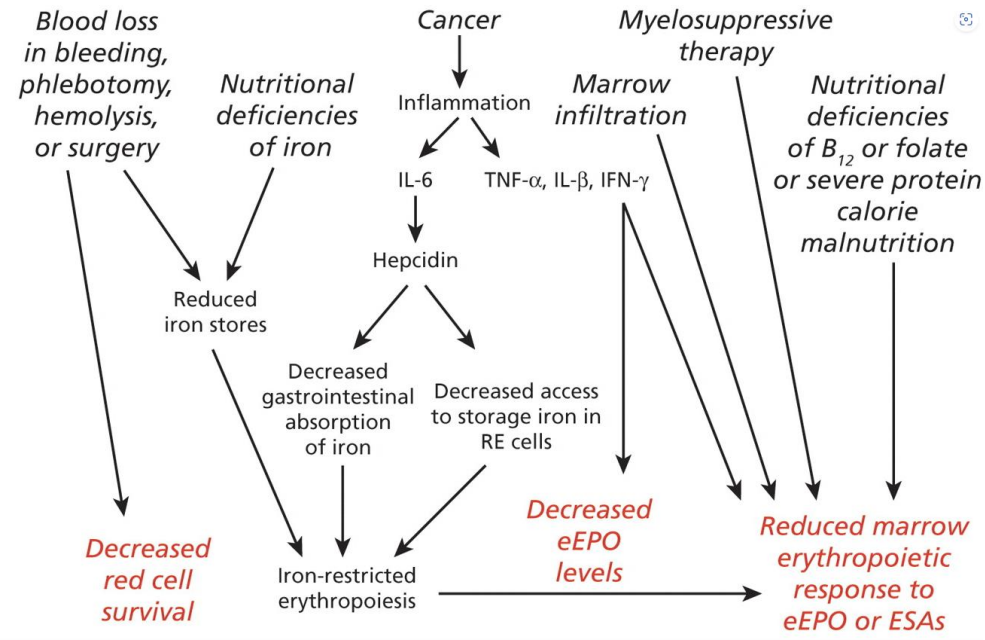
Iron deficiency in cancer

General Overview

- **Pathogenesis of anemia in cancer is multifactorial**



- **Iron deficiency rate in cancer patients:**

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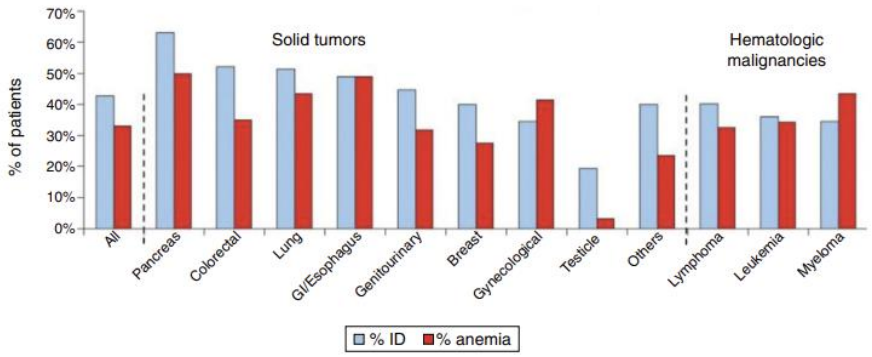


Figure 1 – Prevalence of iron deficiency anemia (ID) and anemia in different types of tumors. GI: gastrointestinal.

- **Iron homeostatis in cancer patients**

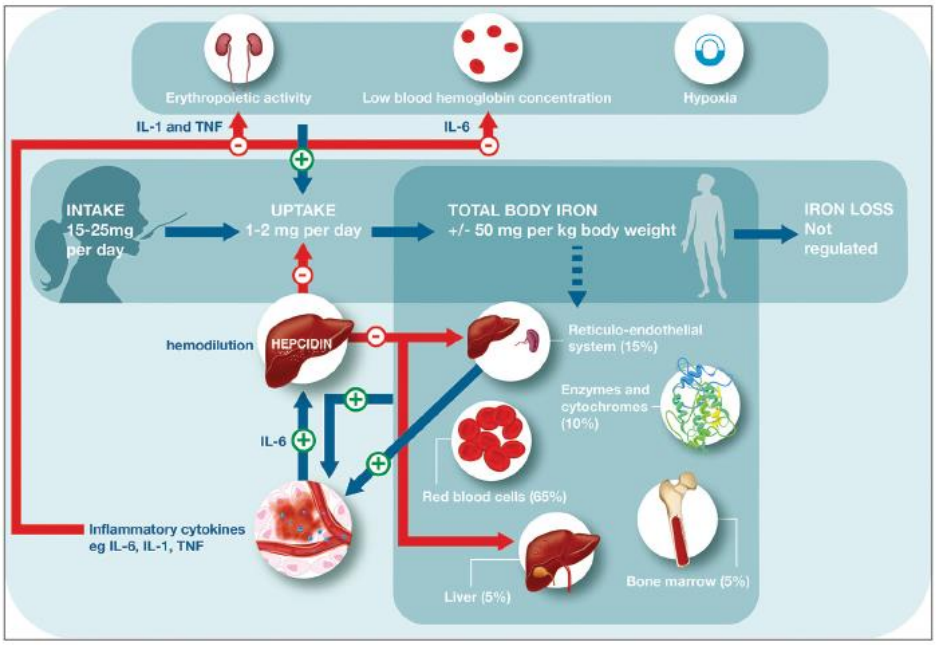
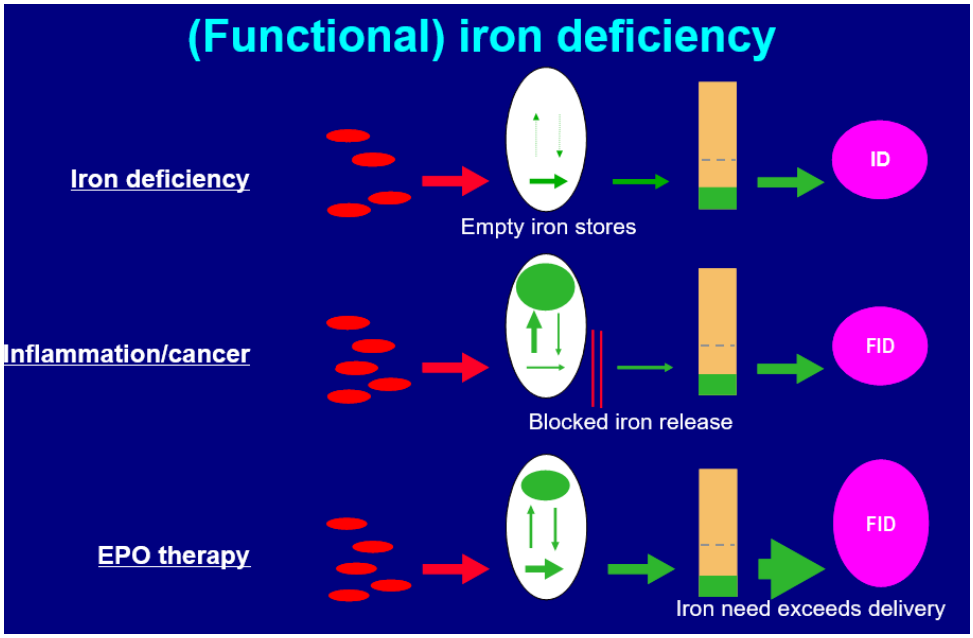


Figure 1 Overview of iron homeostasis in cancer patients. Cytokine-induced hepcidin production results in inhibition of iron uptake and promotion of iron sequestration. Inflammatory cytokines also directly inhibit erythropoietic activity and cause low blood hemoglobin concentration (by hemodilution) thus further worsening anemia in cancer patients
IL, interleukin; TNF, tumor necrosis factor

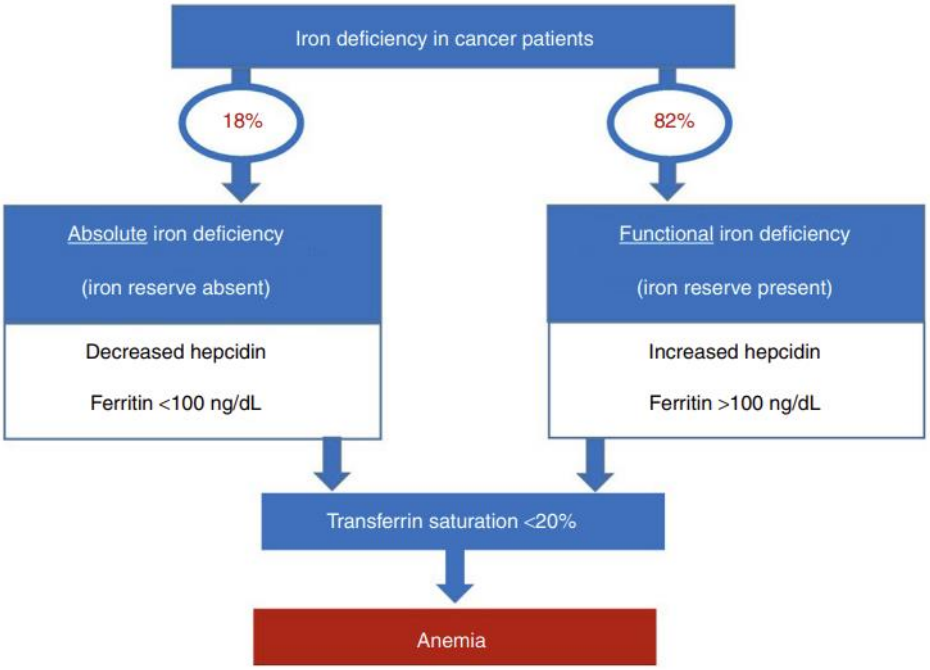
- **Absolute iron deficiency**: lack of iron in reserves is the main event of anemia
- **Function iron deficiency** (FID):
    - Although the reserves are satisfactory, the presence of a chronic inflammation (ex. Cancer) causes the iron to be "trapped" in macrophages and enterocytes, limiting its availability to the bone marrow, triggering anemia.
    - Is the predominant mechanism of iron deficiency associated with cancer
    - Prevalence of FID in oncology patients ranges from 29 to 46%
    - Hepcidin is mediator of iron blockade



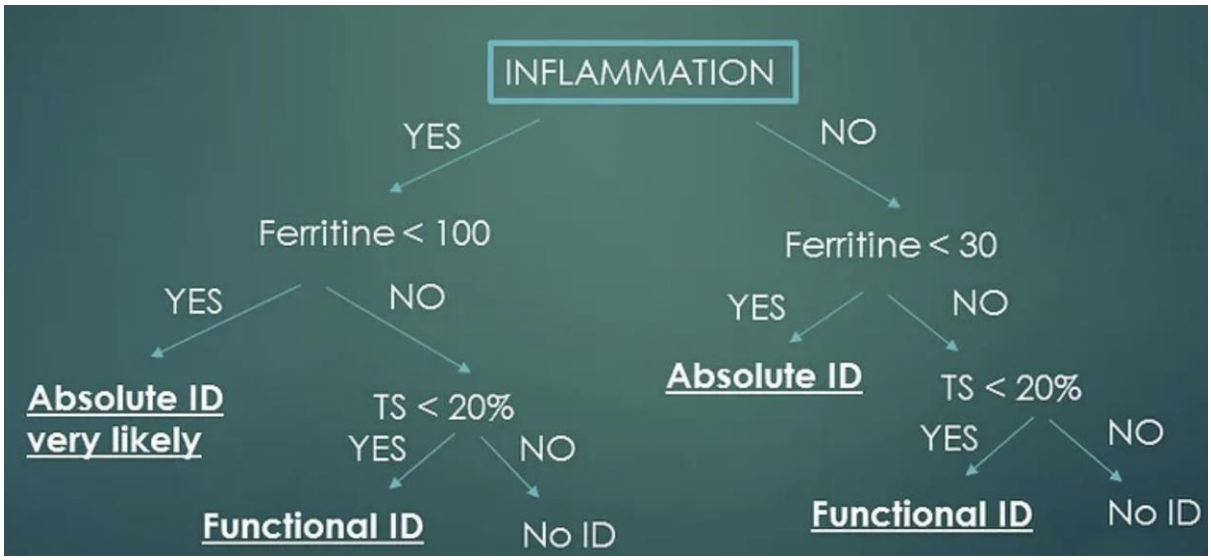
Update: December 2023

Diagnosis of iron deficiency (ID)

- Most important parameter = ferritine (intracellular storage of iron)
  - Absolute iron deficiency (AID) = Ferritin < 30 µg/L (and decreased transferrin saturation)
  - In case of inflammation (ex. Cancer) ferritin <100 µg/L makes AID very likely
- Transferrin saturation < 20% is characteristic for functional iron deficiency



- Hypochromic erythrocytes is a long term indicator of ID erythropoiesis (RBC lifespan 120 days)
- Hb content of reticulocytes (CHr) is a short term indication of ID erythropoiesis (reticulocyte lifespan 4 days)



Treatment

- For all patients treated with EPO, we suggest supplemental iron. We target a transferrin saturation >20 and a serum ferritin >100
- For most patients we suggest IV iron rather than oral iron (ESMO guidelines: Management of anaemia and iron deficiency in patients with cancer: ESMO Clinical Practice Guidelines† - Annals of Oncology)
- Eryhtropoeitin stimulating agents (ESA) versus transfusion
    - ESA's reduce need of transfusions by 35%
    - Impact of quality of life is unclear
    - Risk of thromboembolism is increased by 50% in patients receiving ESAs
    - ESA should only be used in patients receiving chemotherapy

Intraveneus ijzercarboxymaltose complex

Doseringsschema**

Lichaamsgewicht	Lichaamsgewicht 50 kg tot <70kg		Lichaamsgewicht ≥70kg	
Hb waarde	≥10	<10	≥10	<10
Totale ijzerdosering	1000 mg	1500 mg	1500 mg	2000 mg
Toediening in week 1	1000 mg	1000 mg	1000 mg	1000 mg
Toediening in week 2	-	500 mg	500 mg	1000 mg

** Patiënten met een lichaamsgewicht van 35 kg tot <50 kg maximaal 20 mg/kg; dit houdt een dosering van 700-1000 mg per week in.
** Een cumulatieve ijzerdosis van 500 mg dient niet te worden overschreden voor patiënten met een lichaamsgewicht van < 35 kg.