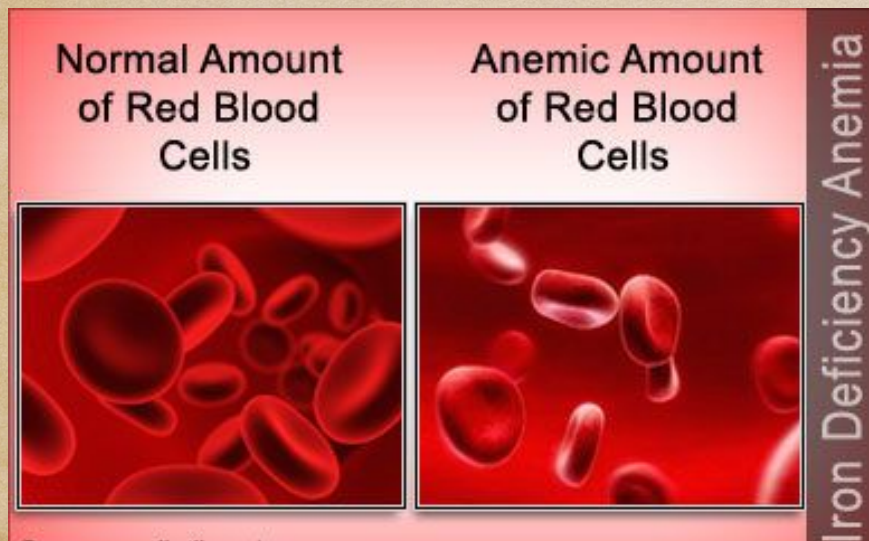


INVESTIGATIONS FOR IRON-DEFICIENCY ANEMIA IN PREGNANCY



M.NAGA JYOTHI
8th SEMESTER

1. Hemoglobin and hematocrit :

- Hemoglobin - $<10\text{g\%}$ (NORMAL : 11-14g%)

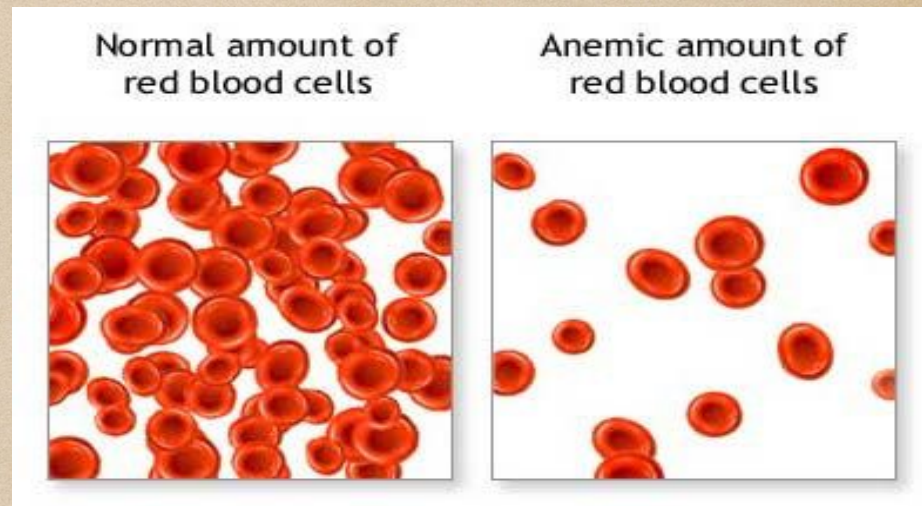
WHO Grading:

MILD 8-10g%

MODERATE 7-8g%

SEVERE 4-7g%

VERY SEVERE $<4\text{g\%}$



- PCV - $<32\%$ (NORMAL : 32%-36%)

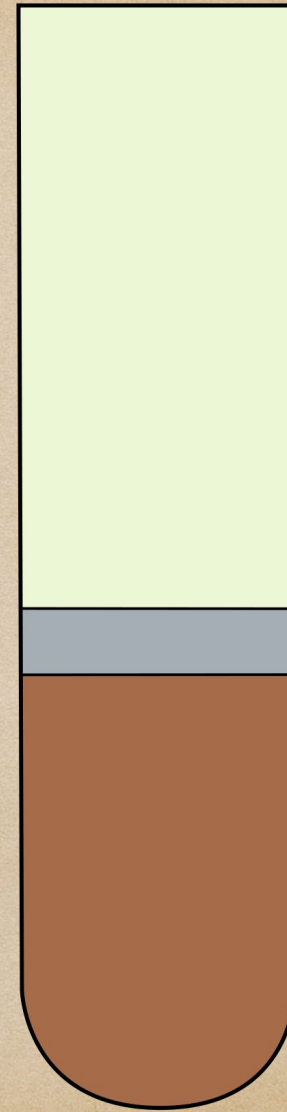
- RBC Count - $<3.2\text{million}$ (NORMAL : 4-4.5million/cubic millimetre)

Plasma

Formed
elements

Leukocytes &
thrombocytes

Erythrocytes



2. Peripheral Smear :

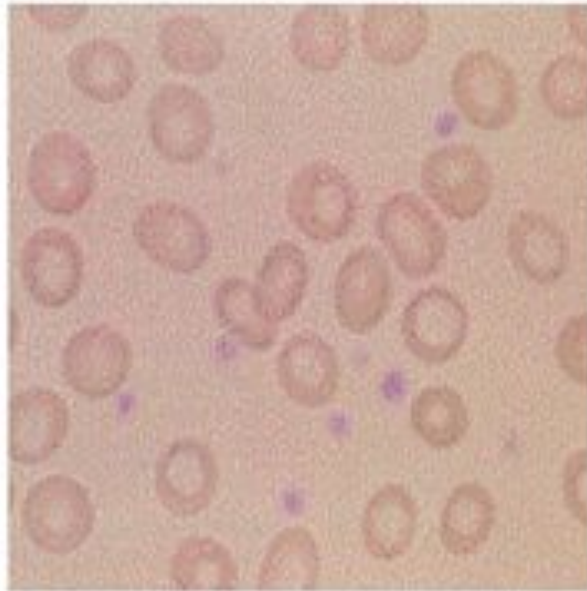
- Thin smear -

RBC Morphology - Microcytic hypochromic RBC's , anisocytosis , poikilocytosis and target cells.

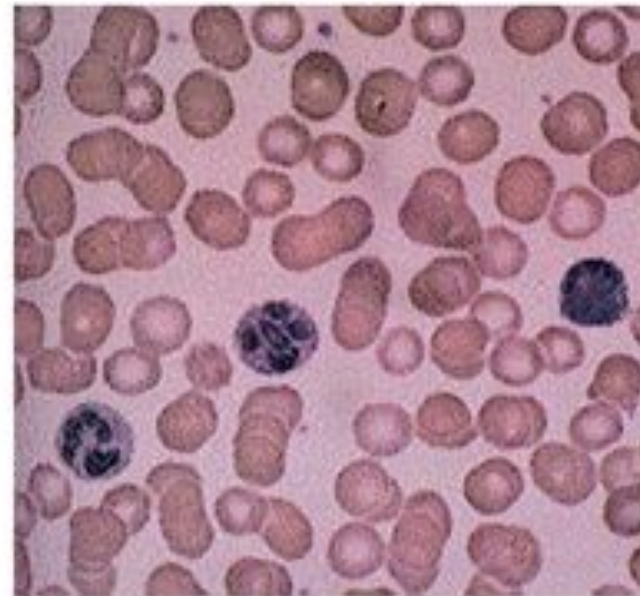
- Thick smear -

Useful in identifying parasites - malaria , leishmania

Iron Deficiency Anemia



anemia



normal blood

3. Red cell indices :

- Mean corpuscular volume ($MCV = Hct/RBC * 10$) - decreased ($< 80 \text{ fl}$) (NORMAL : 80-100fl)
- Mean corpuscular haemoglobin ($MCH = Hb/RBC * 10$) - decreased ($< 25 \text{ pg}$) (NORMAL : 27-31pg)
- Mean cell hemoglobin concentration ($MCHC = Hb/Hct * 100$) - reduced ($< 30\%$ is sensitive indicator) (NORMAL : 32-36g/dl)
- Red cell distribution width (RDW) - increased ($> 14\%$) [helps to differentiate from thalassemia.] (NORMAL : 11.5-14.5%)

4 . Special tests :

A. ferrokinetic studies

- Serum iron and Total iron binding capacity: <30mg/dl and >400mg/dl (NORMAL: 65-165mg/dl and 300-400mg/dl) respectively
- Transferrin % saturation : <16% (NORMAL : 20-50%)
- Serum ferritin : <12ng/ml (NORMAL : 15-300ng/ml)
- Serum transferrin receptor(TfR) : increased (>2.8mg/L) (NORMAL: 1-2mg/dl)
- Zinc protoporphyrin : increased (NORMAL : 0-35microgram/dl)

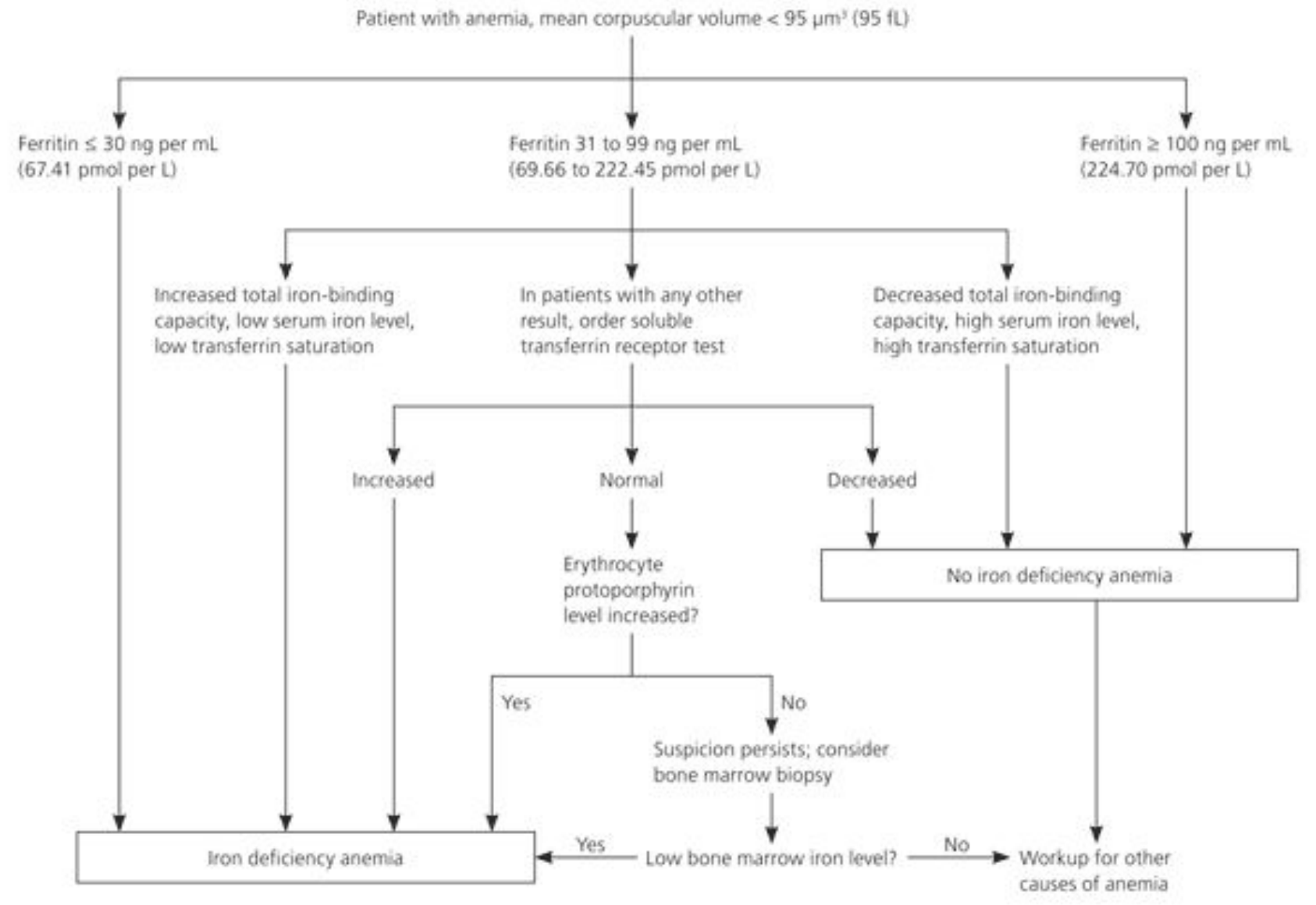
B. Bone marrow(prussian blue stain)studies:

<10% hemosideroblasts

- not done routinely.

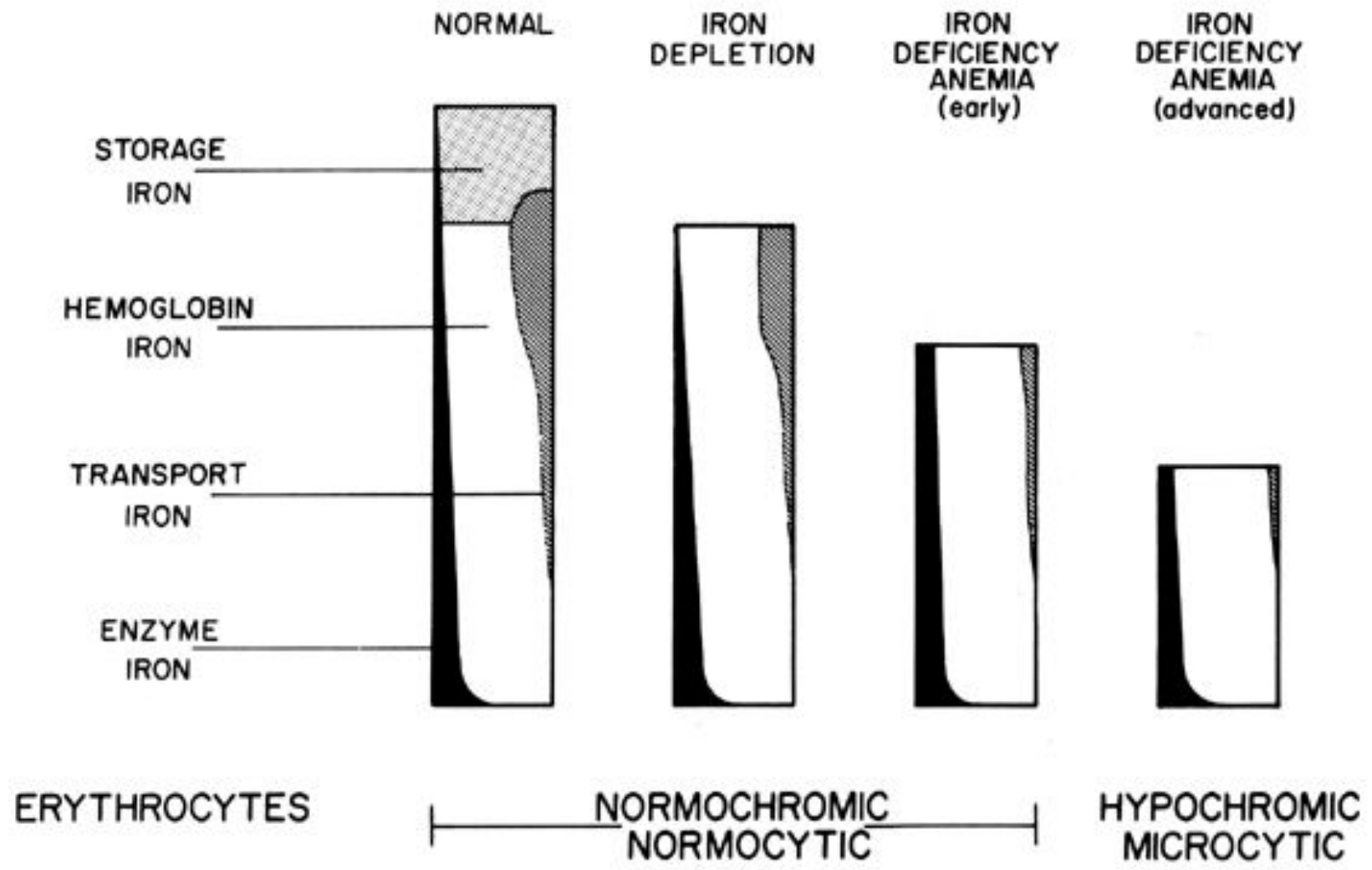
5. Investigations to determine the aetiology :

- Urine for hematuria and pyuria(culture & sensitivity)
- Stool examination for occult blood , ova and cysts.
- Renal function tests for chronic renal disease.
- Tests for tuberculosis(x-ray chest)
- Fractional test meal analysis of gastric juice.
- Serum protien.
- Osmotic fragility.



PHASES OF IRON- DEFICIENCY ANEMIA

1. Decreased iron stores(tissue iron only): decreased ferritin levels
2. Decrease in iron for erythropoiesis:(no clinical anemia)- serum transferrin receptors increases , decreased ferritin & %saturation of iron, increased FEP, decreased hemoglobin & hematocrit
3. Decrease in peripheral blood haemoglobin : decreased ferritin, %saturation of iron, haemoglobin , hematocrit , increased FEP and microcytic hypo chromic anemia.
4. Decrease in tissue oxygen delivery : clinical signs and symptoms.



DIFFERENTIAL DIAGNOSIS

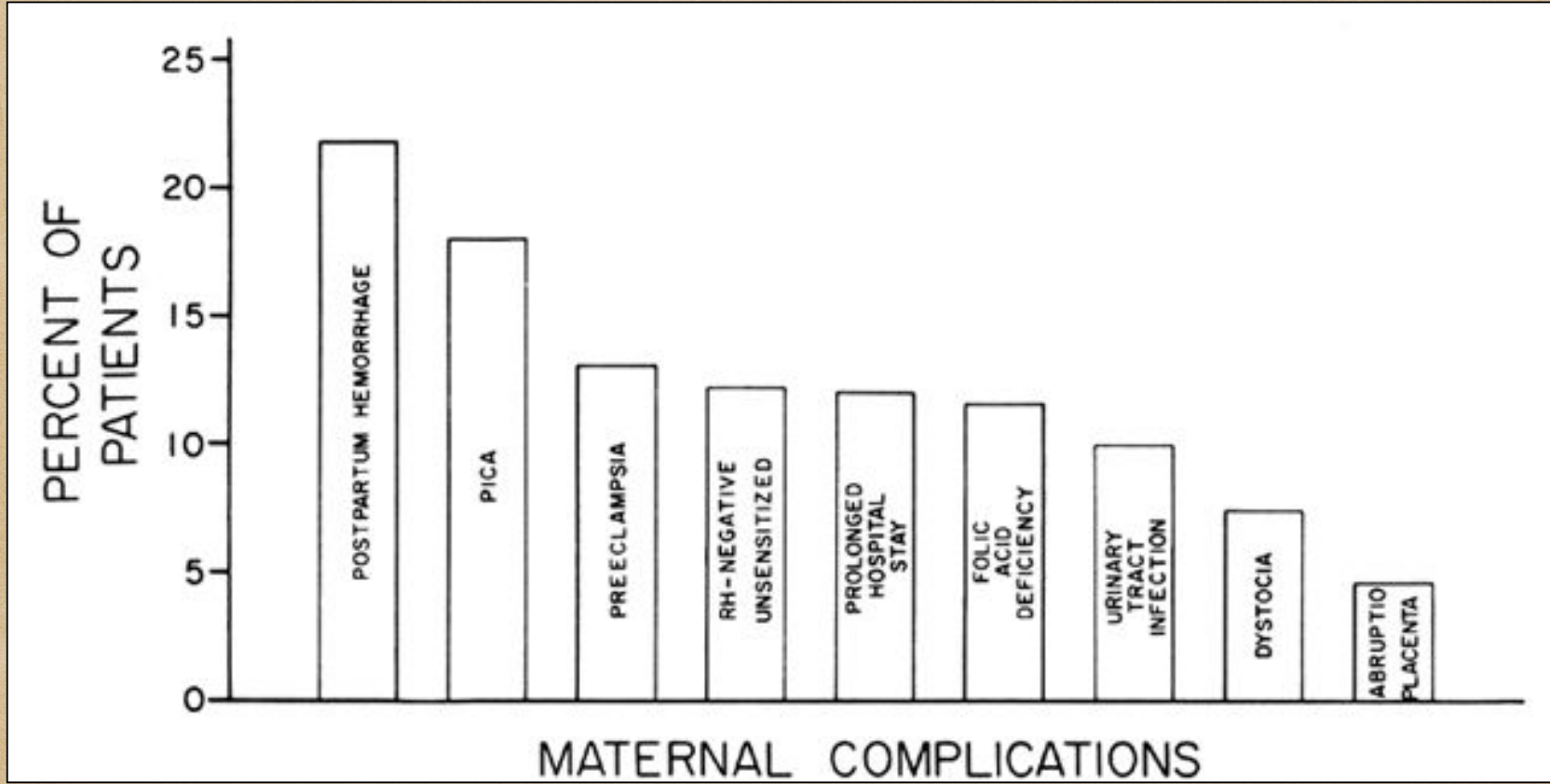
- Anemia due to chronic disease or an inflammatory process
- Thalassemia trait
- Sideroblastic anemia
- Anemia due to lead poisoning
- Infection
- Nephritis & pre-eclampsia
- Hemoglobinopathies

	Serum Ferritin (mcg/ml)	Serum Iron	Transferrin Saturation (%)	Hemoglobin
Anemia of Chronic Disease	normal or increased	decreased	normal or decreased	decreased
Iron Deficiency Anemia	decreased	decreased	decreased	decreased

COMPLICATIONS

1. Maternal :

- Spontaneous abortion
- Susceptibility to infections
- Preterm labour
- Pre-eclampsia
- Inability to withstand postpartum hemorrhage
- Puerperal sepsis
- Congestive cardiac failure
- Sideropenic dysphagia(paterson-kelly syndrome,plummer-vinson syndrome[rare])



2. Fetal :

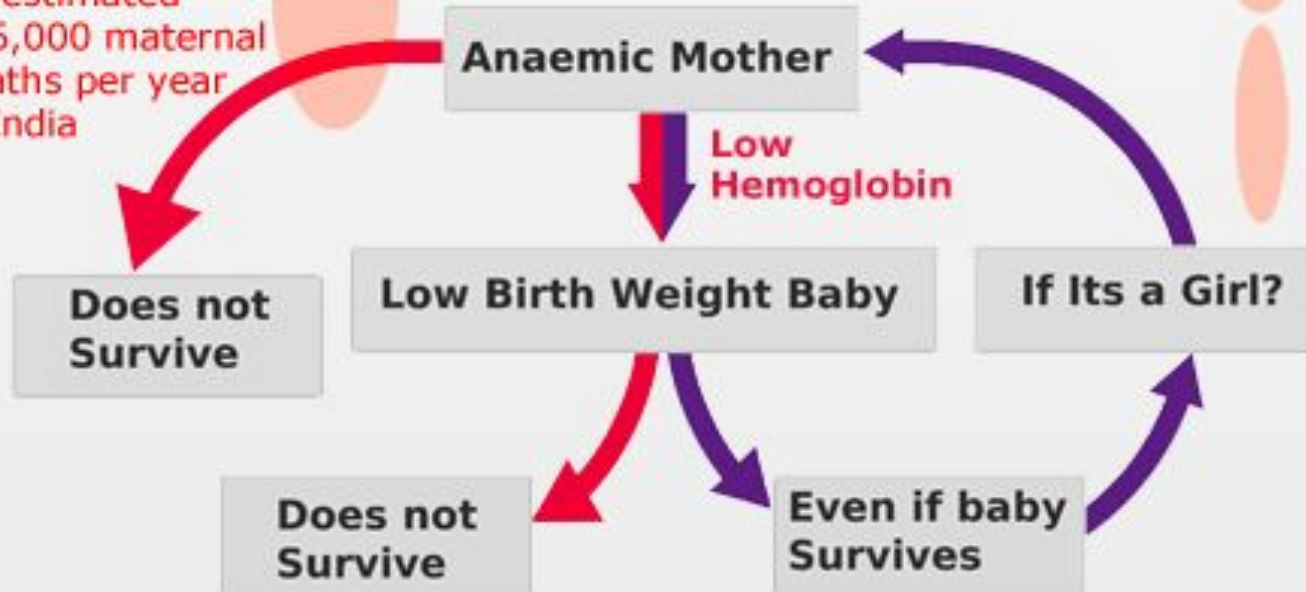
- Intrauterine growth restriction
- Prematurity
- Intrauterine fetal death (severe cases)
- Non-immune hydrops
- Increased morbidity and mortality
- Neonatal anemia
- Behavioural abnormalities in children

3. Puerperium :


- Subinvolution
- Poor lactation
- Puerperal venous thrombosis
- Pulmonary embolism

Anaemia is a **serious problem** especially during pregnancy

An estimated 136,000 maternal deaths per year in India



High Infant Mortality Rate of around 60/1000 live births in India

 prone to diseases
poor mental development
poor physical development
disability

PROGNOSIS

· MATERNAL -

- If detected early and proper treatment is instituted, anemia improves promptly.
- At times, recurrence in subsequent pregnancy is seen.
- Anemia directly or indirectly contributes to about 20% of the maternal deaths.

· FETAL :

- In severe cases fetal prognosis is adversely affected by prematurity with its hazards.
- Baby born at term, to severely anaemic mother will not be anaemic at birth, but as there is little or no reserve iron, anaemia develops in neonatal periods.
- Mean cord blood levels of serum iron, ferritin, B12 and folate are higher than that of mother.
- However, total iron binding capacity and serum levels of vitamin E are lower than that of mother.

