28.1 Levels of Organization

KEY CONCEPT

The human body has five levels of organization.

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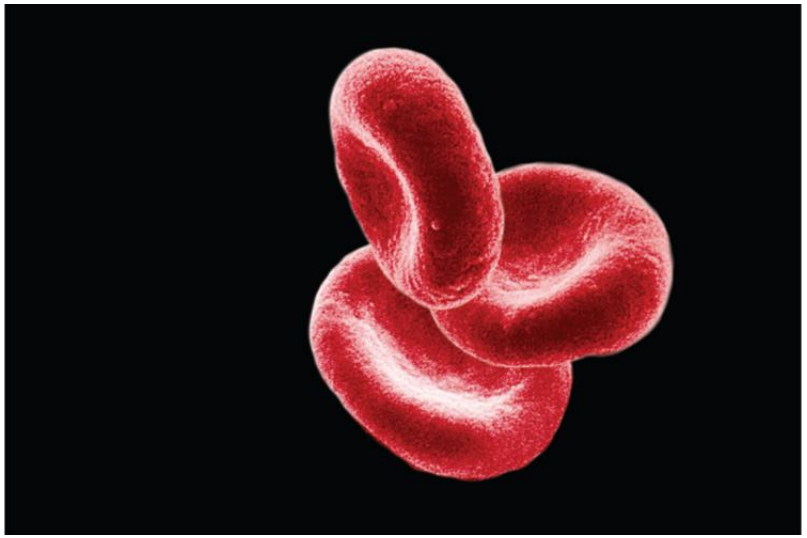
- **Specialized cells develop from a single zygote.**
  - Organisms are made up of specialized cells.



red blood cell

nerve cell

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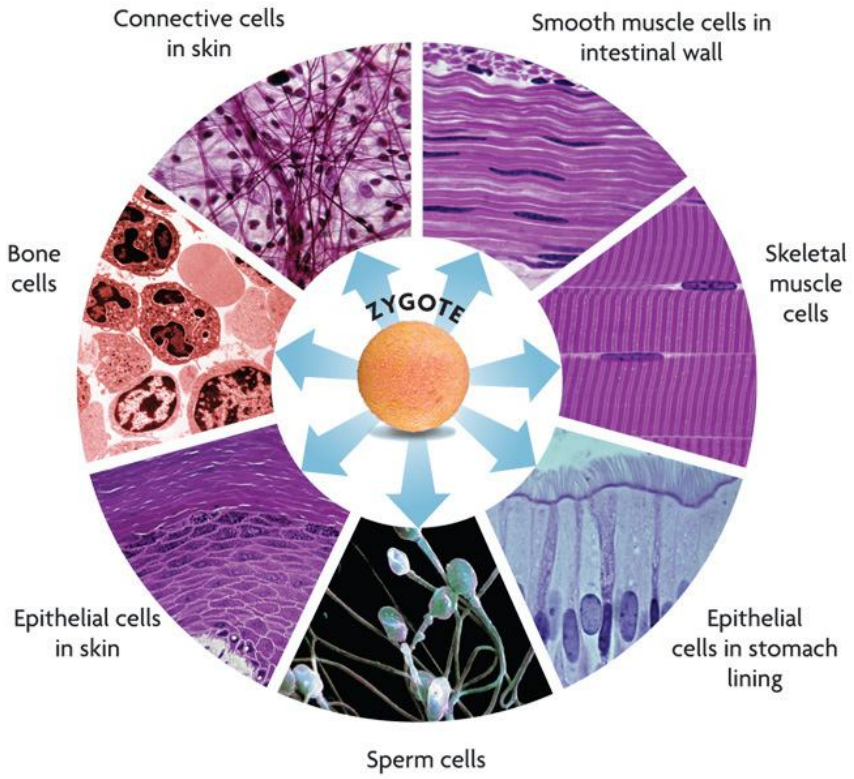
- Zygotes first divide into embryonic stem cells.
- Stem cells develop in two stages.
  - determination, or committing to become one cell type
  - differentiation, or acquiring specialized structures and functions

Cells develop specialized structures and functions during differentiation.



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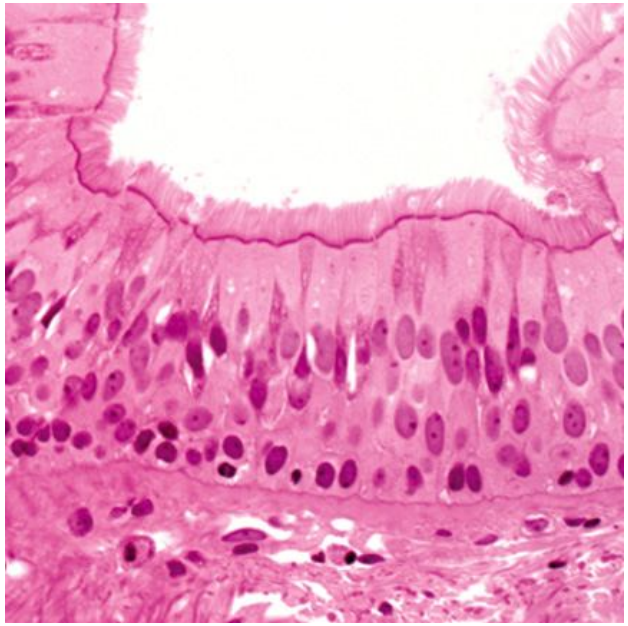
- **Specialized cells function together in tissues, organs, organ systems, and the whole organism.**
  - Specialized cells perform specific tasks.
  - Tissues are groups of similar cells working together.
    - epithelial tissue
    - connective tissue
    - muscle tissue
    - nervous tissue

cell



tissue

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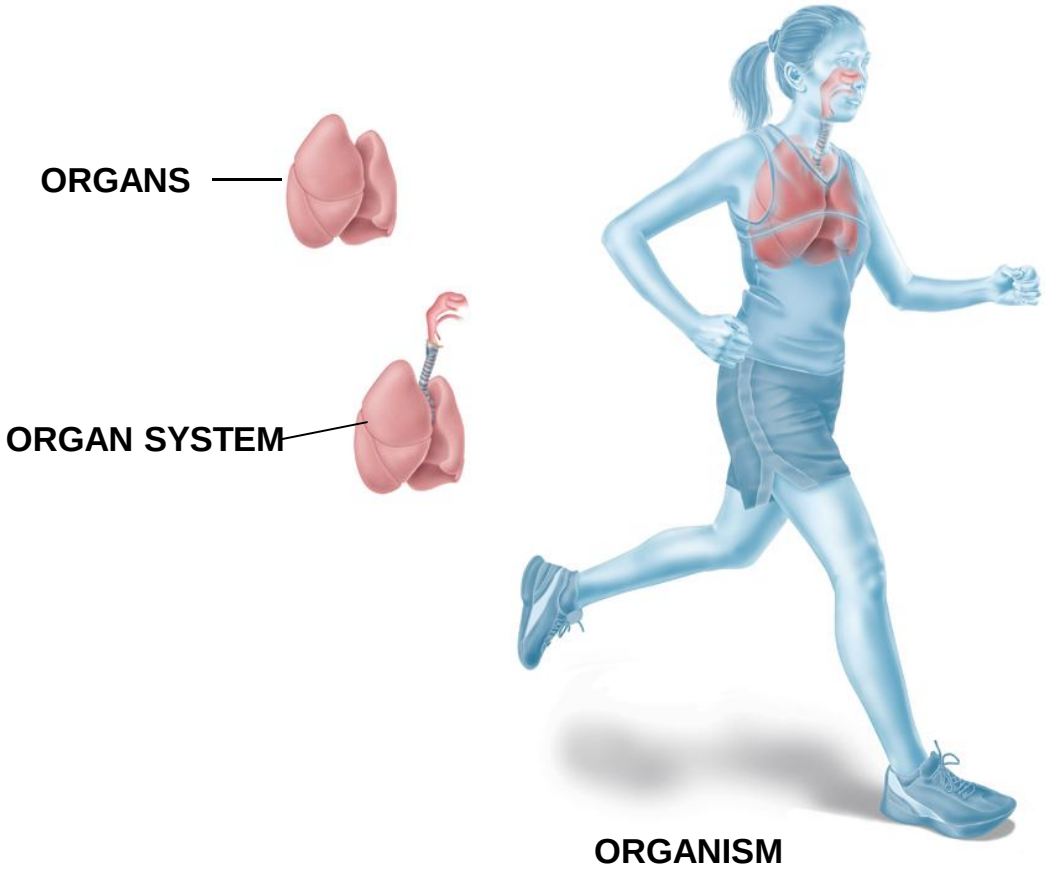
- Organs are different tissues working together.
- Organ systems are two or more organs working together.
- Organism is all organ systems working together.



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- There are 11 major organ systems in the human body.

SYSTEM	MAJOR TISSUES AND ORGANS	PRIMARY FUNCTION
Circulatory	heart, blood vessels, blood, lymph nodes, lymphatic vessels	transports oxygen, nutrients, wastes; helps regulate body temperature; collects fluid lost from blood vessels and returns it to circulatory system
Digestive	mouth, pharynx, esophagus, stomach, small intestine, pancreas, gallbladder, liver	breaks down and absorbs nutrients, salts, and water; eliminates some wastes
Endocrine	hypothalamus, pituitary, thyroid, parathyroid, adrenals, pancreas, ovaries, testes	influences growth, development, metabolism; helps maintain homeostasis
Excretory	skin, lungs, kidneys, bladder, large intestine	eliminates waste products; helps maintain homeostasis
Immune	white blood cells, thymus, spleen	protects against disease; stores and generates white blood cells
Integumentary	skin, hair, nails, sweat and oil glands	acts as a barrier against infection, injury, UV radiation; helps regulate body temperature
Muscular	skeletal, smooth, and cardiac muscles	produces voluntary and involuntary movements; helps to circulate blood and move food through digestive system
Nervous	brain, spinal cord, peripheral nerves	regulates body's response to changes in internal and external environment; processes information
Reproductive	*male:* testes, penis, associated ducts and glands *female:* ovaries, fallopian tubes, uterus, vagina	produces reproductive cells; in females, provides environment for embryo
Respiratory	nose, sinuses, pharynx, larynx, trachea, lungs	brings in O_2 for cells; expels CO_2 and water vapor
Skeletal	bones, cartilage, ligaments, tendons	supports and protects vital organs; allows movement; stores minerals; serves as the site for red blood cell production