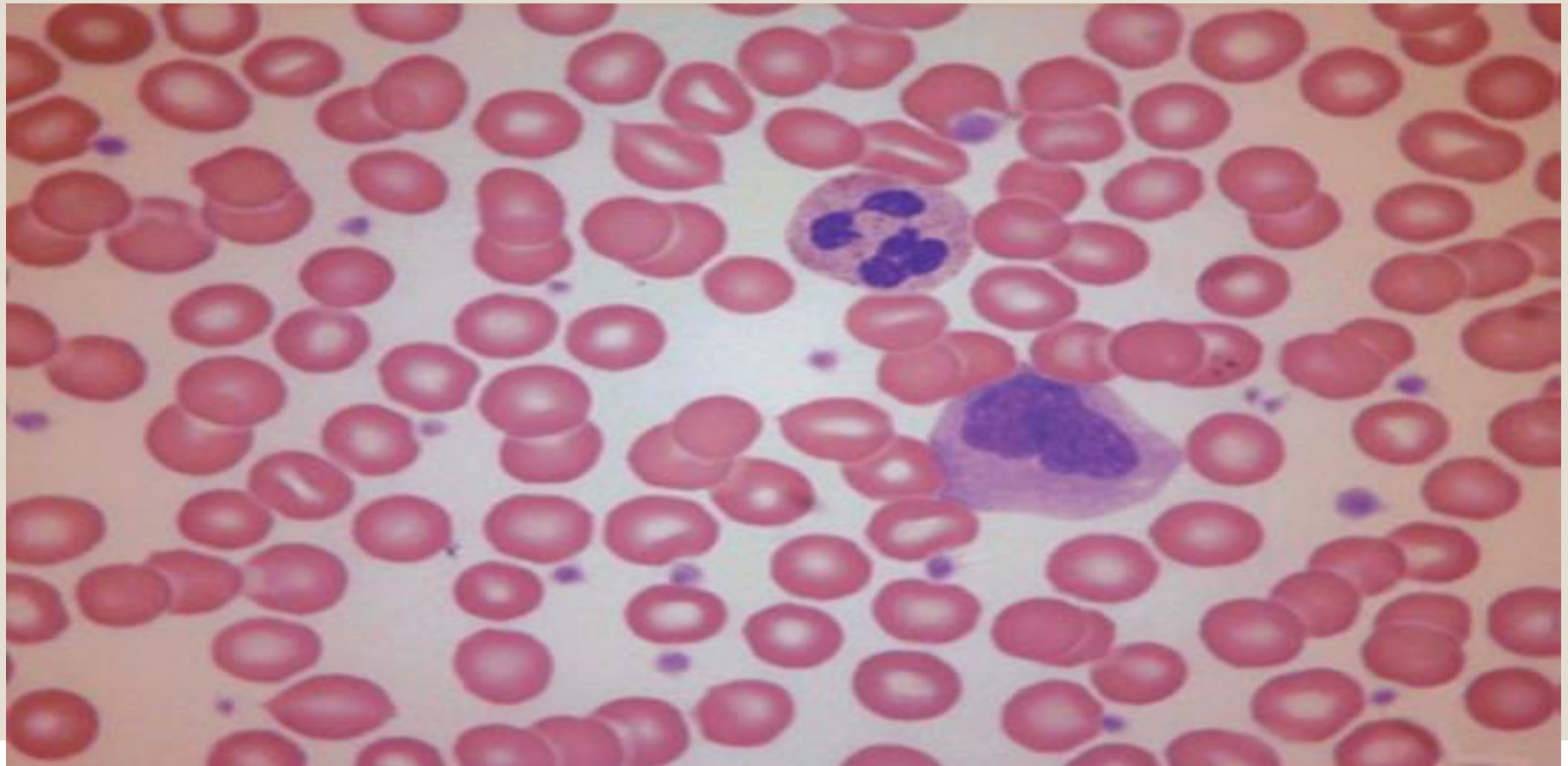




# **ANEMIA CLASSIFICATION**

**By**  
**DR. ZAHRAA NAJAH**

# NORMOCYTIC, NORMOCHROMIC, ANEMIAS



□ Most **important cause** of this type

1. Anemia of chronic disease (some cases)
2. Many hemolytic anemias
3. After acute blood loss
4. Endocrine failure  
(Hypothyroidism, Hypopituitarism)
5. Renal disease
6. Mixed deficiencies
7. Bone marrow failure (aplastic anemia, post-chemotherapy, infiltration by carcinoma)

❑ The patient should **reviewing** for :

Renal and liver function test , Bilirubin, (ESR), Urinalysis, and thyroid profile may help in the diagnosis.

❑ Bone marrow aspirate & biopsy is often necessary to aid the diagnosis if these simple tests do not provide the diagnosis.

# Hemolytic Anemias

- Hemolytic anemias, which result from increased rate in destruction of red cells.

Table 6.1 Classification of haemolytic anaemias.

## Hereditary

### Membrane

Hereditary spherocytosis, hereditary elliptocytosis

### Metabolism

G6PD deficiency, pyruvate kinase deficiency

### Haemoglobin

Genetic abnormalities (Hb S, Hb C, unstable); see Chapter 7

## Acquired

### Immune

*Autoimmune*

Warm antibody type

Cold antibody type

*Alloimmune*

Haemolytic transfusion reactions

Haemolytic disease of the newborn

Allografts, especially stem cell transplantation

*Drug associated*

# DIAGNOSIS OF HEMOLYTIC ANEMIA

❑ Medical history, family history, CBC, blood smear, Reticulocyte count, direct Coombs' test, Chemistry profile with indirect and direct bilirubin, and LDH, urinalysis, and haptoglobin levels are most useful in diagnosing hemolysis.

Test	Finding in hemolysis	Cause
Haptoglobin	Decreased	Binds free hemoglobin
Lactate dehydrogenase	Elevated	Released from lysis of red blood cells
Peripheral blood smear	Abnormal red blood cells	Based on cause of anemia
Reticulocyte count	Increased	Marrow response to anemia
Unconjugated bilirubin	Increased	Increased hemoglobin breakdown
Urinalysis	Urobilinogen, positive for blood	Free hemoglobin and its metabolites

# Reticulocyte Production Index

<2 Decreased Production

>2 Increased Loss

Red Cell Indices MCV

Hemolysis

Bleeding

>94

80-94

<80

Macro

Normo

Micro

Extrinsic

Intrinsic

Coombs Positive

Coombs Negative

Membrane

Hb

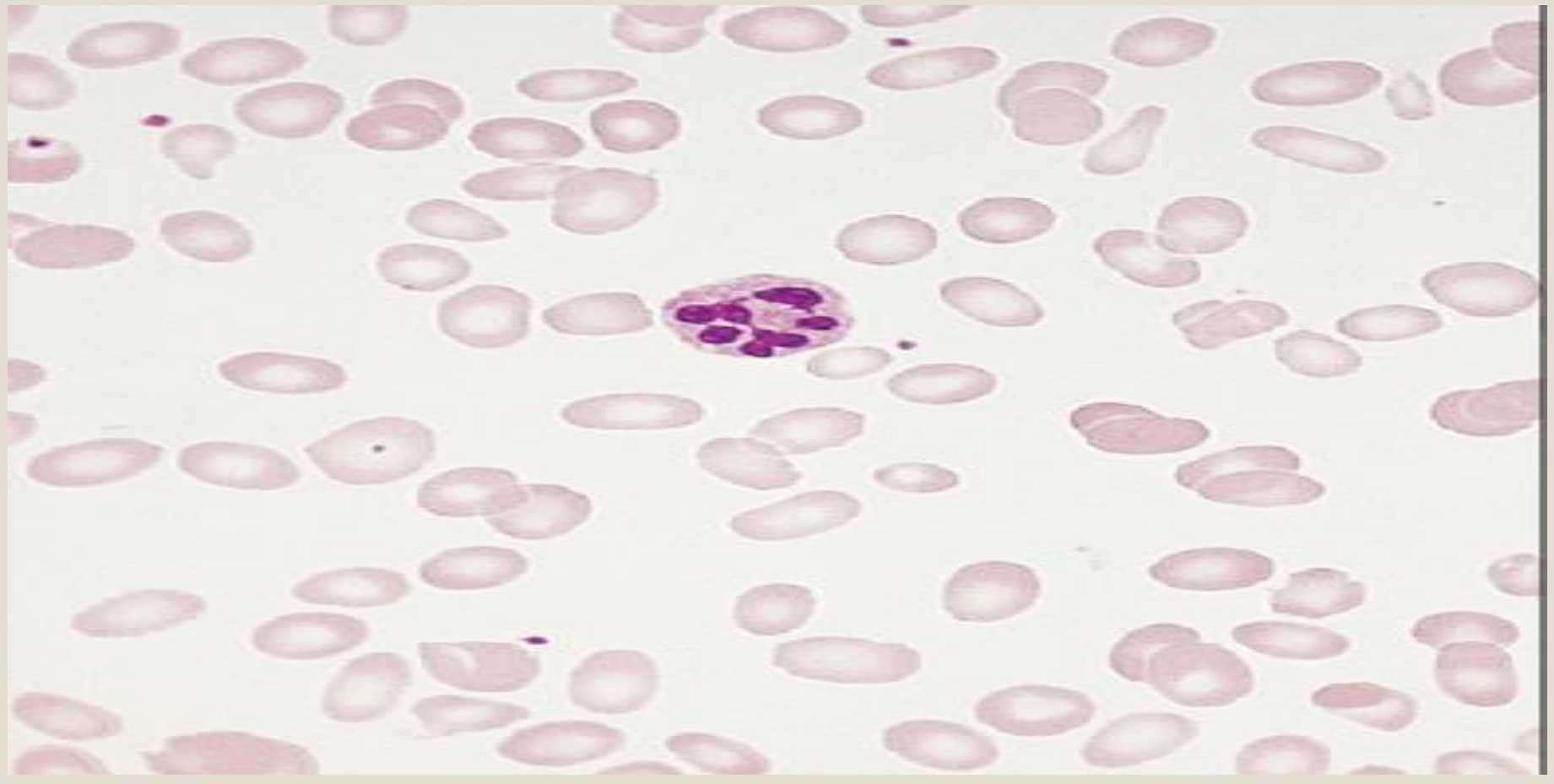
Enzyme

Drug

Warm Antibody

Cold Antibody

# MACROCYTIC ANEMIA





# Differential Diagnosis of Macrocytic Anaemia

## Megaloblastic Anemia

- Vitamin B<sub>12</sub> deficiency
- Folate deficiency
- Drug Induced anemia

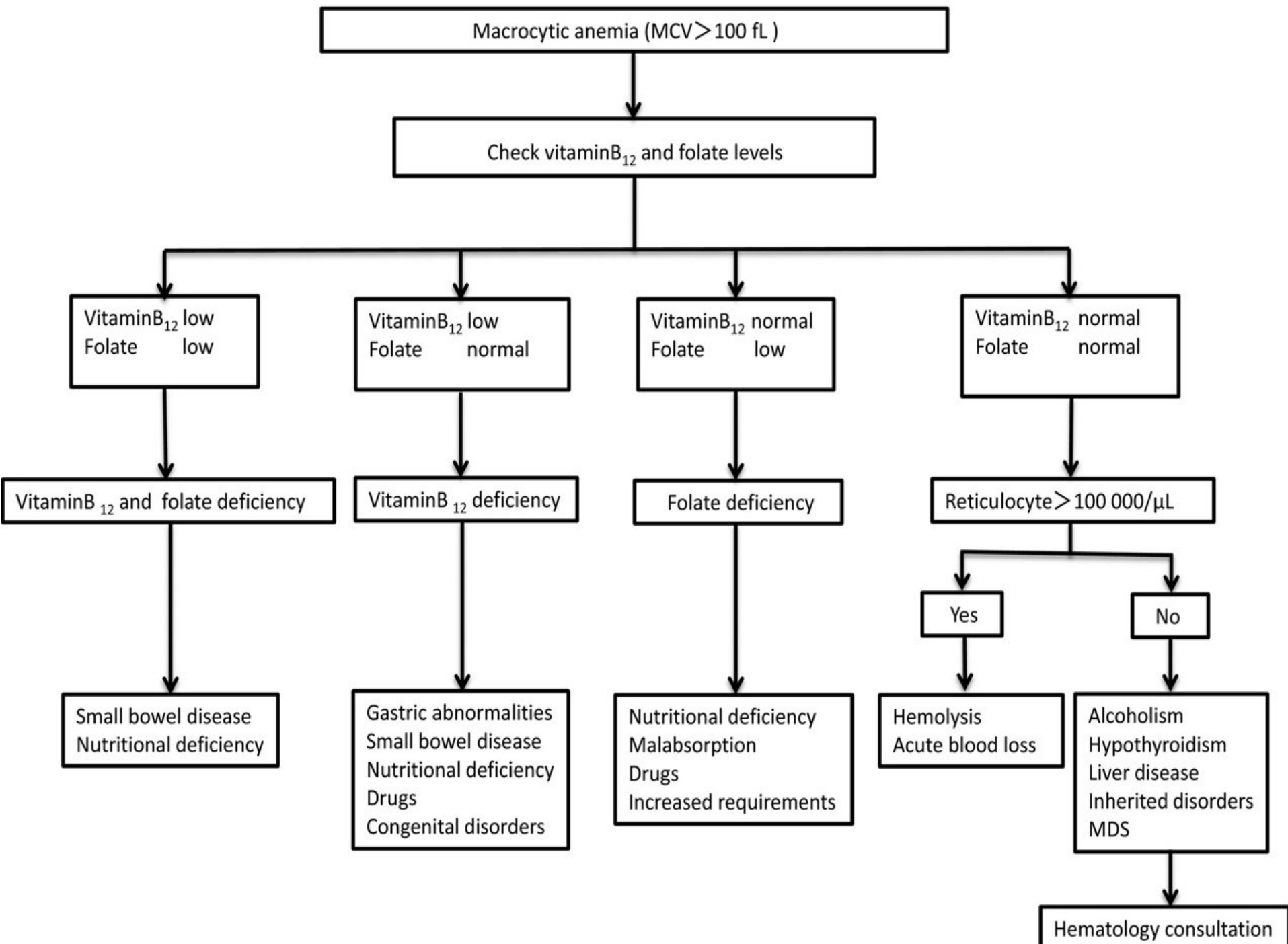
## Non megaloblastic Anemia

- Excess alcohol consumption
- Liver disease
- Hypothyroidism
- Aplastic anemia
- Paraproteinemia(Myeloma)
- Pregnancy
- Neonatal period



## 24.37 Investigations in megaloblastic anaemia

Investigation	Result
Haemoglobin	Often reduced, may be very low
MCV	Usually raised, commonly $> 120$ fL
Erythrocyte count	Low for degree of anaemia
Blood film	Oval macrocytosis, poikilocytosis, red cell fragmentation, neutrophil hypersegmentation
Reticulocyte count	Low for degree of anaemia
Leucocyte count	Low or normal
Platelet count	Low or normal



# Polycythemia

- ❑ Polycythemia, or erythrocytosis, refers to an increase in the RBC mass, usually with a corresponding increase in hemoglobin level. The increase in red cells can be absolute or relative.

**Table 18.1: Pathophysiologic classification of polycythemia**

## ***Absolute***

### **Primary (low erythropoietin level)**

- Polycythemia vera

### **Secondary (high erythropoietin level)**

- Physiologically appropriate
  - Compensatory
  - Lung disease
  - Living in high-altitude
  - Cyanotic heart disease (Tetralogy of Fallot)
- Physiologically inappropriate (with increased erythropoietin)
  - Paraneoplastic: Erythropoietin-secreting tumors (e.g. renal cell carcinoma, uterine leiomyosarcoma)

## ***Relative***

### **Reduced plasma volume**

- Hemoconcentration (dehydration due to diarrhea, vomiting)
- Gaisböck syndrome (spurious polycythemia)

