classifying the types of anaemia. The RDW may become abnormal before the MCV changes.

Normal RDW:

- increased MCV—aplastic anaemia, pre-leukaemia
- normal MCV—anaemia chronic disease, acute blood loss, haemolysis, chronic lymphocytic leukaemia, chronic myelogenous leukaemia, haemoglobinopathy, normal variant
- decreased MCV—anaemia of chonic disease, thalassaemia (heterozygous).

Increased RDW:

- increased MCV—vitamin B_{12} deficiency, folate deficiency, immune haemolytic anaemia, liver disease
- normal MCV—early stage of vitamin B_{12}, folate and iron deficiency anaemias, anaemic globinopathy
- decreased MCV—iron deficiency anaemia, RBC fragmentation, HbH disease.

Reticulocyte count

Using microscopy..... 10–100 × 10^9/L (0.2–2% of total number of RBCs)

The reticulocyte count gives an indication of the ability of the bone marrow to respond to anaemia and produce RBCs. The count will be reduced in untreated anaemia arising from iron, folate or vitamin B_{12} deficiency and elevated in acute bleeding and haemolysis.

Enzymes

Alpha$_1$-antitrypsin

Serum (method dependent) .....0.9–1.7 g/L

Alpha$_1$-antitrypsin deficiency is seen in approximately 1% of patients with emphysema. However, it is more common in younger patients. Neonatal jaundice and hepatic cirrhosis in children are often associated with alpha$_1$-antitrypsin deficiency.

Amylase

.....(method dependent) 70–300 U/L

Amylase is present in large amounts in the pancreas and salivary glands; with smaller amounts found in other tissues. Plasma amylase is elevated in the following conditions: acute pancreatitis (usually >5 × normal), other acute abdominal conditions (perforated peptic ulcer, acute biliary obstruction and small bowel obstruction), salivary gland disease (e.g. mumps), renal disease, opioid-induced spasm of the sphincter of Oddi (2–10 × normal) and macroamylasaemia. Serum amylase does not correlate with the severity of disease, nor does it help in distinguishing acute pancreatitis from other diseases masquerading as pancreatitis.

Creatine kinase

Adult female ..... 30–180 U/L

Adult male ..... 60–220 U/L

Neonate ..... 70–380 U/L

CK-MB .....<4 micrograms/L (<10 U/L)

Creatine kinase (CK) is an enzyme that exists as three isoenzymes[7]:

- CK-MM from skeletal muscle, which accounts for >94% of total CK
- CK-MB from cardiac muscle but with a small contribution from skeletal muscle
- CK-BB from brain tissue which is found in low concentration and is clinically unimportant except occasionally in tumours.

Elevation of creatine kinase may be used as a marker of muscle damage due to trauma or exercise or from medicines that can cause muscle damage (e.g. statins, fibrates) or acute myocardial infarction. An elevated CK, where the MB isoenzyme (CK-MB) is >4 micrograms/L and >2.0% of the total CK, indicates acute myocardial damage. CK testing has largely been superseded by use of troponin levels, although due to CK's short half-life compared with cardiac troponins it may be used to detect re-infarction.

Lactate dehydrogenase

.....(method and age dependent) 110–230 U/L

Lactate dehydrogenase (LDH) is an intracellular enzyme found in the kidney, heart, skeletal muscle, brain, liver and lungs. Increases are usually found in cellular death and/or leakage from the cells. It has traditionally been used to test for myocardial infarcion, but with the advent of more specific cardiac markers such as troponin, the use of LDH has fallen out of favour.[8]

Decreased levels of the enzyme may be seen in cases of malnutrition, hypoglycaemia, adrenal exhaustion and low tissue or organ activity.

Iron homeostasis

Ferritin

Female (pre-menopausal) .....15–200 microgram/L

Female (post-menopausal) and male.....30–300 microgram/L

Ferritin is the main iron storage protein present in the reticulo-endothelial cells of the liver, bone marrow and spleen. It is used as a measure of total body iron stores and may be low before serum iron has substantially