Anemie

schema generale preparazione

- Eziologia
- Patogenesi
- Sintomi generali e specifici di ciascuna forma
- Diagnosi di laboratorio
- Diagnosi differenziale
- Terapia

Table 1. Causes of Iron Deficiency.

Cause	Example
Physiologic	
Increased demand	Infancy, rapid growth (adolescence), menstrual blood loss, pregnancy (second and third trimesters), blood donation
Environmental	Insufficient intake, resulting from poverty, malnutrition, diet (e.g., vegetarian, vegan, iron-poor)
Pathologic	
Decreased absorption	Gastrectomy, duodenal bypass, bariatric surgery, *Helicobacter pylori* infection, celiac sprue, atrophic gastritis, inflammatory bowel diseases (e.g., ulcerative colitis, Crohn's disease)*
Chronic blood loss	Gastrointestinal tract, including esophagitis, erosive gastritis, peptic ulcer, diverticulitis, benign tumors, intestinal cancer, inflammatory bowel diseases, angiodysplasia, hemorrhoids, hookworm infestation, obscure source Genitourinary system, including heavy menses, menorrhagia, intravascular hemolysis (e.g., paroxysmal nocturnal hemoglobinuria, autoimmune hemolytic anemia with cold antibodies, march hemoglobinuria, damaged heart valves, microangiopathic hemolysis) Systemic bleeding, including hemorrhagic telangiectasia, chronic schistosomiasis, Munchausen's syndrome (e.g, self-induced hemorrhages)
Drug-related	Glucocorticoids, salicylates, NSAIDs, proton-pump inhibitors
Genetic	Iron-refractory iron-deficiency anemia
Iron-restricted erythropoietic	Treatment with erythropoiesis-stimulating agents, anemia of chronic disease, chronic kidney disease*

Eziologia carenza di ferro

Scarso introito dietetico

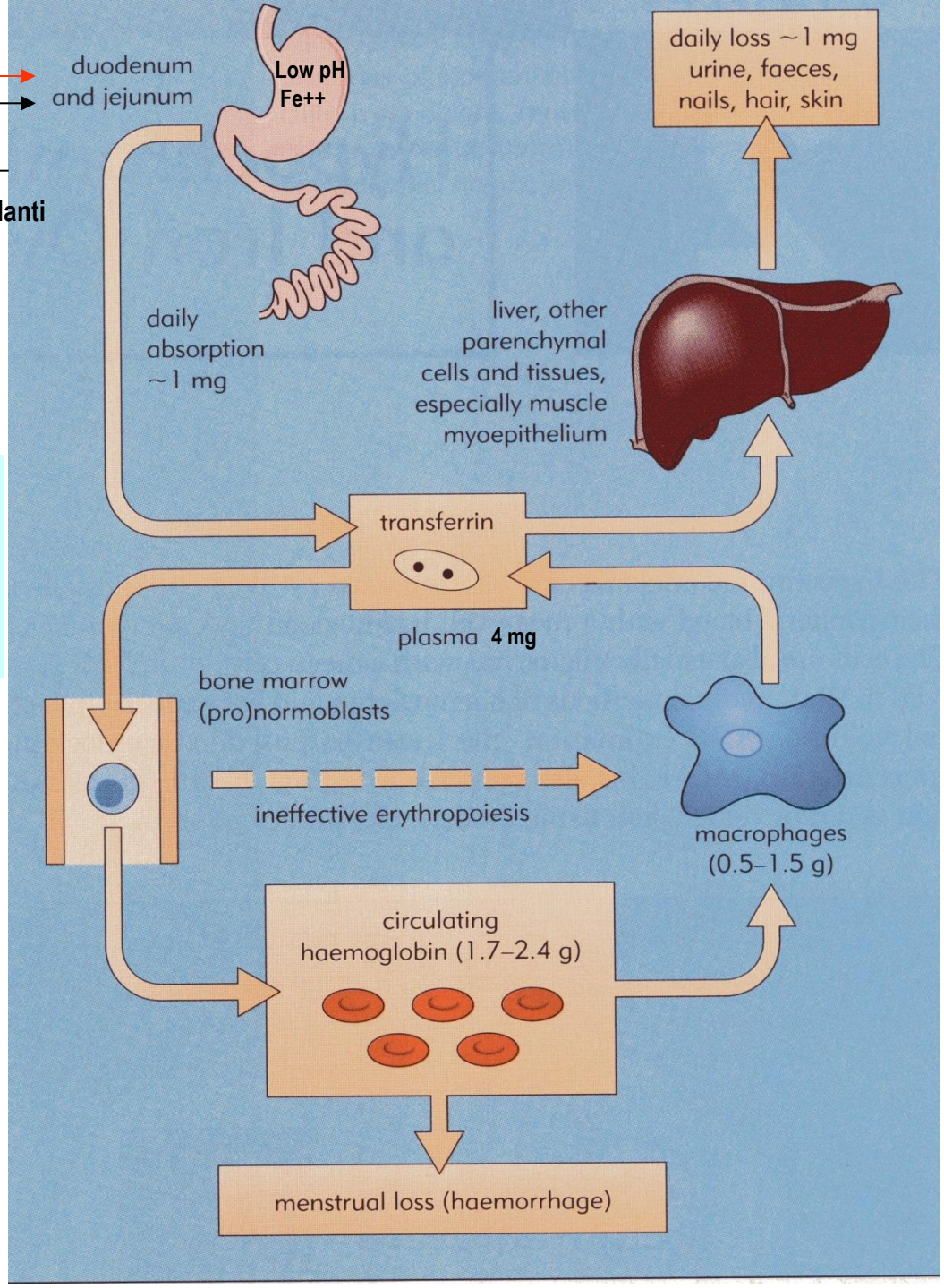
Carni rosse sono ricche di ferro

Verdure frutta e pollame sono povere di ferro

Carni rosse

Verdure ricche
In ferro

Agenti chelanti



Distribuzione del ferro nei vari comparti

Uno dei meccanismi alla base dell'intelligenza mucosa

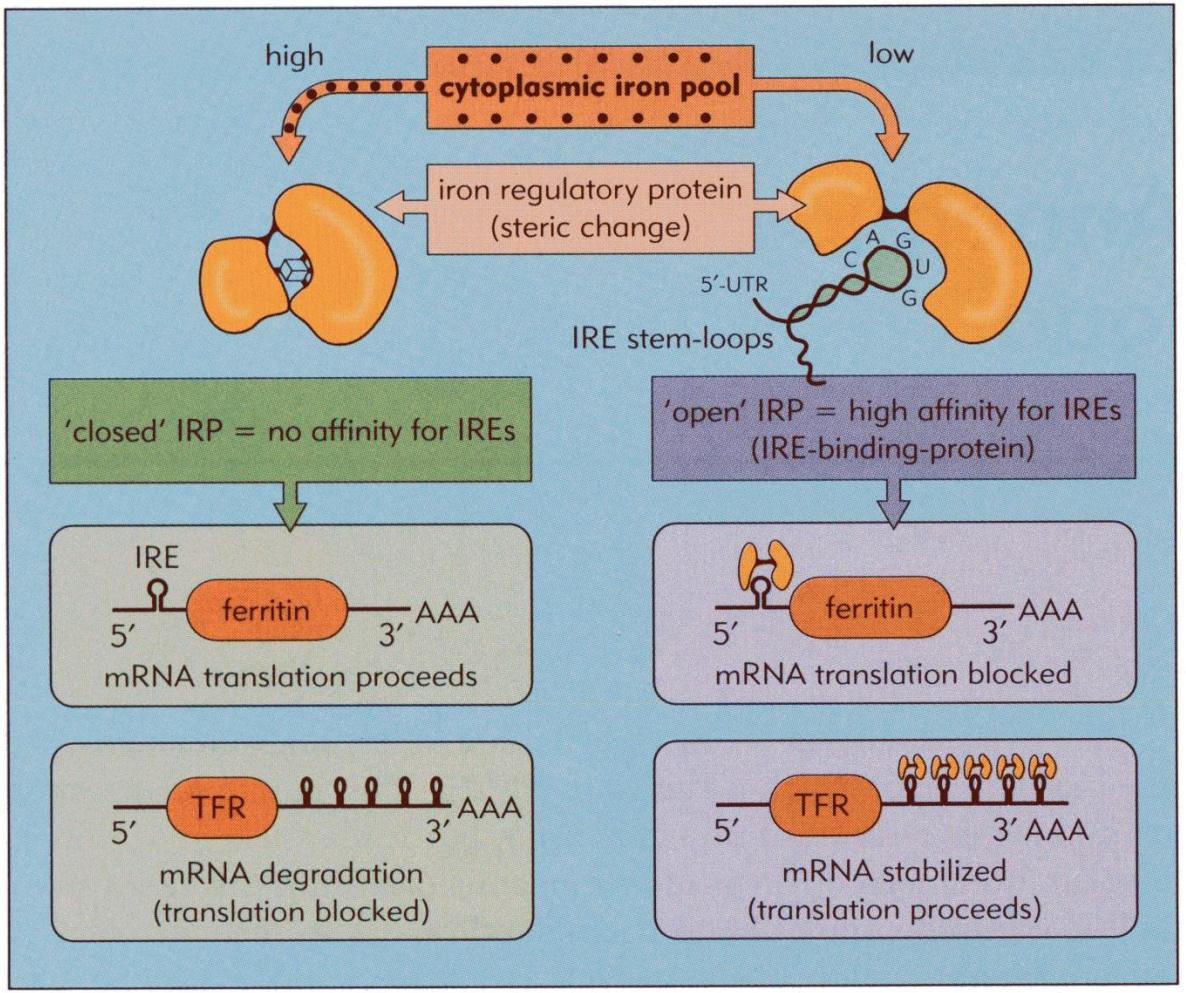
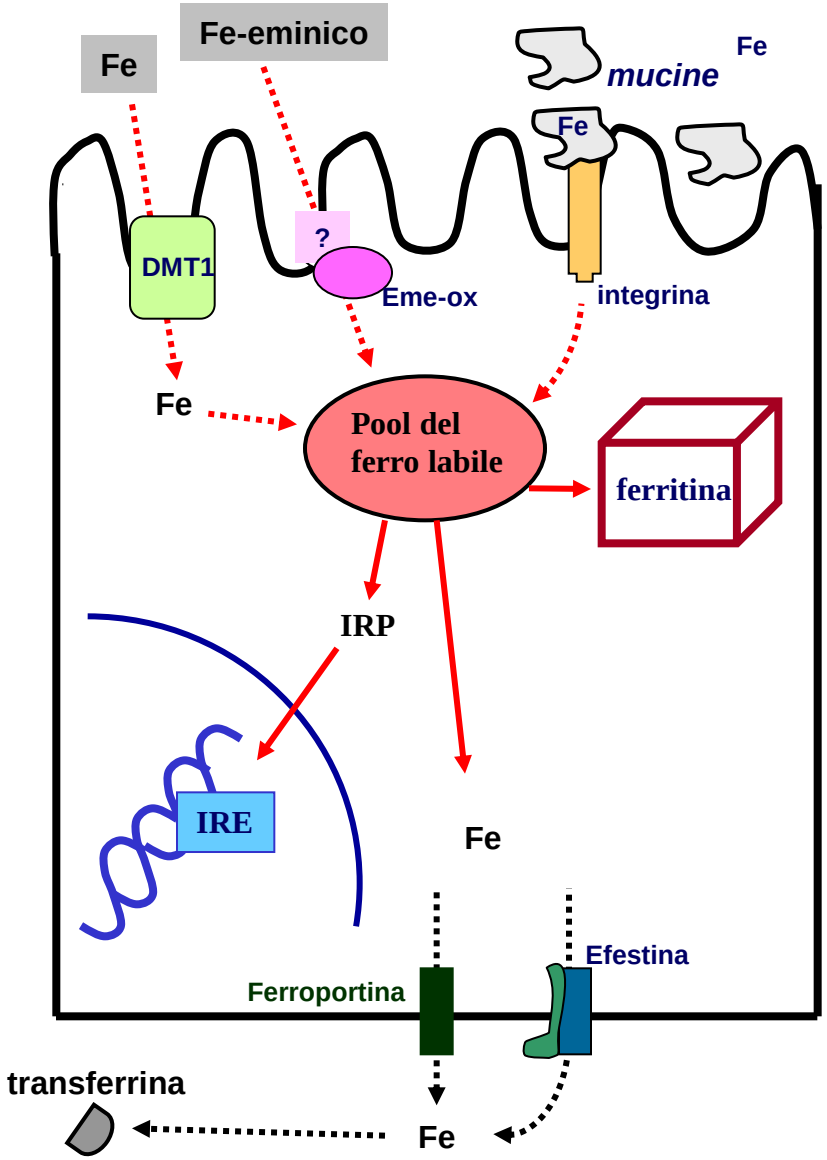
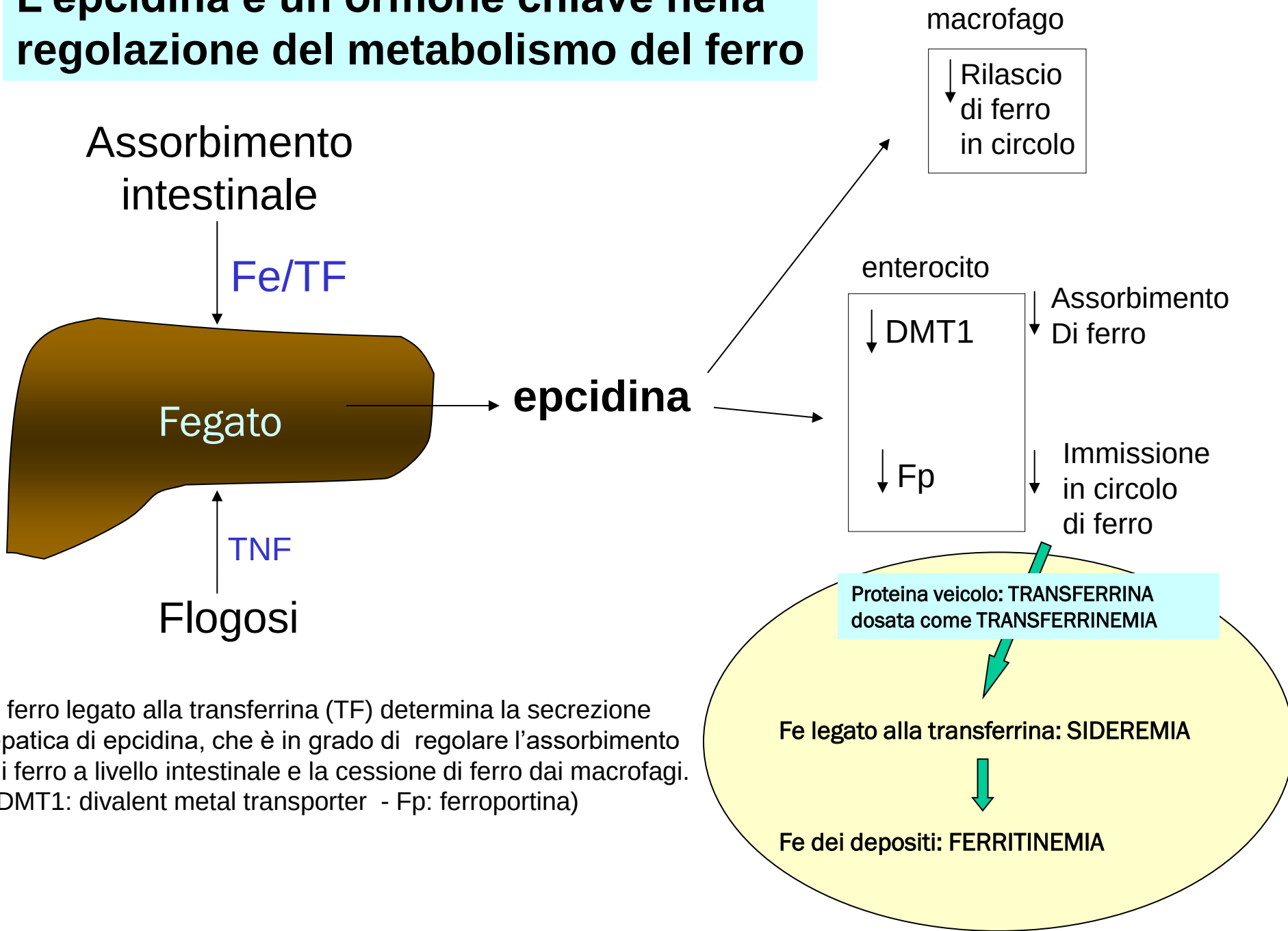


Fig. 2.2 Cellular iron homeostasis: the synthesis of ferritin, the transferrin receptor (TFR), erythroid ALA-synthase (ALA-S) and possibly other proteins involved in iron metabolism is regulated at the level of RNA translation by cytoplasmic iron regulatory proteins (IRP). These proteins can bind to mRNAs that contain a stem and loop structure – an iron-responsive element (IRE). When iron is plentiful, it has a low affinity for IRE, resulting in less transferrin receptor but more ferritin and erythroid ALA-S synthesis. When iron supply is low, binding to the IRE is increased with increased synthesis of transferrin receptor and less ferritin and ALA-S synthesis. (Courtesy of Dr D Girelli.)


villo intestinale
Fe
Fe-eminico
mucine
Fe
Fe
DMT1
?
Eme-ox
integrina
Fe
Pool del
ferro labile
ferritina
IRP
IRE
Fe
Efestina
Ferroportina
transferrina
Fe
Circolo ematico

L'epcidina è un ormone chiave nella regolazione del metabolismo del ferro



Il ferro legato alla transferrina (TF) determina la secrezione epatica di epcidina, che è in grado di regolare l'assorbimento di ferro a livello intestinale e la cessione di ferro dai macrofagi. (DMT1: divalent metal transporter - Fp: ferroportina)

MECCANISMI DI COMPENSO E SINTOMI GENERALI DA ANEMIA

Meccanismo	Significato	Segni e sintomi
Aumento 2,3 DPG	**Calo affinità Hb per O2**	
Redistribuzione flusso	**Organi vitali** **Calo perfusione cute**	**Pallore**
Aumento portata cardiaca	**Significativo per Hb <7 con calo res perferiche e viscosità ematica**	**Non aumenta PA** **Soffio anemico** **Cardiomegalia, pre EPA, ascite, edemi**
Aumento funzione polmonare	**Risposta centri respiratori ad ipossia**	**Scarso beneficio**
SINTOMI		**ASTENIA, DISPNEA DA SFORZO, CARDIOPALMO, RONZIO AURICOLARE, IRRITABILITA', CEFALEA, DIFFICOLTA' A CONCENTRARSI, ANGINA, CLAUDICATIO, CRAMPI**

SINTOMI

- **GENERALI DI ANEMIA**
  Lenta insorgenza e lievi rispetto al grado di anemia (adattamento fisiologico ad anemia a lenta insorgenza)

- **SOFFERENZA DELLE MUCOSE E DELL'EPITELIO**

- **Secchezza e talora perdita capelli**
- **Unghie fragili, coilonichia**
- **Glossite**
- **Cheilite angolare**
- **Plummer Vinson (glossite disfagia, anemia sideropenica)**
- **Atrofia della mucosa gastrica**
- **Pica**

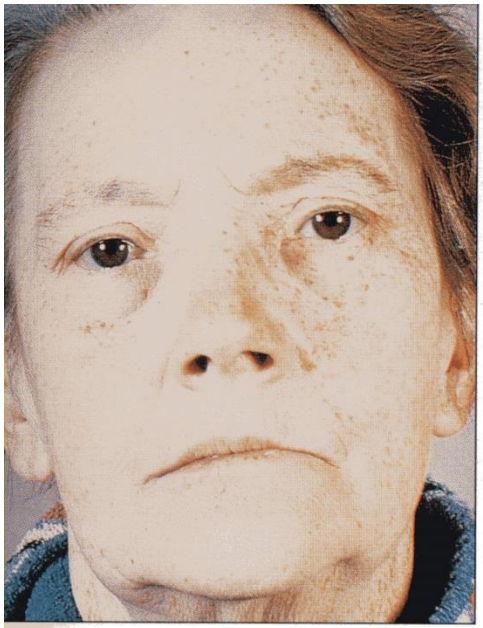
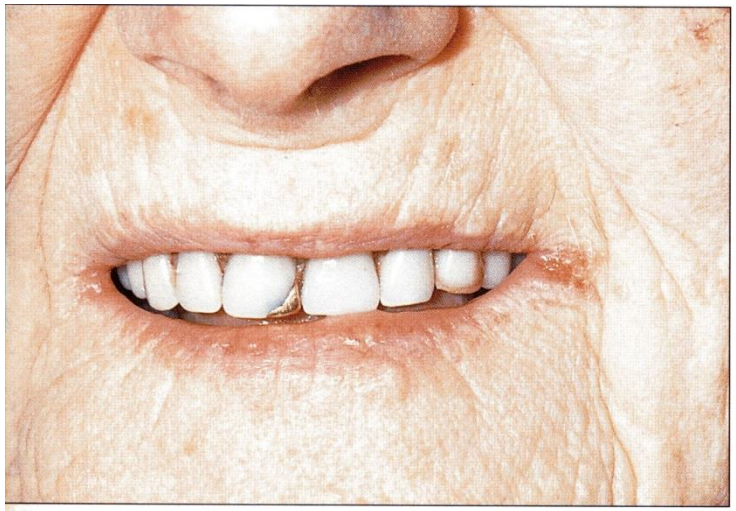


Fig. 2.5 Iron-deficiency anaemia: pallor of mucous membranes (lips) and skin in a 69-year-old woman. (Hb, 8.1 g/dl; RBC, 4.13×10^{12}/1; PCV, 26.8%; MCV, 65 fl; MCH, 19.6 pg.)

Fig. 2.6 Iron-deficiency anaemia: marked pallor of the nail beds in a dark-skinned patient. The nails are flattened.



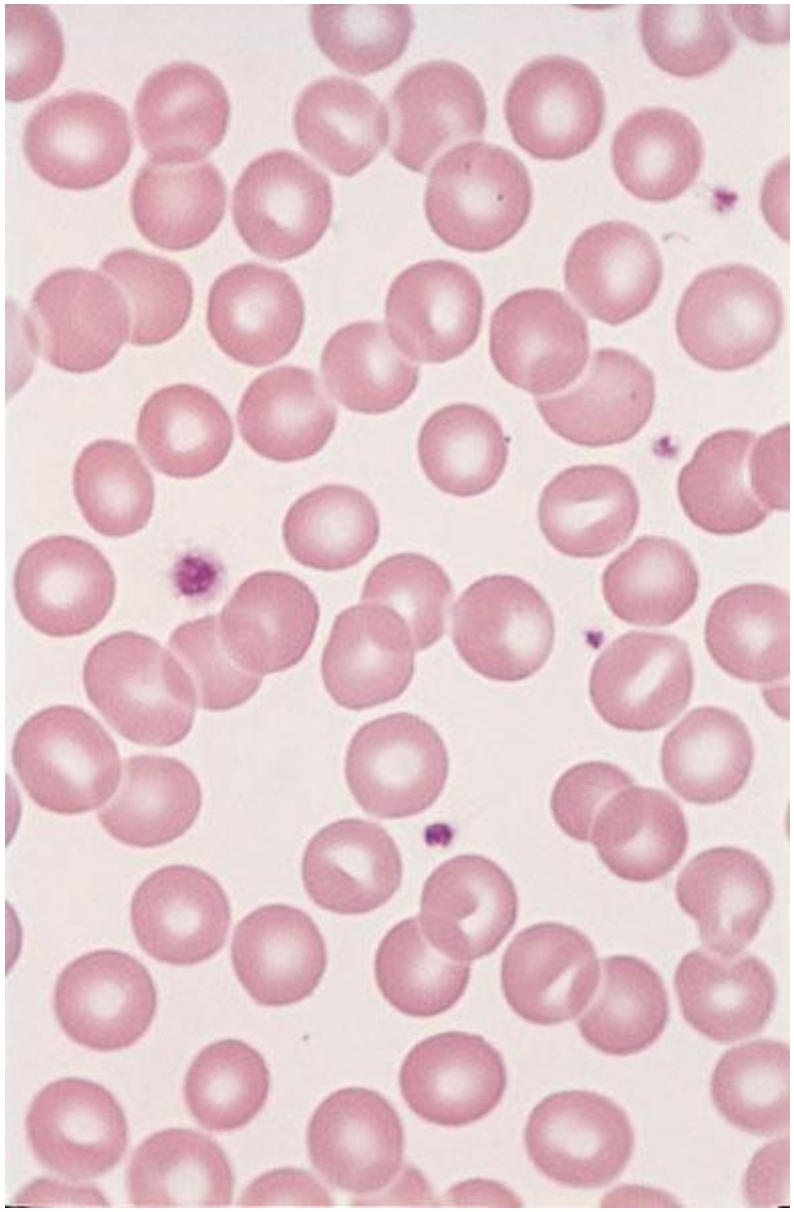
2.9 Iron-deficiency anaemia: angular cheilosis. There is fissuring ılceration at the corners of the mouth. The biochemical ıanism is uncertain but may be similar to that for nail, mucosal ɔharyngeal changes.

Fig. 2.10 Iron-deficiency anaemia: glossitis. The bald, fissured appearance of the tongue is caused by flattening and loss of papillae.

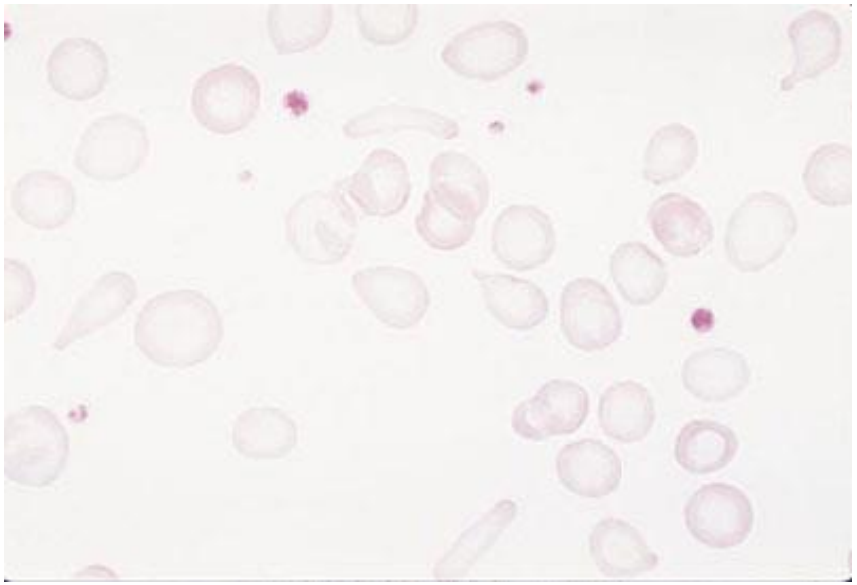
Valori ematici in un caso di anemia microcitica sideropenica

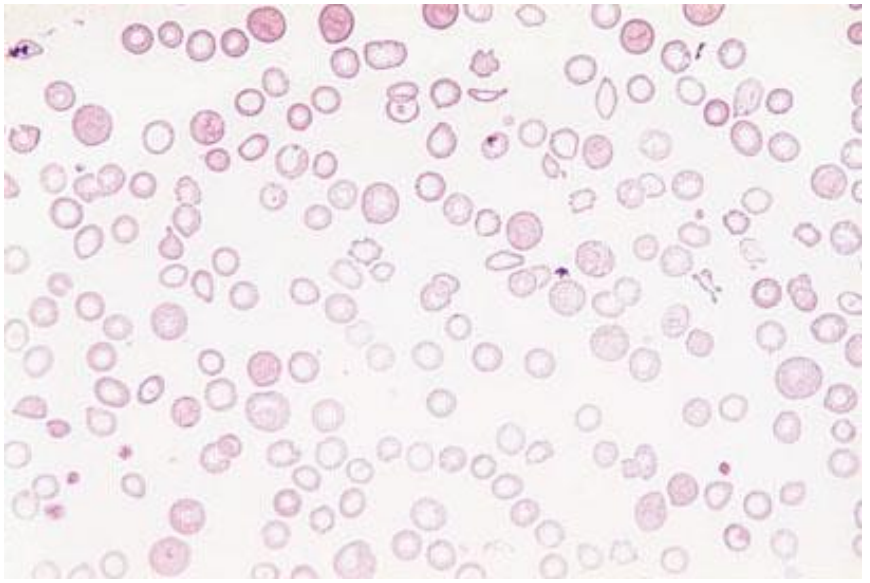
WBC	7.900
Hb	7,3
GR	3.800.000
MCV	68
MCH	22
Pst	450.000

GR normali

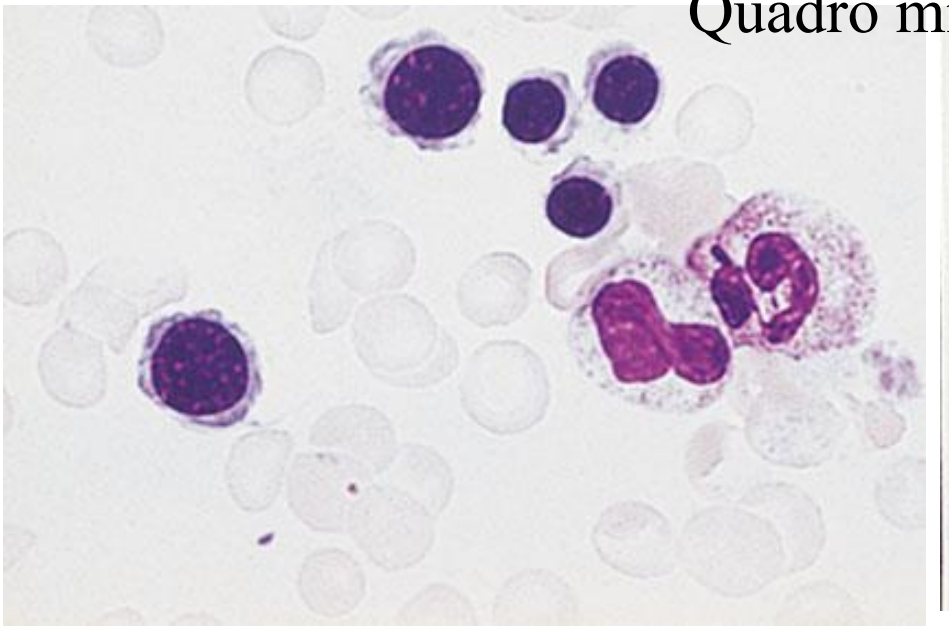


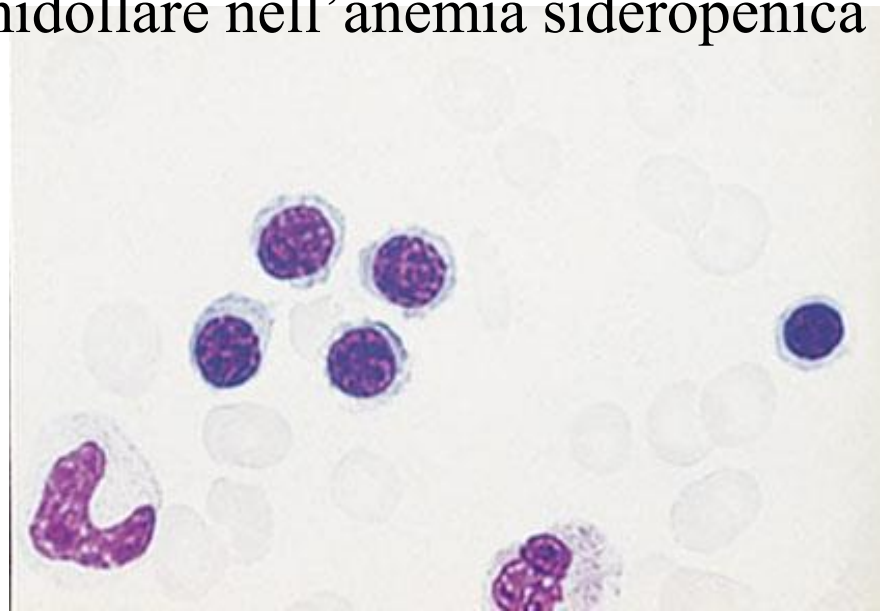
GR nell'anemia sideropenica

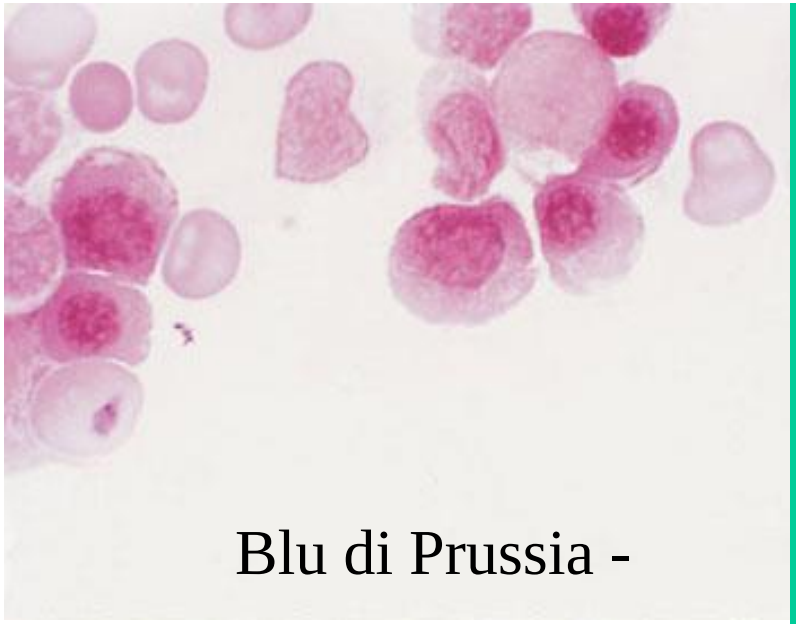




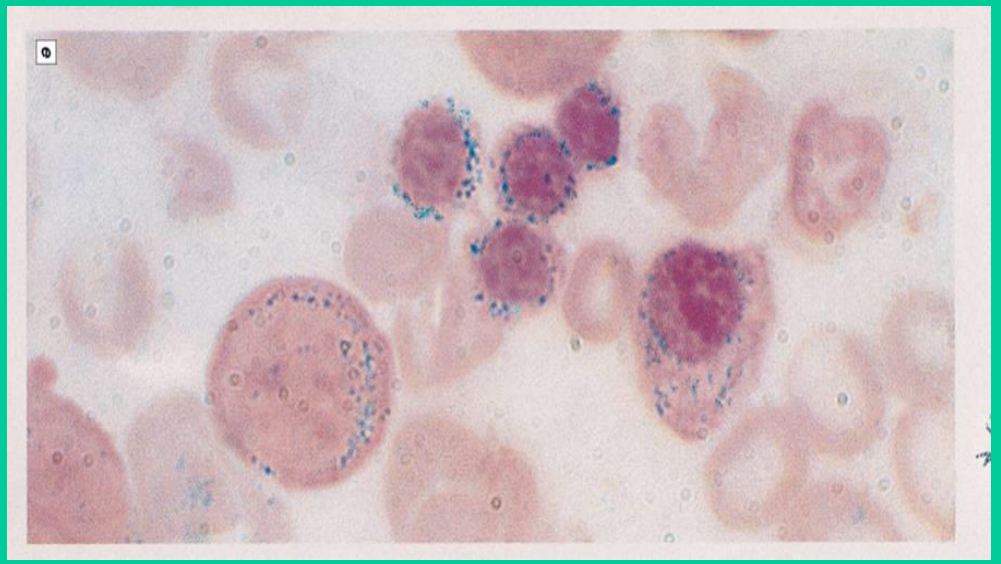
Quadro midollare nell'anemia sideropenica







Blu di Prussia -



Blu di Prussia +

→ Diagnosi

Anemia microcitica
Sideremia bassa
Transferrina elevata
Ferritina bassa
Dimostrazione della causa obbligatoria (RSO!!)
Pensare alla celiachia

→ Diagnosi differenziale

Microcitemia

Indici eritrocitari
Sideremia transferrina ferritina
Elettroforesi Hb

Anemia malattie croniche

MCV
Sideremia transferrina ferritina
Risposta alla terapia

TERAPIA

- **Solfato ferroso (ferrograd) 100-200 mg / die a stomaco vuoto.**
- **Se non tollerato da assumere a stomaco pieno e a dosi più basse, eventualmente a giorni alterni**
- **Effetti collaterali piuttosto frequenti, ma tollerabili (sensazione di gonfiore e tensione, feci scure, epigastralgie)**

- **Preparati gastroprotetti costosi e di limitata efficacia**

- **Ferro IV solo in caso di reale intolleranza al ferro per os e solo in strutture ospedaliere (possibili reazioni gravi, anche se rare)**

- **Monitorare la risposta: crisi reticolocitaria dopo 5-7 gg, aumento Hb di 1-2 gr/dl dopo 20 giorni, correzione di metà del difetto in un mese. Miglioramento astenia, bruciore cavo orale e pica di solito in pochi giorni. Glossite e coilonichia richiedono diverse settimane**

- **Trasfusioni solo in caso di pericolo di vita per scompenso, e nel caso, GR concentrati da infondere molto lentamente promuovendo nel frattempo diuresi con diuretici**

Table 3. Indications for Parenteral Iron Therapy.

Established indication
Failure of oral therapy
Iron intolerance or with low iron levels that are refractory to treatment (e.g., after gastrectomy or duodenal bypass, with *Helicobacter pylori* infection, or with celiac disease, atrophic gastritis, inflammatory bowel disease, or genetically induced IRIDA*)
Need for quick recovery (e.g., with severe iron deficiency in the second or third trimester of pregnancy or with chronic bleeding that is not manageable with oral iron, as may occur in patients with congenital coagulation disorders)
Substitution for blood transfusions when not accepted by patient for religious reasons
Use of erythropoiesis-stimulating agents in chronic kidney disease
Potential indication
Anemia of chronic kidney disease (without treatment of erythropoiesis-stimulating agents)
Persistent anemia after use of erythropoiesis-stimulating agents in patients with cancer who are receiving chemotherapy
Anemia of chronic disease unresponsive to treatment with erythropoiesis-stimulating agents alone
Potential indication with insufficient supporting data
Iron deficiency in heart failure
Transfusion-sparing strategy in surgical patients

MANCATA RISPOSTA ALLA TERAPIA

- **Assunzione della terapia orale: corretta?**
- **Diagnosi: corretta? (Anemia malattie croniche)**
- **Malattie coesistenti: epatopatie o nefropatie croniche (IRC), neoplasie o flogosi occulte, perdite occulte, malassorbimento**