

# Determination and Differentiation

During early embryogenesis, cells divide and move and become limited in their potential as to what cell type they may become. This process of limiting the developmental potential of cells is called **determination**.

## Determination

1. is heritable in that a cell and its daughter cells have the same limited potential
2. has specific genes associated with the determination event
3. is permanent under normal conditions but it is possible to reverse the process experimentally

**Differentiation** is a maturing process in which a determined cell becomes a recognizable, specialized cell. Differentiated cells

1. produce and use cell specific proteins characteristic of their type of differentiated cell (e.g. myosin in muscle cells, hemoglobin in RBC)
2. must be metabolically active in order to produce the specific proteins and carry out the specialized function
3. often assume a characteristic shape
4. are usually terminal and non-dividing although some may be induced to divide because of injury
5. are triggered to differentiate by external stimuli

The types of signals that control the activity of genes in the processes of determination and differentiation are

1. hormones
  - steroid
  - protein
2. protein factors such as
  - growth factors
  - interleukin
  - interferon
3. cell to cell signals located in the matrix of the cells surface
4. environmental factors such as
  - nutrition - too little or too much food
  - heat shock
  - toxic substances