**Summer Academy 2016**

**Stem Cells**



Teacher’s notes

Note: There are two items that must be completed in advance for activity #4.

**1. Order enough MS** (Murashiga and Skoog media) plates so that each student gets one. This takes time to get in, order a week or more in advance. Let the supplier know when you need them in order to insure they are there on time. Here is the link:

<https://us.vwr.com/store/catalog/product.jsp?catalog_number=100219-168>

$83.39 for a package of 20. Order enough packages to supply each student with one plate.

**2. Sterilizing cauliflower: (need to make one day in advance)**

* Cut out one piece of cauliflower about the size of a quarter per student. Include a part of the stem and curd on each one.
* Soak in a beaker with a 10% bleach solution (enough to completely cover all of the pieces)
* May need something weighted to place on the cauliflower to make sure it stays submerged
* Soak for 10 minutes, drain
* Fill beaker with cold STERILE water
* Drain off water
* Repeat the rinse (fill with cold water, drain) two more times
* Cover cauliflower with sterile aluminum foil and store in refrigerator until ready to transfer

**Description**:

This class introduces the learner to the biological properties of stem cells, important terms relating to stem cells, and the importance of animal and plant stem cells. Stem cells have the capacity to renew themselves, which is why there is so much interest in them.

Stem cells:

* Increase understanding of how diseases occur
* Generate healthy cells to replace diseased cells
* Test new drugs for safety and effectiveness
* Future of agriculture

**Objectives**:

Students will:

* Develop understanding of the two main types of stem cells, embryonic and adult
* Recall important terminology
* Use technology to prepare YouTube video summarizing the basics of stem cell therapy
* Demonstrate knowledge of topic by investigating a series of questions through computer search
* Apply information to hands-on lab exercise designed to culture plant stem cells

**North Dakota state standards covered**:

11-12.2.1. Understandings About Scientific Inquiry: Explain how new knowledge and methods emerge from different types of investigations and public communication among scientists

11-12.4.1. Structure and Function: Explain the importance of cell differentiation in the development of tissues, organs, organ systems, and multi-cellular organisms.

11-12.2.7. Abilities Necessary To Do Scientific Inquiry: Design and conduct an independent investigation

9-10.2.3. Abilities Necessary To Do Scientific Inquiry: Identify questions and concepts that guide scientific investigations

9-10.6.3. Technology and Society: Explain how emerging technologies (e.g., genetic manipulation, biofuels, and hydrogen fuels) may impact society and the environment

MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

**Schedule:**

09:00-09:30 Introduction and cultural connection

09:30-09:50 PowerPoint: Animal Stem cell discussion

09:50-10:50 Activity 1: *What are stem cells and what do they do?*

10:50-11:00 Discuss results for activity 1

11:00-11:10 PowerPoint: Plant Stem Cell discussion

11:10-11:20 Activity 2: *Culturing stem cells Instructional video*

11:20-11:50 Lunch

11:50-12:15 Activity 2: *Culturing stem cells Practical*

12:15-12:45 Activity 3: *Virtual lab*

12:45-02:00 Activity 4: *Create stem cell videos*

02:00-02:45 Groups present videos

02:45-03:00 Wrap-up