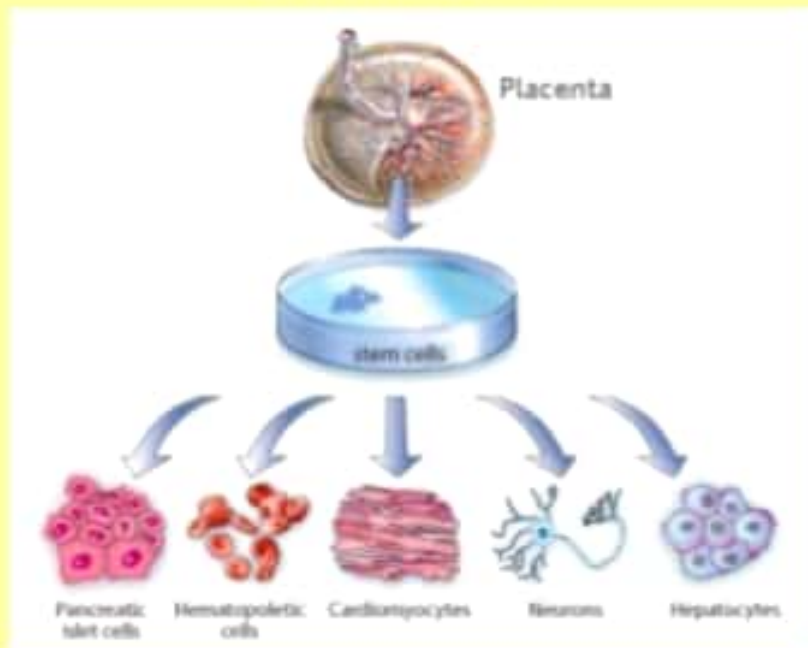


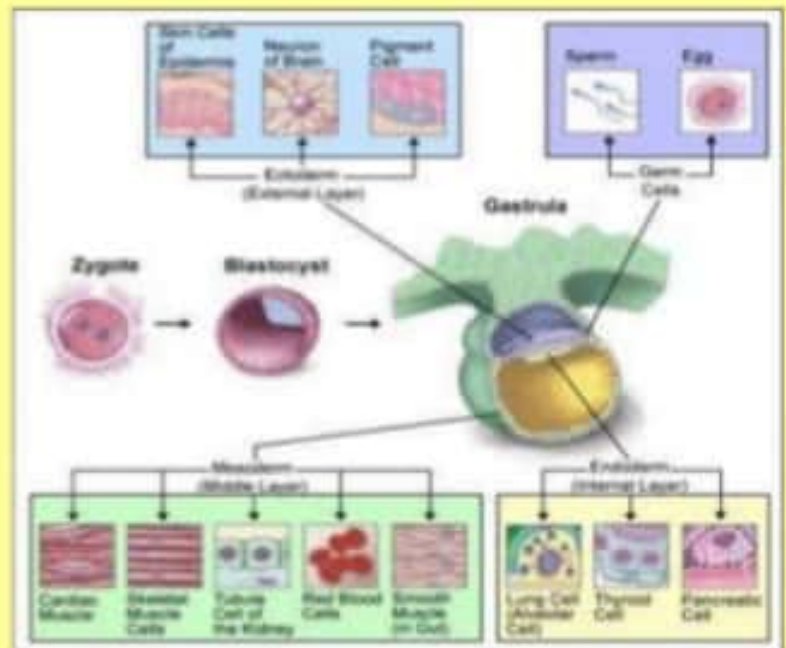
Cell Differentiation

Specialized Cells and Stem Cells



Cell Differentiation

- Multicellular organisms begin as undifferentiated masses of cells
- Variation in DNA expression and gene activity determine the differentiation of cells and ultimately their specialization
- Only specific parts of DNA are activated
- Parts activated determine the function and structure of a cell

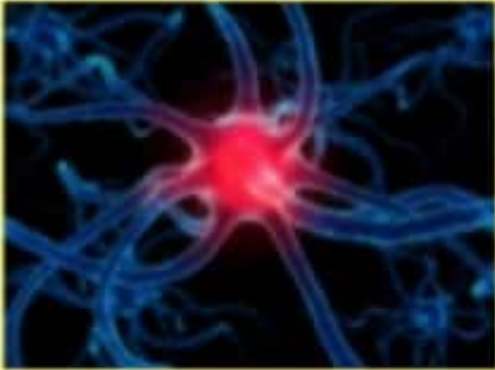


Cell Differentiation

- All cells contain the same DNA so cells initially have the potential to become any type of cell
- Cell Differentiation is irreversible
- All cells in multicellular organism have the same number of chromosomes and DNA
- Different parts of the genetic instructions are used in different types of cells
 - influenced by the cell's environment
- Chemical signals may be released by one cell to influence the development and activity of another cell.



Specialized Cells



Nerve Cells communicate information either by using electric signals (within a cell) or chemical signals (between cells).

Muscle cells contain protein filaments that slide past one another, producing a contraction that changes both the length and the shape of the cell.

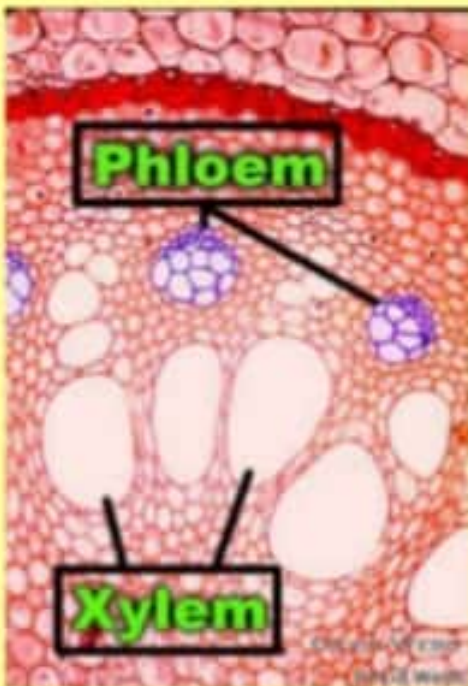


Blood cells are the most common type of blood cell and the vertebrate organism's principal means of delivering oxygen to the body tissues

Specialized Cells



Sperm cells are the male reproductive cell; the male gamete;



Xylem are the long trachea elements that transport water in a plant.

Phloem is part of a plant that carries food down the stem, and carries sugar, and protein to all parts of the plant that need them.

Cellular Differentiation

- Process of producing specialized cells
- Specialized cells have physical and chemical differences that allow them to perform a function that is different than other cells
- All specialized cells come from pre-existing cells so there must be a starter cell that is unspecialized

Specialized Cells

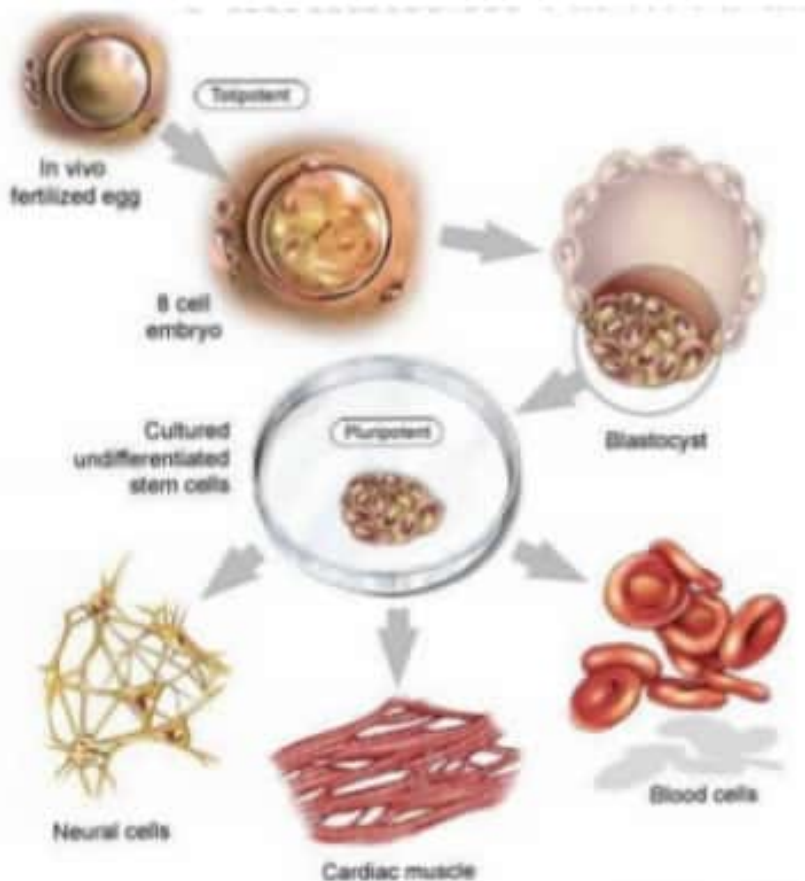


- Complex organisms contain many different types of cells that perform different functions
- Specialized cells have physical and chemical differences that allow them to perform one job very well

What actual cells look like

- Cells in organisms are specialized
- Differentiation not only affects function but also STRUCTURE
- Cells physically look different from each other

Proliferative Potential: Potency



- A cell's potential to differentiate
- Levels of potency:
 - Totipotent
 - Pluripotent
 - Multipotent
 - Unipotent
 - Terminally differentiated