

Biology 11 Exam Review

Study of the Human Body

Fine Print:

This comprehensive review contains information that will be valuable for the preparation of the final exam. However, this review should *not be* the sole study guide for your preparations.

Course structure:

1. From internal to external - from cellular to body systems.

How homeostasis is a part of our cells and into our body systems.

Vocabulary:

Cell theory

Cell types:

Prokaryotic vs eukaryotic

Similarities and Differences between the two

Cell organelles

Nucleus, Nucleolus, Mitochondria, Golgi apparatus, Chloroplast, Cell membrane, lysosome, endoplasmic reticulum, rough endoplasmic reticulum, nucleopore, nuclear membrane, cytosol, peroxisome, cytoplasm

Homeostasis

Positive and negative feedback loop - real examples

Cell membrane:

Fluid Mosaic Model - What is it and what does it mean?

Basic structure found on membrane

Phospholipid bilayer

2 Fatty acid chains, glycerol, phosphate group

Hydrophilic and hydrophobic

Polar or non polar? What makes this property unique?

Relate this to other concepts in later chapters (neurotransmitters, hormones, proteins etc...)

Proteins with the membrane

Integral, and peripheral proteins

Permeability of membrane

Active vs passive transport

Osmosis vs diffusion vs facilitated transport vs active transport

What can be transported across? How does this property important for any of the future body systems with cell-cell communication?

Transport types

Vesicles with exocytosis and endocytosis

Relate these two with hormones, enzymes and neurotransmitters

Endocytosis (3 types)

Phagocytosis

Pinocytosis

Receptor mediated endocytosis

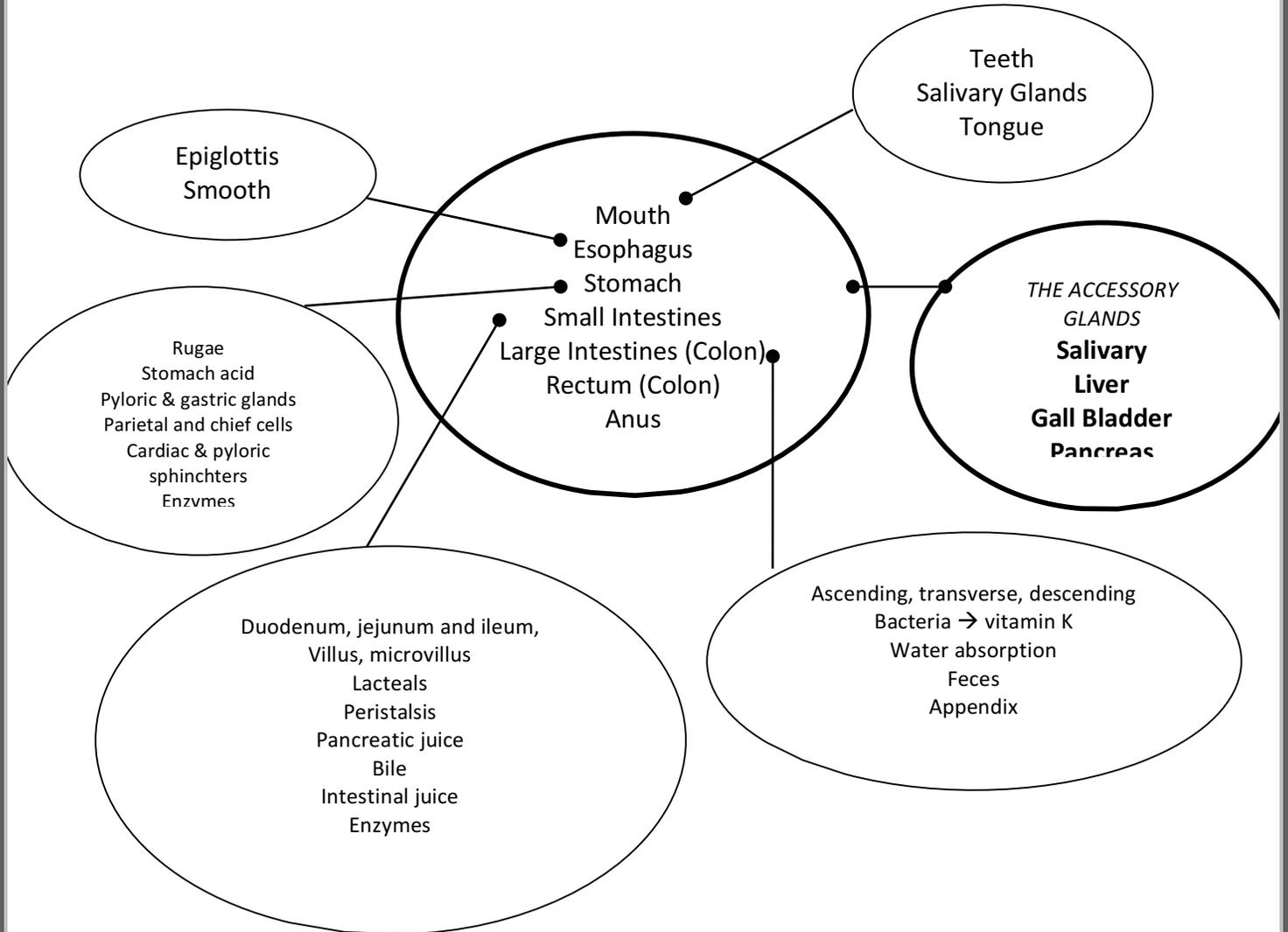
Diseases related to carrier protein fails

Cystinuria - kidney stone build up - be able to thoroughly understand cystinuria as a genetic disorder (DNA related)

2. Digestive system

Parts to know and locate on a diagram:

Mouth, pharynx, salivary glands, larynx, epiglottis, esophagus, stomach, pyloric sphincter, small intestine, large intestine, liver, gall bladder, pancreas, colon, anal sphincter, anus, uvula, soft and hard palate, tonsil, tongue, duodenum, jejunum, ileum, cecum, appendix, rectum and anal canal.



Alimentary Tract Breakdown

Basic info - 9m - contains primary and accessory organs.

Contains both mechanical and chemical digestion (where and how)

Mouth - Know the parts and the type of digestion that occurs here

Enzymes found here: Salivary Amylase

What does this digest?

Pharynx - Know what this does

Enzymes found here: ? None -

Esophagus - Know what this does and peristalsis

Digestive tract cells specialty -

Outer - Serosa

Muscular

Submucosa

Inner - Mucosa

Stomach - Know what this does and the environment found in stomach

Enzymes found here:

Pepsin, pepsinogen,

Vocabs to know:

Pyloric sphincter, chyme, mucus, HCl, rugae

Small intestine - Most nutrient absorption occurs here

What is its primary purpose?

Chemicals and enzymes found here: Trypsin, chymotrypsin, maltase, peptidase, lactase, bile, Pancreatic juices

Structure: Folds, Villi and microvilli, peristalsis all play a role in absorption of glucose and proteins.

Bile - what does this do? Where is it produced? Where is it stored?

Pancreatic juices - what does this do? Where is it produced?

Where are the pancreatic juices / bile released into the small intestine?

Hormones used in regulating digestion

Gastrin - Released in the presence of food to aid in stomach digestion

GIP - Gastric inhibitory peptide - stops the stomach from churning. Used to work against gastrin. Used when food has left the stomach

CCK - released to promote the release of gastric juices

Large intestine - Reabsorption is key!

Re absorbs salts and water from remaining food material.

Know the cecum, colon, rectum, anal canal. Ascending, transverse, and descending colon.

Contains bacteria to break down waste that cannot be broken down body's natural enzymes.

Accessory Organs

Pancreas

Leaf like structure

Releases pancreatic juices to neutralize stomach acid

Secretes insulin and glucagon (how do these relate to kidneys?)

Enzymes that it releases:

Amylase (starch digestion), trypsin (protein digestion), lipase (fat digestion)

Gall bladder

Stores bile (does not make bile)

Liver

What is it?

Stores vitamins (D B E A K) and iron

Enzyme produced here:

Bile

Stores glucose and glucagon (this relates to what disorder?) - diabetes

Breaks down amino acid into urea (this goes where?) - Kidneys

Removes bilirubin (byproduct of hemoglobin) - this leads to what disorder if not healthy? - Jaundice

Regulates cholesterol

Diseases associated with digestive system:

Appendicitis - inflammation of the appendix - surgery is done

3. Macromolecules:

Proteins, nucleic acids, fats, and carbohydrates

These are essential for an organism to function

Proteins:

Enzymes are proteins

Proteins are used for structure, energy, repair, and maintain health structure.

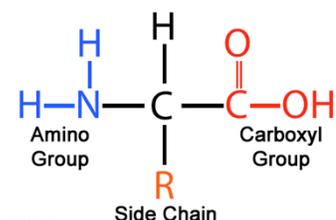
Ex. Hemoglobins, muscles, nerves, proteins that are found on membranes, antibodies, hair, skin.

Formed by connecting amino acids together via a peptide bond.

There are at least 20 amino acids with 8 of them that cannot be made by the body.

All amino acids have a basic structure with different chains (R group) that make up the variety of amino acids.

Amino Acid Structure



Nucleic acids:

These are what your DNA and RNA is made from.

They all are made from the structure of nucleotides, which is, ribose + nitrogenous base + phosphate group.

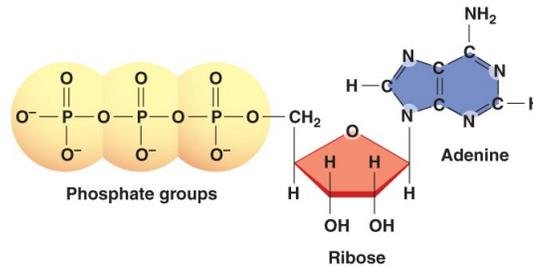
The nitrogenous base varies from DNA and RNA with DNA having thymine while RNA having Uracil.

When nucleic acids combine, the complementary bases pair up in the following fashion:

Adenine - Thymine or Cytosine - Guanine in DNA
Adenine - Uracil or Cytosine - Guanine in RNA
They can be flipped (AT or TA)

Energy used by cells is in the form of ATP, which is adenosine triphosphate

(a) ATP consists of three phosphate groups, ribose, and adenine.



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When 1 of the 3 phosphate groups is broken apart, energy is released.

Carbohydrates:

Made up of sugar molecules

When repeating sugar molecules such as glucose is repeated in 10000x times, it will create the macromolecule, carbohydrate.

Monosaccharide has 1 glucose, while disaccharide has 2 basic sugar molecules joined into 1.

Chains of glucose can make:

Cellulose (plants for structure), Glycogen (animals - for sugar storage), or starch (plants)

Lipids:

Structure: 3 fatty acid chains, glycerol,

Ex: Cholesterol, phospholipids

Saturated (single bonds) vs unsaturated (double bonds) fat

Saturated fat can 'stack' on top of each other or form a more compact structure, which can cause fat build up clogging arteries.

Trans fat is worse by having another double bond

Vitamins vs minerals

Vitamins are organic while minerals are inorganic and hold their chemical structure.

Essential vitamins:

Vit C - Lacking will give you scurvy

Vit K - Blood clotting

Vit A - For eye sight

Vit D - Helps calcium to form bones

Vit E - antioxidant that helps in immune system functions

Minerals: Calcium (bones), potassium (nerves), chloride (electrolyte), sodium (nerves/electrolyte), iron (hemoglobin), zinc (immune system), iodine (goiter).

4. Blood basics

What makes up blood?

55% Plasma - 45% Red blood cells (erythrocytes) - trace% leukocytes - and trace% platelets

Plasma is 90% water with rest being dissolved substances

Importance of blood:

Carries substances throughout the body and gets filtrated.

Be able to link blood and other body systems such as kidney filtration

Red blood cells:

Has biconcave shape allowing increased in surface area

No nucleus

Contains protein hemoglobin to carry the oxygen / carbon dioxide

Can squeeze through tiny capillaries

White blood cells:

Fights infection

Contains a small number

Can create proteins called antibodies to attack future substances

Can change shapes to eliminate foreign substances

Relate WBC to autoimmune diseases

Platelets:

Smaller than RBC

Helps in blood clotting

Blood clotting:

Platelets are required

Called blood clotting cascade

Platelets → Thromboplastin → thrombin + fibrinogen → fibrin

Fibrin forms a net to trap red blood cells

Blood diseases:

Anemia - Generally low RBC count

Could be due to lack of iron in body

Excessive destruction of RBC

Body doesn't produce enough RBC

Hemolytic disease (RBCs are destroyed)

Sickle Cell anemia

Special type of anemia where it is genetics

RBC has sickle shape

Cannot carry oxygen efficiently and can be caught in joints causing pain

Leukemia

Cancer of white blood cell

Uncontrolled production of white blood cells that cannot function

Mature and good WBC decrease causing weakened system

Hemophilia

Loss of blood clotting abilities

Genetic disorder

Blood groups:

4 main groups due to 2 protein factors located on surface of RBC -

Surface factors called antigens such as Antigen A, antigen B.

Antigen A → Blood type A

Antigen B → Blood type B

Antigen O → Blood O

Antigen A+B → AB type

In addition to antigens, there are antibodies found in blood types.

Type A would have antigen A but also antibody B

Type B would have antigen B but also antibody A

Type O would have no antigens but also antibodies A and B

Type AB would have antigen A and B but NO antibodies

In addition to the antigens, there is also the Rh factor.

It makes someone either be + or - in their blood type.

A+ would have A antigen and Rh positive

O+ would have no antigens but just Rh positive.

How do we type for someone's blood?

Three wells are setup. Antibodies of each antigen will be in each well (Anti A, Anti B and Anti Rh).

Place a drop of blood and look for coagulation.

Coagulation is ...

Blood transfusion.

In order to transfuse blood into another person, you must take into account the recipient's blood type. The reason is the antibodies found in the recipient's blood type.

A person with type B- will have antigen B and antibody A.

You cannot give the person type A blood because the antibody A will coagulate with type A antigen! Make sure you know the combinations!

What is the Rh Hemolytic disease of newborn?
Who can get it? How do you fix it? Know the theory behind it

5. Cardiovascular system

Structure and function of arteries / veins / capillaries

Arteries

- Large
- Carries mainly oxygenated blood (from heart)
- Muscular
- No valves
- Can stretch

Arterioles are smaller versions of arteries

Veins

- Large but not that muscular
- Contains valves (how can you tell?)
- What's the purpose for valves?
- No pulse - why?
- Varicose vein? What happened here?

Capillaries

- Thin walls
- Why thin walls?
- What gets passed through the walls?
- Where do you find these?

Heart:

Parts of the heart for you to know the function and identification:

Pericardium, septum, left & right atrium and ventricle, tricuspid and bicuspid valve, semilunar valves, aortic valve, bicuspid or mitral valve, vena cava, aorta, pulmonary artery and vein,

Know the blood flow around the body and through the heart.

Heart beat & Heart sounds:

- Systole and diastole phases of heart beat
- What's happening
- SA and AV node
- What happening between the nodes
- Pacemaker
- Relate pumping of heart to the action potential with sodium and potassium pump!

Electrical signals can be read through a ECG -

- P QRS T wave.
- P - upper heart
- QRS - impulse through the heart
- ST - ventricles contract
- T - Resetting

Blood pressure:

How is blood pressure taken?

What is used and what is the mechanism in taking blood pressure?

6. Respiratory System

Cellular respiration vs internal respiration vs external respiration

Relate the process of breathing to transporting oxygen/CO₂ into cells in lungs (think of arteries, veins, intercostal muscles, capillaries and type of transport)

Parts to know and identify:

Nasal cavity, pharynx, larynx, vocal box, epiglottis, larynx, trachea, bronchi, bronchioles, lungs, alveoli, diaphragm, lobes of lungs, pleura,

Breathing mechanism:

What is happening? How does the air enter? Where does gas exchange occur?

Through what ways.

Talk about pressure and demonstrate with diagrams

7. Excretory system

Metabolic Waste (excretion) vs defecated waste (feces)

What's the difference?

Big picture: relate how metabolic wastes are produced and excreted from the body. Be able to start from the original state (ex. A piece of steak) to defecation and excretion.

Urinary system

Kidney, Loop of Henle, nephron, proximal tubule, distal tubules, renal medulla, renal cortex, renal pelvis, renal calyx, ureter, bladder, urethra, renal artery, renal vein, Glomerulus, Bowman's Capsule

Filtration Process:

Filtration, reabsorption, and secretion

Know each of these processes in detail and what is being reabsorbed or what is secreted.

Know the percentages of relative secretion rates and reabsorption rates. Ask the question why are these percentages the way they are? Ex. Water, glucose, urea,

Feedback system involving hormones

Aldosterone

Retain blood pressure

Reabsorption of Na⁺ to allow water to be taken up to bump up blood pressure

ADH

No urine hormone

Secreted to conserve water

Diuretics such as caffeine or alcohol inhibit these hormones causing more urine production

Urinalysis

How to test urine? What would you find in a regular healthy person versus someone with diabetes? Or other diseases?

Artificial kidney

How would you design one?

What type of structure would you need?

Kidney diseases

Diabetes - accumulation of glucose in blood. Lacking insulin.

Nephritis - inflammation of kidney

Uremia - Too much urea

Urinary calculi - kidney stones

8. Nervous system

Know how our nervous system works -

Sense → process

(integrate) → Output

Basic structure of nervous system

CNS vs PNS

Know PNS breaks down into our sensory and motor division

Motor division can be further broken into somatic and autonomic nervous system.

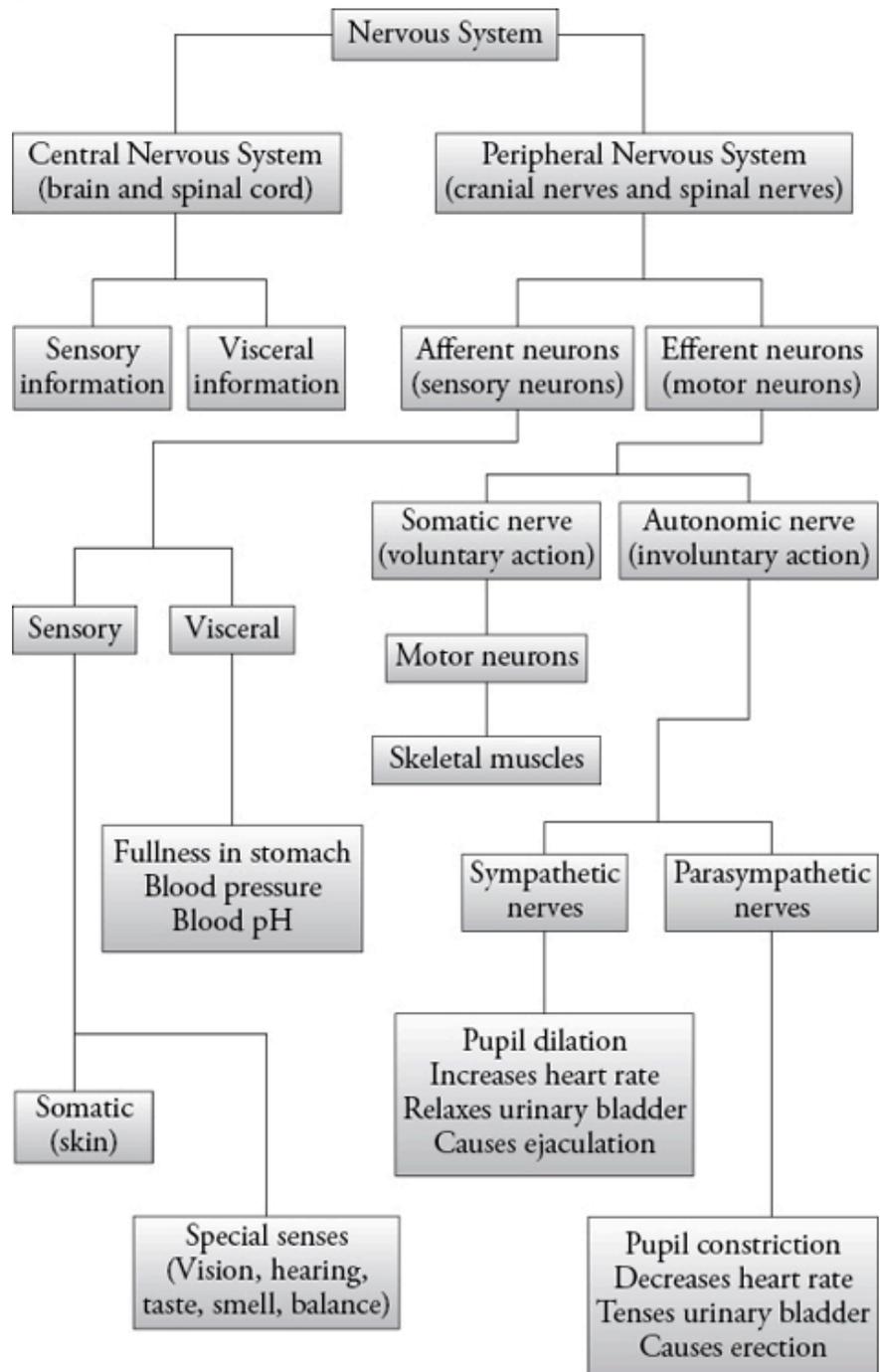
Basic structure of nerves:

Neurons, dendrites, axon, axon terminal, synaptic cleft, nodes of Ranvier, Myelin Sheath, Schwann cells, Ganglia, white and grey matter.

Diseases/disorders

affecting nervous system:

MS, ALS, and Parkinsons



Nerve Impulses:

How does an impulse travel down a neuron?

Na/K pump - know the mechanism and how it works. Know how myelin sheath helps by speeding up the signal (saltatory conduction).

Neurotransmitters:

Know how neurotransmitters work.

Examples: acetylcholine, dopamine, serotonin, norepinephrine

Reflex arc:

Our reflexes - how do they work?

Relating these reflexes with other parts of the body - such as the feeling to urinate, poop, hungry?, pain?, pupil dilation?

That's it!

Remember, to fully appreciate and understand the human body, try to relate each of the systems together and ask the question? Why does it occur? What will it affect? What happens if it is not working? What keeps it in balance? And how cool is it!?

I hope you have enjoyed your time in gr.11 biology!

Yeung