

# Physiology Midterm Study Outline

- This is “just” a study GUIDE. It is up to you how well you want to cover/understand the material.  
Remember, all material from your slides and modules are fair game!  
Good Luck!

## **I. Homeostasis and Diffusion**

### **A. Lecture slides:**

#### 1. Homeostasis

Define homeostasis & be able to identify its components:

Set-point  
Sensor  
Integrating center  
Effector

Body temperature is regulated much like room temperature is regulated by a thermostat- *make the connections*.

What is avg human body temperature?

Know the difference between negative and positive feedback

Example of positive feedback:

Example of negative feedback

Which one is primarily responsible for maintaining homeostasis?

#### 2. Diffusion

Two main types of transport: Active and Passive - *know the differences*

Passive transport includes: simple diffusion, facilitated diffusion, osmosis

*Define the above types of passive transport & know the differences*

Diffusion refers to the movement of \_\_\_\_\_ .

Osmosis refers to the movement of \_\_\_\_\_ .

Which types of transport are considered carrier mediated transport?

What is something that is osmotically active? The example seen in lab was \_\_\_\_\_ ? (thistle tube experiment).

Can something that is osmotically active pass through a membrane by simple diffusion?

Understand the terms Isotonic, Hypertonic, and Hypotonic.

Know the difference between solute and solvent

\* Know slide #18 VERY WELL. What is optimal NaCl concentration for an erythrocyte (RBC)? If a cell is hypertonic to the solution- the solution is hypotonic to the cell. What will happen to the cell in this case. Think of all possible scenarios for a cell in different solutions.

What happens when a person:

drinks ocean water (very high salt concentration).

Why does edema occur when a person with high blood pressure eats foods with high salt content?

### **B. Laboratory activities:**

1. Thistle tube experiment- demonstrated the principle of osmosis- *how?*
2. Recognizing homeostatic mechanisms during exercise

Set points? Sensors? Integration centers? Effectors?

## **II. Digestion, Enzymes, Energy**

### **A. Lecture slides:**

Digestion and absorption – Define

Digestion breaks down the following into \_\_\_\_\_.

polysaccharides -->

proteins -->

triglycerides (fat) -->

Know where protein, lipid, carbohydrate digestion *takes place* and where it *begins*.

Digestive enzymes covered: - know what they digest, where they are functional, optimal pH, temperature.

Amylase

salivary (ptyalin)

pancreatic

Lipase

Pepsin

Trypsin

What is a zymogen?

Why are enzymes needed?

How do they work (in terms of activation energy)?

Are they consumed in the reaction?

Can they be reused?

Do they alter the reaction?

What environmental factors affect enzyme activity?

Would increasing (or decreasing) the enzyme or substrate concentration change enzyme *activity*? or will it change enzymatic *reaction rates*?

What do the cells in the stomach secrete?

goblet cells:

chief cells:

parietal cells:

Know what goes on in the following compartments/structures (Function? Digestion?

Absorption?)

Oral cavity

Pharynx

Epiglottis

Stomach

SI- Small intestine

Accessory organs:

Pancreas

Gall bladder- bile. *Is bile an enzyme?*

Liver

LI- Large intestine

Micro flora (what do they do?)

### **B. Laboratory activities:**

Which substrates and enzymes were used?

Review concepts of the individual experiments and relate them to lab slides.

Invertase is an enzyme we only saw in lab. What does it do?

### **III. Endocrine**

#### **A. Lecture slides:**

How does a hormone reach its target organ?

Know all the endocrine organs we covered and which hormone(s) is/are secreted by them

Also know the function of the hormones.

Pancreas

Ovaries & Testes

Placenta

Thyroid gland

follicular

parafollicular

Parathyroid gland

Pineal gland

light

dark

Anterior pituitary (FLAT PIG)

Posterior pituitary

Hypothalamus

Adrenal gland

hormonal vs. neuronal control.

Glucose metabolism is a good example of a negative feedback mechanism. Know how this works as well as which pancreatic cells secrete what.

GABI

Know pathophysiology: Diabetes-1 vs. Diabetes-2. *Differences?*

#### **B. Laboratory activities:**

1. Know how eating sugar and how exercise affect blood glucose, and what effectors are activated.
2. Know what a Ketone body is and how it fits in with the above idea.
3. The relationship between glucose levels and ketone body levels?

### **IV. Special Senses (equilibrium, hearing, vision, taste, smell)**

#### **A. Lecture slides:**

##### ***1. Equilibrium***

Vestibular apparatus- *know structures and functions*

Otolith organs

Utricle

Saccule

Semicircular Canals

Know what is normal and what is pathological. Define nystagmus, vertigo, etc.

##### ***2. Vision***

Know anatomy of the eye:

Cornea- Refraction & Refractive index

Lens- Refraction & Refractive index

Retina- Seen with an ophthalmoscope  
Rods- What type of vision?  
Cones- What type of vision?  
Optic disc – Why is this a blind spot?  
Fovea centralis - Is this a blind spot? Which receptor type is found here?  
Pathology of the eye- Know the differences & which corrective lens is appropriate (slide 19).  
Myopia  
Hyperopia  
Presbyopia  
Astigmatism  
What is emmetropia?  
What is accommodation?

### **3. Hearing**

Know the anatomy of the ear and order of structures a sound wave encounters:  
Tympanic membrane  
Malleus  
Incus  
Stapes  
Oval window  
Cochlea  
Spiral organ of corti  
Round window  
What is the functional unit of hearing?  
Pathophysiology  
conduction deafness  
sensorineural deafness  
Media Otitis

**4. Taste (gustatory)** review the two slides

**5. Smell (olfactory)** What is a taste bud. Which cells are inside each taste bud?

**B. Laboratory activities:** *know what they illustrate or test for.*

1. Chair Spin- nystagmus
2. Ophthalmoscope to observe retina
3. Snellen eye chart- know what the numbers mean! ex: 20/20, 20/10, 20/200
4. Rhinnes test
5. Weber test
6. Smell- olfactory senses

## **V. Sensory physiology (reflexes and synaptic transmission)**

**A. Lecture slides:**

stretch receptors

Definition

Location

*How does it work?*

Mono-synaptic stretch reflex – Define and know an example

Crossed-extensor reflex - Define and know an example

Babinski reflex- What is normal? What is abnormal? Adult v.s. Infant. Does a positive Babinski sign mean good or bad news for a patient you suspect to have spinal cord injuries?

Cutaneous Sensations – know the four (4) cutaneous sensations.

expanded dendritic nerve endings

Merkel's disks

Ruffini endings

Free nerve endings

Thermoreceptors

Nociceptors

Encapsulated nerve endings

Meisner's corpuscles

Pacinian corpuscles

Alpha fibers/motorneurons innervate \_\_\_\_\_ muscles

Gamma fibers/motorneurons innervate \_\_\_\_\_ muscles

(slide 15)

Receptor distribution

Adaptation- Which sensations adapt fast? Which adapt little if at all?

Referred pain – define & know some examples

### **B. Laboratory activities:**

Reflex testing (types)

Cerebellar testing

Babinski

two-point threshold

## **VI. Muscles**

### **A. Lecture slides:**

Muscle functions in the body- *give examples*

Know what a muscle fiber/muscle cell is and what the functional unit of contraction is.

Know some anatomy along with function.

myofibril

sarcomere

filaments

thin-actin

thick-myosin

troponin

tropomyosin

How does calcium ( $\text{Ca}^{2+}$ ) aid contraction?

What is the role of ATP?

KNOW SLIDE #12- contraction

When does power stroke occur, when does cross bridge formation occur, how is cross bridge dissociated, etc. ?

Rigor mortis – *How? Why?*

motor unit- What is a motor unit?

What is the significance of the (muscle fibers/motor unit) ratio?

Muscle fiber types:

slow oxidative

fast glycolytic  
fast oxidative glycolytic

Define:

Twitch  
Summation  
Tetanus  
Fatigue

Know the 2 main types of contraction along with the subtypes.

isotonic  
    concentric  
    eccentric  
isometric

**B. Laboratory activities:**

Dynamometer  
Body fat analyzer  
    Body fat mass equation  
    BMI equation  
Flexibility  
Muscle endurance