

Pig Prelab Packet: EOR _____

Dissection of the Fetal Pig: Day 1 (Pre-Lab Reading)

Mammal Features

The purpose of dissecting a fetal pig is to learn more about human anatomy. Although the fetal pig is not human; its skeleton, muscles, nervous system, and internal organs are very similar to ours both in structure and function. The pig is a placental mammal. Mammals share several characteristics including live-born young that receive milk from the female's mammary glands, hair on the body for insulation to maintain a constant body temperature, 4-chambered hearts for efficient delivery of oxygen to the body tissues, and a diaphragm muscle that assists respiration and completely separates the inside of the body into the thoracic cavity and the abdominal cavity. Placental mammals also develop completely inside their mother's uterus before they are born. During this time of development, these mammals are connected by the umbilical cord to the placental tissue, which is attached to the wall of the uterus. Nutrients and oxygen from the mother's blood are exchanged with wastes and carbon dioxide in the blood of the developing fetus.

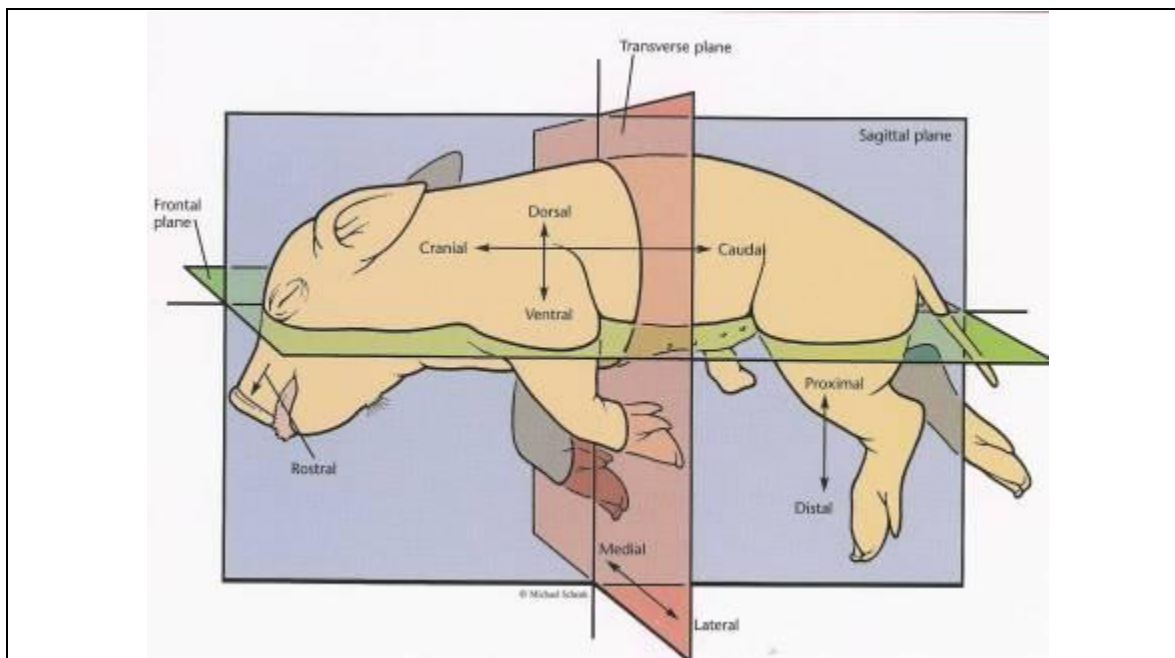
Anatomy Directional Terms

Like most animals, pigs exhibit bilateral symmetry, which means that the animal has right and left sides that are mirror images. Pigs also have distinct front and back ends. The body consists of 3 regions: head, neck, and trunk. We refer to the front end of an animal as the **anterior** or **cranial** end. We refer to the back end of animal as the **posterior** or **caudal** end. The belly surface of an animal is referred to as the **ventral** surface and the back of an animal is the **dorsal** surface.

Consult the diagram below to acquaint yourself with the anatomical directions and planes of the pig's body. Two other descriptives, *proximal* and *distal*, relate to the location of one structure to that of another. **Proximal** indicates that something is relatively close to another structure. For instance, your elbow is more proximal to your shoulder than is your wrist. **Distal** is the opposite of proximal and refers to a structure that is farther away. Other relative terms illustrated on the diagram are medial and lateral. **Medial** refers to the condition of being located closer to the center of the body. **Lateral** describes the condition of being located more to the side.

The diagram below shows the external features of the fetal pig. Notice the regions of the pig's body and each external structure. Notice the tongue has papillae along its edge.

** Label the **Anterior** and **Posterior** regions of the fetal pig below



FETAL PIG DISSECTION: Day 1 (Pre-Lab Questions)

1. Explain what it means if pigs are placental mammals?

2. Name 4 major mammalian characteristics that are exhibited by the fetal pig.

3. The pig can be subdivided into what 3 body sections: _____, _____, _____

4. MATCHING (Directional Terms)

- | | |
|---|---------------|
| _____ 1. Back | A. Posterior |
| _____ 2. Head (cranial) | B. Anterior |
| _____ 3. Tail end (caudal) | C. Transverse |
| _____ 4. Belly (ventral) | D. Ventral |
| _____ 5. Plane cuts from belly to back | E. Frontal |
| _____ 6. Plane cuts from rooster to tooter | F. Dorsal |
| _____ 7. Located more to the side | G. Lateral |
| _____ 8. Toward the point of attachment | H. Distal |
| _____ 9. Toward the midline | I. Proximal |
| _____ 10. Away from the point of attachment | J. Medial |

5. Analogies

- a) Dorsal : Back :: _____ : Belly
- b) Move towards the body center : Medial :: Move towards the side of the body : _____
- c) Distal : Farther away :: _____ : Closer
- d) Anterior : Head or Front of animal :: _____ : Tail or Rear of the animal
- e) Caudal : Posterior :: _____ : Anterior

READ Sections 19.5 → 19.8 (p 396 – 399) in your **textbook** and then answer the questions below:

6. Compare how embryos develop between Marsupial and Placental Mammals:

7. MATCH all of the appropriate 4 animal classes to each description below:

A = Amphibian B = Birds R = Reptile M = Mammal

- _____ a) Endothermic
- _____ b) Ectothermic
- _____ c) First vertebrate to colonize land and some members develop using metamorphosis
- _____ d) Embryos develop in a protected, fluid-filled sac “self-contained pond”
- _____ e) Embryos must develop in moist conditions because eggs are only protected by a jelly-like covering
- _____ f) Most efficient group at extracting oxygen for respiration
- _____ g) Moist skin can supply some oxygen for respiration
- _____ h) Use a diaphragm muscle to improve lung function during respiration

FETAL PIG DISSECTION: Day 3 (Pre-Lab Questions)

Read the following sections of **chapter 22** in the textbook to learn about **Respiration and Gas Exchange** (**22.1, 22.2, 22.6, 22.8, 22.10, 22.11, 22.12**)

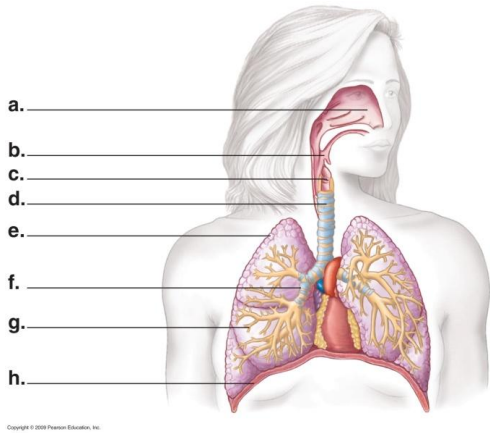
22.2

1) What characteristic describes all respiratory surfaces in cell membranes that allow for gas exchange by diffusion?

22.6

2) Name the sheet of muscle tissue which separates the thoracic and abdominal cavities? _____

3) Label the anatomy of the human respiratory system below (see **p. 459**)



4) Number the structures of the respiratory system below to indicate the correct sequence for air flow through humans

___ Bronchiole ___ larynx ___ nasal cavity ___ pharynx ___ alveoli ___ Bronchi ___ trachea

22.8

5) Human respiration extracts what percentage of O₂ from the air inhaled by our lungs each breath? _____

6) What two types of muscles contract when a person inhales to increase lung volume, create a negative pressure, and promote the intake of air? _____

22.11

7) Which iron-containing protein is used by most vertebrates to carry oxygen to each cell of the body? _____

8) How many total oxygen molecules can each of these proteins carry? _____

9) What other molecule (besides oxygen) can this versatile protein carry throughout the body? _____

22.12

10) Explain (using the concept of diffusion) how a developing fetus can obtain O₂ and rid CO₂ if its lungs are filled with amniotic fluid?

Read the following sections of **chapter 23** in the textbook to learn about **Cardiovascular Circulation** (**23.1, 23.2, 23.3**)

23.1

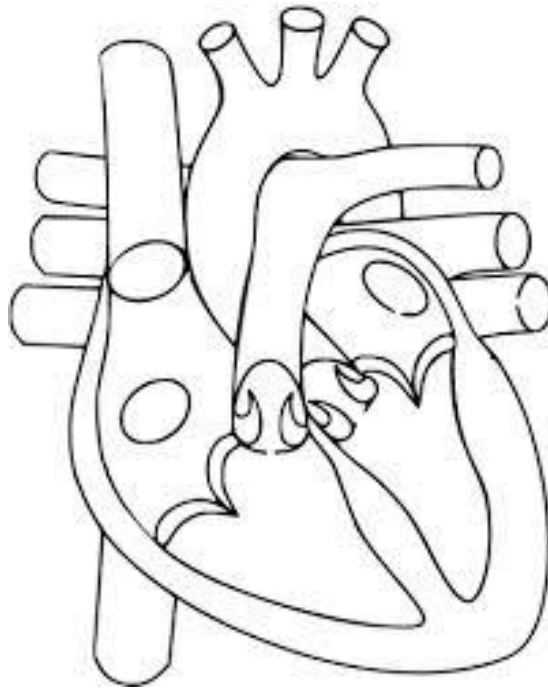
- 1) Arteries are blood vessels that carry blood (AWAY or TOWARD) the heart? (CIRCLE)
- 2) Veins are blood vessels that carry blood (AWAY or TOWARD) the heart? (CIRCLE)
- 3) Capillaries carry blood _____

23.2

- 4) Pulmonary circulation carries blood to the (BODY or LUNGS)? (CIRCLE)
- 5) Systemic circulation carries blood to the (BODY or LUNGS)? (CIRCLE)
- 6) The frog survives nicely with only a 3-chambered heart. Why do humans and pigs need large lungs and 4 chambers in their heart? _____

23.3

- 7) Draw arrows to indicate the direction of blood flow in the heart diagram below



- 8) **Number** the structures of the circulatory system below to indicate the correct sequence for blood flow through humans
___ Lungs ___ **R. Ventricle** ___ **L. Ventricle** ___ **Aorta** ___ **P. Artery** ___ **P Vein** ___ **Vena Cava** ___ Body ___ **R. Atrium**
___ **L. Atrium**

- 9) **LABEL** the **8** circulatory system structures (in BOLD type above)(#8) on the diagram of the heart above (#7).

- 10) **CIRCLE** any of the **10** circulatory system structures above (#8) that would contain blood **LOW** in oxygen.

FETAL PIG DISSECTION: Day 4 (Pre-Lab Questions)

Read the following sections of **chapter 21** in the textbook to learn about the **Digestive System** (21.4 → 21.12)

21.4 → 21.6

- 1) Is it possible for a bite of food to move from the pharynx to the stomach (against gravity) if the person is eating an apple while hanging upside down Explain?
- 2) Compare how long food typically takes to be processed in each part of the digestive system

Digestive structure	TIME to process food (hours)
Stomach	
Small intestine	
Large intestine	

- 3) Summarize 4 functions of saliva as it begins the process of digestion?

21.8

- 4) Identify 2 strategies that the stomach uses to prevent being self-digested by the acid and enzymes that are actively produced to begin the digestion of proteins in the stomach.
- 5) What is gastrin and what is its function in the digestive process?
- 6) How long does it take for Mitosis to completely replace the cells of the inner lining of the stomach?

21.10

- 7) Why are the liver and pancreas included in the digestive system?
- 8) Explain the 2-part process that happens in the small intestine to digest fats (lipids)?
- 9) Explain how the small intestine can have a total surface area about the size of a tennis court (300m²)?

21.11

- 10) Summarize the functions of the liver?

21.12

- 11) What are 2 health conditions that one might expect if the large intestine is NOT functioning properly?
- 12) What are the 2 main components of feces?

Digestive Review

13) **Number** the structures of the digestive system below to indicate the correct sequence for food processing.

___ Esophagus ___ Anus ___ Large Intestine ___ Pharynx ___ Mouth ___ Stomach ___ Rectum ___ Small Intestine

Digestive System Matching: Match each function to the appropriate digestive structure below

A = Small Intestine	C = Stomach	E = Gall Bladder	G = Esophagus	I = Rectum
B = Large Intestine	D = Liver	F = Pancreas	H = Mouth	J = Anus

- _____ 14. Where feces are stored until they are eliminated
- _____ 15. Where bile is produced
- _____ 16. Where bile is stored
- _____ 17. Location where carbohydrate digestion begins
- _____ 18. Location where carbohydrate digestion concludes
- _____ 19. Location where protein digestion begins
- _____ 20. Location where protein digestion concludes
- _____ 21. Location where fat (lipid) digestion begins
- _____ 22. Location where fat (lipid) digestion concludes
- _____ 24. Location where digested biomolecule nutrients are absorbed into the blood
- _____ 25. Location where vitamins are absorbed into the blood
- _____ 26. Location where water is absorbed into the blood
- _____ 27. Connects pharynx to the stomach
- _____ 28. Connected by a duct (tube) to the pancreas
- _____ 29. Connected by a duct (tube) to the gall bladder
- _____ 30. Location of villi and microvilli

FETAL PIG DISSECTION: Day 5 (Pre-Lab Questions)

Read the following sections of **chapter 25** in the textbook to learn about the **Urinary System** (25.5 → 25.9)

25.5

- 1) Liquid waste in mammals is periodically released as urine, which is composed of water and what nitrogen-containing molecule that is filtered from the blood by the kidneys?

25.6

- 2) Even though the human body contains ~ 5 Liters of blood, what volume of blood is filtered through the kidneys each day?
- 3) What is the function of the ureter?
- 4) Blood entering the kidney is forced through tiny functional filtering units called _____ that consists of a long convoluted tube and a hairpin-shaped Loop of Henle surrounded by tiny capillaries.
- 5) Inside the kidney, the following materials are filtered at the Bowman's capsule into the nephron tube from the blood: water, amino acids, waste, salts, glucose. CIRCLE which of these materials are then reabsorbed back into the blood.

25.9

- 6) List several things that could CAUSE a person's kidneys to fail?
- 7) Compare the medical options available for a person whose kidneys have failed?

Urinary Review

- 8) The _____ filters the blood to form urine. From here, the urine flows through the _____ tubes to the _____ where it is stored until it is excreted out through the _____ tube to exit the body.
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Read the following sections of **chapter 27** in the textbook to learn about the **Reproductive System** (27.3 → 27.4)

27.3

- 9) List 2 functions of female ovaries?
- 10) How often does a human female ovulate a ripe egg into the oviduct?
- 11) Where is the endometrium and what is its function?
- 12) What is an ectopic pregnancy?

27.4

- 13) Why aren't the testes located inside the body?
- 14) What tube carries sperm from the testes back into the body and loops the bladder before connecting with the urethra?
- 15) What is the function of the prostate gland?

Urogenital Review

16) The urethra in females carries _____ while the urethra in males carries _____ and _____?

Reproductive Matching: Match each function to the appropriate reproductive structure below

A = Ovary	C = Uterus	E = Oviduct
B = Testes	D = Scrotum	F = Vas Deferens

- _____ 17. Connects the testes to the urethra
 _____ 18. Connects the ovary to the uterus
 _____ 19. Sac that contains the testes
 _____ 20. Location where eggs are usually fertilized by the sperm
 _____ 21. Muscular cavity where the fetus develops
 _____ 22. Produces eggs and hormones like estrogen
 _____ 23. Produces sperm through meiosis cell division

Fetal Pig Urogenital Preview

After studying the diagrams of human male and female reproductive anatomy (p. 536 – 538), identify the corresponding female and male pig urogenital anatomy in the diagrams below using the provided terms.

Female Urogenital Terms: Uterus, Ureter, Ovary, Bladder, Kidney, Oviduct/Uterus Horns
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Male Urogenital Terms: Urethra, Ureter, Testes, Kidney, Vas Deferens

