NCLEX-RN Test Study Guide
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NCLEX Test Resources

Free NCLEX Practice Tests
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
**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
- Dieuretics
- 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
Cyanosis
Chest X-ray

Treatment:
Echocardiogram
Auscultation
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.
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<th>Tests:</th>
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<td>CAT Scan</td>
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<td>Airway obstruction</td>
<td>ABG</td>
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<td>Hypoventilation syndrome</td>
<td>Pulmonary Function Test.</td>
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<td>Severe scoliosis</td>
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<td>Severe asthma</td>
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<th>Treatment:</th>
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<td>Mechanical ventilation</td>
</tr>
<tr>
<td>Wheezing</td>
<td>Bronchodilators</td>
</tr>
<tr>
<td>SOB</td>
<td></td>
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Respiratory Alkalosis: CO2 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 syncitial 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

**Monitor the patient for:**

**Tests:**
- 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 pneumoniasae (pneumococcus).
Types of pneumonia:
- Viral pneumonia
- Walking pneumonia
- Legionella pneumonia
- CMV pneumonia
- Aspiration pneumonia
- Atypical pneumonia
- Legionella pneumonia

Symptoms:
- Fever
- Headache
- Ribvirin
- SOB
- Cough

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

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

Tests:
- CBC
- Lung biopsy
- Thoracentesis
- CT scan
- Bronchoscopy

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Monitor patient for:
- Meningitis
- Emphysema
- 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

**Treatment:**
- Lung transplantation
- Special lavage of the lungs

Pulmonary hypertension: elevated BP in the lung arteries

**Causes:**
- Fatigue
- May be genetically linked
- More predominant in women

**Symptoms:**
- Fatigue
- Chest Pain
- SOB with activity
- LE edema
- 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 were lung arteries and veins form improperly, and a fistula is formed creating poor oxygenation of blood.

Symptoms: CT Scan
SOB with activity Pulmonary arteriogram
Presence of a murmur Low O2 Saturation levels
Cyanosis Elevated RBC’s
Clubbing
Paradoxical embolism Surgery

Tests: Embolization

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

Cause: SOB
Fungus Aspergillus Chest pain

Symptoms:
Wheezing Cough
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 pulmonarle

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

**Causes:**
Chest pain
DVT- most common
Decreased BP
Skin color changes

**Symptoms:**
LE and pelvic pain
Sweating
Dizziness
Anxiety
Tachycardia
Labored breathing
Cough

Tests:
Doppler US
Chest X-ray
Pulmonary angiogram
Pulmonary perfusion test
Plethysmography
ABG
Check O2 saturation

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

Monitor the patient for:
Shock
Pulmonary hypertension
Hemorrhage
Palpitations
Heart failure

Tuberculosis— infection caused by *Mycobacterium tuberculosis*.

Causes:
Fatigue
Due to airborne exposure
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

Symptoms:
Fever
SOB
Fatigue
Loss of appetite
Cough
Joint pain
Treatment:
Bronchoscopy
Antiviral medications
Oxygen therapy

Tests:
CMV serology tests
ABG
Blood cultures

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

Causes:
Herpes simplex virus
Rhinovirus
Influenza

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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
- Rapid pulse
- Anxiety
- Nervousness
- Thready pulse
- Mottled skin color
- Profuse sweating
- Poor capillary refill

Tests:
- Nuclear Scans
- Electrocardiogram
- Echocardiogram
- Electrocardiogram
- ABG
- Chem-7
- Chem-20
- Electrolytes
- Cardiac Enzymes
- Treatment:
  - Amrinone
  - Norepinephrine
  - Dobutamine
  - IV fluids
  - PTCA
  - Extreme cases-pacemaker, IABP

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

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### 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

**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

Tests:
CBC

Treatment:
Increase fluids via IV
Avoid Hypothermia
Epinephrine

Norepinephrine
Dobutamine
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:*  
Janeway lesions  
Weakness  
Fever  
Murmur  
SOB  
Night sweats  

*Tests:*  
CBC  
ESR
ECG
Blood cultures
Enlarged spleen
Presence of splinter hemorrhages

Treatment:
IV antibiotics

Monitor the patient for:
Jaundice
Arrhythmia
CHF

Glomerulonephritis
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

Symptoms:
Dry cough
Pleuritis
Fever
Anxiety
Crackles
Pleural effusion
LE swelling
Chest pain

Unable to lie down flat
Tests:
Auscultation
MRI scan
CT scan
Echocardiogram (key test)
ESR
Chest x-ray

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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:
Bradydcardia
Tachycardia
Ventricular fibrillation
Ectopic heart beat
Ventricular tachycardia
Wolff-Parkinson-white syndrome
Atrial fib.
Sick sinus syndrome
Sinus Tachycardia
Sinus Bradycardia

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

**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

**Tests:**
ECG
CBC

**Treatment:**
Isoenzyme tests
Coronary Angiography
Chest X-ray
MRI
Auscultation

**Congestive Heart Failure:**

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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

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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. S₃ 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

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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
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)

Symptoms:
- Constipation
- Weight gain
- Weakness
- Fatigue
- Poor taste
- Hoarse vocal sounds
- Joint pain
- Muscle weakness
- Poor speech
- Color changes
- Depression

Tests:
- Decreased BP and HR
- Chest X-ray
- Elevated liver enzymes, prolactin, and cholesterol
- Decreased T4 levels and serum sodium levels
- 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
Hyperthyroidism: excessive production of thyroid hormone.

**Causes:**  
Iodine overdose  
Thyroid hormone overdose  
Graves’ disease (key)  
Tumors affecting the reproductive system

**Symptoms:**  
Skin color changes  
Weight loss  
Anxiety  
Possible goiter  
Nausea  
Exophthalmos  
Diarrhea

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

**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
Tests:
  - Salt levels
  - Low levels of cortisol
  - Low levels of aldosterone
  - Increased 17-OH progesterone
  - Increased 17-ketosteroids in urine
Treatment:
  - Reconstructive surgery
  - Hydrocoristone
  - Dexamethasone

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
  - 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
Cortisol level check
MRI- check for tumors

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

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 I vs. type 2 DM.

Symptoms:
- Increased amylase and potassium levels
- Ketones in urine
- Check BP

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

**Tests:**
- T3/T4 increased
- Increased HR
- Lymphocyte concentration noted with biopsy

**Treatment:**
Varies depending on symptoms.
(Beta blockers may be used.)

**Monitor the patient for:**
- Autoimmune thyroditis
- Hashimoto’s thyroiditis
- Goiter
- Stuma lymphomatosoma
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

**Tests:**
- Elevated HR
- Increased T3/T4 levels
- Serum TSH levels are decreased
- Goiter

**Monitor the patient for:**
- Fatigue
- CHF
- Depression
- Hypothyroidism (over-correction)

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

***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 meningidis* (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*

Acitinomycetes- 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

<table>
<thead>
<tr>
<th>Disease</th>
<th>Bacteria</th>
<th>Primary Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculosis, renal and meningeal infections</td>
<td><em>Mycobacterium tuberculosis</em></td>
<td>Isoniazid + rifampin + pyrazinamide</td>
</tr>
<tr>
<td>Leprosy</td>
<td><em>Mycobacterium leprae</em></td>
<td>Dapsone + rifampin</td>
</tr>
</tbody>
</table>

Diseases and Spirochetes Review

<table>
<thead>
<tr>
<th>Disease</th>
<th>Bacteria</th>
<th>Primary Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyme Disease</td>
<td><em>Borrelia burgdorferi</em></td>
<td>Tetracycline</td>
</tr>
<tr>
<td>Meningitis</td>
<td><em>Leptospira</em></td>
<td>Penicillin G</td>
</tr>
<tr>
<td>Syphilis</td>
<td><em>Treponema pallidum</em></td>
<td>Penicillin G</td>
</tr>
</tbody>
</table>

Diseases and Actinomycetes Review

<table>
<thead>
<tr>
<th>Disease</th>
<th>Bacteria</th>
<th>Primary Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervicofacial, and other lesions</td>
<td><em>Actinomyces israelii</em></td>
<td>Penicillin G</td>
</tr>
</tbody>
</table>
# Diseases and Gram-Negative Bacilli Review

<table>
<thead>
<tr>
<th>Disease</th>
<th>Bacteria</th>
<th>Primary Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningitis</td>
<td><em>Flavobacterium meningosepticum</em></td>
<td>Vancomycin</td>
</tr>
<tr>
<td>UTI’s Bacteremia</td>
<td><em>Escherichia coli</em></td>
<td>Ampicillin+/– aminoglycoside</td>
</tr>
<tr>
<td>Gingivitis, Genital infections, ulcerative pharyngitis</td>
<td><em>Fusobacterium nucleatum</em></td>
<td>Penicillin G</td>
</tr>
<tr>
<td>Abscesses</td>
<td><em>Bacteroides species</em></td>
<td>Clindamycin/Penicillin G</td>
</tr>
<tr>
<td>Hospital acquired infections</td>
<td><em>Acinetobacter</em></td>
<td>Aminoglycoside</td>
</tr>
<tr>
<td>Abscesses, Endocarditis</td>
<td><em>Bacteroides fragilis</em></td>
<td>Clindamycin, metronidazole</td>
</tr>
<tr>
<td>Legionnaires’ Disease</td>
<td><em>Legionella pneumophila</em></td>
<td>Erythromycin</td>
</tr>
<tr>
<td>UTI’s</td>
<td><em>Proteus mirabilis</em></td>
<td>Ampicillin/Amoxicillin</td>
</tr>
<tr>
<td>Pneumonia, UTI’s, Bacteremia</td>
<td><em>Pseudomonas aeruginosa</em></td>
<td>Penicillin-Broad</td>
</tr>
<tr>
<td>Bacteremia, Endocarditis</td>
<td><em>Streptobacillus moniliformis</em></td>
<td>Penicillin G</td>
</tr>
<tr>
<td>Pneumonia, UTI</td>
<td><em>Klebsiella pneumoniae</em></td>
<td>Cephalosporin</td>
</tr>
<tr>
<td>Bacteremia, Wound infections</td>
<td><em>Pasteurella multocida</em></td>
<td>Penicillin G</td>
</tr>
</tbody>
</table>
### Diseases and Gram-Positive Bacilli Review

<table>
<thead>
<tr>
<th>Disease</th>
<th>Bacteria</th>
<th>Primary Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Gangrene</td>
<td><em>Clostridium</em></td>
<td>Penicillin G</td>
</tr>
<tr>
<td>Tetanus</td>
<td><em>Clostridium tetani</em></td>
<td>Penicillin G</td>
</tr>
<tr>
<td>Pharyngitis</td>
<td><em>Corynebacterium diptheriae</em></td>
<td>Penicillin G</td>
</tr>
<tr>
<td>Meningitis, Bacteremia</td>
<td><em>Listeria monocytogenes</em></td>
<td>Ampicillin</td>
</tr>
<tr>
<td>Anthrax / pneumonia</td>
<td><em>Bacillus anthracis</em></td>
<td>Penicillin G</td>
</tr>
<tr>
<td>Endocarditis</td>
<td><em>Corynebacterium species</em></td>
<td>Penicillin G/Vancomycin</td>
</tr>
</tbody>
</table>

### Diseases and Cocci Review

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

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<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>abscesses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UTI’s, Endocarditis</td>
<td></td>
<td><em>Streptococcus faecalis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ampicillin, Penicillin G</td>
</tr>
<tr>
<td>Pneumonia, sinusitis, otitis,</td>
<td></td>
<td><em>Streptococcus</em></td>
</tr>
<tr>
<td>Arthritis</td>
<td></td>
<td><em>pneumoniae</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Penicillin G or V</td>
</tr>
<tr>
<td>Cellulitis, Scarlet fever,</td>
<td></td>
<td><em>Streptococcus</em></td>
</tr>
<tr>
<td>bacteremia</td>
<td></td>
<td><em>pyogenes</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Penicillin G or V</td>
</tr>
<tr>
<td>Bacteremia,</td>
<td></td>
<td><em>Streptococcus</em></td>
</tr>
<tr>
<td>endocarditis</td>
<td></td>
<td><em>bovis</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Penicillin G</td>
</tr>
</tbody>
</table>

**DNA Virus Review**

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

**RNA Virus Review**

<table>
<thead>
<tr>
<th>RNA Virus</th>
<th>Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human respiratory virus</td>
<td>Respiratory tract infection</td>
</tr>
<tr>
<td>Hepatitis A virus</td>
<td>Hepatitis A</td>
</tr>
<tr>
<td>Influenza virus A-C</td>
<td>Influenza</td>
</tr>
<tr>
<td>Measles virus</td>
<td>Measles</td>
</tr>
<tr>
<td>Mumps virus</td>
<td>Mumps</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Virus/Condition</th>
<th>Disease/Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory syncytial virus</td>
<td>Respiratory tract infection in children</td>
</tr>
<tr>
<td>Poliovirus</td>
<td>Poliomyelitis</td>
</tr>
<tr>
<td>Rhinovirus types 1-89</td>
<td>Cold</td>
</tr>
<tr>
<td>Human immunodeficiency virus</td>
<td>AIDS</td>
</tr>
<tr>
<td>Rabies virus</td>
<td>Rabies</td>
</tr>
<tr>
<td>Alphavirus</td>
<td>Encephalitis</td>
</tr>
<tr>
<td>Rubella virus</td>
<td>Rubella</td>
</tr>
</tbody>
</table>
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-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-α Promotes the activation of neutrophils and is produced by macrophages.
TNF-β Produced by T lymphocytes and encourages the activation of neutrophils
γ-interferon (Activates macrophages and is produced by helper T cells.)
## Controlled Substance Categories

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

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: Acetominophin has TI of 27. Meperidine (DEMEROL) has a TI of 8.
### Pharmacology

<table>
<thead>
<tr>
<th>Drug Suffix</th>
<th>Example</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>-azepam</td>
<td>Diazepam</td>
<td>Benzodiazepine</td>
</tr>
<tr>
<td>-azine</td>
<td>Chlorpromazine</td>
<td>Phenothiazine</td>
</tr>
<tr>
<td>-azole</td>
<td>Ketoconazole</td>
<td>Anti-fungal</td>
</tr>
<tr>
<td>-barbital</td>
<td>Secobarbital</td>
<td>Barbiturate</td>
</tr>
<tr>
<td>-cillin</td>
<td>Methicillin</td>
<td>Penicillin</td>
</tr>
<tr>
<td>-cycline</td>
<td>Tetracycline</td>
<td>Antibiotic</td>
</tr>
<tr>
<td>-ipramine</td>
<td>Amitriptyline</td>
<td>Tricyclic Anti-depressant</td>
</tr>
<tr>
<td>-navir</td>
<td>Saquinavir</td>
<td>Protease Inhibitor</td>
</tr>
<tr>
<td>-olol</td>
<td>Timolol</td>
<td>Beta Antagonist</td>
</tr>
<tr>
<td>-oxin</td>
<td>Digoxin</td>
<td>Cardiac glycoside</td>
</tr>
<tr>
<td>-phylline</td>
<td>Theophylline</td>
<td>Methylxanthine</td>
</tr>
<tr>
<td>-pril</td>
<td>Enalapril</td>
<td>ACE Inhibitor</td>
</tr>
<tr>
<td>-terol</td>
<td>Albuterol</td>
<td>Beta 2 Agonist</td>
</tr>
<tr>
<td>-tidine</td>
<td>Ranitidine</td>
<td>H2 Antagonist</td>
</tr>
<tr>
<td>-trophin</td>
<td>Somatotrophin</td>
<td>Pituitary Hormone</td>
</tr>
<tr>
<td>-zosin</td>
<td>Doxazosin</td>
<td>Alpha 1 Antagonist</td>
</tr>
</tbody>
</table>
**Cardiovascular Pharmacology**

Antiarrhythmics- Na+ channel blockers (Class I)

**Class IA**
- Procainamide
- Disopyramide
- Amiodarone
- Quinidine

**Class IB**
- Mexiletine
- Lidocaine
- Tocainide

**Class IC**
- Mexiletine
- Lidocaine
- Tocainide
- Propafenone

Antiarrhythmics (Beta blockers) (Class II)
- Metoprolol
- Atenolol
- Propranolol
- Timolol
- Esmolol

Antiarrhythmics (K+Channel blockers) (ClassIII)
- Sotaolol
- Amiodarone
- Bretylium
- Ibutilide

Antiarrhythmics (Ca2+ 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

Dieuretics:
Loop Dieuretics
Hydrochlorothiazide
K+ Sparing Dieuretics
Spironolactone
Triamterene
Amiloride
# CNS Pharmacology

<table>
<thead>
<tr>
<th>Sympathomimetics:</th>
<th>Tricyclic Antidepressants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dopamine</td>
<td>Doxepine</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>Imipramine</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Amitriptyline</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>Nortriptyline</td>
</tr>
<tr>
<td>Isoproterenol</td>
<td>Amitriptyline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cholinomimetics:</th>
<th>Parkinson’s Treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbachol</td>
<td>L-dopa</td>
</tr>
<tr>
<td>Neostigmine</td>
<td>Amantadine</td>
</tr>
<tr>
<td>Pyridostigmine</td>
<td>Bromocriptine</td>
</tr>
<tr>
<td>Echothiophate</td>
<td></td>
</tr>
<tr>
<td>Bethanechol</td>
<td></td>
</tr>
<tr>
<td>Atropine-Muscarinic blocker</td>
<td>Benzodiazepines:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beta blockers:</th>
<th>Opiod Analgesics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atenolol</td>
<td>Heroin</td>
</tr>
<tr>
<td>Nadolol</td>
<td>Methadone</td>
</tr>
<tr>
<td>Propranolol</td>
<td>Morphine</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>Codeine</td>
</tr>
<tr>
<td>Pindolol</td>
<td>Dextromethorphan</td>
</tr>
<tr>
<td>Labetalol</td>
<td>Meperidine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAO Inhibitors:</th>
</tr>
</thead>
</table>
Tranylcypromine
Phenelzine
Seroton specific Re-uptake inhibitors:
Paroxetine
Sertraline
Fluoxetine
Citalopram

Epilepsy Treatment:
Valproic acid
Phenobarbital
Benzodiazepines
Gabapentin
Ethosuximide
Carbamazepine

Neuroleptics (Antipsychotic drugs)
Chlorpromazine
Thioridazine
Clozapine
Fluphenazine
Haloperidol

Alpha 1 Selective blockers:
Terazosin
Prazosin
Doxazosin

Alpha 2 Selective blockers:
Yohimbine

Glaucma Treatment:
Prostaglandins
Dieuretics
Alpha agonists
Beta Blockers

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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
- Celecoxb

NSAID’s:

- Naproxen
- Indomethacin
- Ibuprofen

Diabetic Treatment:

- Sulfonylureas:
- Chlorpropamide
- Tolbutamide
- Glyburide

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Insulin- Key
Metformin

Glitazones:
Rosiglitazone
Troglitazone
Pioglitazone

Asthma Treatment:

Corticosteroids:
Prednisone
Beclomethasone

Nonselective Beta agonists:
Isoproterenolol

Muscarinic agonists:
Ipratropium

Antileukotrienes:
Zafirlukast
Zileuton

H$_2$ blockers:
Famotidine
Nizatidine
Cimetidine
Ranitidine

Beta 2 agonists:
Salmeterol
Albuterol
Anti-Microbial Drugs

Tetracyclines:
- Tetracycline
- Doxycycline
- Minocycline
- Demeclocycline

Macrolides:
- Carithormycin
- Erythromycin
- Azithromycin

Aminoglycosides:
- Amikacin
- Gentamicin
- Neomycin
- Tobramycin
- Streptomycin

Protein Synthesis Inhibitors:
- Chloramphenicol
- Aminoglycosides
- Tetracyclines

TB Medications:
- Isoniazid
- Rifampin
- Ethambutol
- Pyrazinamide
- Ethambutol

Fluoroquinolones:
- Ciprofloxacin
- Sparfloxacin
- Enaxacin
- Nalidixic acid

Sulfonamides:
- Sulfadiazine
- Sulfisoxazole

Sulfamethoxazole

Malaria Treatment:
- Chlorquine
- Quinine
- Mefloquine

Additional Mentionable Anti-viral Drugs:
- Acyclovir
Amatadine
Ribavirin
Zanamivir
Ganciclovir

HIV Treatment:
Zidovudine (AZT)       Protease Inhibitors-(HIV)
Nevirapine             Saquinavir
Didanosine             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**

<table>
<thead>
<tr>
<th>Household</th>
<th>Metric</th>
<th>Apothecary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 quart</td>
<td>1000 ml</td>
<td>1 quart</td>
</tr>
<tr>
<td>1 pint</td>
<td>500 ml</td>
<td>1 pint</td>
</tr>
<tr>
<td>2 tablespoons</td>
<td>30 ml</td>
<td>1 ounce</td>
</tr>
<tr>
<td>1 tablespoons</td>
<td>15 ml</td>
<td>4 fluid drams</td>
</tr>
<tr>
<td>1 teaspoon</td>
<td>5 ml</td>
<td>1 fluid dram</td>
</tr>
<tr>
<td>15 drops</td>
<td>1ml</td>
<td>15 minims</td>
</tr>
</tbody>
</table>

**Common Conversions**
<table>
<thead>
<tr>
<th>Solid Conversions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apothecary</strong></td>
<td><strong>Avoirdupois</strong></td>
</tr>
<tr>
<td>2.7 (lb)</td>
<td>2.2 (lb)</td>
</tr>
<tr>
<td>1.33 (lb)</td>
<td>1 (lb)</td>
</tr>
<tr>
<td>480 (gr)</td>
<td>1 (ounce)</td>
</tr>
<tr>
<td>15 (gr)</td>
<td>15.4 (gr)</td>
</tr>
<tr>
<td>1 (gr)</td>
<td>1 (gr)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquid Conversions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household</strong></td>
<td><strong>Metric</strong></td>
</tr>
<tr>
<td>1 drop</td>
<td>.06 (ml)</td>
</tr>
<tr>
<td>¼ teaspoon</td>
<td>1 (ml)</td>
</tr>
<tr>
<td>1 teaspoon</td>
<td>4 or 5 (ml)</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1 tablespoon</td>
<td>15 (ml)</td>
</tr>
<tr>
<td>2 tablespoons</td>
<td>30 (ml)</td>
</tr>
<tr>
<td>1 cup</td>
<td>250 (ml)</td>
</tr>
<tr>
<td>1 pint</td>
<td>500 (ml)</td>
</tr>
<tr>
<td>1 quart</td>
<td>1000 (ml)</td>
</tr>
</tbody>
</table>

**Metric - (Apothecaries’)**

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Equivalent (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/100 grain</td>
<td>.6 (mg)</td>
</tr>
<tr>
<td>1/60 grain</td>
<td>1 (mg)</td>
</tr>
<tr>
<td>1/30 grain</td>
<td>2 (mg)</td>
</tr>
<tr>
<td>1/20 grain</td>
<td>3 (mg)</td>
</tr>
<tr>
<td>1/15 grain</td>
<td>4 (mg)</td>
</tr>
<tr>
<td>1/10 grain</td>
<td>6 (mg)</td>
</tr>
<tr>
<td>1/6 grain</td>
<td>10 (mg)</td>
</tr>
<tr>
<td>1/5 grain</td>
<td>12 (mg)</td>
</tr>
<tr>
<td>1/3 grain</td>
<td>20 (mg)</td>
</tr>
<tr>
<td>3/8 grain</td>
<td>25 (mg)</td>
</tr>
<tr>
<td>½ grain</td>
<td>30 (mg)</td>
</tr>
<tr>
<td>1 grain</td>
<td>60 (mg)</td>
</tr>
<tr>
<td>1 ½ grains</td>
<td>100 (mg)</td>
</tr>
<tr>
<td>5 grains</td>
<td>300 (mg)</td>
</tr>
<tr>
<td>10 grains</td>
<td>600 (mg)</td>
</tr>
</tbody>
</table>
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, H2O, 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 H2O 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 H2O in a person.
- if $V_d = \text{total amount of body (approx. 42)}$ 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 O2 or add H
3. oxidation rxns- adds an O2 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 entrohepatic 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\textsuperscript{st} 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. The 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 addition 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
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)

\[ \text{Amount of drug going in to kidney (mg/ml)} \]

Or

\[ Cl = \text{flow} \times \frac{[C]_{\text{in}} - [C]_{\text{out}} \text{(amount removed)}}{[C]_{\text{in}} \text{(amount in blood)}} \]

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 1st order kinetics. In
1\textsuperscript{st} order kinetics a constant faction of the drug is eliminated/unit time. The time required to remove half of the drug is called \( t \frac{1}{2} \). \( T1/2 \) is constant in 1\textsuperscript{st} order kinetics.

In 1\textsuperscript{st} order kinetics the:

Rate of elimination = concentration of drug in plasma (mg/ml) \( \times \) 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 = \text{amount of drug in plasma} \over \text{amount of drug given}

Rate of Elimination = Cl \( \times \) concentration in plasma

Time to reach steady state depends on dosing interval and elimination \( t \frac{1}{2} \). 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) \( \times \) \( V_d \) (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 - $!+1 = 2$
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

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

Treatment:
Surgery
Chemotherapy
Radiation


**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
- 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:**
- Dyskinetic CP 20%
- Mixed CP
- Spastic CP 50%
**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:*
- Breaths sounds check
- X-rays

*Treatment:*
- Acetaminophen
- Steroid medications
- Intubation
- Nebulizers

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Monitor the patient for: 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.

Symptoms: ECGH
Fever ESR
Joint pain Urine Analysis
Swollen lymph nodes
Peripheral edema Treatment:
Rashes Gamma globulin
Papillae on the tongue Salicylate treatment
Chapped/Red lips

Tests: Monitor the patient for:
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

Symptoms: 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/Diptheria
- 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: EKG
Right ventricular hypertrophy Echocardiogram
Ventricular septal defect Heart Catheterization
Aorta from both ventricles CBC
Stenosis of the pulmonic outflow tract Heart Murmur

Symptoms: Treatment:
Poor weight gain Surgery
Cyanosis Small meals
Death Limit child’s anxiety
Limited infant feeding Monitor the patient for:
Clubbing Seizures
SOB Poor overall development

Tests:
Chest X-ray Cyanois

Atrial septal defect- congenital opening between the atria.

Symptoms:
Dyspnea Tests:
Reoccurring infections Catheterization
(respiratory) Echocardiography
SOB ECG
Palpitations MRI
Irregular heart rhythm/sounds

Monitor the patient for:

**Treatment:**
Surgery
Antibiotics

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

**Tests:**
Auscultation
Echocardiogram
ECG

Monitor the patient for:

Heart failure
A fib.
Pulmonary Htn.
Endocarditis

Endocarditis
Pulmonary Htn.
Aortic insufficiency
Limited growth and development
Arrhythmias
CHF

Patent ductus arteriosus: open blood vessel (ductus ateriosus) that does not close after birth.
<table>
<thead>
<tr>
<th><strong>Symptoms:</strong></th>
<th><strong>Treatment:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOB</td>
<td>Surgery</td>
</tr>
<tr>
<td>Limited feeding</td>
<td>Indomethacin</td>
</tr>
<tr>
<td></td>
<td>Decrease fluid volumes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tests:</strong></th>
<th><strong>Monitor the patient for:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ECG</td>
<td>Surgical complications</td>
</tr>
<tr>
<td>Echocardiogram</td>
<td>Endocarditis</td>
</tr>
<tr>
<td>Heart murmur</td>
<td>Heart failure</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td></td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th><strong>Symptoms:</strong></th>
<th><strong>Cardiac catheterization</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td></td>
</tr>
<tr>
<td>Hypertension with activity</td>
<td></td>
</tr>
<tr>
<td>Nose bleeding</td>
<td></td>
</tr>
<tr>
<td>Fainting</td>
<td></td>
</tr>
<tr>
<td>SOB</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tests:</strong></th>
<th><strong>Monitor the patient for:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Check BP</td>
<td>Stroke</td>
</tr>
<tr>
<td>Doppler US</td>
<td>Heart failure</td>
</tr>
<tr>
<td>Chest CT</td>
<td>Aortic aneurysm</td>
</tr>
<tr>
<td>MRI</td>
<td>Htn</td>
</tr>
<tr>
<td>ECG</td>
<td>CAD</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>Endocarditis</td>
</tr>
<tr>
<td></td>
<td>Aortic dissection</td>
</tr>
</tbody>
</table>
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. β-hCG
4. CA-125
5. PSA

Define the following terms:

- Basal cell carcinoma:
- Chondrosarcoma:
- Ewing’s sarcoma:
- Giant cell tumor:
- Melaonoma:
- Meningioma:
- Oligodendroglioma:
- Pituitary ademona:
- 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
Zollinger-Ellison syndrome: Tumors of the pancreas that cause upper GI inflammation. The tumors secrete gastrin causing high levels of stomach acid.

**Symptoms:**
- Elevated gastrin levels
- Diarrhea
- Tumors in the pancreas
- Vomiting
- Abdominal pain

**Tests:**
- Cimetidine
- Abdominal CT
- Lansoprazole
+ Calcium Infusion Test
+ Secretin Stimulation Test
- Omeprazole
- Surgery

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

**Key organs affected are:**
- Abdominal pain/distention
- Eyes
- Dementia
- Brain
- Speech problems
- Liver
- Muscle weakness
- Kidneys
- Spenomegaly
- Confusion

**Symptoms:**
- Gait disturbances
- Dementia
- Jaundice
- Tests:
- Tremors
- Various lab tests:
Bilirubin/PT/SGOT increased  Corticosteroids
Albumin/Uric acid production decreased  Penicillamine
MRI
Genetic testing
Low levels of serum copper  Cirrhosis
Copper is found in the tissues  Muscle weakness
Kayser-Fleisher Rings in the eye  Joint pain/stiffness
Anemia

Treatment:
Pyridoxine  Fever
Low copper diet  Hepatitis

Pancreatitis: Inflammation of the pancreas

Symptoms: Sweating
Fever
Vomiting  Tests:
Nausea  X-ray
Chills  CT scan
Anxiety  Various Lab tests
Jaundice


Symptoms: Depression
Nausea  Back pain
Jaundice  Indigestion

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Abdominal pain
Weight loss

Tests:
CT scan
Biopsy
Abdominal US

Liver function test

Treatment:
Surgery
Chemotherapy
Radiation
Whipple procedure

Hepatitis A: Viral infection that causes liver swelling.

Symptoms:
Fatigue
Nausea
Fever
Itching
Vomiting

Increased liver enzymes
Presence of IgG and IgM antibodies
Enlarged liver

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:
Jaundice
Dark Urine
Malaise

Joint pain
Fever
Fatigue
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

Tests:
ELISA assay
Increased levels of liver enzymes
No Hep. A or B antibodies

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.

**Symptoms:**
- Weight loss
- Chest pain
- Heartburn
- Vomiting
- Indigestion
- Fatigue
- Tests:
  - Stool guaiac
  - GI X-rays

**Treatment:**
- Bismuth
- Famotidine
- Sucralfate
- Cimetidine
- Omeprazole
- Antibiotics

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

**Symptoms:**
- Vomiting
- Fever
- Constipation
- Diarrhea
- Nausea

**Tests:**
Barium enema  CT Scan
WBC count  Sigmoidoscopy
Colonoscopy
Intestinal obstruction: Can a paralytic ileus/false obstruction (children) or a mechanical obstruction:

*Types of mechanical obstruction:*
- Tumors
- Volvulus
- Impacted condition
- Hernia

*Symptoms:*
- Diarrhea
- Breath
- Abdominal swelling
- Abdominal pain

*Tests:*
- Barium enema
- CT scan
- Upper/Lower GI series
- Poor bowel sounds

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

*Symptoms:*
- Flush appearance
- Wheezing
- Diarrhea
- Onset of niacin deficiency
- Abdominal pain
- Decreased BP

*Tests:*
- 5-HIAA test
- Increased levels of Chromogranin A and Serotonin
- CT scan
- MRI
- Surgery

*Treatment:*
- 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

Tests:
EGD
Barium Swallow X-ray.

Treatment:
Weight loss
Surgical repair
Medications for reflux

(GERD) - Gastroesophageal reflux disease

Symptoms:
Nausea
Vomiting
Frequent coughing
Hoarseness
Belching
Chest pain
Anatacid 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
Eosophagus inflammation
Bronchospasms

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

Symptoms:
Weight loss
Jaundice
Diarrhea
Abdominal pain
Fever
Joint pain
GI bleeding

Treatment:
Corticosteroids
Mesalamine
Surgery
Ostomy
Azathioprine

Monitor the patient for:
Ankylosing spondylitis
Liver disease
Carcinoma
Pyoderma gangrenosum
Hemorrhage
Perforated colon

Tests:
Barium edema
ESR
CRP
Colonoscopy
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 conjuctiva, 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 epiglotitis 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:*

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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).
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: Bedrest
Trauma: BP medications
Abdominal pain
Pre-eclampsia

Tests:
Check liver function tests: Eclampsia
Check BP: HELLP syndrome
Proteinuria presence: High serum creatinine levels
Apnea: Prolonged elevated diastolic blood pressure >100mmHg

Treatment:
Magnesium sulfate: Thrombocytopenia

Induced labor may occur with the following criteria:

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.
Polyhydaminos 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

**Tests:**
- STD tests
- Pap smear

**Treatment:**
- Laser therapy
- Antibiotics/antifungals
- Cryosurgery
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
- Nausea
- Urination painful
- LBP
- No menstruation

**Tests:**
- Pelvic exam
- Laparoscopy
- ESR
- WBC count
- Pregnancy test
- Cultures for infection

**Treatment:**
- Antibiotics
- Surgery

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

**Symptoms:**
- Seizures
- Headaches
- Hypotension
- Fatigue
- Multiple organ involvement
- Fever
- Nausea
- Vomiting

**Tests:**
- Check BP
- Multiple organ involvement

**Treatment:**
- Dialysis- if kidneys fail
- BP medications
- IV fluids
- Antibiotics

**Monitor the patient for:**
- Kidney failure
Liver failure  Heart failure
Extreme shock

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
LBP
Periods (painful)
Sexual intercourse painful
Tests:
Pelvic US
Laparoscopy

Treatment:
Progesterone treatment
Pain management
Surgery
Hormone treatment
Synarel treatment

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

Tests:
Rectal exam
X-rays
Pad test
Urine analysis
PVR test
Cystoscopy
Pelvic exam

Treatment:
Surgery
Medications
(pseudoephedrine/phenylpropanolamine)/Estrogen
Pelvic floor re-training
Fluid intake changes

Urge incontinence- urine loss caused by bladder contraction.

Symptoms:
Frequent urination
Abdominal pain/distention

Pelvic exam
X-rays
Cystoscopy
EMG

Tests:
Pad test
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 Scraping, 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: Sarcaptes scabies, 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 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

<table>
<thead>
<tr>
<th>Part of the Skeleton</th>
<th>Number of Bones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Axial Skeleton</strong></td>
<td>80</td>
</tr>
<tr>
<td>Skull</td>
<td>22</td>
</tr>
<tr>
<td>Ossicles (malleus, incus and stapes)</td>
<td>6</td>
</tr>
<tr>
<td>Vertebral column</td>
<td>26</td>
</tr>
<tr>
<td>Ribs</td>
<td>24</td>
</tr>
<tr>
<td>Sternum</td>
<td>1</td>
</tr>
<tr>
<td>Hyoid</td>
<td>1</td>
</tr>
<tr>
<td><strong>Appendicular Skeleton</strong></td>
<td>126</td>
</tr>
<tr>
<td>Upper extremities</td>
<td>64</td>
</tr>
<tr>
<td>Lower extremities</td>
<td>62</td>
</tr>
</tbody>
</table>

**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**

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

**Joints**

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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**

<table>
<thead>
<tr>
<th>Joint Type</th>
<th>Characteristic</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball and socket</td>
<td>Permits all types of movement (abduction, adduction, flexion, extension, circumduction); it is considered a universal joint.</td>
<td>Hips and shoulder joints</td>
</tr>
<tr>
<td>Hinge (ginglymus)</td>
<td>Permits motion in one plane only</td>
<td>Elbow and knee, interphalangeal joints</td>
</tr>
<tr>
<td>Rotating or pivot</td>
<td>Rotation is only motion permitted</td>
<td>Radius and ulna, atlas and axis (first and second cervical vertebrae)</td>
</tr>
<tr>
<td>Plane or gliding</td>
<td></td>
<td>Between tarsal bones and carpal bones</td>
</tr>
<tr>
<td>Condylar (condyloid)</td>
<td>Permits sliding motion</td>
<td></td>
</tr>
</tbody>
</table>
Permits motion in two planes which are at right angles to each other (rotation is not possible)

| Metacarpophalangeal joints, temporomandibular |

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

**Treatment:**
- Test ROM of hip
- 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

**Treatment:**
- X-ray of hips
- AROM testing of hips
- 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

**Tests:**
- ESR increased
- CPK
- Hemoglobin low

**Treatment:**
- Pain management
- Corticosteroids
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
- Scleroderma: connective tissue disease that is diffuse.

**Symptoms:**
- Heartburn
- Wheezing

**Treatment:**
- NSAIDS
- Protective clothing
- Cytotoxic drugs
- Hydroxychloroquine

**Monitor the patient for:**
- Seizures
- Infection
- Hemolytic anemia
- Myocarditis
- Infection
- Renal failure

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Skin thickness changes
Weight loss
Joint pain
SOB
Hair loss
Bloating

Tests:
Monitor skin changes

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

Chest x-ray
Antinuclear antibody test
ESR increased

Monitor the patient for:
Renal failure
Heart failure
Pulmonary fibrosis

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%

**Symptoms:**
- Painful joints
- Eye inflammation
- Fever
- Rash
- Temperature changes (joints)
- Poor AROM

**Tests:**
- ANA test
- HLA antigen test
- CBC
- Physical exam of joints
- X-rays of joints
- Eye exam
- RA factor test

**Treatment:**
- Physical therapy
- Corticosteroids
- NSAIDS
- Infliximab
- Hydrochloroquine
- Methotrexate

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
<table>
<thead>
<tr>
<th>Treatment:</th>
<th>Monitor the patient for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-rays- abnormal bone development.</td>
<td>Spinal deformities</td>
</tr>
<tr>
<td>Bone scan</td>
<td>Heart failure</td>
</tr>
<tr>
<td>NSAIDS</td>
<td>Paraplegia</td>
</tr>
<tr>
<td>Calcitonin</td>
<td>Fractures</td>
</tr>
<tr>
<td>Plicamycin</td>
<td></td>
</tr>
<tr>
<td>Etidronate</td>
<td></td>
</tr>
</tbody>
</table>

**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

**Tests:**
- Passive testing of joints
- X-ray

**Treatment:**
- Physical therapy
- Cox 2 inhibitors
- NSAIDS
- Joint injections
- Aquatic exercises
- Surgery

**Gout:** uric acid development in the joints causing arthritis.

**Stages:**
- Asymptomatic
- Acute
- Intercritical

**Symptoms:**
- Joint edema

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Fever
Lower extremity and/or upper extremity joint pain

**Tests:**
- Uric acid in the urine
- Synovial biopsy
- Synovial analysis

**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

**Tests:**
- Joint contractures
- CPK levels increased
- Cardiac testing
- EMG

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Muscle biopsy testing

**Treatment:**
Physical therapy
Braces
Mobility assistance

*Monitor the patient for:*
Contractures
Pneumonia
Respiratory failure
CHF
Cardiomyopathy
Limited mobility

Ankylosing spondylitis: Vertebrae of the spine fuse.

**Symptoms:**
Limited AROM
Back and neck pain
Joint edema
Fever Weight loss

**Tests:**
X-ray spine
CBC
ESR test
NSAIDS
Surgery
HLA-B27 antigen test

*Monitor the patient for:*
Pulmonary fibrosis
Aortic valve stenosis
Uveitis

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

**Symptoms:**
Severe pain
Weakness
Skin color changes

**Tests:**
Muscular length testing
Osteosarcoma: bone tumor that is malignant and found in adolescents.

**Symptoms:**
- Bone pain
- Fractures
- Swelling

**Tests:**
- X-ray
- Biopsy
- Bone scan
- 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: Catapress
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 Pentamide 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 O2 levels.  
B: Cough regularly and deeply to clear airway passages.  
C: Cough following bronchodilator utilization  
D: Decrease CO2 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 likely 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
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., 90/70 mm 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 if 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 pyroli
C: Vibrio cholera
D: Hemophilus aegyptius
32. A nurse if 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 loosing 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: CO₂ 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/
<table>
<thead>
<tr>
<th>Lobe</th>
<th>Lesion Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occipital Lobe</td>
<td>Homonymous hemianopsia, partial seizures with limited visual phenomena</td>
</tr>
<tr>
<td>Thalamus</td>
<td>Contralateral thalamus pain, contralateral hemisensory loss</td>
</tr>
<tr>
<td>Pineal gland</td>
<td>Early hydrocephalus, papillary abnormalities, Parinaud’s syndrome</td>
</tr>
<tr>
<td>Internal capsule</td>
<td>Hemisensory loss, homonymous hemianopsia, contralateral hemiplegia</td>
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<tr>
<td>Basal ganglia</td>
<td>Contralateral dystonia, Contralateral choreoathetosis</td>
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<tr>
<td>Pons</td>
<td>Diplopia, internal strabismus, VI and VII involvement, contralateral hemisensory and hemiparesis loss, ipsilateral cerebellar ataxia</td>
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<tr>
<td>Broca’s area</td>
<td>Motor dysphasia</td>
</tr>
<tr>
<td>Precentral gyrus</td>
<td>Jacksonian seizures, generalized seizures, hemiparesis</td>
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<tr>
<td>Superficial parietal lobe</td>
<td>Receptive dysphasia</td>
</tr>
<tr>
<td>Cerebellar hemisphere</td>
<td>Ipsilateral cerebellar ataxia with hypotonia, dysmetria, intention tremor, nystagmus to side of</td>
</tr>
<tr>
<td>Lesion</td>
<td>Lesion</td>
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<tr>
<td>Midbrain</td>
<td>Loss of upward gaze, III involvement, ipsilateral cerebellar signs, diplopia</td>
</tr>
<tr>
<td>Angular gyrus</td>
<td>Finger agnosia, allochiria, agraphia, acalculia</td>
</tr>
<tr>
<td>Temporal lobe</td>
<td>Contralateral homonymous upper quadrantanopsia, partial complex seizures</td>
</tr>
<tr>
<td>Paracentral lobe</td>
<td>Urgency of micturition, incontinence, progressive spastic paraparesis</td>
</tr>
<tr>
<td>Third Ventricle</td>
<td>Hydrocephalus</td>
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<tr>
<td>Fourth Ventricle</td>
<td>Hydrocephalus, progressive spastic hemiparesis</td>
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<tr>
<td>Optic Chiasm</td>
<td>Bitemporal hemianopsia, optic atrophy</td>
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<tr>
<td>Uncus</td>
<td>Partial complex seizures</td>
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<tr>
<td>Superior temporal gyrus</td>
<td>Receptive dysphasia</td>
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<tr>
<td>Prefrontal area</td>
<td>Apathy, poor attention span, loss of judgement, release phenomena, distractible</td>
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<tr>
<td>Orbital surface frontal lobe</td>
<td>Paroxysmal atrial tachycardia</td>
</tr>
<tr>
<td>Hypothalmus</td>
<td>Amenorrhea, cachexia, hypopituitarism, hypothyrodism, impotence, diencephalic autonomic seizures</td>
</tr>
</tbody>
</table>
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
Ankylosing 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
Coccycodynia
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

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

Eccymosis
Ectopic pregnancy
Electrocardiogram (ECG)
Embolism
Emphysema
Encephalopathy
Endocrine system
Epinephrine
Epstein-Barr virus
Erythropoietien
Erythema nodosum
Esophagitis
Ewing’s sarcoma
Exophthalmos

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

Gamma globulin
Gangrene
Gaucher’s disease
Gestation
Giant cell tumor
Gilbert’s syndrome
Gliosis
Glucagon
Glucose tolerance test
Goodpasture’s syndrome
Graves disease
Guillain-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
Juvenile 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

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

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
Morphea multiple myeloma
Multiple sclerosis
Munchausen’s syndrome
Myalgias
Myopathy

Menarche
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

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
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
Urogilinogen
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

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

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

ech/o  sound
electr/o  electricity
embry/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
femor/o  femur
fet/i  fetus
fet/o  fetus
fibr/o  fibrous tissue
fibul/o  fibula
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
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

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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

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

U

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

Prefixes

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

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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

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## Suffixes

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