



Learning notes

Tissue culture and stem cells

Linked Article: [Tissue engineering: how it allows us to build organs in the laboratory](#)

This article talks about the urgent need to address the problem of a shortage of organ donors and available organs, so that thousands of people waiting for life-saving replacement organs, such as hearts, kidneys or lungs can get the replacement organ they need. The article explains how scientists are working to build artificial body parts and discusses how this might be done through techniques using stem cells and tissue culture, amongst other methods.

Learning Task:

Carry out tissue culture for yourself using cauliflower.

This practical uses stem cells from a cauliflower plant rather than animal stem cells. It will help you to understand what a stem cell is and how they can be used to grow organs.

The technique is cheap, reliable and straightforward. It uses the liquid used to sterilise baby's bottles and is based on an approach developed by Kew Gardens to clone and protect a rare species of tree in a part of the world without many laboratory facilities.

You will need:

- cauliflower curd (the white 'floret' part)
- small sterilised containers
- growth medium (MS, 20g/l sucrose, 2.5mg/l Kinetin, 0.032% SDICN – see SAPS Teaching and Technical notes at this link for where to buy and how to prepare this.
- chopping board

- Forceps
- Scalpel
- small glass jars
- Milton tablets
- Deionised water
- Petri dish
- Safety glasses and disposable gloves
- Virkon disinfectant for wiping down tables

For details of the method, technical notes and a 'how to' video please see this Science and Plants for Schools, Cauliflower Cloning resource www.stem.org.uk/rx34ju

You can find an easy to follow picture guide to download for students - see Student Guide and more on the National Centre for Biotechnology Education (NCBE) website. It is also possible to buy Cauliflower Cloning Kits of equipment from this UK site. www.ncbe.reading.ac.uk/MATERIALS/Plant%20science/cauliflower.html

As with all practical activities in school you should carry out a risk assessment based on guidance from your local safety organisation – CLEAPSS, SSERC or your local relevant organisation.

Take your learning further:

Debate about using STEM Cells for medical treatment and consider the ethical, political and factual issues that stem cell treatments raise. Role play gives students a chance to explore the different sides of the issue and compare others' points of view. 'I'm a scientist...' debate kit www.stem.org.uk/rx32jj

All About STEM Cells has materials that explain where embryonic stem cells come from
www.stem.org.uk/rxzvp

SSERC have case study style report cards with articles about different developments using stem cells, such as making human body parts www.sserc.org.uk/subject-areas/interdisciplinary-learning/lets-talk/stem-cells/

Take your learning further still:

You can find a detailed and well-illustrated booklet called, 'Stem cells – science and ethics' downloadable as a pdf, on the Biotechnology and biological sciences research council [website](#).

You may also like to read about the Nobel Prize for Medicine 2012 was awarded to John B. Gurdon and Shinya Yamanaka and download a summary poster from Nobel.org, as they say - 'The Nobel Prize recognizes two scientists who discovered that mature, specialised cells can be reprogrammed to become immature cells capable of developing into all tissues of the body. Their findings have revolutionised our understanding of how cells and organisms develop. Source: www.nobelprize.org/prizes/medicine/2012/press-release