

# PATHCHAT

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## Basic Approach to Abnormal FBC:

### Part I (RBC indices)

Full blood count (FBC) results should always be interpreted in context of the following:

- Normal baseline for the patient in question (5% of the population may have values outside the reference range)
- Sex (in general, red blood cell (RBC) measurements are lower in women)
- Race (persons of African descent show lower haemoglobin (Hb) than people of Caucasian ancestry)

The parameters on which to focus when interpreting an FBC include the following:

- Hb
- Mean cell volume (MCV) (important in the classification of anaemia)
- RBC count
- RBC distribution width (RDW)

### Anaemia (low Hb)

The first step is to classify the anaemia as microcytic (low MCV), normocytic (normal MCV) or macrocytic (high MCV). See Figure 1. A peripheral blood (PB) slide evaluation can also assist to guide the differential diagnosis and suggest further testing.

#### Microcytic anaemia

There are three main possibilities for a microcytic anaemia, namely iron deficiency, thalassaemia and anaemia of chronic disease (ACD). Since iron deficiency is the most common cause of a microcytic anaemia, a ferritin level is recommended as an initial investigation. A low ferritin level confirms iron deficiency. A normal or raised ferritin level suggests possible thalassaemia or ACD.

In patients with thalassaemia, the microcytosis tends to be longstanding, family history may be helpful, the RBC count may be raised or RBC morphology suggestive. Hb electrophoresis is then indicated. In ACD, the RDW tends to be normal and RBC morphology unremarkable. Further testing would be dictated by patient history, examination and possible PB morphology findings.

#### Normocytic anaemia

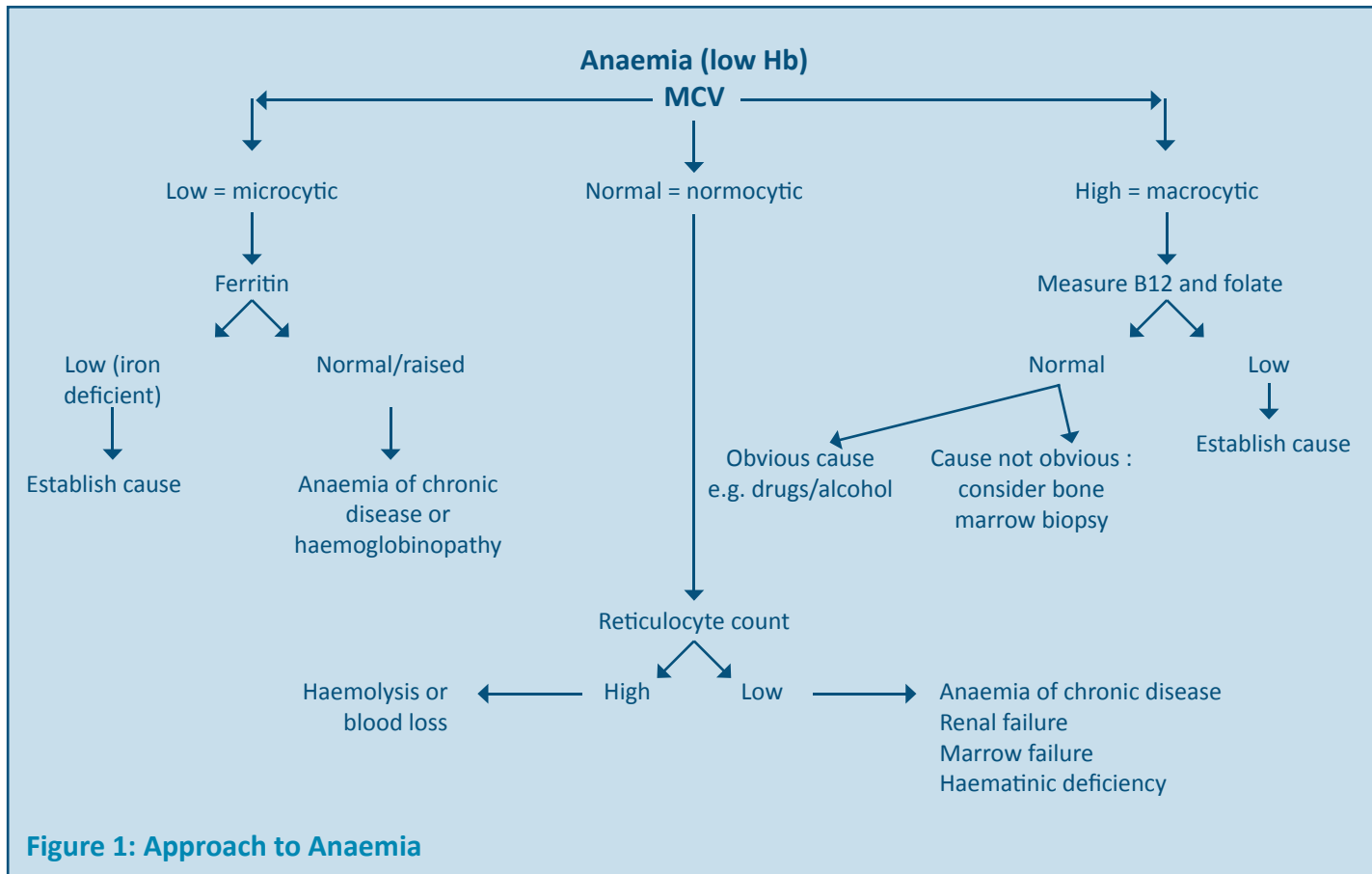
A reticulocyte count and PB slide review are appropriate initial investigations. A high reticulocyte count indicates loss or destruction of RBCs by blood loss or haemolysis. Patient history, faecal occult bloods, PB slide review and/or haemolysis screens are then recommended. A low reticulocyte count indicates underproduction of RBCs. Common or treatable causes should be excluded or considered first. These include anaemia of renal failure and nutritional anaemia. Although iron and B12/folate deficiency are usually associated with microcytic and macrocytic pictures respectively, they can sometimes cause a normocytic anaemia. If the above have been excluded, the differential would include ACD or a primary bone marrow disorder. Patient history and PB slide findings are helpful in distinguishing between the two.

#### Macrocytic anaemia

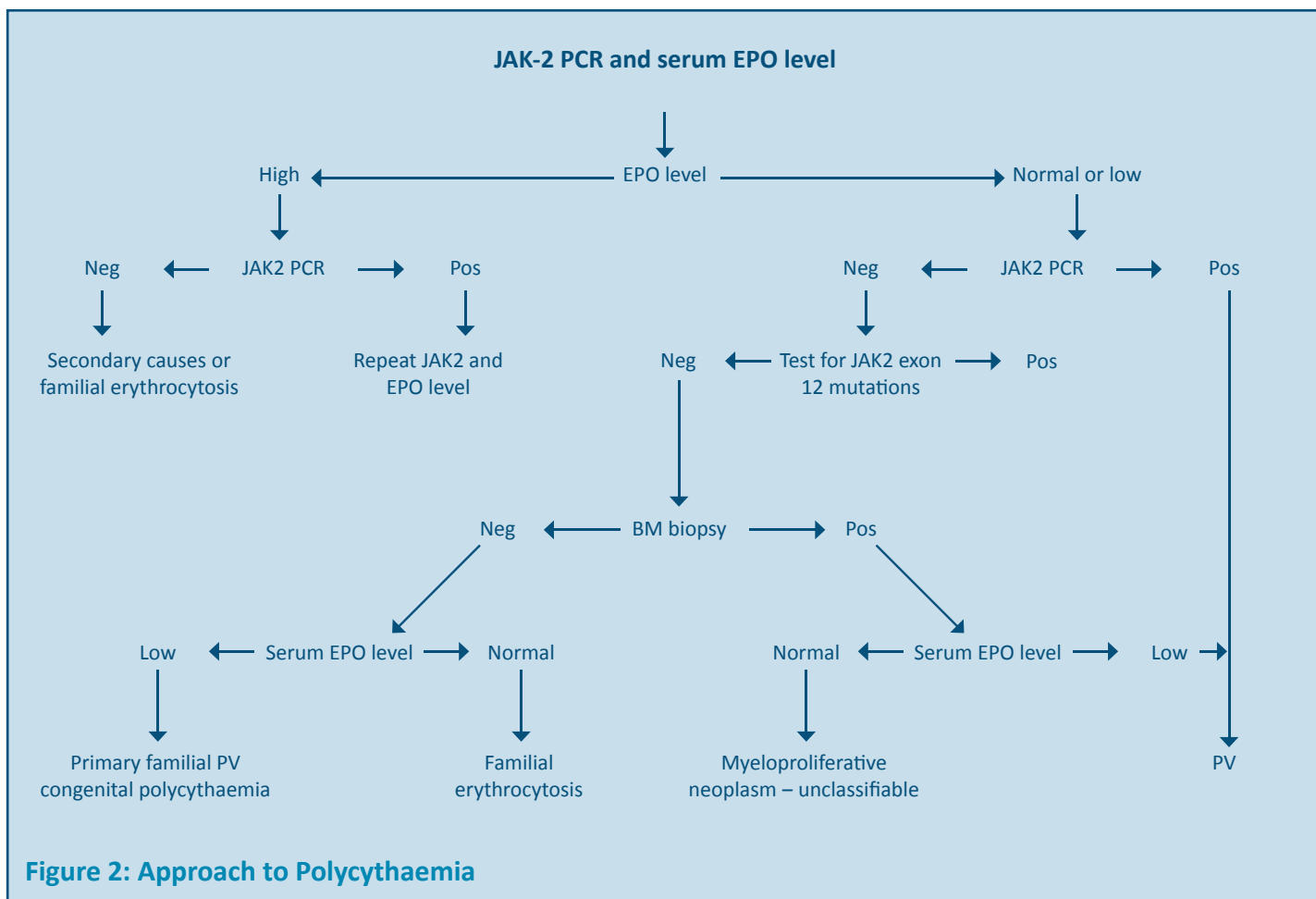
B12 and folate levels are recommended initially. If a deficiency is confirmed, an underlying cause should be sought. Certain drugs, alcohol, liver disease and haemolysis are common causes of a macrocytosis. Once nutritional deficiencies have been excluded, a comprehensive medication and/or alcohol history should be obtained and a liver function tests (LFT) and reticulocyte count done. If the above have been excluded, the possibility of a myelodysplastic syndrome or other primary bone marrow disorder should be considered. Once again, a PB slide review can provide useful clues to narrow the differential diagnosis.

#### Polycythaemia (increased Hb and/or Hct)

A raised Hb may either be due to a true polycythaemia (increased RBC mass) or an increase in plasma cell volume (dehydration, alcohol, smoking, diuretics). True polycythaemia may be primary i.e. Polycythaemia Vera (a clonal myeloproliferative condition), or secondary (often, but not always driven by erythropoietin). It is advisable to confirm a raised Hb or haematocrit (Hct) on a fresh specimen. History and clinical examination may reveal obvious secondary causes (cardiac, pulmonary, etc.) for the polycythaemia. Figure 2 demonstrates an approach to polycythaemia based on JAK-2 and erythropoietin testing.



**Figure 1: Approach to Anaemia**



**Figure 2: Approach to Polycythaemia**