



## Lesson Overview

### 11.4 Cell Differentiation

# Lesson Overview      Cell Differentiation

All organisms start life as one cell.

Such a cell is **totipotent** - able to form all the tissues of the body.

Only the fertilized egg and the cells of the first few cell divisions are truly totipotent.

Most multicellular organisms develop into an **embryo** soon after fertilization

After four days, an embryo becomes a **blastocyst** - a hollow ball of cells containing an inner cell mass.

The inner cell mass cells are **pluripotent** - capable of developing into many, but not all, of the body's cell types.

# Lesson Overview      Cell Differentiation

During development, a multicellular organism's cells become differentiated

**differentiation** - process by which cells become specialized

Differentiated cells perform the jobs that multicellular organisms need to stay alive.

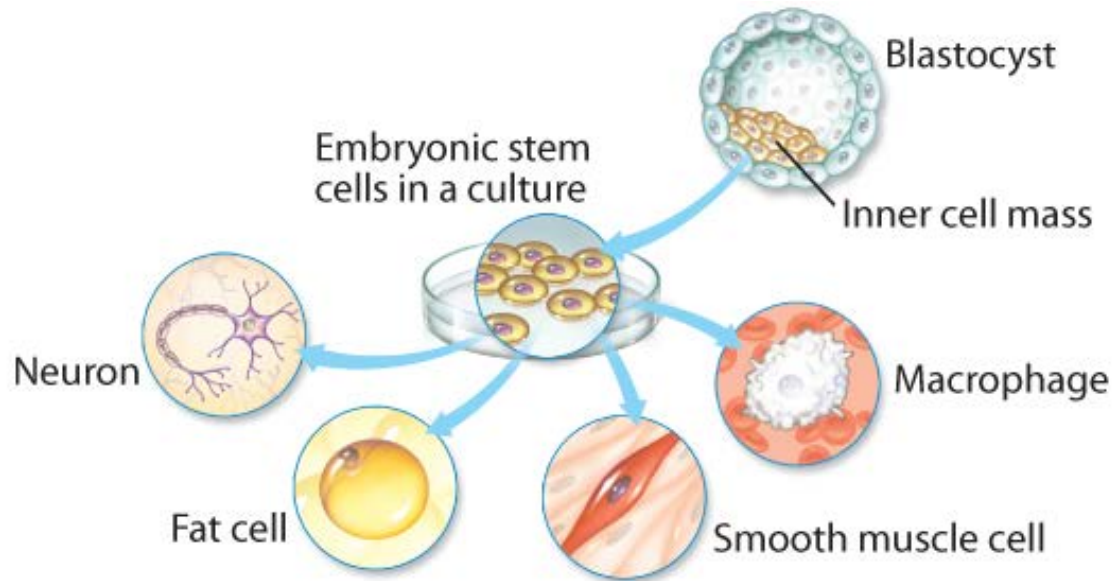
Cell differentiation in mammals is controlled by many factors in the embryo.

Most adult cells complete their differentiation and can no longer become other types of cells.

# Stem Cells

**Stem cells** are unspecialized cells from which differentiated cells develop.

There are two types of stem cells: embryonic and adult stem cells.



# Embryonic Stem Cells

Embryonic stem cells are found in the inner cell mass of the blastocyst.

Embryonic stem cells are pluripotent and capable of almost indefinite regeneration.

# Adult Stem Cells

Adult organisms contain some stem cells.

Adult stem cells are **multipotent** - can produce many types of differentiated cells.

Adult stem cells tend to be specific for a given type of tissue.

### Potential Benefits

repair or even replace damaged cells resulting from illnesses such as heart attack, stroke, and spinal cord injuries.

# Ethical Issues

Most scientists want embryonic stem cells.

techniques for **harvesting** embryonic stem cells destroy the embryo.

Central question:

Is the embryo a living person?