

## Blood

**\*\* Students will use their textbooks and lab books as a study guide to locate these components on all models, charts, diagrams and prepared slides.**

1. Name the 2 major components of blood (plasma, formed elements) and state their average percentages.
2. Name the constituents of plasma.
3. Identify the formed elements and cite their relative percentages and normal number of cells per mm<sup>3</sup> of blood. Differentiate between erythrocytes & leukocytes. Differentiate between the types of granulocytes and agranulocytes. State one function of each formed element.
4. Describe the proper technique for making a blood smear, and identify the stain used for blood smears.
5. Explain what is meant by the terms leukopenia, leukocytosis, leukemia, anemia, polycythemia.
6. Define anemia (a condition in which the oxygen-carrying capacity of blood is reduced) and list 3 common causes of anemia. Understand hemoglobin. Define oxyhemoglobin and carbaminohemoglobin.
7. Define leukemia and list the common types of leukemia.
8. Define hematocrit, describe how a hematocrit determination is performed and normal values. Explain the tests involved in a complete blood count (CBC).
9. Explain the use of the hemacytometer in performing a WBC/RBC count.
10. Know the difference between plasma and serum.
11. Know the intrinsic and extrinsic system of coagulation and the laboratory tests that are used to measure them.

### Histology:

1. Identify: neutrophil, eosinophil, basophil, lymphocytes, monocyte, platelet, red blood cell.

### Physiology CD - Respiratory

Gas Transport (pages 1-19)

- Items to know:
1. How O<sub>2</sub> is transported. What affects its affinity to hemoglobin?
  2. How CO<sub>2</sub> is transported.

# Heart

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts, diagrams, and dissected animals.**

1. Describe the location of the heart using correct directional & anatomical terminology.
2. Identify the coverings of the heart: pericardium (fibrous pericardium, serous pericardium) and pericardial cavity.
3. Identify the layers of the heart wall: epicardium, myocardium, endocardium.
4. Identify the external anatomy of the heart & associated structures:

superior vena cava	pulmonary trunk	apex
pulmonary arteries	ascending aorta	base
pulmonary veins(4)	ligamentum arteriosum	arch of aorta
inferior vena cava	left subclavian artery	auricles
left common carotid artery	brachiocephalic artery	
anterior interventricular sulcus (grooves)	posterior interventricular sulcus (grooves)	
coronary sulcus (grooves)		
5. Identify the internal anatomy of the heart & associated structures:

right & left atria	right & left ventricles	fossa ovalis
pectinate muscles	tricuspid valve (right AV valve)	bicuspid valve
aortic semilunar valve	pulmonary semilunar valve	(left AV valve - Mitral)
trabeculae carneae	papillary muscle	
interventricular septum	chordae tendinae.	
6. Understand heart sounds, murmurs and cardiac cycle (systole, diastole)
7. Trace the pathway of blood through the heart. (pulmonary and systemic circuits)
8. Identify the following coronary vessels & their major branches:
  - Left coronary artery: Anterior interventricular artery
  - Right coronary artery: Posterior interventricular artery
  - Coronary sinus: Great cardiac vein

## **HISTOLOGY:**

Cardiac Muscle: Identify striations, intercalated discs, and interconnecting fibers.

# Vessels, Cardiovascular Physiology

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts, and diagrams.**

1. Identify the components of the conduction system of the heart & trace the conduction pathway: sinoatrial node, atrioventricular node, atrioventricular bundle(Bundle of His), bundle branches, conduction myofibers(Purkinje fibers).
2. Identify the individual waves & intervals of a normal EKG & what each one represents: P wave, QRS complex, T wave, P-R interval, S-T segment.
3. Define systolic pressure, diastolic pressure, pulse pressure, blood pressure, sounds of Korotkoff, tachycardia, bradycardia.
4. Determine the radial pulse of a subject. Follow procedure given in your lab book.
5. Determine the blood pressure of a subject and state normal parameters. Follow procedures given in your lab book.
6. Identify the following structures on a diagram of an artery:  
**Tunica interna:** endothelium, lumen  
**Tunica media:** smooth muscle, elastic fibers (thickest layer in arteries)  
**Tunica externa:** collagen fibers
7. Identify the following structures on a diagram of a vein:  
**Tunica interna:** endothelium, lumen, valves  
**Tunica media:** smooth muscle  
**Tunica externa:** collagen fibers (thickest layer in veins)
8. Identify the following structures and follow the pathway of blood in fetal circulation:  
ductus arteriosus                      foramen ovale                      ductus venosus  
umbilical vein                              umbilical arteries                      umbilical cord

## HISTOLOGY

1. Artery/Vein:  
Differentiate between an artery and a vein.  
Identify tunica interna, tunica media, tunica externa, lumen.

## Physiology CD - Cardiovascular

- I. Cardiac Output (pages 1-10)  
Items to learn: 1. Be able to calculate cardiac output by knowing EDV, ESV, and HR.
- II. Factors that affect blood pressure (pages 1-15)  
Items to learn: 1. Name the four factors that influence blood pressure.

## BLOOD VESSELS

(Name and locate on charts, models and diagrams)

### ARTERIES

Circle of Willis  
    Anterior communicating artery  
    Posterior communicating artery  
Common carotid artery  
    External carotid artery  
    Internal carotid artery  
Vertebral artery  
Subclavian artery  
Axillary artery  
Brachial artery  
Radial artery  
Ulnar artery  
Superficial palmar arch  
  
Aortic arch  
    Brachiocephalic artery  
    Left common carotid artery  
    Left subclavian artery  
Thoracic aorta  
Abdominal aorta  
    Celiac Trunk: Gastric artery  
                  Splenic artery  
                  Common hepatic artery  
    Superior mesenteric artery  
    Renal artery  
    Gonadal artery  
    Inferior mesenteric artery  
Common iliac artery  
    Internal iliac artery  
    External iliac artery  
Femoral artery  
Popliteal artery  
Anterior tibial artery  
Dorsalis pedis artery  
Posterior tibial artery  
Plantar arch

### VEINS

Superior sagittal sinus  
Inferior sagittal sinus  
External jugular vein  
Internal jugular vein  
Brachiocephalic vein  
Superior vena cava  
Azygous vein (system)  
Subclavian vein  
Axillary vein  
Brachial vein  
Basilic vein  
Cephalic vein  
Radial vein  
Ulnar vein  
Superficial palmar venous arch  
Inferior vena cava  
Hepatic veins  
Hepatic portal system  
    Inferior mesenteric vein  
    Splenic vein  
    Superior mesenteric vein  
    Hepatic portal vein  
Renal veins  
Common iliac vein  
    Internal iliac vein  
    External iliac vein  
Femoral vein  
Great saphenous vein  
Popliteal vein  
Anterior tibial vein  
Dorsalis pedis vein  
Posterior tibial vein  
Plantar arch



# Respiratory System

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts and diagrams.**

1. Identify the following structures of the **upper respiratory tract**:

oral cavity	esophagus	middle meatus
nasal cavity	trachea	inferior meatus
hard palate	paranasal sinuses	external nares = nostrils
soft palate	maxillary sinus	internal nares
uvula	sphenoidal sinus	nasal septum
pharynx	ethmoid sinus	Eustachian tube
nasopharynx	frontal sinus	palatine tonsil
oropharynx	turbinates	pharyngeal tonsil
laryngopharynx	superior nasal concha	lingual tonsil
larynx	middle nasal concha	mucous membrane
	inferior nasal concha	
	superior meatus	

2. Identify and function of the following structures of the **larynx**:

hyoid bone	thyroid cartilage	glottis	tracheal cartilages
cricoid cartilage	arytenoid cartilage		trachealis muscle
vocal fold(true vocal cord)	epiglottis		

3. Identify the following structures of the **bronchial tree** and **respiratory zone**:

primary bronchus	secondary bronchus	tertiary bronchus
bronchiole	terminal bronchiole	respiratory bronchiole
alveolar duct	alveolar sacs	alveolus

4. Identify the following structures of the **lungs**:

apex	base	hilus	
oblique fissure	cardiac notch	horizontal fissure	diaphragm
middle lobe	inferior lobe	superior lobe	
visceral pleura	pleural cavity	parietal pleura	

5. Know the following structures of the **respiratory membrane**:

alveolar wall (simple squamous epithelium), capillary endothelium (simple squamous epithelium)  
surfactant-secreting cells, alveolar macrophages

6. Understand spirometry and give the amounts for the respiratory volumes & capacities & a brief description of each:

Respiratory volumes: tidal, inspiratory reserve, expiratory reserve, residual.

Respiratory capacities: total lung, vital, inspiratory.

## HISTOLOGY:

1. Lung: Identify alveoli, bronchiole.
2. Trachea Identify ciliated pseudostratified columnar epithelium, mucous glands, hyaline cartilage.

## Physiology CD - Respiratory

I. Control of respiration experiments (pages 7-17)

Items to learn: 1. Understand how the amount of breathing (hypoventilation (hyperventilation) influences (via CO<sub>2</sub>) the pH of blood.

## Physiology CD - Fluids, Electrolytes etc.

II. Acid/base homeostasis (pages 7-30)

Items to learn: 1. Understand how the bicarbonate ion buffers the pH of blood.



## Endocrine System

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts, diagrams, and dissected animals.**

1. Define hormone, target cell/organ, neuroendocrine organ.
2. Differentiate between endocrine & exocrine glands.
3. Identify the endocrine organs/glands of the body & locate these organs by verbal description as well as on charts, diagrams, models and in dissected animals where applicable.
4. Hypothalamus:
  - a) Identify infundibulum (hypothalamic hypophyseal tract, hypophyseal portal system).
  - b) Name the 2 hormones (other than releasing and inhibiting hormones) produced by the hypothalamus.
5. Pituitary Gland (Hypophysis):
  - a) Identify adenohypophysis, neurohypophysis.
  - b) Name the 6 main hormones produced by the adenohypophysis and their function.
  - c) Name the 2 hormones stored in and released from the neurohypophysis and their function.
6. Thyroid Gland:
  - a) Identify lobes & isthmus.
  - b) Name the hormones of the thyroid & the specific cells or structures which produce them and their function.
7. Parathyroid Glands:
  - a) Name the hormone of the parathyroid and its function.
8. Adrenal Glands:
  - a) Name the hormones of the adrenals & state whether each is produced in the cortex or medulla and their functions.
9. Pancreas:
  - a) Name the hormones of the pancreas & the specific cells which produce them and their functions.
10. Pineal Gland:
  - a) Name a product of the pineal (melatonin).
11. Thymus Gland:
  - a) Name the hormone produced by the thymus and its function.
12. Name the hormones produced by the testes and the ovaries and their functions.
13. Explain the endocrine diseases discussed by your instructor, especially diabetes mellitus.

### HISTOLOGY:

1. Hypophysis: Identify adenohypophysis, neurohypophysis.
2. Thyroid gland: Identify follicles, follicular cells, thyroid colloid, parafollicular cells.
3. Adrenal gland: Identify: adrenal cortex, adrenal medulla. (Cortex has 3 zones: zona glomerulosa, zona fasciculata, zona reticularis.)
4. Pancreas: Identify islets of Langerhans, acini.

### Physiology CD - Fluids, Electrolytes etc.

- I. Water homeostasis (pages 14-17)  
Items to review: 1. ADH role
- II. Electrolyte homeostasis (pages 22-24)  
Items to review: 1. Aldosterone role
- III. Electrolyte homeostasis (pages 33-38)  
Items to review 1. PTH role 2. Calcitonin role



9. Identify the following gross features of the small intestine:
- |                  |                                  |       |            |
|------------------|----------------------------------|-------|------------|
| Duodenum         | Jejunum                          | Ileum | lacteal    |
| Duodenal papilla | Plicae circulares/circular folds | villi | microvilli |
10. Identify the following gross features of the large intestine:
- |                         |                         |                 |            |
|-------------------------|-------------------------|-----------------|------------|
| Hepatic flexure         | Transverse colon        | Haustra         | Rectum     |
| Ascending colon         | Appendix                | Ileocecal valve | Anal canal |
| Cecum                   | Sigmoid colon           | Splenic flexure | Tenia coli |
| Descending colon        | Internal anal sphincter |                 |            |
| External anal sphincter |                         |                 |            |
11. Identify the following gross features of the liver/gallbladder:
- |                          |                     |              |                |
|--------------------------|---------------------|--------------|----------------|
| Right lobe               | Left lobe           | Caudate lobe | Quadrante lobe |
| Falciform ligament       | Cystic duct         |              |                |
| Common bile duct         | Common hepatic duct |              |                |
| Hepatopancreatic ampulla |                     |              |                |
12. Identify the following gross features of the pancreas:
- |                      |                          |      |
|----------------------|--------------------------|------|
| Body                 | Head                     | Tail |
| Main pancreatic duct | Hepatopancreatic ampulla |      |
13. Understand food digestion (page in the lab manual).

**HISTOLOGY:** Use a light microscope or diagram to identify:

- A. Esophagus: Mucosa, submucosa, muscularis, adventitia
- B. Stomach: Mucosa, submucosa, muscularis, serosa, gastric glands
- C. Duodenum: Mucosa, submucosa, muscularis, serosa, intestinal glands (in mucosa), duodenal glands (in submucosa)
- D. Jejunum: Mucosa, submucosa, muscularis, serosa, villi
- E. Ileum: Mucosa, submucosa, muscularis, serosa, peyer's patches
- F. Colon: Mucosa, submucosa, muscularis, serosa, goblet cells
- G. Liver: Lobule, Hepatocytes, Sinusoids, Central vein, Bile canaliculi, Portal triad
- H. Pancreas: acini, islets of Langerhans

# Urinary System

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts, diagrams, dissected material and slides.**

1. Give the location of the kidneys and their approximate weight and size.  
\*Located in retroperitoneal position from about T12 to L3, Bean-shaped, weighs about 5 oz.
2. Identify the following gross anatomical structures of the urinary system:  
Renal arteries                      Renal veins                      Renal hilus  
Urinary bladder                      Urethra                      Ureters
3. Identify the following structures of the internal and external kidney:  
Cortex                      Renal capsule  
Medulla                      Renal (Medullary) pyramid                      Renal pelvis  
Minor calyces                      Renal Papilla of pyramid                      Renal columns  
Major calyces
4. Identify the following vessels and trace the pathway of blood through the kidney:  
Renal artery, segmental artery, interlob ar artery, arcuate artery, interlobular artery, afferent arteriole, glomerular capillaries, efferent arteriole, peritubular capillaries, vasa recta, interlobular vein, arcuate vein, interlobar vein, renal vein.
5. Identify the following structures of the urinary bladder:  
Detrusor muscle                      Trigone                      Ureteral openings  
Internal urethral sphincter                      External urethral sphincter
6. Recall the following abnormal urinary constituents, and give one indication of their clinical significance:  
Glucose                      Casts                      Ketone bodies                      Leukocytes  
Albumin                      Bile pigments                      Erythrocytes                      Calculi
7. Give the characteristics and composition of normal urine by identify such factors as:  
Color and transparency, odor, pH, specific gravity, chemical composition.

**HISTOLOGY:** Use the light microscope or diagram to locate and identify:

- A. Kidney: Simple cuboidal epithelium of tubules, glomeruli.
- B. Bladder: Muscularis (smooth muscle layers), transitional epithelium.
- C. Nephron:
  1. The *renal corpuscle*: Glomerulus with capillaries, Glomerular (Bowman's) capsule (parietal layer, visceral layer)  
Understand terms: Filtration membrane: Glomerular endothelium with fenestrations, basement membrane, visceral layer of Bowman's capsule with filtration slits.
  2. The *tubules*: Order of the flow of urine: Proximal convoluted tubule, Loop of Henle (Descending limb, Ascending limb), Distal convoluted tubule, collecting duct
  3. Juxtaglomerular apparatus

## Physiology CD - Urinary

Glomerular Filtration (pages 1-16)

- Items to learn:
1. Urine formation is due to what three processes?
  2. What are the three mechanisms that influence the blood pressure regulation of glomerular filtration rate?

## **Internal Organs**

### Laboratory Manual

#### **IDENTIFY ADDITIONAL CAT ANATOMY AND PHYSIOLOGY:**

Heart

Lungs

Larynx

Trachea with cartilage rings

Diaphragm

Thymus gland

Thyroid gland

Esophagus - peristalsis

Stomach (fundus, body, pylorus, greater curvature, lesser curvature, rugae)

Small intestine (duodenum, jejunum, ileum)

Large intestine (cecum, descending colon)

Rectum

Greater omentum

Lesser omentum

Mesentery

Mesocolon

Peritoneal layers and cavity

Liver

Gall bladder

Pancreas

Spleen

Kidney

Urinary bladder

Ureter

Urethra

Ovary

Uterus

Testis

Penis

## Male Reproductive System

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts, diagrams, or dissected animals.**

1. Define gametes, semen, gonad, ejaculation, erection.
2. **TESTES/SCROTUM**
  - a) Identify dartos muscle, cremaster muscle, tunica albuginea, seminiferous tubules, epididymis, testis, scrotum.
  - b) Name the hormones of the testes & the specific cells which produce them.
3. **DUCT SYSTEM**
  - a) Identify seminiferous tubules, rete testis, efferent duct, epididymis, vas deferens, ejaculatory duct, prostatic urethra from urinary bladder, membranous urethra, spongy (penile) urethra.
4. **MALE ACCESSORY SEX GLANDS**
  - a) Identify seminal vesicles, prostate gland, bulbourethral gland.
5. **PENIS**
  - a) Identify corpora cavernosa, corpus spongiosum, glans penis, prepuce (foreskin), external urethral orifice, and bulb of penis.

## HISTOLOGY

1. **SPERMATOGENESIS/SEMINIFEROUS TUBULES**
  - a) Identify: lumen, basement membrane, spermatogonia, spermatozoa, interstitial cells of Leydig.
  - b) Identify head (acrosome, nucleus), midpiece, and flagella on diagram or slide of spermatozoa.
  - c) Identify the following cells which occur in spermatogenesis, (meiosis), on a diagram: Spermatogonium (2n), primary spermatocyte (2n), secondary spermatocyte (1n), spermatid, spermatozoa, sustentacular (Sertoli) cells.
2. **PENIS (view with dissecting scope)**
  - a) Identify corpus spongiosum, corpora cavernosa, urethra
4. **PROSTATE TISSUES (note glandular alveoli)**

# Female Reproductive System

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts, diagrams, slides, and dissected animals.**

## 1. OVARIES

- a) Identify tunica albuginea, medulla, cortex.
- b) Identify ligaments & peritoneal extensions which anchor ovaries in pelvic cavity: ovarian ligament, suspensory ligament, mesovarium.
- c) Name the hormones of the ovaries & the structure which produce them and their functions.

## 2. UTERINE / FALLOPIAN TUBES

- a) Identify fimbriae, infundibulum, ampulla, isthmus.

## 3. UTERUS

- a) Identify body, fundus, isthmus, cervix, cervical canal, external os, internal os, lumen of uterus.
- b) Identify perimetrium, myometrium, endometrium (stratum basalis, stratum functionalis) of uterine wall. Understand menstrual cycle.
- c) Identify ligaments & peritoneal extensions which anchor the uterus in the pelvic cavity: round ligaments, uterosacral ligaments, lateral cervical (cardinal) ligaments, broad ligaments.

## 4. VAGINA AND VULVA (EXTERNAL GENITALIA)

- a) Identify vagina, fornix
- b) Identify mons pubis, labia majora, labia minora, vestibule, Bartholin's(greater vestibular) glands, clitoris, perineum, urethral orifice, prepuce of clitoris, vaginal orifice, hymen.

## 5. MAMMARY GLANDS

- a) Identify suspensory ligament, lobe, areola, nipple.
- b) Identify lobule containing alveoli, mammary duct, lactiferous sinus, lactiferous duct.

## HISTOLOGY

### 1. OVARY - Ovarian cycle

- a) Identify primordial follicles, primary follicles, secondary follicles, graafian follicles, oocyte, corona radiata, zona pellucida, corpus luteum.
- b) Identify the following cells which occur in oogenesis, (meiosis), on a diagram:  
Oogonium(2n), primary oocyte((2n), secondary oocyte, ovum, three polar bodies.

### 2. FALLOPIAN TUBES

- a) Identify ciliated simple columnar epithelium, folds of mucosa.

### 3. UTERUS(viewed on dissecting scope)

- a) Identify myometrium, endometrium.

### 4. MAMMARY GLANDS

- a) Identify glandular alveoli.

## Development & Genetics

**\*\* Students will use their textbooks and lab books as a study guide to locate anatomical structures on all models, charts and diagrams.**

1. Define fertilization, gamete, zygote, cleavage, morula, blastocyst (blastula), gastrula (gastrulation – ectoderm, mesoderm, endoderm): allele, dominance, recessiveness, genotype, phenotype, homologous chromosomes, heterozygous, homozygous, sex chromosomes, autosomes, sex linked disorders, karyotype, haploid, diploid.
2. Identify cell stages from fertilization to implantation & give the elapsed time & location of each cell formation.

<b>zygote</b>	just after fertilization	fallopian tube (ampulla)
<b>morula</b>	3 -4 days after fertilization	fallopian tube(close to uterus)
<b>blastocyst</b>	4.5-5 days after fertilization	uterus(floating freely)
<b>blastocyst</b>	6 days after fertilization	implantation in the uterine wall
3. Identify the following on a diagram or model of a blastocyst: trophoblast, inner cell mass, blastocyst cavity.
4. Identify the following structures and functions on a diagram of a 16-day embryo and a model of a 30-day embryo: primary germ layers, amniotic cavity, amnion, yolk sac, chorionic villus, body stalk.
5. Identify the following structures on a diagram of a 4.5-week embryo: chorionic villus, amnion, amnionic cavity, yolk sac, primitive umbilical cord.
6. Identify the following structures on a diagram of a 13-week fetus: placenta, chorionic villi, yolk sac, amnion, amnionic cavity, umbilical cord.
7. Identify the following structures on the placenta model: umbilical cord, umbilical arteries, umbilical vein, fetal portion of placenta, maternal portion of placenta.
8. Note the following venereal (VD) or sexually transmitted (STD) diseases: gonorrhea, syphilis, chlamydia, trichomoniasis(vaginitis), genital herpes, AIDS.
9. Identify genotypes of selected human phenotypes as assigned by your instructor. (For example, eye color).
10. Be able to recognize what Punnett Square analysis is.