Hematology and Coagulation Tests

WBC

Hct

Hgb

Platelets

Red Blood Cell

Reticulocyte Count (0.5 –2%)

Immature RBC

Erythrocytes (RBC) [M = 4.5-5.9 X 106 cells/ mm3 , F = 4.1-5.1 X 106 cells/] mm3

Normal life span: 120 days = 4 months = 1/3 year

Hemoglobin: a protein within RBC that carries oxygen. Contains Iron

[NL = male 13.5-17.5 g/dl; female 11.5-15.5 g/dl]

Measurements

Hematocrit = RBC / blood volume. [NL= male 39-50%; female 33-45%]

MC**V** (Mean corpuscular Volume): Indicates the SIZE of the RBC

MCH**C** (Mean Corpuscular Hemoglobin CONCENTRATION): indicates the Amount of hemoglobin in each RBC

WBC or Leukocytes [4,400-11,300 cells]

WBC: Cells of the immune system average life span 1-2 days

Types of WBC

Neutrophils: innate immune system has segs and bands

ANC (absolute neutrophil Count) = total WBCs x (% neutrophils + % bands)

Normal ANC: 1500 to 8000 /mm3 1.2 – 8.0

Neutropenia if neutrophils < 2000

Risk of infection if neutrophils <500

Segs: Mature neutrophils (Adult normal – 54-62%)

Bands: Immature Neutrophils 🡪 shift to the left (Adult normal – 3-5%)

Lymphocytes: increased in viral infections (25-33% of WBC)

T cells

B Cells

NK

Eosinophils: increase in parasitic and allergic infection (25-33% of WBC)

Macrophages become Monocytes (Phagocytosis) (2-8% of WBC)

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| --- | --- | --- | --- | --- |
| nEUTROPHILS2 | Bands | Lymphocyte | Monocytes | Eosinophils |
| Bacterial infections\* | Bacterial infections\* | Viral infections | Tuberculosis | Allergic disorders |
| Fungal infections | Fungal infections | Pertussis (bacteria whooping cough) | Subacute bacterial endocarditis | Drug hypersensitivity reactions |
| Disease states such as DKA (diabetic ketoacidisos), AMI |  |  | Mononucleosis | Parasitic infections |
| Stress |  |  | Malaria |  |
| Drugs: epinephrine, steroids |  |  |  |  |

Platelets

General: Life span 3 – 5 days

Thrombocytosis: increase in platelets

Thrombocytopenia: decrease in platelets

Coagulation Testing: Extrinsic

prothrombin time (PT)

Prolonged PT

Vitamin K deficiency

Liver disease: Prothrombin is produced in the liver

prothrombin ratio (PR)


\text{INR}= \left(\frac{\text{PT}_\text{test}}{\text{PT}_\text{normal}}\right)^\text{ISI}
international normalized ratio (INR) high INR = bleeding b/c test Prothrombin Time is high

Warfarin: value is over 1

Range: 2-3 (takes twice to three times as long to coagulate)

Coagulation Testing: Intrinsic

aPTT Partial\_thromboplastin\_time measures heparin which is produced in body (cannot be measure Extrinsic)

Blood Test: Myocardial Infarct

CreaTINE (not creatinine) Kinase:  is an[enzyme](http://en.wikipedia.org/wiki/Enzyme) ([EC](http://en.wikipedia.org/wiki/EC_number) [2.7.3.2](http://enzyme.expasy.org/EC/2.7.3.2)) expressed by various tissues and cell types. CK catalyses the conversion of [creatine](http://en.wikipedia.org/wiki/Creatine) and consumes [adenosine triphosphate](http://en.wikipedia.org/wiki/Adenosine_triphosphate) (ATP) to create [phosphocreatine](http://en.wikipedia.org/wiki/Phosphocreatine) (PCr) and [adenosine diphosphate](http://en.wikipedia.org/wiki/Adenosine_diphosphate) (ADP).

CK-MM (located in the skeletal muscles and heart),

CK-MB (mainly located in the heart), 🡪 increases b/c heart is trying to make energy

CK-BB (located in the brain)

Troponin

Muscle hooks onto the troponin