

# Laboratory Tests for Iron Stores and Iron Availability

**Iron;** needed for life, but potentially very toxic (free radicals).

## Tests of iron metabolism

### Serum iron ( SI)

- F: 600-1400 mg/L, 11-25mmol/L
- M: 750-1500 mg/L, 13-27mmol/L
- Low in Fe deficiency and chronic disease
- High in hemolytic syndromes and iron overload

### Total iron binding capacity (TIBC)

- amount of iron needed to bind to all the transferrin
- 2500 – 4500 mg/L , 45-82 mmol/L
- High in Fe deficiency
- Low in chronic disease

### Serum ferritin

- Fe storage glycoprotein
- Can store up to 2000 Fe
- 30-300 ng/mL)
- Serum level is very low, but closely correlates with level in cells
- Closely correlates with total body Fe stores
- <12 ng/mL Fe deficiency
- Elevated in Fe overload, liver injury, tumors (Acute phase protein)
- Tests for iron metabolism

### Additional;

#### Serum transferrin receptor

Increase in increased erythropoiesis and early Fe deficiency

#### RBC ferritin

storage status over the previous 3 month (Fe deficiency/overload) unaffected by liver function or acute illness

#### Free RBC porphyrin

increased when heme synthesis altered

## Iron Deficiency Anemia

### **Prelatent;** (Decreasing iron stores of organism)

- Decrease in serum ferritin – most sensitive parameter
- decrease of iron in BM – (iron is in BM cells in form of ferritin)
- increase TIBC (body has tendency to increase the absorption of iron and iron transporting capacity) this leads to decrease in Tf saturation even when serum iron is normal

### **Latent;** (Decreases serum iron available for erythropoiesis)

- decrease serum iron
- further decrease Tf saturation
- increase sTfR

### **Manifest anemia**

- parameters of anemia (low Hb, Hct, Erythrocyte count)
- anemia of iron deficiency is hypochromic and microcytic

	Anemia of chronic diseases	Anemia due to lack of iron	Myelodysplastic syndrome
Serum iron	↓↓↓	↓↓↓	↑↑↑
Transferrin/TIBC	↓	↑↑↑	↓↓↓
ferritin	↑	↓↓↓	↑↑↑
	Iron is locked into macrophages to be out of reach of bacteria.	Lack of stores, see prelatent, latent and manifest anemia.	Aplastic disorder of BM, enough iron in organism.