Anatomy Questions:

1. **Gap junction:** dye passes from one cell to the next
2. **Derivation of adrenal medulla:** neural crest origin (S100 antigen positive); neuroblasts develop into ganglia; know the layers of the adrenal gland from outside in: cortex: glomerulosa, fasciculata, reticularis: medulla
3. **Tibial nerve function:** plantar flexion of toes; injury: loss of plantar flexion, foot dorsiflexed and everted (calcaneovalgus-cavus), sensory loss on sole of foot
4. **Composition of aortic valve (also pulmonic valve):** lined by endothelium and have abundant fibroelastic tissue plus a dense collagenous core; avascular. MV and TV have a loose connective tissue core which is increased in mitral/tricuspid valve prolapse (myxomatous degeneration)
5. **Break humerus, wrist drop:** radial nerve injury
6. **Post-radical mastectomy--winged scapula:** indicates injury to the **long thoracic nerve**; paralysis of the serratus anterior muscle
7. **Patient with a nosebleed and rhinorrhea:** fracture of cribriform plate in ethmoid sinus
8. **Medial longitudinal fasciculus demyelination in MS:** bilateral internuclear ophthalmoplegia
9. **Parathyroid derivation:** third and fourth pharyngeal pouches
10. **Aortic arch derivatives:** review in embryology book or First Aid for Boards
11. **What runs along the radial artery:** median nerve
12. **Artery affected in femoral neck fracture:** medial femoral circumflex artery– damage leads to aseptic necrosis of the femoral head
13. **EM of egg:** where does sperm penetrate (zona pellucida)
14. **Where is metaphase II completed:** in uterus
15. **Types of collagen:** I (bone, tendon, skin; greatest tensile strength), III (initial collagen of wound repair; replaced by type I [collagenase with Zn as a cofactor]), IV (basement membrane), X (epiphyseal plate; picture of bone on the exam and had to label where X was located)
16. **Wallerian degeneration:** Schwann cells begin to proliferate and form a tube that will serve to guide axon sprouts in the regeneration process; regeneration of the nerve occurs by the outgrowth of multiple axon sprouts from the proximal surviving segment of the axon; sprouts are directed distally (growth rate of 1-3 mm/day) down the tube established by the proliferating Schwann cells; sprouts are remyelinated and reestablish continuity with the motor end plate of the muscle.
17. **Circle of Willis diagram:** name arteries
18. **CT liver:** show where the hepatic vein drains into the inferior vena cava
19. **Nerve injured in midshaft humerus fracture:** radial nerve
20. **Know the layers of the gastric mucosa**
21. **Oligodendrocytes:** myelinate in the CNS, while Schwann cells myelinate in the PNS
22. **Stage of eggs post-partum:** meiosis I arrested in prophase
23. **Eye closed cannot open and eye deviated down and out:** oculomotor nerve palsy; **eye down and in:** trochlear nerve palsy
24. **Child with a popsicle stick in his mouth falls down causing the popsicle stick to hit the back of his throat and develops ptosis and meiosis of the right eye:** injury to the cervical sympathetic ganglion
25. **Vertical diplopia is associated with:** cranial nerve IV palsy
26. **Patient with headache and physical findings of mydriasis in the right eye in association with mild lid lag, and deviation of the eye down and out:** an aneurysm compressing cranial nerve III (headache is the giveaway for aneurysm)
27. **Patient with a recent history of bacterial meningitis has horizontal diplopia in the left eye, which is worse on gaze to the left:** cranial nerve VI palsy (lateral rectus weakness from VI nerve palsy)

28. **Patient with bilateral lateral rectus muscle weakness:** increase in intracranial pressure (classic sign; papilledema usually present)
29. **Paralysis of upward gaze in an infant:** hydrocephalus secondary to stenosis of the aqueduct of Sylvius (this is called Parinaud's syndrome)
30. **Multiple ocular motor nerve disorders:** diabetes mellitus (common cranial nerve palsies from osmotic damage to nerves)
31. **Weakness of the quadriceps muscle and an absent knee jerk reflex:** herniated L_3–L_4 disk
32. **Pain in the hip and lateral quadriceps, numbness of the anterolateral leg and the webbed space between the great toe, weakness of dorsiflexion of the foot, and normal knee and ankle jerk reflexes:** herniated L_4–L_5 disk (note the normal DTRs)
33. **Numbness along the lateral and posterior aspect of the calf and plantar aspect of the foot, and an absent ankle jerk reflex:** herniated L_5–S_1 disk
34. **Young child falls on his outstretched arm and has pain in the middle and lateral portion of his clavicle; upper extremity remains in abduction, extension, and internal rotation:** nerve injured is C_5–C_6 (Erb-Duchenne syndrome, or superior brachial plexus injury due to a clavicular fracture; these are also the most common fractures in newborns; C_8–T_1 are inferior brachial plexus injures or Klumpke's syndrome)
35. **Patient has paralysis of the oculomotor nerve after a head injury:** uncal herniation with compression of the IIIrd nerve (ptosis of eye, mydriasis)
36. **Numbness of the thenar aspect of the hand:** median nerve (carpal tunnel)
37. **Wrist bone with greatest incidence of aseptic necrosis:** navicular bone (scaphoid)
38. **Supracondylar fracture:** injury to brachial artery and median nerve; danger of ischemic contractures in forearm muscle (Volkmann's ischemic contracture)
39. **Know the fetal circulation:** ductus venosus and umbilical vein have the highest oxygen content
40. **EM of alveolus with macrophage, type II pneumocytes (lamellar bodies [surfactant])**
41. **EM of small bowel with microvilli on the surface**
42. **Histologic section of seminiferous tubule:** identify cell that makes sex hormone binding globulin (Sertoli cell); Sertoli cell also synthesizes inhibin (negative feedback with FSH)
43. **Know the bands in skeletal muscle:** A band has myosin ATPase
44. **Respiratory bronchiole:** last airway structure with cilia
45. **Terminal bronchioles:** cilia but no goblet cells; site of obstruction in asthma, CF, chronic bronchitis
46. **EM:** know normal organelles in a cell--see picture in First AID for Boards
47. **Know normal structures CT exams of the chest, abdomen, leg, arm, CNS**
48. **Voice hoarseness post thyroid surgery:** injury to laryngeal nerve
49. **MRI of orbit:** find superior oblique muscle
50. **MRI of abdomen:** identify splenic artery above the pancreas
51. **Chest x-ray:** fluid in the costophrenic sulcus in CHF
52. **Barium study of small intestine:** need to know how to separate from large bowel; superior mesenteric artery supplies small bowel
53. **X-ray showing enlargement of the posterior heart:** enlarged left atrium in a patient with mitral stenosis; most posteriorly located chamber in the heart; see best with transesophageal ultrasound
54. **Neuroanatomy:** emphasis on blood supply and lesions of the brainstem and cortex, all of the cranial nerves and their functions
55. **MRI of the carotids with occlusion of the anterior cerebral artery:** would effect the contralateral leg
56. **Schwannoma in jugular foramen:** weakness of palate/loss gag reflex/laryngeal paralysis (X), trapezius/sternocleidomastoid (XI), loss taste sensation posterior third of tongue (IX)
57. **Weber syndrome:** lesion of oculomotor nerve and UMN signs with a midline, midbrain lesion

58. **Horner's syndrome:** diagram of vertebra and sympathetic trunk; pick cervical sympathetic ganglion
59. **Pupil light reflexes with eye diagrams of pupils**: one set is an oculomotor nerve lesion
60. **Gross of brainstem anterior view--find area of oculomotor nerve**
61. **Frontal lobe lesion:** affects personality
62. **Bitemporal hemianopsia:** lesion at the optic chiasm; commonly a craniopharyngioma (derived from Rathke's pouch)
63. **Inferior quadrantanopia:** defect in the superior fibers in the parietal lobe
64. **Loss of sensation in the hands, history of burns without knowing it: syringomyelia in cervical cord and involvement of crossed spinothalamics:** syringomyelia
65. **C2 transection of fasciculus gracilis:** effects vibration and fine touch of lower extremity only
66. **CN III and UMN signs on opposite side:** midline midbrain lesion
67. **Loss of pain and temperature and UMN signs on opposite side:** mid pons lesion
68. **Horner's syndrome with localization of lesion on a diagram:** lateral medullary syndrome with associated cranial nerve palsy in the medulla and hypothalamus with associated temperature regulation problems
69. **Parkinson's disease:** MPTP drug of abuse association
70. **Cross-section of an embryo:** identify neural crest tissue
71. **Blood production prior to birth:** liver, bone marrow
72. **Bochdalek hernia in posterolateral part of diaphragm on left:** present early in life; visceral contents extend into the chest cavity causing severe respiratory distress at birth; parasternal diaphragmatic hernias extend through the foramen of Morgagni beneath the sternum and do not usually develop symptoms until later in life.
73. **Artery associated with foregut:** celiac; midgut: superior mesenteric; hindgut: inferior mesenteric
74. **Damage to hearing in a rock and roll band player:** injury to cochlea
75. **Know normal histologic appearance of small bowel and stomach**
76. **Argyll-Robertson pupil:** accommodates when patient follows finger moving towards the nose but does not react to direct light; neurosyphilis
77. **MRI of liver**: had to identify the hepatic vein– vessel emptying into the inferior vena cava
78. **Pathogenesis of hypospadias:** faulty closure of urethral folds
79. **Pathogenesis of epispadias:** defect in genital tubercle, associated with exstrophy of bladder
80. **Feces draining from umbilicus in 4 day old:** persistent umbilical (vitelline) sinus
81. **Urine draining from umbilicus in 4 day old:** persistent urachal sinus
82. **Femoral neck fracture:** bleeds into the capsule, may compromise medial femoral circumflex artery leading to avascular necrosis, posterior dislocations are most dangerous

Microbiology Questions:

1. **Mechanism of action of *Streptococcus agalactiae* (group B streptococcus):** inhibits phagocytosis
2. **Cause of an immunodeficiency with a high IgM:** defect in isotype switching
3. **Cyclosporine necessary in identical twin transplant--?why:** there is still some difference in MHC sites from crossover of chromosomes during meiosis
4. **Major drift with influenza:** major changes in the reassortment of genome pieces indicating a need for a new vaccine; only protects against influenza A; egg based vaccine; killed virus vaccine
5. **Receptor for HIV:** CD_4 molecule on helper T cells (also macrophages, dendritic cells)
6. **Tetany at birth:** DiGeorge syndrome, a pure T cell deficiency due to absence of the third and fourth pharyngeal pouches (3rd inferior parathyroids + thymus; 4th superior parathyroids); absent thymic shadow
7. **Graft versus host reaction:** common in T cell deficiencies; must irradiate the donor blood to destroy lymphocytes (also destroys CMV)
8. **CD common to both B and T cells:** CD_{45} is present in all leukocytes
9. **Complement fixation reactions:** read Jawitz section in Medical Microbiology on immunologic tests
10. **Hanta virus:** carried in rodents (deer mice); ARDS, hemorrhage, renal failure; viral RNA in lung tissue (PCR test)
11. ***Staphylococcus aureus***: protein A attaches to Fc receptor of macrophages, hence blocking opsonization of bacteria
12. ***Proteus mirabilis***: moves with flagella; urease producer
13. C. ***diphtheria***: toxin inhibits elongation factor 2 by ADP-ribosylation, hence blocking protein synthesis
14. ***Mycoplasma pneumoniae***: requires sterols
15. **Pneumonitis (larval transmigration) + ova in stools:** Ascaris or hookworm; not Strongyloides (rhabditiform larvae in the stool not eggs)
16. **Latex agglutination reactions:** antibody to capsular antigens is attached to the beads
17. **Locations of cells in lymph node:** B (follicles), T (paracortex), histiocytes (sinuses)
18. **Cells that attack protozoans:** CD_4 T cells
19. **What gives bacteria their shape:** peptidoglycan layer in the cell wall
20. **Tumbling motility, Gram positive rod:** *Listeria monocytogenes*; invades mononuclear cells, beta-hemolysis in blood agar, transplacental infection in fetus or occurs in renal transplant patients, mainly contracted from eating unpasteurized cheese (goat's milk cheese)
21. **Gray membrane that bleeds when removed:** Diphtheria
22. **Dengue:** transmitted by mosquito (Aedes aegypti; same mosquito as in yellow fever); "breakbone fever"; may be hemorrhagic
23. **Infection associated with premature rupture of the membrane:** group B streptococcus (*S. agalactiae*); CAMP test
24. **IL-1 function on B lymphocytes:** activates B cells
25. **Location for *Staphylococcus aureus* carriers:** anterior nares
26. **River blindness:** Onchocerca, bite of blackfly, do skin biopsy, ivermectin
27. **Rhinovirus:** common cold occurs more often in fall and winter; person to person droplet infection and contamination of hands; acid-labile (does not cause gastroenteritis because of this)
28. **Virus responsible for a cold in spring and summer:** adenovirus
29. **Lactobacillus in vagina:** responsible for the acid pH
30. **Influenza vaccine:** killed; egg-based
31. **Pruritic skin lesion in Gulf War veteran:** cutaneous leishmaniasis due to bite of sandfly

32. **Hib vaccine:** antibody against capsular polysaccharide
33. **In addition to the normal childhood immunizations, what additional immunizations are recommended in sickle cell disease and cystic fibrosis:** Pneumococcus and influenza (Pneumovax is given after 2 years of age)
34. **Which live vaccine can be given to a patient with AIDS:** MMR (MMR is given only because the natural infection for measles is worse than the one that potentially could happen with the attenuated virus)
35. **List the live vaccines:** MMR, varicella, OPV, BCG, smallpox, and yellow fever
36. **List the polysaccharide vaccines:** Pneumococcus and Hib (meningococcal vaccine is another example)
37. **List the killed virus vaccines:** influenza, rabies, SALK vaccine
38. **List the immunizations that are contraindicated in patients with anaphylactic reactions against eggs**: MMR, influenza, yellow fever
39. **List immunizations that are contraindicated in patients with anaphylactic reactions against neomycin**: MMR, varicella (neomycin is used as a preservative)
40. **Verrucoid lesion in lower extremity in a patient returning from South America**: South American blastomycosis, yeast with a ships wheel appearance; North American blastomycosis has wide based buds
41. **AIDS patient with 2 peaks in the natural history of his disease**: p24 antigen
42. **ELISA test for HIV:** anti-gp 120 antibodies, confirm with western blot
43. **Best test for detecting HIV viral burden in blood:** HIV RNA by PCR
44. **Newborn baby in HIV positive mother**: newborn has anti-gp 120 in the serum (IgG antibody); prevent HIV in newborn by giving mother AZT.
45. **Animal association with toxoplasmosis**: cat
46. **Most common cause of diarrhea in children**: rotavirus
47. **E. *coli:*** attaches to the urogenital epithelium, hence its #1 status for urinary tract infections
48. **Bruton's agammaglobulinemia:** SXR; defect in pre-B to B cells; prone to respiratory infections; need IV gamma globulin
48. **SCID:** first immunodeficiency treated with gene therapy (replacement of adenosine deaminase)
50. **Wiskott Aldrich:** SXR; triad of sinopulmonary infections, eczema, thrombocytopenia; B and T cell deficiency; increased incidence of leukemia/lymphoma
51. **Part of a vaccine that is antigenic:** polysaccharide capsule
52. **Person working with animal hides develops lung disease:** *Bacillus anthrax* (woolsorter's disease)
53. **Cryptococcus:** evades host destruction via its polysaccharide capsule
54. **Child with anemia and diarrhea--? parasite:** hookworm produces iron deficiency
55. **Lymphocutaneous nodules in a rose gardener**: sporotrichosis; treat with potassium iodide
56. **Elderly male smoker with non-productive cough, bacteria fails to grow on ordinary media (must be supplemented with iron and cysteine), need Dieterle silver stain to identify:** Legionella; treat with erythromycin
57. **Macrophage activation:** γ-interferon secreted from helper T cell
58. **Know examples of all the hypersensitivity reactions**: see immunopathology chapter
59. **IgA deficiency:** sinopulmonary disease; most common genetic immunodeficiency
60. **AIDS:** most common acquired immunodeficiency
61: **HLA system coded on chromosome 6**
62. **Hyperacute rejection of a transplant:** ABO incompatibility or patient had anti-HLA antibodies against an HLA antigen in the graft, type II hypersensitivity reaction
63. **HLA-A, B, C code for class I antigens:** CD_8 cytotoxic T cells recognize
64. **HLA-D loci code for class II antigens:** CD_4 helper T cells, macrophages recognize

65. **Graft vs host reaction:** NK cell mediated; common in bone marrow and liver transplants; rash, jaundice (necrosis of bile ducts), diarrhea, danger in T cell deficient patients
66. **Receptor for EBV:** CD_{21} on B cells; polyclonal stimulator causing increased synthesis of immunoglobulins□ reason for hypergammaglobulinemia in AIDS; increased divisions increase risk for t;8:14 and Burkitt's lymphoma
67. **CD type for histiocytes:** CD_1; positive in patients with histiocytosis X (Hand-Schuller-Christian; Letterer-Siwe, eosinophilic granuloma)
68. **Destroy C. *difficile* in bedpan**: autoclave
69. **Hanta virus:** carried in rodents (deer mice); ARDS, hemorrhage, renal failure; viral RNA in lung tissue (PCR test)
70. **Blastomycosis:** spores associated with beaver dams and inland water ways; broad-based-bud; shipwheel appearing yeast is South American blastomycosis
71. **Impetigo:** most commonly caused by group A streptococcus
72. **CD_3**: antigen recognition site for T cells
73. **Antigen that binds to CD_4 on T cells in HIV**: gp120
74. **Risk for HIV if accidental needle stick from an HIV positive patient:** 1/330; Rx with triple therapy for 6 months and get ELISA test at repeated intervals
75. **Fever in malaria:** coincides with rupture of RBCs
76. **Malaria:** treat with primaquine and develop acute intravascular hemolysis in G6PD deficiency

Biochemistry Questions:

1. **Rate limiting reaction in cholesterol synthesis**: HMG Co reductase
2. **Findings in PKU**: mousy odor; tyrosine missing, hence it must be supplied in the diet, can diagnose by amniocentesis and finding the abnormal gene; eliminate phenylalanine from diet (Nutrasweet is aspartate and phenylalanine, so cannot use it)
3. **I cell disease**: inability to phosphorylate the mannose residues of potential lysosomal enzymes located in Golgi apparatus, hence they cannot be taken up by the lysosomes to degrade complex substrates
4. **Number of glucoses necessary to build palmitic acid a 16 carbon compound**: 4 glucoses, each glucose run produces 2 acetyl CoA, the latter containing 2 carbons each
5. **Insulin lack in DKA**: **decreased** glycolysis, glycogenesis, fatty acid synthesis, storage of fat in adipose
6. **Uncoupling agents** (e.g., **alcohol, salicylates):** produces brown fat from increased heat from reactions trying to increase the generation of more protons to make ATP
7. **Von Gierke's:** decreased glucose 6-phosphatase (gluconeogenic enzyme) with decrease in glucose (fasting hypoglycemia) and increase in glucose 6-phosphate with production of normal glycogen in the liver and kidneys; stimulation tests with glucagon, fructose, etc. cannot increase the glucose levels owing to the missing enzyme
8. **Biochemical processes in both cytosol and mitochondria:** urea cycle, heme synthesis, gluconeogenesis
9. **Female with pheochromocytoma:** what dietary alteration: probably decrease phenylalanine (essential AA) and tyrosine (not an essential AA) in the diet
10. **Pregnant female with PKU: what diet**: low in phenylalanine and high in tyrosine; **avoid Nutrasweet** since it contains aspartate and phenylalanine
11. **Lesch Nyhan:** SXR with absent HGPRT, self-mutilation, hyperuricemia, mental retardation
12. **Glucokinase:** only in liver, high Vm and high Km, not inhibited by glucose 6-phosphate; hexokinase: in all tissues; inhibited by glucose 6-phosphate; low Vm and low Km
13. **Branched chain amino acids and maple syrup urine disease:** only muscle can metabolize branched chain amino acids
14. **Glycogenolysis:** review biochemistry
15. **Key enzyme in gluconeogenesis**: fructose 1,6 bisphosphatase (catalyzes the conversion of fructose 1,6-bisphosphate to fructose 6-phosphate)
16. **Locations of glucose 6-phosphatase (gluconeogenic hormone):** liver, kidney, intestinal epithelium (lesser extent than others); absent in von Gierke's disease
17. **Shuttles and what they carry:** carnitine (even chained fatty acids), malate (NADH)
18. **Functions of LDL**: vitamin D synthesis, other steroid synthesis, cell membranes, synthesis of bile salts/acids
19. **Acetyl CoA uses**: how many times used in FA synthesis, CH synthesis, ketone body synthesis; not a substrate for gluconeogenesis
20. **Km and Vmax Lineweaver Burke**: competitive vs non-competitive inhibitors, competitive (e.g., alcohol dehydrogenase binding ethanol, methanol, ethylene glycol at the same binding site) has no change in Vm but an increase in Km (lower affinity for ethanol, increasing ethanol reverses the inhibition), non-competitive inhibitor (e.g., organophosphates and effect on acetylcholinesterase, does not bind to the same site as acetylcholine, binds to another site on the enzyme that decreases velocity of the reaction) has a decrease in the Vm, but the Km remains the same, since the substrate still binds to the normal site
21. **Question on fatty acid length and energy production**
22. **Urea cycle**: method of eliminating ammonia, located in the hepatocyte

23. **Epinephrine given and only small branched chains found**: debrancher deficiency
24. **Know cholesterol synthesis**: review Harvey/Champe, note that first few steps are similar to ketone body synthesis except HMG CoA lyase is used instead of HMG CoA reductase
25. **Origin of apolipoproteins 100 (liver) and 48 (intestine)**
26. **Rate limiting step in glycogenolysis:** glycogen phosphorylase
27. **Reason why liver can not use ketones for fuel**: liver cannot activate acetoacetate in the mitochondria, which requires succinyl CoA: acetoacetate CoA transferase (a thiotransferase enzyme) in order to convert AcAc into acetoacetyl CoA.
28. **McArdles disease**: absent muscle phosphorylase; increased glycogen in muscle; no increase in lactic acid after exercise
29. **Pregnant woman is a beer drinker--what supplements does she need**: still needs folate because alcohol increases loss of folate in urine and stool which offsets the amount of folate present in beer; furthermore, she would probably be taken off beer because of fetal alcohol syndrome and would need folate; iron is not affected by beer drinking
30. **Insulin:** key hormone of the fed state; **glucagon:** key hormone of the fasting state
31. **Mannose 6-phosphate**: involved in transfer of dolichol (lipid) in the RER in the synthesis of O-linked glycosides
32. **Know all the lysosomal storage diseases:** see Genetics notes; two SXR diseases are Fabry's and Hunter's syndrome
33. **Know all the reactions involving NAD/NADH and NADP/NADPH**: see Nutrition notes
34. **Major source of NADPH**: HMP shunt; malate dehydrogenase reaction to a lesser extent; NADPH supplies reducing equivalents
35. **Mutation changes an amino acid sequence--which one would have the greatest effect on migration in a serum protein electrophoresis**: one with the most negative charges (most acidic)--glutamine; one that would remain closest to the anode (- pole) is the most basic amino acid--arginine
36. **Mechanism of ketoacidosis in DKA**: increased β-oxidation of fatty acids and production of acetyl CoA, which is used by the liver to synthesize ketone bodies
37. **Promoter location:** linear gene drawing with labels: pick upstream location
38. **Energy source for protein synthesis**: GTP
39. **Isoenzyme with 2 genes, 4 subunits:** LDH isoenzymes; 5 isotypes: LLLL, LLLH, LLHH, LHHH, HHHH
40. **Second messengers:** atrial natriuretic peptide: cGMP, insulin: tyrosine kinase, nicotinic: ion channels; see Katzung/Trevor pharmacology for more second messenger relationships
41. **Best method of detecting relatedness of a new bacteria**: restriction fragment length polymorphism
42. **Enzyme used for PCR:** DNA polymerase
43. **Source of glucose in a brain in starvation:** alanine (transaminated into pyruvate)
44. **Glutamine:** most abundant amino acid, carries ammonia in nontoxic form
45. **Tyrosine:** thyroid hormone, synthesis of melanin, synthesis of neurotransmitters (dopamine, Nor, Epi), decreased in PKU (must supply tyrosine in diet)
46. **Glycine:** inhibitory neurotransmitter blocked by tetanus toxin, synthesis of δ aminolevulinic acid in heme synthesis, synthesis of bile acids/salts
47. **Biochemistry of hepatic encephalopathy:** increase in aromatic amino acids– phenylalanine, tyrosine, tryptophan (mnemonic– PTT) leads to increased synthesis of false neurotransmitters (GABA, octopamine) in hepatic encephalopathy; branched chain amino acids inhibit synthesis of false neurotransmitters– reason why they are given for Rx

Pharmacology Questions:

1. **Pharmacology general**: heavy emphasis on antimicrobials and mechanisms of action and resistance to the drug, cardiovascular drugs, asthma drugs, NSAIDs, endocrine drugs, CNS drugs; know the class of drug, mechanism of action, and significant side effects
2. **Treatment of benzodiazepam overdose**: flumazenil
3. **Arachidonic acid metabolism**: review inflammation chapter
4. **Cause of cough/angioedema in patient on an ACE inhibitor**: bradykinin
5. **Use of epinephrine in shock**: 1:1000 dilution subcutaneously
6. **Dantrolene**: used in the treatment of malignant hyperthermia after halothane
7. **Treatment of acetaminophen overdose**: acetylcysteine to replace used up GSH (neutralizes acetaminophen free radicals formed in the liver cytochrome system)
8. **Mechanism of loop diuretic**: blocks Na-K-2Cl cotransport pump in the thick ascending limb in the renal medulla; also blocks calcium reabsorption
9. **Cyanide poisoning treatment**: review in environmental pathology chapter; amyl nitrite and thiosulfate
10. **Thrush**: may be a complication of a corticosteroid inhaler
11. **Isotretinoin:** always do a pregnancy test in females; put them on BCP
12. **Mechanism of propylthiouracil**: blocks iodination of the tyrosine residues of thyroglobulin; also blocks coupling of DIT and MIT; only drug that can be used in pregnancy but may produce goiter in the newborn and nail defects
13. **P450 system in the liver**: makes drugs water soluble
14. **Angioedema and renal failure**: ACE inhibitor relationship
15. **Mechanism of action of retinoic acid**: behaves like a steroid in that it binds to receptors in the nucleus with subsequent transcription of genes; proteins produced by this action are important in growth, differentiation, reproduction, and embryonic development; also used in treatment of acute progranulocytic leukemia
16. **Allopurinol action in purine synthesis**: blocks xanthine oxidase (schematic of purine metabolism was provided and had to identify the reactions [hypoxanthine to xanthine and xanthine to uric acid]), mercaptopurine degradation is inhibited as well
17. **Most common antibiotic used to prevent endocarditis in patients with valvular disease**: amoxicillin is the drug of choice; all valvular diseases except asymptomatic MVP and all congenital heart disease except asymptomatic ASD)
18. **Yellow coloration of the skin that can be mistaken for jaundice--? drug**: quinacrine; chlorpromazine and arsenic produce a blue-gray color to the skin
19. **Diffuse erythema followed by separation of the skin (scalded skin syndrome or toxic epidermal necrolysis)--?drug**: barbiturates, sulfonamides, phenytoin, NSAIDs
20. **Hair loss in a woman--?drug:** oral contraceptives (predictable side effect; estrogen causes hair to be at same stage of development; may also occur after delivery)
21. **Erythematous, hyperpigmented plaque-like lesion that recurs at the same site every time:** fixed drug eruption (phenolphthalein, NSAIDs, tetracycline, Bactrim, and barbiturates are the most common cause of these reactions)
22. **Group of drugs has the highest association with urticarial and maculopapular lesions:** amoxicillin, TMP/SMX, ampicillin/penicillin (rashes are the MOST COMMON adverse reaction to drugs, with maculopapular rashes leading the list; most drug reactions involving skin are NOT type I hypersensitivity histamine-related)
23. **Elderly woman on thiazides is most at risk for developing**: gout
24. **Tardive dyskinesia, malignant syndrome (sweating, hyperpyrexia, autonomic instability):** neuroleptics

25. **Antipsychotic drug requiring visual examination:** thioridazine (also produces heart conduction defects)
26. **Nephrogenic diabetes insipidus--? drug**: lithium for bipolar disturbances
27. **Drug contraindicated with MAO inhibitors**: epinephrine
28. **Use of phentolamine:** non-selective α-blocker that lowers blood pressure during surgery for a pheochromocytoma
29. **Mechanism of AZT**: inhibits reverse transcriptase; produces a macrocytic anemia unrelated to folate/B12
30. **Treatment of Pb poisoning**: BAL and EDTA
31. **Drugs involved in folate metabolism**: phenytoin blocks intestinal conjugase (polyglutamate to monoglutamate, BCP blocks uptake of monoglutamate, methotrexate/TMP-SMX block dihydrofolate reductase
32. **Cromolyn sodium**: stabilizes mast cell membrane preventing release of preformed mediators and release of prostaglandins/leukotrienes after the release reaction
33. **Methotrexate:** blocks dihydrofolate reductase and the conversion of dihydrofolate to tetrahydrofolate
34. **Glucuronyl transferase in liver renders compounds water soluble**
35. **Cyclooxygenase**: aspirin inhibits irreversible, NSAIDs reversible
36. **Thromboxane A_2:** synthesized in platelet; vasoconstrictor and increases platelet aggregation, also a bronchoconstrictor
37. **Effect of proton blockers**: blocks H^+-K^+-ATPase proton pump in parietal cell; not a receptor mediated event; **H_2 blockers**: blocks H_2 receptor, which normally activates adenylate cyclase producing cAMP which stimulates protein kinase; **acetylcholine**: activates cholinergic receptor causing the release of calcium, which stimulates protein kinase; **misoprostol:** blocks the prostaglandin receptor, which normally inhibits adenylate cyclase and cAMP production
38. **Treatment of schistosomiasis and clonorchiasis**: praziquantel
39. **7-fold membrane spanning protein-? drug**: propranolol a β–blocker
40. **Phase 3 clinical trials**: double blind
41. **Ticlopidine:** substitute for aspirin in preventing strokes, CAD if the patient is allergic to aspirin; causes **neutropenia**
42. **Drug induced SLE**: procainamide and hydralazine
43. **Overdose of succinylcholine**: use acetylcholine blockers
44. **Finasteride**: blocks 5-α reductase, which converts testosterone into dihydrotestosterone, hence testosterone would increase proximal to the block and dihydrotestosterone would decrease; **increases hair growth**
45. **Flutamide, cyproterone, spironolactone**: block androgen receptor, hence testosterone/ dihydrotestosterone increase but have not physiologic effect
46. **Ketoconazole**: inhibits testosterone synthesis (suppresses adrenal steroid synthesis)
47. **Leuprolide**: GnRH analogue, which when given in sustained fashion, inhibits FSH and LH, hence lowering testosterone and estrogen levels
48. **ACE inhibitors**: increase in renin and ATI, but a decrease in ATII and aldosterone; aldosterone eventually increases, hence the addition of spironolactone to keep aldosterone suppressed□ increases longevity in CHF
49. **Arsenic poisoning**: dimercaprol
50. **Chloroquine in treatment of malaria--malaria recurred-why?:** exoerythrocytic/hepatic stage (e.g., *P. vivax*, *P. ovale*); drug kills active disease but does not eradicate hepatic stage
51. **Primaquine in treatment of malaria:** not good in the active stage but does kill the hepatic stage of *P. vivax* and *ovale*

52. **Dantrolene:** reduces the release of calcium from the sarcoplasmic reticulum of skeletal muscle; antispasmodic drug; also used in treating malignant hyperthermia
53. **Methanol:** increased anion gap metabolic acidosis due to conversion of methanol into formic acid; optic nerve degeneration and blindness; treat with alcohol infusion to block metabolism of methanol by alcohol dehydrogenase
54. **Botulism toxin**: blocks the release of acetylcholine (diagram of neurotransmitter synthesis and must locate the block); good diagram in Katzung/Trevor pharmacology book; used to treat LES spasm in achalasia
55. **Ribavirin**: used in severe RSV infections in children
56. **Asthma:** albuterol (β_2-selective agonist; bronchodilator); albuterol may cause hypokalemia– drives K^+ into cells
57. **Acetylcholine breakdown**: occurs in the synapse into choline and acetate by acetylcholinesterase in the cleft; products are recycled and not excreted
58. **Know the graph of NOR/EPI/isoproterenol and effects on blood pressure and heart rate, plus the effect of α_1-blockers**: see graph in Katzung/Trevor book
59. **Amphotericin**: disrupts cell membrane permeability; binds to ergosterol in the membrane
60. **Ketoconazole**: inhibits the metabolism of nonsedating antihistamines like Seldane leading to cardiac arrhythmias
61. **Be very familiar with second messengers**: see Harvey/Champe biochem book page 80
62. **Opioid toxicity**: naloxone (opioid receptor antagonist)
63. **Opioids**: no tolerance to miosis and constipation
64. **Codeine:** metabolized into morphine in small amounts owing to significant first pass metabolism of morphine in the liver
65. **Delirium tremens**: use benzodiazepines
66. **Lovastatin**: inhibits HMG CoA reductase
67. **Patent ductus arteriosus**: keep open with PGE
68. **Penicillin:** □-lactam antibiotic that inhibits cell wall synthesis; bind to specific receptors in cytoplasmic membrane; inhibit transpeptidase enzymes that cross-link linear peptidoglycan chains that form part of the cell wall; activate autolytic enzymes in the cell wall
69. **Cephalosporins + aminoglycosides**: synergistic effect of enhancing nephrotoxicity
70. **Erythromycin:** interacts with the 50S subunit of bacterial ribosomes leading to inhibition of protein synthesis; inhibits the formation of the initiation complex and interferes with translocation reactions; resistance develops secondary to plasmid-mediated formation of enzymes that methylate the receptor that erythromycin binds with; coliforms produce a transmissible plasmid that produces an esterase that hydrolyzes the lactone ring of erythromycin
71. **Chloramphenicol:** gray baby syndrome (dose related aplastic anemia)
72. **Sulfonamides, dapsone:** may precipitate hemolysis in G6PD deficiency
73. **TMP:** inhibits dihydrofolate reductase; plasmid-mediated resistance; TMP + SMX has a synergetic effect from the sequential blockade of folate synthesis, since SMX blocks dihydropterate synthase, which is an enzyme that converts paraaminobenzoic acid into dihydrofolic acid
74. **Metronidazole:** produces a disulfiram-like reaction
75. **Fluconazole:** treatment of esophageal candidiasis in AIDS
76. **Ganciclovir:** first drug used in treating CMV retinitis, the most common cause of blindness in AIDS; foscarnet is used if ganciclovir does not work
77. **Cholinomimetic used in treating open angle glaucoma:** pilocarpine, **physostigmine**
78. **Dobutamine:** inotropic (increase contractility) vasodilator (decreases afterload) that activates $\alpha 1$ and $\beta 1 > \beta 2$ activity without much chronotropic effect: used in the treatment of shock (cardiogenic) associated with hypotension, hypotension associated with renal failure or CHF

79. **Dopamine:** stimulates cardiac β1 receptors, peripheral α-receptors, and dopaminergic receptors in vessels in the renal and splanchnic bed; at low doses, it is primarily a vasodilator that increases renal and splanchnic blood flow; at high doses, it increases cardiac contractility (inotropic) and cardiac output via its activation of cardiac β1 receptors
80. **Benzodiazepines:** via its own receptors in the thalamus, limbic structures, and cerebra cortex which are part of the GABA receptor-chloride ion channel macromolecular complex, benzodiazepines facilitate the inhibitory action of GABA via increased conductance in the chloride ion channels (flumazenil blocks this effect by blocking the receptor for benzodiazepines and is the treatment of choice for benzodiazepam overdose)
81. An elderly woman on thiazides is most at risk for developing
    A. diabetes mellitus
    B. gout
    C. a renal stone
    D. metabolic acidosis
    E. hyperkalemia
82. A child who ingests 30 adult aspirins will most likely develop
    A. a normal anion gap metabolic acidosis
    B. a mixed respiratory and metabolic acidosis
    C. profound respiratory acidosis
    D. an increased anion gap metabolic acidosis
    E. metabolic alkalosis from vomiting

Answer: D (children, unlike adults, do not commonly develop a mixed metabolic acidosis and respiratory alkalosis. Rx is to perform gastric lavage and add activated charcoal and to produce an alkaline urine for increased excretion of the acid)

83. Open angle glaucoma is best treated with
    A. a β-adrenergic blocking agent
    B. topical corticosteroids
    C. topical antihistamines
    D. furosemide
    E. intravenous acetazolamide

Answer: A (timolol is a favored agent; pilocarpine may also be used; most common type of glaucoma; produces gradual loss of peripheral vision (tunnel vision) and optic atrophy)

84. **Trazodone:** second generation anti-depressant; inhibition of serotonin reuptake; sedation; may cause priapism
85. **Thioridazine:** retinitis pigmentosum may be a complication
86. **Tamoxifen:** anti-estrogen; estrogen receptor partial agonist that blocks the binding of estrogen to their receptors in ERA-positive breast cancer cells; also protects against osteoporosis and CAD; risk factor for endometrial cancer; can be used in treating progestin-resistant endometrial cancer
87. **Acetaminophen:** analgesic and antipyretic but not an anti-inflammatory agent; inhibits prostaglandin synthesis in the CNS; very weak cyclooxygenase inhibitor; most common drug causing acute fulminant hepatitis; converted into free radicals in the liver; glutathione inactivates the FRs (acetylcysteine treatment replaces GSH)
88. **Digitalis toxicity:** treat with digoxin antibodies (FAB fragments)
89. **Cephalosporins:** first generation: drug of choice for surgical prophylaxis in many cases; second generation: sinusitis (cefuroxime), mixed anaerobic infections; third generation: meningitis, GC (ceftriaxone)
90. **Cromolyn sodium in asthma:** only for prophylaxis; blocks early and late asthmatic responses to allergens

91. **Omeprazole:** inhibits the proton pump located on the luminal membrane of the parietal cell; useful in the treatment of ZE syndrome, GERD, and *H. pylori* infections
92. **Clozapine:** blocks D_4 (dopamine) and 5-HT_{2a} receptors moreso than D_2 receptors
93. **Fever in a patient on a loop diuretic**: do not use any type of NSAID (including aspirin) since it blocks renal synthesis of prostaglandin, which vasodilates the afferent arteriole. Use acetaminophen to lower fever, since it does not interfere with prostaglandin synthesis. Loop diuretics lead to volume depletion, hence angiotensin II will be elevated (vasoconstricts efferent arteriole). Loss of prostaglandin effect predisposes the patient to renal failure.
94. **Pathogenesis of cough and angioedema in ACE inhibitors**: increase in bradykinin
95. **Red man syndrome**: IV vancomycin
96. **Drug for bacterial carrier states** (*S. aureus, N. meningitidis, H. influenzae*): rifampin
97. **Single dose drug for GC and Chlamydia**: azithromycin
98. **Rx of malignant hypertension:** nitroprusside
99. **Patient on Lasix who develops fever and needs antipyretic:** use acetaminophen, do not use NSAIDs since they block prostaglandin production in the kidneys
100. **Antihypertensive and antiarrhymic drug that lowers blood pressure and increases heart rate:** calcium channel blocker, e.g., nifedipine

Physiology Questions:

NOTE: a lot of graphs are used; know the classic cardiac cycle graph very well; review Yarrow diagrams on fluid alterations in my fluids and hemodynamics chapter

1. **Major site of water reabsorption in the GI tract**: in descending order: jejunum, ileum, colon
2. **Most effective nephron site for acid excretion**: proximal tubule of the kidney
3. **Nephron site for ADH effect**: collecting tubule
4. **Nephron site for greatest generation of free water/most susceptible to ischemia**: thick ascending limb in the medulla
5. **Compression of the thorax under water:** produces a restrictive pattern on PFTs
6. **Constriction of the efferent arteriole**: increases the GFR and decreases renal plasma flow
7. **Know Starling equation for GFR ml/min:** GFR = Kf [(P_{GC} - P_{BS}) - π_{GC}], where Kf = hydraulic conductance in ml/min . mm Hg or filtration coefficient in ml/min . mm Hg, P_{GC} = hydrostatic pressure in the glomerular capillary in mm Hg (pushes fluid out of the capillary; e.g., +45 mm Hg; it is increased if the efferent arteriole is constricted and decreased if the afferent arteriole is constricted), P_{BS} = hydrostatic pressure in Bowman's space in mm Hg (pushes fluid into the capillary; e.g., -10 mm Hg), and π_{GC} = the oncotic pressure in the glomerular capillary in mm Hg (brings fluid back into the capillary; e.g., -19 mm Hg); the net filtration is the algebraic sum of the above 3 parameters (in the above example, the net pressure would be -10 + 45 -19 = + 16 mm Hg)--fluid should move out of the glomerular capillaries; question: what Starling force changes to produce a net ultrafiltration of zero (answer: π_{GC}, which becomes increased [pulls fluid back into the glomerular capillary; using the above example--- 10 + 45 - **35** = 0 net pressure]; it is the only factor that does not remain constant along the length of the capillary owing to differences in protein concentration; the high π_{GC} at the end of the glomerular capillary extends into the peritubular capillaries that surrounds the nephrons and allows for the reabsorption of solutes).
8. **Filtration fraction in the glomerulus**: FF = GFR/RPF; constrict afferent arteriole, no change in FF (↓ GFR/↓ RPF), constrict efferent arteriole increases FF (↑↑ GFR/↓ RPF), increase plasma protein concentration, hence increasing π_{GC}, decreases the FF (↓ GFR/no change RPF); decreasing plasma protein concentration, hence decreasing π_{GC}, increases the FF (↑ GFR/no change RPF); constricting the ureter, decreases PBS, hence decreasing GFR and the FF without affecting RPF (↓ GFR/no change RPF)
9. **Negative charge of GBM**: heparan sulfate
10. **S1 heart sound correlates with C wave in the jugular venous pulses (C wave is closure of the tricuspid valve); know the jugular venous pulses:** see box in cardiovascular chapter on physical diagnosis
11. **Carotid massage:** decreases heart rate and increases vasodilatation (carotid sinus baroreceptor innervated by the IX and Xth nerve; impulses generated in this receptor inhibit tonic discharge of the vasoconstrictor nerves and excite vagal innervation of the heart producing vasodilatation, venodilation, drop in blood pressure and heart rate, and a decrease in cardiac output)
12. **3% Hypertonic saline and effect on POsm and ADH levels**: 3% hypertonic saline increases POsm. Increased POsm stimulates the release of ADH (increases). Atrial natriuretic peptide is also stimulated and normally does inhibit ADH release, however, hypertonicity overrides ANP.
13. **Patient walking briskly on a hot day:** question was put in a chart form; no increase in body temperature, vasodilatation of vessels in skin
14. **Marathon runner on a hot day:** question was put in a chart form; increase in body temperature, vasodilatation of vessels in skin