

Fetal Pig Dissection

1. Pre-lab Reading

Chapter 34.1 “Parts of the Digestive System” [Biology2e](#), OpenStax College

Chapter 39.1 “Systems of Gas Exchange” [Biology2e](#), OpenStax College

Chapter 39.3 “Breathing” [Biology2e](#), OpenStax College

Chapter 40.3 “Mammalian Heart and Blood Vessels” [Biology2e](#), OpenStax College

2. Purpose and Objectives

The purpose of this lab is to examine the characteristic features of a vertebrate animal using the fetal pig (*Sus scrofa*) as a model.

Objectives

1. Perform a whole-body dissection of a vertebrate animal.
2. Identify the major anatomical features of the vertebrate body.
3. Relate anatomical structures with their functions.

3. Safety Guidelines

1. Wear safety goggles while participating in the dissection.
2. Fluids will need to be drained from the pig once the body cavities are open. Carefully drain the fluids into the container provided. Make sure you are wearing safety goggles during this process.

3. Use scalpels and other sharp instruments with extreme care. Many of the dissection steps should be done using dissecting needles and probes to tease away tissues rather than using a scalpel. Also, **once a small incision is made a scissors works well for cutting open the body cavities.**

4. Background Information

While there are significant differences between the anatomy of a pig and that of a human, the fetal pig provides an excellent model of general mammalian anatomy. The basic body plan and functional relationships of the pig are strikingly similar to those of humans and other mammals as well.

In today's investigation, you will examine both the external and internal anatomy of the fetal pig, noting differences and similarities between its anatomy and that of a human and of the invertebrate animals studied previously. You will also learn about the functions of many of the anatomical parts that you identify.

The pig is classified in Kingdom Animalia, Phylum Chordata and Class Mammalia. The organisms in phylum Chordata have a neural cord, a bundle of nerve fibers that extends from the brain and facilitates communication between the brain and the rest of the body. In the subphylum Vertebratae this bundle of nerve fibers is enclosed in a protective column of bone and is called the spinal cord. The vertebrate group includes the fish, amphibians, reptiles, and birds in addition to mammals.

All vertebrates, including the pig, are triploblastic deuterostomes with bilateral symmetry. The vertebrates exhibit many of the "advanced" evolutionary features seen in some of the invertebrates examined previously. These include cephalization, a complete digestive tract, and a closed circulatory system. Vertebrates have a true coelomate body cavity. You should be able to see mesoderm-derived connective tissue both lining the body cavities of the pig and covering the internal organs. Some organs (digestive tract,

respiratory tract, heart and some blood vessels) have a layer of muscle that allows for control of fluid or gas movement. Muscle tissue also develops from mesoderm.

Although it is not as obvious as in the earthworm, vertebrates also exhibit segmentation. Ribs, vertebrae and spinal nerves, for example, develop from repeating tissue segments that form early in development and are then modified according to their location. A segmented pattern of nerve and muscle location helps fine tune control of movement.

The vertebrates are generally larger than invertebrates because they have features not seen in the invertebrate group. These include a rigid internal skeleton, which protects and supports body organs, and a large complex heart, a centralized pump that greatly improves circulation.

Class Mammalia, which includes both pigs and humans, is characterized by the presence of mammary glands, the ability to give birth to live young, and an endothermic pattern of temperature regulation. Mammals (and birds) have a four chambered heart and separate circulatory circuits for transport of blood to the lungs vs. transport to the rest of the body. This maximizes delivery of oxygen to body tissues.

5. Procedure

1. Read the Basic Dissection Techniques and Safety section in the dissection manual.

2. External Anatomy

Use the manual provided as a guide to the fetal pig dissection. Become familiar with the general anatomical terms listed below.

dorsal: toward the back of the body

ventral: toward the underside of the body

anterior (cranial): toward the head

posterior (caudal): toward the tail

lateral: to the side of the body

medial: toward the center of the body

right and left: from the pig's perspective

proximal: closer to the trunk

distal: farther from the trunk

Proceed with an examination of the external features of the fetal pig. Locate the following structures:

ears

nares

anus

male/female

genital papilla

urogenital opening

Make sure to examine both a male and female pig and know how to tell the difference.

3. Digestive System and Abdominal Cavity

Follow the instructions in the dissection manual to expose the internal organs. Identify the major digestive organs, beginning in the head, neck and oral cavity and proceeding to the abdominal cavity.

Structures to identify:

abdominal cavity

peritoneum (not shown in book)

liver, gallbladder

esophagus (thoracic cavity)

stomach

small intestine

pancreas

large intestine (spiral colon)

umbilical vein and artery

spleen

Record the function of each digestive system/abdominal cavity structure listed in your lab notebook.

4. **Circulatory System and Thoracic Cavity**

Examine the cardiovascular structures of the fetal pig following the directions outlined in your manual in the Thoracic Cavity and Neck Region section. Be sure to identify the parts of the heart and the major vessels associated with the heart. Examine the diagrams in the manual depicting the flow of blood through the heart and relate them to your specimen. Identify the following:

thoracic cavity

pericardial membrane

heart

4 chambers: r & l

ventricles

r & l atria with auricles

cranial and caudal vena cava

pulmonary veins

braciocephalic veins

**internal and external jugular
veins**

**pulmonary artery, and r & l
branches**

aorta and aortic arch

**Brachiocephalic trunk
(artery)**

Left subclavian artery

dorsal aorta

ductus arteriosus

coronary arteries

Make a simple **drawing** of the heart and major vessels. **Label** the following: right and left ventricles, right and left atria, cranial and caudal vena cava, pulmonary artery, pulmonary veins, aorta, brachiocephalic trunk (artery), left subclavian artery.

Be able to trace the pathway of blood through the heart, lungs and major vessels in the adult and fetal pig.

5. **Respiratory System**

What is the function of the respiratory system? Identify the organs listed below and **record the function of each in your lab notebook.**

larynx
trachea

lungs
diaphragm

Excretory System

What is the function of the excretory system? Be able to identify the following organs:

kidney

urinary bladder

ureter

renal veins and arteries

Record the function of each excretory system structure listed in your lab notebook.

6. Reproductive System

What is the purpose of the reproductive system? Identify the reproductive organs of both the male and female pig. This will involve working with another group that has a pig of the opposite sex of your pig.

Identify the following organs and know the function of each one:

Male

testes

epididymus

ductus deferens

penis

Female

ovaries

oviducts (fallopian tubes)

uterus

6. Conclusion and Summary

1. Which of the following are seen in vertebrates but **not in any** invertebrates: bilateral symmetry, complete digestive tract, closed circulatory system, rigid internal skeleton, and/or body segmentation?

2. Which of the following characteristics is/are found **only** in mammals: mammary glands, ability to give birth to live young, endothermic temperature regulation, spinal cord?

3. What are the advantages of each of the following characteristics: closed circulatory system, four chambered heart, rigid internal skeleton, large complex brain and spinal cord?

4. Trace the pathway of food through the mammalian complete digestive system starting with the mouth. At least five structures should be listed, including the mouth.