Where do RBC, WBC, and platelets come from?

RBC	bone marrow
WBC	bone marrow, (B cells: T Cells:thymus gland)
Platelets	bone marrow

Flow of Blood

Left Ventricle->Pulmonary Artery->Lung->Capillaries-> Pulmonary Vein->Left Atrium->Left Ventricle->Aorta->Aorta Diverges->Blood deliver to upper or lower party->blood returns to the right atrium (upper:superior vena cava/lower:inferior vena cava)->right Ventricle

3 Kinds of Vessels

Arteries	Arteroles
Veins	-Venules
Capillaries	Capillary Beds

Veins: bring blood to the heart

Pulmonary Vein	from *lungs* **to** *heart*
Superior Vena Cava	from *upper body* **to** *heart*
Inferior Vena Cave	from *lower body* **to** *heart*

Arteries carry blood away from the heart

Pulmonary Artery	away from the *heart* to the *lungs*
Aorta	away from *heart* to *body*

Heart Beat

Diastole	entire heart is relaxed
Systole	Atria contract, ventricles contract
Heart Rate	number of beats per minute
Pumping	a series of contraction and relaxation of the heart muscle
Cardiac Muscles	contract and relax **without** stimulation from the nervous system (SA node/pace maker)
Cardiac Output	volume of blood pumped by a ventricle per minute

Heart Attack

damage or death of the cardiac muscle due to blockage of a coronary artery

Primary vs. Secondary Immune Response

Primary	occurs upon first exposure to an antigen, slower than the secondary immune response, produces effector cells and memory cells that may confer lifelong immunity
Secondary	memory cells are activated by a second exposure to the same antigen, initiates a faster and stronger response

Urea vs Ammonia

Urea	(is from the breakdown of proteins) produced in the vertebrate liver by combining ammonia and carbon dioxide, less toxic, easier to store, highly soluble in water
Ammonia	poisonous, to toxic to be store in the body, soluble in water, easily disposed of by aquatic animals, results from breakdown of amino acids from protein

Fuctional unit of the Kidney

The nephron

Trace Urine Through the Urinary System

Glomerular capsule, PCT, descending limb of loop of Henle, ascending limb of loop of Henle, DCT, collecting tubule, papillary duct of renal papillae, minor calyx, major calyx, renal pelvis, ureter, bladder, urethra

Flow of Filtrate through the Nephron

glomerular capsule, Proximal Convoluted tubule (PCT), Loop of Henle, Distal Convoluted tubule (DCT), Collecting duct

Processes of the Nephron

Filtration	blood pressure forces water and many small molecules through a capillary wall into the start of the capsular space

Processes of the Nephron (cont)

Reabsorption	refines the filtrate, reclaims valuable solutes (glucose, salt and amino acids) from filtrate, returns these to the blood, most reabsorption occurs in the PCT
Secretion	substances in the blood are transported into the filtrate.
Excretion	the final product, urine, is excreted via the ureters, urinary bladder and urethra

APC

a foreign antigen (a nonself molecule) and one of the body's own self proteins, to a helper T Cel

2 Divisions of the Nervous System

central nervous system (CNS)	which consists of the brain and the spinal cord
peripheral nervous system (PNS)	consists of nerves and small concentrations of gray matter called ganglia.

Myelin

enclose axons, form cellular insulation, speed up signal transmition, is a lipoprotein, is white matter

Neurotransmitters

Acetycholine	in the brain and in the synapses between motor neurons and muscle cells
Biogenic amines	important transmitters in the CNS and include serotonin and dopamine, which affect sleep, mood and attention
Neuropeptides	consist of relatively short chains of amino acids important in the CNS and include endorphins, decreasing our perception of pain
Nitric Oxide	is a dissolved gas and triggers erections during sexual arousal in men

Axons vs Dendrites

Axons	passes messages from the cell body to other neurons, muscles or glands
Dendrites	receive messages from other cells

Parts of the brain

hypothalmus	(Cerebellum) controls pituitary and ANS, therefore controls homeostasis

Parts of the brain (cont)

thalmus	(Cerebellum) relay center for most senses deal with both emotions and most senses
medulla oblongata	(Brainstem) controls breathing, heart rate, & swollowing
pons	(Brainstem) bridge between forebrain and cerebellum, controls breathing, many important nerves originate here
midbrain	(Brainstem) coordinates visual and auditory reflexes

Brain Lobes

Frontal Lobe	(motor) helps plan movements & involved with personality, control of emotions and expression of emotional behavior
Temporal Lobe	Association center for **hearing** and **smell**
Occiptal Lobe	Association centers for **vision**
Parietal Lobe	Association area for **touch**

Axial vs Apendicular Skeleton

Axial	skull, vertebrae, ribs
Apendicular	shoulder and pelvic girdles, arms and legs

Anatomy of a Long Bone

Fat-storing central cavity (Medullary Cavity)	contains yellow marrow (fat)
Spongy bone	located at the ends of bones, contains red bone marrow, the site of blood cell production (WBC's, RBC's and platelets)

Joints

sutures	allow no movements (ex. skull and pelvis)
ball-and-socket	allow for the greatest range of motion (ex. shoulder and hip)
hinge joint	uniaxle, allow for movement in one plane (ex. elbow and interphalangeal)
piviot	(ex. radioulnar & atlantoaxial)

Thick vs Thin Filament

Thick	made of myosin
Thin	made of actin(mostly), troponin, tropomyosin binding sites on actin (at rest)

Calcium

What does it do?	initiates muscle contaction by moving regulatory proteins away from the actin binding sites
Where is calcium stored?	endoplasmic reticulum

Anaerobic Metabolism vs Aerobic matabolism

Anaerobic Metabolism	The amount of energy generated by anaerobic metabolism is less than one-tenth of what is produced by aerobic metabolism.
Aerobic matabolism	provides most of the ATP used to power muscle movement during exercise

Motor Unit

consists of a neuron, the set of muscle fibers it controls

Fast vs Slow Fibers

Fast Fibers	high proportioned in fingers and eyes (white fibers)
Slow Fibers	high proportion in postural muscles (red fibers)