

Anemia of Chronic Disease

TUCOM

Dep. of Medicine

5th year

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Learning objectives

1. Define anemia of chronic disease
2. Clarify the pathogenesis of anemia of chronic disease
3. Review the investigations of anemia of chronic disease
4. Outline the treatment of anemia of chronic disease

Anemia of chronic disease (ACD)

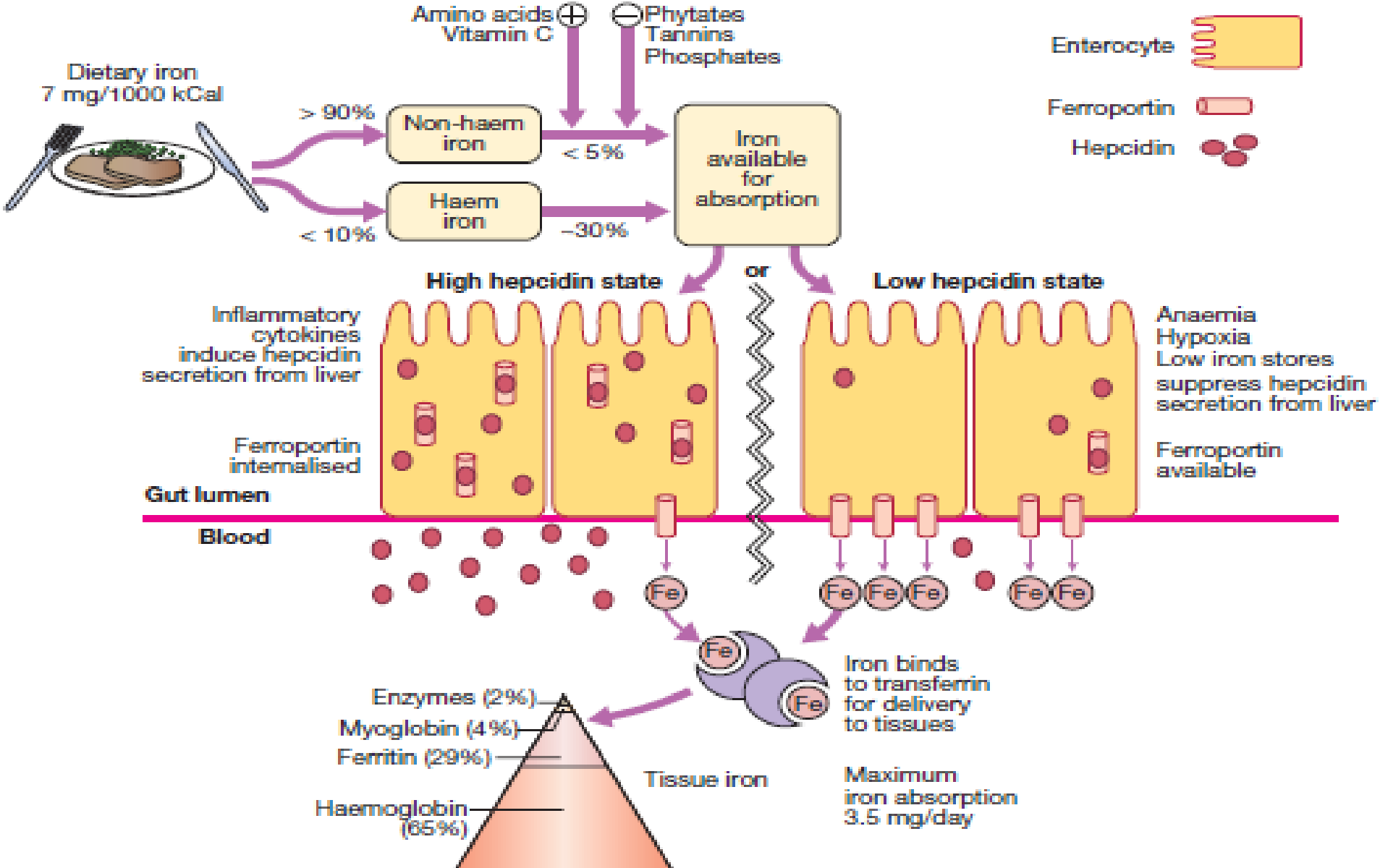
ACD is defined as the anemia that occurs in the setting of chronic inflammatory, infectious, malignant, and autoimmune diseases. It is mild, with hemoglobin in the range of 85–115 g/L, and is usually associated with a normal MCV (normocytic, normochromic).

Causes of normocytic anemia (MCV 78-98 fl)

- Early iron deficiency
- Aplastic anemia
- Endocrinopathies
- **Anemia of chronic disease (ACD)**
- Anemia of renal failure
- Mixed nutritional deficiency

Pathogenesis:

- The key regulatory protein that accounts for the findings characteristic of ACD is hepcidin, which is produced by the liver, in response to proinflammatory cytokines, especially IL-6 secretion.
- Hepcidin binds to ferroportin on the membrane of iron-exporting cells, such as small intestinal enterocytes and macrophages, internalising the ferroportin and thereby inhibiting the export of iron from these cells into the blood.
- The iron remains trapped inside the cells in the form of ferritin, levels of which are therefore normal or high in the face of significant anemia.
- Other related factors are an absolute or relative EPO deficiency, poor iron incorporation into developing erythrocytes, and shortened erythrocyte survival.



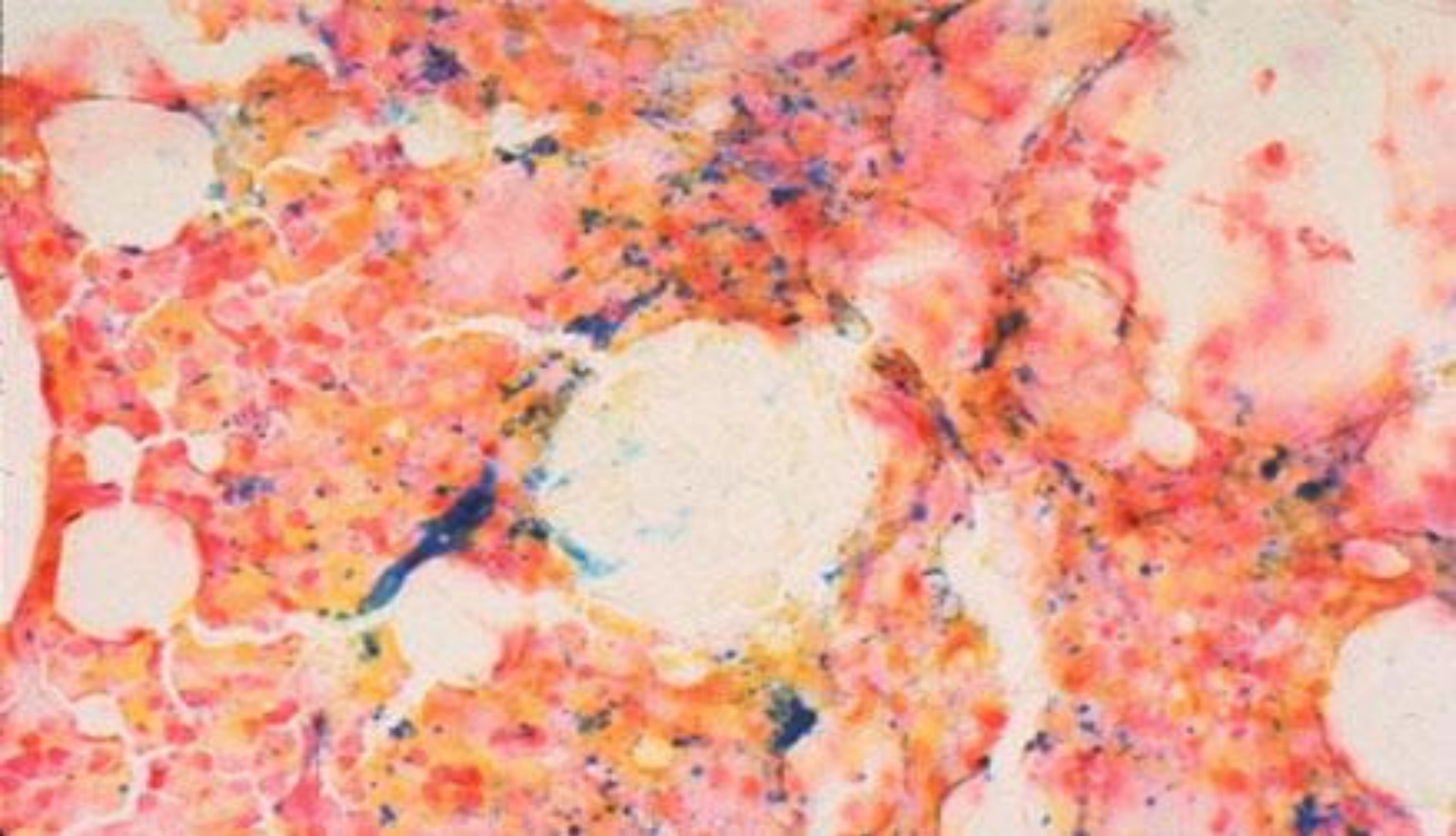
The regulation of iron absorption, uptake and distribution in the body. The transport of iron is regulated in a similar fashion to enterocytes in other iron-transporting cells such as macrophages

Diagnosis:

It is often difficult to distinguish ACD associated with a low MCV from iron deficiency

24.33 Investigations to differentiate anaemia of chronic disease from iron deficiency anaemia					
	Ferritin	Iron	TIBC	Transferrin saturation	Soluble transferrin receptor
Iron deficiency anaemia	↓	↓	↑	↓	↑
Anaemia of chronic disease	↑/Normal	↓	↓	↓	↓/Normal
(TIBC = total iron binding capacity)					

Examination of the bone marrow may ultimately be required to assess iron stores directly.



Prussian blue stain for iron in a normal bone marrow (the blue staining material is iron within the reticuloendothelial cells in bone marrow). Iron deficiency anemia will develop following depletion of iron stores from the bone marrow.

Treatment:

- Treatment of the underlying chronic condition
- A trial of oral iron can be given in difficult situations. A positive response occurs in true iron deficiency but not in ACD.
- The mainstay of treatment of the anemia of chronic renal failure is erythropoietin (EPO) and iron replacement.
- Responses to EPO replacement are most dramatic in patients with multiple myeloma, rheumatoid arthritis, and in the anemia associated with HIV infection.



Recombinant human erythropoietin (EPO), EPREX: is effective in correcting the anaemia of CKD.

EPO side effects: Hypertension and thrombosis (including thrombosis of the AV fistulae used for haemodialysis).

Thanks