ANEMIA OF CHRONIC INFLAMMATION 🔥

Overview

Anemia of chronic inflammation (ACI), also known as anemia of chronic disease, is the most common anemia seen in hospitalized patients 🏥.
It superficially resembles iron deficiency anemia but differs fundamentally in pathogenesis and iron status.

📌 Key concept:

> This anemia results from suppression of erythropoiesis by systemic inflammation, not from true iron deficiency.

ASSOCIATED CONDITIONS 🦠

ACI occurs in disorders with persistent inflammation, including:

1️⃣ Chronic Infections

- Osteomyelitis
- Bacterial endocarditis
- Lung abscess

2️⃣ Chronic Immune-Mediated Disorders

- Rheumatoid arthritis
- Crohn disease

3️⃣ Malignancies

- Hodgkin lymphoma
- Carcinomas of lung and breast

PATHOGENESIS ⚙️

The anemia results from iron sequestration + reduced red cell production, driven by inflammatory cytokines.

Core Mechanism 🧬

Chronic inflammation → ↑ Pro-inflammatory cytokines (especially IL-6) 🔥 → ↑ Hepatic hepcidin synthesis 🧠 → Hepcidin downregulates ferroportin 🚫 → ↓ Iron export from:

- Marrow macrophages
- Enterocytes

→ ↓ Iron delivery to erythroid precursors

→ Functional iron deficiency

→ ↓ Hemoglobin synthesis

→ Anemia

Additional Contributing Mechanism 🩺

Chronic inflammation

→ ↓ Erythropoietin (EPO) synthesis by kidney

→ ↓ Marrow response to EPO

→ ↓ Red cell production

📌 Important:

Iron stores are adequate or increased, but iron is unavailable for erythropoiesis.

Why Does the Body Do This? 🤔

Although not fully understood, these changes may be adaptive:

- ↓ Plasma iron
- ↓ Availability of iron to iron-dependent microorganisms 🦠
- Part of the innate immune defense strategy

CLINICAL FEATURES 🧍‍♂️ 🧍‍♀️

- Usually mild to moderate anemia
- Often asymptomatic
- Symptoms (if present):
    - Fatigue

- Reduced exercise tolerance
- Pallor

LABORATORY FINDINGS 📊

Parameter	Anemia of Chronic Inflammation
Serum iron	↓
MCV	Normal or slightly ↓
Red cell appearance	Mildly hypochromic, mildly microcytic
Serum ferritin	↑ (acute-phase reactant)
Bone marrow iron	Increased
TIBC	↓

Transferrin saturation	↓
Erythropoietin levels	↓
Platelets	Often normal or ↑

📌 Classic exam contrast:

- Iron deficiency: low ferritin
- ACI: high ferritin

DIFFERENTIATION FROM IRON DEFICIENCY ⭐

Feature	Iron Deficiency Anemia	ACI
Cause	True iron depletion	Iron sequestration
Serum ferritin	↓	↑
TIBC	↑	↓

Bone marrow iron	Absent	Present
Response to iron	Excellent	Poor unless inflammation treated

MANAGEMENT & PROGNOSIS 💊🩺

- Iron therapy alone → limited benefit
- Erythropoietin + iron → partial improvement
- Definitive treatment:
  → Control of the underlying inflammatory disease

📌 Key Robbins line to remember:

Correction of the anemia requires effective treatment of the underlying condition.

Summary 📝

Anemia of chronic inflammation is a normocytic or mildly microcytic anemia caused by IL-6-mediated hepcidin elevation leading to iron sequestration and suppressed erythropoiesis.

-> The End <-