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Study Guide Zone



# NCLEX-RN Test Study Guide

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## ***NCLEX Test Resources***

### **Free NCLEX Practice Tests**

[http://www.testprepreview.com/nclex\\_practice.htm](http://www.testprepreview.com/nclex_practice.htm)

### **Financial Aid Facts**

<http://www.finaidfacts.org>

### **Scholarship Help**

<http://www.scholarshiphelp.org>

### **Study Tips and Information**

[http://www.studyguidezone.com/resource\\_tips.htm](http://www.studyguidezone.com/resource_tips.htm)

## ***Introduction to this Guide***

Your NCLEX score is one of the most critical elements to your qualification to become a nurse, so it is naturally much too important for you to take this test unprepared. The higher your NCLEX score, the better your chances of passing the boards.

Careful preparation, as described in this expert guide, along with hard work, will dramatically enhance your probability of success. In fact, it is wise to apply this philosophy not only to your board's exam, but to other elements of your life as well, to raise you above the competition. Your NCLEX score is one of the areas in the licensure process over which you have a substantial amount of control; this opportunity should not be taken lightly. Hence, a rational, prepared approach to your NCLEX test as well as the rest of the licensure process will contribute considerably to the likelihood of success.

Keep in mind, that although it is possible to take the NCLEX more than once, you should never take the test as an "experiment" just to see how well you do. It is of extreme importance that you always be prepared to do your best when taking the NCLEX. For one thing, it is extremely challenging to surmount a poor performance. If you are looking to take a "practice" run, look into review course, professionally developed mock NCLEX examinations, and, of course, this guide.

This guide provides you with the professional instruction you require for understanding the traditional NCLEX test. Covered are all aspects of the test and preparation procedures that you will require throughout the process. Upon completion of this guide, you'll have the confidence

and knowledge you need for maximizing your performance on your NCLEX test.

## ***Testing and Analysis***

It won't take you long to discover that the NCLEX is unlike any test you've taken before, and it is probably unlike any test you will ever take again in your academic career. The typical high school or college test is a knowledge-based test. The NCLEX, however, is application-based.

What does this mean to you? It means that you'll have to prepare yourself in a completely different way! You won't simply be reciting memorized facts as they were phrased in some textbook, and you won't be applying any learned formulas to specific problems that will be laid out.

The NCLEX requires you to think in a thorough, quick and strategic manner...and still be accurate, logical and wise. This test is designed to judge your abilities in the ways that the licensure boards feel is vital to the success of first year nursing graduate.

To some extent, you have already gradually obtained these abilities over the length of your academic career. However, what you probably have not yet become familiar with is the capability to use these abilities for the purpose of maximizing performance within the complex and profound environment of a standardized, skills-based examination.

There are different strategies, mindsets and perspectives that you will be required to apply throughout the NCLEX. You'll need to be prepared to use your whole brain as far as thinking and assessment is concerned, and you'll need to do this in a timely manner. This is not

something you can learn from taking a course or reading a book, but it is something you can develop through practice and concentration.

The following chapters in this guidebook will lay out the format and style of the NCLEX as well as give you sample questions and examples of the frame of mind you'll be expected to take. If there is one skill that you take with you from your preparation for the NCLEX, this should be it.



## ***Introduction to the NCLEX***

The purpose of the NCLEX is to establish a standard method of measurement for the skills that have been acquired by nursing school graduates. These skills are considered critical to the healthcare profession. The principle behind the NCLEX is similar to the SAT's that are required for application to American colleges. Although these tests are similar experiences in some respects, the NCLEX is a much more challenging and complex.

Fortunately, the NCLEX does not change very dramatically from year to year. What this means to you, is that it has become possible for quality practice tests to be produced, and if you should take enough of these tests, in addition to learning the correct strategies, you will be able to prepare for the test in an effective manner.

The NCLEX is not just a multiple-choice test. Fill in the blank questions and multiple right answer questions have been added to the test. Although these types of questions are not the majority of questions asked on the NCLEX. The main point is that the content has stayed the same. The nursing principles tested prior to these changes are still the same. The content has remained relatively the same. If you understand the content material of the exam, the type of testing question won't matter.

## ***The NCLEX Scoring Scale***

The minimum number of questions asked on the NCLEX-RN exam is 75. The maximum number of questions is 265. The exam is offered in CAT format which means the difficulty of the questions varies significantly. If you miss a question, the computer will give you an easier question. If you get it right, then you will get harder questions.

Many NCLEX test takers freak out if computer shuts off after 75 questions, or if they have to take the maximum number of questions. The main point is to be prepared to go the distance. Don't be sprinter and concentrate for 100 questions and then let your concentration begin to fade. Likewise, don't stress on how many questions you have to take. You won't know the outcome until you get your scores, so don't stress out.

Take some time for yourself and do something fun following the exam.

### ***NCLEX Tips***

1. Arrive early to the testing center.
2. Bring multiple forms of idea.
3. Wear layered clothing.
4. Get a good night's sleep before the test. (Don't cram)
5. Use a study partner when preparing for the exam.
6. Be familiar with the format of the exam.
7. Know your medical terminology.
8. Limit your distractions preparing for the exam.
9. Take time to unwind and reduce stress as you prepare.

10. Remember if you don't pass, you can retake the exam.

## ***General Strategies***

### **Strategy 1: Understanding the Intimidation**

The test writers will generally choose some material on the exam that will be completely foreign to most test takers. You can't expect all of the medical topics to be a topic with which you have a fair amount of familiarity. If you do happen to come across a high number of topics/cases that you are extremely familiar with, consider yourself lucky, but don't plan on that happening.

Each case and scenario will be slightly different. Try and understand all of the material, while weeding out the distracter information. The cases will also frequently be drawn from real world experiences. Therefore, the passage that you will face on the test may almost seem out of context and as though it begins in the middle of a medical process. You won't have a nice title overhead explaining the general topic being covered but will immediately be thrown into the middle of a strange format that you don't recognize.

Getting hit by strange sounding medical topics that you don't recognize, of which you may only have a small exposure, is just normal on the NCLEX. Just remember that the questions themselves will contain all the information necessary to choose a correct answer.



## **Strategy 2: Finding your Optimal Pace**

Everyone reads and tests at a different rate. It will take practice to determine what is the optimal rate at which you can read fast and yet absorb and comprehend the information. This is true for both the flyover that you should initially conduct and then the subsequent reading you will have to do as you go through and begin focusing on a specific question. However, on the flyover, you are looking for only a surface level knowledge and are not trying to comprehend the minutia of details that will be contained in the question. Basically, skim the question and then read the question slowly.

With practice, you will find the pace that you should maintain on the test while answering the questions. It should be a comfortable rate. This is not a speed-reading test. If you have a good pace, and don't spend too much time on any question, you should have a sufficient amount of time to read the questions at a comfortable rate. The two extremes you want to avoid are the dumbfounded mode, in which you are lip reading every word individually and mouthing each word as though in a stupor, and the overwhelmed mode, where you are panicked and are buzzing back and forth through the question in a frenzy and not comprehending anything.

You must find your own pace that is relaxed and focused, allowing you to have time for every question and give you optimal comprehension. Note that you are looking for optimal comprehension, not maximum comprehension. If you spent hours on each word and memorized the question, you would have maximum comprehension. That isn't the goal though, you want to optimize how much you comprehend with

how much time you spend reading each question. Practice will allow you to determine that optimal rate.

### **Strategy 3: Don't be a Perfectionist**

If you're a perfectionist, this may be one of the hardest strategies, and yet one of the most important. The test you are taking is timed, and you cannot afford to spend too much time on any one question.

If you are working on a question and you've got your answer split between two possible answer choices, and you're going back through the question and reading it over and over again in order to decide between the two answer choices, you can be in one of the most frustrating situations possible. You feel that if you just spent one more minute on the problem, that you would be able to figure the right answer out and decide between the two. Watch out! You can easily get so absorbed in that problem that you lose track of time, get off track and end up spending the rest of the test playing catch up because of all the wasted time, which may leave you rattled and cause you to miss even more questions that you would have otherwise.

Therefore, unless you will only be satisfied with a perfect score and your abilities are in the top .1% strata of test takers, you should not go into the test with the mindset that you've got to get every question right. It is far better to accept that you will have to guess on some questions and possibly get them wrong and still have time for every question, than to analyze every question until you're absolutely confident in your answer and then run out of time on the test.

## **Strategy 4: Factually Correct, but Actually Wrong**

A favorite ploy of question writers is to write answer choices that are factually correct on their own, but fail to answer the question, and so are actually wrong.

When you are going through the answer choices and one jumps out for being factually correct, watch out. Before you mark it as your answer choice, first make sure that you go back to the question and confirm that the answer choice answers the question being asked.

## **Strategy 5: Extraneous Information**

Some answer choices will seem to fit in and answer the question being asked. They might even be factually correct. Everything seems to check out, so what could possibly be wrong?

Does the answer choice actually match the question, or is it based on extraneous information contained in the question. Just because an answer choice seems right, don't assume that you overlooked information while reading the question. Your mind can easily play tricks on you and make you think that you read something or that you overlooked a phrase.

Unless you are behind on time, always go back to the question and make sure that the answer choice "checks out."





## **Strategy 6: Avoiding Definites**

Answer choices that make definite statements with no “wiggle room” are often wrong. Try to choose answer choices that make less definite and more general statements that would likely be correct in a wider range of situations and aren’t exclusive.

Example:

- A. The nurse should follow universal contact precautions at all times in every case.
- B. The nursing assistant completely demonstrated poor awareness of transfer safety.
- C. Never allow new medications to be accessible on the unit.
- D. Sometimes, the action taken by the aide was not well planned.

Without knowing anything about the question, answer choice D uses the term “sometimes,” which has wiggle room, meaning there could have been a few strong points and weak points about the aide’s performance. All of the other answer choices have a more definite sense about them, implying a more precise answer choice without wiggle room that is often wrong.

## **Strategy 7: Using Common Sense**

The questions on the test are not intended to be trick questions. Therefore, most of the answer choices will have a sense of normalcy about them that may be fairly obvious and could be answered simply by using common sense.

While many of the topics will be ones that you are somewhat unfamiliar with, there will likely be numerous topics that you have some prior indirect knowledge about that will help you answer the questions.

### **Strategy 8: Instincts are Right**

When in doubt, go with your first instinct. This is an old test-taking trick that still works today. Oftentimes if something feels right instinctively, it is right. Unfortunately, over analytical test takers will often convince themselves otherwise. Don't fall for that trap and try not to get too nitpicky about an answer choice. You shouldn't have to twist the facts and create hypothetical scenarios for an answer choice to be correct.

### **Strategy 9: No Fear**

The depth and breadth of the NCLEX test can be a bit intimidating to a lot of people as it can deal with topics that have never been encountered before and are highly technical. Don't get bogged down by the information presented. Don't try to understand every facet of the nursing management process. You won't have to write an essay about the topics afterwards, so don't memorize all of the minute details. Don't get overwhelmed.

## **Strategy 10: Don't Get Thrown Off by New Information**

Sometimes test writers will include completely new information in answer choices that are wrong. Test takers will get thrown off by the new information and if it seems like it might be related, they could choose that answer choice incorrectly. Make sure that you don't get distracted by answer choices containing new information that doesn't answer the question.

Example: Which conclusion is best supported?

A: Hyponatremia can cause the anxiety presented in this case.

Was anxiety even discussed in the question? If the answer is NO – then don't consider this answer choice, it is wrong.

## **Strategy 11: Narrowing the Search**

Whenever two answer choices are direct opposites, the correct answer choice is usually one of the two. It is hard for test writers to resist making one of the wrong answer choices with the same wording, but changing one word to make it the direct opposite in meaning. This can usually cue a test taker in that one of the two choices is correct.

Example:

A. Calcium is the primary mineral linked to osteoporosis treatment.

B. Potassium is the primary mineral linked to osteoporosis treatment.

These answer choices are direct opposites, meaning one of them is likely correct. You can typically rule out the other two answer choices.

## **Strategy 12: You're not Expected to be Einstein**

The questions will contain the information that you need to know in order to answer them. You aren't expected to be Einstein or to know all related knowledge to the topic being discussed. Remember, these questions may be about obscure topics that you've never heard of. If you would need to know a lot of outside knowledge about a topic in order to choose a certain answer choice – it's usually wrong.

### ***Respiratory Conditions***

#### Pulmonary Valve Stenosis

##### *Causes:*

Congenital  
Endocarditis  
Rheumatic Fever

##### *Symptoms:*

Fainting  
SOB  
Palpitations  
Cyanosis  
Poor weight gain

##### *Tests:*

Cardiac catheterization  
ECG  
Chest-Xray  
Echocardiogram

##### *Treatment:*

Prostaglandins  
Diuretics  
Anti-arrhythmics

Blood thinners

Valvuloplasty

ARDS- low oxygen levels caused by a build up of fluid in the lungs and inflammation of lung tissue.

*Causes:*

Trauma

Chemical inhalation

Pneumonia

Septic shock

*Symptoms:*

Low BP

Rapid breathing

SOB

*Tests:*

ABG

CBC

Cultures

Treatment:

Echocardiogram

Auscultation

Cyanosis

Chest X-ray

Mechanical Ventilation

Treat the underlying condition

*Monitor the Patient for:*

Pulmonary fibrosis

Multiple system organ failure

Ventilator associated pneumonia

Acidosis

Respiratory failure

Respiratory Acidosis- Build-up of Carbon Dioxide in the lungs that causes acid-base imbalances and the body becomes acidic.

*Causes:*

COPD

Airway obstruction

Hypoventilation syndrome

Severe scoliosis

Severe asthma

Confusion

Fatigue

*Tests:*

CAT Scan

ABG

Pulmonary Function Test.

*Symptoms:*

Chronic cough

Wheezing

SOB

*Treatment:*

Mechanical ventilation

Bronchodilators

Respiratory Alkalosis: CO<sub>2</sub> levels are reduced and pH is high.

*Causes:*

Anxiety  
Fever  
Hyperventilation

*Tests:*

ABG  
Chest X-ray  
Pulmonary function tests

*Symptoms:*

Dizziness  
Numbness

*Treatment:*

Paper bag technique  
Increase carbon dioxide levels

RSV (Respiratory syncytial virus) - spread by contact, virus can survive for various time periods on different surfaces.

*Symptoms:*

Fever  
SOB  
Cyanosis  
Wheezing  
Nasal congestion  
Croupy cough

*Treatment:*

Ribvirin  
Ventilator in severe cases  
IV fluids  
Bronchodilators

*Tests:*

ABG  
Chest X-ray

*Monitor the patient for:*

Pneumonia  
Respiratory failure  
Otitis Media



## Hyperventilation

Causes:

COPD

Panic Attacks

Stress

Ketoacidosis

Aspirin overdose

Anxiety

Apnea: no spontaneous breathing.

Causes:

Obstructive sleep apnea

Seizures

Cardiac Arrhythmias

Brain injury

Nervous system dysfunction

Drug overdose

Prematurity

Bronchospasm

Encephalitis

Choking

Lung surgery

Causes:

Cancer

Lung abscesses

Atelectasis

Emphysema

Pneumothorax

Tumors

Bronchiectasis

Pneumonia: viruses the primary cause in young children, bacteria the primary cause in adults. Bacteria: *Streptococcus pneumoniae*, *Mycoplasma pneumoniae*, *pneumoniae* (pneumococcus).

*Types of pneumonia:*

Viral pneumonia  
Walking pneumonia  
Legionella pneumonia  
CMV pneumonia  
Aspiration pneumonia  
Atypical pneumonia  
Legionella pneumonia

Chest pain

*Tests:*

Chest X-ray  
Pulmonary perfusion scan  
CBC  
Cultures of sputum  
Presence of crackles

*Symptoms:*

Fever  
Headache  
Ribvirin  
SOB  
Cough

*Treatment:*

Antibiotics if caused by a  
bacterial infection  
Respiratory treatments  
Steroids  
IV fluids  
Vaccine treatments

Pulmonary actinomycosis –bacteria infection of the lungs caused by  
(propionibacteria or actinomyces)

*Causes:*

Microorganisms

Fever

*Symptoms:*

Pleural effusions  
Facial lesions  
Chest pain  
Cough  
Weight loss

*Tests:*

CBC  
Lung biopsy  
Thoracentesis  
CT scan  
Bronchoscopy

*Monitor patient for:*

Emphysema

Meningitis

Osteomyelitis

Alveolar proteinosis: A build-up of a phospholipid in the lungs where carbon dioxide and oxygen are transferred.

*Causes:*

May be associated with infection

Genetic disorder 30-50 yrs. Old

*Tests:*

Chest X-ray

Presence of crackles

CT scan

*Symptoms:*

Weight loss

Fatigue

Cough

Fever

SOB

Bronchoscopy

ABG- low O<sub>2</sub> levels

Pulmonary Function tests

*Treatment:*

Lung transplantation

Special lavage of the lungs

Pulmonary hypertension: elevated BP in the lung arteries

*Causes:*

May be genetically linked

More predominant in women

Fatigue

Chest Pain

SOB with activity

LE edema

*Symptoms:*

Fainting

Weakness

*Tests:*

Pulmonary arteriogram  
Chest X-ray  
ECG  
Pulmonary function tests  
CT scan  
Cardiac catheterization

*Treatment:*

Manage symptoms  
Diuretics  
Calcium channel blockers  
Heart/Lung Transplant if  
necessary

Pulmonary arteriovenous fistulas: a congenital defect where lung arteries and veins form improperly, and a fistula is formed creating poor oxygenation of blood.

*Symptoms:*

SOB with activity  
Presence of a murmur  
Cyanosis  
Clubbing  
Paradoxical embolism

CT Scan  
Pulmonary arteriogram  
Low O2 Saturation levels  
Elevated RBC's

*Treatment:*

Surgery  
Embolization

*Tests:*

Pulmonary aspergilloma: fungal infection of the lung cavities causing abscesses.

*Cause:*

Fungus *Aspergillus*

SOB  
Chest pain  
Fever  
Cough

*Symptoms:*

Wheezing

*Tests:*

CT scan

Sputum culture

Serum precipitans

Chest X-ray

Bronchoscopy

*Treatment:*

Surgery

Antifungal medications

Pulmonary edema: most commonly caused by Heart Failure, but may be due to lung disorders.

*Symptoms:*

Restless behavior

Anxiety

Wheezing

Poor speech

SOB

Sweating

Pale skin

Drowning sensation

*Tests:*

Murmurs may be present

Echocardiogram

Presence of crackles

Low O2 Saturation levels

*Treatment:*

Diuretics

Oxygen

Treat the underlying cause

Idiopathic pulmonary fibrosis: Thickening of lung tissue in the lower aspects of the lungs.

*Causes:*

Response to an inflammatory agent

Found in people ages 50-70.

Linked to smoking

*Symptoms:*

Cough

SOB

Chest pain

Cyanosis

Clubbing

Cyanosis

*Tests:*

Pulmonary function tests

Lung biopsy

Rule out other connective tissue diseases

CT scan

Chest X-ray

*Treatment:*

Lung transplantation

Corticosteroids

Anti-inflammatory drugs

*Monitor the patient for:*

Polycythemia

Pulmonary Htn.

Respiratory failure

Cor pulmonale

Pulmonary emboli: Blood clot of the pulmonary vessels or blockage due to fat droplets, tumors or parasites.

*Causes:*

DVT- most common

Chest pain

Decreased BP

Skin color changes

*Symptoms:*

SOB (rapid onset)

LE and pelvic pain

Sweating

Dizziness  
Anxiety  
Tachycardia  
Labored breathing  
Cough

*Tests:*

Doppler US  
Chest X-ray  
Pulmonary angiogram

*Monitor the patient for:*

Shock  
Pulmonary hypertension  
Hemorrhage  
Palpitations  
Heart failure

Pulmonary perfusion test  
Plethysmography  
ABG  
Check O2 saturation

*Treatment:*

Placement of an IVC filter  
Administer Oxygen  
Surgery  
Thrombolytic Therapy if clot detected

Tuberculosis- infection caused by *Mycobacterium tuberculosis*.

*Causes:*

Due to airborne exposure

Fatigue  
Wheezing  
Phlegm production

*Symptoms:*

Fever  
Chest pain  
SOB  
Weight Loss

*Tests:*

Thoracentesis  
Sputum cultures  
Presence of crackles

TB skin test	Generally about 6 months
Chest X-ray	Rifampin
Bronchoscopy	Pyrazinamide
	Isoniazid

*Treatment:*

Cytomegalovirus – can cause lung infections and is a herpes-type virus.

*Causes:*

More common in immunocompromised patients  
Often associated with organ transplantation

<i>Symptoms:</i>	Bronchoscopy
Fever	
SOB	<i>Treatment:</i>
Fatigue	Antiviral medications
Loss of appetite	Oxygen therapy
Cough	
Joint pain	<i>Monitor the patient for:</i>

<i>Tests:</i>	Kidney dysfunction
CMV serology tests	Infection
ABG	Decreased WBC levels
Blood cultures	Relapses

Viral pneumonia – inflammation of the lungs caused by viral infection.

<i>Causes:</i>	Herpes simplex virus
Rhinovirus	Influenza



Adenovirus

Hantavirus

CMV

RSV

*Symptoms:*

Fatigue

Sore Throats

Nausea

Joint pain

Headaches

Muscular pain

Cough

SOB

*Tests:*

Bronchoscopy

Open Lung biopsy

Sputum cultures

Viral blood tests

*Treatment:*

Antiviral medications

IV fluids

*Monitor the patient for:*

Liver failure

Heart failure

Respiratory failure

Pneumothorax: a build-up of a gas in the pleural cavities.

*Types:*

Traumatic pneumothorax

Tension pneumothorax

Spontaneous pneumothorax

Secondary spontaneous

pneumothorax

*Symptoms:*

SOB

Tachycardia

Hypotension

Anxiety

Cyanosis

Chest pain-sharp

Fatigue

*Tests:*

ABG

Chest X-ray

Poor breath sounds

*Treatment:*

Chest tube insertion

Administration of oxygen

# ***Circulatory System***

## ***Functions***

The circulatory system serves:

- (1) to conduct nutrients and oxygen to the tissues;
- (2) to remove waste materials by transporting nitrogenous compounds to the kidneys and carbon dioxide to the lungs;
- (3) to transport chemical messengers (hormones) to target organs and modulate and integrate the internal milieu of the body;
- (4) to transport agents which serve the body in allergic, immune, and infectious responses;
- (5) to initiate clotting and thereby prevent blood loss;
- (6) to maintain body temperature;
- (7) to produce, carry and contain blood;
- (8) to transfer body reserves, specifically mineral salts, to areas of need.

## ***General Components and Structure***

The circulatory system consists of the heart, blood vessels, blood and lymphatics. It is a network of tubular structures through which blood travels to and from all the parts of the body. In vertebrates this is a completely closed circuit system, as William Harvey (1628) once demonstrated. The heart is a modified, specialized, powerful pumping blood vessel. Arteries, eventually becoming arterioles, conduct blood

to capillaries (essentially endothelial tubes), and venules, eventually becoming veins, return blood from the capillary bed to the heart.

## **Course of Circulation**

### **Systemic Route:**

a. *Arterial system.* Blood is delivered by the pulmonary veins (two from each lung) to the left atrium, passes through the bicuspid (mitral) valve into the left ventricle and then is pumped into the ascending aorta; backflow here is prevented by the aortic semilunar valves. The aortic arch toward the right side gives rise to the brachiocephalic (innominate) artery which divides into the right subclavian and right common carotid arteries. Next, arising from the arch is the common carotid artery, then the left subclavian artery.

The subclavians supply the upper limbs. As the subclavian arteries leave the axilla (armpit) and enter the arm (brachium), they are called brachial arteries. Below the elbow these main trunk lines divide into ulnar and radial arteries, which supply the forearm and eventually form a set of arterial arches in the hand which give rise to common and proper digital arteries. The descending (dorsal) aorta continues along the posterior aspect of the thorax giving rise to the segmental intercostals arteries. After passage "through" (behind) the diaphragm it is called the abdominal aorta.

At the pelvic rim the abdominal aorta divides into the right and left common iliac arteries. These divide into the internal iliacs, which

supply the pelvic organs, and the external iliacs, which supply the lower limb.

b. *Venous system.* Veins are frequently multiple and variations are common. They return blood originating in the capillaries of peripheral and distal body parts to the heart.

**Hepatic Portal System:** Blood draining the alimentary tract (intestines), pancreas, spleen and gall bladder does not return directly to the systemic circulation, but is relayed by the hepatic portal system of veins to and through the liver. In the liver, absorbed foodstuffs and wastes are processed. After processing, the liver returns the blood via hepatic veins to the inferior vena cava and from there to the heart.

**Pulmonary Circuit:** Blood is oxygenated and depleted of metabolic products such as carbon dioxide in the lungs.

**Lymphatic Drainage:** A network of lymphatic capillaries permeates the body tissues. Lymph is a fluid similar in composition to blood plasma, and tissue fluids not reabsorbed into blood capillaries are transported via the lymphatic system eventually to join the venous system at the junction of the left internal jugular and subclavian veins.

## The Heart

The heart is a highly specialized blood vessel which pumps 72 times per minute and propels about 4,000 gallons (about 15,000 liters) of blood daily to the tissues. It is composed of:

Endocardium (lining coat; epithelium)

Myocardium (middle coat; cardiac muscle)

Epicardium (external coat or visceral layer of pericardium;  
epithelium and mostly connective tissue)

Impulse conducting system

**Cardiac Nerves:** Modification of the intrinsic rhythmicity of the heart muscle is produced by cardiac nerves of the sympathetic and parasympathetic nervous system. Stimulation of the sympathetic system increases the rate and force of the heartbeat and dilates the coronary arteries. Stimulation of the parasympathetic (vagus nerve) reduces the rate and force of the heartbeat and constricts the coronary circulation. Visceral afferent (sensory) fibers from the heart end almost wholly in the first four segments of the thoracic spinal cord.

**Cardiac Cycle:** Alternating contraction and relaxation is repeated about 75 times per minute; the duration of one cycle is about 0.8 second. Three phases succeed one another during the cycle:

- a) atrial systole: 0.1 second,
- b) ventricular systole: 0.3 second,
- c) diastole: 0.4 second

The actual period of rest for each chamber is 0.7 second for the atria and 0.5 second for the ventricles, so in spite of its activity, the heart is at rest longer than at work.

## ***Blood***

Blood is composed of cells (corpuscles) and a liquid intercellular ground substance called plasma. The average blood volume is 5 or 6

liters (7% of body weight). Plasma constitutes about 55% of blood volume, cellular elements about 45%.

**Plasma:** Over 90% of plasma is water; the balance is made up of plasma proteins and dissolved electrolytes, hormones, antibodies, nutrients, and waste products. Plasma is isotonic (0.85% sodium chloride). Plasma plays a vital role in respiration, circulation, coagulation, temperature regulation, buffer activities and overall fluid balance.

## Cardiovascular Conditions

Cardiogenic Shock: heart is unable to meet the demands of the body. This can be caused by conduction system failure or heart muscle dysfunction.

### *Symptoms of Shock:*

Rapid breathing	ABG
Rapid pulse	Chem-7
Anxiety	Chem-20
Nervousness	Electrolytes
Thready pulse	Cardiac Enzymes

Mottled skin color

Profuse sweating

Poor capillary refill

### *Treatment:*

Amrinone  
Norepinephrine  
Dobutamine

### *Tests:*

Nuclear Scans	IV fluids
Electrocardiogram	PTCA
Echocardiogram	Extreme cases-pacemaker, IABP
Electrocardiogram	

Aortic insufficiency: Heart valve disease that prevents the aortic valve from closing completely. Backflow of blood into the left ventricle.

### *Causes:*

	Endocarditis
Rheumatic fever	Marfan's syndrome
Congenital abnormalities	Ankylosing spondylitis



Reiter's syndrome

*Symptoms:*

Fainting

Weakness

Bounding pulse

Chest pain on occasion

SOB

Fatigue

*Tests:*

Palpation

Increased pulse pressure and  
diastolic pressure

Pulmonary edema present

Auscultation

Left heart catheterization

Aortic angiography

Doppler US

Echocardiogram

Treatment:

Digoxin

Diuretics

Surgical aorta valve repair

*Monitor patient for:*

PE

Left-sided heart failure

Endocarditis

Aortic aneurysm: Expansion of the blood vessel wall often identified in the thoracic region.

*Causes:*

Htn

Marfan's syndrome

Syphilis

Atherosclerosis (most common)

Trauma

*Symptoms:*

Possible back pain may be the  
only indicator

*Tests:*

Aortogram

Chest CT

X-ray

Treatment:

Varies depending on location

Stent

Circulatory arrest

Surgery

Bleeding

Stroke

Graft infection

Irregular Heartbeats

Heart Attack

*Monitor patient for:*

Hypovolemic shock: Poor blood volume prevents the heart from pumping enough blood to the body.

*Causes:*

Trauma

Diarrhea

Burns

GI Bleeding

Cardiogenic shock: Enough blood is available, however the heart is unable to move the blood in an effective manner.

*Symptoms:*

Anxiety

Weakness

Sweating

Rapid pulse

Confusion

Clammy skin

Echocardiogram

CT scan

Endoscopy with GI bleeding

Swan-Ganz catheterization

*Treatment:*

Increase fluids via IV

Avoid Hypothermia

Epinephrine

Norepinephrine

Dobutamine

*Tests:*

CBC

Dopamine

Myocarditis: inflammation of the heart muscle.

*Causes:*

Bacterial or Viral Infections  
Polio, adenovirus, coxsackie  
virus

*Symptoms:*

Leg edema  
SOB  
Viral symptoms  
Joint Pain  
Syncope  
Heart attack (Pain)  
Fever  
Unable to lie flat  
Irregular heart beats

*Tests:*

Chest X-ray  
Echocardiogram  
ECG  
WBC and RBC count  
Blood cultures

*Treatment:*

Diuretics  
Pacemaker  
Antibiotics  
Steroids

*Monitor the patient for:*

Pericarditis  
Cardiomyopathy

Heart valve infection: endocarditis (inflammation), probable valvular heart disease. Can be caused by fungi or bacteria.

*Symptoms:*

Weakness  
Fever  
Murmur  
SOB  
Night sweats

Janeway lesions  
Joint pain

*Tests:*

CBC  
ESR

ECG	Surgery may be indicated
Blood cultures	
Enlarged spleen	<i>Monitor the patient for:</i>
Presence of splinter hemorrhages	Jaundice
	Arrhythmias
	CHF
<i>Treatment:</i>	Glomerulonephritis
IV antibiotics	Emboli

Pericarditis: Inflammation of the pericardium.

Causes:

Viral- coxsackie, adenovirus, influenza, rubella viruses

Bacterial (various microorganisms)

Fungi

Often associated with TB, Kidney failure, AIDS, and autoimmune disorders.

Surgery

<i>Symptoms:</i>	Unable to lie down flat
Dry cough	
Pleuritis	<i>Tests:</i>
Fever	Auscultation
Anxiety	MRI scan
Crackles	CT scan
Pleural effusion	Echocardiogram (key test)
LE swelling	ESR
Chest pain	Chest x-ray

Blood cultures

CBC

*Treatment:*

NSAIDS

Pericardiocentesis

Analgesics

Pericardiectomy

*Monitor the patient for:*

Constrictive pericarditis

A fib.

Supraventricular tachycardia

(SVT)

Arrhythmias: Irregular heart beats and rhythms disorder

*Types:*

Bradycardia

Tachycardia

Ventricular fibrillation

Ectopic heart beat

Ventricular tachycardia

Wolff-Parkinson-white syndrome

Atrial fib.

Sick sinus syndrome

Sinus Tachycardia

Sinus Bradycardia

Irregular pulse

*Tests:*

Coronary angiography

ECG

Echocardiogram

Holter monitor

*Treatment:*

Defibrillation

Pacemaker

Medications

*Symptoms:*

SOB

Fainting

Palpitations

Dizziness

Chest pain

*Monitor the patient for:*

Heart failure

Stroke

Heart attack

Ischemia



Arteriosclerosis: hardening of the arteries.

*Causes:*

Smoking

Htn

Kidney disease

CAD

Stroke

*Symptoms:*

Claudication pain

Cold feet

Muscle acheness and pain in the legs

Hair loss on the legs

Numbness in the extremities

Weak distal pulse

*Tests:*

Doppler US

Angiography

IVSU

MRI test

Poor ABI (Ankle brachial index) reading

*Treatment:*

Analgesics

Vasodilation medications

Surgery if severe

Ballon surgery

Stent placement

*Monitor the patient for:*

Arterial emboli

Ulcers

Impotence

Gas gangrene

Infection of the lower extremities

Cardiomyopathy- poor hear pumping and weakness of the myocardium.

*Causes:*

Htn

Heart attacks

Viral infections



*Types:*

Alcoholic cardiomyopathy- due to alcohol consumption

Dilated cardiomyopathy-left ventricle enlargement

Hypertrophic cardiomyopathy-abnormal growth left ventricle

Ischemic cardiomyopathy- weakness of the myocardium due to heart attacks.

Peripartum cardiomyopathy- found in late pregnancy

Restrictive cardiomyopathy-limited filling of the heart due to inability to relax heart tissue.

*Symptoms:*

Chest pain

SOB

Fatigue

Ascites

LE swelling

Fainting

Poor Appetite

Htn

Palpitations

Isoenzyme tests

Coronary Angiography

Chest X-ray

MRI

Auscultation

*Treatment:*

Ace inhibitors

Diuretics

Blood thinners

LVAD – Left Ventricular Assist

Device

Digoxin

Vasodilators

*Tests:*

ECG

CBC

Congestive Heart Failure:

Class I describes a patient who is not limited with normal physical activity by symptoms.

Class II occurs when ordinary physical activity results in fatigue, dyspnea, or other symptoms.

Class III is characterized by a marked limitation in normal physical activity.

Class IV is defined by symptoms at rest or with any physical activity.

*Causes:*

CAD

Valvular heart disease

Cardiomyopathies

Endocarditis

Extracardiac infection

Pulmonary embolus

*Symptoms:*

Skin cold or cyanotic

Wheezing

Mitral valvular deficits

Lower extremity edema

Pulsus alternans

Hypertension

Tachypnea

## Heart Sounds:

- S1- tricuspid and mitral valve close
- S2- pulmonary and aortic valve close
- S3- ventricular filling complete
- S4-elevated atrial pressure (atrial kick)

## Wave Review

- ST segment: ventricles depolarized
- P wave: atrial depolarization
- PR segment: AV node conduction
- QRS complex: ventricular depolarization
- U wave: hypokalemia creates a U wave
- T wave: ventricular repolarization

## Wave Review Indepth:

1. P WAVE - small upward wave; indicates atrial depolarization
2. QRS COMPLEX - initial downward deflection followed by large upright wave followed by small downward wave; represents ventricular depolarization; masks atrial repolarization; enlarged R portion - enlarged ventricles; enlarged Q portion - probable heart attack.
3. T WAVE - dome shaped wave; indicates ventricular repolarization; flat when insufficient oxygen; elevated with increased K levels
4. P - R INTERVAL - interval from beginning of P wave to R wave; represents conduction time from initial atrial excitation to initial ventricular excitation; good diagnostic tool; normally < 0.2sec.

5. S-T SEGMENT - time from end of S to beginning to T wave; represents time between end of spreading impulse through ventricles and ventricular repolarization; elevated with heart attack; depressed when insufficient oxygen.
6. Q-T INTERVAL - time for singular depolarization and repolarization of the ventricles. Conduction problems, myocardial damage or congenital heart defects can prolong this.

## **Arrhythmias Review**

### Supraventricular Tachyarrhythmias

Atrial fibrillation – Abnormal QRS rhythm and poor P wave appearance.  
(>300bpm.)

Sinus Tachycardia- Elevated ventricular rhythm/rate.

Paroxysmal atrial tachycardia- Abnormal P wave, Normal QRS complex

Atrial flutter- Irregular P Wave development. (250-350 bpm.)

Paroxysmal supraventricular tachycardia- Elevated bpm (160-250)

Multifocal atrial tachycardia- bpm (>105). Various P wave appearances.

### Ventricular Tachyarrhythmias

Ventricular Tachycardia- Presence of 3 or greater PVC's (150-200bpm), possible abrupt onset. Possibly due to an ischemic ventricle. No P waves present.

(PVC)- Premature Ventricular Contraction- In many cases no P wave followed by a large QRS complex that is premature, followed by a compensatory pause.

Ventricular fibrillation- Completely abnormal ventricular rate and rhythm requiring emergency intervention. No effective cardiac output.

### Bradyarrhythmias

AV block (primary, secondary (I,II) Tertiary

Primary-  $>.02$  PR interval

Secondary (Mobitz I) – PR interval Increase

Secondary (Mobitz II) – PR interval (no change)

Tertiary- most severe, No signal between ventricles and atria noted on ECG. Probable use of Atrophine indicated. Pacemaker required.

Right Bundle Branch Block (RBBB)/Left Bundle Branch Block (LBBB)

Sinus Bradycardia-  $<60$  bpm, with presence of a standard P wave.

## ***Cardiac Failure Review***

### Right Sided Heart Failure

- A. Right Upper Quadrant Pain
- B. Right Ventricular heave
- C. Tricuspid Murmur
- D. Weight gain
- E. Nausea
- F. Elevated Right Atrial pressure
- G. Elevated Central Venous pressure
- H. Peripheral edema
- I. Ascites
- J. Anorexia
- K. Hepatomegaly

### Left Sided Heart Failure

- A. Left Ventricular Heave
- B. Confusion
- C. Paroxysmal nocturnal dyspnea
- D. DOE
- E. Fatigue
- F. S<sub>3</sub> gallop
- G. Crackles
- H. Tachycardia
- I. Cough
- J. Mitral Murmur
- K. Diaphoresis
- L. Orthopnea

### ECG Changes with MI

T Wave inversion  
ST Segment Elevation  
Abnormal Q waves

### ECG Changes with Digitalis

Inverts T wave  
QT segment shorter

Depresses ST segment

#### ECG Changes with Quinidine

Inverts T wave

QT segment longer

QRS segment longer

#### ECG Changes with Potassium

Hyperkalemia- Lowers P wave, Increases width of QRS complex

Hypokalemia- Lowers T wave, causes a U wave

#### ECG Changes with Calcium

Hypercalcemia-Makes a longer QRS segment

Hypocalcemia- Increases time of QT interval



## ***Endocrine Review***

Hypothyroidism: Poor production of thyroid hormone:

Primary- Thyroid cannot meet the demands of the pituitary gland.

Secondary- No stimulation of the thyroid by the pituitary gland.

### *Causes:*

Surgical thyroid removal

Irradiation

Congenital defects

Hashimoto's thyroiditis (key)

Decreased BP and HR

Chest X-ray

Elevated liver enzymes,

prolactin, and cholesterol

Decreased T4 levels and serum  
sodium levels

### *Symptoms:*

Constipation

Weight gain

Weakness

Fatigue

Poor taste

Hoarse vocal sounds

Joint pain

Muscle weakness

Poor speech

Color changes

Depression

Presence of anemia

Low temperature

Poor reflexes

### *Treatment:*

Increase thyroid hormone levels

Levothyroxine

### *Monitor the patient for:*

Hyperthyroidism symptoms  
following treatment

Heart disease

Miscarriage

Myxedema coma if untreated

### *Tests:*

Hyperthyroidism: excessive production of thyroid hormone.

*Causes:*

Iodine overdose  
Thyroid hormone overdose  
Graves' disease (key)  
Tumors affecting the reproductive system

Hair loss  
Elevated BP  
Fatigue  
Sweating

*Tests:*

Elevated Systolic pressure noted  
T3/T4 (free) levels increased  
TSH levels reduced

*Symptoms:*

Skin color changes  
Weight loss  
Anxiety  
Possible goiter  
Nausea  
Exophthalmos  
Diarrhea

*Treatment:*

Radioactive iodine  
Surgery  
Beta-blockers  
Antithyroid drugs

Congenital adrenal hyperplasia: Excessive production of androgen and low levels of aldosterone and cortisol. (Genetically inherited disorder). Different forms of this disorder that affect males and females differently.

Causes: Adrenal gland enzyme deficit causes cortisol and aldosterone to not be produced. Causing male sex characteristics to be expressed prematurely in boys and found in girls.

*Symptoms:*

Boys:

Small testes development  
Enlarged penis development  
Strong musculature appearance

*Girls:*

Abnormal hair growth  
Low toned voice  
Abnormal genitalia  
Lack of menstruation

Salt levels

Low levels of cortisol  
Low levels of aldosterone  
Increased 17-OH progesterone  
Increased 17-ketosteroids in urine

*Treatment:*

Reconstructive surgery  
Hydrocortisone  
Dexamethasone

*Tests:*

Primary/Secondary Hyperaldosteronism

Primary Hyperaldosteronism: problem within the adrenal gland causing excessive production of aldosterone.

Secondary Hyperaldosteronism: problem found elsewhere causing excessive production of aldosterone.

*Causes:*

Primary:

Tumor affecting the adrenal gland  
Possibly due to HBP

Secondary:

Nephrotic syndrome  
Heart failure  
Cirrhosis  
Htn

*Symptoms:*

Paralysis  
Fatigue  
Numbness sensations  
Htn  
Weakness

*Tests:*

Increased urinary aldosterone

Abnormal ECG readings  
Decreased potassium levels  
Decreased renin levels

*Treatment:*  
Primary: Surgery  
Secondary: Diet/Drugs

Cushing's syndrome: Abnormal production of ACTH which in turn causes elevated cortisol levels.

*Causes:*

Corticosteroids prolonged use  
Tumors

*Tests:*  
Dexamethasone suppression test

*Symptoms:*

Muscle weakness  
Central obesity distribution  
Back pain  
Thirst  
Skin color changes  
Bone and joint pain  
Htn  
Headaches  
Frequent urination  
Moon face  
Weight gain  
Acne

Cortisol level check  
MRI- check for tumors

*Treatment:*  
Surgery to remove tumor  
Monitor corticosteroid levels

*Monitor the patient for:*

Kidney stones  
Htn  
Bone fractures  
DM  
Infections

Diabetic ketoacidosis: increased levels of ketones due to a lack of glucose.

Causes: Insufficient insulin causing ketone production which end up in the urine. More common in type 1 vs. type 2 DM.

*Symptoms:*

Low BP  
Abdominal pain  
Headaches  
Rapid breathing  
Loss of appetite  
Nausea  
Fruit breath smell  
Mental deficits

Increased amylase and  
potassium levels  
Ketones in urine  
Check BP

*Treatment:*

Insulin  
IV fluids

*Monitor the patient for:*

*Tests:*

Elevated glucose levels

Renal failure  
MI  
Coma

T3/T4 Review

Both are stimulated by TSH release from the Pituitary gland

T4 control basal metabolic rate

T4 becomes T3 within cells. (T3) Active form.

T3 radioimmunoassay- Check T3 levels

Hyperthyroidism- T3 increased, T4 normal- (in many cases)

*Medications that increase levels of T4:*

Methadone  
Oral contraceptives  
Estrogen

Clofibrate

*Medications that decrease levels of T4:*

Lithium

Propranolol

Interferon alpha

Anabolic steroids

Methimazole

Lymphocytic thyroiditis: Hyperthyroidism leading to hypothyroidism and then normal levels.

Causes: Lymphocytes permeate the thyroid gland causing hyperthyroidism initially.

*Symptoms:*

Fatigue

Menstrual changes

Weight loss

Poor temperature tolerance

Muscle weakness

Hyperthyroidism symptoms

Lymphocyte concentration noted with biopsy

*Treatment:*

Varies depending on symptoms.

(Beta blockers may be used.)

*Tests:*

T3/T4 increased

Increased HR

*Monitor the patient for:*

Autoimmune thyroiditis

Hashimoto's thyroiditis

Goiter

Struma lymphomatosa

Graves' disease: most commonly linked to hyperthyroidism, and is an autoimmune disease. Exophthalmos may be noted (protruding eyeballs). Excessive production of thyroid hormones.

*Symptoms:*

Elevated appetite

Anxiety

Menstrual changes

Fatigue

Poor temperature tolerance

Diplopia

Exophthalmos

*Treatment:*

Beta-blockers

Surgery

Prednisone

Radioactive iodine

*Monitor the patient for:*

Fatigue

CHF

Depression

Hypothyroidism (over-correction)

*Tests:*

Elevated HR

Increased T3/T4 levels

Serum TSH levels are decreased

Goiter

Type I diabetes (Juvenile onset diabetes)

Causes: Poor insulin production from the beta cells of the pancreas. Excessive levels of glucose in the blood stream that cannot be used due to the lack of insulin. Moreover, the patient continues to experience hunger, due to the cells not getting the fuel that they need. After 7-10 years the beta cells are completely destroyed in many cases.

*Symptoms:*

Weight loss

Vomiting

Nausea

Abdominal pain

Frequent urination

Elevated thirst

*Tests:*

Fasting glucose test

Insulin test

Urine analysis

*Treatment:*

Insulin

Relieve the diabetic ketoacidosis symptoms

Foot ulcer prevention

*Monitor for infection:*

Monitor for hypoglycemia conditions if type I is over-corrected.

Glucagon may need to be administered if hypoglycemia conditions are severe.

Monitor the patient for ketone build-up if type I untreated.

Get the eyes checked- once a year



## Type II diabetes

The body does not respond appropriately to the insulin that is present. Insulin resistance is present in Type II diabetes. Results in hyperglycemia.

### *Risk factors for Type II*

#### *Diabetes:*

Obesity

Limited exercise individuals

Race-Minorities have a higher distribution

Elevated Cholesterol levels

Htn

#### *Symptoms:*

Blurred vision

Fatigue

Elevated appetite

Frequent urination

Thirst

Note: A person may have Type II and be symptom free.

#### *Tests:*

Random blood glucose test.

Oral glucose tolerance test

Fasting glucose test.

#### *Treatment:*

Tlazamide

Glimepiride

Control diet

Increase exercise levels

Repaglidine/Nateglinide

Glycosylated hemoglobin

BUN/ECG

Frequent blood sugar testing

Acarbose

Diabetic Ulcer prevention

Monitor the patient for:

Neuropathy

CAD

Increased cholesterol

Retinopathy

PVD

Htn



Diabetes Risk Factors:

Bad diet

Htn

Weight distribution around the waist/overweight.

Certain minority groups

History of diabetes in your family

Poor exercise program

Elevated triglyceride levels

# ***Microbiology Review***

## **Characteristics of Bacteria Types**

Rickettsias- gram-negative bacteria, small

*Rickettsia rickettsii*

Spirochetes- spiral shape, no flagella, slender

*Lyme disease, Treponema pallidum-syphilis*

Gram positive cocci- Hold color with Gram stain, ovoid or spherical shape

*Staphylococcus aureus, Streptococcus pneumoniae*

Gram negative cocci- Loose color with Gram stain, spherical or oval shape

*Neisseria meningitidis* (meningococcus), *Neisseria gonorrhoeae* (gonococcus)

Mycoplasmas- *Mycoplasma pneumoniae*

Acid-fast bacilli- Hold color with staining even when stained with acid in most

cases. *Mycobacterium leprae, Mycobacterium tuberculosis*

Actinomycetes- Stained positive with a gram stain, narrow filaments

*Nocardia, Actinomyces israelii*

Gram positive- Rod shaped, hold color with gram stain

*Clostridium tetani, Bacillus anthracis*

Gram negative- Do not hold color with gram stain, also rod shaped.

*Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae*

### Diseases and Acid Fast Bacilli Review

Disease	Bacteria	Primary Medication
Tuberculosis, renal and meningeal infections	<i>Mycobacterium tuberculosis</i>	Isoniazid + rifampin + pyrazinamide
Leprosy	<i>Mycobacterium leprae</i>	Dapsone + rifampin

### Diseases and Spirochetes Review

Disease	Bacteria	Primary Medication
Lyme Disease	<i>Borrelia burgdorferi</i>	Tetracycline
Meningitis	<i>Leptospira</i>	Penicillin G
Syphilis	<i>Treponema pallidum</i>	Penicillin G

### Diseases and Actinomycetes Review

Disease	Bacteria	Primary Medication
Cervicofacial, and other lesions	<i>Actinomyces israelii</i>	Penicillin G

## Diseases and Gram-Negative Bacilli Review

Disease	Bacteria	Primary Medication
Meningitis	<i>Flavobacterium meningosepticum</i>	Vancomycin
UTI's Bacteremia	<i>Escherichia coli</i>	Ampicillin +/- aminoglycoside
Gingivitis, Genital infections, ulcerative pharyngitis	<i>Fusobacterium nucleatum</i>	Penicillin G
Abscesses	<i>Bacteroides species</i>	Clindamycin/Penicillin G
Hospital acquired infections	<i>Acinetobacter</i>	Aminoglycoside
Abscesses, Endocarditis	<i>Bacteroides fragilis</i>	Clindamycin, metronidazole
Legionnaires' Disease	<i>Legionella pneumophila</i>	Erythromycin
UTI's	<i>Proteus mirabilis</i>	Ampicillin/Amoxicillin
Pneumonia, UTI's, Bacteremia	<i>Pseudomonas aeruginosa</i>	Penicillin-Broad
Bacteremia, Endocarditis	<i>Streptobacillus moniliformis</i>	Penicillin G
Pneumonia, UTI	<i>Klebsiella pneumoniae</i>	Cephalosporin
Bacteremia, Wound infections	<i>Pasteurella multocida</i>	Penicillin G

## Diseases and Gram-Positive Bacilli Review

Disease	Bacteria	Primary Medication
Gas Gangrene	<i>Clostridium</i>	Penicillin G
Tetanus	<i>Clostridium tetani</i>	Penicillin G
Pharyngitis	<i>Corynebacterium diphtheriae</i>	Penicillin G
Meningitis, Bacteremia	<i>Listeria monocytogenes</i>	Ampicillin
Anthrax / pneumonia	<i>Bacillus anthracis</i>	Penicillin G
Endocarditis	<i>Corynebacterium species</i>	Penicillin G/Vancomycin

## Diseases and Cocci Review

Disease	Bacteria	Primary Medication
Genital infections, arthritis-dermatitis syndrome	<i>Neisseria gonorrhoeae</i>	Ampicillin, Amoxicillin
Meningitis, Bacteremia	<i>Neisseria meningitidis</i>	Penicillin G
Endocarditis, Bacteremia	<i>Streptococcus (viridans group)</i>	Gentamicin
Bacteremia, brain and other abscesses	<i>Streptococcus (anaerobic species)</i>	Penicillin G
Endocarditis, Bacteremia	<i>Streptococcus agalactiae</i>	Ampicillin
Pneumonia, Osteomyelitis,	<i>Staphylococcus aureus</i>	Penicillin G/Vancomycin

abscesses		
UTI's, Endocarditis	<i>Streptococcus faecalis</i>	Ampicillin, Penicillin G
Pneumonia, sinusitis, otitis, Arthritis	<i>Streptococcus pneumoniae</i>	Penicillin G or V
Cellulitis, Scarlet fever, bacteremia	<i>Streptococcus pyogenes</i>	Penicillin G or V
Bacteremia, endocarditis	<i>Streptococcus bovis</i>	Penicillin G

### DNA Virus Review

<i>DNA Virus</i>	<i>Infection</i>
Adenovirus	Eye and Respiratory infections
Hepatitis B	Hepatitis B
Cytomegalovirus	Cytomegalic inclusion disease
Epstein-Barr	Infectious mononucleosis
Herpes Types 1 and 2	Local infections oral and genital
Varicella-zoster	Chickenpox, herpes zoster
Smallpox	Smallpox

### RNA Virus Review

<i>RNA Virus</i>	<i>Infection</i>
Human respiratory virus	Respiratory tract infection
Hepatitis A virus	Hepatitis A
Influenza virus A-C	Influenza
Measles virus	Measles
Mumps virus	Mumps



Respiratory syncytial virus	Respiratory tract infection in children
Poliovirus	Poliomyelitis
Rhinovirus types 1-89	Cold
Human immunodeficiency virus	AIDS
Rabies virus	Rabies
Alphavirus	Encephalitis
Rubella virus	Rubella

## **Immunoglobulin isotypes**

IgA– can be located in secretions and prevents viral and bacterial attachment to membranes.

IgD- can be located on B cells

IgE-main mediator of mast cells with allergen exposure.

IgG- primarily found in secondary responses. Does cross placenta and destroys viruses/bacteria.

IgM- primarily found in first response. Located on B cells

## **Cytokines Review**

IL-1 Primarily stimulate of fever response. Helps activate B and T cells. Produced by macrophages.

IL-2 Aids in the development of Cytotoxic T cells and helper cells. Produced by helper T cells.

IL-3 Aids in the development of bone marrow stem cells. Produced by T-cells.

IL-4 Aids in the growth of B cells. Produced by helper T-cells. Aids in the production of IgG and IgE

IL-5 Promotes the growth of eosinophils. Produced by helper T-cells. Also promotes IgA production.

IL-8 Neutrophil factor

TNF- $\alpha$  Promotes the activation of neutrophils and is produced by macrophages.

TNF- $\beta$  Produced by T lymphocytes and encourages the activation of neutrophils

$\gamma$ -interferon (Activates macrophages and is produced by helper T cells.)



## Controlled Substance Categories

Schedule I	Highest potential abuse, used mostly for research. (heroin, peyote, marijuana)
Schedule II	High potential abuse, but used for therapeutic purposes (opioids, amphetamines and barbiturates)
Schedule III	Mild to moderate physical dependence or strong psychological dependence on both. (opioids such as codeine, hydrocodone that are combined with other non-opoid drugs)
Schedule IV	Limited potential for abuse and physical and/or psychological dependence (benzodiazepines, and some low potency opioids)
Schedule V	Lowest abuse potential of controlled substances. Used in cough medications and anti-diarrheal preps.

Dose Response- the relationship between dose and the body's response is called a dose-response curve (DRC).

Potency- relates to the dosage required to produce a certain response. A more potent drug requires a lower dosage than does a less potent drug to produce a given effect.

Efficacy- usually refers to maximum efficacy. Maximum efficacy is plateau (or maximum response), but may not be achievable clinically due to undesirable side effects. In general, the steepness of the curve dictates the range of doses that are useful therapeutically.

$LD_{50}/ED_{50}$  -- Quantal dose response curve is the relationship between the dose of the drug and the occurrence of a certain response.

Therapeutic index (TI)- the ratio of the median effective dose ( $ED_{50}$ ) and the toxic dose ( $TD_{50}$ ) is a predictor of the safety of a drug. This ratio is called the therapeutic index. Note: Acetaminophen has TI of 27. Meperidine (DEMEROL) has a TI of 8.

## ***Pharmacology***

Drug Suffix	Example	Action
-azepam	Diazepam	Benzodiazepine
-azine	Chlorpromazine	Phenothiazine
-azole	Ketoconazole	Anti-fungal
-barbital	Secobarbital	Barbiturate
-cillin	Methicillin	Penicillin
-cycline	Tetracycline	Antibiotic
-ipramine	Amitriptyline	Tricyclic Anti-depressant
-navir	Saquinavir	Protease Inhibitor
-olol	Timolol	Beta Antagonist
-oxin	Digoxin	Cardiac glycoside
-phylline	Theophylline	Methylxanthine
-pril	Enalapril	ACE Inhibitor
-terol	Albuterol	Beta 2 Agonist
-tidine	Ranitidine	H <sub>2</sub> Antagonist
-trophin	Somatotrophin	Pituitary Hormone
-zosin	Doxazosin	Alpha 1 Antagonist

## Cardiovascular Pharmacology

Antiarrhythmics-  $\text{Na}^+$  channel blockers (Class I)

Class IA

Procainamide

Disopyramide

Amiodarone

Quinidine

Class IB

Mexiletine

Lidocaine

Tocainide

Class IC

Flecainide

Encainide

Propafenone

Antiarrhythmics (Beta blockers) (Class II)

Metoprolol

Atenolol

Propranolol

Timolol

Esmolol

Antiarrhythmics ( $\text{K}^+$  Channel blockers) (Class III)

Sotalol

Amiodarone

Bretylum

Ibutilide

Antiarrhythmics ( $\text{Ca}^{2+}$  channel blockers) (Class IV)

Diltiazem

Verapamil

Vasodilators:

Verapamil

Minoxidil

Hydralazine

Calcium Channel Blockers:

Verapamil

Diltiazem

Nifedipine

Sympathoplegics:

Beta blockers

Clonidine

Reserpine

Guanethidine

Prazosin

ACE Inhibitors:

Lisinopril

Enalapril

Captopril

Cardiac glycosides:

Digoxin

Diuretics:

Loop Diuretics

Hydrochlorothiazide

K<sup>+</sup> Sparing Diuretics

Spirolactone

Triamterene

Amiloride



## **CNS Pharmacology**

### Sympathomimetics:

Dopamine  
Dobutamine  
Epinephrine  
Norepinephrine  
Isoproterenol

### Cholinomimetics:

Carbachol  
Neostigmine  
Pyridostigmine  
Echothiophate  
Bethanechol

### Cholinoreceptor blockers:

Hexamethonium-Nicotinic  
blocker  
Atropine-Muscarinic blocker

### Beta blockers:

Atenolol  
Nadolol  
Propranolol  
Metoprolol  
Pindolol  
Labetalol

### Tricyclic Antidepressants:

Doxepine  
Imipramine  
Amitriptyline  
Nortriptyline  
Amitriptyline

### Parkinson's Treatment:

L-dopa  
Amantadine  
Bromocriptine

### Benzodiazepines:

Lorazepam  
Triazolam  
Oxazepam  
Diazepam

### Opioid Analgesics:

Heroin  
Methadone  
Morphine  
Codeine  
Dextromethorphan  
Meperidine

### MAO Inhibitors:

Tranylcypromine

Phenelzine

Seroton specific Re-uptake

inhibitors:

Paroxetine

Sertraline

Fluoxetine

Citalopram

Epilepsy Treatment:

Valproic acid

Phenobarbital

Benzodiazepines

Gabapentin

Ethosuximide

Carbamazepine

Barbiturates:

Pentobarbital

Thiopental

Phenobarbital

Secobarbital

IV Anesthetics:

Midazolam

Ketamine

Morphine

Fentanyl

Propofol

Thiopental

Local Anesthetics:

Tetracaine

Procaine

Lidocaine

Neuroleptics (Antipsychotic  
drugs)

Chlorpromazine

Thioridazine

Clozapine

Fluphenazine

Haloperidol

Alpha 1 Selective blockers:

Terazosin

Prazosin

Doxazosin

Alpha 2 Selective blockers:

Yohimbine

Glaucoma Treatment:

Prostaglandins

Diuretics

Alpha agonists

Beta Blockers

## Cholinomimetics

## Cancer Treatment Drugs:

Etoposide

Nitrosoureas

Cisplatin

Doxorubicin

Incristine

Paclitaxel

Methotrexate

6 – mercaptopurine

Busulfan

5 – fluorouracil

Lomustine

Carmustine

## Throbolytics:

Urokinase

Anistreplase

Streptokinase

Alteplase

## Cox 2 Inhibitors:

Rofecoxib

Celecoxib

## NSAID's:

Naproxen

Indomethacin

Ibuprofen

## Diabetic Treatment:

Sulfonylureas:

Chlorpropamide

Tolbutamide

Glyburide

Insulin- Key

Metformin

Glitazones:

Rosiglitazone

Troglitazone

Pioglitazone

Asthma Treatment:

Corticosteroids:

Prednisone

Beclomethasone

Antileukotrienes:

Zafirlukast

Zileuton

Beta 2 agonists:

Salmeterol

Albuterol

Nonselective Beta agonists:

Isoproterenol

Muscarinic agonists:

Ipratropium

H<sub>2</sub> blockers:

Famotidine

Nizatidine

Cimetidine

Ranitidine

## Anti-Microbial Drugs

### Tetracyclines:

Tetracycline

Doxycycline

Minocycline

Demeclocycline

Isoniazid

Rifampin

Ethambutol

Pyrazinamide

Ethambutol

### Macrolides:

Clarithromycin

Erythromycin

Azithromycin

### Aminoglycosides:

Amikacin

Gentamicin

Neomycin

Tobramycin

Streptomycin

### Fluoroquinolones:

Ciprofloxacin

Sparfloxacin

Enoxacin

Nalidixic acid

Norfloxacin

Moxifloxacin

### Sulfonamides:

Sulfadiazine

Sulfisoxazole

Sulfamethoxazole

### Malaria Treatment:

Chloroquine

Quinine

Mefloquine

### Protein Synthesis Inhibitors:

Chloramphenicol

Aminoglycosides

Tetracyclines

### TB Medications:

### Additional Mentionable Anti-viral Drugs:

Acyclovir

Amatadine

Ribavirin

Zanamivir

Ganciclovir

HIV Treatment:

Zidovudine (AZT)

Nevirapine

Didanosine

Protease Inhibitors-(HIV)

Saquinavir

Retinonavir

Nelfinavir

## ***Measurement Equivalents***

### **Weights Conversion Table**

.1 mg	1/600 grain
.2 mg	1/300 grain
.5 mg	1/120 grain
1 mg	1/60 grain
10 mg	1/6 grain
30 mg	½ grain
60 mg	1 grain
300 mg	5 grains
1 gm	15 grains
4 gm	60 grains
15 gm	4 drams
30 gm	1 ounce

### **Volume Conversion Table**

<i>Household</i>	<i>Metric</i>	<i>Apothecary</i>
1 quart	1000 ml	1 quart
1 pint	500 ml	1 pint
2 tablespoons	30 ml	1 ounce
1 tablespoons	15 ml	4 fluid drams
1 teaspoon	5 ml	1 fluid dram
15 drops	1ml	15 minims

### **Common Conversions**

1 meter	1000 (mm)
1 meter	100 (cm)
.001 milligram	1 (mcg)
1 gram	1000(mg)
1000 grams	1 (kg)
1 tablespoon (T)	15 (ml)
1 teaspoon (tsp)	5 (ml)
20 drops	1 (ml)
2.2 (lb)	1 (kg)
1 (lb)	453.6 (gm)
1 (oz)	30 (gm)
1 (ml)	1 (cc)
1 (dl)	100 (ml)

### Solid Conversions

<i>Apothecary</i>	<i>Avoirdupois</i>
2.7 (lb)	2.2 (lb)
1.33 (lb)	1 (lb)
480 (gr)	1 (ounce)
15 (gr)	15.4 (gr)
1 (gr)	1 (gr)

### Liquid Conversions

<i>Household</i>	<i>Metric</i>	<i>Apothecary</i>
1 drop	.06 (ml)	1 minim
¼ teaspoon	1 (ml)	15 or 16 minims



1 teaspoon	4 or 5 (ml)	1 fluid dram
1 tablespoon	15 (ml)	4 fluid dram
2 tablespoons	30 (ml)	1 fluid ounce
1 cup	250 (ml)	8 fluid ounces
1 pint	500 (ml)	16 fluid ounces
1 quart	1000 (ml)	32 fluid ounces

### **Metric - (Apothecaries')**

1/100 grain	.6 (mg)
1/60 grain	1 (mg)
1/30 grain	2 (mg)
1/20 grain	3 (mg)
1/15 grain	4 (mg)
1/10 grain	6 (mg)
1/6 grain	10 (mg)
1/5 grain	12 (mg)
1/3 grain	20 (mg)
3/8 grain	25 (mg)
½ grain	30 (mg)
1 grain	60 (mg)
1 ½ grains	100 (mg)
5 grains	300 (mg)
10 grains	600 (mg)

## ***Drug Distribution***

Bioavailability dependant on several things:

1. Route of administration
2. The drug's ability to cross membranes
3. The drug's binding to plasma proteins and intracellular components

Membrane Review:

1. Membranes separate the body in components
2. The ability of membranes to act as barriers is related to its structure
3. Lipid Soluable compounds (many drugs) pass through by becoming dissolved in the lipid bylayer.
4. Glucose, H<sub>2</sub>O, electrolytes can't pass on their own. They use pores.
5. In excitable tissues, the pores open and close.
6. Movement occurs by:
  - a. passive diffusion
  - b. active transport
  - c. facilitated diffusion
  - d. endocytosis

Passive Diffusion Review:

1. No energy expended.
2. Weak acids and bases need to be in non-ionized form (no net charge).

3. Drugs can also move between cell junctions. BBB is exception.
4. Must be lipid soluble to pass through pores.
5. Osmosis is a special case of diffusion
  - a. A drug dissolved in H<sub>2</sub>O will move with the water by "bulk flow"
  - b. Usually limited to movement through gap junctions because size too large for pores.

#### Active Transport Review:

1. Requires energy and requires a transport protein
2. Drugs must be similar to some endogenous substance.
3. Can carry substances against a gradient
4. Some drugs may exert their effect by increasing or decreasing transport proteins.

#### Facilitated Diffusion Review:

1. Requires transport protein
2. Does not require energy
3. Very few drugs move this way

#### Endocytosis:

1. Drug gets engulfed by cell via invagination
2. Very few drugs move this way and only in certain cells.

#### Regulation of distribution determined by:

1. Lipid permeability
2. Blood flow

3. Binding to plasma proteins
4. Binding to subcellular components

Volume of Distribution ( $V_d$ ) - is a calculation of where the drug is distributed.

$$V_d = \frac{\text{amount of drug given (mg)}}{\text{concentration in plasma (mg/ml)}}$$

Calculate the  $V_d$  and compare to the total amount of body H<sub>2</sub>O in a person.

- if  $V_d$  = total amount of body (approx. 42) is uniformly distributed
- if  $V_d$  is less than 42 – retained in plasma and probably bound to plasma proteins
- if  $V_d$  is more than 42 – concentrated in tissues

This is not a “real value” but tells you where the drug is being distributed.

#### Placental Transfer of Drugs

1. Some drugs cause congenital anomalies
2. Cross placenta by simple diffusion
3. Must be polar or lipid-insoluble Not to Enter
4. Must assume the fetus is subjected to all drugs taken by the mother to some extent.

## ***Biotransformation of Drugs***

Biotransformation refers to chemically altering the original drug structure. "Metabolite" refers to the altered version.

Biotransformation metabolites are generally more polar than the original drug. The kidney will excrete polar compounds, but reabsorb non-polar compounds.

Enzymatic reactions are either Phase I or Phase II reactions:

Phase I include:

1. hydrolysis rxns – split the original compound into separate parts
2. reduction rxns – either remove O<sub>2</sub> or add H
3. oxidation rxns- adds an O<sub>2</sub> molecule and removes a H molecule. These are the most predominant reactions for biotransforming drugs

Phase I reactions are generally more polar and usually inactive-some exceptions.

Phase II reactions are called conjugation rxns.

1. Lead to the formation of a covalent bond between the drug and another compound such as glucaronic acid, amino acids or acetate.
2. Products are highly polar and generally inactive- morphine is exception.
3. Products are rapidly excreted in urine and feces because poorly reabsorbed by kidney and intestine.
4. There is also a phenomenon known as enterohepatic recirculation – can result in re-entry of the parent drug back

into the circulation and leads to delayed elimination and prolonged effect of the drug.

Most metabolism takes place in the liver- 1<sup>st</sup> pass significant. Kidney, skin, GI, and lungs have significant metabolic capacity. Phase I reactions take place mostly in endoplasmic reticulum (ER). Phase II reactions take place mostly in cytosol.

Cytochrome P450 mono-oxygenase enzymes are the major catalyst in Phase I. The Cyt 450 system is a series of enzymes that are heme containing proteins. They catalyze oxidation/reduction reactions- which make compounds more + or -. These metabolites are subjected to conjugation reactions and then excreted.

Biotransformation Factors:

1. Induction- certain drugs induce synthesis of additional Cyt 450 enzymes
2. Inhibition- certain drugs inhibit Cyt 450 enzymes
3. Genetic Polymorphism-slow vs. fast metabolizers
4. Disease- impaired liver function, decreased hepatic blood flow
5. Age/Gender-rate of phase I/II reactions slow in infants, females may have reduced ability to metabolize certain compounds?

## **Drug Elimination**

1. Renal elimination

- a. Drugs get filtered and if not reabsorbed, gets excreted in urine
  - b. Renal excretion involves: glomerular filtration, active tubular secretion, and passive tubular reabsorption.
2. Elimination by other routes.
- a. Lungs mostly volatile compounds
  - b. Bile/fecal excretion
  - c. Saliva, sweat, tears, breast milk
  - d. Hair, skin

## ***General Pharmacokinetics Review***

Clinical Pharmacokinetics attempts to quantify the relationship between dose and effect. Primary parameters that dictate dosage include:

1. Clearance
2. Volume of Distribution
3. Bioavailability

Clearance-measure of the body's ability to eliminate a drug. Clearance is an expression of the volume of plasma which is cleared of the drug per unit time (ml/hr) not the concentration of the drug cleared.

Clearance = flow (ml/min) x amount of drug removed from the blood (mg/ml)

Amount of drug going in to kidney  
(mg/ml)

Or

CI = flow x [C]in – [C]out (amount removed)  
[C] in (amount in blood)

The systems of drug elimination are not usually saturated so drug elimination is dependent on the concentration of drug in the plasma. This means the higher the concentration of the drug, the faster the blood is cleared. When this is true this is called 1<sup>st</sup> order kinetics. In



1<sup>st</sup> order kinetics a constant fraction of the drug is eliminated/unit time. The time required to remove half of the drug is called  $t_{1/2}$ .  $T_{1/2}$  is constant in 1<sup>st</sup> order kinetics.

In 1<sup>st</sup> order kinetics the:

Rate of elimination = concentration of drug in plasma (mg/ml) x Cl (ml/hr). When the systems for drug elimination become saturated, now have zero order elimination. Zero order elimination means that the elimination rate is constant over time, regardless of the concentration of drug in the system.

The aim is to maintain a steady-state concentration of a drug within a known therapeutic range. Steady state is achieved when the rate of elimination = rate of availability.

Availability =  $\frac{\text{amount of drug in plasma}}{\text{amount of drug given}}$

Rate of Elimination = Cl x concentration in plasma

Time to reach steady state depends on dosing interval and elimination  $t_{1/2}$ . If you want to achieve steady state more rapidly, a loading dose can be given followed by a maintenance dose.

Loading dose (mg) = target concentration (mg/ml) x  $V_d$  (ml)

Maintenance dose = amount given must equal amount eliminated within dosing time.

If given at intervals shorter than elimination time = toxicity.

If given at intervals longer than elimination time = ineffective dose.

## **Pharmacodynamic Terms**

1. Agonist – has affinity and efficacy
2. Partial agonist – has affinity and partial efficacy
3. Antagonist – has affinity, no efficacy
4. Additive effects-  $1+1 = 2$
5. Synergistic effects-  $1+1 = 3$
6. Affinity – attraction between drug and (X)
7. Specificity- attraction between drug and specific (X)
8. Potentiation- one drug enhances the effect of another drug  
Ex. Aspirin bumps T3/T4 off plasma proteins- more free T3/T4

## **Autonomic Nervous System Receptors**

1. Cholinergic Receptors – Ach binds both – prefers Muscarinic
  - a. Nicotinic-preferentially binds nicotine. Found at ganglion on post synaptic fiber. Found in both SNS and PNS. Drugs that bind to nicotinic receptors affect both systems.

- b. Muscarinic- preferentially binds muscarine. Found on target tissue in PNS and located on sweat gland in SNS.

## 2. Adrenergic Receptors:

Alpha- found NE excited target tissue and also inhibited further release of NE from nerve. (constricted VSM)

Beta- found that NE and EPI equally potent in heart but EPI 50x more potent

## ***Specific Pediatric Conditions***

Wilm's tumor: kidney tumor found in children. Cause: unknown/possible genetic link. Tumor will spread to other regions. Sometimes children will be born with aniridia. Do not exert pressure over the abdomen.

### *Symptoms:*

Fever  
Vomiting  
Fatigue  
Irregular urine coloration  
Abdominal pain  
Constipation  
Abdominal mass  
Increased BP

BUN  
Creatinine  
Analysis of the urine  
X-ray  
CT Scan  
Family history of cancer  
CBC

### *Tests:*

*Treatment:*  
Surgery  
Chemotherapy

## Radiation

Neuroblastoma: tumor in children that starts from nervous tissue.  
Capable of spreading rapidly. Cause unknown.

### *Symptoms:*

Abdominal mass  
Skin color changes  
Fatigue  
Tachycardia  
Motor paralysis  
Anxiety  
Diarrhea  
Random eye movements  
Bone and joint pain  
Labored breathing

### *Tests:*

Bone scan  
CBC  
MIBG scan

Catecholamines tests

X-ray  
CT scan  
MRI

### *Treatment:*

Radiation  
Chemotherapy  
Surgery

### *Monitor the patient for:*

Kidney failure  
Metastasis  
Various Organ system failures  
Liver failure

Cerebral palsy: Cerebrum injury causing multiple nerve function deficits.

### *Types:*

Spastic CP 50%

Dyskinetic CP 20%  
Mixed CP

Ataxic CP

*Symptoms:*

Poor respiration status

Mental retardation

Spasticity

Speech and language deficits

Delayed motor and sensory  
development

Seizures

Joint contractions

*Tests:*

Sensory and Motor Skill testing

Check for spasticity

CT scan/MRI

EEG

*Treatment:*

PT/OT/ST

Surgery

Seizure medications

Spasticity reducing medication

Croup: trouble breathing in infants and children that can be caused by bacteria, viruses, allergies or foreign objects. Primarily, caused by viruses.

*Symptoms:*

Labored breathing

Symptoms increased at night.

Noisy cough

Stridor

*Tests:*

X-rays

Breaths sounds check

*Treatment:*

Acetaminophen

Steroid medications

Intubation

Nebulizers

<i>Monitor the patient for:</i>	Dehydration
Respiratory arrest	Epiglottitis
Atelectasis	

Kawasaki disease: a disease that affects young children primarily. Unknown origin probable autoimmune disease. Attacks the heart, blood vessels, and lymph nodes.

<i>Symptoms:</i>	ECGH
Fever	ESR
Joint pain	Urine Analysis
Swollen lymph nodes	
Peripheral edema	<i>Treatment:</i>
Rashes	Gamma globulin
Papillae on the tongue	Salicylate treatment
Chapped/Red lips	
	<i>Monitor the patient for:</i>
<i>Tests:</i>	Coronary aneurysm
CBC	MI
Presence of pyuria	Vasculitis
Chest X-ray	

Pyloric stenosis: a narrowing of the opening between the intestine and stomach. Most common in infants. May have genetic factors

<i>Symptoms:</i>	Belching
Diarrhea	Vomiting
Abdominal pain	Weight loss

*Tests:*

Abdomen distended

Barium X-ray

US

Electrolyte imbalance

*Treatment:*

Surgery

IV fluids

*Vaccinations*

Attenuated – Varicella, MMR

Inactivated – Influenza

Toxoid – Tetanus/Diphtheria

Biosynthetic – Hib conjugate vaccine

Tetralogy of Fallot- 4 heart defects that are congenital. Poorly oxygenated blood is pumped to the body's tissues.

*4 factors:*

Right ventricular hypertrophy  
Ventricular septal defect  
Aorta from both ventricles  
Stenosis of the pulmonic outflow tract

EKG

Echocardiogram

Heart Catheterization

CBC

Heart Murmur

*Treatment:*

Surgery

Small meals

Limit child's anxiety

*Symptoms:*

Poor weight gain

Cyanosis

Death

Limited infant feeding

Clubbing

SOB

*Monitor the patient for:*

Seizures

Poor overall development

*Tests:*

Chest X-ray

Cyanois

Atrial septal defect- congenital opening between the atria.

*Symptoms:*

Dyspnea

Reoccurring infections  
(respiratory)

SOB

Palpitations

*Tests:*

Catheterization

Echocardiography

ECG

MRI



Irregular heart rhythm/sounds

*Treatment:*

Surgery

Antibiotics

*Monitor the patient for:*

Heart failure

A fib.

Pulmonary Htn.

Endocarditis

Ventricular septal defect- opening between the ventricles of the heart.

*Symptoms:*

Poor weight gain

Labored breathing

Profuse sweating

SOB

Poor color

Irregular heart beat

Respiratory infections

reoccurring

Chest X-ray

*Treatment:*

Digoxin

Surgery

Digitalis

*Monitor the patient for:*

Endocarditis

Pulmonary Htn.

Aortic insufficiency

Limited growth and

development

Arrhythmias

CHF

*Tests:*

Auscultation

Echocardiogram

ECG

Patent ductus arteriosus: open blood vessel (ductus arteriosus) that does not close after birth.

*Symptoms:*

SOB

Limited feeding

*Tests:*

ECG

Echocardiogram

Heart murmur

Chest X-ray

*Treatment:*

Surgery

Indomethacin

Decrease fluid volumes

*Monitor the patient for:*

Surgical complications

Endocarditis

Heart failure

Aortic coarctation: aorta becomes narrow at some point due to a birth defect

*Symptoms:*

Headache

Hypertension with activity

Nose bleeding

Fainting

SOB

Cardiac catheterization

*Treatment:*

Surgery

*Monitor the patient for:*

Stroke

Heart failure

Aortic aneurysm

Htn

CAD

Endocarditis

Aortic dissection

*Tests:*

Check BP

Doppler US

Chest CT

MRI

ECG

Chest X-ray



## ***Tumor Review***

### Primary Tumors

Neuromas-80-90% of brain tumors, named for what part of nerve cell affected.

Meningiomas - outside of arachnoidal tissue, usually benign and slow growing

Glioblastoma Multiform-50% of all primary tumors, linked to specific genetic mutations

### Secondary Tumors

Metastatic carcinomas

Scale –degree of anaplasia: differentiation of mature (good) vs. immature cells (bad)

Grade I: up to 25% anaplasia

Grade II: 26-50% anaplasia

Grade III: 51-75% anaplasia

Grade IV: 76-100% anaplasia

### Primary Tumor Effect:

1. Headaches
2. Vomiting
1. Seizures
2. Neurological problems
3. Dementia
4. Drowsiness

### Secondary Tumor Effect:

1. Direct compression/necrosis

2. Herniation of brain tissue
3. Increase ICP

*Noteworthy Tumor Markers*

1. AFP
2. Alkaline phosphatase
3.  $\beta$ -hCG
4. CA-125
5. PSA

Define the following terms:

Basal cell carcinoma:

Chondrosarcoma:

Ewing's sarcoma:

Giant cell tumor:

Melanoma:

Meningioma:

Oligodendroglioma:

Pituitary adenoma:

Schwannoma:

Squamous cell carcinoma:

Leukemia Review

Know the following four types of leukemias.

ALL- acute lymphocytic leukemia

AML- acute myelocytic leukemia

CLL- chronic lymphocytic leukemia

CML- chronic myeloid leukemia

## ***GI Review***

Zollinger-Ellison syndrome: Tumors of the pancreas that cause upper GI inflammation. The tumors secrete gastrin causing high levels of stomach acid.

*Symptoms:*

Diarrhea

Vomiting

Abdominal pain

Elevated gastrin levels

Tumors in the pancreas

*Tests:*

Abdominal CT

+ Calcium Infusion Test

+ Secretin Stimulation Test

*Treatment:*

Ranitidine

Cimetidine

Lansoprazole

Omeprazole

Surgery

Wilson's disease: High levels of copper in various tissues throughout the body. (Genetically linked- Autosomal recessive).

*Key organs affected are:*

Eyes

Brain

Liver

Kidneys

Abdominal pain/distention

Dementia

Speech problems

Muscle weakness

Splenomegaly

Confusion

*Symptoms:*

Gait disturbances

Jaundice

Tremors

Dementia

*Tests:*

Various lab tests:

Bilirubin/PT/ SGOT increased

Albumin/Uric acid production  
decreased

MRI

Genetic testing

Low levels of serum copper

Copper is found in the tissues

Kayser-Fleisher Rings in the eye

*Treatment:*

Pyridoxine

Low copper diet

Corticosteroids

Penicillamine

*Monitor the patient for:*

Cirrhosis

Muscle weakness

Joint pain/stiffness

Anemia

Fever

Hepatitis

Pancreatitis: Inflammation of the pancreas

*Symptoms:*

Fever

Vomiting

Nausea

Chills

Anxiety

Jaundice

Sweating

*Tests:*

X-ray

CT scan

Various Lab tests

Pancreatic Cancer: cancer of the pancreas. Higher rates in men.

*Symptoms:*

Nausea

Jaundice

Depression

Back pain

Indigestion

Abdominal pain

Liver function test

Weight loss

*Treatment:*

*Tests:*

Surgery

CT scan

Chemotherapy

Biopsy

Radiation

Abdominal US

Whipple procedure

Hepatitis A: Viral infection that causes liver swelling.

*Symptoms:*

Increased liver enzymes

Fatigue

Presence of IgG and IgM

Nausea

antibodies

Fever

Enlarged liver

Itching

Vomiting

*Treatment:*

Rest

*Tests:*

Proper diet low in fatty foods

Hepatitis B: Sexually transmitted disease, also transmitted with body fluids and some individual may be symptom free but still be carriers.

*Symptoms:*

Joint pain

Jaundice

Fever

Dark Urine

Fatigue

Malaise



*Tests:*

Decreased albumin levels  
+ antibodies and antigen  
Increased levels of  
transaminase

*Treatment:*

Monitor for changes in the liver.  
Recombinant alpha interferon in  
some cases.  
Transplant necessary if liver  
failure occurs.

Hepatitis C

*Symptoms:*

Fatigue  
Vomiting  
Urine color changes (dark)  
Jaundice  
Abdominal pain

ELISA assay

Increased levels of liver  
enzymes  
No Hep. A or B antibodies

*Tests:*

*Treatment:*

Interferon alpha  
Ribavirin

Gastritis: can be caused by various sources (bacteria, viruses, bile  
reflux or autoimmune diseases). Inflammation of the stomach lining.

*Symptoms:*

Loss of appetite  
Hiccups  
Nausea  
Vomiting blood  
Abdominal pain

*Tests:*

EGC  
X-Ray  
CT scan

## Ulcers

Peptic Ulcers-ulcer in the duodenum or stomach

Gastric Ulcers- ulcer in the stomach

Duodenum Ulcer-ulcer in the duodenum

Bacteria: *Helicobacter pylori*- often associated with ulcer formation.

<i>Symptoms:</i>	Stool guaiac
Weight loss	GI X-rays
Chest pain	
Heartburn	<i>Treatment:</i>
Vomiting	Bismuth
Indigestion	Famotidine
Fatigue	Sucralfate
	Cimetidine
<i>Tests:</i>	Omeprazole
EGD	Antibiotics

Diverticulitis – abnormal pouch formation that becomes inflamed in the intestinal wall.

<i>Symptoms:</i>	Vomiting
Fever	Constipation
Diarrhea	
Nausea	<i>Tests:</i>

Barium enema

CT Scan

WBC count

Sigmoidoscopy

Colonoscopy

Intestinal obstruction: Can a paralytic ileus/false obstruction (children) or a mechanical obstruction:

*Types of mechanical*

Diarrhea

*obstruction:*

Breath

Tumors

Abdominal swelling

Volvulus

Abdominal pain

Impacted condition

Hernia

*Tests:*

Barium enema

*Symptoms:*

CT scan

Constipation

Upper/Lower GI series

Vomiting

Poor bowel sounds

Carcinoid Syndrome: symptoms caused by carcinoid tumors. Linked to increased secretion of Serotonin.

*Symptoms:*

5-HIAA test

Flush appearance

Increased levels of

Wheezing

Chromogranin A and Serotonin

Diarrhea

CT scan

Onset of niacin deficiency

MRI

Abdominal pain

Decreased BP

*Treatment:*

Surgery

*Tests:*

Sandostatin

Chemotherapy

Multivitamins

Octreotide

Interferon

*Monitor the patient for:*

Low BP

Right Sided Heart Failure

Hiatal Hernia: Stomach sticks into the chest through the diaphragm.

Can cause reflux symptoms.

*Symptoms:*

Chest pain

Heartburn

Poor swallow

Barium Swallow X-ray.

*Treatment:*

Weight loss

Surgical repair

*Tests:*

EGD

Medications for reflux

(GERD) -Gastroesophageal reflux disease

*Symptoms:*

Nausea

Vomiting

Frequent coughing

Hoarseness

Belching

Chest pain

Antacid relief

Sore Throat

*Tests:*

Barium swallow

Bernstein test

Stool guaiac

Endoscopy

*Treatment:*

Weight loss

Antacids

Proton pump inhibitors

Limit fat and caffeine  
Histamine H2 blockers

*Monitor the patient for:*

Chronic pulmonary disease  
Barrett's esophagus  
Esophagus inflammation  
Bronchospasms

Ulcerative colitis: chronic inflammation of the rectum and large intestine.

*Symptoms:*

Weight loss

Jaundice

Diarrhea

Abdominal pain

Fever

Joint pain

GI bleeding

*Tests:*

Barium edema

ESR

CRP

Colonoscopy

*Treatment:*

Corticosteroids

Mesalamine

Surgery

Ostomy

Azathioprine

*Monitor the patient for:*

Ankylosing spondylitis

Liver disease

Carcinoma

Pyoderma gangrenosum

Hemorrhage

Perforated colon

## ***Eye, Ear, and Mouth Review***

### **Disorders of the Eye**

#### *Diabetic retinopathy:*

Blood vessels in the retina are affected. Can lead to blindness if untreated. Two primary stages (Proliferative and Nonproliferative). Retina may experience bleeding in nonproliferative stage. During the proliferative stage damage begins moving towards the center of the eye and there is an increase in bleeding. Any damage caused is non-reversible. Only further damage can be prevented.

#### Strabismus:

Eyes are moving in different stages. The axes of the eyes are not parallel. Normally, treated with an eyepatch; however, eye drops are now used in many cases. Atropine drops are placed in the stronger eye for correction purposes. Surgery may be necessary in some cases. Suture surgery will reduce the pull of certain eye muscles.

#### *Macular Degeneration:*

Impaired central vision caused by destruction of the macula, which is the center part of the retina. Limited vision straight ahead. More common in people over 60. Can be characterized as dry or wet types. Wet type more common. Vitamin C, Zinc, and Vitamin E may help slow progression.

*Esotropia:*

Appearance of cross-eyed gaze or internal strabismus.

*Exotropia:*

External strabismus or divergent gaze.

*Conjunctivitis:*

Inflammation of the conjunctiva, that can be caused by viruses or bacteria. Also known as pink eye. If viral source can be highly contagious. Antibiotic eye drops and warm cloths to the eye helpful treatment. Conjunctivitis can also be caused by chemicals or allergic reactions. Re-occurring conjunctivitis can indicate a larger underlying disease process.

*Glaucoma:*

An increase in fluid pressure in the eye leading to possible optic nerve damage. More common in African-Americans. Minimal onset symptoms, often picked to late. Certain drugs may decrease the amount of fluid entering the eye. Two major types of glaucoma are open-angle glaucoma and angle-closure glaucoma.





## Disorders of the Mouth

### *Acute pharyngitis:*

Often the cause of sore throats, inflammation of the pharynx.

### *Acute tonsillitis:*

Viral or Bacterial infection that causes inflammation of the tonsils.

### *Aphthous ulcer:*

Also known as a canker sore. A sensitive ulcer in the lining of the mouth. 1 in 5 people have these ulcers. Cause is unknown in many cases.

### *Acute Epiglottitis*

Inflammation of the epiglottitis that may lead to blockage of the respiratory system and death if not treated. Often caused by numerous bacteria. Intubation may be required and speed is critical in treatment. IV antibiotics will help reverse this condition in most cases. Common symptoms are high fever and sore throat.

### *Oral candidiasis:*

This is a yeast infection of the throat and mouth by *Candida albicans*.

### *Oral leukoplakia:*

A patch or spot in the mouth that can become cancerous.

*Parotitis:*

A feature of mumps and inflammation of the parotid glands.

## Disorders of the Ear

### *Otitis media:*

Most common caused by the bacteria (H.flu) and Streptococcus pneumoniae in about 85% of cases. 15% of cases viral related. More common in bottlefeeding babies. Can be caused by upper respiratory infections. Ear drums can rupture in severe cases. A myringotomy may be performed in severe cases to relieve pus in the middle ear.

### *Barotitis:*

Atmospheric pressures causing middle ear dysfunction. Any change in altitude causes problems.

### *Mastoiditis:*

May be caused by an ear infection and is known as inflammation of the mastoid.

### *Meniere's disease:*

Inner ear disorder. Causes unknown. Episodic rotational vertigo, Tinnitus, Hearing loss, and Ringing in the ears are key symptoms. Dazide is the primary medication for Meniere's disease. Low salt diet and surgery are also other treatment options. Diagnosis is a rule-out diagnosis.

### *Labyrinthitis:*

Vertigo associated with nausea and malaise. Related to bacterial and viral infections. Inflammation of the labyrinth in the inner ear.

*Otitis externa:*

Usually caused by a bacterial infection. Swimmer's ear. Infection of the skin with the outer ear canal that progress to the ear drum.

Itching, Drainage and Pain are the key symptoms. Suctioning of the ear canal may be necessary. Most common ear drops (Volsol, Cipro, Cortisporin).

## ***Obstetrics/Gynecology***

Amniocentesis: Removal of some fluid surrounding the fetus for analysis. Fetus location is identified by US prior to the procedure. Results may take a month.

*Used to check for:*

Spina bifida

Rh compatibility

Immature lungs

Down syndrome

Chorionic villus sampling: Removal of placental tissue for analysis from the uterus during early pregnancy. US helps guide the procedure. 1-2 weeks get the results. Can be performed earlier than amniocentesis.

*Used to check for:*

Tay-Sachs disease

Down syndrome

Other disorders

*Monitor the patient for:*

Infection

Miscarriage

Bleeding

Preeclampsia: presence of protein in the urine, and increased BP during pregnancy. Found in 8% of pregnancies.

*Symptoms:*

Abnormal Rapid Weight gain  
Headaches  
Peripheral edema  
Nausea  
Anxiety  
Htn  
Low urination frequency

*Tests:*

Proteinuria  
BP check  
Weight gain analysis  
Thrombocytopenia  
Evidence of edema

*Treatment:*

Deliver the baby  
Bed rest  
Medications

*Induced labor may occur with the following criteria:*

Eclampsia  
HELLP syndrome  
High serum creatinine levels  
Prolonged elevated diastolic blood pressure >100mmHg  
Thrombocytopenia  
Abnormal fetal growth

Eclampsia: seizures occurring during pregnancy, symptoms of pre-eclampsia have worsened. Factors that cause eclampsia vs. pre-eclampsia relatively unknown.

*Symptoms:*

Weight gain sudden

Seizures

Trauma

Abdominal pain

Pre-eclampsia

Bedrest

BP medications

*Induced labor may occur with the following criteria:*

*Tests:*

Check liver function tests

Check BP

Proteinuria presence

Apnea

Eclampsia

HELLP syndrome

High serum creatinine levels

Prolonged elevated diastolic blood pressure >100mmHg

*Treatment:*

Magnesium sulfate

Thrombocytopenia

Abnormal fetal growth

Amniotic fluid- greatest at 34 weeks gestation.

*Functions:*

Allows normal lung development

Freedom for movement

Fetus temperature regulation

Trauma prevention

Oligohydramnios: Low levels of amniotic fluid that can cause: fetal abnormalities, ruptured membranes and fetus disorders.

Polyhydramnios: High levels of amniotic fluid that can cause: gestational diabetes and congenital defects.

*Polyhydramnios Causes:*

Beckwith-Wiedemann syndrome

Hydrops fetalis

Multiple fetus development

Anencephaly

Esophageal atresia

Gastroschisis

Sheehan's syndrome: hypopituitarism caused by uterine hemorrhage during childbirth. The pituitary gland is unable to function due to blood loss.

*Symptoms:*

Amenorrhea

Fatigue

Unable to breast-feed baby

Anxiety

Decreased BP

Hair loss

*Tests:*

CT scan of Pituitary gland

Check pituitary hormone levels

*Treatment:*

Hormone therapy

Breast infections/Mastitis: Infection or inflammation due to bacterial infections. (*S. aureus*).

*Symptoms:*

Fever

Nipple pain/discharge

Breast pain

Swelling of the breast

*Tests:*

Physical examination

*Treatment:*



Antibiotics  
Moist heat

Breast pump

Atrophic vaginitis- low estrogen levels cause inflammation of the vagina. Most common after menopause.

*Symptoms:*

Pain with intercourse  
Itching pain  
Vaginal discharge  
Vaginal irritation after  
intercourse

*Tests:*

Pelvic examination

*Treatment:*

Hormone therapy  
Vaginal lubricant

Cervicitis: infection, foreign bodies, or chemicals that causes inflammation of the cervix.

*Symptoms:*

Pain with intercourse  
Vaginal discharge  
Pelvic pain  
Vaginal pain

STD tests

Pap smear

*Treatment:*

Laser therapy  
Antibiotics/antifungals  
Cryosurgery

*Tests:*

Pelvic examination

Pelvic inflammatory disease: infection of the fallopian tubes, uterus or ovaries caused by STD's in the majority of cases.

*Symptoms:*

Vaginal discharge  
Fever  
Pain with intercourse  
Fever  
Nausea  
Urination painful  
LBP  
No menstruation

Pelvic exam  
Laparoscopy  
ESR  
WBC count  
Pregnancy test  
Cultures for infection

*Treatment:*

Antibiotics  
Surgery

*Tests:*

Toxic shock syndrome: infection of (*S. aureus*) that causes organ disorders and shock.

*Symptoms:*

Seizures  
Headaches  
Hypotension  
Fatigue  
Multiple organ involvement  
Fever  
Nausea  
Vomiting

Check BP  
Multiple organ involvement

*Treatment:*

Dialysis- if kidneys fail  
BP medications  
IV fluids  
Antibiotics

*Monitor the patient for:*

*Tests:*

Kidney failure

Liver failure  
Extreme shock

Heart failure

Hirsutism: development of dark areas of hair in women that are uncommon.

*Causes:*

Cushing's syndrome  
Congenital adrenal hyperplasia  
Hyperthecosis  
PCOS  
High Androgen levels  
Certain medications

*Treatment:*

Laser treatment  
Birth control medications  
Electrolysis  
Bleaching

Dysmenorrhea: painful menses.

*Symptoms:*

Constipation  
Nausea  
Vomiting  
Diarrhea

*Tests:*

Determine if normal  
dysmenorrhea is occurring.  
Pain relief  
Anti-inflammatory medications

Endometriosis: abnormal tissue growth outside the uterus.

*Symptoms:*

Spotting

Infertility

Pelvic exam.

LBP

Periods (painful)

*Treatment:*

Sexual intercourse painful

Progesterone treatment

Pain management

*Tests:*

Surgery

Pelvic US

Hormone treatment

Laparoscopy

Synarel treatment

Stress Incontinence: A laugh, sneeze or activity that causes involuntary urination. Urethral sphincter dysfunction.

*Tests:*

Rectal exam

*Treatment:*

X-rays

Surgery

Pad test

Medications

Urine analysis

(pseudoephedrine/phenylpropanolamine)/Estrogen

PVR test

Cystoscopy

Pelvic floor re-training

Pelvic exam

Fluid intake changes

Urge incontinence- urine loss caused by bladder contraction.

*Symptoms:*

Pelvic exam

Frequent urination

X-rays

Abdominal pain/distention

Cystoscopy

EMG

*Tests:*

Pad test

Urinary stress test

PVR test

Genital exam-men

*Treatment:*

Surgery

Medications-(tolterodine,  
propratheline, imipramine,

tolterodine, terbutaline)

Biofeedback training

Kegel strengthening

## ***Dermatology Review***

*Atopic Dermatitis:*

Scaling, Itching, Redness and Excoriation. Possible lichenification in chronic cases. Most common in young children around the elbow and knees. Adults are more common in neck and knees. May be associated with an allergic disorder, hay fever, or asthma.

*Contact Dermatitis:*

Itchy, weepy reaction with a foreign substance (Poison Ivy) or lotions. Skin becomes red.

*Diaper Rash:*

Inflammatory reaction in the region covered by a diaper. This may include chemical allergies, sweat, yeast, or friction irritation.

*Ermatitis stasis:*

Decreased blood flow the lower legs resulting in a skin irritation, possible ulcer formation.

*Onychomycosis:*

Fungal infection related to the fingernails or toenails. Often caused by *Trichophyton rubrum*.

*Lichen planus:*

Treated with topical corticosteroids. The presence of pink or purple spots on the legs and arms. Lesions are itchy, flat and polygonal. May cause hair loss.

*Pityriasis rosea:*

A mild to moderate rash that starts as a single pink patch and then numerous patches begin to appear on the skin. This may lead to itching. Found primarily in ages 10-35 years old.

### *Psoriasis:*

An autoimmune disease mediated by T lymphocytes that can lead to arthritis. Generally, treated with UV light, tar soap and topical steroid cream. A reddish rash that can be found in numerous locations.

### *Stevens-Johnson syndrome:*

An allergic reaction that can include rashes, and involve the inside of the mouth. May be due to drug sensitivity. Can lead to uveitis and keratitis. Other factors related to SJS include: pneumonia, fever, myalgia and hepatitis. SJS can be extremely similar to varicella zoster and pemphigus vulgaris conditions. There may also be the presence of herpes virus or *Mycoplasma pneumoniae*.

### *Bullous pemphigoid:*

Eruptions of the skin caused by the accumulation of antibodies in the basement membrane of the skin. Treated with cortisone creams or internally. Skin biopsy offers definitive diagnosis.

### *Acne vulgaris:*

Oil glands become inflamed, plugged or red. May be treated in moderate to severe cases with anti-inflammatory medications or creams.

### *Rosacea:*

A redness that covers the middle part of the face. Blood vessels in the face dilate. Most common in adults 30-50 years old. Unable to be cured, only treated. May cause long term skin damage is left untreated. Antibiotics are often prescribed.

*Seborrheic keratosis:*

The development of skin "tags" or the barnacles of old age. Usually found in people over 30 years old. Appear to be tabs growing in groups or individually on your skin. Can be treated with Scrapping, Freezing or Electrosurgery.

*Actinic keratosis:*

A site that can become cancerous, usually small and rough on the skin that has been exposed to the sun a lot. Usually treated with cryosurgery and photodynamic therapy.

*Scabies:*

Caused by the human itch mite: *Sarcoptes scabiei*, and identified by presence of raised, red bumps that are itchy. Closer identification with a visual aid will show streaks in the skin created by the mite.

*Molluscum contagiosum:*

Considered a STD. Small downgrowths called molluscum bodies that include the presence of soft tumors in the skin caused by a virus. Contagious.



*Herpes zoster:*

Infection caused by the varicella-zoster virus. Can cause chickenpox and then shingles in later years. The virus infects the dorsal root ganglia of nerves and can cause intense itching.

*St. Anthony's Fire:*

Claviceps purpurea (fungus) can cause intense pain in the extremities by causing blood vessels to constrict. Fungus produces ergotamines.

*Impetigo:*

A skin infection caused by Staph or Streptococcus that causes itchy, red skin and pustules. Treated with topical antibiotics and primarily affects children.

*Acanthosis nigricans:*

The presence of dark velvety patches of skin around the armpit, back, neck and groin. Can occur with multiple diseases. Has been linked to patients with insulin dysfunction.

*Hidradenitis suppurativa:*

The presence of numerous abscess in the groin and armpit region.

*Melasma:*

"Mask of Pregnancy" Changes in the pigmentation of women that are pregnant. Occurs in 50% of all pregnancies.

Urticaria:

Elevated itchy areas that are linked to allergic reactions. May be accompanied with edema and may blanch with touch. "Hives"

Vitiligo:

Loss of melanocytes resulting in skin turning white. Hair in regions affected will also turn white. Primarily identified in ages 10-30. Several genetic factors involved. May be associated with other more severe autoimmune disorders.

## ***Axial Skeleton***

The axial skeleton consists of 80 bones forming the trunk (spine and thorax) and skull.

**Vertebral Column:** The main trunk of the body is supported by the spine, or vertebral column, which is composed of 26 bones, some of which are formed by the fusion of a few bones. The vertebral column from superior to inferior consists of 7 cervical (neck), 12 thoracic and 5 lumbar vertebrae, as well as a sacrum, formed by fusion of 5 sacral vertebrae, and a coccyx, formed by fusion of 4 coccygeal vertebrae.

**Ribs and Sternum:** The axial skeleton also contains 12 pairs of *ribs* attached posteriorly to the thoracic vertebrae and anteriorly either directly or via cartilage to the *sternum* (breastbone). The ribs and sternum form the *thoracic cage*, which protects the heart and lungs. Seven pairs of ribs articulate with the sternum (*fixed ribs*) directly, and three do so via cartilage; the two most inferior pairs do not attach anteriorly and are referred to as *floating ribs*.

**Skull:** The skull consists of 22 bones fused together to form a rigid structure which houses and protects organs such as the brain, auditory apparatus and eyes. The bones of the skull form the *face* and *cranium* (brain case) and consist of 6 single bones (*occipital, frontal, ethmoid, sphenoid, vomer* and *mandible*) and 8 paired bones (*parietal, temporal, maxillary, palatine, zygomatic, lacrimal, inferior concha* and *nasal*). The *lower jaw* or *mandible* is the only movable bone of the skull (head); it articulates with the temporal bones.

**Other Parts:** Other bones considered part of the axial skeleton are the *middle ear bones (ossicles)* and the small U-shaped *hyoid bone* that is suspended in a portion of the neck by muscles and ligaments.

## ***Appendicular Skeleton***

The *appendicular skeleton* forms the major internal support of the appendages—the *upper* and *lower extremities* (limbs).

**Pectoral Girdle and Upper Extremities:** The arms are attached to and suspended from the axial skeleton via the *shoulder (pectoral) girdle*. The latter is composed of two *clavicles (collarbones)* and two *scapulae (shoulder blades)*. The clavicles articulate with the sternum; the two *sternoclavicular joints* are the only sites of articulation between the trunk and upper extremity.

Each upper limb from distal to proximal (closest to the body) consists

Each upper limb from distal to proximal (closest to the body) consists of hand, wrist, forearm and arm (upper arm). The *hand* consists of 5 *digits* (fingers) and 5 *metacarpal* bones. Each digit is composed of three bones called *phalanges*, except the thumb which has only two bones.

**Pelvic Girdle and Lower Extremities:** The lower *extremities*, or legs, are attached to the axial skeleton via the *pelvic* or *hip girdle*. Each of the two coxal, or *hip bones* comprising the pelvic girdle is formed by the fusion of three bones—*ilium*, *pubis*, and *ischium*. The

coxal bones attach the lower limbs to the trunk by articulating with the sacrum.

THE HUMAN SKELETAL SYSTEM	
Part of the Skeleton	Number of Bones
<b>Axial Skeleton</b>	<b>80</b>
Skull	22
Ossicles (malleus, incus and stapes)	6
Vertebral column	26
Ribs	24
Sternum	1
Hyoid	1
<b>Appendicular Skeleton</b>	<b>126</b>
Upper extremities	64
Lower extremities	62

### ***Characteristics of Bone***

*Bone* is a specialized type of connective tissue consisting of cells (*osteocytes*) embedded in a calcified matrix which gives bone its characteristic hard and rigid nature. Bones are encased by a *periosteum*, a connective tissue sheath. All bone has a central marrow cavity. *Bone marrow* fills the marrow cavity or smaller marrow spaces, depending on the type of bone.

**Types of Bone:** There are two types of bone in the skeleton: *compact bone* and *spongy* (cancellous) bone.

*Compact Bone.* *Compact bone* lies within the periosteum, forms the outer region of bones, and appears dense due to its compact organization. The living osteocytes and calcified matrix are arranged in layers, or *lamellae*. Lamellae may be circularly arranged surrounding a central canal, the *Haversian canal*, which contains small blood vessels.

*Spongy Bone.* *Spongy bone* consists of *bars*, *spicules* or *trabeculae*, which forms a lattice meshwork. Spongy bone is found at the ends of long bones and the inner layer of flat, irregular and short bones. The trabeculae consist of osteocytes embedded in calcified matrix, which in definitive bone has a lamellar nature. The spaces between the trabeculae contain bone marrow.

**Bone Cells:** The cells of bone are osteocytes, osteoblasts, and osteoclasts. *Osteocytes* are found singly in *lacunae* (spaces) within the calcified matrix and communicate with each other via small canals in the bone known as *canaliculi*. The latter contain osteocyte cell processes. The osteocytes in compact and spongy bone are similar in structure and function.

*Osteoblasts* are cells which form bone matrix, surrounding themselves with it, and thus are transformed into osteocytes. They arise from undifferentiated cells, such as mesenchymal cells. They are cuboidal cells which line the trabeculae of immature or developing spongy bone.

*Osteoclasts* are cells found during bone development and remodeling. They are multinucleated cells lying in cavities, *Howship's lacunae*, on the surface of the bone tissue being resorbed. Osteoclasts remove the existing calcified matrix releasing the inorganic or organic components.

**Bone Matrix:** *Matrix* of compact and spongy bone consists of collagenous fibers and ground substance which constitute the organic component of bone. Matrix also consists of inorganic material which is about 65% of the dry weight of bone. Approximately 85% of the inorganic component consists of calcium phosphate in a crystalline form (hydroxyapatite crystals). Glycoproteins are the main components of the ground substance.

## MAJOR TYPES OF HUMAN BONES

Type of Bone	Characteristics	Examples
Long bones	Width less than length	Humerus, radius, ulna, femur, tibia
Short bones	Length and width close to equal in size	Carpal and tarsal bones
Flat bones	Thin flat shape	Scapulae, ribs, sternum, bones of cranium (occipital, frontal, parietal)
Irregular bones	Multifaceted shape	Vertebrae, sphenoid, ethmoid
Sesamoid	Small bones located in tendons of muscles	-----

### ***Joints***

The bones of the skeleton articulate with each other at *joints*, which are variable in structure and function. Some joints are immovable, such as the *sutures* between the bones of the cranium. Others are *slightly movable joints*; examples are the *intervertebral joints* and the *pubic symphysis* (joint between the two pubic bones of the coxal bones).

## TYPES OF JOINTS

Joint Type	Characteristic	Example
Ball and socket	Permits all types of movement (abduction, adduction, flexion, extension, circumduction); it is considered a universal joint.	Hips and shoulder joints
Hinge (ginglymus)	Permits motion in one plane only	Elbow and knee, interphalangeal joints
Rotating or pivot	Rotation is only motion permitted	Radius and ulna, atlas and axis (first and second cervical vertebrae)
Plane or gliding		Between tarsal bones and carpal bones
Condylar (condyloid)	Permits sliding motion	



	Permits motion in two planes which are at right angles to each other (rotation is not possible)	Metacarpophalangeal joints, temporomandibular
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Adjacent bones at a joint are connected by fibrous connective tissue bands known as *ligaments*. They are strong bands which support the joint and may also act to limit the degree of motion occurring at a joint.

## ***Musculoskeletal Conditions***

Legg-Calve-Perthes disease: poor blood supply to the superior aspect of the femur. Most common in boys ages 4-10. The femur ball flattens out and deteriorates. 4x higher incidence in boys + Bony crescent sign.

### *Symptoms:*

Hip and Knee pain

Limited AROM and PROM

Pain with gait and unequal leg length.

### *Tests:*

X-ray Hip

Test ROM of hip

### *Treatment:*

Surgery

Physical therapy

Brace

Bedrest

Developmental dysplasia of the hip: abnormal development of the hip joint found that is congenital.

### *Symptoms:*

Fat rolls asymmetrical

Abnormal leg length

AROM limited

### *Tests:*

US

X-ray of hips

AROM testing of hips

### *Treatment:*

Cast

Surgery

Physical Therapy

Slipped capital femoral epiphysis: 2x greater incidence in males, most common hip disorder in adolescents. The ball of the femur separates from the femur along the epiphysis.

*Symptoms:*

Hip pain  
Gait dysfunction  
Knee pain  
Abnormal Hip AROM

*Tests:*

X-ray  
Palpation of the hips  
Treatment:  
Surgery

Polymyalgia Rheumatica- hip or shoulder pain disorder in people greater than 50 years old.

*Symptoms:*

Shoulder pain  
Hip pain  
Fever  
Anemia  
Fatigue

ESR increased  
CPK  
Hemoglobin low

*Treatment:*

Pain management  
Corticosteroids

*Tests:*

Systemic lupus erythematosus: autoimmune disorder that affects joints, skin and various organ systems. Chronic and inflammatory. 9x more common in females.

*Symptoms:*

Butterfly rash

Weight loss

Fever

Hair loss

Abdominal pain

Mouth sores

Fatigue

Seizures

Arthritis

Nausea

Joint pain

Psychosis

*Tests:*

CBC

Chest X-ray

ANA test

Skin rash observation

Coombs' test

Urine analysis

Test for various antibodies

*Treatment:*

NSAIDs

Protective clothing

Cytotoxic drugs

Hydroxychloroquine

*Monitor the patient for:*

Seizures

Infection

Hemolytic anemia

Myocarditis

Infection

Renal failure

Scleroderma: connective tissue disease that is diffuse.

*Symptoms:*

Wheezing

Heartburn

Raynaud's phenomenon

Skin thickness changes

Weight loss

Joint pain

SOB

Hair loss

Bloating

*Tests:*

Monitor skin changes

Chest x-ray

Antinuclear antibody test

ESR increased

*Monitor the patient for:*

Renal failure

Heart failure

Pulmonary fibrosis

Rheumatoid Arthritis: inflammatory autoimmune disease that affects various tissues and joints.

*Symptoms:*

Fever

Fatigue

Joint pain and swelling

ROM decreased

Hand/Feet deformities

Numbness

Skin color changes

*Tests:*

Rheumatoid factor tests

C-reactive protein

Synovial fluid exam

X-rays of involved joints

ESR increased

*Treatment:*

Physical therapy

Moist heat

Anti-inflammatory drugs

Corticosteroids

Anti-malarial drugs

Cox-2 inhibitors

Splinting

Juvenile Rheumatoid Arthritis: inflammatory disease that occurs in children.

*Types:*

Pauciarticular JRA- 50%

Polyarticular JRA- 40%

Systemic JRA- 10%

HLA antigen test

CBC

Physical exam of joints

X-rays of joints

Eye exam

RA factor test

*Symptoms:*

Painful joints

Eye inflammation

Fever

Rash

Temperature changes (joints)

Poor AROM

*Treatment:*

Physical therapy

Corticosteroids

NSAIDS

Infliximab

Hydrochloroquine

Methotrexate

*Tests:*

ANA test

Paget's disease: abnormal bone development that follows bone destruction.

*Symptoms:*

Sharp bone pain

Joint pain

Bow legged appearance

Hearing loss

Neck and back pain

Headaches

*Tests:*

Increased alkaline phosphatase levels

X-rays- abnormal bone  
development.  
Bone scan

Tiludronate  
Surgery

*Treatment:*

NSAIDS  
Calcitonin  
Plicamycin  
Etidronate

*Monitor the patient for:*

Spinal deformities  
Hear loss  
Paraplegia  
Heart failure  
Fractures

Osteoarthritis: chronic condition affecting the joint cartilage that may result in bone spurs being formed in the joints.

*Symptoms:*

Join pain  
Morning stiffness  
Limited AROM  
Weight bearing increases  
symptoms

Passive testing of joints

*Treatment:*

Physical therapy  
Cox 2 inhibitors  
NSAIDS  
Joint injections  
Aquatic exercises

*Tests:*

X-ray

Surgery

Gout: uric acid development in the joints causing arthritis.

*Stages:*

Asymptomatic  
Acute  
Intercritical

Chronic

*Symptoms:*

Joint edema

Fever  
Lower extremity and/or upper  
extremity joint pain

Synovial biopsy  
Synovial analysis

*Tests:*

Uric acid in the urine

*Monitor the patient for:*

Kidney stones  
Kidney disorders

Fibromyalgia: joint, muscle and soft tissue pain in numerous  
locations. Presence of tender points and soft tissue pain.

*Symptoms:*

Fatigue  
Body aches  
Poor exercise capacity  
Muscle/Joint pain

*Treatment:*

Anti-depressants  
Physical therapy  
Stress Management  
Massage  
Support group

*Tests:*

Rule-out diagnosis.

Duchenne muscular dystrophy: Genetically X-linked recessive type of  
muscular dystrophy that starts in the lower extremities. Dystrophin-  
protein dysfunction.

*Symptoms:*

Falls  
Fatigue  
Muscle weakness  
Gait dysfunction  
Scoliosis

Joint contractures

*Tests:*

CPK levels increased  
Cardiac testing  
EMG



Muscle biopsy testing

*Monitor the patient for:*

Contractures

*Treatment:*

Pneumonia

Physical therapy

Respiratory failure

Braces

CHF

Mobility assistance

Cardiomyopathy

Limited mobility

Ankylosing spondylitis: Vertebrae of the spine fuse.

*Symptoms:*

ESR test

Limited AROM

NSAIDS

Back and neck pain

Surgery

Joint edema

HLA-B27 antigen test

Fever Weight loss

*Monitor the patient for:*

*Tests:*

Pulmonary fibrosis

X-ray spine

Aortic valve stenosis

CBC

Uveitis

Compartment syndrome: impaired blood flow and nerve dysfunction caused by nerve and blood vessel compression.

*Symptoms:*

Muscular length testing

Severe pain

Weakness

*Treatment:*

Skin color changes

Surgery

Physical Therapy

*Tests:*

Osteosarcoma: bone tumor that is malignant and found in adolescents.

*Symptoms:*

Bone pain

Fractures

Swelling

X-ray

Biopsy

Bone scan

*Tests:*

CT scan

*Treatment:*

Chemotherapy

Surgery

## ***Sample Questions***

1. A nurse is reviewing a patient's medication during shift change. Which of the following medication would be contraindicated if the patient were pregnant? Note: More than one answer may be correct.

- A: Coumadin
- B: Finasteride
- C: Celebrex
- D: Catapres
- E: Habitrol
- F: Clofazimine

2. A nurse is reviewing a patient's PMH. The history indicates photosensitive reactions to medications. Which of the following drugs has not been associated with photosensitive reactions? Note: More than one answer may be correct.

- A: Cipro
- B: Sulfonamide
- C: Noroxin
- D: Bactrim
- E: Accutane
- F: Nitrodur

3. A patient tells you that her urine is starting to look discolored. If you believe this change is due to medication, which of the following patient's medication does not cause urine discoloration?

- A: Sulfasalazine
- B: Levodopa
- C: Phenolphthalein
- D: Aspirin

4. You are responsible for reviewing the nursing unit's refrigerator. If you found the following drug in the refrigerator it should be removed from the refrigerator's contents?

- A: Corgard
- B: Humulin (injection)
- C: Urokinase
- D: Epogen (injection)

5. A 34 year old female has recently been diagnosed with an autoimmune disease. She has also recently discovered that she is pregnant. Which of the following is the only immunoglobulin that will provide protection to the fetus in the womb?

- A: IgA
- B: IgD
- C: IgE
- D: IgG

6. A second year nursing student has just suffered a needlestick while working with a patient that is positive for AIDS. Which of the following is the most important action that nursing student should take?

- A: Immediately see a social worker

- B: Start prophylactic AZT treatment
- C: Start prophylactic Pentamidine treatment
- D: Seek counseling

7. A thirty five year old male has been an insulin-dependent diabetic for five years and now is unable to urinate. Which of the following would you most likely suspect?

- A: Atherosclerosis
- B: Diabetic nephropathy
- C: Autonomic neuropathy
- D: Somatic neuropathy

8. You are taking the history of a 14 year old girl who has a (BMI) of 18. The girl reports inability to eat, induced vomiting and severe constipation. Which of the following would you most likely suspect?

- A: Multiple sclerosis
- B: Anorexia nervosa
- C: Bulimia
- D: Systemic sclerosis

9. A 24 year old female is admitted to the ER for confusion. This patient has a history of a myeloma diagnosis, constipation, intense abdominal pain, and polyuria. Which of the following would you most likely suspect?

- A: Diverticulosis
- B: Hypercalcaemia

- C: Hypocalcaemia
- D: Irritable bowel syndrome

10. Rho gam is most often used to treat\_\_\_\_\_ mothers that have a \_\_\_\_\_ infant.

- A: RH positive, RH positive
- B: RH positive, RH negative
- C: RH negative, RH positive
- D: RH negative, RH negative

11. A new mother has some questions about (PKU). Which of the following statements made by a nurse is not correct regarding PKU?

- A: A Guthrie test can check the necessary lab values.
- B: The urine has a high concentration of phenylpyruvic acid
- C: Mental deficits are often present with PKU.
- D: The effects of PKU are reversible.

12. A patient has taken an overdose of aspirin. Which of the following should a nurse most closely monitor for during acute management of this patient?

- A: Onset of pulmonary edema
- B: Metabolic alkalosis
- C: Respiratory alkalosis
- D: Parkinson's disease type symptoms

13. A fifty-year-old blind and deaf patient has been admitted to your floor. As the charge nurse your primary responsibility for this patient is?

- A: Let others know about the patient's deficits
- B: Communicate with your supervisor your concerns about the patient's deficits.
- C: Continuously update the patient on the social environment.
- D: Provide a secure environment for the patient.

14. A patient is getting discharged from a SNF facility. The patient has a history of severe COPD and PVD. The patient is primarily concerned about their ability to breath easily. Which of the following would be the best instruction for this patient?

- A: Deep breathing techniques to increase O<sub>2</sub> levels.
- B: Cough regularly and deeply to clear airway passages.
- C: Cough following bronchodilator utilization
- D: Decrease CO<sub>2</sub> levels by increase oxygen take output during meals.

15. A nurse is caring for an infant that has recently been diagnosed with a congenital heart defect. Which of the following clinical signs would most likely be present?

- A: Slow pulse rate
- B: Weight gain
- C: Decreased systolic pressure
- D: Irregular WBC lab values

16. A mother has recently been informed that her child has Down's syndrome. You will be assigned to care for the child at shift change. Which of the following characteristics is not associated with Down's syndrome?

- A: Simian crease
- B: Brachycephaly
- C: Oily skin
- D: Hypotonicity

17. A patient has recently experienced a (MI) within the last 4 hours. Which of the following medications would most like be administered?

- A: Streptokinase
- B: Atropine
- C: Acetaminophen
- D: Coumadin

18. A patient asks a nurse, "My doctor recommended I increase my intake of folic acid. What type of foods contain folic acids?"

- A: Green vegetables and liver
- B: Yellow vegetables and red meat
- C: Carrots
- D: Milk

19. A nurse is putting together a presentation on meningitis. Which of the following microorganisms has noted been linked to meningitis in humans?



- A: S. pneumonia
- B: H. influenza
- C: N. meningitis
- D: Cl. difficile

20. A nurse is administering blood to a patient who has a low hemoglobin count. The patient asks how long to RBC's last in my body? The correct response is.

- A: The life span of RBC is 45 days.
- B: The life span of RBC is 60 days.
- C: The life span of RBC is 90 days.
- D: The life span of RBC is 120 days.

21. A 65 year old man has been admitted to the hospital for spinal stenosis surgery. When does the discharge training and planning begin for this patient?

- A: Following surgery
- B: Upon admit
- C: Within 48 hours of discharge
- D: Preoperative discussion

22. A child is 5 years old and has been recently admitted into the hospital. According to Erickson which of the following stages is the child in?

- A: Trust vs. mistrust

- B: Initiative vs. guilt
- C: Autonomy vs. shame
- D: Intimacy vs. isolation

23. A toddler is 16 months old and has been recently admitted into the hospital. According to Erickson which of the following stages is the toddler in?

- A: Trust vs. mistrust
- B: Initiative vs. guilt
- C: Autonomy vs. shame
- D: Intimacy vs. isolation

24. A young adult is 20 years old and has been recently admitted into the hospital. According to Erickson which of the following stages is the adult in?

- A: Trust vs. mistrust
- B: Initiative vs. guilt
- C: Autonomy vs. shame
- D: Intimacy vs. isolation

25. A nurse is making rounds taking vital signs. Which of the following vital signs is abnormal?

- A: 11 year old male – 90 b.p.m, 22 resp/min. , 100/70 mm Hg
- B: 13 year old female – 105 b.p.m., 22 resp/min., 105/60 mm Hg
- C: 5 year old male- 102 b.p.m, 24 resp/min., 90/65 mm Hg
- D: 6 year old female- 100 b.p.m., 26 resp/min., 90/70mm Hg

26. When you are taking a patient's history, she tells you she has been depressed and is dealing with an anxiety disorder. Which of the following medications would the patient most likely be taking?

- A: Elavil
- B: Calcitonin
- C: Pergolide
- D: Verapamil

27. Which of the following conditions would a nurse not administer erythromycin?

- A: Campylobacterial infection
- B: Legionnaire's disease
- C: Pneumonia
- D: Multiple Sclerosis

28. A patient's chart indicates a history of hyperkalemia. Which of the following would you not expect to see with this patient if this condition were acute?

- A: Decreased HR
- B: Paresthesias
- C: Muscle weakness of the extremities
- D: Migranes

29. A patient's chart indicates a history of ketoacidosis. Which of the following would you not expect to see with this patient if this condition were acute?

- A: Vomiting
- B: Extreme Thirst
- C: Weight gain
- D: Acetone breath smell

30. A patient's chart indicates a history of meningitis. Which of the following would you not expect to see with this patient if this condition were acute?

- A: Increased appetite
- B: Vomiting
- C: Fever
- D: Poor tolerance of light

31. A nurse is reviewing a patient's chart and notices that the patient suffers from conjunctivitis. Which of the following microorganisms is related to this condition?

- A: *Yersinia pestis*
- B: *Helicobacter pylori*
- C: *Vibrio cholera*
- D: *Hemophilus aegyptius*

32. A nurse is reviewing a patient's chart and notices that the patient suffers from Lyme disease. Which of the following microorganisms is related to this condition?

- A: *Borrelia burgdorferi*
- B: *Streptococcus pyrogens*
- C: *Bacillus anthracis*
- D: *Enterococcus faecalis*

33. A fragile 87 year-old female has recently been admitted to the hospital with increased confusion and falls over last 2 weeks. She is also noted to have a mild left hemiparesis. Which of the following tests is most likely to be performed?

- A: FBC (full blood count)
- B: ECG (electrocardiogram)
- C: Thyroid function tests
- D: CT scan

34. A 84 year-old male has been losing mobility and gaining weight over the last 2 months. The patient also has the heater running in his house 24 hours a day, even on warm days. Which of the following tests is most likely to be performed?

- A: FBC (full blood count)
- B: ECG (electrocardiogram)
- C: Thyroid function tests
- D: CT scan

35. A 20 year-old female attending college is found unconscious in her dorm room. She has a fever and a noticeable rash. She has just been admitted to the hospital. Which of the following tests is most likely to be performed first?

- A: Blood sugar check
- B: CT scan
- C: Blood cultures
- D: Arterial blood gases

36. A 28 year old male has been found wandering around in a confused pattern. The male is sweaty and pale. Which of the following tests is most likely to be performed first?

- A: Blood sugar check
- B: CT scan
- C: Blood cultures
- D: Arterial blood gases

37. A mother is inquiring about her child's ability to potty train. Which of the following factors is the most important aspect of toilet training?

- A: The age of the child
- B: The child ability to understand instruction.
- C: The overall mental and physical abilities of the child.
- D: Frequent attempts with positive reinforcement.

38. A parent calls the pediatric clinic and is frantic about the bottle of cleaning fluid her child drank 20 minutes. Which of the following is the most important instruction the nurse can give the parent?

- A: This too shall pass.
- B: Take the child immediately to the ER
- C: Contact the Poison Control Center quickly
- D: Give the child syrup of ipecac

39. A nurse is administering a shot of Vitamin K to a 30 day-old infant. Which of the following target areas is the most appropriate?

- A: Gluteus maximus
- B: Gluteus minimus
- C: Vastus lateralis
- D: Vastus medialis

40. A nurse has just started her rounds delivering medication. A new patient on her rounds is a 4 year-old boy who is non-verbal. This child does not have on any identification. What should the nurse do?

- A: Contact the provider
- B: Ask the child to write their name on paper.
- C: Ask a co-worker about the identification of the child.
- D: Ask the father who is in the room the child's name.

41. A nurse is observing a child's motor, sensory and speech development. The child is 7 months old. Which of the following tasks would generally not be observed?

- A: Child recognizes tone of voice.
- B: Child exhibits fear of strangers.
- C: Child pulls to stand and occasionally bounces.
- D: Child plays patty-cake and imitates.

42. A nurse is observing a child's motor, sensory and speech development. The child is 5 months old. Which of the following tasks would generally not be observed?

- A: Child sits with support.
- B: Child laughs out loud.
- C: Child shifts weight side to side in prone.
- D: Child transfers objects between hands.

43. A nurse is caring for an adult that has recently been diagnosed with renal failure. Which of the following clinical signs would most likely not be present?

- A: Hypotension
- B: Heart failure
- C: Dizziness
- D: Memory loss

44. A nurse is caring for an adult that has recently been diagnosed with hypokalemia. Which of the following clinical signs would most likely not be present?

- A: Leg cramps



- B: Respiratory distress
- C: Confusion
- D: Flaccid paralysis

45. A nurse is caring for an adult that has recently been diagnosed with metabolic acidosis. Which of the following clinical signs would most likely not be present?

- A: Weakness
- B: Dysrhythmias
- C: Dry skin
- D: Malaise

46. A nurse is caring for an adult that has recently been diagnosed with metabolic alkalosis. Which of the following clinical signs would most likely not be present?

- A: Vomiting
- B: Diarrhea
- C: Agitation
- D: Hyperventilation

47. A nurse is caring for an adult that has recently been diagnosed with respiratory acidosis. Which of the following clinical signs would most likely not be present?

- A: CO<sub>2</sub> Retention
- B: Dyspnea
- C: Headaches

D: Tachypnea

48. A nurse is caring for an adult that has recently been diagnosed with respiratory alkalosis. Which of the following clinical signs would most likely not be present?

A: Anxiety attacks

B: Dizziness

C: Hyperventilation cyanosis

D: Blurred vision

49. A nurse is reviewing a patient's medication list. The drug Pentoxifylline is present on the list. Which of the following conditions is commonly treated with this medication?

A: COPD

B: CAD

C: PVD

D: MS

50. A patient has been on long-term management for CHF. Which of the following drugs is considered a loop diuretic that could be used to treat CHF symptoms?

A: Ciprofloxacin

B: Lepirudin

C: Naproxen

D: Bumex

51. A patient has recently been diagnosed with polio and has questions about the diagnosis. Which of the following systems is most affected by polio?

- A: PNS
- B: CNS
- C: Urinary system
- D: Cardiac system

52. A nurse is educating a patient about right-sided heart deficits. Which of the following clinical signs is not associated with right-sided heart deficits?

- A: Orthopnea
- B: Dependent edema
- C: Ascites
- D: Nocturia

53. A nurse is reviewing a patient's medication. Which of the following is considered a potassium sparing diuretic?

- A: Esidrix
- B: Lasix
- C: Aldactone
- D: Edecrin

54. A nurse is reviewing a patient's medication. The patient is taking Digoxin. Which of the following is not an effect of Digoxin?

- A: Depressed HR
- B: Increased CO
- C: Increased venous pressure
- D: Increased contractility of cardiac muscle

55. A patient has been instructed by the doctor to reduce their intake of Potassium. Which types of foods should not worry about avoiding?

- A: Bananas
- B: Tomatoes
- C: Orange juice
- D: Apples

56. A patient's chart indicates the patient is suffering from Digoxin toxicity. Which of the following clinical signs is not associated with digoxin toxicity?

- A: Ventricular bigeminy
- B: Anorexia
- C: Normal ventricular rhythm
- D: Nausea

57. A fourteen year old male has just been admitted to your floor. He has a history of central abdominal pain that has moved to the right iliac fossa region. He also has tenderness over the region and a fever. Which of the following would you most likely suspect?

- A: Appendicitis
- B: Acute pancreatitis

- C: Ulcerative colitis
- D: Cholecystitis

58. A thirteen-year old male has a tender lump area in his left groin. His abdomen is distended and he has been vomiting for the past 24 hours. Which of the following would you most like suspect?

- A: Ulcerative colitis
- B: Biliary colic
- C: Acute gastroenteritis
- D: Strangulated hernia

59. Which of the following is the key risk factor for development of Parkinson's disease dementia?

- A: History of strokes
- B: Acute headaches history
- C: Edward's syndrome
- D: Use of phenothiazines

60. A father notifies your clinic that his son's homeroom teacher has just been diagnosed with meningitis and his son spent the day with the teacher in detention yesterday. Which of the following would be the most likely intervention?

- A: Isolation of the son
- B: Treatment of the son with Aciclovir
- C: Treatment of the son with Rifampicin
- D: Reassure the father

61. A patient has recently been diagnosed with hyponatremia. Which of the following is not associated with hyponatremia?

- A: Muscle twitching
- B: Anxiety
- C: Cyanosis
- D: Sticky mucous membranes

62. A patient has recently been diagnosed with hypernatremia. Which of the following is not associated with hypernatremia?

- A: Hypotension
- B: Tachycardia
- C: Pitting edema
- D: Weight gain

63. Which of the following normal blood therapeutic concentrations is abnormal?

- A: Phenobarbital 10-40 mcg/ml
- B: Lithium .6 – 1.2 mEq/L
- C: Digoxin .5 – 1.6 ng/ml
- D: Valproic acid 40 – 100 mcg/ml

64. Which of the following normal blood therapeutic concentrations is abnormal?

- A: Digitoxin 09 – 25 mcg/ml
- B: Vancomycin 05 – 15 mcg/ml

C: Primidone 02 – 14 mcg/ml

D: Theophylline 10 – 20 mcg/ml

65. Which of the following normal blood therapeutic concentrations is abnormal?

A: Phenytoin 10 – 20 mcg/ml

B: Quinidine 02 – 06 mcg/ml

C: Haloperidol 05 – 20 ng/ml

D: Carbamazepine 5 – 25 mcg/ml

### ***Answer Key***

1. (A) and (B) are both contraindicated with pregnancy.
2. (F) All of the others have can cause photosensitivity reactions.
3. (D) All of the others can cause urine discoloration.
4. (A) Corgard could be removed from the refrigerator.
5. (D) IgG is the only immunoglobulin that can cross the placental barrier.
6. (B) AZT treatment is the most critical intervention.
7. (C) Autonomic neuropathy can cause inability to urinate.
8. (B) All of the clinical signs and systems point to a condition of anorexia nervosa.

9. (B) Hypercalcaemia can cause polyuria, severe abdominal pain, and confusion.
10. (C) Rho gam prevents the production of anti-RH antibodies in the mother that has a Rh positive fetus.
11. (D) The effects of PKU stay with the infant throughout their life.
12. (D) Aspirin overdose can lead to metabolic acidosis and cause pulmonary edema development.
13. (D) This patient's safety is your primary concern.
14. (C) The bronchodilator will allow a more productive cough.
15. (B) Weight gain is associated with CHF and congenital heart deficits.
16. (C) The skin would be dry and not oily.
17. (A) Streptokinase is a clot busting drug and the best choice in this situation.
18. (A) Green vegetables and liver are a great source of folic acid.
19. (D) *Cl. difficile* has not been linked to meningitis.



- 20. (D) RBC's last for 120 days in the body.
- 21. (B) Discharge education begins upon admit.
- 22. (B) Initiative vs. guilt- 3-6 years old
- 23. (A) Trust vs. Mistrust- 12-18 months old
- 24. (D) Intimacy vs. isolation- 18-35 years old
- 25. (B) HR and Respirations are slightly increased. BP is down.
- 26. (A) Elavil is a tricyclic antidepressant.
- 27. (D) Erythromycin is used to treat conditions A-C.
- 28. (D) Answer choices A-C were symptoms of acute hyperkalemia.
- 29. (C) Weight loss would be expected.
- 30. (A) Loss of appetite would be expected.
- 31. (D) Choice A is linked to Plague, Choice B is linked to peptic ulcers, Choice C is linked to Cholera.

32. (A) Choice B is linked to Rheumatic fever, Choice C is linked to Anthrax, Choice D is linked to Endocarditis.
33. (D) A CT scan would be performed for further investigation of the hemiparesis.
34. (C) Weight gain and poor temperature tolerance indicate something may be wrong with the thyroid function.
35. (C) Blood cultures would be performed to investigate the fever and rash symptoms.
36. (A) With a history of diabetes, the first response should be to check blood sugar levels.
37. (C) Age is not the greatest factor in potty training. The overall mental and physical abilities of the child is the most important factor.
38. (C) The poison control center will have an exact plan of action for this child.
39. (C) Vastus lateralis is the most appropriate location.
40. (D) In this case you are able to determine the name of the child by the father's statement, moreover you should not withhold the medication from the child following identification.
41. (D) These skills generally develop between 10-15 months.

42. (D) Transferring objects between hands is a 8-9 month skill.
43. (A) Hypertension is often related renal failure.
44. (D) Flaccid paralysis is an indication of Hyperkalemia.
45. (B) Dysrhythmias are associated with metabolic alkalosis.
46. (D) Hyperventilation occurs with metabolic acidosis.  
Hypoventilation occurs with metabolic alkalosis.
47. (D) Tachypnea is associated with respiratory alkalosis.
48. (C) Hyperventilation cyanosis is associated with respiratory acidosis.
49. (C) This drug is a hemorheological agent that helps blood viscosity.
50. (D) Bumex is considered a loop diuretic.
51. (B) Polio is caused by a virus that attacks the CNS.
52. (A) Orthopnea is a left- sided heart failure clinical symptom.

53. (C) Aldactone (Spironolactone) is considered a potassium sparing diuretic.
54. (C) Digoxin decreases venous pressure.
55. (D) All the others are high in potassium.
56. (C) Ventricular rhythm may be premature with Digoxin toxicity.
57. (A) Appendicitis is most likely indicated in this case.
58. (D) A hernia is the most likely indicated in this case.
59. (D) Penothiazines are considered a risk factor for Parkinson's disease dementia.
60. (C) Rifampicin would be used in this case.
61. (D) Stick mucuous membranes are associated with hypernatremia.
62. (A) Hypotension would be associated with hyponatremia.
63. (C) The normal ranges for Digoxin is .7 – 1.4 ng/ml.
64. (C) The normal ranges of Primidone is 04 –12 mcg/ml.

65. (C) The normal ranges of Carbamazepine is 10 – 20 mcg/ml.

## ***Valuable NCLEX Resource Links***

NCLEX Secrets

<http://www.nclex-test.com>

Internet Exam

<http://www.internetexam.com>

NCLEX Secrets

<http://www.nclex-test.com>

Nurse Success Courses

<http://www.nursesuccess.com/>

RN Express

<http://www.rnexpress.com/>

Online NCLEX Course

<http://www.testpreparationsecrets.com/nclex>

Hurst Review

<http://www.hurstreview.com/>

Delmar's Online Review

<http://www.nursingreview.com/>

## ***Special Report– Quick Reference Lesion Review***

Occipital Lobe	Homonymous hemianopsia, partial seizures with limited visual phenomena
Thalamus	Contralateral thalamus pain, contralateral hemisensory loss
Pineal gland	Early hydrocephalus, papillary abnormalities, Parinaud's syndrome
Internal capsule	Hemisensory loss, homonymous hemianopsia, contralateral hemiplegia
Basal ganglia	Contralateral dystonia, Contralateral choreoathetosis
Pons	Diplopia, internal strabismus, VI and VII involvement, contralateral hemisensory and hemiparesis loss, ipsilateral cerebellar ataxia
Broca's area	Motor dysphasia
Precentral gyrus	Jacksonian seizures, generalized seizures, hemiparesis
Superficial parietal lobe	Receptive dysphasia
Cerebellar hemisphere	Ipsilateral cerebellar ataxia with hypotonia, dysmetria, intention tremor, nystagmus to side of

	lesion
Midbrain	Loss of upward gaze, III involvement, ipsilateral cerebellar signs, diplopia
Angular gyrus	Finger agnosia, allochiria, agraphia, acalculia
Temporal lobe	Contralateral homonymous upper quadrantanopsia, partial complex seizures
Paracentral lobe	Urgency of micturition, incontinence, progressive spastic paraparesis
Third Ventricle	Hydrocephalus
Fourth Ventricle	Hydrocephalus, progressive spastic hemiparesis
Optic Chiasm	Bitemporal hemianopsia, optic atrophy
Uncus	Partial complex seizures
Superior temporal gyrus	Receptive dysphasia
Prefrontal area	Apathy, poor attention span, loss of judgement, release phenomena, distractible
Orbital surface frontal lobe	Paroxysmal atrial tachycardia
Hypothalamus	Amenorrhea, cachexia, hypopituitarism, hypothyroidism, impotence, diencephalic autonomic seizures





## ***Special Report- High Frequency Terms***

The following terms were compiled as high frequency NCLEX test terms. I recommend printing out this list and identifying the terms you are unfamiliar with. Then, use a medical dictionary or the internet to look up the terms you have questions about. Take one section per day if you have the time to maximize recall.

### **A**

Acquired immunodeficiency syndrome  
Acromegaly  
Acute lymphoblastic leukemia  
Acute myelogenous leukemia  
Acute nonlymphocytic leukemia  
Adenocarcinoma  
Adjuvant disease  
Agoraphobia  
Alopecia  
Alzheimer's dementia  
Amebiasis  
Amenorrhea  
Amyloidosis  
Anastomoses  
Aneurysm  
Angina pectoris  
Angiogenesis  
Anklyosing spondylitis  
Anxiety  
Appendicitis  
Arterial disease  
Arteriosclerosis  
Arthralgia  
Arthritis bacterial  
Arthritis (Crohn's disease)  
Arthritis (gouty)  
Arthritis (Reiter's syndrome)  
Arthritis (Rheumatoid arthritis)  
Atypical angina  
Avascular necrosis  
AZT

### **B**

Barrett's oesophagus  
Back pain (Sciatica)  
Back pain (tumor)  
Barlow's syndrome  
Basal cell carcinoma  
Behçet's disease  
Benign prostate hypertrophy  
Biliary disease  
Bilirubin  
Biliverdin  
Blood cultures  
Boerhaave's syndrome  
Bornholm disease  
Bowen's disease  
Bradycardia  
Braxton-Hicks contractions  
Bronchiectasis  
Budd-Chiari syndrome  
Buerger's disease  
Bulimia  
Burkitt Lymphoma

### **C**

CAD  
Cancer (basal cell)  
Cancer (pancreatic)  
Cancer (prostate)  
Cancer (squamous cell)  
Candidiasis  
Cardiac disease  
Cardiac valvular disease  
Carpal tunnel syndrome  
Catecholamines  
Cauda equina syndrome

Centriacinar emphysema  
Charcot-Marie-Tooth disease  
Chest pain  
Chest x-ray  
Cholecystectomy  
Cholecystitis  
Chondroma  
Chronic lymphocytic leukemia  
Chronic myelogenous leukemia  
Chvostek's sign  
Cirrhosis  
Click-murmur syndrome  
Clonidine  
Coccygodynia  
COLD  
Colles' fracture  
Combined hormone replacement  
Computed tomography (CT)  
scan of head  
Confusion  
Conjunctivitis  
Connective tissue disease  
Conn's syndrome  
Coombs' test  
Cor pulmonale  
Corticosteroids  
CREST syndrome  
Cretinism  
Creutzfeldt-Jakob disease  
Crohn's disease  
Cushing's syndrome

## **D**

Dactylitis  
Degenerative heart disease  
Dermatitis  
Diabetes insipidus  
Diabetes mellitus  
Diabetic nephropathy  
Dialysis  
Diaphoresis  
Dietary modification  
Diffuse lymphoma

Digitalis  
Dopamine  
Down's syndrome  
Duchenne muscular dystrophy  
DVT  
Dysmenorrhea  
Dyspnea

## **E**

Ecchymosis  
Ectopic pregnancy  
Electrocardiogram (ECG)  
Embolism  
Emphysema  
Encephalopathy  
Endocrine system  
Epinephrine  
Epstein-Barr virus  
Erythropoietin  
Erythema nodosum  
Esophagitis  
Ewing's sarcoma  
Exophthalmos

## **F**

Fabry's disease  
Fallopian tube  
Fallot's tetralogy  
Fanconi's syndrome  
Fatigue  
Fecal incontinence  
Fibrillation  
Fibromyalgia syndrome  
Fibrous ankylosis  
Follicle-stimulating hormone  
Fuch's corneal dystrophy  
Full blood count (FBC)  
Functional dyspepsia

## **G**

Gamma globulin  
Gangrene  
Gaucher's disease

Gestatoin  
Giant cell tumor  
Gilbert's syndrome  
Gliosis  
Glucagon  
Glucose tolerance test  
Goodpasture's syndrome  
Graves disease  
Guillai-Barre' syndrome  
Gynecomastia

## **H**

Haemochromatosis  
Hand-foot syndrome  
Hashimoto's thyroiditis  
Hartmann's solution  
Heart failure  
Heart rate  
Helper T cells  
Hemarthrosis  
Hematuria  
Hemophilia  
Hemorrhage  
Henoch-Schönlein syndrome  
Heparin  
Hepatic encephalopathy  
Hepatitis (A-E)  
Herpes zoster  
Hiatal hernia  
Hirschsprung's disease  
HIV  
Hodgkin's disease  
Homans sign  
Homocystinuria  
Hormone replacement therapy  
Huntington's chorea  
Hurler's syndrome  
Hunter's syndrome  
Hyalinization  
Hypercortisolism  
Hyperglycemia  
Hyperplasia  
Hyperparathyroidism  
Hypnotic preparations

Hypochromia  
Hyponatremia  
Hypothyroidism  
Hypoxia  
Hysterectomy

## **I**

IBD Inflammatory bowel disease  
IBS Irritable bowel syndrome  
Immune serum globulin  
Immunoglobulins (IgE, IgG, IgM)  
Inderal  
Induration  
Infectious arthritis  
Inflammatory bowel disease  
Inhibitors  
Interferon  
Interleukin (I), (II)  
Interstitial cystitis  
Intramedullary tumors  
Iridocyclitis  
Ischemic Heart Disease  
Isographs  
Isotonic solution

## **J**

Jaundice  
Joint pain (gout)  
Joint pain (psoriatic arthritis)  
Joint sepsis  
Jevenile rheumatoid arthritis

## **K**

Kaposi's sarcoma  
Kawasaki disease  
Kehr's sign  
Kernicterus  
Ketoacidosis  
Kidney failure  
Kidney stones  
Kleihauer test

Korsakoff's psychosis  
Krabbe's disease  
Kreim test  
Kupffer's cells  
Kussmaul's respirations

## **L**

Labile hypertension  
Lactation  
Large cell carcinoma  
Lesch-Nyhan syndrome  
Leukemias  
Leukopenia  
Lewy body dementia  
Lhermitte's sign  
Lipoproteins  
Lobar pneumonia  
Low back pain  
Low density lipoprotein  
Lumbar pain  
Lupus carditis  
Lupus erythematosus  
Lyme disease  
Lymph nodes  
Lymphocytes  
Lymphoid cells  
Lymphotoxin

## **M**

Macrophages  
Malignant melanoma  
Mallory-Weiss tear  
Mantoux test  
Marie-Strumpell disease  
Mastodynia  
Meckel's diverticulum  
Medial cartilage tear  
Melanoma  
Menarche  
Ménière's disease  
Menorrhagia  
Metabolic acidosis  
Metabolic alkalosis  
Metabolism

Metaplasia  
Mid-stream specimen of urine  
Mineral supplements  
Mitral valve prolapse  
Monocytes  
Morpheamultiple myeloma  
Multiple sclerosis  
Munchausen's syndrome  
Myalgias  
Myopathy

## **N**

Neck pain  
Neomycin  
Neoplasms  
Neoplastic disease  
Neurogenic back pain  
Neurologic disorders  
Neurotransmitters  
Niemann-Pick disease  
Night sweats  
Nitrates  
Nitroglycerin  
Nocturnal angina  
Non-Hodgkin's lymphoma  
Norepinephrine  
Nystagmus

## **O**

Oat cell carcinoma  
Obstipation  
Ochronosis  
Oliguria  
Oncogenesis  
Oophorectomy  
Orthostatic hypotension  
Osteitis deformans  
Osteoarthritis  
Osteoblastoma  
Osteochondroma  
Osteomyelitis  
Osteopenia  
Osteoporosis  
Overlap syndrome

**P**

Paget's disease  
 Pain—joint  
 Pain-sources  
 Palmar erythema  
 Palpitations  
 Pancoast's tumors  
 Pancreatic carcinoma  
 Pancreatitis  
 Papilledema  
 Parathyroid hormone  
 Paraneoplastic syndromes  
 Paresthesia  
 Parkinson's disease  
 Paroxysmal  
 Pelvic inflammatory disease (PID)  
 Periarthritis  
 Pericarditis  
 Peripheral arterial disease  
 Perthes disease  
 Phagocytosis  
 Phrenic nerve  
 Pick's disease  
 Plasma cell myeloma  
 Pleural pain  
 Pneumonia  
 Polycythemia  
 Polyneuropathy  
 Polyuria  
 Posttraumatic stress disorder  
 Pregnancy  
 Prinzmetal's angina  
 Pruritus  
 Psoriatic arthropathy  
 Psychological support  
 Pulmonary edema  
 Purpura  
 Pyoderma  
 Pyrophosphate arthropathy

**Q**

Quadriceps

**R**

RA- Rheumatoid arthritis  
 Radiograph  
 Raynaud's disease  
 Reactive arthritis  
 Rectocele  
 Referred pain  
 Reidel's thyroiditis  
 Reiter's syndrome  
 Relaxin  
 Renal failure  
 Renal tuberculosis  
 Respiration  
 Reticuloendothelial  
 Retrovirus  
 Rheumatic chorea  
 Rheumatic fever  
 Rickets  
 Right ventricular failure

**S**

Sacral pain  
 Sacroilitis  
 Salpingitis  
 Sarcoma  
 Satiety  
 Sciatica  
 Scleroderma  
 Serotonin  
 Serum cholesterol  
 Serum urea and electrolytes concentration  
 Sengstaken-Blakemore tube  
 Sex hormones  
 Shoulder pain  
 Sickle cell anemia  
 Sinus bradycardia  
 Sinus tachycardia  
 Sjogren's syndrome  
 SLE- systemic lupus erythematosus

Smoking  
Spastic colitis  
Spondylotic  
Stem cells  
Stool culture  
Stokes-Adams attacks  
Swan-Ganz catheter  
Syndesmophyte  
Synovitis  
Systemic disease  
Systolic rate

## **T**

T4 cell count  
Takayasu disease  
Tay-Sachs disease  
T lymphocytes  
Tendinitis  
Tenesmus  
Testosterone  
Thoracic aneurysms  
Thrombin  
Thrombosis  
Thyroid function tests  
Thyroid gland  
Tietze's syndrome  
Tissue necrosis  
Toxins  
Tourette syndrome  
Tracheal pain  
Transfer factor  
Trauma  
Tuberculosis  
Tumor-benign  
Tumor-metastatic  
Tumor markers  
Turner syndrome

## **U**

Ulceration  
Ultrasound abdomen  
Umbilical pain  
Ureter obstruction  
Urethritis  
Urinary bladder  
Urinary tract infection  
Uroginogen  
Urologic pain  
Urticaria  
UTI  
Uveitis

## **V**

Vaginal bleeding  
Vaginal lubricant  
Vaginal oestrogen therapy  
Vascular disorders  
Venous insufficiency  
Ventricular failure  
Vertebral osteomyelitis  
Vertigo  
Visceral back pain  
Visceral pericardium  
Vital signs  
Vomiting  
Von Willebrand's disease

## **W**

Weight gain  
Wenckebach phenomenon  
Wernicke's encephalopathy  
Wet pleurisy  
Wilson's disease  
Wolff-Parkinson-White  
syndrome  
Wright-Schober test

## ***Definition of Root Words***

### **A**

abdomin/o	abdomen
acou/o	hearing
aden/o	gland
adenoid/o	adenoids
adren/o	adrenal gland
alveol/o	alveolus
amni/o	amnion
andro/o	male
angi/o	vessel
ankly/o	stiff
anter/o	frontal
an/o	anus
aponeur/o	aponeurosis
appendic/o	appendix
arche/o	beginning
arteri/o	artery
atri/o	atrium
aur/i	ear
aur/o	ear
aut/o	self

### **B**

bacteri/o	bacteria
balan/o	glans penis
bi/o	life
blephar/o	eyelid
bronch/i	bronchus
bronch/o	bronchus

### **C**

calc/i	calcium
cancer/o	cancer
carcin/o	cancer
cardi/o	heart
carp/o	carpals
caud/o	tail
cec/o	cecum
celi/o	abdomen
cephal/o	head
cerebell/o	cerebellum
cerebr/o	cerebrum
cervic/o	cervix
cheil/o	lip
cholangi/o	bile duct



chol/e	gall
chondro/o	cartilage
chori/o	chorion
chrom/o	color
clavic/o	clavicle
col/o	colon
colp/o	vagina
core/o	pupil
corne/o	cornea
coron/o	heart
cortic/o	cortex
cor/o	pupil
cost/o	rib
crani/o	cranium
cry/o	cold
cutane/o	skin
cyes/i	pregnancy
cyst/o	bladder

## D

dacry/o	tear
dermat/o	skin
diaphragmat/o	diaphragm
dipl/o	double
dips/o	thirst
dist/o	distal
diverticul/o	diverticulum
dors/o	back
duoden/o	duodenum
dur/o	dura

## E

ech/o	sound
electr/o	electricity
embryo/o	embryo
encephal/o	brain
endocrin/o	endocrine
enter/o	intestine

epididym/o	epididymis
epiglott/o	epiglottis
episi/o	vulva
epitheli/o	epithelium
erythr/o	red
esophag/o	esophagus
esthesi/o	sensation

## F

femor/o	femur
fet/i	fetus
fet/o	fetus
fibr/o	fibrous tissue
fibul/o	fibula

## G

ganglion/o	ganglion
gastr/o	stomach
gingiv/o	gum
glomerul/o	glomerulus
gloss/o	tongue
glyc/o	sugar
gnos/o	knowledge
gravid/o	pregnancy
gynec/o	woman

## H

hem/o	blood
hepat/o	liver
herni/o	hernia
heter/o	other
hidr/o	sweat
hist/o	tissue
humer/o	humerus
hydr/o	water
hymen/o	hymen
hyster/o	uterus

## I

ile/o	ileum
ili/o	ilium
irid/o	iris
iri/o	iris
ischi/o	ischium
ischo/o	blockage

## J

jejun/o	jejunum
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## K

kal/i	potassium
kary/o	nucleus
kerat/o	hard
kinesi/o	motion
kyph/o	hump

## L

lacrim/o	tear duct
lact/o	milk
lamin/o	lamina
lapar/o	abdomen
later/o	lateral
lei/o	smooth
leuk/o	white
lingu/o	tongue
lip/o	fat
lith/o	stone
lob/o	lob/o
lord/o	flexed forward
lumb/o	lumbar
lymph/o	lymph

## M

mamm/o	breast
mandibul/o	mandible
mast/o	breast

mastoid/o	mastoid
maxill/o	maxilla
meat/o	opening
melan/o	black
mening/o	meninges
menisc/o	meniscus
men/o	menstruation
ment/o	mind
metr/i	uterus
metr/o	uterus
mon/o	one
muc/o	mucus
myc/o	fungus
myel/o	spinal cord
my/o	muscle

## N

nas/o	nose
nat/o	birth
necr/o	death
nephr/o	kidney
neur/o	nerve
noct/i	night

## O

ocul/o	eye
olig/o	few
omphal/o	navel
onc/o	tumor
onych/o	nail
oophor/o	ovary
ophthalm/o	eye
opt/o	vision
orchid/o	testicle
orch/o	testicle
organ/o	organ
or/o	mouth
orth/o	straight
oste/o	bone
ot/o	ear
ox/i	oxygen

## P

pachy/o	thick
palat/o	palate
pancreat/o	pancreas
par/o	labor
patell/o	patella
path/o	disease
pelv/i	pelvis
perine/o	peritoneum
petr/o	stone
phalang/o	pharynx
phas/o	speech
phleb/o	vein
phot/o	light
phren/o	mind
plasm/o	plasma
pleur/o	pleura
pneumon/o	lung
poli/o	gray matter
polyp/o	small growth
poster/o	posterior
prim/i	first
proct/o	rectum
proxim/o	proximal
pseud/o	fake
psych/o	mind
pub/o	pubis
puerper/o	childbirth
pulmon/o	lung
pupill/o	pupil
pyel/o	renal pelvis
pylor/o	pylorus
py/o	pus

## Q

quadr/i	four
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## R

rachi/o	spinal
radic/o	nerve
radi/o	radius
rect/o	rectum
ren/o	kidney
retin/o	retina
rhabd/o	striated
rhytid/o	wrinkles
rhiz/o	nerve

## S

sacr/o	sacrum
scapul/o	scapula
scler/o	sclera
scoli/o	curved
seb/o	sebum
sept/o	septum
sial/o	saliva
sinus/o	sinus
somat/o	body
son/o	sound
spermat/o	sperm
spir/o	breathe
splen/o	spleen
spondyl/o	vertebra
staped/o	stapes
staphyl/o	clusters
stern/o	sternum
steth/o	chest
stomat/o	mouth
strept/o	chain-like
super/o	superior
synovi/o	synovia

## T

tars/o	tarsal
ten/o	tendon
test/o	testicle
therm/o	heat
thorac/o	thorax

thromb/o	clot
thym/o	thymus
thyroid/o	thyroid gland
tibi/o	tibia
tom/o	pressure
tonsill/o	tonsils
toxic/o	poison
trachel/o	trachea
trich/o	hair
tympan/o	eardrum

## U

uln/o	ulna
ungu/o	nail
ureter/o	ureter
urethr/o	urethra
ur/o	urine

uter/o	uterus
uvul/o	uvula

## V

vagin/o	vagina
valv/o	valve
vas/o	vessel
ven/o	vein
ventricul/o	ventricle
ventro/o	frontal
vertebr/o	vertebra
vesic/o	bladder
vesicul/o	seminal vesicle

## Prefixes

an-	without
ante-	before
bi-	two
brady-	slow
dia-	through
dys-	difficult
endo-	within
epi-	over
eu-	normal
exo-	outward
hemi-	half
hyper-	excessive
hypo-	deficient
inter-	between
intra-	within
meta-	change

multi-	numerous
nulli-	none
pan-	total
para-	beyond
per-	through
peri-	surrounding
post-	after
pre-	before
pro-	before
sub-	below
supra-	superior
sym-	join
syn-	join
tachy-	rapid
tetra-	four
trans-	through

## ***Suffixes***

-al	pertaining to	-oid	resembling
-algia	pain	-ology	study
-apheresis	removal	-oma	tumor
-ary	pertaining to	-opia	vision
-asthenia	weakness	-opsy	view of
-capnia	carbon dioxide	-orrhaphy	repairing
-cele	hernia	-orrhea	flow
-clasia	break	-osis	condition
-clasis	break	-otomy	cut into
-crit	separate	-oxia	oxygen
-cyte	cell	-paresis	partial paralysis
-desis	fusion	-pathy	disease
-drome	run	-pepsia	digestion
-eal	pertaining to	-pexy	suspension
-ectasis	expansion	-phagia	swallowing, eating
-ectomy	removal	-phobia	excessive fear of
-esis	condition	-phonia	sound, voice
-genesis	cause	-physis	growth
-genic	pertaining to	-plasia	development
-gram	record	-plasm	a growth
-graph	recording	-plegia	paralysis
device		-pnea	breathing
-ial	pertaining to	-poiesis	formation
-iasis	condition	-ptosis	sagging
-iatrist	physician	-salpinx	fallopian tube
-iatry	specialty	-sacoma	malignant tumor
-ic	pertaining to	-schisis	crack
-ician	one that	-sclerosis	hardening
-ictal	attack	-stasis	standing
-ior	pertaining to	-stenosis	narrowing
-ism	condition of	-thorax	chest
-itis	inflammation	-tocia	labor, birth
-lysis	separating	-tome	cutting device
-malacia	softening	-trophy	develop
-meter	measure	-uria	urine
-odynia	pain		

