



Building Body Parts Regenerating Tissues for Injured People



Winston-Salem, NC (Armed Forces Institute of Regenerative Medicine) -- Scientists use cell cultures and scaffolds as part of their efforts to discover and refine new techniques in regenerative medicine. Inspired by the salamander's ability to regenerate limbs, researchers in this field develop ways to create replacement tissues, bones, and organs. This technology can be used to help people with traumatic injuries or diseases.

"Every cell in your body has all the genetic information necessary to create a whole new human being who looks just like you." Anthony Atala, MD, director, AFIRM

Framework

Middle School

Standards

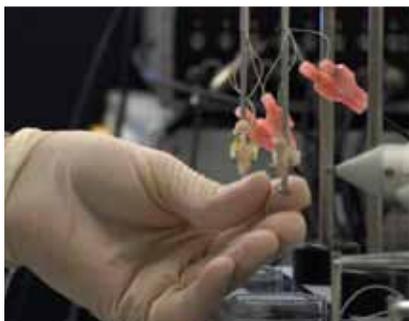
- NSES - C.i.3 ➤ Cells grow and divide, thereby producing more cells.
- NSES - C.i.4 ➤ Specialized cells perform specialized functions.
- STL - 3.F ➤ Knowledge from other fields (such as biology) has an effect on the development of technology.
- STL - 14.G ➤ Innovations in medical technologies are described.

Content Illustrated

- Cultured cells will grow on an ear-shaped scaffold.



Content



Life Science

- Salamanders have the ability to regenerate whole limbs.
- Every cell in your body contains the necessary genetic information to make another whole being that looks identical to you.
- Three types of cells can become tissue: Stem cells are more primitive and can become any tissue at all; more defined cells can become a limited number of tissues; specialized cells can only become one type of cell. Given the right environment, cells reproduce to form tissue.
- Scientists are working on regenerating more than 22 different types of tissue including heart, liver, pancreas, nerve, bone, and cartilage.

Technology

- For tissue regeneration, a small sample of tissue first is taken from the patient. Then those cells are cultured and grown outside the body. A scaffold is created in the needed shape of the target organ or tissue. When a large number of cells have been grown, the scaffold is coated with the cells.
- The scaffold and cells are placed in a warm, sterile environment for four to six weeks and are then ready for implantation in the body.
- Scaffolds are designed to disintegrate after a few months after implantation.

Guiding Questions

- What are clones?
- What's the difference between stem cells and specialized cells?
- What kinds of problems could "regenerative medicine" address?

Suggested Activities

To think about as you watch:

- Identify the function and location of the organs and tissues mentioned in this webisode.
- Find out which diseases could be treated with stem cells.
- Distinguish and identify different cells from different tissues by looking at photographs and illustrations.
- Watch this webisode as an additional reference for *Engineering Now: Bioreactor*.

Keywords

cell
genetic information
organ
regenerative medicine
salamander
scaffold
specialized cells
stem cell
tissue

- *Building Body Parts* can be found online at www.ndep.us/Building-Body-Parts. Visit www.ndep.us/LabTV for a list of process skills modeled in webisodes.