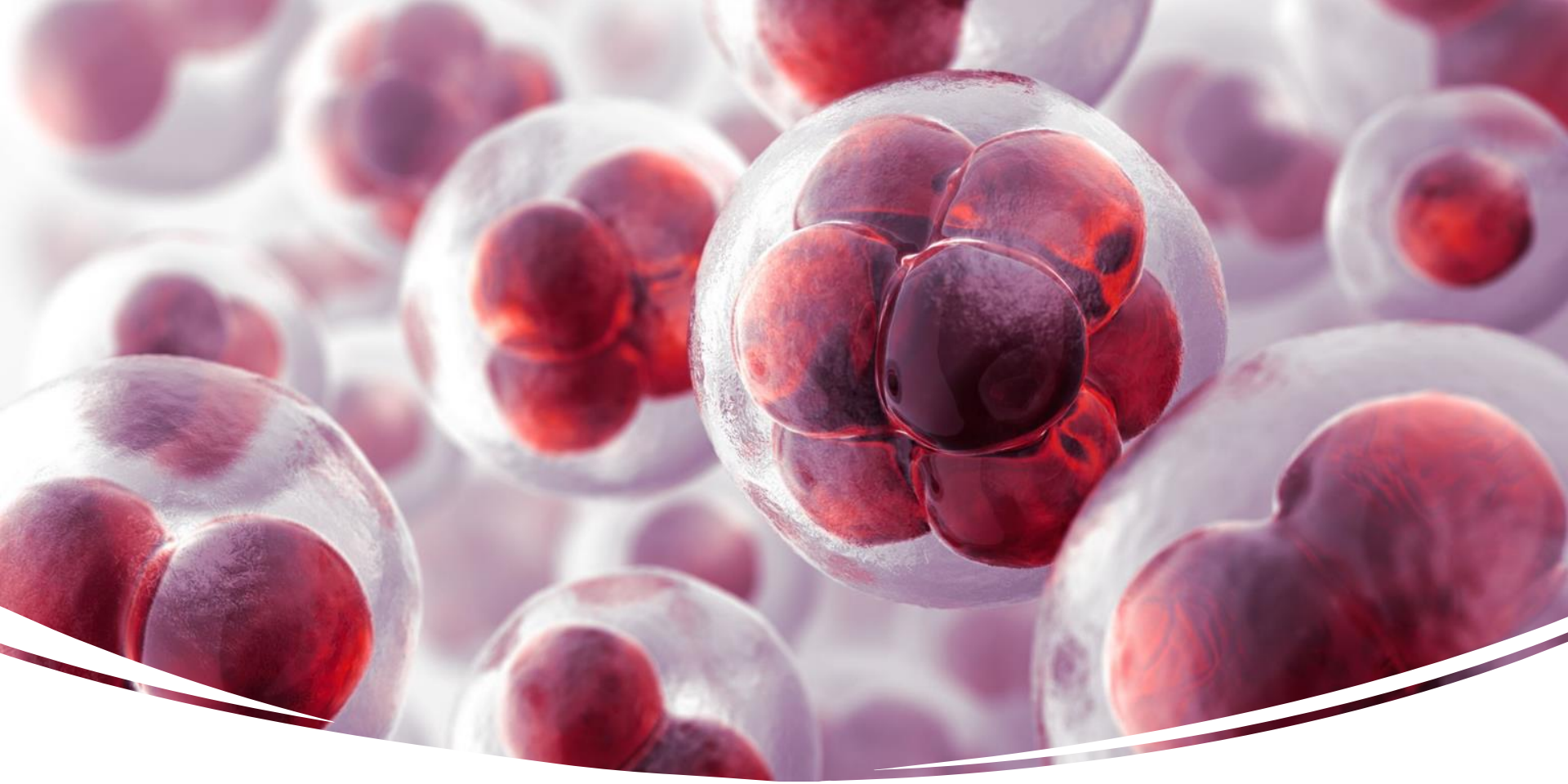

A.L. Jihad Haji Saleh

Updates in iron deficiency anemia

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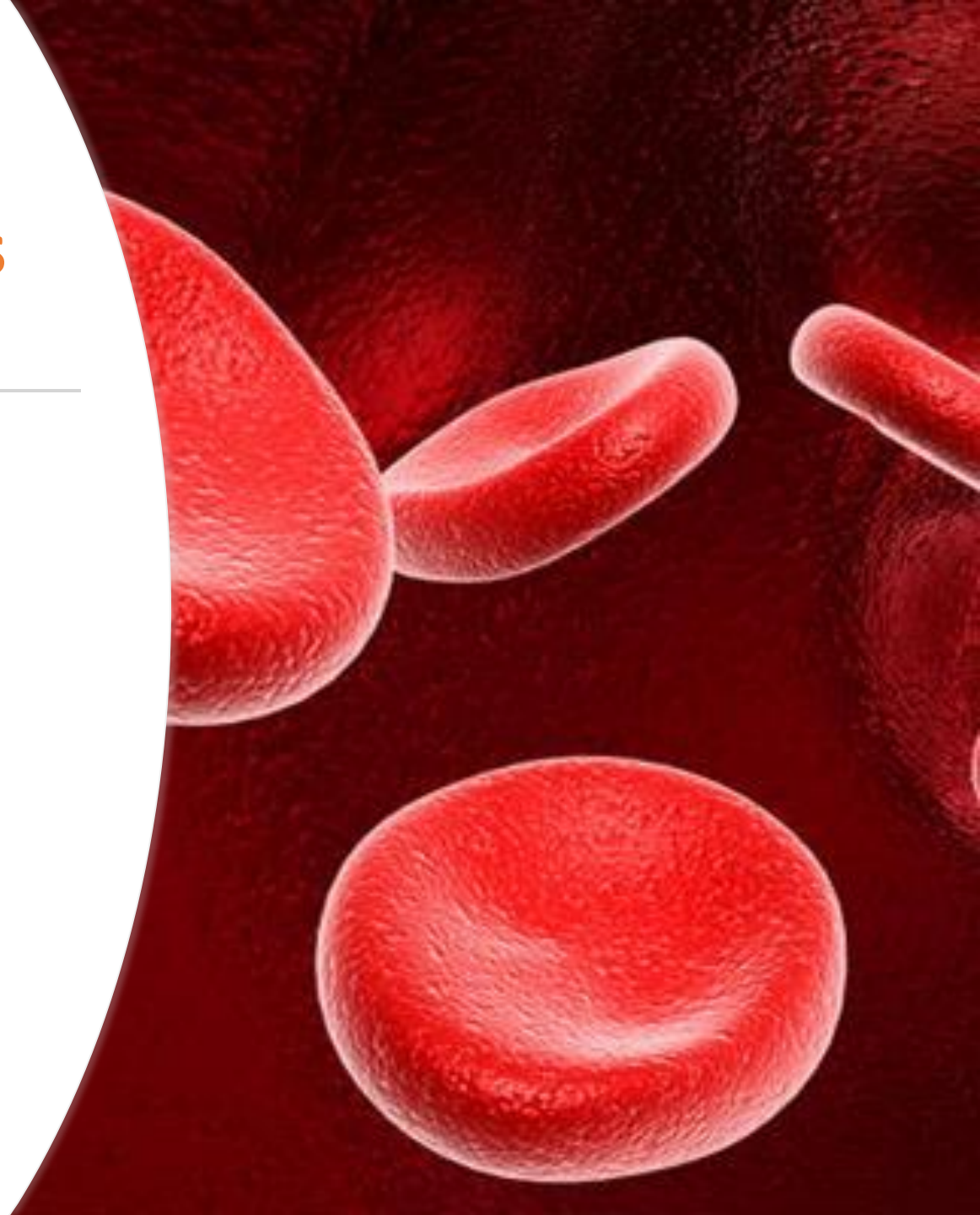
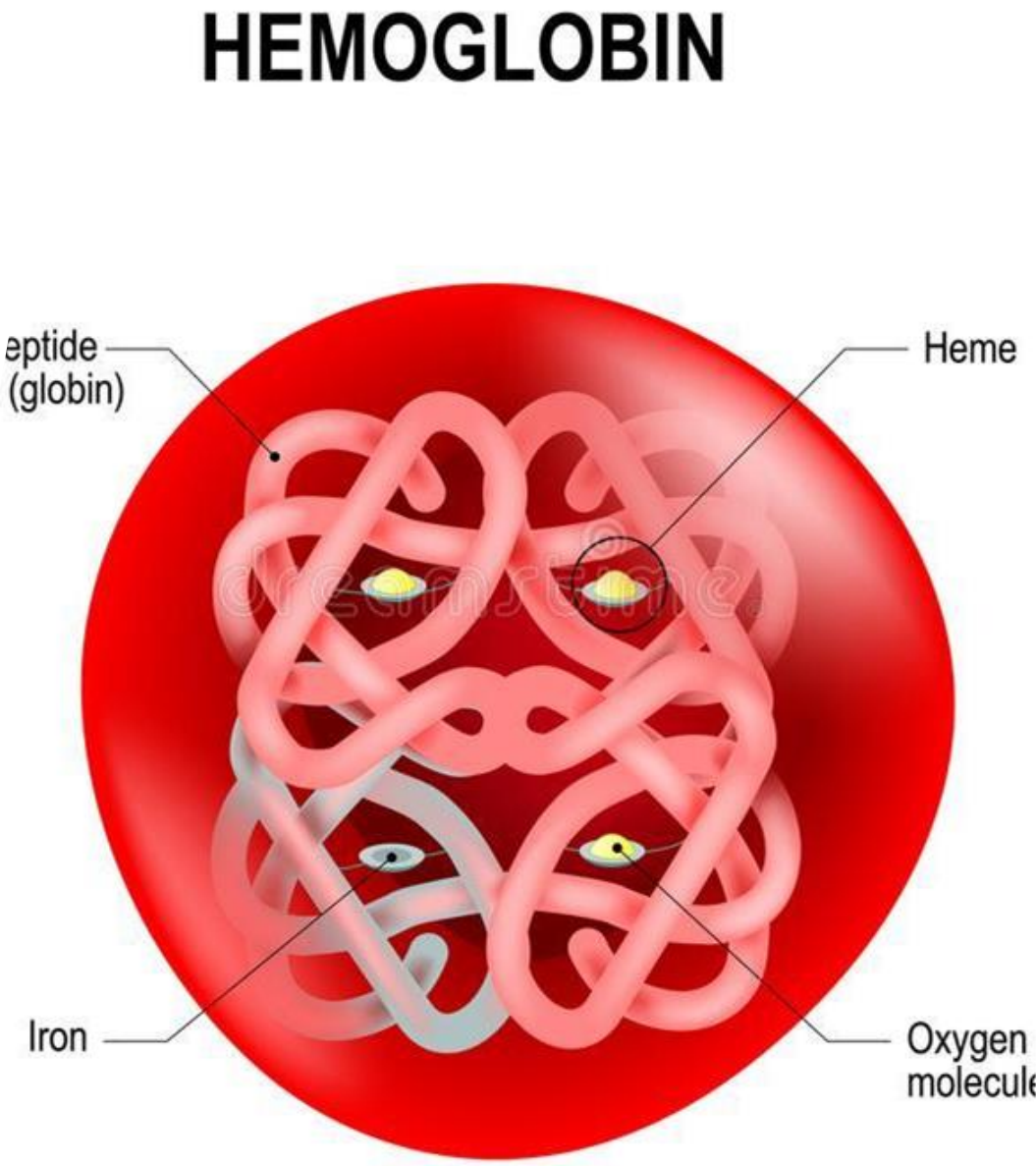


Introduction of Anaemia

Anaemia: **a condition in which blood lacks adequate healthy red blood cells. Red blood cells carry oxygen to th body's tissues.**

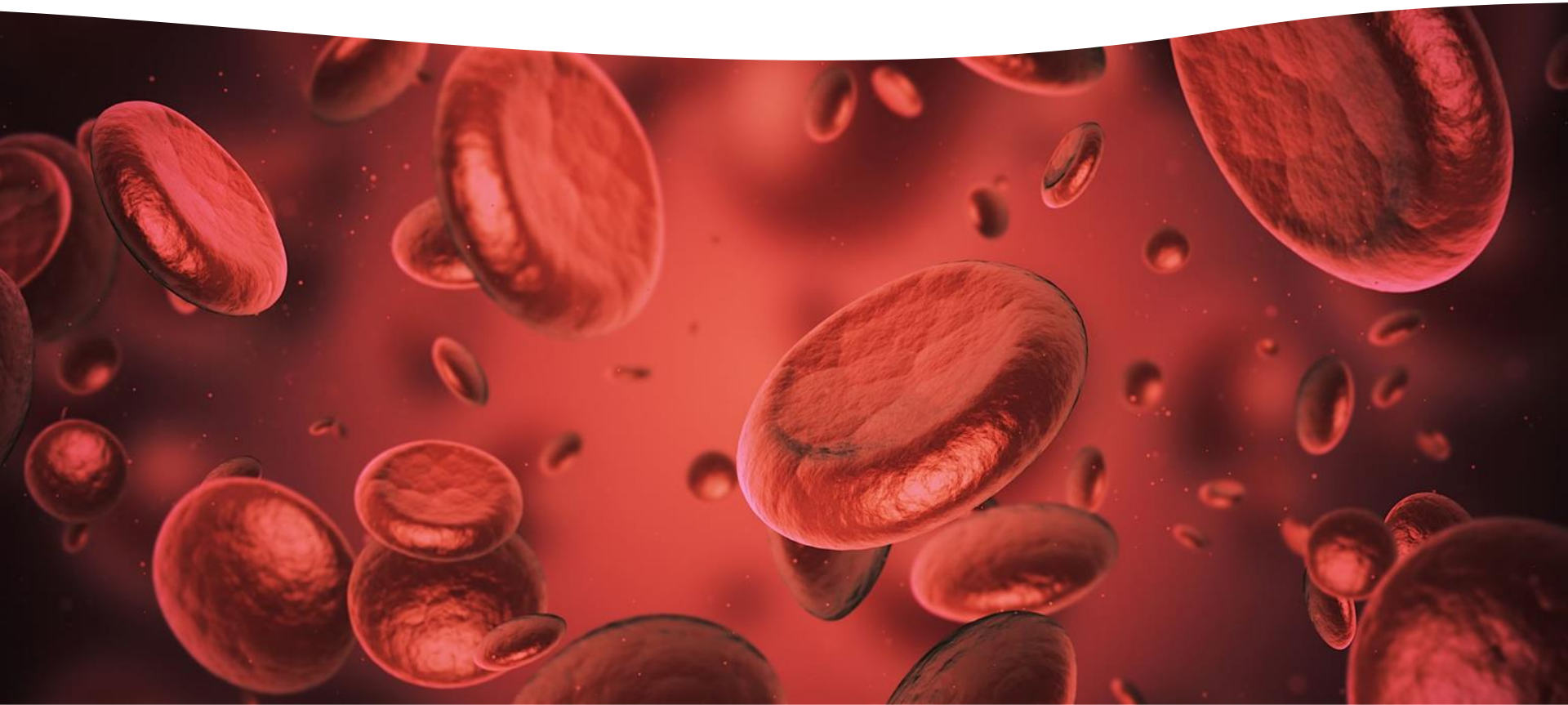
REDUCTION OF HEMOGLOBIN CONCENTRATION BELOW REFERENCE VALUE



There are three types of anaemia

- **Blood loss**
- **Decreased red blood cells**
- **Destruction of red blood cell**

- **Without enough iron, your body can't produce enough of a substance in red blood cells that enables them to carry oxygen (hemoglobin). As a result, iron deficiency anemia may leave you tired and short of breath.**



WHO Criteria for Anemia

Age or Sex Group	Hgb, g/dL
Children 6-59 months	< 11
Children 5-11 years	< 11.5
Children 12-14 years	< 12
Nonpregnant women (above 15 years of age)	< 12
Pregnant women	< 11
Men (above 15 years of age)	< 13

WHO. 2017 nutritional anaemias.

Iron

- **is an important mineral that helps maintain healthy blood.**
- **There are two types of iron:**
- **Heme iron comes from animal sources like red meat and fish.**
- **while non-heme iron comes from plant sources like beans, nuts, and vegetables**

IDA

- **Iron deficiency anaemia often takes a long time to develops.**
- **People may not know they have until the symptoms are severe.**

SYMPTOMS OF ANEMIA

- **Iron deficiency anaemia often takes a long time to develops.**
- **People may not know they have until the symptoms are severe.**

Manifestations of IDA

- Fatigue, loss of stamina
- Decreased cognitive function
- Impaired work performance
- Depression
- Tachycardia
- Cold intolerance
- Hair loss
- Restless leg syndrome
- Pica

DeLoughery TG. *Med Clin North Am*. 2017;101:319-332.
Friedman AJ, et al. *J Womens Health (Larchmt).* 2012;21:1282-1289.

Detrimental Effects of ID

Mitochondria

- Decreased oxidative metabolism, iron-sulfur clusters synthesis, and density of mitochondrial cristae

Cell

- Deranged mitochondrial morphology
- ↓Number of mitochondria
- ↓Myoglobin pool; AMPK activation
- ↑Glycolytic activity

Tissue

- Altered muscle fiber composition
- ↓Muscle mass

Organism

- Decreased overall physical work capacity, aerobic capacity, endurance capacity, and aerobic and endurance adaptation after training

Stugiewicz M, et al. *Eur J Heart Fail.* 2016;18:762-773.

Causes

- Blood loss
- A lack of iron in your diet
- inability to absorb iron
- Pregnancy

Risk factors

Women. Because women lose blood during menstruation, women in general are at greater risk of iron deficiency anemia

Vegetarians. People who don't eat meat may have a greater risk of iron deficiency anemia if they don't eat other iron-rich foods

Frequent blood donors

Infants and children

COMPLICATION

slow growth of developmental delays in children and infants.

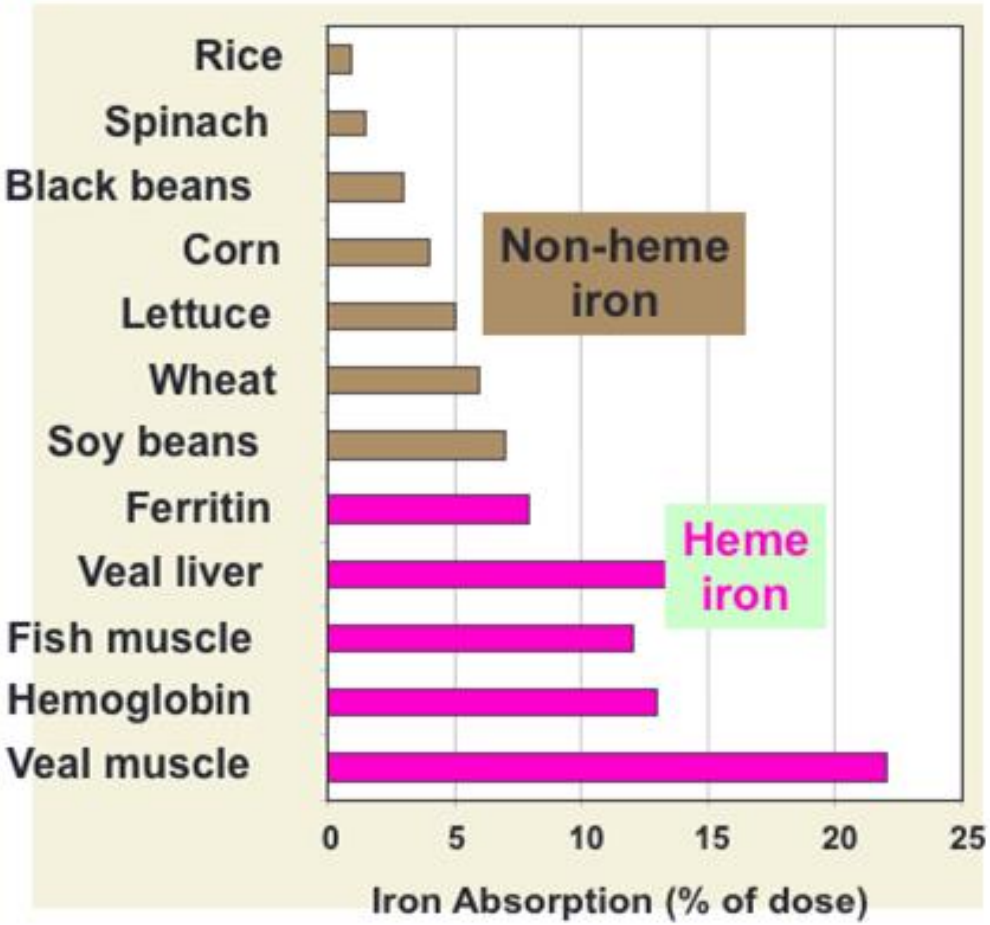
heart problems including heart failure or

An enlarged heart due to it compensating

For lack of oxygen

pregnancy complication, including low birth weights

Iron absorption from food

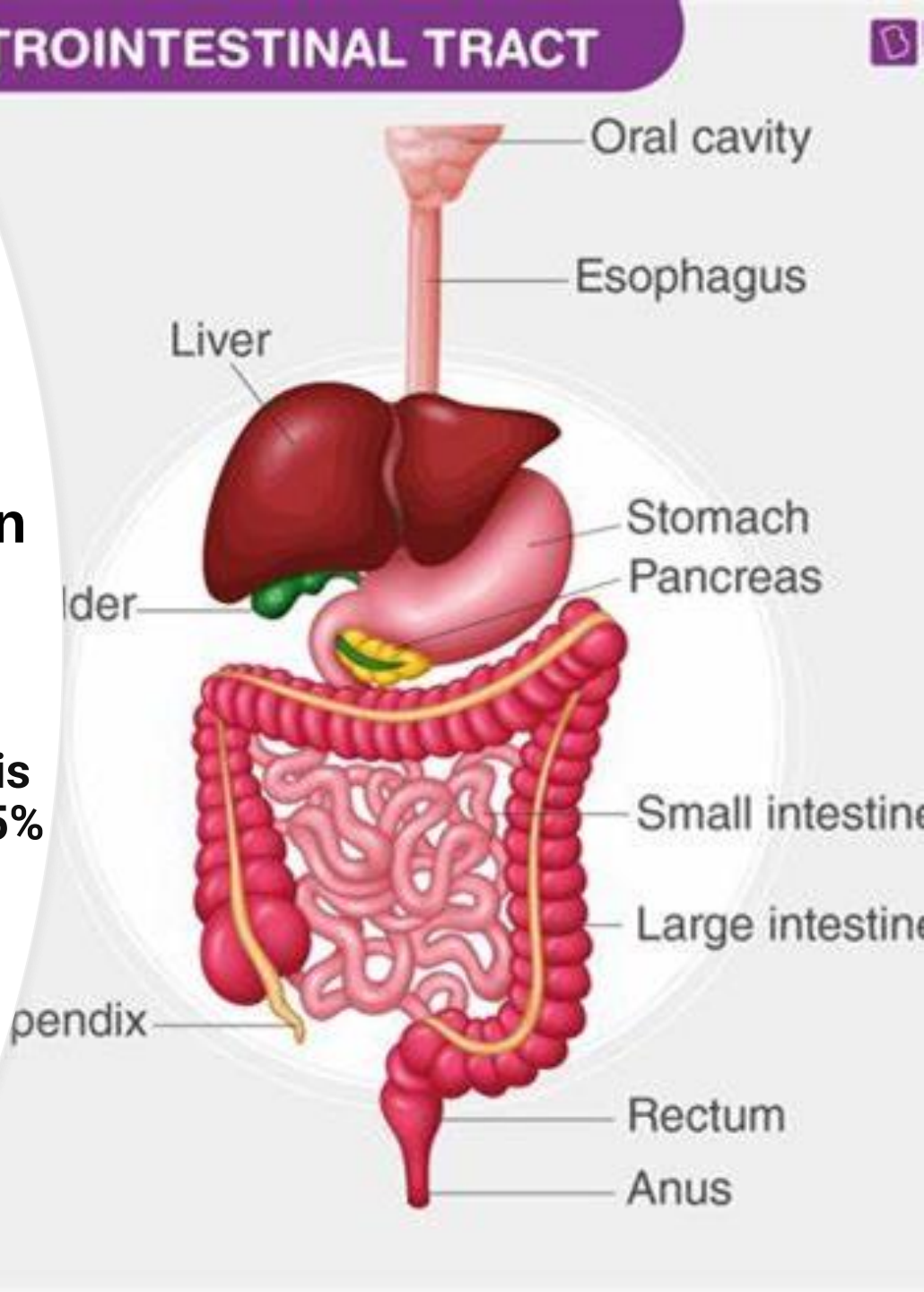



Iron Rich Foods
Fruits
Dark Chocolate
Broccoli
Red Meat
Legumes
Leafy Greens
Whole Grains
Tofu
Pumpkin Seeds

Iron absorption

- **Absorption of iron occurs in the small intestine**

- **The amount of iron absorbed compared to the amount ingested is typically low, but may range from 5% as much as 35% depending on circumstances and type of iron.**



Iron Absorption

- Food sources supply: 10 - 25 mg / day
- Absorbed in the brush border of the upper small intestine
  - Enhanced by gastric acid
  - Inhibited by tannins, systemic inflammation

- Most dietary iron is nonheme form, <5% bioavailability
- < 10% dietary iron is heme form, >25% bioavailability

tannin

- You should not take iron with tea, because tea contains tannins and caffeine that interfere with your body's ability to absorb iron.

- It can reduce your iron intake by as much as 50 percent

When to see a doctor

- If you or your child develops signs and symptoms that suggest iron deficiency anemia

- So see your doctor for a diagnosis rather than taking iron supplements on your own. Overloading the body with iron can be dangerous because excess iron accumulation can damage your liver and cause other complications.

Anemia treatment : -

1- Blood transfution.

2 – Using the deficient materials necessary for red blood cells formation.

3 – Treatment the pathological condition causing the anemia.

4 – Supplemental therapy .

Goals of Treatment

- Restore Hb to normal levels
- Replenish iron stores
- Relieve symptoms
- Improve quality of life

Keating GM. *Drugs*. 2015;75:101-127.

Goals of Treatment

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Keating GM. *Drugs*. 2015;75:101-127.

Provider-Reported Barriers to Anemia Treatment

Oral Iron Supplementation	IV Iron Supplementation
• Patient adherence • GI side effects	• Safety concerns (anaphylaxis) • Access to infusion centers • Cost • Time off work for infusions • Patient apprehension/ fear of infusion

Hou JK, et al. *Inflamm Bowel Dis*. 2017;23:35-43.

Oral Iron Supplementation

Advantages

- Cheap
- Easy to administer

Disadvantages

- Poorly absorbed (max 5 to 10 mg/day)
- GI side effects common
- Compliance often poor
- Absorption limited if ferritin elevated
- Absorption reduced in inflammation

Drozd M, et al. *Am J Cardiovasc Drugs*. 2017;17:183-201.
McDonagh T, Macdougall IC. *Eur J Heart Fail*. 2015;17:248-262.

types of iron in supplements include:

- ferrous sulfate
- ferrous gluconate
- ferric citrate
- ferric sulfate
- Ferrous bis-glucinate

Limitations of Oral Iron

- Low rate of absorption
  - Maximum rate of absorption of oral iron is ~10%
  - May be improved with every other day dosing vs daily
  - Affected by certain foods, drug-drug interactions
- Long-term treatment is necessary
- Substantial AEs: ~56% of patients
  - GI issues: constipation, pain, nausea, vomiting, diarrhea
  - Result in poor adherence: ~20% discontinue treatment

Khalafallah AA, et al. *J Pregnancy*. 2012;2012:630519; Schrier SL. *Blood*. 2015;126:1971; Auerbach M ,et al. *Lancet Haematol*. 2017;4:e500; Stoffel NU, et al. *Lancet Haematol*. 2017;4:e524-e533.

The oral dose of elemental iron for iron-deficiency anaemia should be 100 to 200 mg daily. It is customary to give this as dried ferrous sulfate; for prophylaxis of iron-deficiency anaemia, ferrous sulfate may be effective.

Iron content of different iron salts

Iron salt/amount		Content of ferrous iron
ferrous fumarate	200 mg	65 mg
ferrous gluconate	300 mg	35 mg
ferrous sulfate	300 mg	60 mg
ferrous sulfate, dried	200 mg	65 mg

J Perinat Med. 2014 Mar;42(2):197-206. doi: 10.1515/jpm-2013-0153.

Ferrous bisglycinate 25 mg iron is as effective as ferrous sulfate 50 mg iron in the prophylaxis of iron deficiency and anemia during pregnancy in a randomized trial.

Milman N, Jønsson L, Dyre P, Pedersen PL, Larsen LG.

Abstract

OBJECTIVE: To compare the effects of oral ferrous bisglycinate 25 mg iron/day vs. ferrous sulfate 50 mg iron/day in the prevention of iron deficiency (ID) and iron deficiency anemia (IDA) in pregnant women.

DESIGN: Randomized, double-blind, intention-to-treat study.

SETTING: Antenatal care clinic.

SAMPLE: 80 healthy ethnic Danish pregnant women.

METHODS: Women were allocated to ferrous bisglycinate 25 mg elemental iron (Aminojern®) (n=40) or ferrous sulfate 50 mg elemental iron (n=40) from 15 to 19 weeks of gestation to delivery. Hematological status (hemoglobin, red blood cell indices) and iron status (plasma iron, plasma transferrin, plasma transferrin saturation, plasma ferritin) were measured at 15-19 weeks (baseline), 27-28 weeks and 36-37 weeks of gestation.

MAIN OUTCOME MEASURES: Occurrence of ID (ferritin <15 µg/L) and IDA (ferritin <12 µg/L and hemoglobin <110 g/L).

RESULTS: At inclusion, there were no significant differences between the bisglycinate and sulfate group concerning hematological status and iron status. The frequencies of ID and IDA were low and not significantly different in the two iron groups. The frequency of gastrointestinal complaints was lower in the bisglycinate than in the sulfate group (P=0.001). Newborns weight was slightly higher in the bisglycinate vs. the sulfate group (3601±517 g vs. 3395±426 g, P=0.09).

CONCLUSIONS: In the prevention of ID and IDA, ferrous bisglycinate was not inferior to ferrous sulfate. Ferrous bisglycinate in a low dose of 25 mg iron/day appears to be adequate to prevent IDA in more than 95% of Danish women during pregnancy and postpartum.

HOW TO PREVENT ANEMIA

- **Eat plenty of iron rich foods ,such as tofu, green and leafy vegetables.**
- **Red meat,lentils,beans and iron-fortified cereals and bread**
- **Eat and drink vitamin-c rich foods and drinks**
- **Avoid drinking tea or coffee with your**
- **Meals, as they can affects iron absorption**

Concluding Remarks

- IDA is a significant public health problem that requires treatment
- Oral iron is commonly used as first-line treatment, but it may not be tolerated or effective and treatment escalation may be necessary
- Currently available IV iron formulations are rapidly effective and have low risk for AEs

CLINICAL PEARLS

- IDA due to poor dietary iron intake is the most common anemia.
- Blood loss and reduced iron stores due to malabsorption or poor utilization are major risk factors for IDA.
- Premenopausal women and children are at the greatest risk for IDA.
- Cow's milk should not be given to any child age <12 months.
- Oral iron supplementation is the standard treatment for IDA.

Thank you so much