Immune System Function

Antigen enters body – B lymphocytes become plasma cells

Plasma Cells – produce antibodies

Antigen – Antibody response

T Cell lymphocytes react to destroy antigens directly

Antigens destroyed indirectly by recruiting other lymphocytes or macrophages

Effective against bacteria, fungi, virus, cancer, transplanted cells

Numbers (consult text) – normal values:

WBC x (10^3)		4.5 to 11.0
RBC x (10^6)		3.5 to 5.5
Hemoglobin:	Female	12 to 16 g/100mL
	Male	14 to 18 g/100mL
Hematocrit:	Female	36 to 48 mL/100mL
	Male	40 to 54 mL/100mL
Mean Cell Volume		80-100
Mean Cell Hemoglobin		26 to 34
Hemoglobin Content		31 to 37
Platelet Count x (10^3)		150-450

WBC Differential

SEGs	50-60%
Bands	3-8%
Lymphocytes	25-40%
Monocytes	2-4
Eosinophils	1-4
Basophils	0-1
Neutrophils	100

Neutrophil count is extremely important, reduced numbers can lead to severe infection.
Below 1000/mm^3 the neutrophils are neutropenic.
Cancer patients have special problems with neutropenia.

Blood Plasma
A.   Components:

	1.	water	91.5%
	2.	inorganic salts	1.5%
	3.	plasma proteins	7.0%

B.   Plasma proteins:
1.   Albumin   60%
2.   Globulin   36% (alpha, beta, gamma)
3.   Fibrinogen   4%

C.   Plasma nutrients and gasses:
1.   amino acids, sugars and lipids
2.   sugars: glucose, glycogen
3.   lipids: triglycerides, phospholipids, cholesterol
        • These are usually combined with protein (lipoprotein)
        • Very low density (VLDL), low density (LDL), high density (HDL)
        • Fats are less dense than protein
        • As fat content decreases, density increases
        • Apoproteins are molecules that can attach to receptors

Process:
        • VLDL carry fats from liver that were formed from carbs
        • VLDL are converted to LDL at adipose tissue
        • LDL molecules have high cholesterol content
        • Liver cells have receptors that remove LDL
        • Chylomicrons are converted to HDL

D.   Non-protein nitrogen:
1.   Amino acids, urea, uric acid, creatine, creatinine
2.   Creatine is stored as creatine phosphate – high density
3.   A rise in NpN may be a symptom of renal failure, infection or excessive protein
        Metabolism

E.   Blood Coagulation:
1.   Blood clots maintain homeostasis
2.   Clotting depends on:
        • Factors that enhance clotting
        • Factors that inhibit clotting
3.   Process is as follows:
        • Tissue damaged – release thromboplastin
        • Blood vessel spasms
        • Platelet plug formation
        • Extrinsic clot formation
        • Prothrombin activator
        • Prothrombin + Ca converted to thrombin
        • Fibrinogen goes to fibrin
        • Blood clot formation
4.   Intrinsic blood clot
        • Blood contacts foreign surface
        • Hageman factor activation

- Series of reactions
- Prothrombin activator
- Thrombin – fibrinogen – fibrin – blood clots