



# Chapter 25

## Animal Tissues and Organ Systems



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# Specialized cells build animal bodies

This chapter introduces the anatomy and physiology of animals.



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# What is anatomy?

**Anatomy** is the study of an organism's **structure**.



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# What is physiology?

**Physiology** considers how an organism's body works.



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# Structure fits function

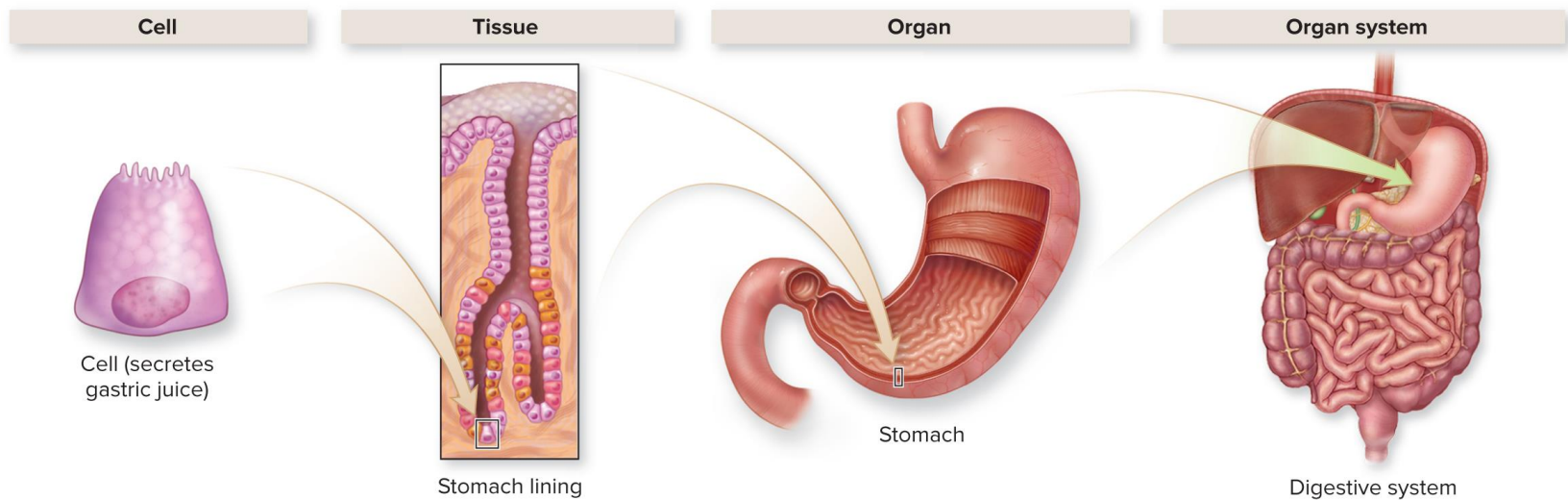
In this mole, and in all organisms, anatomy and physiology are closely related. The structure of his broad front paws fits their function: digging.



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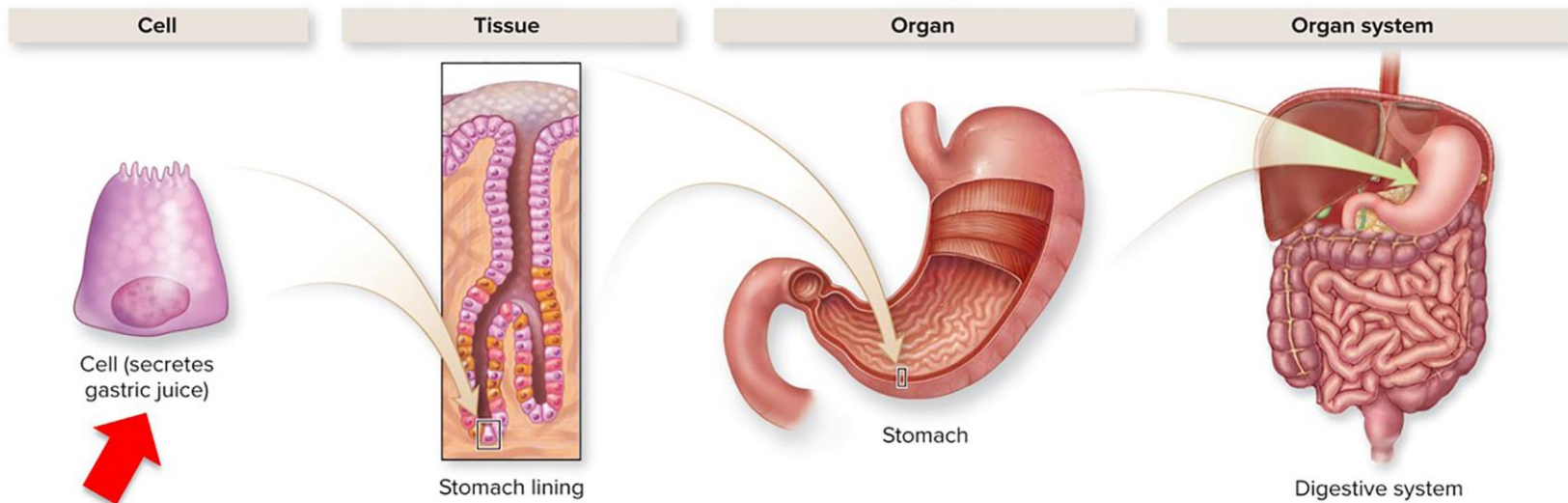
# The organizational hierarchy of the body

Biologists describe the animal body in terms of an organizational hierarchy.



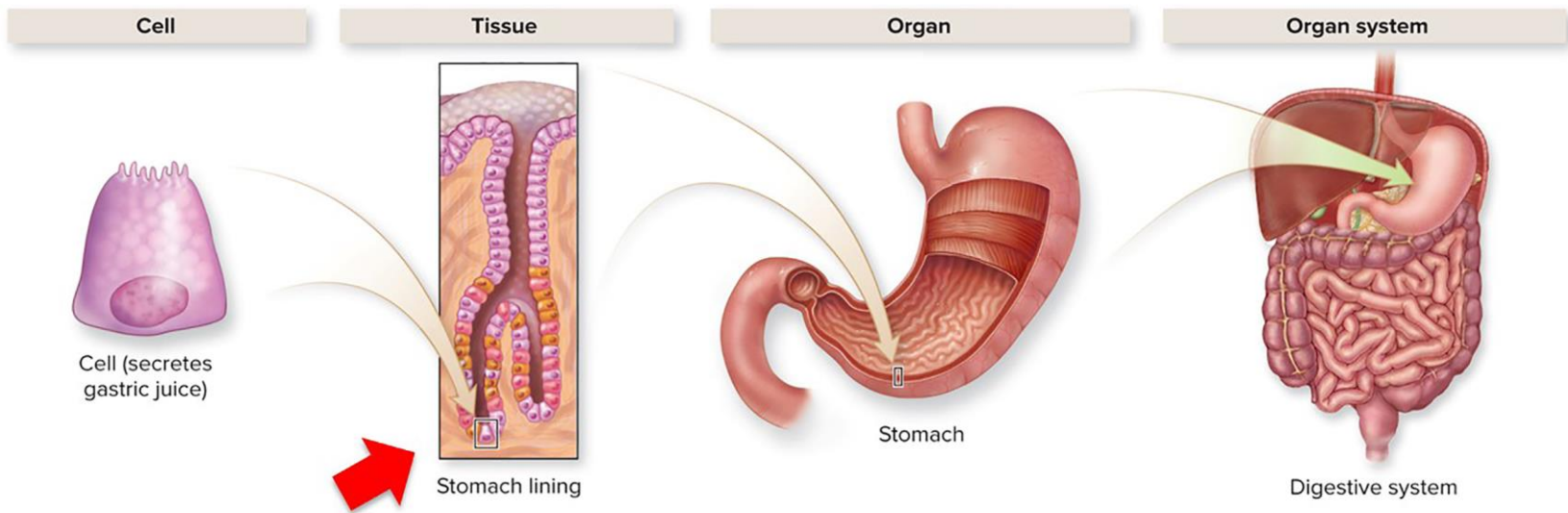
# Cells

Cells are the building blocks of animal bodies.



# Tissues

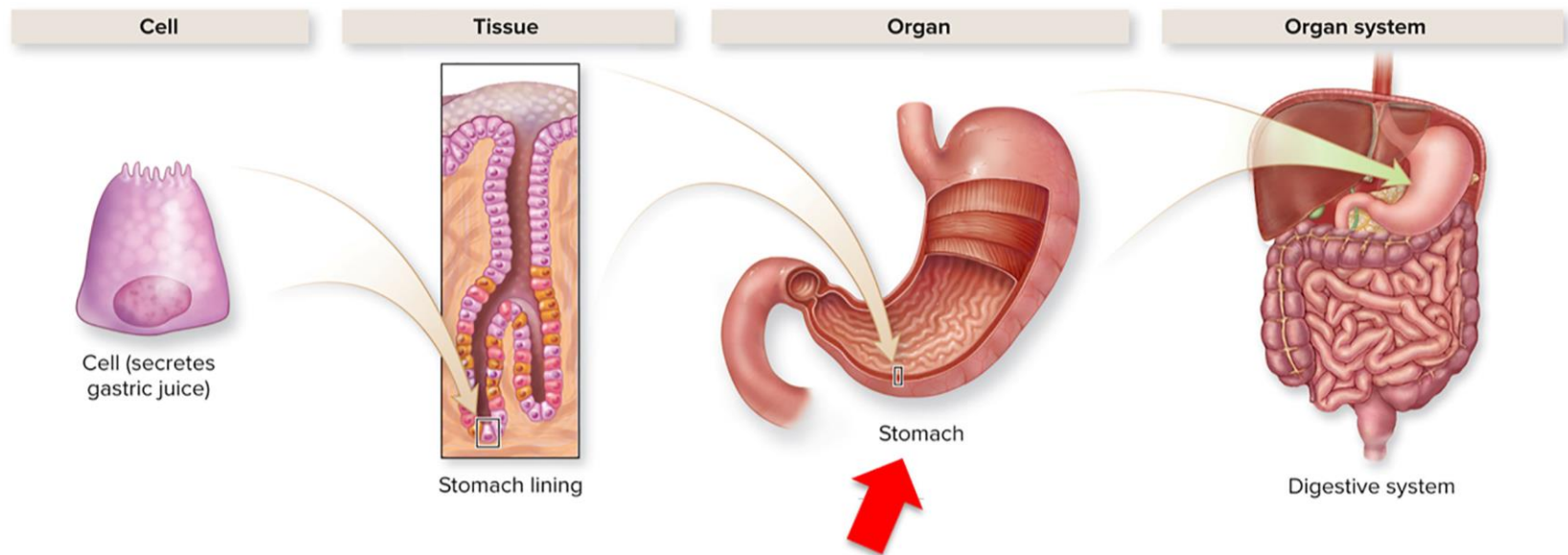
Cells are organized into **tissues**, groups of cells that interact and provide a specific function.





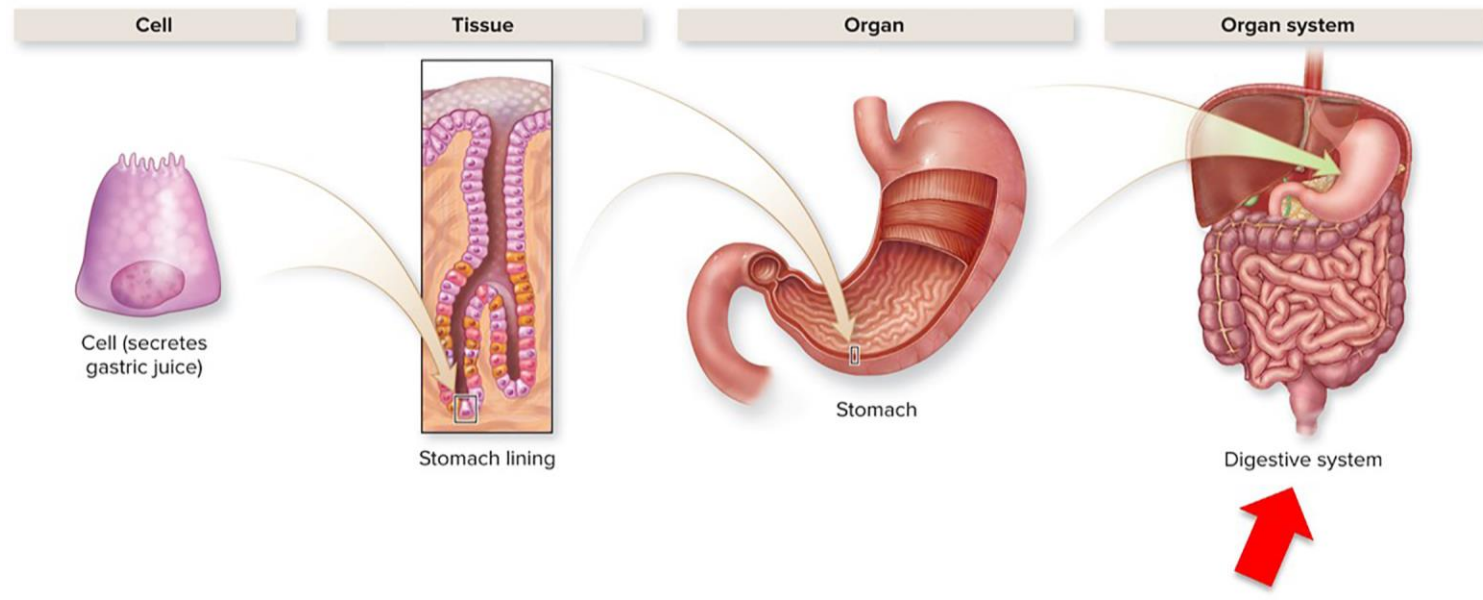
# Organs

Different tissues interact and function as units called **organs**.



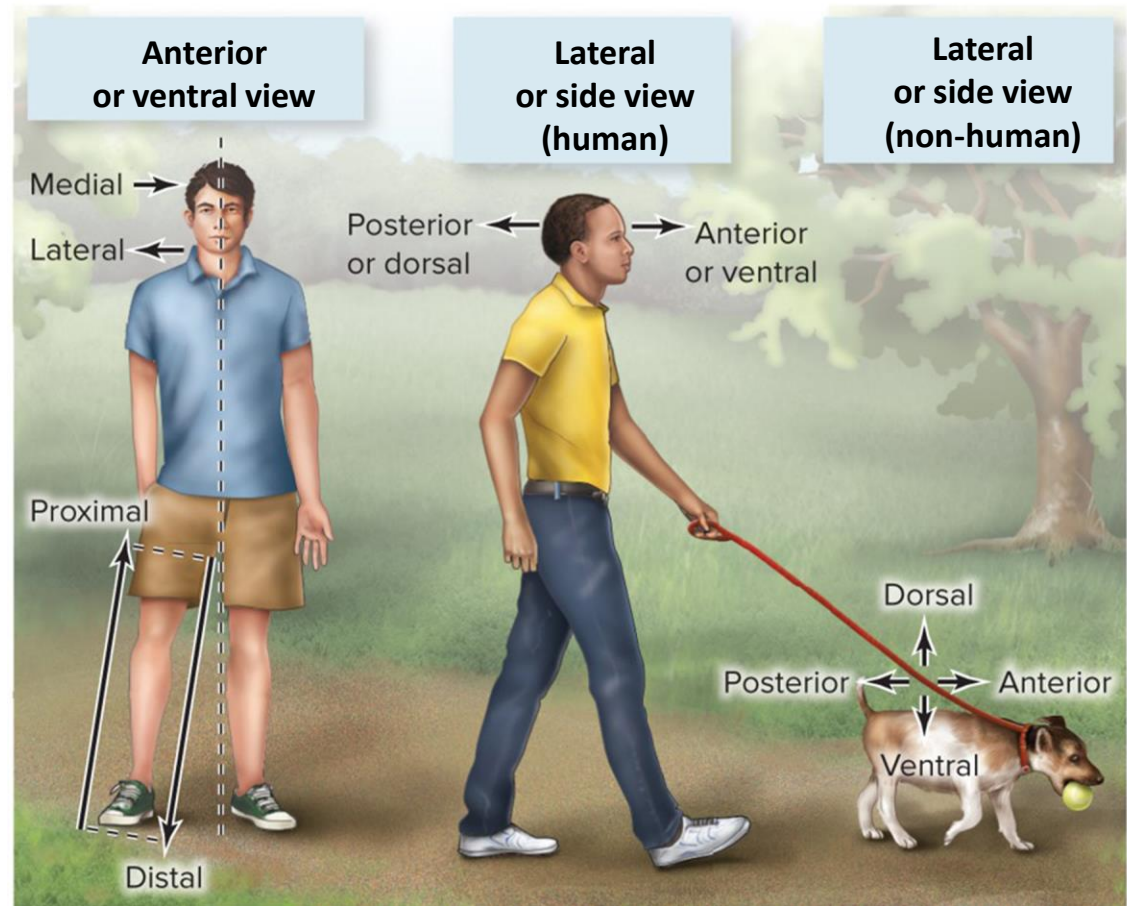
# Organ systems

**Organ systems** consist of two or more organs that are physically or functionally joined.



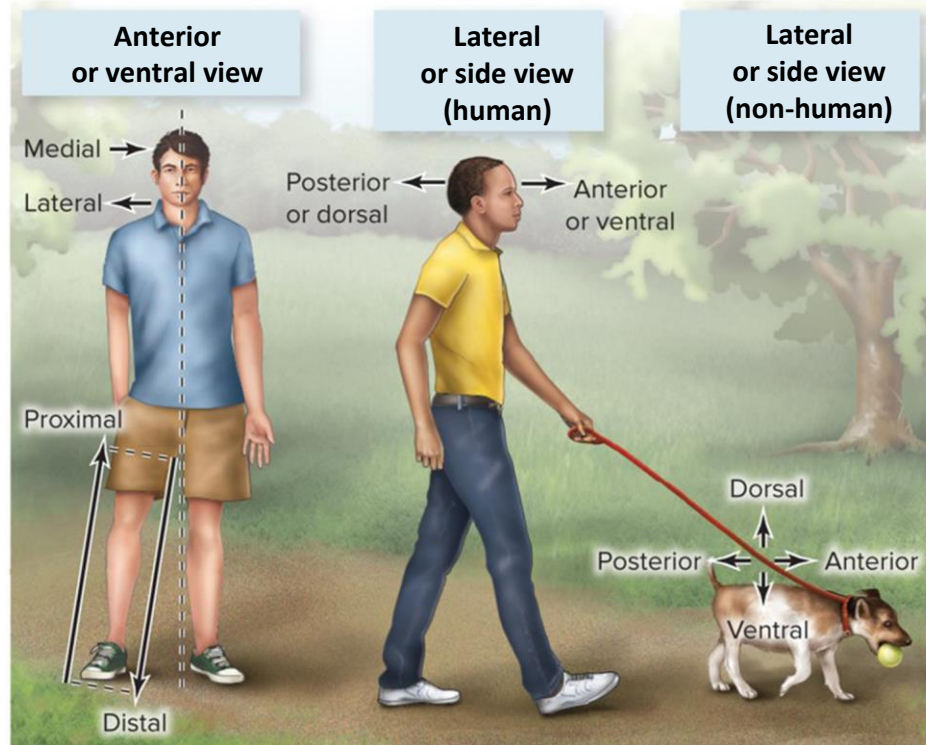
# Anatomical terminology, 1

Scientists use terms to refer to the relative position of structures within an organism.



# Anatomical terminology, 2

Scientists use terms to refer to the relative position of structures within an organism.



**Lateral:** away from the midline  
**Medial:** toward the midline  
**Anterior:** toward the front  
**Posterior:** toward the back

**Proximal:** toward the point of attachment  
**Distal:** away from the point of attachment  
**Dorsal:** toward the spine  
**Ventral:** toward the belly

# Clicker question #1



Which of the following is physically the smallest?

- A. respiratory system
- B. DNA
- C.  $O_2$
- D. lung
- E. red blood cell

# Clicker question #1, solution

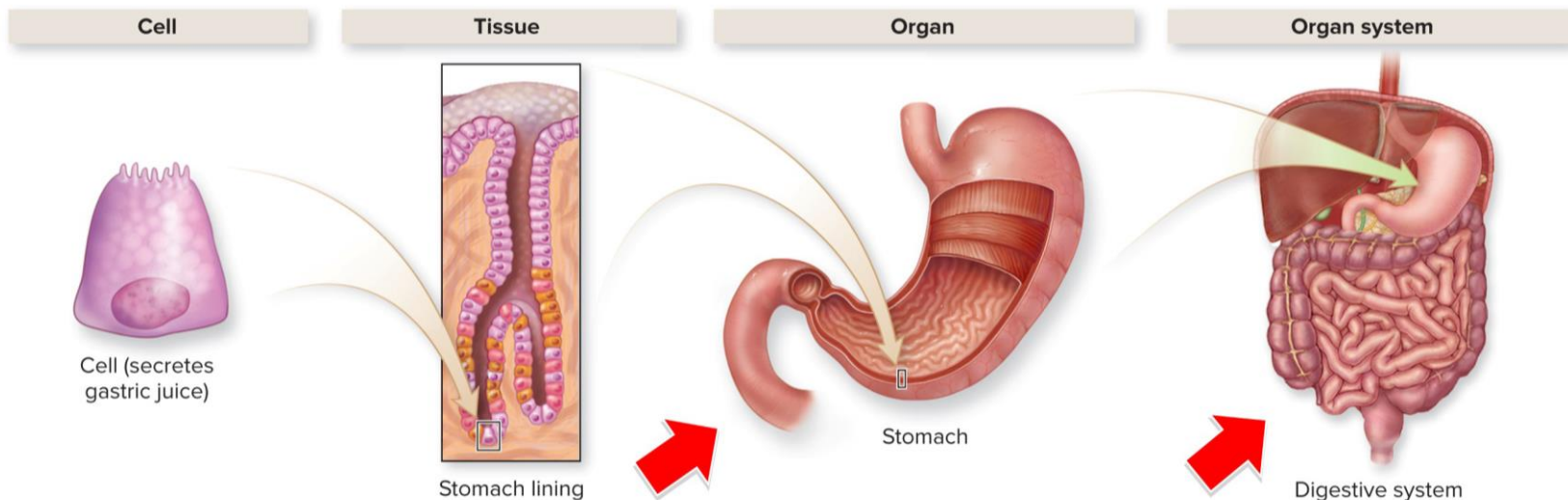


Which of the following is physically the smallest?

C.  $O_2$

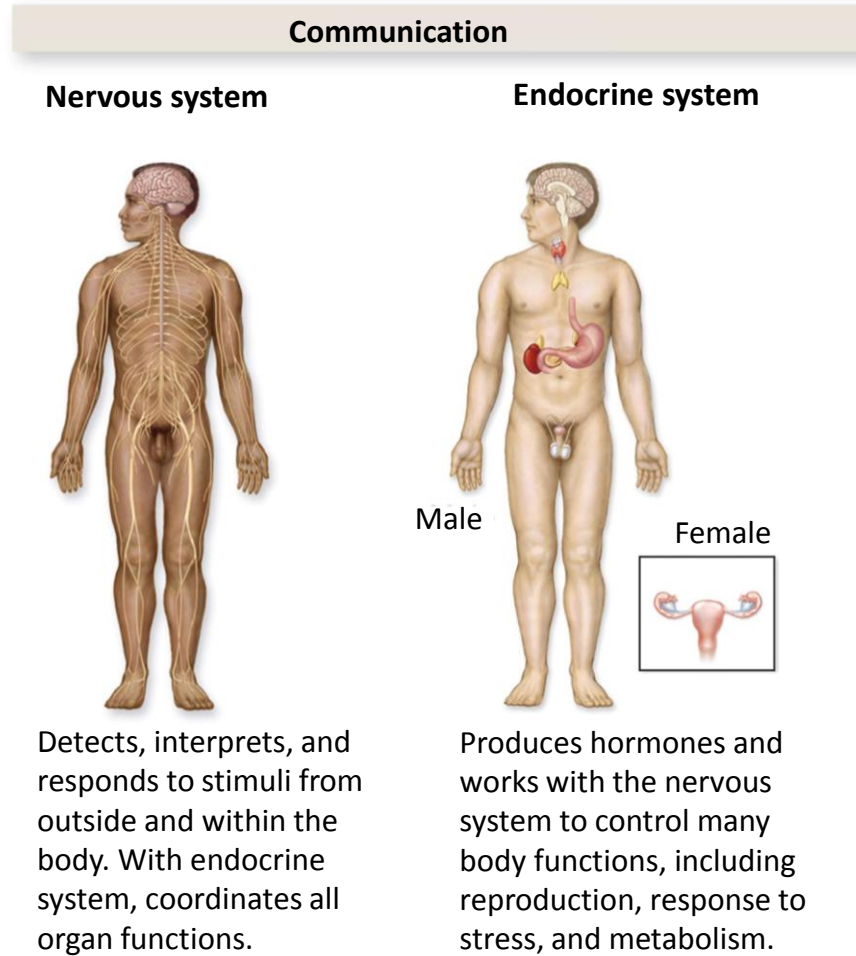
# Organ systems are interconnected

Organs are arranged in organ systems that have interconnected structures and functions.



# The nervous system and endocrine system are interconnected

The nervous and endocrine systems coordinate **communication.**





# The skeletal system and the muscular system are interconnected

## Support and movement

Skeletal system



Provides framework for muscles to attach, making movement possible. Houses bone marrow. Protects soft organs. Stores **minerals**.

Muscular system

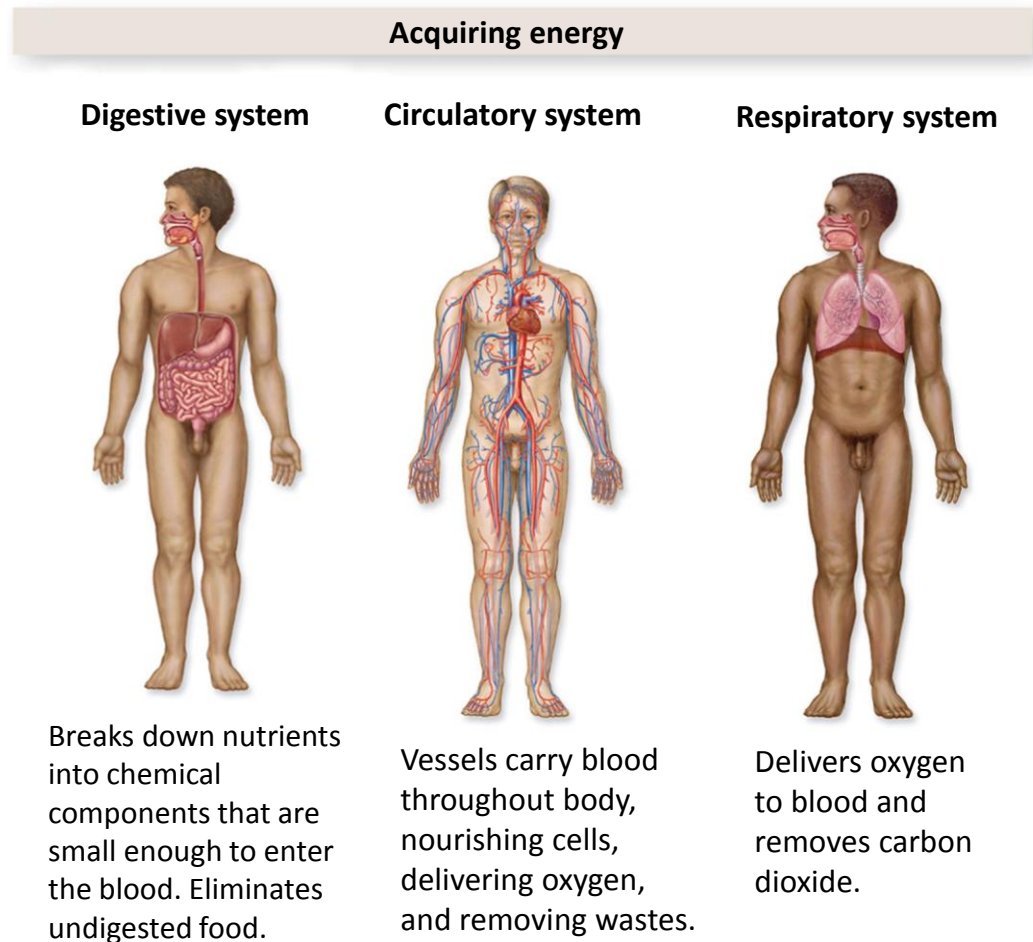


Supports posture and enables body to move. Helps maintain body temperature.

The skeletal and muscular systems support and move the body.

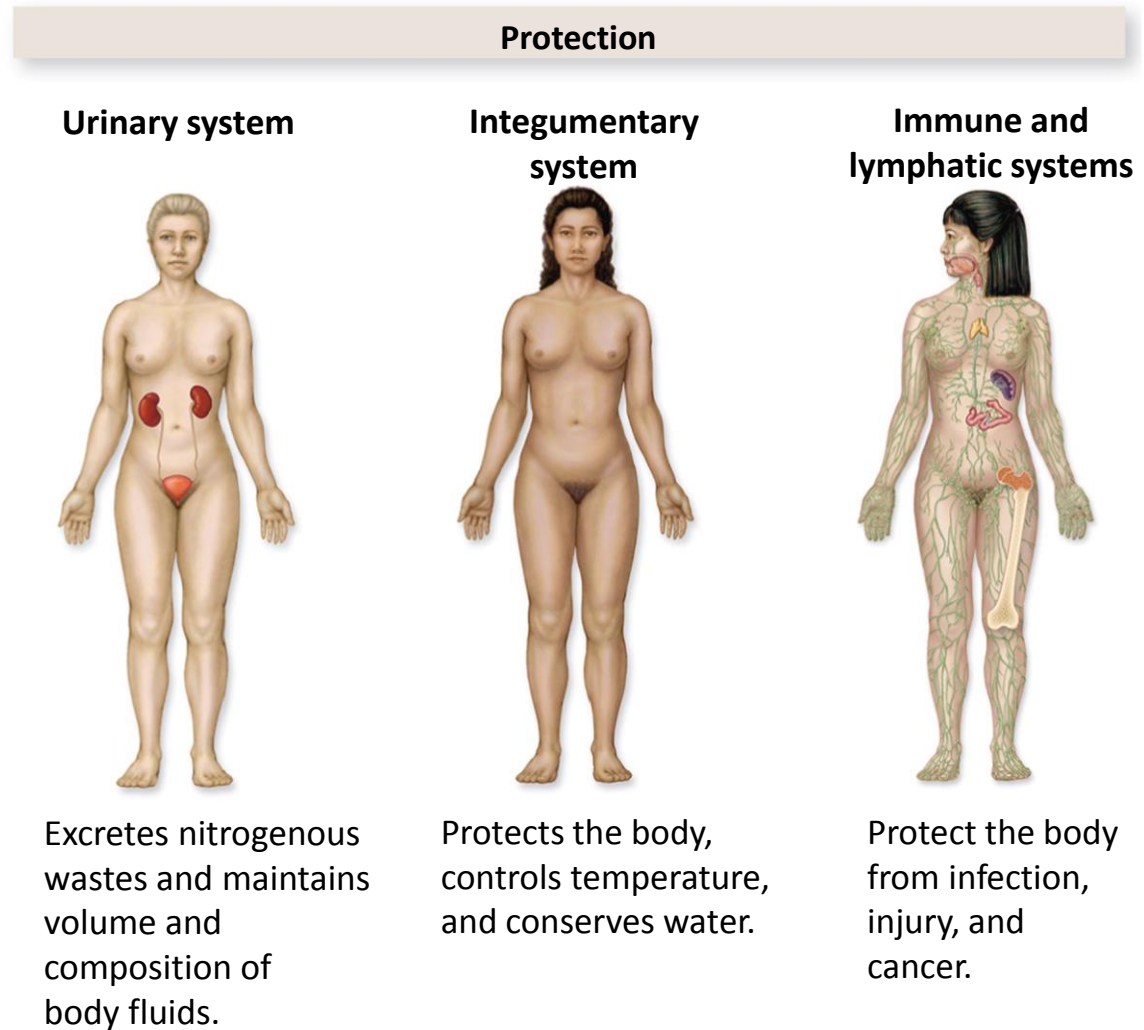
# The digestive, circulatory, and respiratory systems are interconnected

The digestive, circulatory, and respiratory systems work together to acquire energy.



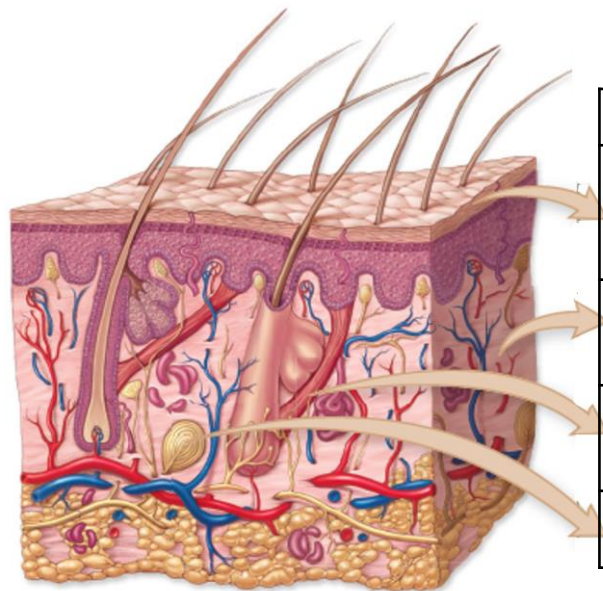
# The urinary, integumentary and the lymphatic systems are interconnected

The urinary, integumentary, immune, and lymphatic systems **protect** the body.



# The integumentary system regulates temperature and conserves moisture

**Skin** is an organ. It consists of multiple interacting tissue types.



**Multiple Tissue Types Interact in Each Organ System**

Tissue type	Description	Functions
Epithelial	Single or multiple layer of flattened, cube-shaped, or columnar cells	Cover interior and exterior surfaces of organs; protection; secretion; absorption
Connective	Cells scattered in prominent extracellular matrix	Support, adhesion, insulation, attachment, and transportation
Muscle	Elongated cells that contract when stimulated	Movement
Nervous	Cells that transmit electrical impulses	Rapid communication among cells

# The male and female reproductive systems are interconnected

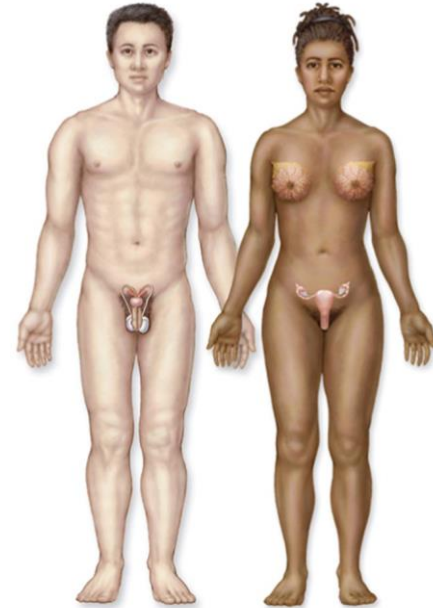
The reproductive system produces the next generation.

## Reproduction

### Reproductive system

Male

Female



Manufactures gametes and enables the female to carry and give birth to offspring.

# 25.3 Mastering concepts

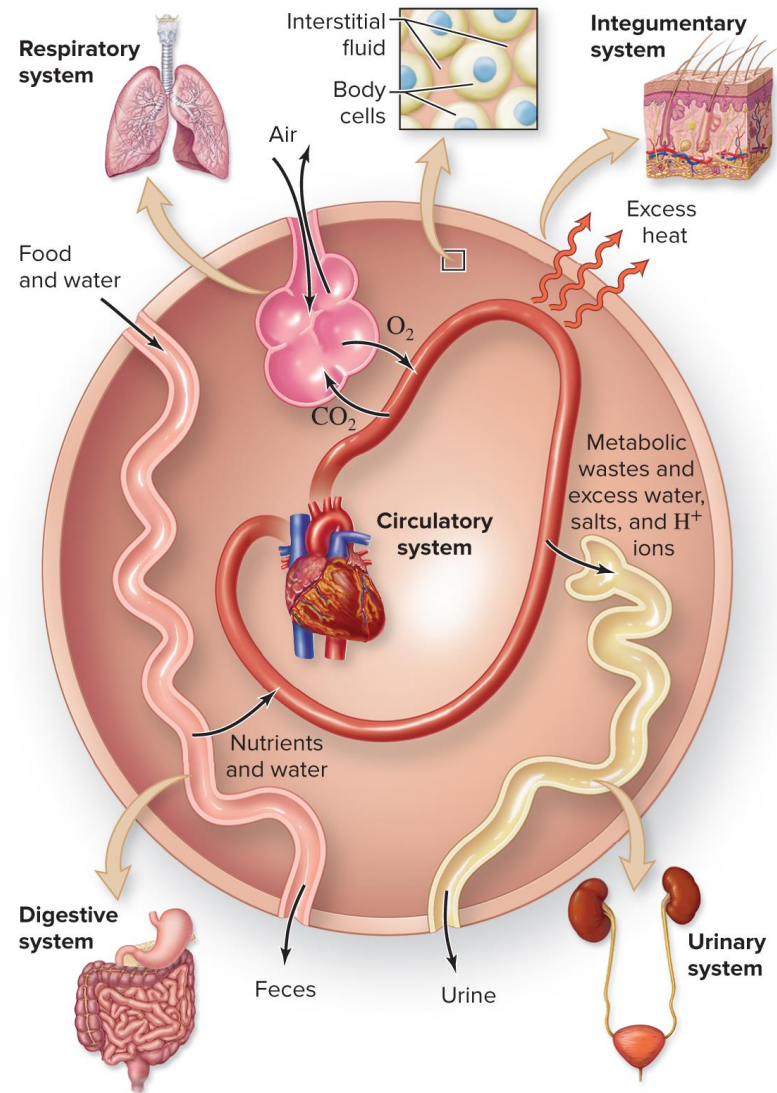


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Which organ systems contribute to each of the five general functions of life?

# Homeostasis

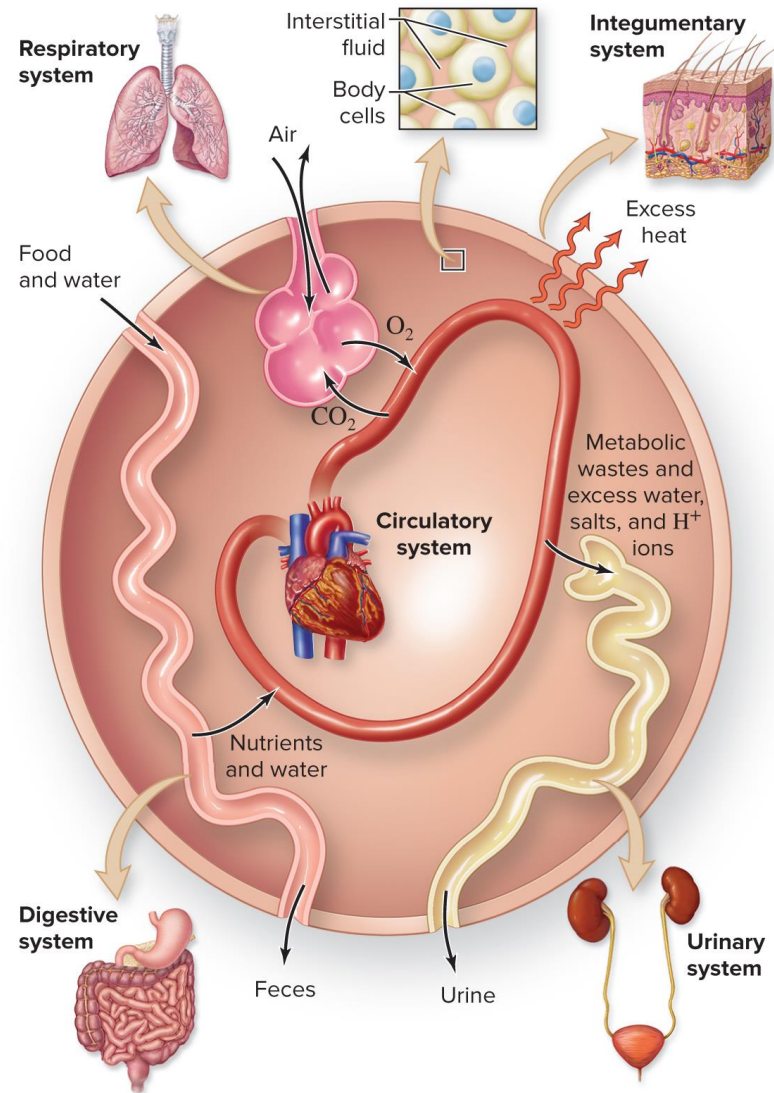
**Homeostasis** is a state of internal constancy.



# Organ system interactions promote homeostasis

Organ systems interact in many ways. For example, the circulatory system exchanges substances with other organ systems to maintain homeostasis.

Organ systems **interact** to maintain a stable temperature, blood pressure, and fluid composition in an animal's body.





# Interstitial fluid

**Interstitial fluid** bathes all body cells. Substances move through interstitial fluid as they pass between organ systems.

