Anaemia

What is Anamia	A reduction the Hb concentration below normal ranges (M: <13g/dL / F: <12g/dL)
Aetiology	1. Decreased RCB production 2. Loss of RBCs 3. Increased RBC destruction

Anaemia Main Categories

Microcytic / hypochomic	Low MCV / Low MCH
Normocytic / normochomic	Normal MCV / Normal MCH
Macrocytic / hyperchomic	High MCV / High MCH

Clinical Presentation

fatigue
dyspnoea
chest pain
dizziness
palpitations
headaches
worsening of other conditions - intermittent claudication

Normocytic Anaemia

Normal MCV, indicating normal sized RBCs	
DDx: Anaemia of chronic disease/inflammation	Haemolysis
	Bone marrow infiltration
	Acute blood loss

Normocytic Anaemia

Investigations	
FBC	Low Hb, normal MCV
Blood Film	Normocytic, normochromic RBCs
Iron Studies	normal/low serum iron, low TIBC, normal/high serum ferritin
+/- other Ix	Serum erythropoietin (EPO) level is decreased in CKD
Management	
Manage underlying cause	consult haem/medical team
EPO replacement	

Normocytic Anaemia (cont)

RCC transfusion if severe or symptomatic
Iron supplementation may or may not be needed

Normocytic Anaemia Causes

Anaemia of Chronic Diseases	Chronic renal disease, rheumatic disease, congestive heart failure
Mechanism	depends on underlying pathology
	decrease in release of stored iron
	shortened red cell survival
	impaired marrow response in red cell relacement

Macrocytic Anaemia

Macrocytic Anaemia	Large RBCs and increased MCV
Aetiology	
Megaloblastic	B12 or folate deficiency
Normoblastic	alcohol excess, reticulocytosis, liver disease
Mechanism	
Megaloblastic	Impaired DNA synthesis
Normoblastic	Unkown
Signs and symptoms	General symptoms of anaemia
	Pallor +/- glossitis, angular stomatitis
	B12 deficiency can lead to neurologic syndrome

Megaloblastic Anaemia

Vit B12	Found in animal sources
Causes of deficiency	Pernicious anaemia (autoimmune disorder)
	Veganism
	Gastrectomy/gastric absorptive disease
	Chron's disease/coeliac

Megaloblastic Anaemia (cont)

Folate	green veg,, organ meat, fortified cereals
Causes of deficiency	Poor dietary intake
	Alcohol
	Anti-epileptic drugs (phenytoin)
	Methotrexate
	Coeliac disease

Management Macrocytic Anaemia

Treat underlying cause	consult haem/medical team
B12 deficiency	IM hydroxocobalamin (B12): replenish levels with frequent administration then gradually reduce frequency
Folat deficiency	Oral folate replacement: folic acid 5mg OD

Signs - on CE

Jaundice	can occur in haemolysis
Koilonychia	spoon shaped nails in IDA
conjunctive pallor	ensure looking at palpebral conjunctiva
sclera icterus	jaundice (haemolysis)
angular stomatitis	B12/folate/iron deficiency
systolic flow murmur	mid-systolic ejection murmur due to increased semi-lunar blood flow

Anaemia Differential Diagnosis

Microcytic Anaemia	Normocytic Anaemia	Macrocytic Anaemia
Iron deficiency anaemia (50% of cases)	Anaemia of chronic disease	Vitamin B12
Thallasaemia	Inflammation:	
Chronic diseases	Chronic infection	

Iron Deficiency Anaemia

4 main causes	Decreased intake (infant/vegan)
	Decreased absorption (gastrectomy, IBD, coeliac disease)
	Increased demand (childhood, pregnancy)
	Increased loss (chronic slow bleed)
Potential Symptoms	GI blood loss, heavy menstrual bleeding, Pica

IDA Investigations and Management

Investigations	
FBC	decreased Hb and MCV. Check WCC & platelets (expect normal in IDA)
Iron Studies	decreased serum iron, serum ferritin, transferrin sat., increased TIBC
Blood Film	microcytic and hypochromic RBCs, Poikilocytosis / Anisocytosis
+/- other Ix	Faecal occult blood (FOB), OGD, colonoscopy
Management	
Manage underlying cause	consult haem/medical team
Start supplemental iron	Aim 1-2g raise in Hb every week

1st line: oral iron replacement eg. Ferrous fumerate

2nd line: IV iron replacement (Ferrinject)

3rd line: RCC transfusion (if severe)

Don't forget to type and screen if giving a blood transfusion

Microcytic Anaemia

Low Hb & MCV, indication RBCs	Causes of microcytic anaemia; mnemonic TAILS
Mechanism:	Defect in synthesis of haem
	Thalassaemia - defect in synthesis of globin chain

DDX:
T - Thalassemia
A - Anaemia of chronic disease
I - Iron deficiency anaemia
L - lead poisoning
S - sideroblastic anaemia

Macrocytic Anaemia

Investigations	
FBC	Low Hb, MCV is elevated
B12/Folate Deficiency	check levels
Anti-parietal cell anti-body & intrinsic factor antibody	screening for pernicious anaemia
Anti-tTG & IgA	screening for coeliac disease
LFTs	GGT may be elevated in alcohol excess
Peripheral blood smear	anisocytosis, poikiloctyosis, hypersegmented neutrophils

Don't forget to ask about diet (vegan), alcohol intake, medications

IDA Iron Studies

Serum iron levels	LOW	measures amount of iron in transit in blood
Serrum ferritin	LOW	total iron stored in the body
Total iron binding capacity	HIGH	TIBC increases in order to try and maximise use of the little iron available
Transferrin saturation	LOW	level of saturation of transferring with iron: normal is 30%. Reduced in iron deficiency states

Autoimmune Haemolytic Anaemia (Haemolysis)

Warm AIHA	Antibody active at body temp
	Aetiologies include: rheumatic disease and lymphoproliferative disorders
	IgG antibodies +/- complement
Cold AIHA	Antibody active only at lower temps
	Aetiologies include: infections (eg. mono) and lymphoma
	IgM antibodies

Haemolytic Anaemia

Investigations	
FBC	Low Hb, normal MCV
Reticulocytes	elevated
LDH	elevated
Haptoglonbin	low
LFT's	unconjugated Bilirubin - elevated
Direct Antiog-lobin (Coombs) Test	if + then autoimmune haemolysis likely
Blood Film	look for specific abnormalities
Management	
Treat underlying cause	consult haem/medical team
Stabilize pt	consult haem re. need for transfusion
Warm AIHA	1st line: corticosteroids, 2nd line: Rituximab, Azathioprine, Cyclosporin, 3rd line: splectomy
Cold AIHA	Avoid cold temps & treat underlying cause +/- immunosuppressant (rituximab)

Haemolytic Anaemia

Haenolytic Anaemia	Haemolysis: destruction of red blood cells
Aetiologies	
Autoimmune	Warm, cold, transfusion reaction, drug induces
Haemoglobinopathies	sickle cell, hereditary spherocytosis, thalassaemia
Infections	malaria
Enzyme defects	G6PD
Microangiopathic haemolytic anaemia (MAHA)	haemolytic uremic syndrome, TTP, DIC, eclampsia/HELLP
Mechanical haemolysis	heart valve prosthesis
Rare	Paroxysmal noctural, haemoglob-inuria (PNH)