

Erythrocytes indices and morphology

- **Erythrocytes, indices**

Material: 3 ml EDTA blood (not older than 6 hours)

1. MCH: mean corpuscular Hb, HbE

Calculation: Hemoglobin [g/dl] x 10 adult 27 -32 pg

2. MCV: mean corpuscular volume

Calculation: Hematocrit [g/dl] x 10 adult 83 – 101 fl

RBC count [mio] children 75 - 110 fl

3. MCHC: mean corpuscular Hb concentration

Calculation: Hemoglobin [g/dl] x 10 adult 31-36 g/dl

Hematocrit [%] children 32-37 g/dl

• Erythrocytes, morphology

Nomenclature of erythrocyte morphology:

Description	Morphology	Disorder
Acanthocytes/ Burr cells	with 5 - 10 unequal pseudopodia like forms	A-β-lipoproteinemia, verotoxin (E. coli, EHEC), hemolytic uremic syndrome
Anisocytosis	Different size of RBC	every anemia, iron deficiency anemia, thalassemia
Anisochromia	different staining caused by different Hb concentrations in the single RBCs	
Anulocytes	extended central bright area	iron deficiency anemia, thalassemia
Basophilic stippling	granula as remaining RNA	heavy metal poisoning (lead, arsenic), A. perniciosa, hemoglobinopathy, osteomyelofibrosis, dyserythropoesis, extramedullar erythropoiesis

Description	Morphology	Disorder
Dakrocytes	tear shaped RBCs	splenomegalia, osteomyelofibrosis
Echinocytes	10-30 pseudopodia like forms	uremia
Elliptocytes/ ovalocytes	normal < 1%	familial elliptocytosis if more than 20%, megaloblastic or iron deficiency anemia up to 10%
Fragmentocytes	Parts of erythrocytes	Mechanical by cardiac valve substitute, hemolytic uremic syndrome
Heinz bodies	denaturated precipitated hemoglobin by oxidative damage in enzyme deficiency	G 6 P D H d e f e c t , methemoglobinemia
Howell-Jolly bodies	nuclear residuals	splenectomy
Hyperchromasia	increased staining of Hb, MCH increased	megaloblastic anemia, vitamin B12 and folic acid deficiency
Hypochromasia	inadequate coloring of Hb, MCH decreased	hypochrome anemias: thalassemia, myelodysplastic syndrome, iron deficiency, infections, tumor anemia
Macrocytes	erythrocytes of normal shape but diameter increased (> 8.5 mcm), often hyperchromic, MCV and MCH increased, MCHC normal	Regular alcohol consumption, hepatic cirrhosis
Megalocytes	extended, slightly oval hyperchromic erythrocytes, MCV increased	vitamin B12 or folic acid deficiency, intrinsic factor defect, fish tapeworm

Description	Morphology	Disorder
Microcytes	RBCs with normal shape but diameter reduced (< 7 μm), often hypochromic, MCV and MCH decreased	iron deficiency anemia, thalassemia, sideroachrestic anemia
Normocytes	7-8 μm sized normal erythrocytes with a central bright area	
Poikilocytosis	Different shapes	every serious anemia
Polychromasia	different staining	
Schistocytes	ruptured erythrocytes	mechanical hemolysis e.g. cardiac valve substitution, microangiopathic hemolysis, verotoxin (E. coli)
Spheric cells	see spherocytes	hereditary spherocytosis
Spherocytes	small thick erythrocytes without a central bright area, MCHC increased, MCV and MCH decreased	spherocytosis
Sickle cells	in abnormal Hb (HbS) RBC transform into sickle shape	sickle cell anemia
Target cells	hypochromic RBC with central bulge	thalassemia, hepatic cirrhosis, cholestasis

For complete list of laboratory test offered at Freiburg Medical Laboratory, please visit <http://www.fml-dubai.com/parameter-listings/>