

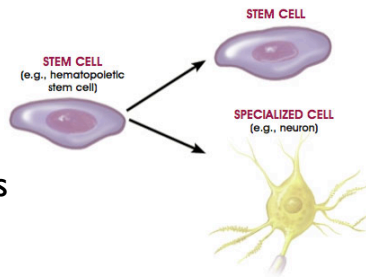
Stem Cell Science

US275 Scientific Ethics
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Stem cells are the biological raw materials for repair and growth.

- unspecialized cells
- capable of self-renewal
- under proper conditions will become specialized cells or tissues.

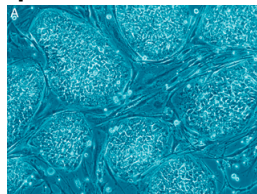


Distinguishing features of progenitor/precursor cells and stem cells.

<http://stemcells.nih.gov/info/scireport/chapter4.asp>

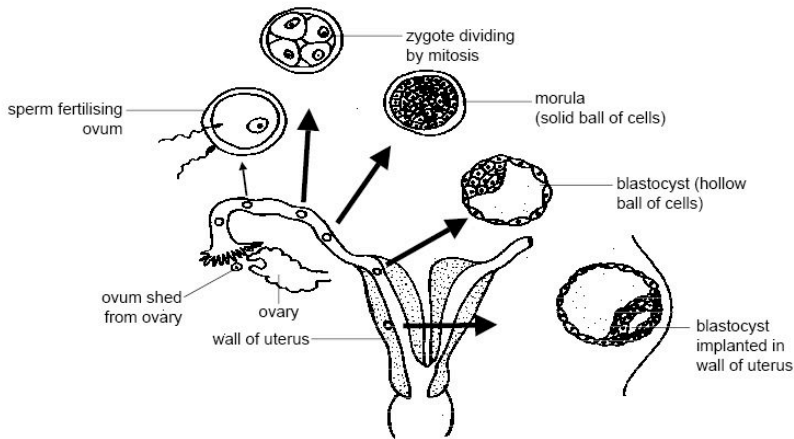
Understanding the signals during development allow for the production of specialized cells.

- normal development
 - unspecialized cells become specialized
- stem cells
 - apply chemicals to push cells to become desired cell types.



Human Embryonic stem cells (top) and neurons derived from human embryonic stem cells.
Public Library of Science.

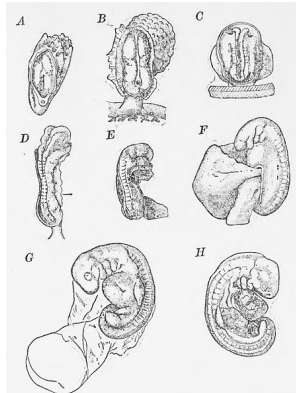
In human reproduction, the fertilized egg develops before it implants into the wall of the uterus.



Development and Implantation of the embryo
Ruth Lawson, 2007, Wikimedia Commons

Development continues as cells divide and differentiate into organs.

- cells divide
 - produce more mass
- differentiate
 - basic organs produced by 8 weeks in utero.
 - heart beat at 3 weeks
 - brain waves at 6 weeks



Facts and Factors of development
Edward Grant Conklin, 1914

At about 24 - 26 weeks of gestation, most babies are extremely premature but viable.

- 6 months (third trimester)
 - weight about 640 grams (22 ounces)
 - height about 23 centimeters (9 inches)
 - immature organs
 - especially lungs



Normally a pregnancy lasts 40 weeks (three trimesters).

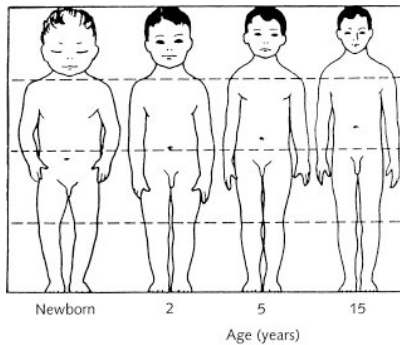
- Development occurs after birth
 - rapid growth
 - further development of organs such as the brain and spinal cord



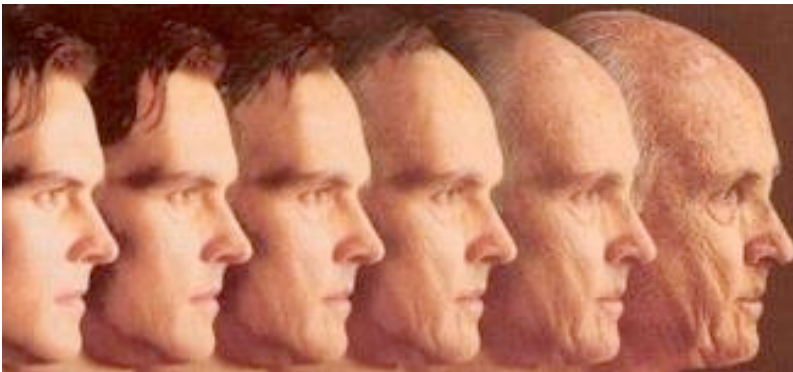
A newborn female human infant, glistens from amniotic fluid seconds after birth.
Wikimedia Commons

The human body continues to change throughout an individual's life.

- infant
 - < 1 year
- toddler
 - 1 - 3 years of age
- Primary school age
 - 4 - 12 years of age
- Adolescence and puberty
 - 13 - 19 years of age



Many of the effects of aging are the result of a decrease in the normal body repair mechanisms.



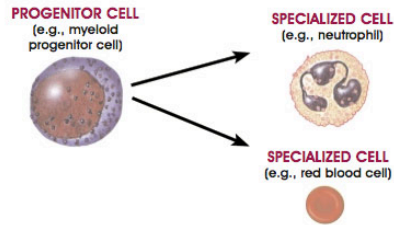
Rare cells in the adult are capable of stem-cell like properties.

- bone marrow

- very small percentage

- 1 out of 10 - 15,000 cells

- produce blood cells
- for an entire lifetime



Distinguishing features of progenitor/precursor cells and stem cells.
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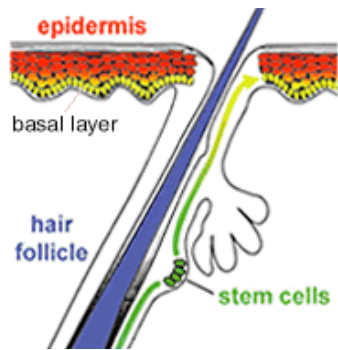
Adult stem cells in some regions of the body are involved with tissue repair.

- skin

- produce skin

- heart

- when stimulated can produce new cardiac muscle cells



http://virtuallaboratory.colorado.edu/Biofundamentals/lectureNotes/Topic5-3_StemCells.htm

TO BE CONTINUED

in the lecture on:

*Stem Cell Science:
Embryonic Stem Cells*

Any Questions?

Email me at:
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<http://www.vippitbullkennels.com/images/animated-question-mark.gif>