

Specialized Cells & Levels of Organization

In Living Things

✦ Multicellular Organisms

Remember that some organisms are made of just one cell. These are called... _____.

Most organisms are made of many cells; they are Multicellular.

✦ Level 1: Cells

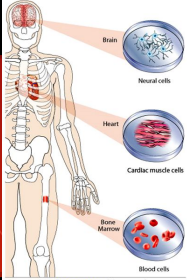
The smallest living part of an organism.

The basic building block of living things.

✦ Specialized Cells

In multicellular organisms, the cells differentiate into specific shapes and structures in order to do specific jobs. These are called specialized cells.

- Differentiate means to change form to become more specialized.

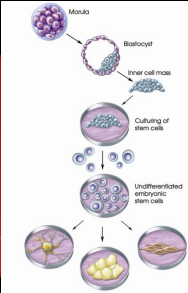


The diagram shows a human skeleton with callouts to different tissues and their corresponding specialized cells: Brain (Neural cells), Heart (Cardiac muscle cells), and Bone Marrow (Blood cells). Each tissue is shown in a petri dish with its respective cell type.

CELL DIFFERENTIATION
A normal process in development in which cells become structurally and functionally different from one another — for example, nerve, muscle and blood cells.

We say that cells “Differentiate”

Illustration by [gettyimages.com](http://www.gettyimages.com) of the Center for Reproductive Sciences



The diagram illustrates the process of cell differentiation from a zygote to specialized cells. It starts with a Zygote, which becomes an Inner cell mass, then a Culturing of stem cells, leading to Undifferentiated embryonic stem cells. These stem cells then differentiate into various specialized cell types like Neurons, Muscle, and Blood cells.

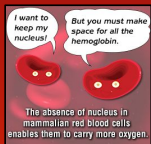
In biology, “specialized” is a term used to explain that a cell has developed into a specific type of cell.

An unspecialized cell refers to cells which have not yet differentiated (changed) into a specific type of cell.

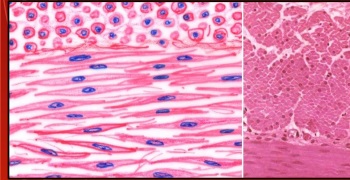
✦ Structure Begets Function

The structure of a cell can tell you what its job is.

Red Blood Cell--
to carry oxygen
to cells



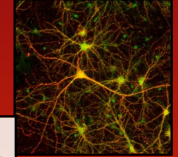
✦ muscle cells



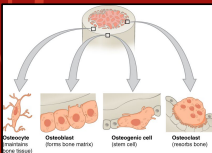
Muscle cells are long and thin to connect together. They bunch up and pull together in order to move bones.

✦ nerve cells

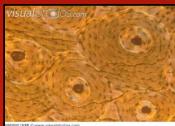
Nerve cells have one short, round end for receiving information from other cells and one long, thin end for passing on information to other cells.



✦ bone cells

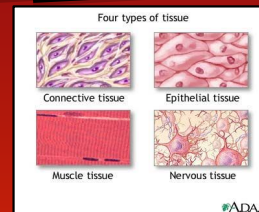


Designed to secrete collagen and calcium to provide strength and support to bones.

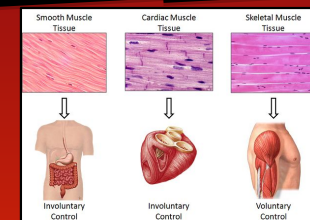


✦ Level 2: Tissues

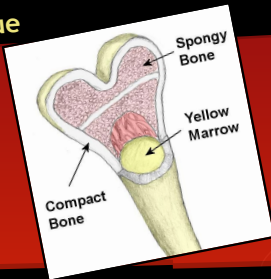
A group of similar cells work together to form tissues. Tissues perform a specific function.



✦ muscle tissue



✦ bone tissue

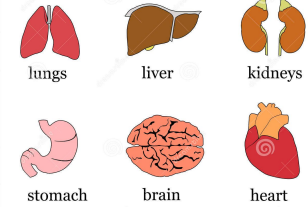


✦ Level 3: Organ

Made of a group of tissues working together to perform a specific function.



INTERNAL ORGANS



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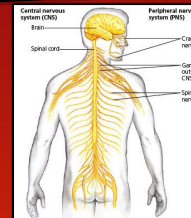
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✦ Level 4: Organ System

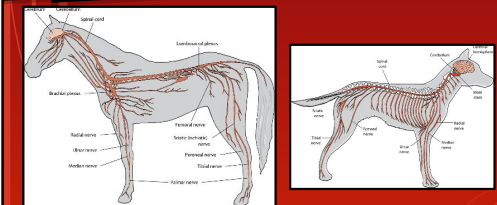
A group of organs working together to perform a specific function for the organism.

✦ Nervous System

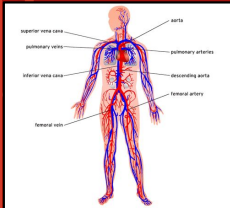
Organs Included:
Brain
Spinal Cord
Peripheral Nerves



✦ Nervous Systems

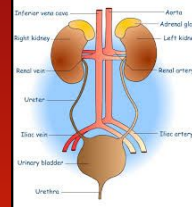


✦ Circulatory System



Organs Included:
Heart
Arteries
Veins

✦ Excretory System



Organs Included:
Kidneys
Ureters
Bladder
Urethra

✦ Level 5: Organism

A living thing.



Because... babies!

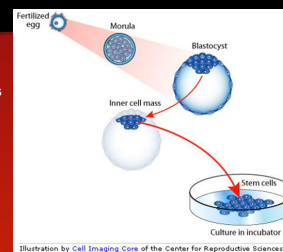


✦ Levels in Order: Simple to Complex

Cell → Tissue → Organ →
Organ System → Organism

memorize this!

Stem Cells
Unspecified cells
capable of self
renewal and
differentiate into
specialized cells.



✦ What is Stem Cell Research good for?

Stem cell research
can lead to cures
and/or treatments
for diseases and
injuries.

