

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

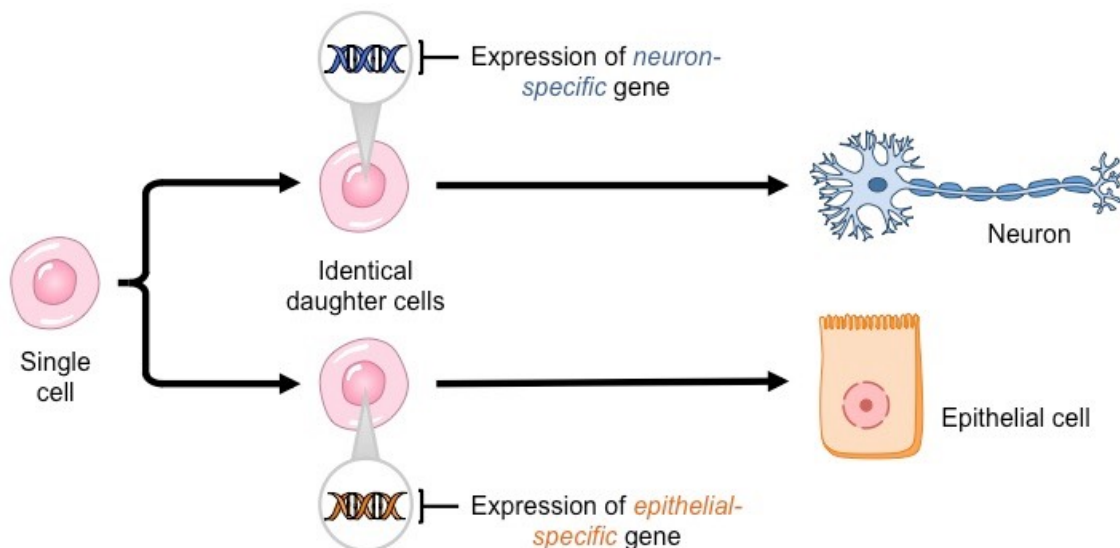
## Stem Cell Virtual Lab

**Objective:** To understand cell differentiation.

**Essential Question:** How does a single cell undergoing mitosis produce the variety of cells we see in a multicellular organism?

**Part 1- Research:** Bio Ninja: <http://ib.bioninja.com.au/standard-level/topic-1-cell-biology/11-introduction-to-cells/cell-differentiation.html>

<u><b>Differentiation</b></u>
Differentiation is the process during development whereby newly formed cells become more specialized and distinct from one another as they mature.
All cells of an organism share an identical genome – each cell contains the <i>entire set of genetic instructions</i> for that organism.
The activation of different instructions (genes) within a given cell by chemical signals will cause it to differentiate.
<u><b>Cell Specialization via Differential Gene Expression</b></u>



**Summarize:** (Explain in your own words the research and what the diagram depicts)

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**Part 2 - Virtual Lab:** <http://virtualstemlab.com/stemcell.html>

- **Embryonic Stem cells**

1. Click on the “embryonic” stem cell at the bottom of the screen.
2. Listen to Dr. Chi Dang and read the script on the top right.
3. Answer the following questions.

1. **What are stem cells?**

2. **What part of the cell do you think Dr. Dang is referring to when he talks about putting the alphabet together to understand how it is read?**

3. **What can practicing physicians hope to do with stem cells ?**

- **Adult Stem Cells**

4. Take the pipet to pick up the stem cell and drag it to the empty petri dish. Click on any cell type and create. Repeat to create other types of cells.
5. Click on the “adult” stem cell at the bottom of the screen.
6. Listen to Dr. Chi Dang and read the script on the top right.
7. Answer the following questions about Adult Stem Cells

1. **What are the limitations to adult stem cells?**

2. **What type of adult stem cells have been effectively used with this procedure?**

3. **What process has allowed children to be cured of leukemia?**

- **Pluripotent Stem Cells**

8. Take the pipet to pick up the stem cell and drag it to the petri dishes that contain adult stem cells and create. Repeat to create other types of cells.
9. Click on the “induced pluripotent” stem cell at the bottom of the screen.
10. Listen to Dr. Chi Dang and read the script on the top right.
11. Answer the following questions about pluripotent stem cells

1. **What is the importance of pluripotent cells?**

**2. What two things can pluripotent cells do?**

**3. What problems can arise with the use of pluripotent cells?**

**4. What do scientists need to do to prevent these problems?**

11. Click “initiate” and then “create.”

**1. What are you doing to the cell when you click “initiate”?**

**Conclusion:**

If every single cell in your body has the exact same genetic information, explain how is your body made up of different cells that perform different functions?