Classification of Anaemia

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MEASUREMENT OF HAEMATOCRIT

The haematocrit ratio (Hct) is the proportion of blood made up of red blood cells.

After centrifugation the heavier red cells settle to the bottom of the tube. The straw-coloured plasma remains at the top. The two layers are separated by a ‘buffy coat’ of white cells and platelets.

Normal values for Ht range between 0.42 - 0.47, generally higher in men than women.
## Red Cell Indices

<table>
<thead>
<tr>
<th></th>
<th>Metric</th>
<th>Values</th>
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</thead>
<tbody>
<tr>
<td><strong>MCV</strong></td>
<td>haematocrit</td>
<td>&lt;80, 80-100, &gt;100 fl</td>
</tr>
<tr>
<td></td>
<td>RBC count</td>
<td></td>
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<tr>
<td><strong>MCHC</strong></td>
<td>haemoglobin</td>
<td>&lt;32, 32-36, &gt;36 g/dl</td>
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<tr>
<td><strong>MCH</strong></td>
<td>haemoglobin</td>
<td>27-31 pg</td>
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</tbody>
</table>
- **Macrocytic** (MCV > 100)
  - Megaloblastic
    - *Vit B12 or folate deficiency*
  - Non-megaloblastic
    - *Alcohol, liver disease, hypothyroidism, aplastic anaemia*

- **Normocytic** (MCV 80-100)
  - Haemolytic anaemia
  - Renal failure
  - Mixed deficiencies
  - Acute blood loss
  - Aplastic anaemia (bone marrow failure)

- **Microcytic** (MCV < 80)
  - Iron deficiency
  - Thalassaemia
  - Anaemia of chronic disease
  - Sideroblastic anaemia
Low Hb=Anaemia

MCV

Low=microcytic

Ferritin
Fe deficient
Establish cause

Fe normal
Anaemia of chronic disease or haemoglobinopathy

Normal=normocytic

High=macrocytic

Measure B_{12} + folate

Normal

Obvious cause

Cause not obvious
Consider bone marrow

Reticulocyte count

Haemolysis or blood loss

high

low

Anaemia of chronic disease
Renal failure
Marrow failure
Iron distribution in the body

Figure 9.1 Haematology at a Glance
Causes of iron deficiency

- Chronic blood loss
  - Menorrhagia, parasites, aspirin, haemorrhoids, carcinoma
- Malabsorption
  - Post-gastrectomy, gluten enteropathy
- Inadequate diet
  - Unusual in developed countries
- Increased demands
  - Prematurity, adolescence, pregnancy
Clinical features

- General features of anaemia
  - Shortness of breath
  - Tiredness
  - Headache
  - Pallor
- Koilonychia (spoon shaped nails)
- Glossitis
- Pica (abnormal appetite)
- Hair thinning
- Pharyngeal web (Paterson-Kelly/Plummer-Vinson syndrome)
Koilonychia
Glossitis
Laboratory findings

- Hypochromic, microcytic anaemia
- Elevated platelet count (thrombocytosis)
- Serum iron and ferritin reduced
- Bone marrow
  - Absent iron stores
  - Erythroid hyperplasia
Treatment of iron deficiency

- Oral ferrous sulphate (67mg Fe/tablet)
- 3X/day before meals
- Side effects – nausea, abdominal pain
- Reticulocyte response within 7 days
- Continue treatment for 6 months
- Poor response
  - Non-compliance
  - Malabsorption
  - Ongoing blood loss
  - Incorrect diagnosis
Intravenous iron

- Oral iron not tolerated
- Malabsorption
- Rapid filling of iron stores required e.g. late pregnancy
- Anaphylaxis may occur – always administer a test dose
Iron overload - causes

- Primary haemochromatosis – hereditary condition leading to ↑ iron absorption
- African iron overload – use of iron utensils
- Excess dietary iron
- Ineffective erythropoiesis with ↑ iron absorption
- Repeated blood transfusions
Iron overload - clinical features

- Heart failure
- Retarded growth
- Excessive skin pigmentation
- Recurrent infections
- Symptoms are caused by organ dysfunction secondary to iron deposition
Iron overload – laboratory features

- Raised serum ferritin
- Increased iron in liver and bone marrow

Treatment

- Iron chelation using subcutaneous desferrioxamine by infusion pump
Management of iron overload
Sideroblastic anaemia

- Refractory anaemia
- May present with hypochromic, microcytic indices
- May be congenital or due to:
  - Drugs (INH)
  - Toxins (alcohol, lead)
  - Myelodysplasia