HIGH YIELD QUESTIONS FOR USMLE

1. **Physiologic effects of hemorrhage:** drop in diastolic blood pressure, activation of the RAA system from decreased renal blood flow and catecholamine stimulation, catecholamine release from the high pressure baroreceptors (sinus tachycardia, increased cardiac contraction, increase in peripheral resistance, stimulation of the JG apparatus, venoconstriction), increased reabsorption of sodium from the kidneys, release of atrial natriuretic peptide, release of ADH.
2. **Opportunistic infections in AIDS:** know Pneumocystis, CMV, Cryptococcus, MAI, TB, Herpes (esophagitis), Candida (thrush, esophagitis), Cryptosporidium (acid fast; diarrhea)
3. **Cocaine:** decreased uptake of DOPA and NOR; review environmental path notes
4. **Signs/symptoms of drugs of abuse:** review environmental path notes
5. **Serum protein electrophoresis interpretation:** see Table in inflammation notes; now difference between polyclonal (chronic inflammation) and monoclonal (one clone of plasma cells; monoclonal gammopathy of undetermined significance is the most common cause)
6. **Absence of Y chromosome:** germinal ridge moves in the direction of ovarian differentiation; presence of the Y chromosome → testes differentiation
7. **Know sensitivity, specificity, prevalence, incidence, predictive value of a positive and negative test, risk ratio, odds ratio, case fatality risk:** some of this is in general principles notes and the remainder in Fadem's chapter on statistics
8. **UVB light:** produces thymidine dimers, which if not replaced with normal DNA by DNA repair enzymes, may result in cancer (basal cell, squame, melanoma)
9. **ESR increase with age:** probably abnormal and indicates a disease process rather than being an age-related finding
10. **Key elements in wound healing:** granulation tissue, fibronectin
11. **Cause of death in 15-25 age bracket:** MVA; Black male in this age bracket is homicide
12. **Xeroderma pigmentosum:** AR disease with absent DNA repair enzymes and increased incidence of UVB-related skin cancers
13. **Cytochrome oxidase:** inhibited by CO and cyanide
14. **Chronic granulomatous disease of childhood:** SXR disease, absent NADPH oxidase, absent respiratory burst, cannot kill catalase positive *S. aureus* but can kill catalase negative streptococci
15. **Picture of coagulation necrosis** in an acute myocardial infarction
16. **Cause of atrophy in a muscle** in a cast: lack of muscle stimulation
17. **Mosaicism:** non-disjunction in somatic cells
18. **Calculate the reference interval of the test given the mean of the test and 1 SD:** remember to double the SD, since 2 SD covering 95% of the normal population is used
19. **Factors altering the oxygen dissociation curve:** left and right shift; see cell injury notes or Harvey Champ biochemistry book
20. **Mitochondrial inheritance:** mother gives the disease to all her kids but her married son to none of his kids
21. **MC vitamin deficiency in alcoholics:** folate
22. **MC metal deficiency in alcoholics:** magnesium
23. **Vitamin associated with pyruvate dehydrogenase:** thiamin
23. **Always determine the genetic sex of a child with ambiguous genitalia**
25. **Respiratory burst:** NADPH oxidase conversion of molecular oxygen into superoxide free radicals; neutrophils and monocytes only
26. **In caisson disease, what is decreased when a diver comes up too quickly:** PN_2 in blood, since it forms bubbles in the vessels and moves into tissue
27. **Clear cell adenocarcinoma of vagina:** DES exposure; vaginal adenosis is the precursor
28. **What happens to the other kidney if one is damaged:** it undergoes hypertrophy
29. **Vitamin E toxicity:** decreases the levels of the vitamin K dependent factors; increased incidence of hemorrhagic strokes; potentiates the action of warfarin
30. **Biotin reaction:** carboxylase reaction in the conversion of pyruvate to oxaloacetate
31. **Cherry red macula:** Tay Sach disease
32. **Know how to interpret pedigree for all of the inheritance patterns:** review genetics notes
33. **Pyridoxine (B6):** transamination reactions involving the transaminases AST and ALT
34. **Know how to interpret ABGs:** see fluid and hemodynamic notes and examples in tables

35. **Functions of atrial natriuretic peptide:** opposite of angiotensin II– inhibition of ADH release, inhibits ATII effect on stimulating thirst, inhibits aldosterone secretion, inhibits renal reabsorption of Na (direct effect; loss of sodium in the urine), and inhibits renin release;
vasodilatation of the peripheral resistance vessels
36. **Disorders associated with smoking and alcohol:** see environmental pathology notes
37. **Chance of a male with cystic fibrosis having a child:** <5%, since the vas deferens never fully develop or are atretic; females with CF can get pregnant but it is difficult owing to the thick cervical mucus
38. **Vitamin supplements in CF:** all of the fat soluble vitamins
39. **Women is a pure vegan and is breast feeding her baby and the baby develops anemia:** B_{12} deficiency.
40. **EBV attaches to CD_{21} molecule in B cells**
42. **Hypogonadism, mental retardation, and unilateral gynecomastia:** Klinefelter syndrome
43. **Hypogonadism and color blindness:** Kallmann syndrome (absent GnRH)
44. **Hypogonadism, mental retardation, retinitis pigmentosum:** Laurence-Moon-Biedl syndrome
45. **Male with hypogonadism, mental retardation, short stature, and webbed neck:** Noonan syndrome (similar to a Turner's syndrome)
46. **Hypogonadism and anosmia (lack of smell):** Kallmann syndrome
47. **Male pseudohermaphrodite with cryptorchidism:** testicular feminization (absent androgen receptors; SXR; most common cause of male pseudohermaphroditism)
48. **Microdeletion syndrome with hypogonadism, mental retardation, short stature, and obesity:** Prader-Willi syndrome (chromosome 15 deletion is of paternal origin); Angelman syndrome deletion is of maternal origin
49. **Patient with neurofibromatosis has severe diastolic hypertension:** probable pheochromocytoma
50. **Complications of cyclophosphamide:** hemorrhagic cystitis and transitional carcinoma of the bladder
51. **Decline in deaths due to SIDS is attributed to:** having the baby sleep supine (babies rebreathe their own CO_2; those with immature central chemoreceptors do not respond to the respiratory acidosis by moving their heads and die)
52. **Most important risk factor for increased morbidity/mortality in a single 25 year old Black male:** unprotected sex (AIDS #1 killer in this age bracket; also applies to women regardless of age, but not white men, where MVAs are the #1 killer)
53. **Several employees that work in a car assembly plant present with headache, nausea, vomiting, muscle weakness, and abdominal cramps:** lead poisoning from incineration of batteries; may change the history to people making moonshine in an old car radiator
54. **Newborn female presents with edema of the hands and feet and a cystic mass in the neck:** Turner's syndrome with a 45 XO karyotype
55. **Compared to mature breast milk, cow's milk has:** more vitamin K, less ascorbic acid, more vitamin B_{12}, more casein (breast milk has low iron but it is better absorbed; casein is the key protein in cow's milk, while whey is the primary protein in breast milk)
56. **Vitamin that is absent in colostrum:** vitamin D
57. **Anemia in an infant that develops when switched from cow's milk to goat's milk:** goat's milk is low in folate, B6, iron, and high in potassium, chloride, arachidonic acids, and linoleic acids when compared to cow's milk
58. **Type of UV light with the greatest potential for producing a corneal burn (e.g., snow skiing):** UVB (UVB is also the culprit for cancer; B is bad)
59. **Retinal hemorrhages in young children:** possible child abuse (shaking syndrome)
60. **Patient is stung by a bee and begins to have respiratory difficulty, flushing, and abdominal cramping–?treatment:** aqueous epinephrine 1:1000 sc. (0.01 mL/kg sc. or IM)
61. **Fire ant bites:** multiple wheals that later develop into vesicles, and pustules
62. **Black widow bite:** painful bite (carrying some logs from outside, moving boxes in a basement) followed by crampy pain in the thighs and abdomen (Rx with muscle relaxant [calcium gluconate is excellent], tetanus prophylaxis, antivenin if available in severe cases)
63. **Poisonous type of scorpion bite in Southwest:** painful sting followed by local itching, paresthesias, nausea and vomiting and hypertension
64. **Brown recluse spider bite:** painless bite beginning with a slightly tender red papular lesion on the arm that latter forms a hemorrhagic blister surrounded by purpura
65. **Chigger bites:** extremely pruritic discrete, bright red papules on legs and around the waist
66. **Child who ingests 30 adult aspirins will most likely develop:** an increased anion gap metabolic acidosis (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)
67. **What disease is more likely to infect the fetus after the first trimester:** syphilis
68. **Engineer driving a train involved in a crash with an oncoming train was found to have THC metabolites in his urine–why did this occur:** a delayed reaction time (it also impairs the ability to judge speed and distances)
69. **Angiosarcoma of the liver–causes:** vinyl chloride, arsenic, Thorotrast

70. **Know adrenal steroid synthesis and test results for adrenogenital syndrome:** see genetics notes

Abnormality	21-hydroxylase deficiency	11-hydroxylase deficiency	17-hydroxylase deficiency
Ambiguous genitalia male	No	No	Yes (female appearing; no male hormones); male pseudohermaphrodite
Ambiguous genitalia female	female pseudoherm-aphrodite	female pseudoherm-aphrodite	No
Salt loser with volume depletion	Yes	No	No
Salt retention with hypertension	No	Yes	Yes
Plasma ACTH	Increased	Increased	Increased
Hypocortisolism	Yes	Yes	Yes
Urine 17-ketosteroids	Increased	Increased	Decreased
Urine 17-hydroxycorticoids	Decreased	Increased	Decreased

71. **Know all the teratogens and congenital infections:** see genetics notes

72. **Know the common age-dependent changes:**

System	Age Dependent	Age Related
Cardiovascular	Loss of elasticity of the aorta	Atherosclerosis, coronary atherosclerosis (50% asymptomatic), ischemic heart disease, temporal arteritis, aortic stenosis.
Respiratory	Findings resemble obstructive lung disease: overinflation of the lungs ("senile emphysema"), decreased elasticity, decreased FEV 1 sec, increased functional residual capacity, decreased PaO_2	Cancer and pneumonia.
Musculoskeletal	Osteoarthritis	Osteoporosis and fractures (vertebral most common), rheumatoid arthritis, Paget's disease.
Central nervous system/Special senses	Cataracts, presbycusis (inner ear degeneration), otosclerosis (conductive hearing loss), decreased smell and taste, arcus senilis.	Dementia (Alzheimer's disease, multi-infarct and others), cerebral atrophy, transient ischemic attacks, Parkinson's disease, subdural hematoma, stroke.
Immune system	Increased CD4 and decreased CD8 T cells, increased synthesis of autoantibodies, decreased cellular immunity.	Increased incidence of monoclonal gammopathy of undermined significance, increased incidence of multiple myeloma, increased susceptibility to influenza.
Integument	Loss of skin elasticity, increased cross bridging of collagen, increased body fat, ecchymoses from vessel instability (senile purpura; mainly on hands), decreased skin turgor (tenting of the skin when pinched).	Increased incidence of ultraviolet light induced skin cancers (actinic keratosis [precursor for squamous cell carcinoma], basal cell carcinoma [most common skin cancer] and squamous cell carcinoma. Increased incidence of seborrheic keratosis (pigmented lesions).
Reproductive	Breast and vulvovaginal atrophy, decreased serum estrogens and increased gonadotropins, testicular atrophy with decreased testosterone levels, prostate hyperplasia/cancer.	Increased incidence of cancers of the vulva, vagina, cervix, endometrium, ovary, breast, spermatocytic seminoma and malignant lymphoma of the testis (metastatic).
Renal	Decreased glomerular filtration rate (40% drop) and creatinine clearance (important in dosing drugs properly to avoid toxicity).	Increased incidence of renal adenocarcinoma and renovascular hypertension secondary to atherosclerosis.
Endocrine	Increased carbohydrate intolerance (less insulin receptors from increased adipose).	Type II diabetes.

73. **Target organs for acetaminophen injury:** liver and kidneys (renal medulla); free radical injury

74. **Low AFP:** Down syndrome

75. **Corticosteroids:** block phospholipase A_2 hence decreasing prostaglandin and leukotriene production; decrease leukocyte adhesion (increase neutrophils, decrease lymphocytes and eosinophils)

76. **Ectopic hormone relationships:**

Ectopic hormone	Tumor (s)	Syndrome (s)
ACTH	Most common ectopic secretion ("big" ACTH). Small cell carcinoma of lung, medullary carcinoma of thyroid.	Cushing syndrome (hyperpigmented)
ADH	Small cell carcinoma of lung.	Dilutional hyponatremia
β-hCG	Trophoblastic tumors: benign (hydatidiform mole and invasive mole), malignant (choriocarcinoma). Germ cell tumors of ovary and testes.	Gynecomastia (β-hCG is an LH analogue), hyperthyroidism (similar to TSH), precocious puberty in children.
Calcitonin	Medullary carcinoma of thyroid.	Hypocalcemia.
Erythropoietin	Renal adenocarcinoma, Wilm's tumor, hepatocellular carcinoma, Lindau von Hippel disease (cerebellar hemangioblastoma, renal adenocarcinoma), kidney lesions (cysts, hydronephrosis), large uterine leiomyomas producing hydronephrosis.	Secondary polycythemia (normal PaO_2, ↑ RBC mass, normal plasma volume).
Insulin-like	Hepatocellular carcinoma, retroperitoneal tumors.	Hypoglycemia.
PTH-like Peptide	Squamous carcinoma of lung, renal adenocarcinoma, breast cancer, ovarian cancer.	Hypercalcemia (low PTH)
Serotonin	Carcinoid syndrome due to metastatic small bowel carcinoid to liver, small cell carcinoma of lung, bronchial carcinoid, medullary carcinoma of thyroid.	Carcinoid syndrome: flushing, diarrhea, valvular lesions: tricuspid insufficiency and pulmonic stenosis.

77. **Tumor markers:**

Tumor Marker	Product and Cancer Association (s)
AFP	Gene product (oncofetal antigen). Hepatocellular carcinoma, germ cell tumors: yolk sac or endodermal sinus tumors of testicle or ovary. testicular/ovarian cancer
AAT	Enzyme. Hepatocellular carcinoma, yolk sac or endodermal sinus tumors of testicle or ovary.
β-hCG	Hormone. Trophoblastic tumor in germ cell tumors of ovary/testis and placenta: benign (hydatidiform and invasive moles), malignant (choriocarcinoma).
β2-microglobulin	Protein. Multiple myeloma (excellent prognostic factor). Light chains in urine (Bence Jones protein).
Bombesin	Peptide. Small cell carcinoma of lung, neuroblastoma.
CA 15-3	Glycoprotein (cancer antigen). Breast cancer.
CA 19-9	Glycoprotein (cancer antigen). Pancreatic cancer (excellent marker)
CA 125	Glycoprotein (cancer antigen). Surface derived ovarian cancer.
CEA	Gene product (oncofetal antigen). Colorectal, pancreatic, breast and small cell cancer of lung. Bad prognostic sign if elevated preoperatively (greater incidence of undetected metastasis).
LDH	Enzyme. Marker of Hodgkin's disease. Non-specific tumor marker in general.
Neuron Specific Enolase (NSE)	Enzyme. Small cell carcinoma of lung, neuroblastoma.
PSA	Glycoprotein. Prostate adenocarcinoma. Excellent sensitivity but poor specificity (increased in prostate hyperplasia). Excellent indicator of tumor burden. Not increased after rectal exam.

78. **Precursors/risk factors for all the major cancers:** see table in the neoplasia notes

79. **Carcinogenic viruses:**

Oncogenic RNA Viruses	Tumor (s)	Oncogenic DNA Viruses	Tumor (s)
HTLV-1	Adult T cell leukemia/ lymphoma	HBV	Hepatocellular carcinoma (aflatoxin B a cocarcinogen)
HTLV-2	Hairy cell leukemia	EBV	Burkitt's lymphoma, nasopharyngeal carcinoma, polyclonal malignant lymphoma
HIV	CNS malignant lymphoma	HPV (HSV-2 may act as a cocarcinogen)	Squamous carcinoma of the cervix, vagina, vulva, and anus in homosexuals. Laryngeal papillomas (may progress to cancer)
HCV	Hepatocellular carcinoma	HSV- 8	Kaposi's sarcoma

80. **Know functions of testosterone and dihydrotestosterone in fetal development of a male:** see genetics notes
81. **EM of zebra bodies in lysosomes in Niemann Pick disease:** zebra bodies look like lamellar bodies in type II pneumocytes
82. **Enamel injury in young woman:** bulimia; metabolic alkalosis from vomiting; Boerhaave's syndrome
83. **Anorexia nervosa:** secondary amenorrhea (<15% of ideal body weight; decreased GnRH and gonadotropins), distorted body image, osteoporosis, ventricular arrhythmia most common cause of death
84. **Kwashiorkor:** decreased protein intake but normal total caloric intake (all CHO); fatty liver from decreased apolipoproteins; pitting edema; flaky paint dermatitis
85. **Marasmus:** decreased total caloric intake; loss of muscle mass
86. **Vitamin A deficiency:** squamous metaplasia in eyes, bronchus; nyctalopia
87. **Vitamin A toxicity:** increased intracranial pressure; hypercalcemia
88. **Primary hypothyroidism:** β-carotenemia from decreased conversion of β-carotenes into retinoic acid in the intestine (thyroxine is a cofactor); patient is yellow but for the eyes
89. **Vitamin D metabolism:** see nutrition notes; know this very well

90. **Rickets vs osteomalacia in adults:** craniotabes and rachitic rosary in rickets, not osteomalacia; both have an increase in unmineralized osteoid
91. **Vitamin E deficiency:** cerebellar dysfunction; hemolytic anemia; **toxicity:** interferes with vitamin K dependent factors leading to a hemorrhagic diathesis
92. **Vitamin C deficiency:** teeth bleed when brushed; glossitis; perifollicular hemorrhages; **tea and toast** diet
93. **Thiamin deficiency:** alcohol abuse most common cause (poor nutrition); important biochemical reactions: pyruvate dehydrogenase, transketolase, ketoglutarate dehydrogenase; Wernicke (confusion, ataxia, nystagmus)-Korsakoff (antegrade and retrograde memory deficits); ring hemorrhages in mamillary bodies and periventricular area; high output failure; congestive cardiomyopathy; peripheral neuropathy
94. **Niacin deficiency:** important biochemical reactions: NAD/NADH, NADP/NADPH; pellagra; tryptophan can be used to synthesize niacin (tryptophan decreased in Hartnup's disease, carcinoid syndrome [converted into serotonin], corn diet); diarrhea, dermatitis (hyperpigmentation), dementia
95. **Riboflavin deficiency:** important biochemical reactions: FMN and FAD reactions, synthesis of glutathione; magenta tongue, neovascularization of cornea, angular stomatitis
96. **Pyridoxine deficiency:** INH most common cause; important reactions: transaminase, heme synthesis (sideroblastic anemia with ringed sideroblasts), neurotransmitter synthesis; absent in goat's milk
97. **Pantothenic acid:** important in fatty acid synthase complex; coenzyme reactions
98. **Biotin deficiency:** avidin in raw eggs binds the vitamin; alopecia
99. **Trace metals and their deficiencies:**

Trace Element	Functions	Clinical Disorders
Chromium	Part of the glucose tolerance factor, which potentiates insulin activity.	**Deficiency associated with:** Glucose intolerance Peripheral neuropathy.
Copper	Copper is a cofactor in many enzymes that are involved in oxidation-reduction reactions that bind and directly react with oxygen. Plasma levels are normally increased in pregnancy, inflammation, and with birth control pills. It is bound to ceruloplasmin, which is synthesized in the liver. It is a cofactor for the following enzymes: **Lysyl oxidase:** forms cross-links in collagen and elastic tissue to increase tensile strength. Cytochrome c oxidase: electron-transport system. **Superoxide dismutase:** antioxidant that neutralizes oxygen free radicals. **Ferroxidase:** converts iron to +3 so it can bind to transferrin. **Tyrosinase:** conversion of tyrosine to DOPA in melanin synthesis.	**Deficiency associated with:** Microcytic hypochromic anemia (cannot bind to transferrin). Skeletal abnormalities (defective collagen): osteoporosis. Skin depigmentation (problem with tyrosinase). Dissecting aortic aneurysms (defective collagen and elastic tissue). Mencke's kinky hair syndrome: rare sex-linked recessive disease with impaired utilization of copper. **Toxicity associated with:** **Wilson's disease**: an autosomal recessive disease with a defect in the excretion of copper into bile. It leads to liver damage and eventual deposition of free copper into the eye (Kayser-Fleischer ring) and lenticular nuclei in the brain. Total copper levels are decreased owing to a decrease in ceruloplasmin synthesis by the damaged liver, but free copper levels are increased.
Selenium	Selenium primarily functions in the metalloenzyme glutathione peroxidase, which is an anti-oxidant that destroys peroxides in the cytosol. It neutralizes peroxides in the cytosol, while vitamin E prevents peroxide formation in the membranes of cells. It inhibits DNA synthesis and stimulates the immune system. It is an enzyme cofactor in the peripheral conversion of T4 into T3.	**Deficiency associated with:** Muscle pain and weakness cardiomyopathy.
Zinc	Cofactor in superoxide dismutase, carbonic anhydrase, alkaline phosphatase, collagenases, RNA and DNA polymerases, thymidine kinase, alcohol dehydrogenase.	**Deficiency associated with:** **Growth retardation** **Hypogonadism and infertility** **Decreased taste (dysgeusia)** Rash around the eyes and mouth Poor wound healing Impaired cellular immunity. Deficiency is common in diabetics, alcoholics, and cirrhosis. **Acrodermatitis enteropathica** is a recessive disease characterized by decreased intestinal absorption of zinc.

100. **Goat's milk:** vitamin B6 (pyridoxine) and folate deficiency
101. **Functions of vitamin C:** reduce dietary iron from ferric to ferrous for reabsorption; hydroxylation of proline and lysine (binding site for cross-bridges); prevents nitrosamination; reduces metHb back to reduced Hb

102. **Cyanosis not relieved by oxygen in a patient coming home from a camping trip:** methemoglobinemia (water has nitrites that oxidized iron to ferric condition); SaO_2 not PaO_2 is decreased; methylene blue treatment of choice; ascorbic acid has an ancillary role
103. **Picture of child with fetal alcohol syndrome**
104. **Newborn:** high Hb due to increase in HbF
105. **HbF:** left shifts ODC, protects newborns with sickle cell disease and severe β-thalassemia, increased with hydroxyurea, resistant to alkali/acid denaturation
106. **Raising the upper limit of normal of a test:** increases specificity and predictive value of a positive test; decreases sensitivity and predictive value of a negative test result
107. **Prevalence:** Prevalence (number of people with disease in the population studied) = Incidence (number of new cases over a period of time) x Duration of the disease
108. **Picture of adrenal cortex:** what part is atrophied in a patient on corticosteroids: fasciculata and reticularis, not the glomerulosa where aldosterone is
109. **Apoptosis:** individual cell necrosis; normal involution of structures (atrophy, thymus), programmed cell death, loss of Mullerian structures in males and Wolffian structures in females, Councilman (acidophilic) bodies, psammoma bodies, mechanism of atresia in the bowel (no lumen)
110. **Paraneoplastic syndromes:** ectopic hormones, hypercalcemia (PTH-like peptide from primary squamous carcinoma of the lung, renal adenocarcinoma), acanthosis nigricans (stomach cancer), Eaton-Lambert syndrome (myasthenia-like; small cell carcinoma), polymyositis (lung cancer)
111. **Oncogenesis in HPV:** gene products E6 and E7 in HPV infections inhibit p53 suppressor gene leading to cancer
112. **Metalloenzyme that aids tumor invasion of tissue:** collagenase with Zn as a cofactor
113. **Smoker with history of peptic ulcer disease--? advice:** stop smoking
114. **Normal karyotype in a child with Down syndrome:** probable translocation with chromosome 21 sitting on top of chromosome 14, or an acrocentric (Robertsonian) translocation of chromosome 21
115. **Sepsis in a elderly man with benign prostatic hyperplasia:** usually *E. coli* and can produce endotoxic shock (warm shock due to activation of complement system and release of anaphylatoxins + release of nitric oxide from damaged endothelial cells)
116. **DNA repair defects:** Fanconi's anemia (cross-linking agents)
117. **Effect of barbiturates and other drugs that enhance the liver cytochrome system:** it will decrease heme and increase activity of ALA synthase, the rate limiting enzyme in heme synthesis; dangerous in precipitating porphyric attacks
118. **Genomic imprinting:** did chromosome come from mother or father; e.g., chromosome 15 microdeletion syndromes--Prader Willi and Angelman's syndrome
119. **Normal changes in pregnancy:** greater increase in plasma volume than RBC mass leading to decreased Hb, increased GFR and CCr, decreased BUN, creatinine, and uric acid; increased alkaline phosphatase; respiratory alkalosis from progesterone effect; increased T4 and cortisol from increased synthesis of their binding proteins (free hormone normal)
120. **Main difference in adult male and female:** iron studies all lower in females
121. **Children:** increased alkaline phosphatase (osteoblasts from bone growth) and phosphate, slight decrease in Hb
122. **Analytes increased with hemolyzed blood sample:** LDH, potassium
123. **Lipid most affected by fasting:** triglyceride component coming from chylomicrons; CH and HDL not affected
124. **Enhance cytochrome system in the SER of the liver:** alcohol, barbiturates; increase in serum GGT; decreased drug levels from increased metabolism
125. **Inhibit cytochrome system:** H_2 blockers, proton blockers; danger of drug toxicity
126. **First sign of tissue hypoxia:** swelling of cell from inactive Na/K ATPase pump
127. **Fatty liver:** most commonly due to alcohol
128. **Examples of growth alterations:** atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia; see tables in cell injury notes
129. **Examples of cell accumulations:** melanin, iron, calcium (dystrophic, metastatic), glycogen, bilirubin products: see tables in cell injury notes
130. **Cell cycle:** know parts of the cell cycle, role of p53 suppressor gene in inhibiting kinases, drugs that block specific areas of the cycle; see cell injury notes
131. **Free radicals:** superoxide, OH, peroxide, drugs [acetaminophen, CCL_4]); iron increases FR formation
132. **Types of cell necrosis:** coagulation (infarction; exception CNS), liquefactive (infections, brain infarct or infection), caseous (systemic TB and atypical TB, systemic fungi; all the rest are non-caseating), enzymatic fat necrosis (acute pancreatitis), fibrinoid (necrosis of immunologic injury; small vessel vasculitis, vegetations in RHD and Libman-Sacks), gummatous (tertiary syphilis): see cell injury notes
133. **Chemical mediators of inflammation:** histamine, C3a, C3b, C5a, LTB_4, LTC-D-E_4, bradykinin, prostaglandins; see table in inflammation notes
134. **Factors increasing and decreasing adhesion molecule synthesis:** increase: C5a, LTB4, endotoxins, IL-1, TNF; decrease: catecholamines, corticosteroids, lithium
135. **Recognize a granuloma (circumscribed, red, contain multinucleated giant cells):** example of type IV hypersensitivity; macrophages when activated become epithelioid cells and fuse into multinucleated giant cells

136. **Key factors in wound healing:** role of fibronectin and granulation tissue; factors interfering with healing (infection most common)
137. **Types of inflammation:** suppurative (abscess), cellulitis (streptococcus), granulomatous (TB), pseudomembranous (diphtheria, *C. difficile*), fibrinous (pericarditis), serous (blister)
138. **Important suppressor genes:** p53 (most cancers; chromosome 17), APC (familial polyposis; chromosome 5), BRCA-1 (breast/ovarian cancer; chromosome 17), BRCA-2 (breast cancer; chromosome 13), NF-1 and -2 (neurofibromatosis), Rb (retinoblastoma; chromosome 13)
139. **Fragile X syndrome:** SXR disease; most common genetic cause of mental retardation in **males** (Down syndrome most common overall); **triplet repeat; macroorchidism** at puberty
140. **Cri-du-chat:** deletion of short arm of chromosome 5; mental retardation, cry like a cat, relation with VSD
141. **Marfan's syndrome:** AD; fibrillin defect in elastic tissue; MVP with sudden death; dissection most common cause of death; dislocated lens; homocystinuria is similar (AR disease; differences are mental retardation, vessel thrombosis from increase in homocysteine)
142. **Neurofibromatosis:** AD; brain tumors: meningioma, acoustic neuroma, pheochromocytoma, cafe au lait, Lisch nodules (hamartomas in iris)
143. **Von Hippel Lindau:** AD; cerebellar hemangioblastomas; pheochromocytoma; renal adenocarcinoma (high incidence)
144. **Congenital malformations:** see genetics notes; alcohol number 1 teratogen
145. **Oncogene relationships: erb-B2/neu [HER-2]** codes for a growth factor receptor: breast, ovarian and colon cancer (erb B2); **ras** codes for membrane associated GTP-binding proteins (G proteins) that transduce signals received from growth factor receptors to the phosphatidyl inositol second messenger system: ~30% of all human cancers including cancers of the lung, colon and pancreas as well as leukemia (20-25% of acute myelogenous leukemia); **abl** produces non-receptor proteins located on the inner cell membrane surface: t9;22 translocation leads to chronic myelogenous leukemia; **c-myc** is located in the nucleus and produce protein products that activate nuclear transcription: t8;14 translocation leading to Burkitt's lymphoma; **N-myc**: neuroblastoma; **ret**: MEN IIa and IIb; **bcl-2**: t14;18 translocation leads to inactivation of apoptosis gene on B cells leading to immortal cell (no longer programmed to die) and follicular B cell lymphoma
146. **Grade of cancer (histologic appearance of tumor):** well differentiated [low grade] if you can tell what its origin is; poorly differentiated [high grade, anaplastic] if you cannot tell its tissue of origin
147. **Stage of cancer:** T = tumor size, N = nodal metastasis, M = other metastatic sites; more important than grade
148. **Tumor nomenclature:** carcinoma (squamous, adeno-, transitional), sarcoma (mesenchymal origin), hamartoma (not neoplastic; bronchial hamartoma, PJ polyp, hyperplastic polyp), choristoma (not neoplastic, normal pancreas in stomach wall), mixed tumor (parotid salivary gland tumor; 2 tissues from same cell layer), teratoma (tissues from ecto-, endo-, and mesoderm; cystic teratoma of ovary with teeth and hair); review first part of neoplasia notes
149. **Increased AG metabolic acidosis (AG = Na - [Cl + HCO_3) = 12 +/- 4 mEq/L):** adding an acid and the anion of the acid replaces the bicarbonate used to buffer the hydrogen ions; e.g., lactate, acetoacetate, β-hydroxybutyrate, phosphate/sulfate (renal failure), salicylate, formate (methanol poisoning), oxalate (ethylene glycol poisoning), acetate (paraldehyde)
150. **Normal AG metabolic acidosis:** losing bicarbonate and bicarbonate is replaced by an equal number of Cl anions, hence the normal AG; type I renal tubular acidosis (distal): aldosterone mediated proton pump in collecting duct is dysfunctional (cannot secrete H ions, which combine with Cl ions to form HCl; cannot regenerate bicarbonate; urine pH >5.5); type II (proximal): lower threshold for bicarbonate reclamation (~15 mEq/L), hence bicarbonate is lost in the urine until the serum bicarbonate is 15 mEq/L, then bicarbonate can be reclaimed (initially urine pH >5.5, but when equilibrium is reached between the threshold and the serum bicarbonate level, the urine pH <5.5); diarrhea: lose sodium, potassium, and bicarbonate, the latter replaced by chloride
151. **Acute transplant rejection:** within 3 months; predominantly cellular immune reaction (type IV; CD_8 cytotoxic T cells; parenchymal damage) and smaller humoral component (vessel damage with fibrosis)
152. **Chemical carcinogens:**

Carcinogen	Tumor (s)	Carcinogen	Tumor (s)
Aniline dyes	Transitional cell carcinoma of bladder, ureters, renal pelvis	**Polycyclic hydrocarbons** (tobacco smoke). **Alcohol is cocarcinogen** for oral, esophageal and laryngeal cancers	**Small cell carcinoma of lung; squamous cancers of oral cavity, esophagus, larynx, lung, cervix; transitional carcinoma of bladder; adenocarcinoma of pancreas**
Benzidine	Transitional cell carcinoma of bladder, ureters, renal pelvis	Chromium	Lung cancer
Cyclophosphamide	Transitional cell carcinoma of bladder, ureters, renal pelvis	**Nickel**	**Lung, nasal cavity cancer**
Phenacetin	Transitional cell carcinoma of bladder, ureters, renal pelvis	**Uranium (radon gas)**	**Lung cancer**
Vinyl chloride	**Angiosarcoma of liver**	Woodworking	Nasal cavity cancer

Thorotrast	Angiosarcoma of liver, hepatocellular carcinoma	**Chewing tobacco**	Verrucous carcinoma in mouth
Arsenic	**Angiosarcoma of liver**, squamous carcinoma of skin, lung cancer	**Alkylating agents**	**Acute leukemia**, malignant lymphoma
Asbestos	**Primary lung cancer if a smoker (co-carcinogen with smoking), mesothelioma if a non-smoker (no relation to smoking)**	**Benzene**	**Acute leukemia**
Oral contraceptives	**Liver cell adenomas, hepatocellular carcinoma**	**Diethylstilbestrol**	**Clear cell adenocarcinoma of cervix and vagina**
Aflatoxins (Aspergillus flavus; cocarcinogen with HBV)	**Hepatocellular carcinoma**	**Nitrosamines** (inhibited by ascorbic acid and refrigeration)	**Esophageal and gastric cancers**
Cadmium	Prostate cancer, lung cancer	Tars, soots, oils	Squamous carcinoma of skin (scrotum in chimney sweeps)

153. **Metastasis:** carcinomas: lymphatic to regional nodes (subcapsular sinus), vessel invasion (uncommon; exceptions follicular cancer of thyroid, renal adenocarcinoma, hepatocellular carcinoma), seeding (ovarian cancers); sarcomas: primarily vascular (lung and bone); tumor cells bind to adhesion molecules on the endothelial surface and bind to fibronectin and laminin receptors when infiltrating through tissue
154. **ESR:** increased in acute/chronic inflammation and monoclonal gammopathies, best initial screen for temporal arteritis, zero sed rate in HbSS disease and polycythemias
155. **SiADH:** small cell carcinoma of the lung, any CNS injury, any pulmonary infection, chlorpropamide; hyponatremia (<120 mEq/L), increased sodium in urine, Uosm greater than Posm (concentrating urine), no pitting edema (TBW increased but not TBNa); restrict water not salt; use demeclocycline if patient has a small cell cancer since the drug produces a nephrogenic DI and allows the patient to drink water
156. **Primary aldosteronism (Conn syndrome):** benign adenoma in zona glomerulosa; low renin hypertension, no pitting edema (escape mechanism from block of proximal reabsorption of sodium), severe hypokalemia (muscle weakness, U waves on ECG), metabolic alkalosis (possible tetany from low ionized calcium), normal to increased serum sodium
157. **Cancer incidence mortality and incidence in males and females in descending order:** mortality due to cancer in males: lung, prostate, **colorectal**; mortality due to cancer in females: lung, breast, **colorectal**; cancer incidence (new cases per year, not mortality) in males: prostate, lung, **colorectal**; cancer incidence in females: breast, lung, **colorectal**; NOTE: colorectal second most common cause of cancer death in both males and females (greater than the sum of prostate and breast cancer)
158. **Cancers decreasing in incidence:** stomach, cervical (Pap smear), endometrial (Pap smear, biopsy with bleeding)
159. **Cancers increasing in incidence:** breast (mammography), prostate (PSA screen), colorectal, pancreas, malignant lymphoma, malignant melanoma (most rapidly increasing cancer in the world), multiple myeloma; cancer more common in blacks than whites
160. **Gynecologic cancers in order of decreasing incidence and mortality:** incidence: **endometrial**, ovarian, cervical; mortality: ovarian, cervical, **endometrial**
161. **Metastasis more common than primary cancer:**

Organ	Most common primary site	Most common primary cancer of the organ
Lymph node	Breast	Non-Hodgkin's lymphoma
Lung	Breast	Adenocarcinoma
Bone	Breast	Multiple myeloma
Liver	Lung	Hepatocellular carcinoma
Adrenal	Lung	Adenocarcinoma
Brain	Lung	Glioblastoma multiforme

162. **Smoking + alcohol:** have synergistic effect on producing cancers of the oral cavity, esophagus, larynx
163. **Birth control pills protect against:** gonorrhea not Chlamydia, ovarian cancer
164. **Birth control pill adverse effects:** see environmental path notes
165. **CO poisoning:** necrosis of the globus pallidus; Parkinson's; SaO_2 decreased, PaO_2 normal; left shift ODC; inhibit cytochrome oxidase
166. **Respiratory acidosis:** increase $PaCO_2$, decrease PaO_2 and SaO_2
167. **Anemia:** normal PaO_2 and SaO_2 but decreased Hb concentration
168. **Normal O_2 content (1.34 [Hb] x SaO_2 + PaO_2):** cyanide poisoning, ischemia, uncoupling of oxidative phosphorylation
169. **Dystrophic calcification:** normal serum calcium/phosphate but deposit of calcium into damaged tissue: atherosclerotic plaques, enzymatic fat necrosis, periventricular calcification in CMV
170. **Metastatic calcification:** increased serum calcium and/or phosphate with deposition of calcium in normal tissue: nephrocalcinosis in primary hyperparathyroidism, calcification of basal ganglia in primary hypoparathyroidism (high phosphorous)

171. **Cell cycle:** p53 suppressor gene produces a protein product that has an inhibitory effect on the kinases that control the movement from one phase to the next in the cell cycle
172. **Labile cells:** contain stem cells; bone marrow stem cells, skin (stratum basalis), intestine (base of the glands)
173. **Stable cells:** in Go phase and must be stimulated to go into the G1 phase (e.g., hormones); most parenchymal cells in organs; smooth muscle; astrocytes and other neuroglial cells
174. **Permanent cells:** cannot enter the cell cycle; skeletal and cardiac muscle; neurons
175. **Most common bone metastasized to:** vertebra; due to the Batson vertebral plexus which communicates with the vena cava.