

## OUTLINES FOR MIDTERM #3

### CHAPTER 26 – WATER AND SALT PHYSIOLOGY - CONCEPTS

#### I. Body Fluids

- A. Intracellular
- B. Extracellular
  - 1. interstitial
  - 2. plasma

#### II. Regulation of Body Fluids

- A. Osmoregulation
- B. Ionic regulation
- C. Cell volume regulation
  - 1. Role of organic solutes

#### III. U/P ratios

### CHAPTER 27 – WATER AND SALT PHYSIOLOGY – ANIMALS IN DIFFERENT ENVIRONMENTS

#### I. Freshwater

- A. Hyperosmotic regulators
- B. Regulatory challenges
  - 1. Water influx
  - 2. Salt efflux
- C. Mechanisms of regulation
  - 1. Dilute urine
  - 2. Active ion transport
    - a. Chloride cells – location, structure, and function

#### II. Seawater

- A. Hyposmotic regulators
- B. Regulatory challenges
  - 1. Water efflux
  - 2. Salt influx
- C. Mechanisms of regulation
  - 1. Drinking
  - 2. Active ion transport
    - a. Chloride cells – location, structure, and function
- D. Stenohaline vs. Euryhaline

#### III. Terrestrial

- A. Sources of water loss and ways to reduce water loss
  - 1. Cutaneous
  - 2. Respiratory
  - 3. Excretion
- B. Sources of water gain
  - 1. Ingestion (pre-formed)
  - 2. Metabolic
- C. Humidic vs. Xeric

## CHAPTER 28 – KIDNEY

### I. Role in salt and water regulation

### II. Anatomy

#### A. Gross anatomy

1. Cortex
2. Medulla
3. Ureter

#### B. Cardiovascular vessels

#### C. Nephron

### III. Function – nephrons in action!

#### A. Renal corpuscle (glomerulus + Bowman's capsule)

1. Filtration of blood to generate isosmotic primary urine

#### B. Proximal convoluted tubule (PCT)

1. Selective reabsorption of water and solutes (from primary urine to blood)
2. Decrease in urine volume, but still isosmotic

#### C. Loop of Henle

1. Generates osmotic pressure gradient in the medulla
  - a. Descending limb – permeable to solutes and water
  - b. Ascending limb – active transport of NaCl, impermeable to water
2. Urine leaving Loop of Henle is hyposmotic to blood

#### D. Distal convoluted tubule

1. Reabsorption of NaCl from urine to blood
2. Hyposmotic urine

#### E. Collecting duct

1. Permeability to water under hormonal control
  - a. Diuresis – hyposmotic (dilute) urine
  - b. Antidiuresis – hyperosmotic (concentrated) urine
    - i. ADH (Vasopressin)

## CHAPTER 15 – ENDOCRINE PHYSIOLOGY

### I. Signaling molecules

#### A. Hormone

#### B. Neurohormone

#### C. Neurotransmitter

### II. Endocrine Glands

### III. Hormones

#### A. Steroids

1. Synthesis
2. Effects

#### B. Peptides

1. Synthesis
2. Effects

#### C. Amines

1. Synthesis
2. Effects

### IV. Control of Endocrine System

#### A. Hypothalamus and Pituitary

## CHAPTER 5 – NUTRITION, FEEDING, AND DIGESTION

### I. Nutrition

- A. Proteins
- B. Carbohydrates
- C. Lipids

### II. Feeding

- A. Attack and ingest
- B. Grazing
- C. Symbiosis
- D. Suspension (filter) feeding

### III. Digestion

- A. Digestive system anatomy
  - 1. headgut
  - 2. foregut
  - 3. midgut
  - 4. hindgut
- B. Mechanical Digestion
- C. Chemical Digestion
  - 1. Enzymes (Hydrolysis)
- D. Digestion and Absorption of the Big 3 Nutrients
  - 1. Proteins
  - 2. Carbohydrates
  - 3. Lipids
    - a. special role of bile salts