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LANCET LABORATORIES
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Newsletter

APPROACH TO ADULT PATIENT WITH ANEMIA

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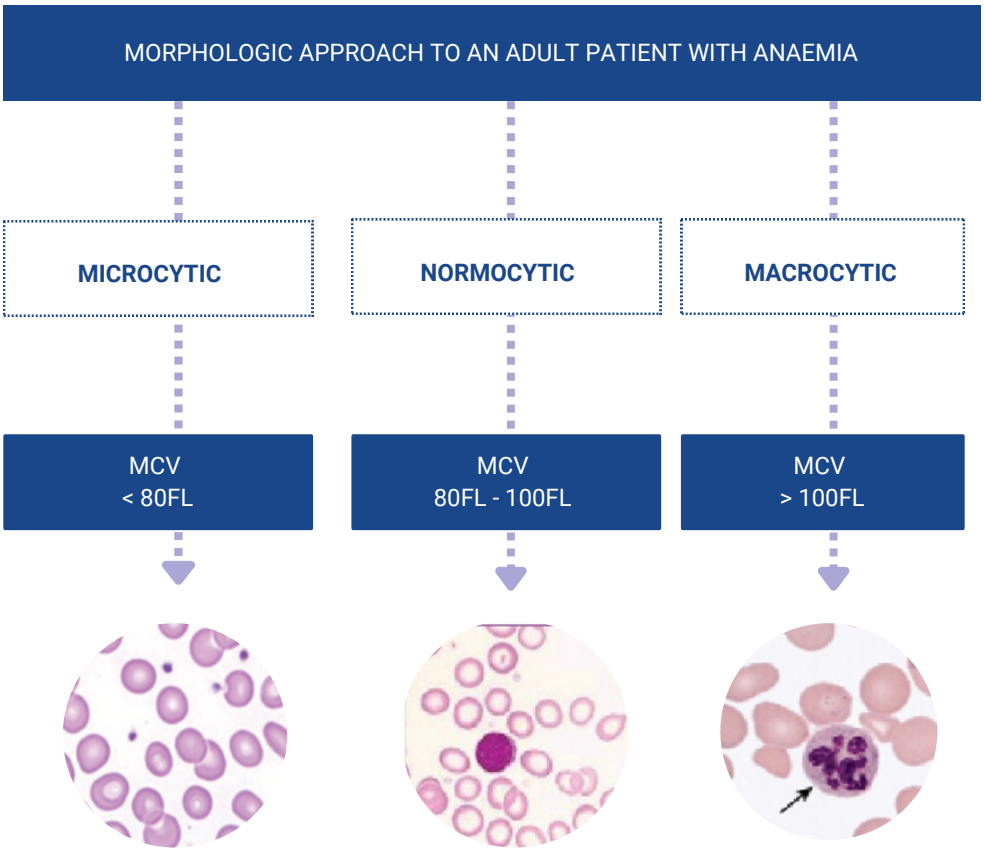
Anaemia is defined as a reduction in one or more of the red blood cell indices of Hemoglobin (Hb) concentration, Hematocrit, and Red blood cell (RBC) count. However, Hemoglobin concentration is the most widely used parameter.

- Normal lower limits of "Hb" varies with age, sex and race.
- As a Clinician, one is often familiar with the Kinetic Approach to a patient with Anemia.
- This approach classifies Anemia by the mechanisms causing the Anemia. These mechanisms are decreased red blood cell production, increased red blood cell destruction and blood loss.



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MICROCYTIC ANEMIA

CONDITION	DIAGNOSIS/ CAUSES	MECHANISM	CONDITION CLINICAL SIGNS	PERIPHERAL BLOOD SMEAR	ADDITIONAL INVESTIGATION
IRON DEFICIENCY	Blood Loss: • Menorrhagia • GIT bleed (Hemorrhoids, Peptic Ulcer, etc) • Bleeding Disorders	Inadequate supply of iron for Erythropoiesis	Koilonychia Angular Cheilosis Glossitis	Hypochromia Poikilocytoses Elliptocytes	Iron studies: Serum iron ↓ Serum Ferritin ↓ Transferrin ↑
	Malabsorption: • Gluten Enteropathy • Pregnancy • Poor dietary intake				
THALASSEMIA'S	Alpha Thalassemia Beta Thalassemia	Disorders of globin production	Hepatosplenomegaly Thalassemic facies: • bossed skull, • prominent, • frontal, • parietal bones, • enlarged maxilla	Hypochromia Tear drops Target cells Basophilic stippling	Hemoglobin electrophoresis HPLC Hb quantification
SIDEROBLASTIC ANEMIA	Acquired primary: · Refractory Anemia with ring sideroblasts (MDS)	Clonal disorder with impaired Haem synthesis	Hypochromia Target cells Basophilic stippling Poikilocytosis Pappenheimer bodies Red cells can be microcytic or macrocytic		Iron studies: Serum Iron ↑ Ferritin ↑ Bone marrow Aspirate
	Acquired Secondary: • Drugs • Isoniazid, • Pyrazinamide, • Chloramphenicol, Alcohol, • Lead toxicity, • Copper deficiency.	Underlying molecular defects affecting synthesis of the haem group	Mitochondrial toxicity/impaired haem synthesis	Red cells can be microcytic or macrocytic	
	• Congenital: • ·X-linked Autosomal	Underlying molecular defects affecting synthesis of the Haem group	Syndromic features	Hypochromia Target cells Basophilic stippling Poikilocytosis Pappenheimer bodies	Biochemical assay of enzymes
	Severe cases of Anemia or inflammation or chronic disease	See normocytic Anemias			

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NORMOCYTIC ANEMIA

CONDITION	DIAGNOSIS/ CAUSES	MECHANISM	CONDITION CLINICAL SIGNS	PERIPHERAL BLOOD SMEAR	ADDITIONAL INVESTIGATION
APLASTIC ANEMIA (AA)	Acquired • Drugs: chloramphenicol, Sulphonamides, linezolid, diclofenac, phenytoin, carbamazepine, thiouracil phenothiazides, chloroquine, allopurinol, mebendazole, thiazides etc. • Environmental: benzene, pesticides cutting oils lubricating agents recreational drugs Inherited • Congenital bone marrow failure syndromes	Inadequate supply of Iron for Erythropoiesis.	Koilonychia Angular chelosis Glossitis	Hypochromia Poikilocytes Elliptocytes	Iron studies: Serum iron ↓ Serum Ferritin ↓ Transferrin ↑
PURE RED CELL APLASIA	Transient Infections: • Parvovirus B19 • CMV • HIV • Mumps • Drugs • Chronic • Idiopathic Congenital syndromes: • Immunological • Thymoma • Haematological malignancies • Autoimmune diseases	Serum antibodies with selective cytotoxicity for marrow Erythroid cells. Immunological suppression of Erythropoiesis		Normocytosis or Macrocytosis	↓ Reticulocyte count Bone marrow aspirate & trephine biopsy PCR for Parvovirus B19 Screening for auto antibodies
SYSTEMIC DISORDERS CHRONIC DISEASE	Anemia of inflammation (previously called Anemia of chronic disorders) Infections (bacterial, viral and fungal) 1. Acute/Chronic Autoimmune conditions 2. Chronic diseases Ageing	Changes in iron handling/systematic iron distribution under control of hepcidin, red blood cell production due to a "blunted" Erythropoietin (EPO) response and reduced red blood cell lifespan.		Mild-normocytic red cells, severe "Microcytic" red cells Rouleaux formation Neutrophilia or Neutrophilia with toxic granulation and left shift lymphopaenia Thrombocytopaenia	Iron Studies: Serum Iron ↓ Ferritin N/ ↑ Infective markers: ↑ CRP ↑ PCT ↑ ESR Autoimmune screen Viral studies Blood Culture

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MICROCYTIC ANEMIA

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CHRONIC RENAL DISEASE		Deficiency of EPO production by the Renal Interstitial cells			U&E and eGFR EPO levels
MALIGNANCY		Anemia of inflammation therapy related bone marrow infiltration			Bone marrow biopsy
ACQUIRED ANEMIA IN HOSPITALISED PATIENTS		Blood loss during procedures: Anemia of inflammation changes in nutrition especially in ICU			

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