DIAGNOSTIC APPROACH TOWARDS A PATIENT WITH ANAEMIA

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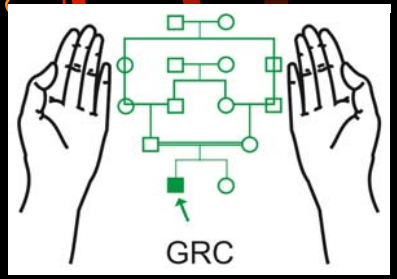

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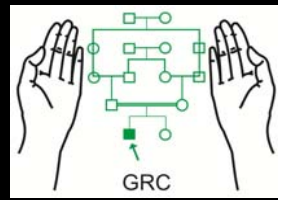
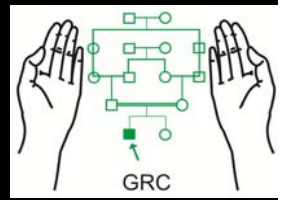
Anaemia

Reduction in Haemoglobin below the normal range for the age and sex of the individual



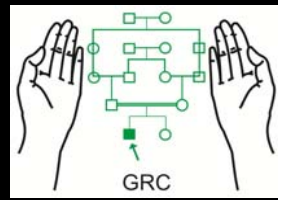
Reference Ranges

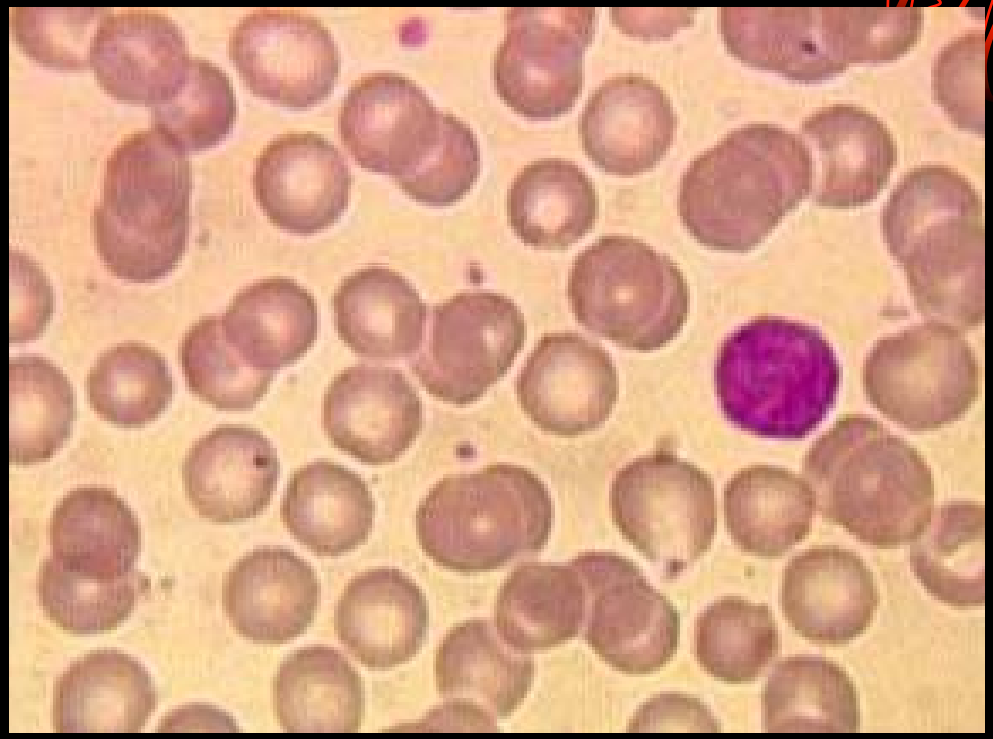
- Haemoglobin:
  - Adult males: 13.5-18.5 g/dL
  - Adult females: 11.5-16.5 g/dL
  - Children: 11.5-14.5 g/dl
- Packed Cell Volume (PCV):
  - Adult males: 0.40-0.54 L/L
  - Adult female: 0.37-0.47 L/L
- TRBC:
  - Adult male: 4.5-6.5 X 10^{12}/L
  - Adult females: 3.8-5.8 X 10^{12}/L

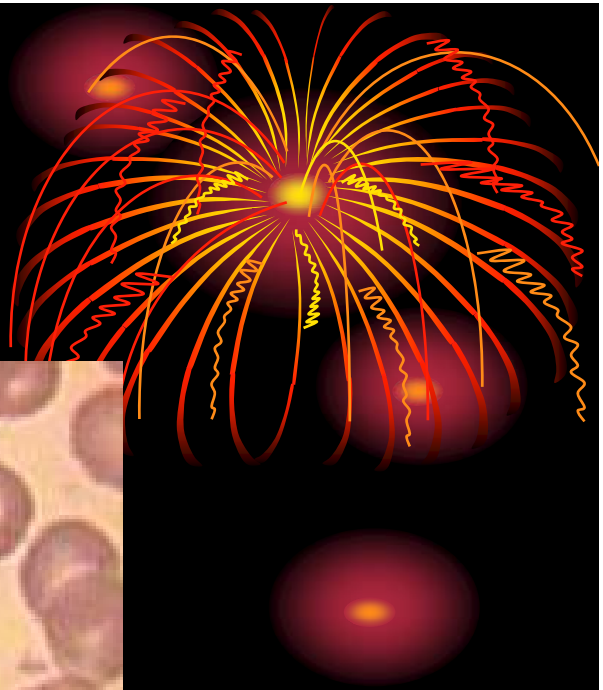


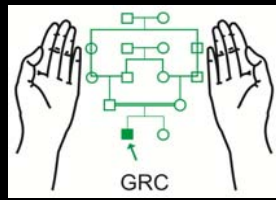
Absolute Values

- Mean Cell Volume (MCV):
  - Adults: 76-96 fL
  - Infants: 100-120 fL
  - Children: 70-86 fL
- Mean Cell Haemoglobin (MCH):
  - Adults: 27-32 pg
  - Children: 24-30 pg
- Mean Cell Haemoglobin Concentration (MCHC):
  - Adults & Children: 30-35 g/dL





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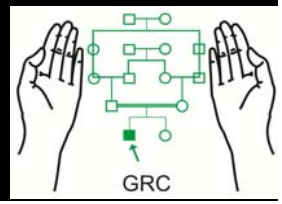
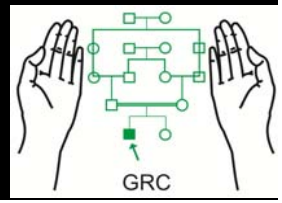
Physiological Adaptation in Anaemia

- Erythroid hyperplasia
- Increased release of O_2 from RBCs (increased 2,3-DPG)
- Increased cardiac output
- Maintenance of blood volume
- Redistribution of blood flow



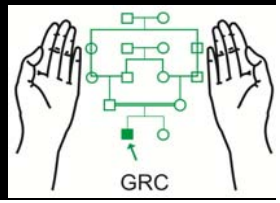
Clinical Features of Anaemia

- Fatigue and weakness
- Dyspnoea on exertion
- Palpitation
- Faintness, giddiness, headach blackouts etc.
- Pallor
- High output state
- Signs and symptoms of the underlying disease



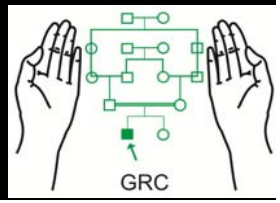
Diagnosis of Anaemia

- Is the patient anaemic?
- What is the type of anaemia?
- What is the cause of anaemia?



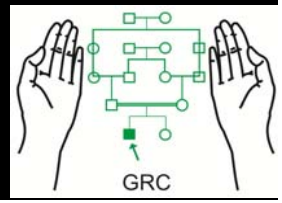
Classification of Anaemias

- Aetiological
- Morphological
  - Hypochromic microcytic
  - Macrocytic
  - Normochromic normocytic



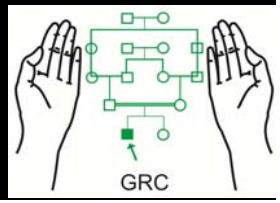
Hypochromic Microcytic Anaemias

- Iron Deficiency
- Thalassaemia
- Chronic disorders
- Sideroblastic anaemia



Hypochromic Microcytic Anaemias

- **Hb:** **6.5 g/dl**
- **TRBC:** **3.1 X 10^{12}/L**
- **MCV:** **62.1 fl**
- **MCH:** **19.2 pg**
- **TLC:** **11.0 X 10^{9}/L**
- **Platelets:** **470 X 10^{9}/L**
- **Reticulocytes:** **3.5%**
- **ESR:** **43 mm in 1st hour**



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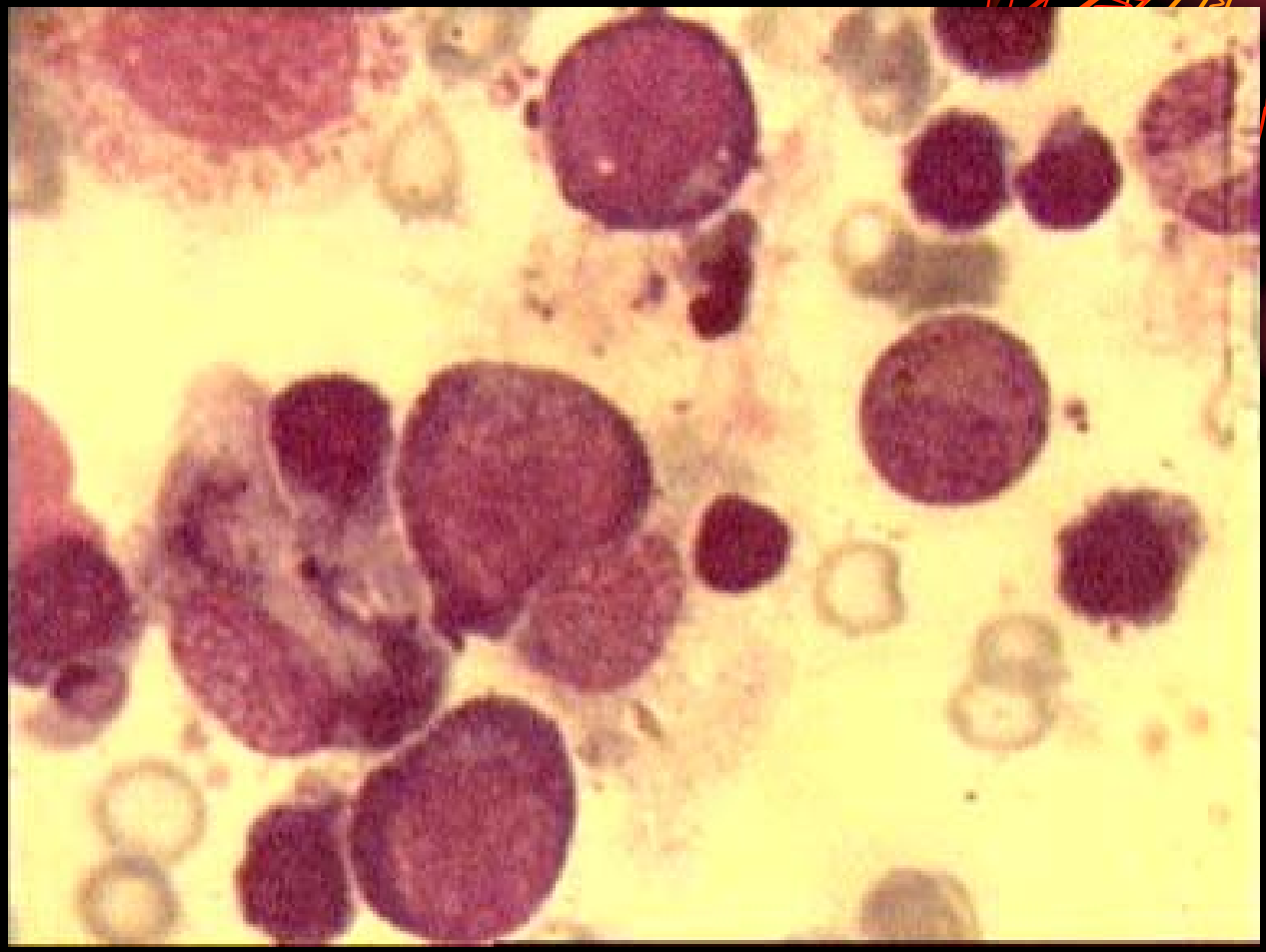

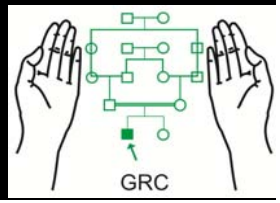
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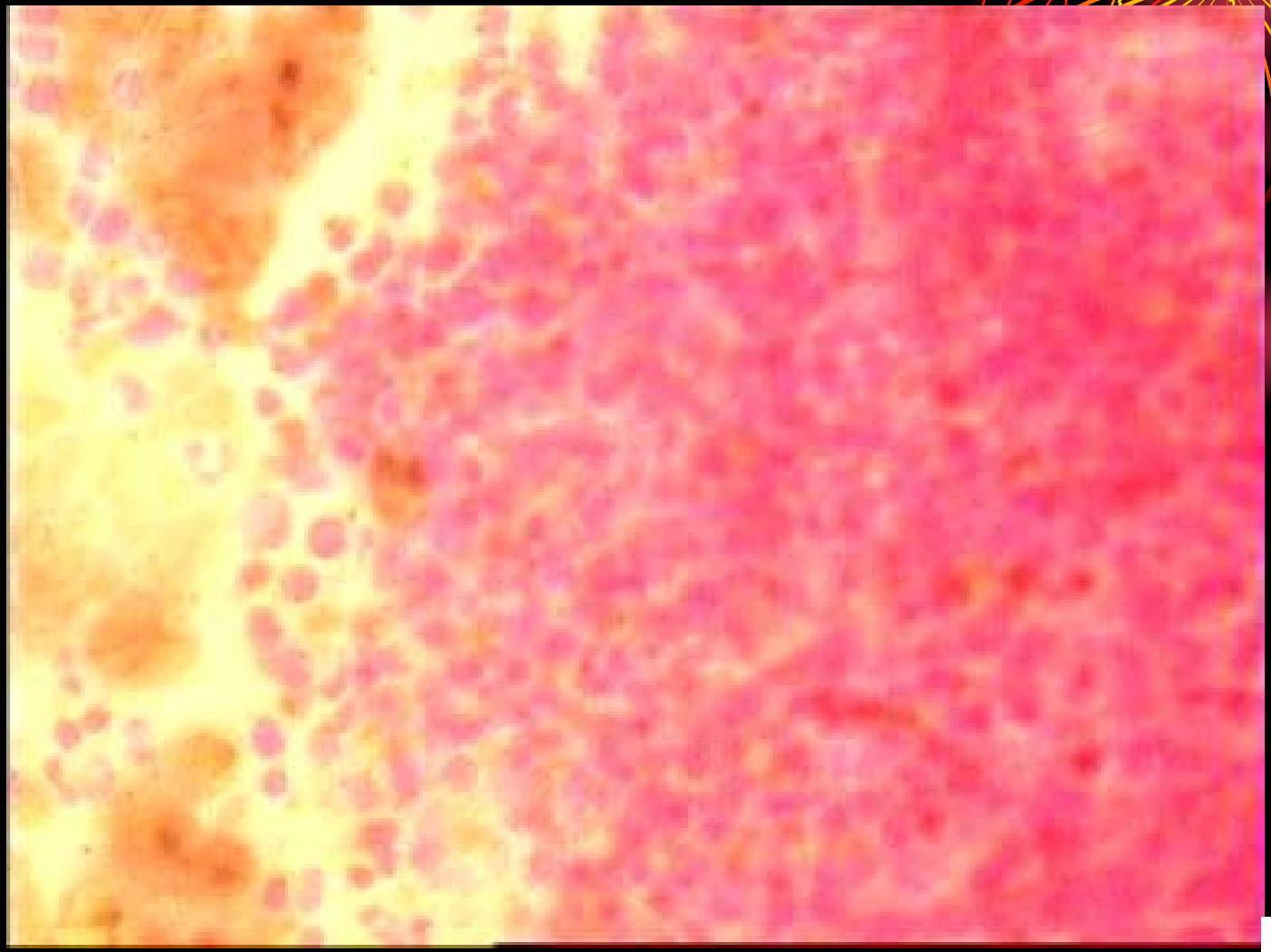

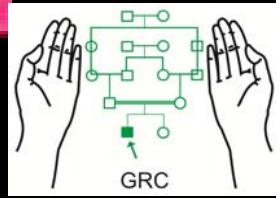
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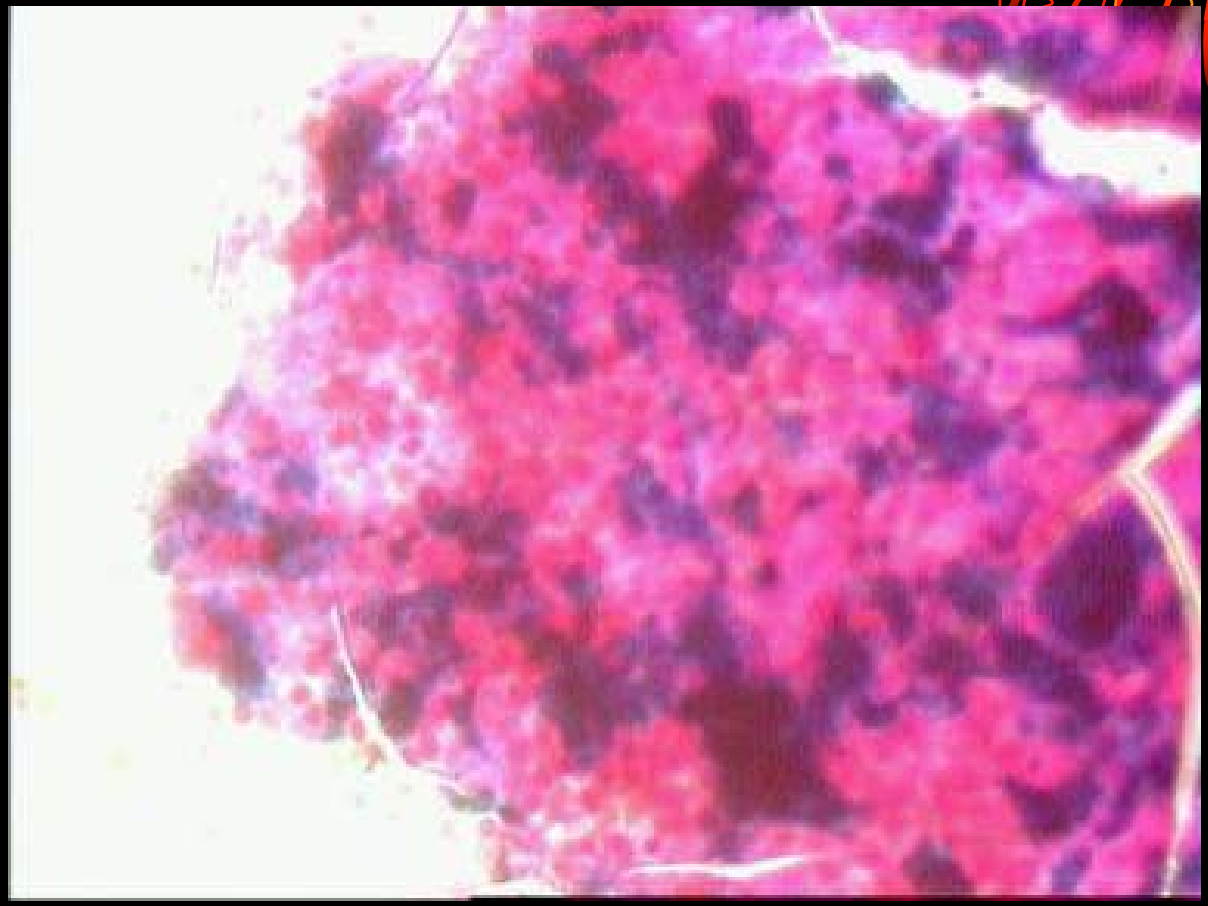

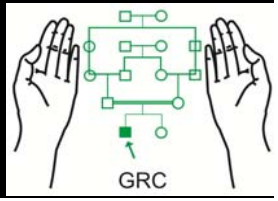
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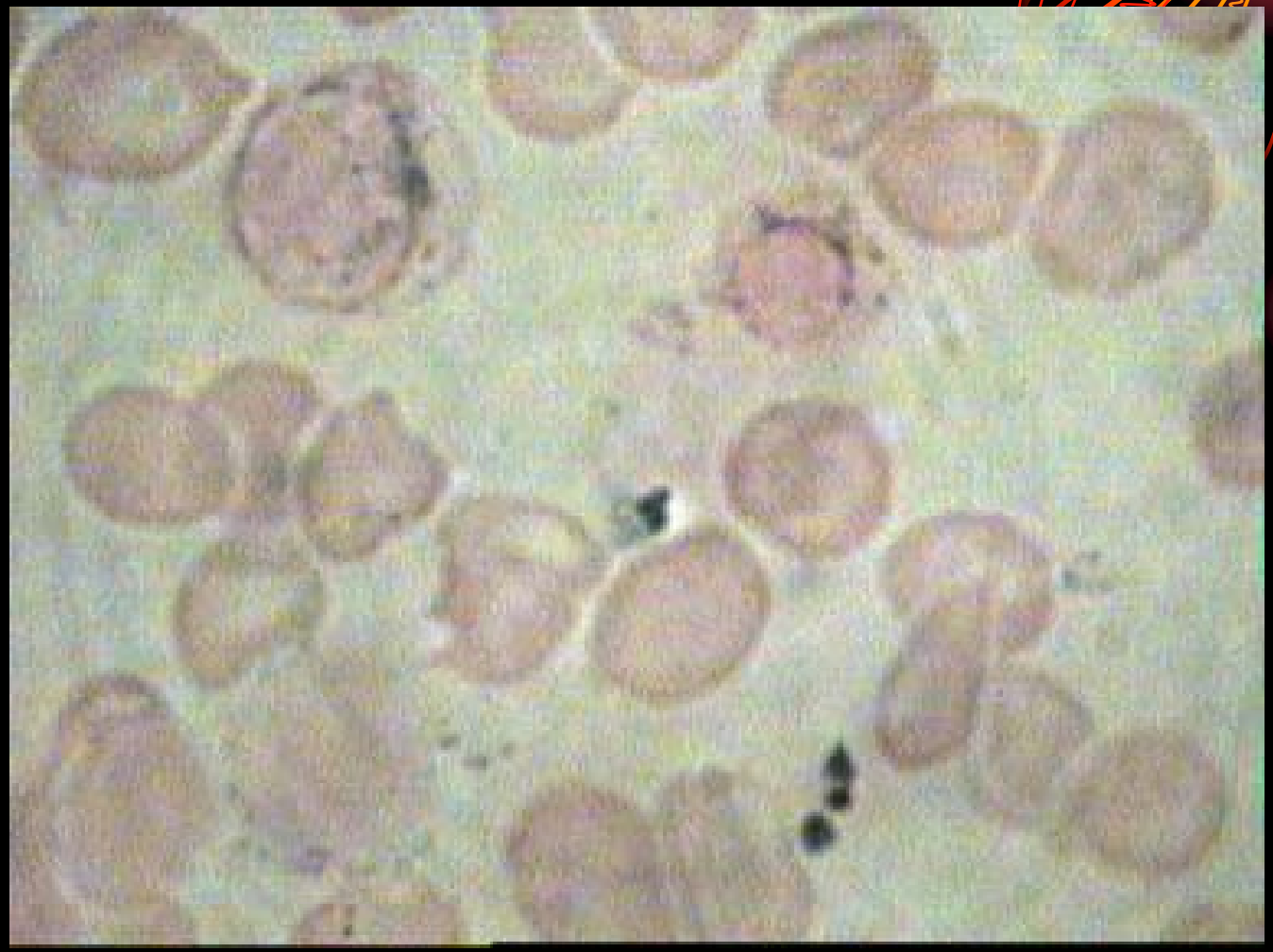

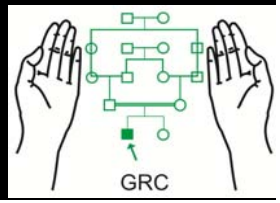
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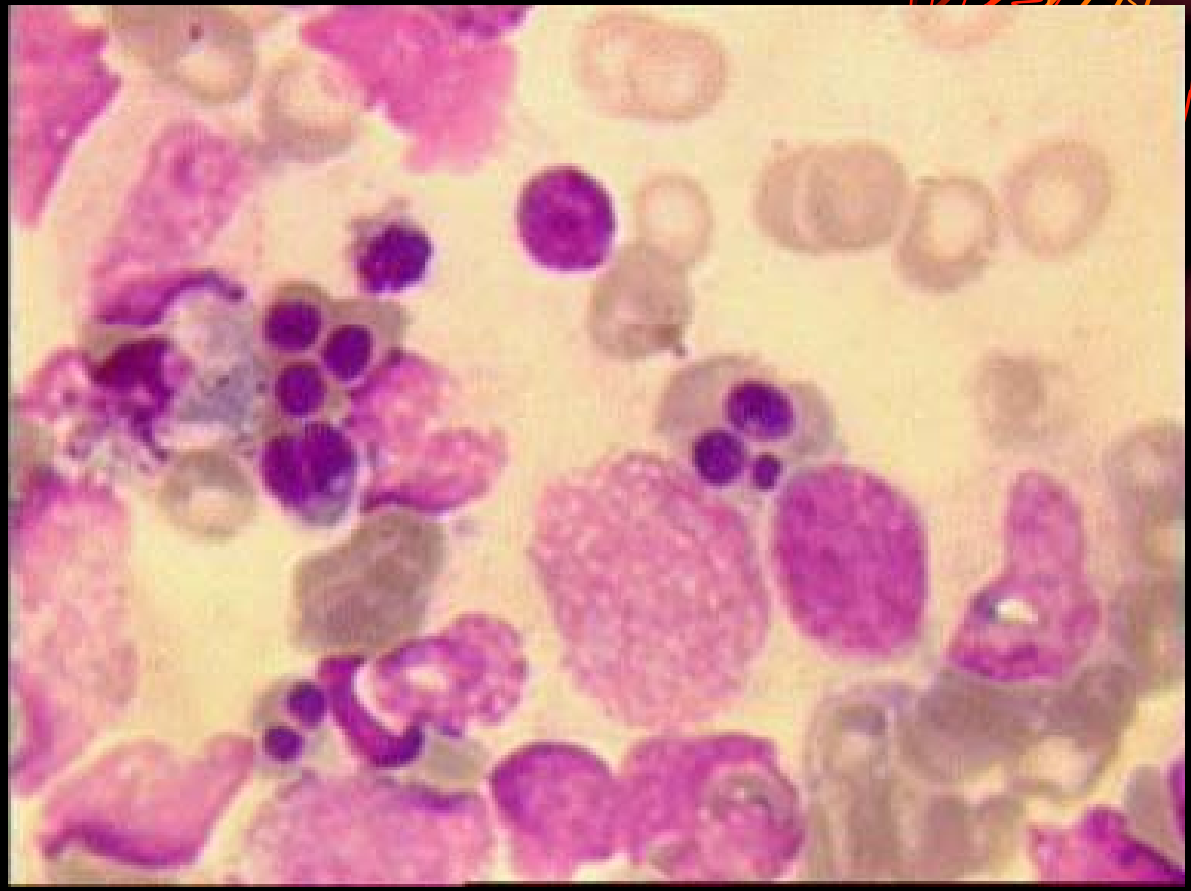

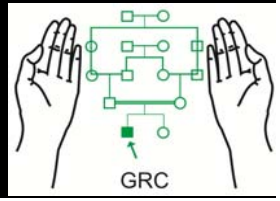
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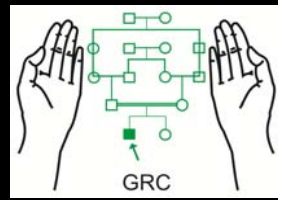
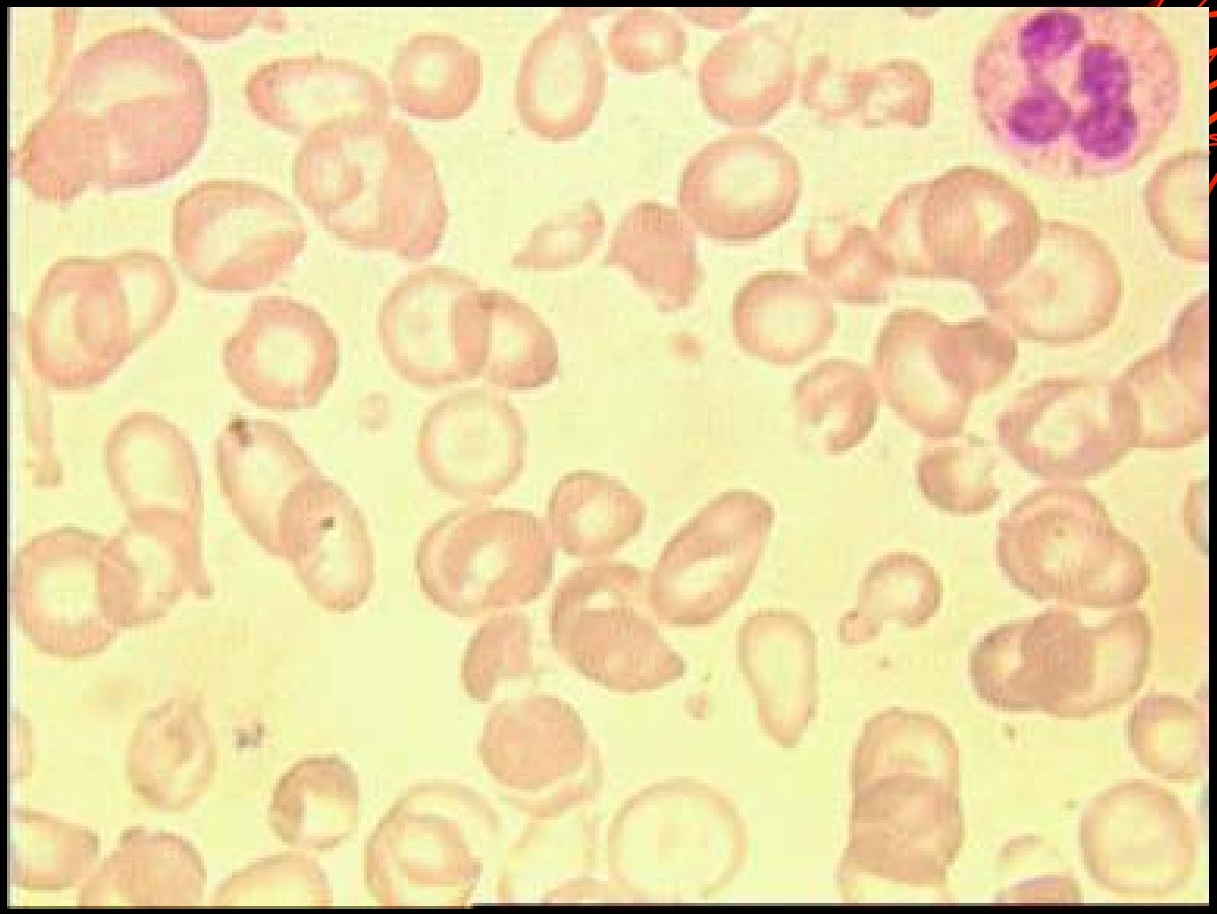
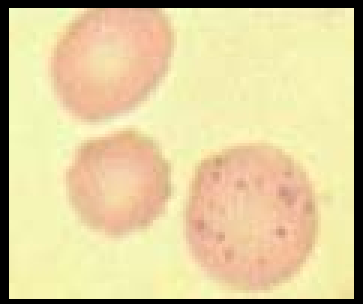
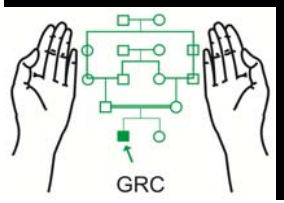
- Hb: 10.5 g/dl
- TRBC: 6.1×10^{12}/L
- MCV: 69.1 fl
- MCH: 18.2 pg
- TLC: 7.2×10^{9}/L
- Platelets: 220×10^{9}/L
- Reticulocytes:3.5%
- ESR: 22 mm in 1st hour





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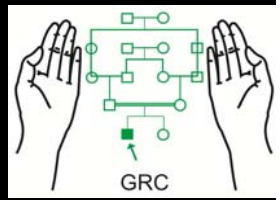
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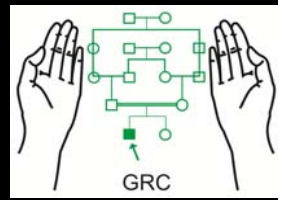
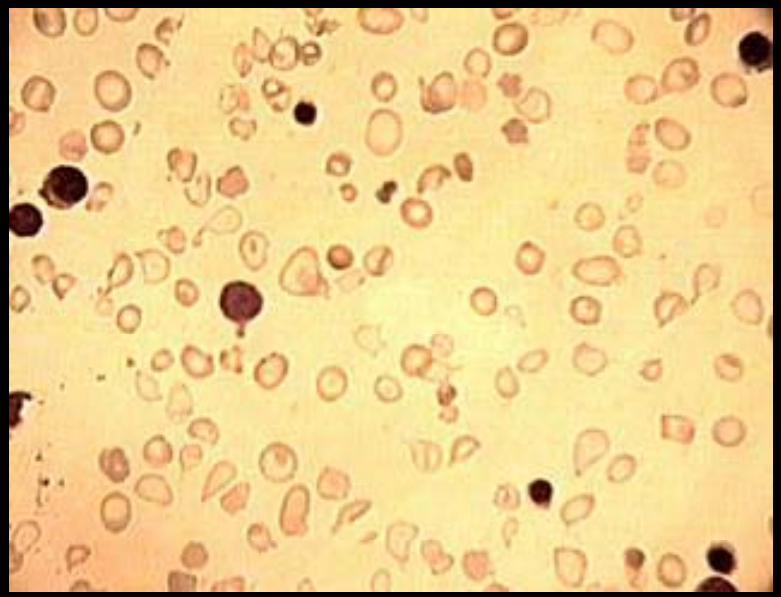
- TLC: $37.0 \times 10^9/L$
- Hb: 3.5 g/dl
- TRBC: $2.7 \times 10^{12}/L$
- MCV: 64.1 fl
- MCH: 21.2 pg
- Platelets: $270 \times 10^9/L$
- Retics: 4.5%
- ESR: 37 mm in 1st hour



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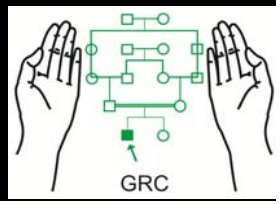
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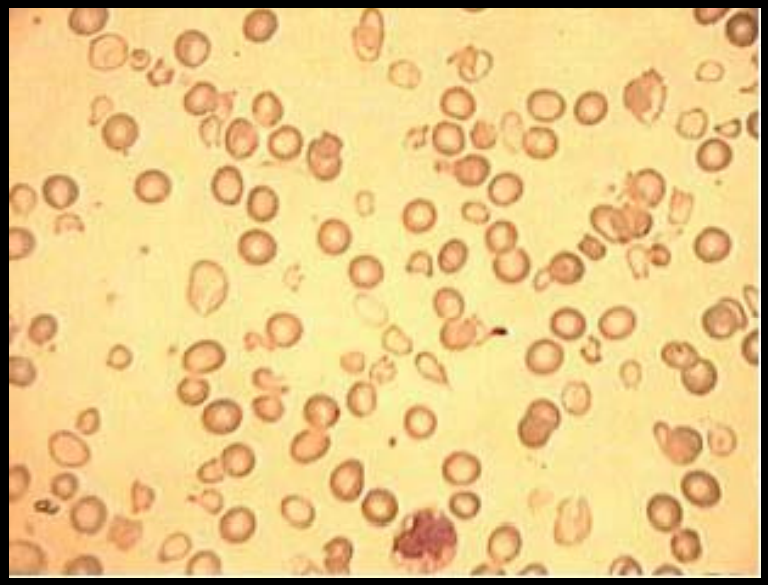

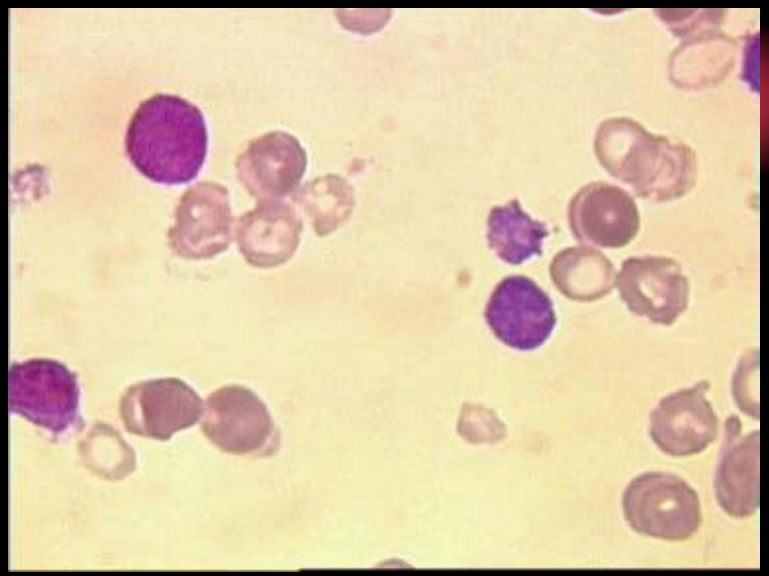

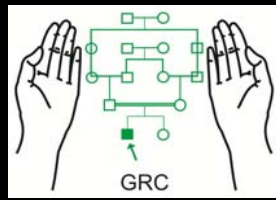
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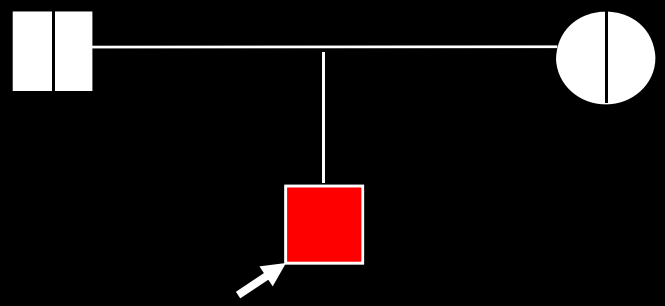
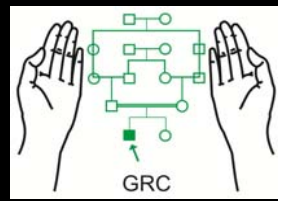
Hb: 12.7 g/dl
MCV: 66 fl
MCH: 19 pg



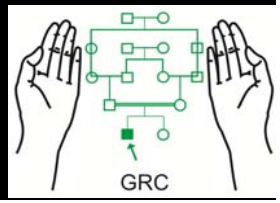
Hb: 10.4 g/dl
MCV: 64 fl
MCH: 18 pg

Transfusion Dependent Anaemia ??
Hb: 6.7 g/dl
MCV: 76 fl
MCH: 24 pg
Hb-F: 3.5%



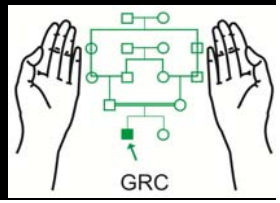
Macrocytic Anaemias

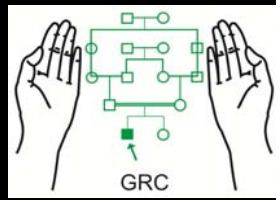
- Vitamin B12 deficiency
- Folic acid deficiency
- Liver disease
- Alcoholism
- Pregnancy
- Hypothyroidism
- Haemorrhage
- Haemolytic anaemias



Macrocytic Anaemia

- **Hb:** **7.5 g/dl**
- **TRBC:** **3.1 X 10^{12}/L**
- **MCV:** **120.1 fl**
- **MCH:** **29.2 pg**
- **TLC:** **2.7 X 10^{9}/L**
- **Platelets:** **32 X 10^{9}/L**
- **Reticulocytes:** **2.5%**
- **ESR:** **31 mm in 1st hour**

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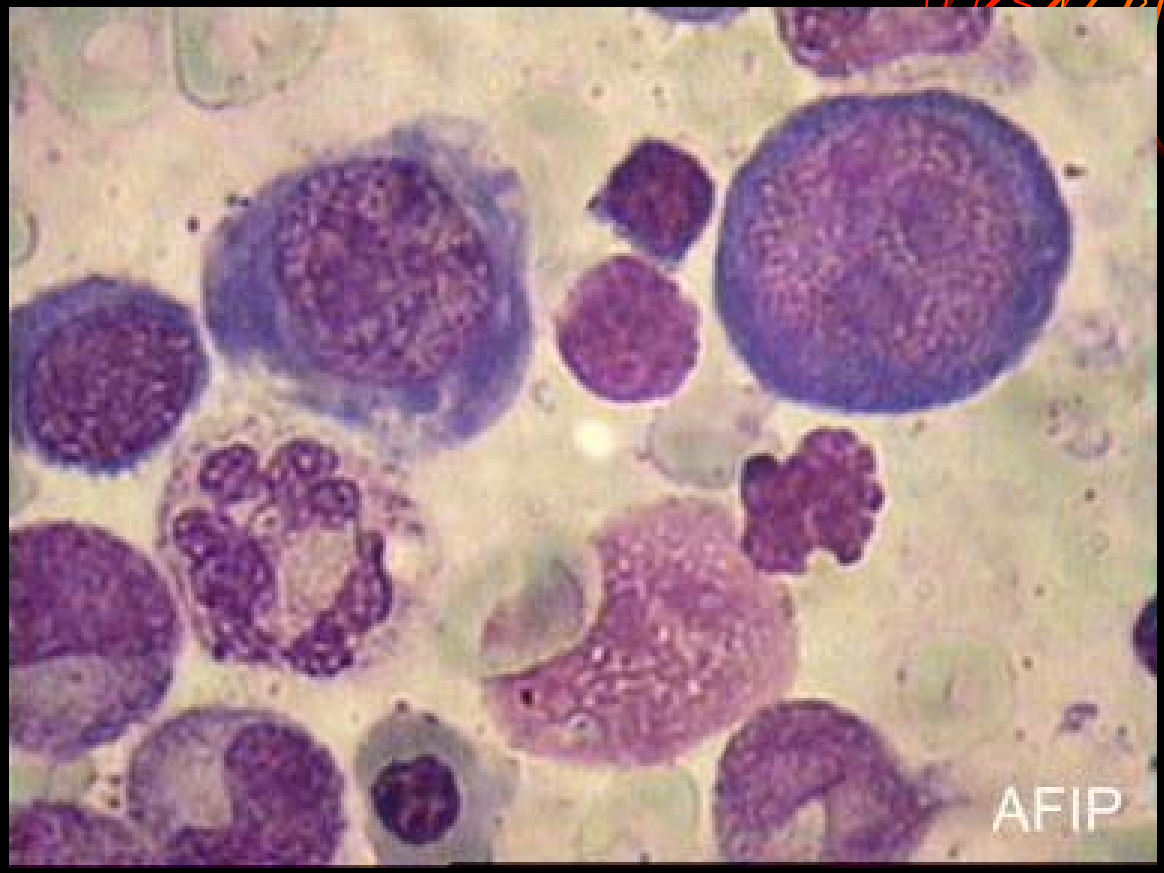
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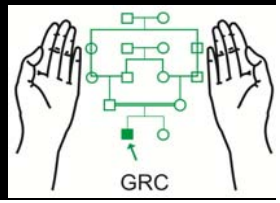
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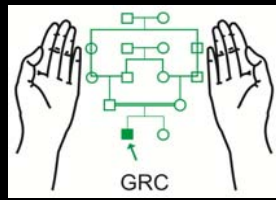
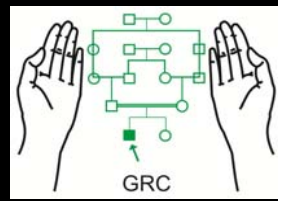
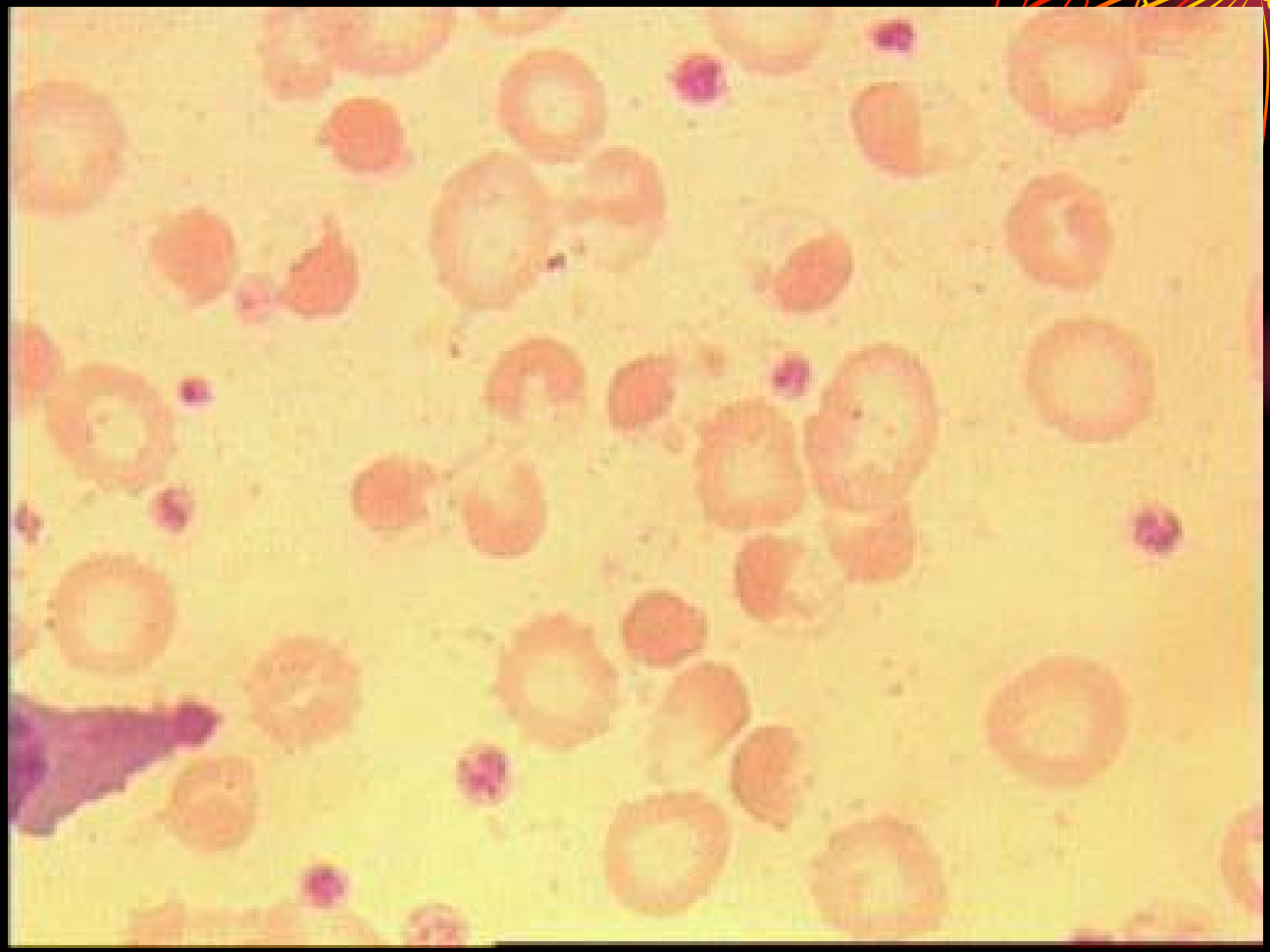
Normochromic Normocytic Anaemias

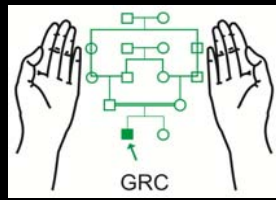
- Haemolytic Anaemias
- Chronic Disorders
- Marrow Aplasia
- Marrow Dysplasia
- Marrrow Infiltration



- TLC: 15.7×10^9/L
- Hb: 7.5 g/dl
- TRBC: 2.9×10^{12}/L
- MCV: 100.1 fl
- MCH: 29.2 pg
- Platelets: 232×10^9/L
- Reticulocytes: 25.0%
- ESR: 31 mm in 1st hour



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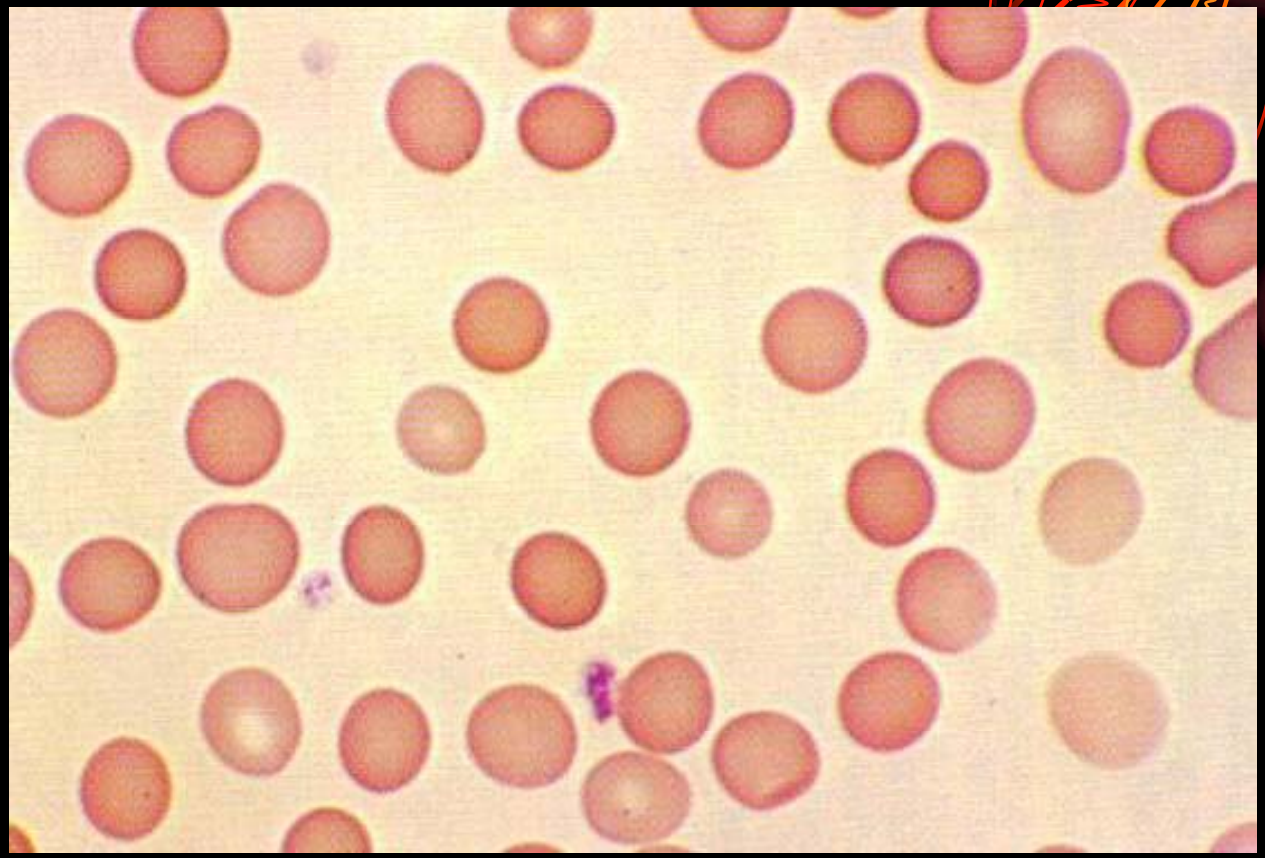

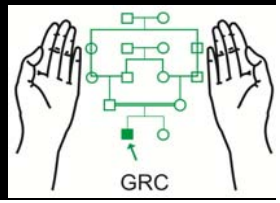
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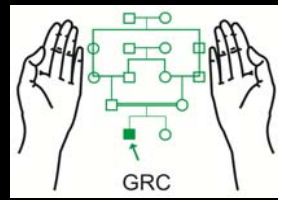
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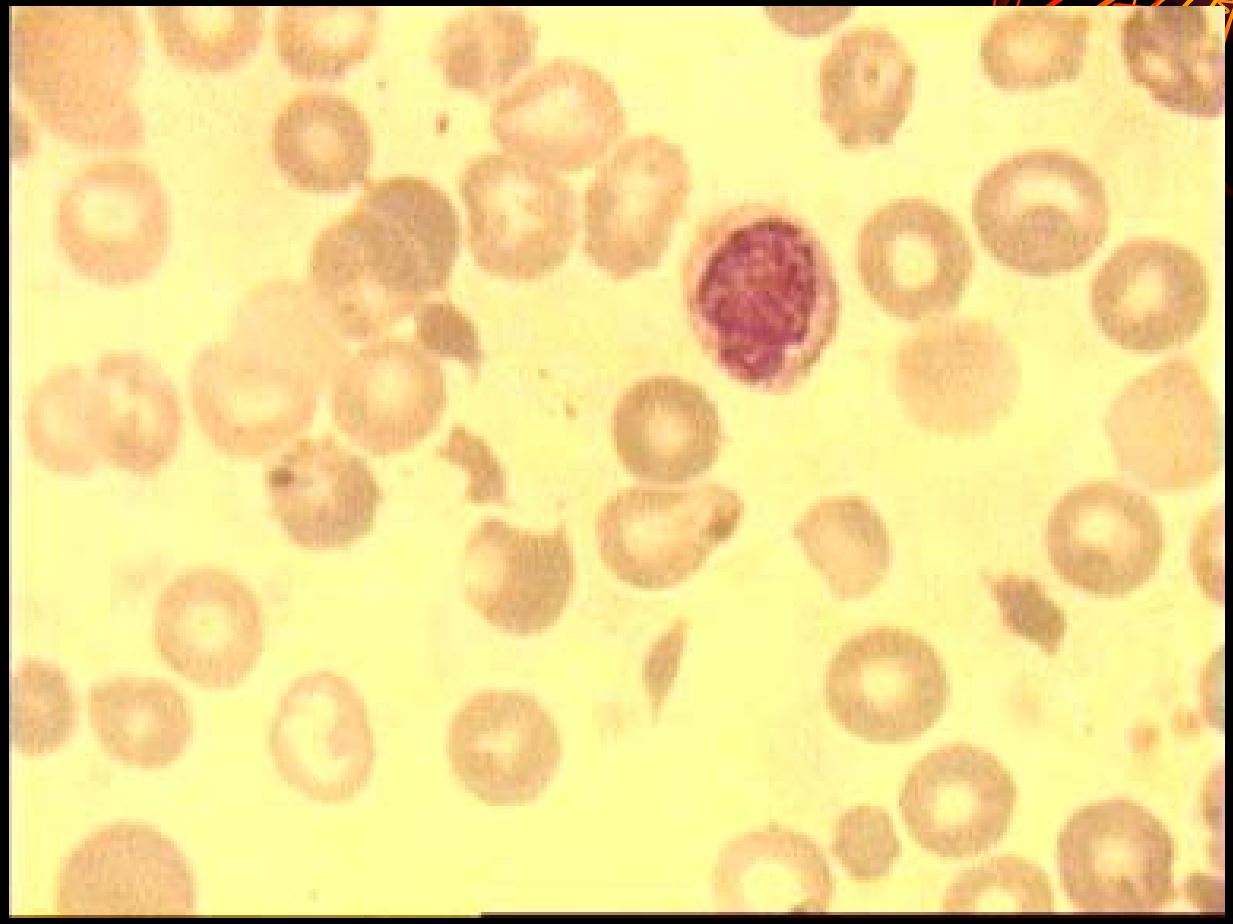

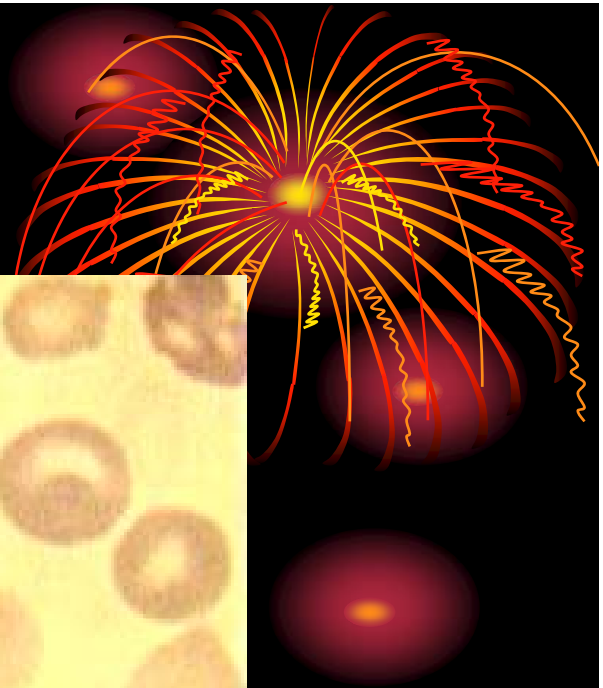

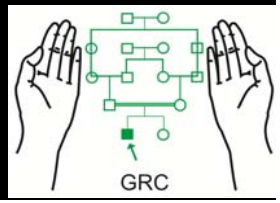
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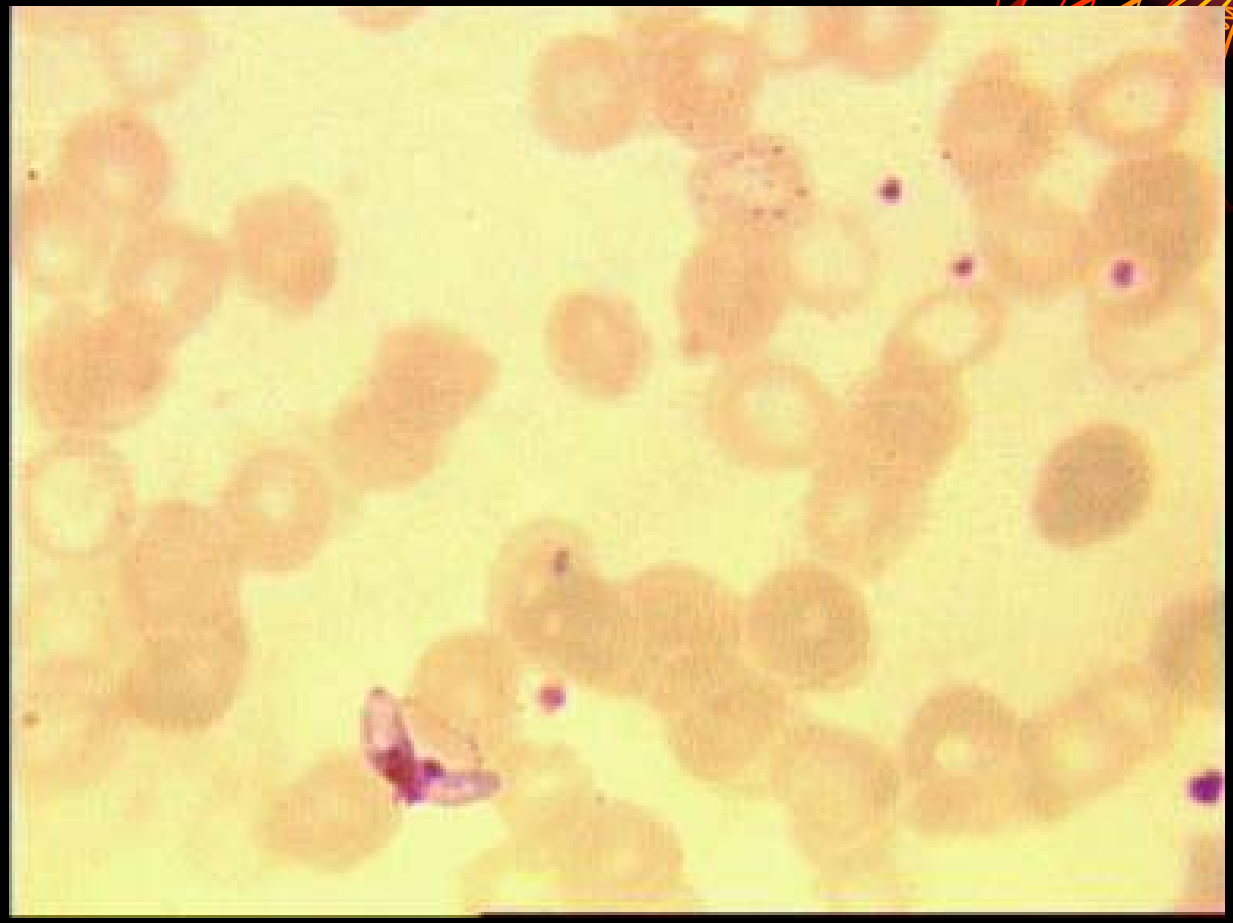

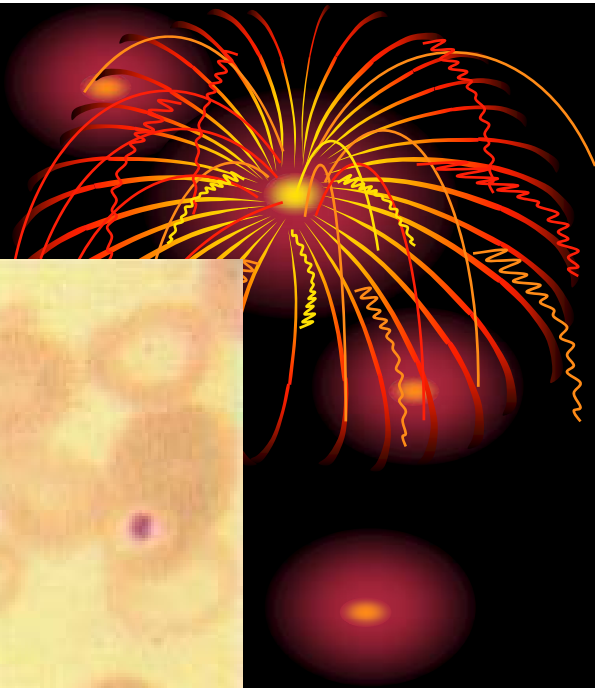

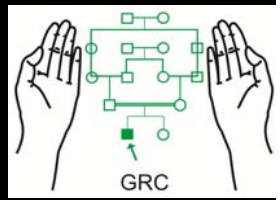
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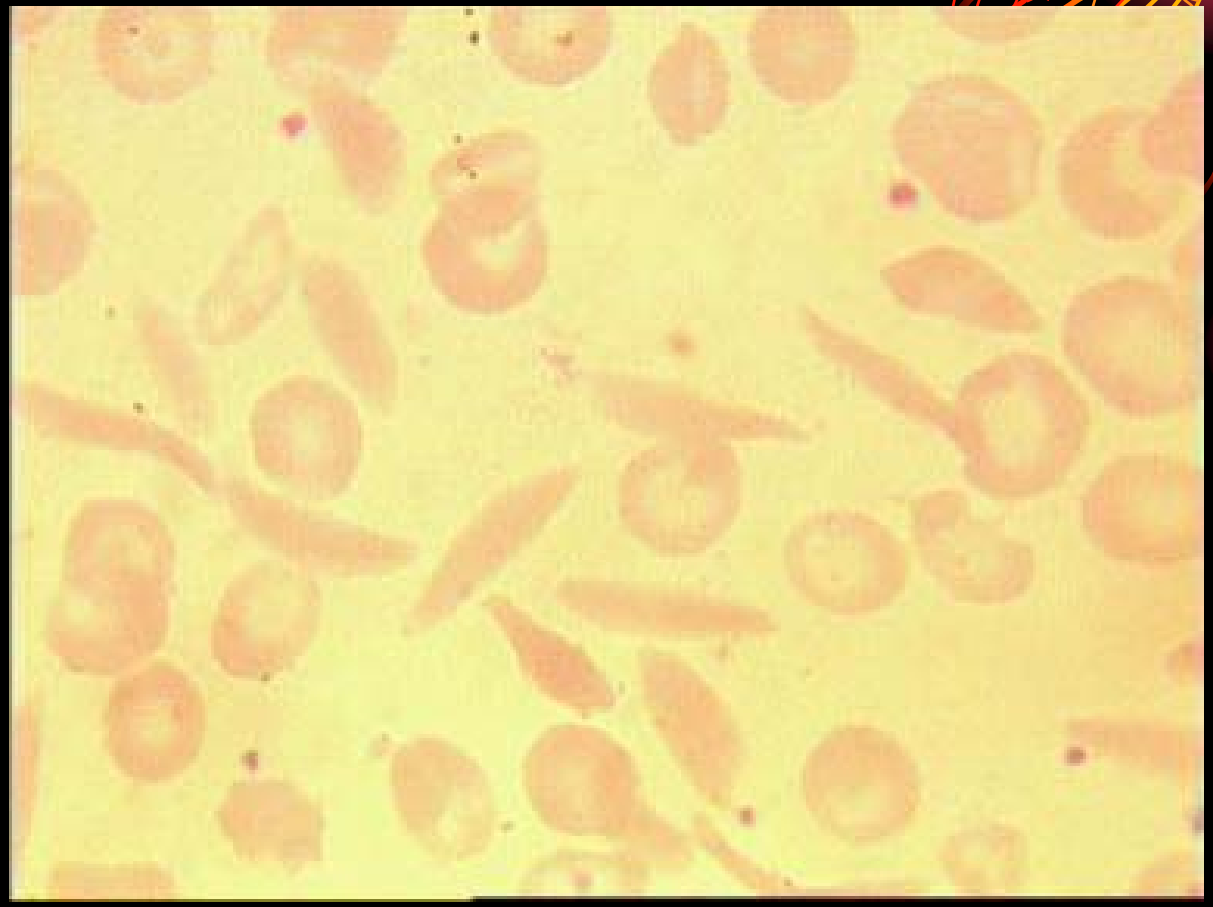

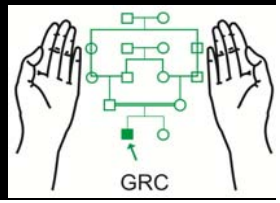
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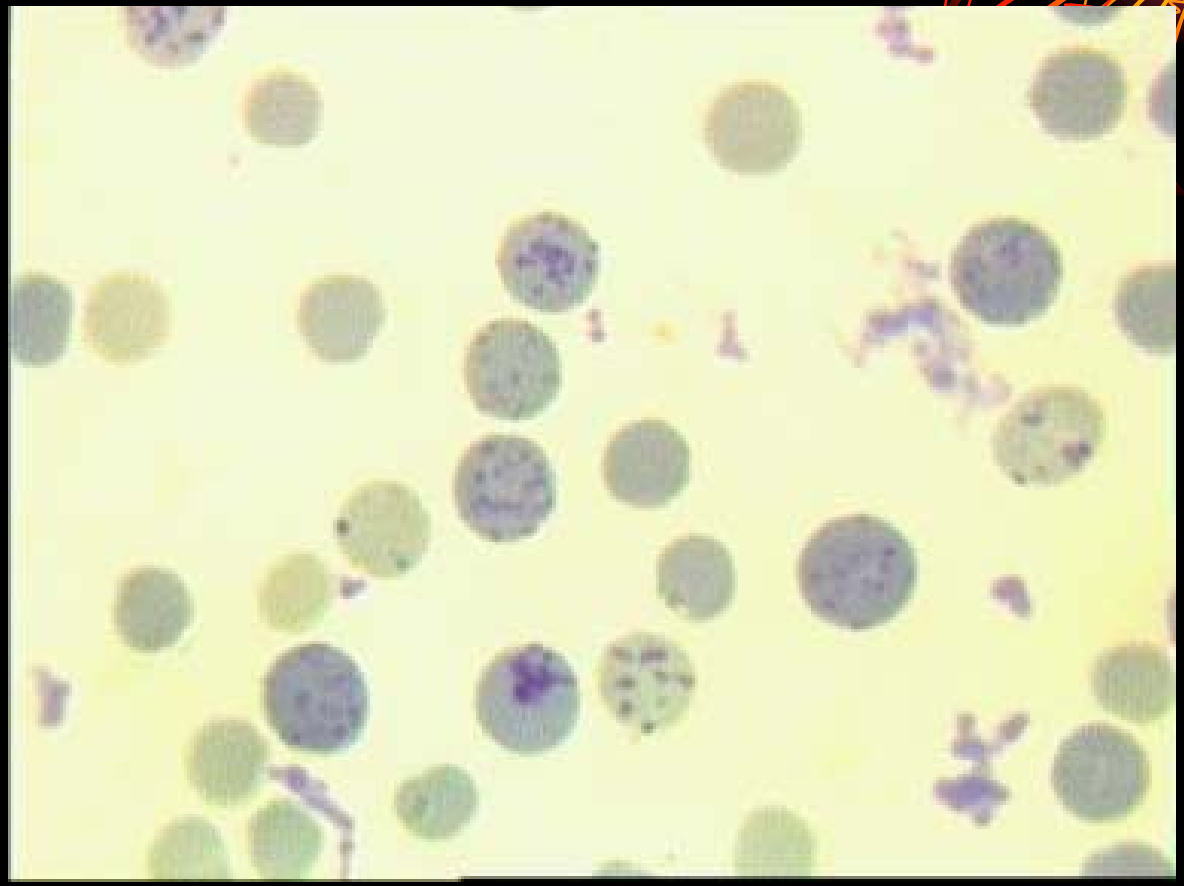

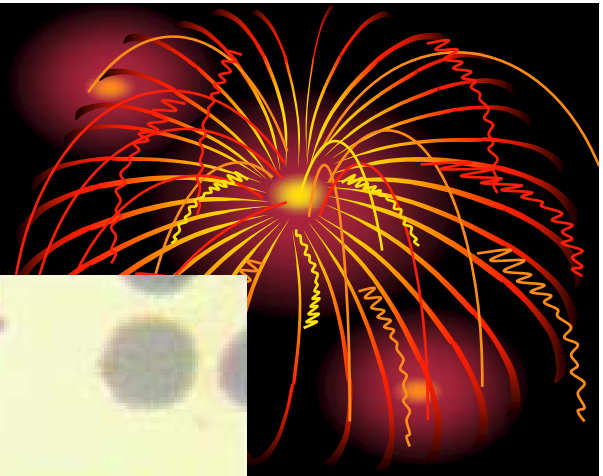

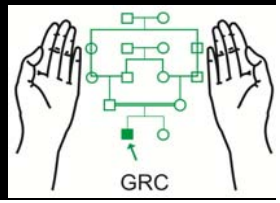
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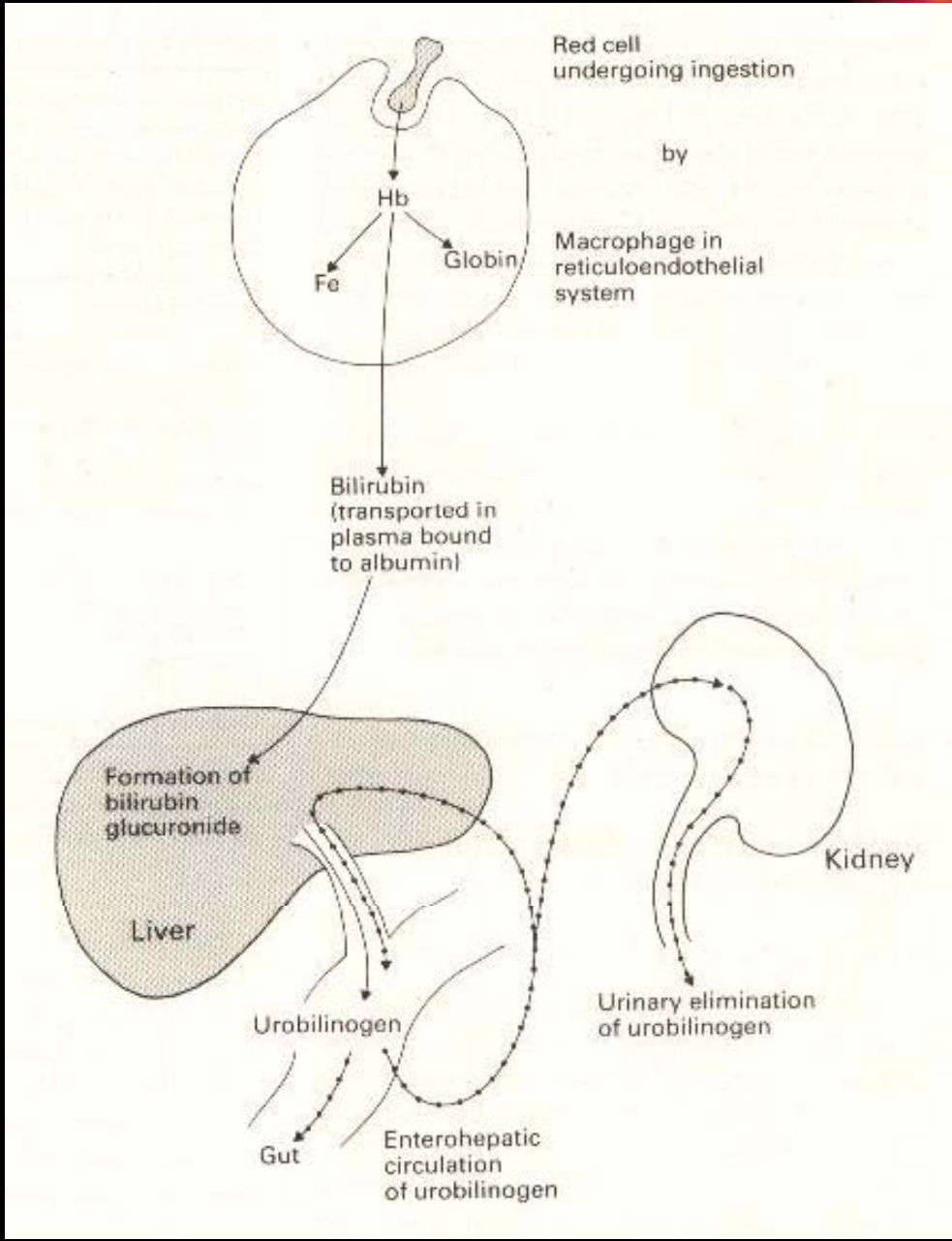
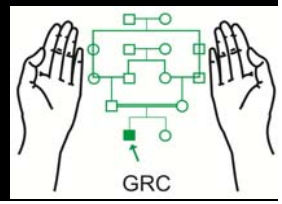

Red cell
undergoing ingestion
by
Hb
Fe
Globin
Macrophage in
reticuloendothelial
system
Bilirubin
(transported in
plasma bound
to albumin)
Formation of
bilirubin
glucuronide
Liver
Kidney
Urobilinogen
Urinary elimination
of urobilinogen
Gut
Enterohepatic
circulation
of urobilinogen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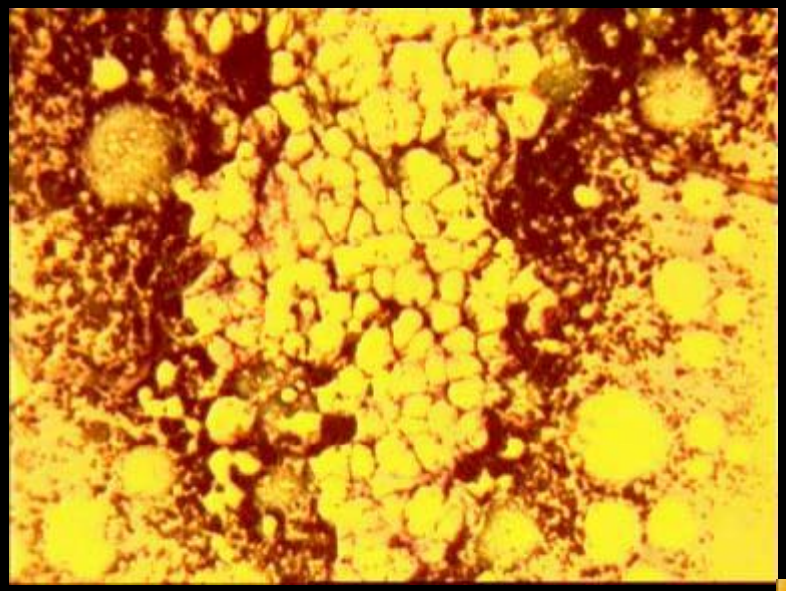

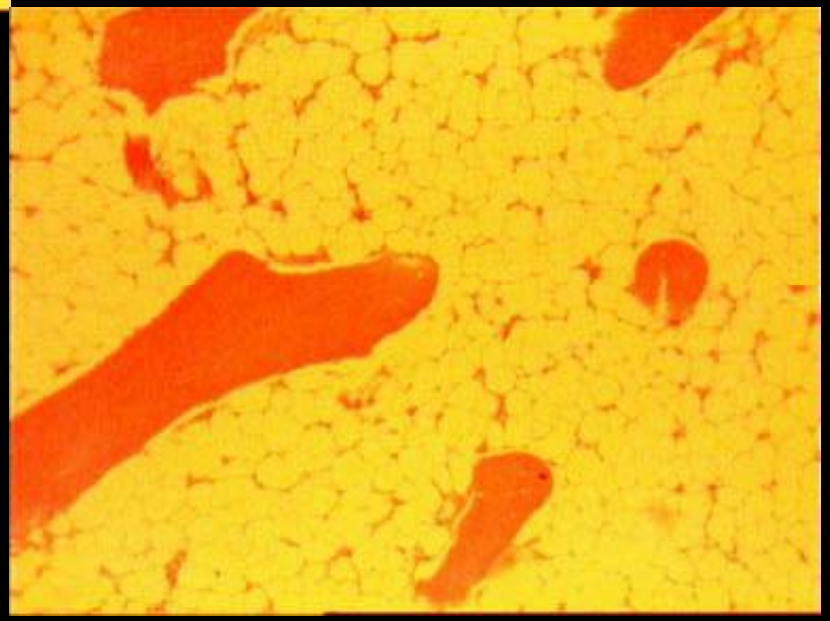

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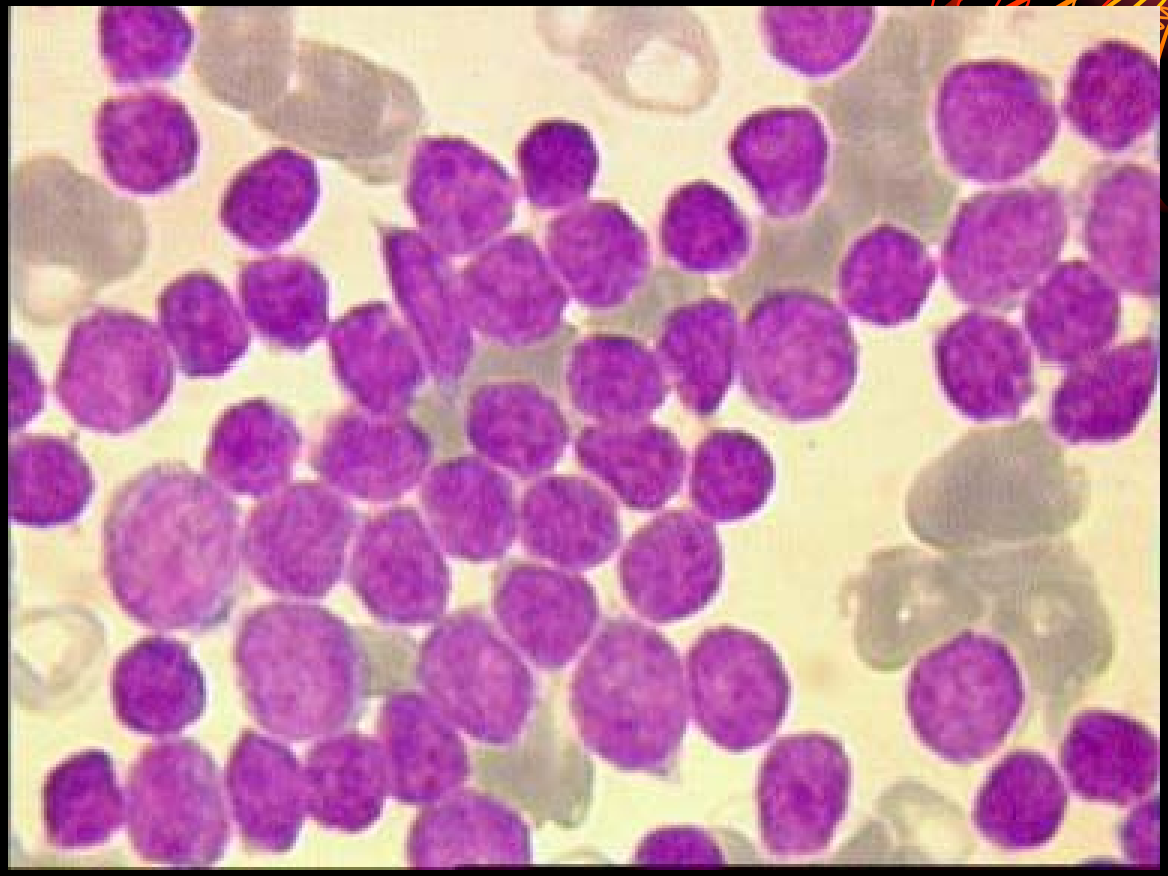

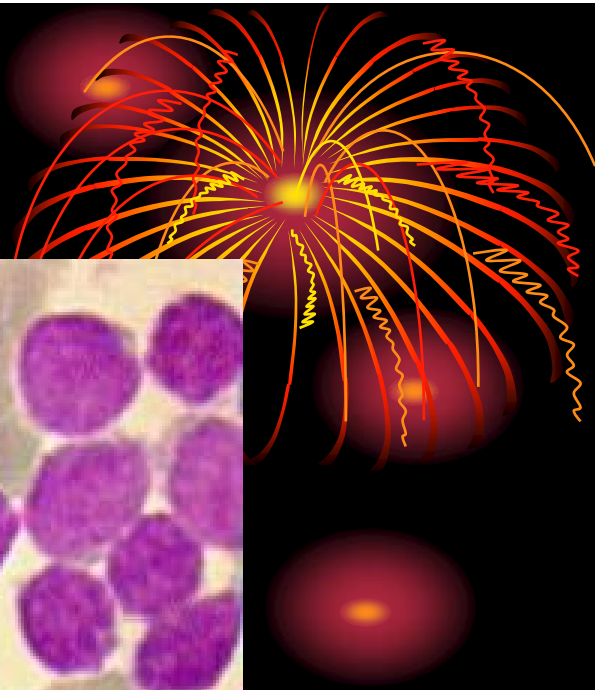

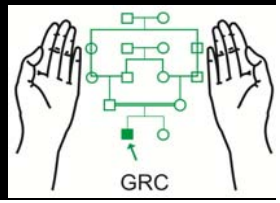
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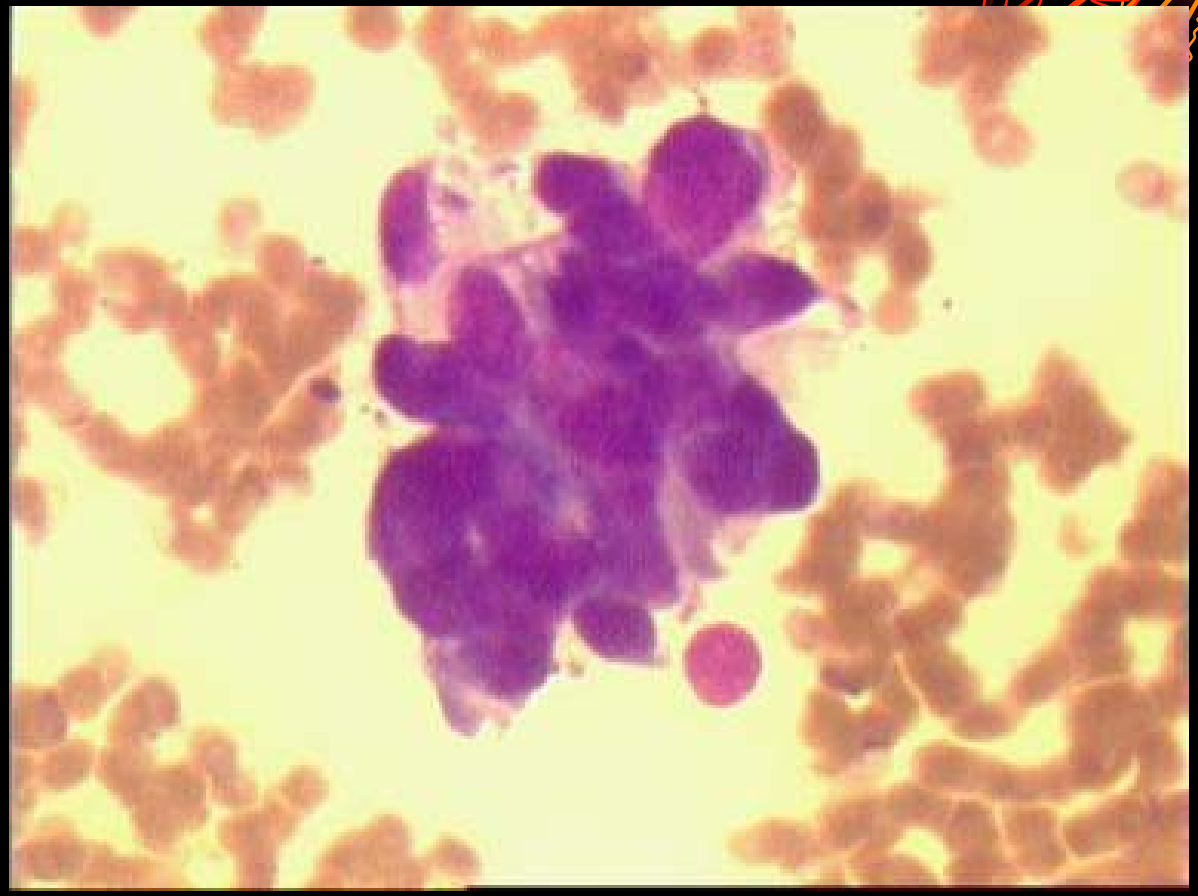

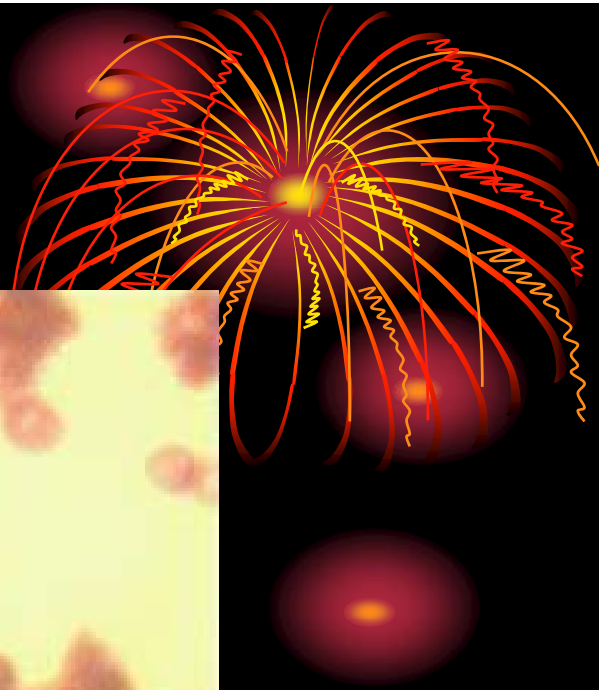

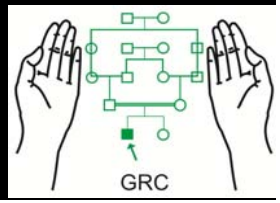
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