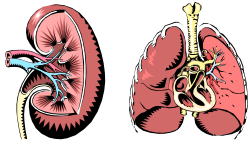


# Bio& 242: Unit 2 / Study Guide

## Urinary & Respiratory system

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### Chapter 23, The Urinary System

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1. Major organs or structures of the Urinary System. Be able to identify the following in microscope, photographs, diagrams, charts, and/or models:

**A. ORGANS AND DUCTS:**

R & L Kidney, R & L Ureter, Urinary bladder, Bulbospongiosus muscle, External urethral sphincter Urethra (female), Prostatic urethra (male), Membranous urethra (male), Spongy or penile urethra (male)

**Ureter Histology**

Mucosa (Transitional epithelium), Lamina propria (Areolar connective tissue)

Muscularis (Longitudinal and Circular), Visceral peritoneum

**Urethra Histology**

Upper part (Transitional epithelium), Middle part (stratified columnar), Lower part near meatus (stratified squamous)

**B. KIDNEY:**

Renal capsule, Renal cortex, Renal medulla, Renal column, Renal pyramid, Renal papilla, Renal sinus, Minor calyx, Major calyx, Renal pelvis, Renal hilus, Parietal peritoneum, (location = Retroperitoneal)

**C. NEPHRON:**

Cortical nephron, Juxtamedullary nephron, Glomerular (Bowman's) capsule, Glomerulus, Capillary endothelial cell, Capsular space, Juxtaglomerular apparatus, Juxtaglomerular cells, Macula densa, Proximal convoluted tubule, Loop of Henle, Descending limb, Thin ascending limb, Thick ascending limb, Distal convoluted tubule, Collecting duct, Papillary duct

**Nephron Histology**

Renal corpuscle, Capsular space, Parietal epithelium (simple squamous), Visceral epithelium (see filtration membrane), PCT (Microvillated simple cuboidal), L of H (thin) simple squamous, L of H (thick) simple cuboidal, DCT (simple cuboidal), Upper CT (simple cuboidal), Lower CT (simple columnar), Papillary duct (simple columnar)

**D. FILTRATION MEMBRANE: (Glomerulus)**

Endothelial fenestrations, Basement membrane (lamina densa), Podocytes, Pedicels, Filtration slits

**E. URINARY BLADDER:**

Visceral peritoneum, Detrusor muscle, Trigone, Internal urethral orifice, Rugae, Internal urethral sphincter

**Bladder Histology**

Transitional epithelium, Lamina propria, Muscularis (Longitudinal, Circular, and Longitudinal layers), Rugae, Visceral peritoneum

**F. KIDNEY BLOOD SUPPLY:**

**Arteries**

L & R Renal artery, Segmental arteries, Interlobar arteries, Arcuate arteries, Interlobular Arteries, Afferent arterioles, Glomerular capillaries, Efferent arterioles, Peritubular capillaries Vasa recta,

## Veins

Interlobular veins, Arcuate veins, Interlobar veins, Segmental veins, L& R Renal vein

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1. Understand the major functions of the urinary system and the anatomical structures involved.
2. Understand the basic physiology of the urinary system.
3. Understand the physiology of glomerular filtration including the pressures involved. Know how to calculate NHP, FP, and GFR:

Glomerular filtrate	Filtration pressure (FP)
Glomerular (blood) hydrostatic pressure (GHP)	Capsular hydrostatic pressure (CsHP)
Blood colloid osmotic pressure (BCOP)	Glomerular filtration rate (GFR)
Net hydrostatic pressure (NHP)	
4. Understand the regulation of glomerular filtration rate:

Renal autoregulation	Hormonal regulation
Renin	Angiotensin converting enzyme
Angiotensinogen	Angiotensin II
Antidiuretic hormone (ADH)	
5. Understand the physiology of urine production:

Urine formation involves: filtration, reabsorption, and secretion.

Renal structures involved:

Proximal convoluted tubule	Loop of Henle (thin and thick portions)
Distal convoluted tubule	Collecting duct
Vasa Recta	

Understand how compounds are moved: (In particular, review summary figure from PowerPoint presentation) facilitated diffusion, active transport, cotransport (symporter) countertransport (antiporter), countercurrent multiplication
6. Understand the hormonal control of urine volume and osmotic concentration  
antidiuretic hormone (ADH) aldosterone
7. Know the normal volume, physical characteristics and principal constituents of urine. Also, know the abnormal constituents found in urine and what may cause them to appear in urine.
8. Be familiar with the following medical terminology:

Albuminuria	Anuria	Bilirubinuria
Calculi	Cystitis	Diuresis
Diuretics	Dysuria	Enuresis
Glomerulonephritis	Glucosuria	Hematuria
Hemodialysis	Hemoglobinuria	Incontinence
Ketonuria	Micturition	Polycystic kidney disease
Polyuria	Proteinuria	Pyelogram
Pyelonephritis	Pyuria	Renal failure
Shock wave lithotripsy	Urethritis	Urinalysis
Urinary tract infection (UTI)		

## Chapter 22, The respiratory System

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1. Be able to identify the following structures of the respiratory system using microscope, photographs, diagrams, charts, and/or models:
    - a. **NOSE AND NASAL CAVITY:**  
External nares, Frontal sinus, Hard palate, Internal nares, Nasal conchae (superior, middle, inferior)  
Nasal meatuses (superior, middle, inferior), Nasal septum, Nasopharynx, Nostrils, Olfactory epithelium, Orifice of Eustachian tube, Oropharynx, Palatine tonsil, Soft palate, Sphenoidal sinus  
Uvula, Vestibule
    - b. **LARYNX:**  
Arytenoid cartilage, Corniculate cartilage, Cricoid cartilage, Epiglottis, glottis, Laryngeal sinus  
Laryngopharynx, Rima glottidis, Thyroid cartilage, Ventricular folds (false vocal cords)  
Vocal folds (true vocal cords)
    - c. **TRACHEA:**  
Carina, Tracheal cartilage (hyaline), Trachealis muscle(Histology), Pseudostratified ciliated columnar epithelium, Lamina propria, Seromucous gland, Submucosa (aereolar connective tissue), Perichondrium, Hyaline cartilage, Adventitia
    - d. **BRONCHI: (Left & Right Side)**  
Primary bronchi, Bronchioles, Secondary bronchi (lobar), Terminal bronchioles, Tertiary bronchi, Respiratory bronchioles, Alveolar ducts
    - e. **LUNGS: (Left & Right)**  
**(EXTERNAL ANATOMY)**  
Apex, Base, Hilus, Horizontal fissure, Inferior lobe, Middle lobe, Oblique fissure, Pulmonary arteries. Pulmonary veins, Superior lobe  
**(INTERNAL ANATOMY/Histology)**  
Alveolar ducts, Alveolar sacs, Alveolus, Lobules, Respiratory bronchioles, Surfactant, "Type 1" Alveolar cells, "Type 2" Alveolar cells
    - f. **RESPIRATORY MUSCLES:**  
**Principal Muscles of Inspiration:**  
Diaphragm  
**Accessory Muscles of Inspiration:**  
External intercostals                                  Pectoralis minor                                  Scalenes  
Sternocleidomastoid  
**Principal muscles of expiration:**  
No active muscles- Diaphragm relaxes  
**Muscles of Expiration:**  
External Obliques                                  Internal Intercostals                                  Internal Obliques  
Rectus Abdominus                                  Transversus Abdominus
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- 1.) Understand the basic physiology of voice production.

- 2.) Know the following gas laws and understand how they affect pulmonary ventilation, external respiration, and internal respiration:  
Boyle's Law      Dalton's Law      Henry's Law
- 3.) Understand the physiology of pulmonary ventilation:  
**Important terms and concepts:** Atmospheric pressure, alveolar pressure, intrapleural pressure, costal breathing, diaphragmatic breathing, surface tension, surfactant, compliance.
4. Know lung volumes and capacities and how to calculate them:  
**Important terms and concepts:** Spirometer, tidal volume, anatomic dead space, minute volume of respiration, alveolar ventilation rate, inspiratory reserve volume, expiratory reserve volume, forced expiratory volume, residual volume, minimal volume, inspiratory capacity, functional residual capacity, vital capacity, total lung capacity.
5. Understand the mechanisms of external respiration, internal respiration and oxygen transport.  
**Important terms and concepts:** (Understand factor that change oxyhemoglobin affinity and diffusion: blood pH, blood [CO<sub>2</sub>], blood temperature, fetal hemoglobin)
6. Understand the nervous control of respiration:  
**Important terms and concepts:** Medullary rhythmicity area, pneumotaxic area, apneustic area, central chemoreceptors, peripheral chemoreceptors, aortic body, carotid bodies.
7. Know the following medical terms and disorders:

Anemic Hypoxia	Anoxia	Asthma	Atelectasis
Bronchitis	Bronchogenic carcinoma (lung cancer)		Bronchoscopy
Cystic fibrosis	Dyspnea	Emphysema	Epistaxis
Histotoxic hypoxia	Hypercapnia	Hyperventilation	Hypocapnia
Hypoventilation	Hypoxia	Hypoxic hypoxia	Ischemic hypoxia
Pleurisy	Pneumonia	Pulmonary embolism	Tracheostomy
Tuberculosis			

## CHAPTER 24: Fluid, Electrolyte, and Acid-base Balance

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1. Know the body fluid and electrolyte compartments.  
**Important terms and concepts:** Intracellular fluid (ICF) versus extracellular fluids (ECF) both plasma and interstitial fluids, and anions and cations
2. Understand the regulation of fluid balance. (water gain and loss)  
**Important terms and concepts:** Basic regulation mechanisms, hormones (ADH, aldosterone, and ANP), edema, water losses, water gains, metabolic water generation, overhydration, dehydration, fluid shifts, hypertonic, hypotonic, and isotonic
3. Understand the following electrolyte imbalances and their homeostatic regulations (see table on electrolyte balance). Know how to express concentration of solutions in the following units: percent, millimoles, milliequivalents, milliosmoles, and osmotic pressure  
**Important terms and concepts:** Hypo- or Hypernatremia, Hypo- or hyperchloremia, Hypo- or hypercalcemia, Hypo- or hyperphosphatemia, Hypo- or hypermagnesemia.

4. Understand the mechanisms of acid-base balance and buffer systems.

**Important terms and concepts:** protein buffer system, carbonic buffer system, phosphate buffer system, acidemia, acidosis, alkalemia, alkalosis, volatile acid, fixed acid, organic acids, respiratory compensation, renal compensation, respiratory acidosis, respiratory alkalosis, metabolic acidosis, metabolic alkalosis.