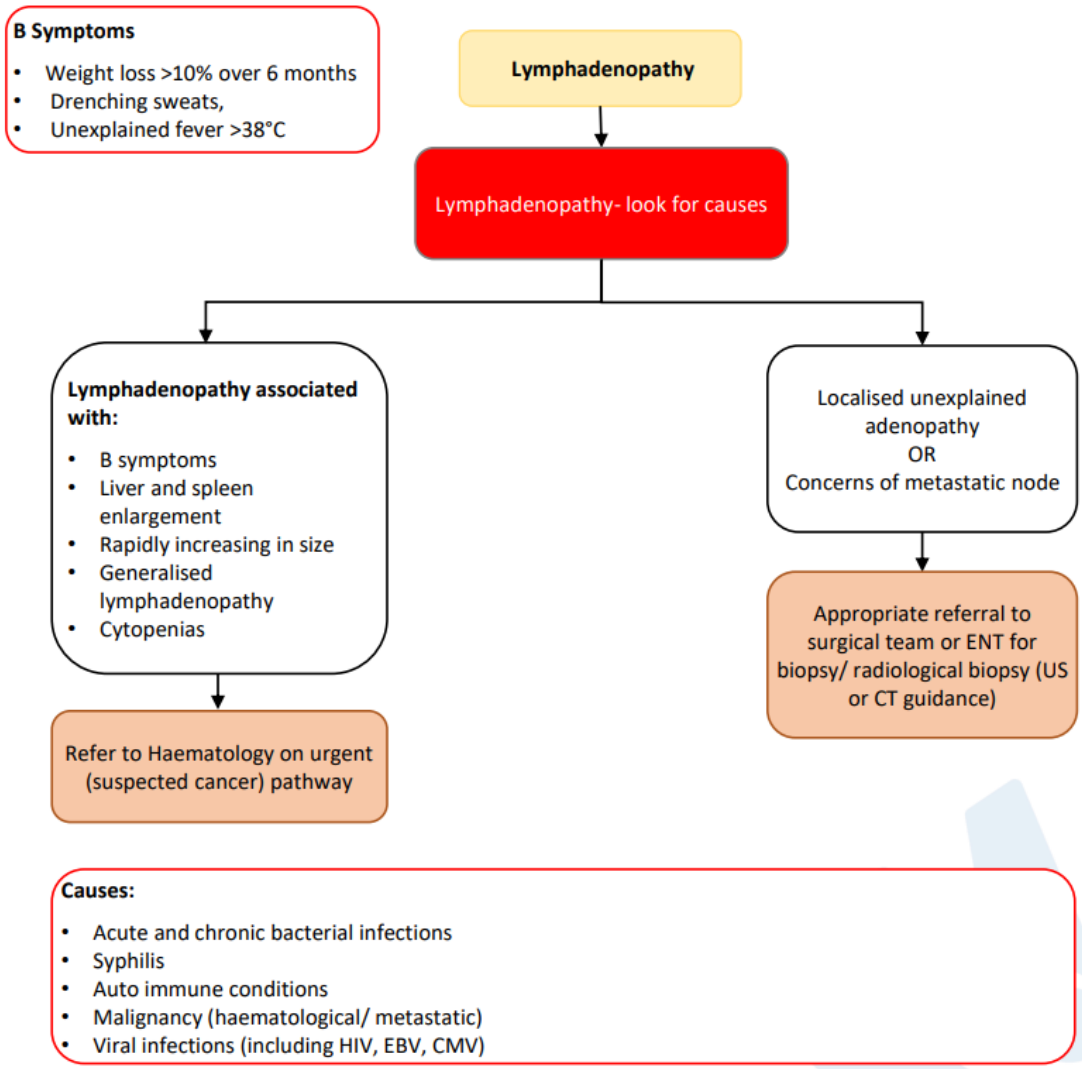
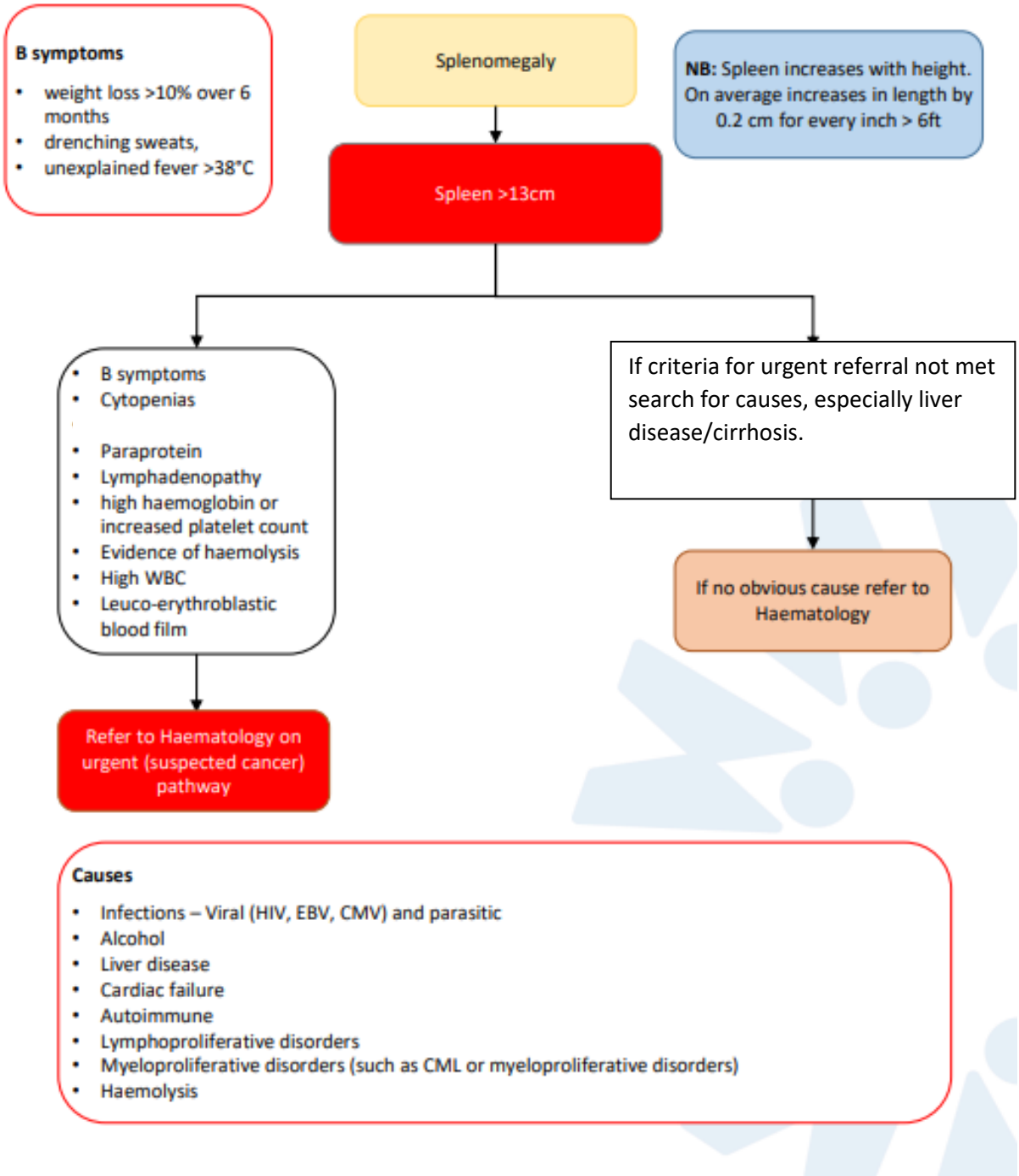
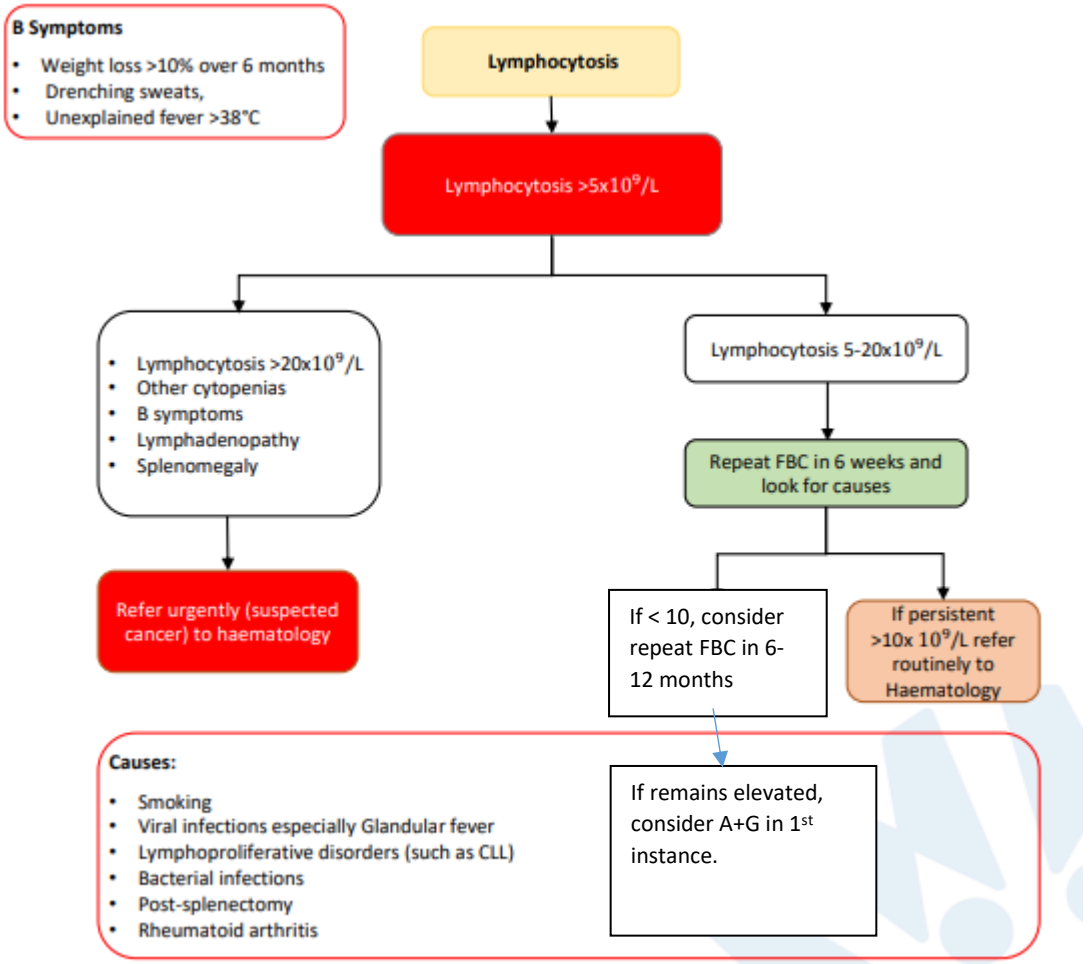
LYMPHADENOPATHY



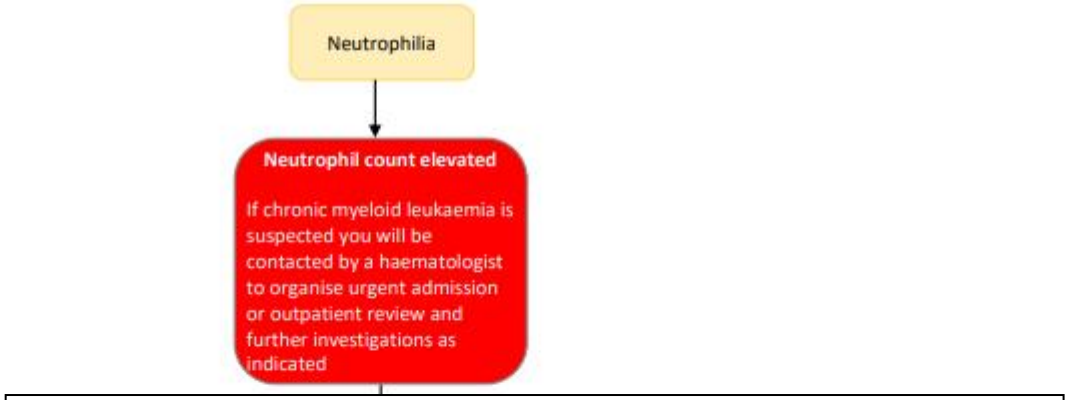
SPLENOMEGALY



Lymphocytosis



Neutrophilia



- Splenectomy/hyposplenism
- Acute/chronic infection/inflammation, including e.g RA, PMR, GCA, IBD etc
- Post-op/trauma
- Steroids
- Pregnancy
- Smoking – Very common
- Rare – CML, other myeloproliferative disorders
- Obesity – Isolated leucocytosis without other cause has been reported in obese individuals

- Repeat FBC in 6-12 weeks, especially if there is recent acute infection/inflammation/surgery/trauma
- Blood film
- CRP/ESR
- Smoking history, medication e.g steroids
- Clinical correlation - Any recent infection/inflammatory disorders, surgery etc

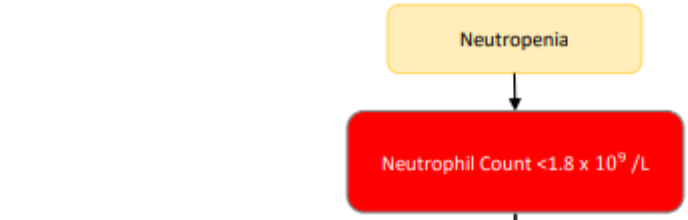
- **If a blood film is thought to be suggestive of a primary haematological disorder e.g CML, the blood film comments will contain advice on what to do next. Generally a 2WW referral would be appropriate.**
- **Persistent UNEXPLAINED (i.e none of the above causes are present) neutrophilia > 20 x10^9** –> Routine referral to haematology.
- Consider A+G if unsure

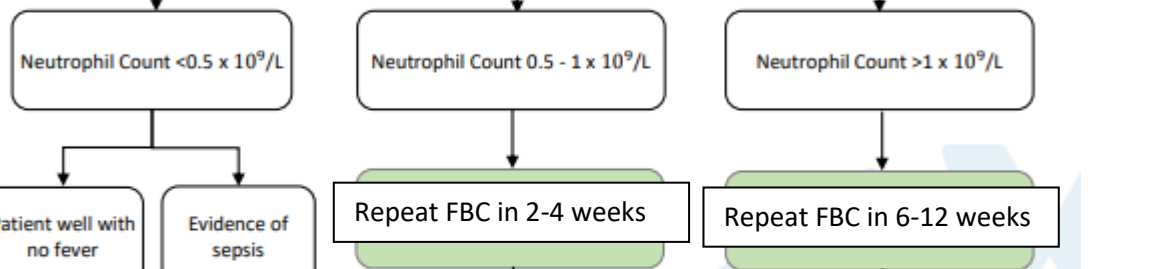
Neutropenia

Workup

If neutropenia persists on repeat:

- Medication history
- Blood film
- U+E, LFT
- B12/folate
- TFT
- HIV, Hep B/C screen
- ANA, RF, anti-CCP etc if suggestive clinical features





Repeat FBC in 2-4 weeks

Repeat FBC in 6-12 weeks

Repeat FBC in 1 week.

Safety net re neutropenic sepsis.

If persists and no obvious cause -> urgent referral

Admit to hospital for management of Neutropenic sepsis

Workup as above.

If no clear cause, consider routine referral to haematology.

Workup as above.

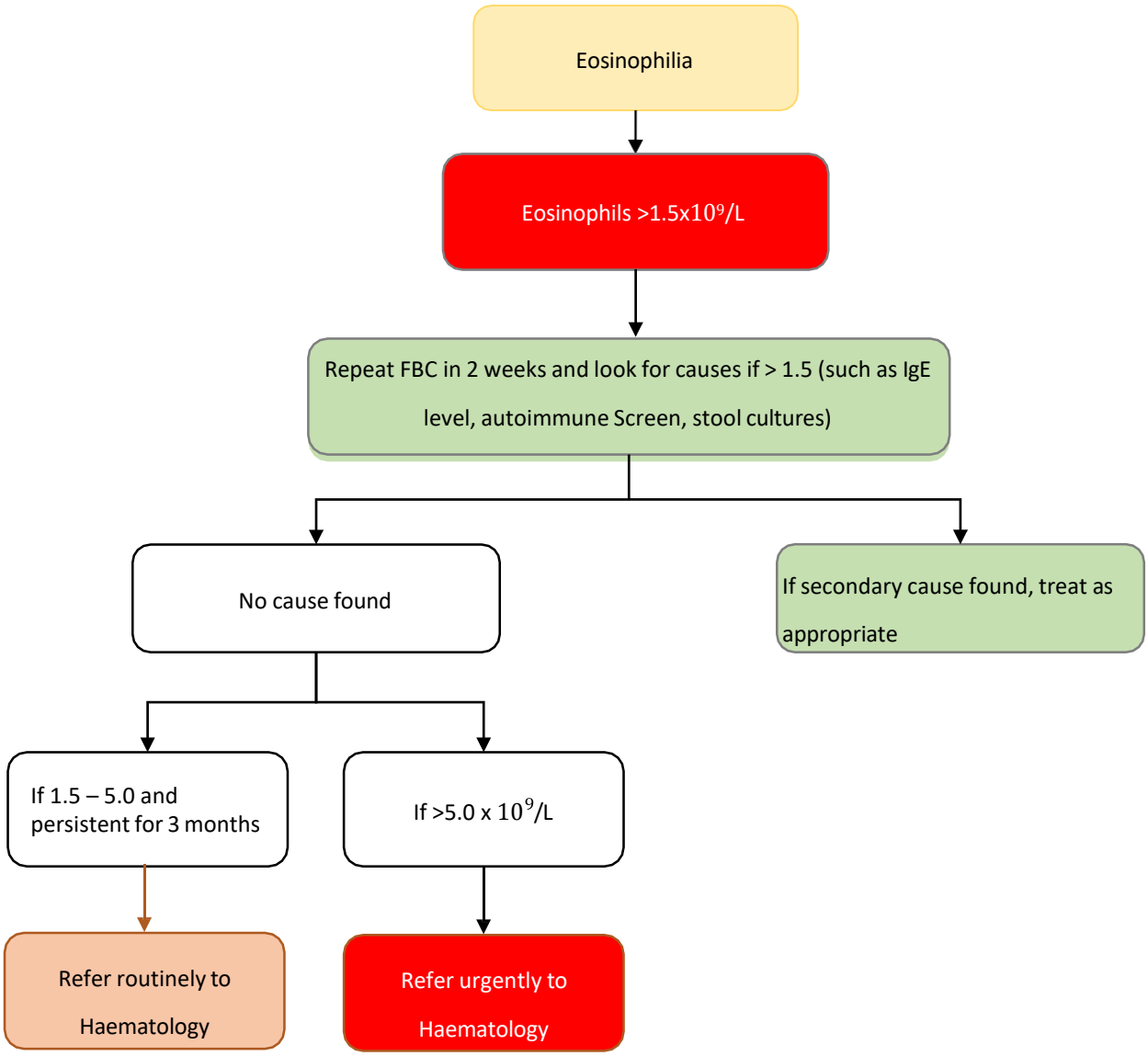
If no clear cause, consider repeat in 6-12 months and A+G if still low at this point.

Note:

Common causes:

- Transient following acute (especially viral) infection
- Medication – Many but commonly anti-thyroid drugs, antiepileptics, antipsychotics, quinine, co-trimoxazole, antimetabolites (MTX, AZA, 6-MP, hydroxycarbamide), antibiotics,
- 'benign ethnic neutropenia' – Black and middle eastern people commonly have a lower neutrophil count (0.8-1.5) – This is a normal variant.
- B12/folate deficiency, eating disorder with malnutrition
- Autoimmune/rheumatological disorders e.g RA (Felty's syndrome), SLE, IBD, thyroid diseases
- Congenital/cyclical neutropenia – Rare
- BM disorders – MDS, aplastic anaemia, infiltration, LGL leukaemia – Would generally expect pancytopenia as opposed to isolated neutropenia
- Idiopathic – Common

EOSINOPHILIA



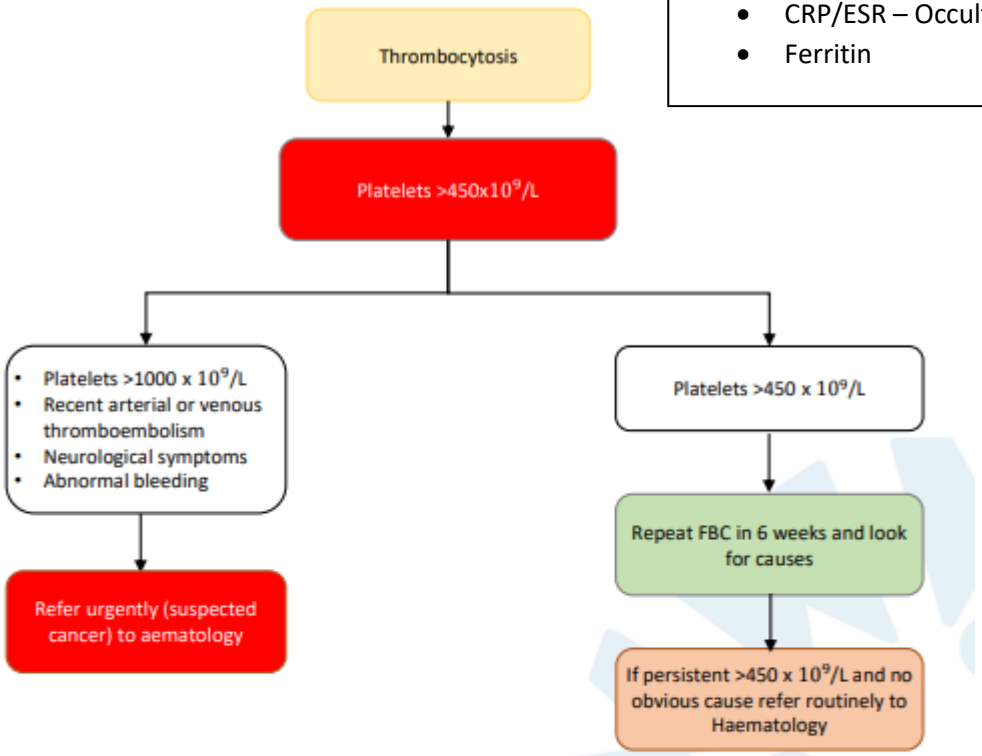
Causes

- Asthma / atopic dermatitis / acute urticarial
- Infections: especially those due to parasites (most commonly helminthes - hookworm, schistosomiasis - but also giardiasis or other protozoal infections and strongyloides)
- Drugs (penicillins, carbamazepine, sulphonamides are common but any drug is a possible cause)
- Connective tissue disease (rheumatoid arthritis, polyarteritis nodosa, Wegener's granulomatosis)
- Solid malignancy (breast, renal and lung cancer)
- Respiratory disease (Churg-Strauss syndrome, bronchiectasis, cystic fibrosis)
- Myeloproliferative disorders

Thrombocytosis

Work-up:

- Clinical correlation and review for symptoms of underlying disorders (see box below) such as infection, inflammation, malignancy
- CRP/ESR – Occult inflammation
- Ferritin



Causes

- Iron Deficiency Anaemia
- Malignancies especially the LEGO cancers (lung, endometrium, gastric and oesophageal)
- Inflammation
- Infection
- Post-Splenectony and Hyposplenism (e.g. Coeliac Disease)
- Myeloproliferative Disorders
- Post-Operatively

Polycythaemia (raised HCT [not raised Hb] >0.48 in females, >0.52 in males)

Raised HCT: >0.48 female, >0.52 male.

Repeat FBC in 2-4 weeks **with good hydration 24 hours prior** to ensure not dehydrated at time of sampling.

Consider

- Relative polycythaemia (reduced plasma volume, normal red cell mass):
  - Dehydration
  - Diuretics
  - Excess OH consumption
  - Smoking
- Absolute polycythaemia (increased red cell mass):
  - Central hypoxia – e.g Chronic lung diseases, OSA.
  - Local renal hypoxia – Renal artery stenosis, end stage renal disease, hydronephrosis, PKD
  - EPO secreting tumour
  - Polycythaemia vera (rare)
- Implicated medications:
  - Diuretics
  - Androgens
  - EPO
- Other:
  - Post renal transplant
  - Smoking (multifactorial)

Recent thrombosis

Neurological disturbance, visual symptoms

Bleeding

HCT > 0.6

YES

Refer urgently to haematology

NO

Consider routine referral to haematology if a cause is not apparent.

If there is a clear secondary cause e.g hypoxia from COPD or OSA, management is optimising the management of the underlying cause.

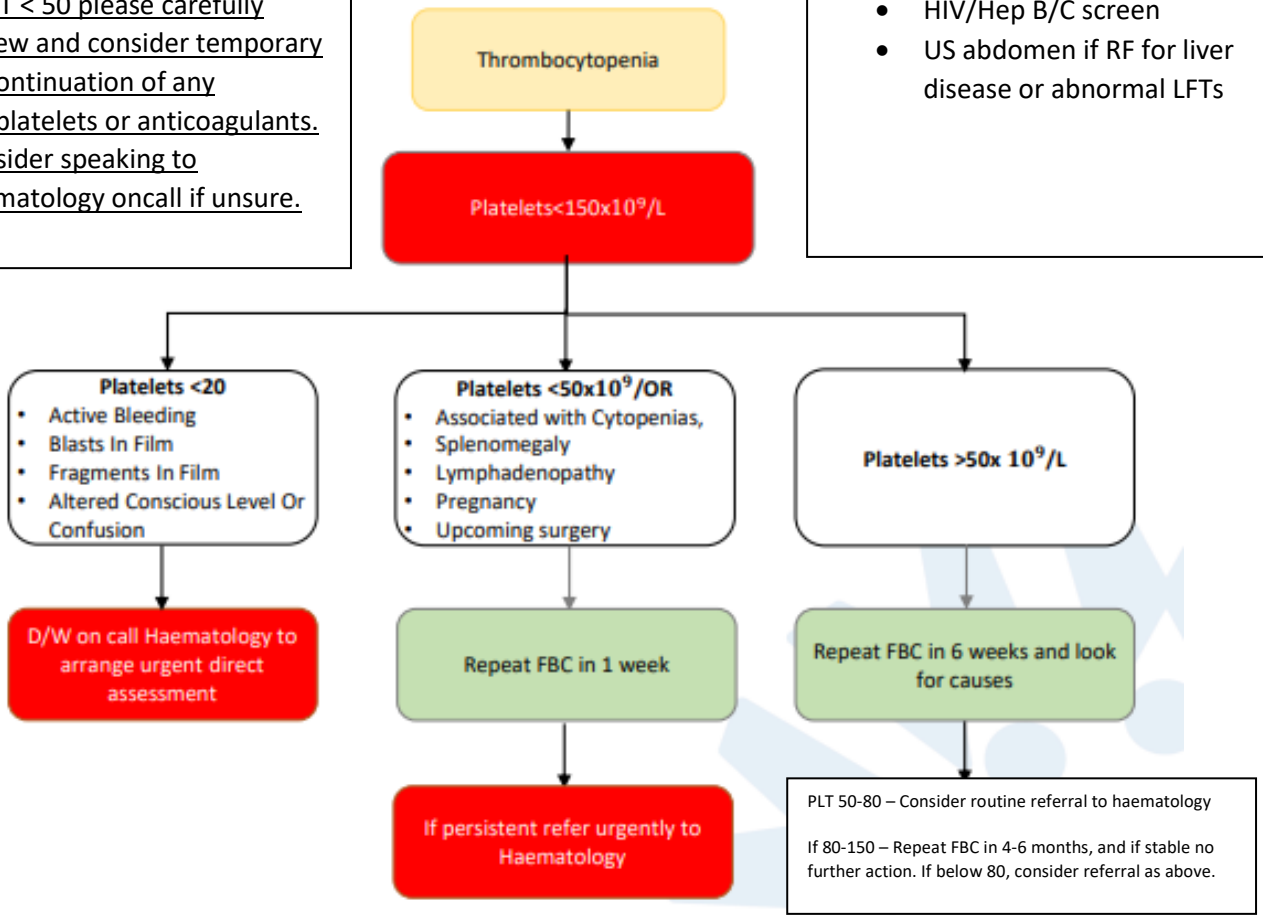
Thrombocytopenia

Platelet clumps on blood film? Likely pseudothrombocytopenia (in vitro phenomena) – Consider Citrate platelet count and if normal no action required.

If PLT < 50 please carefully review and consider temporary discontinuation of any antiplatelets or anticoagulants. Consider speaking to haematology oncall if unsure.

Investigations:

- Blood film if not already done
- B12, folate, ferritin
- U+E, LFT
- Review medications
- OH history
- TFT
- HIV/Hep B/C screen
- US abdomen if RF for liver disease or abnormal LFTs



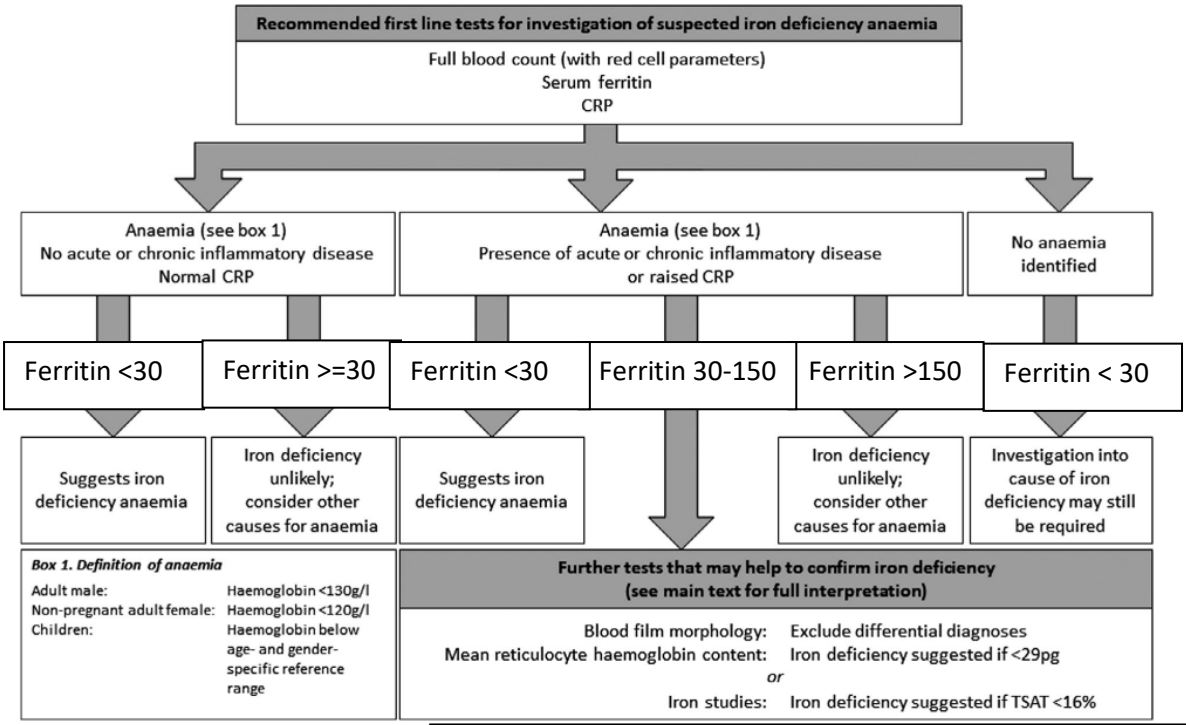
Causes

- Spurious result from clumping – please look at blood film report and repeat using citrated sample
- Immune thrombocytopenic purpura (ITP)
- Alcohol
- Liver dysfunction
- Medications
- B12/folate deficiency
- HIV/Hepatitis B/C
- Bone marrow failure/infiltration

MICROCYTIC ANAEMIA (anaemia with low MCV and/or MCH)

3 main causes are:

- Iron deficiency anaemia (IDA)
- Thalassaemia trait
- Anaemia of chronic disease



Once IDA is excluded, Thalassaemia trait is suggested by:

- Normal or slightly low Hb with very low MCV/MCH (disproportionate)
- MCV/MCH never been normal

Thalassaemia trait is not likely if the MCV/MCH have been normal at some point.

Anaemia of chronic disease is a clinical diagnosis based on the exclusion of other causes and presence of serious comorbid illness.

Detailed guidance on IDA can be found at [Anaemia - iron deficiency | Health topics A to Z | CKS | NICE]

In patients with IDA, priorities are:

- Iron replacement with PO iron (maximum OD).
- Investigation and management of the underlying cause.

IDA patients should not be referred to haematology in the first instance. Only those who are truly non responsive to oral iron (after addressing any ongoing bleeding), or unable to tolerate oral iron (try once alternate days if OD not tolerated) are appropriate for referral and consideration of IV iron.

It is expected that workup for underlying causes and onward referral for e.g GI investigations, management of menorrhagia will be done from primary care.

It should be noted that in patients with IDA due to bleeding, for example menorrhagia, control of bleeding is absolutely essential to successfully managing the iron deficiency and must be prioritised, alongside iron replacement.

Please also note that ferritin will not increase until the FBC has normalised, therefore assessment of initial response to oral iron is based on improvement in Hb.

Please note also that oral iron should continue for at least 3 months AFTER normalisation of the FBC, to rebuild iron stores, and those at ongoing risk of IDA may benefit from ongoing supplementation – See CKS for details of who may benefit.

NORMOCYTIC ANAEMIA (anaemia with normal MCV)

Consider:

- Anaemia of chronic disease – COMMONEST CAUSE OVERALL
- Renal anaemia (eGFR < 45)
- Acute blood loss
- Haemolysis
- Haematinic deficiency
- Haematological causes - e.g MDS, Myeloma

Check:

- Assess for bleeding clinically
- Vit B12, folate, ferritin
- Reticulocyte count, LDH
- U&E, LFT
- Blood film if not already available
- Consider myeloma screen (serum protein electrophoresis and urine BJP) if other causes excluded. **Not a first line investigation.**

Elevated reticulocyte count?

Consider bleeding or haemolysis:

- Assess for bleeding clinically and review LDH and BIL. Haemolysis suggested if raised BIL/LDH.

Haemolysis – Urgent referral to haematology

Bleeding – Refer as appropriate to e.g gastro, urology etc

Significant CKD

Refer to renal team for management of renal anaemia

Positive myeloma screen?

Check calcium

Evaluate for bone pain

SEE PARAPROTEIN GUIDELINE

Investigations negative/no significant abnormality

Haematinic deficiency – Replace as appropriate

Suspect anaemia of chronic disease if comorbidities present. Optimise management chronic disease(s).

Consider A+G if no comorbidities/cause not clear.

PANCYTOPENIA

Severe if any of:

- Hb < 80
- PLT < 30
- NEUT < 0.5

Consider reversible causes:

- Drugs e.g. methotrexate, azathioprine, hydroxycarbamide, chemotherapy
- B12/folate deficiency

Check:

- OH consumption, medication history
- Vit B12, folate, ferritin
- Reticulocyte count
- U&E, LFT, Calcium
- LDH
- ANA, RF, anti-CCP etc if suggestive clinical features
- TFT
- Blood film if not already available
- Consider myeloma screen (serum protein electrophoresis and urine BJP) if other causes excluded. **Not a first line investigation.**
- Consider abdominal US if RF or features to suggest liver disease

Unwell/ febrile/ other clinical concerns → Discuss with on- call Haematologist Consider admission

Clear cause → Treat underlying cause and monitor to ensure resolves

Blood film shows concerning features E.g.

- DIC
- Blasts
- Leucoerythroblastic features

→ Follow advice from blood film report or discuss with on call Haematologists

Non-severe

No clear cause → Routine referral to Haematology

Severe features present but clinically stable → Possible reversible cause?

- YES - Treat and discuss with Haematology team as required
- No – 2WW Haematology referral

MACROCYTOSIS +/- ANAEMIA (MCV >100)

Macrocytosis +/- anaemia

Repeat FBC to ensure not spurious (e.g. delayed transport/ overheating etc)

MCV remains raised

- Alcohol history
- Smoking history
- Medication history
- Blood Film
- VIT B12 and folate
- Reticulocyte count/LDH
- LFT
- TFT
- Consider myeloma screen (serum protein electrophoresis and urine BJP) **if other causes excluded and there is anaemia. Not a first line investigation. Not indicated if no anaemia.**

Underlying cause identified? – Treat as appropriate and monitor for resolution.

Consider referral to Haematology if:

- No cause identified and MCV>105fL if any cytopenia or >110fL in the absence of cytopenia
- Primary haematological disorder is suspected e.g dysplasia on blood film, paraprotein detected, evidence of haemolysis (e.g raised BIL, reticulocytes, LDH)

Vitamin B12 and folate deficiencies are not the only causes of macrocytosis.

Other (non-megaloblastic) causes of macrocytosis include:

- Alcohol — may cause macrocytosis with neither anaemia nor a change in liver function. Alcohol is the most frequent cause of a raised mean cell volume (MCV) in the absence of anaemia.
- Drugs — antimetabolites, such as hydroxycarbamide, methotrexate and azathioprine.
- Haematological abnormalities such as:
  - Myelodysplasia.
  - Aplastic anaemia.
  - Pure red cell aplasia.
  - Plasma protein changes (for example myeloma).
  - Reticulocytosis.
- Liver disease — chronic liver disease is associated with anaemia that is mildly macrocytic.
- Pregnancy and the neonatal period.
- Severe thyroid deficiency — anaemia caused by hypothyroidism is often macrocytic. However, MCV falls once thyroxine treatment is started.
- Smoking

Detailed guidance of investigation and management of B12/folate deficiency available at: Anaemia - B12 and folate deficiency | Health topics A to Z | CKS | NICE

See also BUKU medicine.