Name_____

Stem Cells: What are they? A Great Overview!

Learn Genetics link: http://learn.genetics.utah.edu
choose the module : Stem cells

I. Click on: "What is a stem cell"

1. What is a stem cell? Why is the name "stem cell" appropriate?

2. When stem cells receive a signal-what happens? (describe differentiation).

3. **View differentiation animation**! Sign here when you have viewed this_____

Click on: Differentiation Booth "What kind of cell do you want stem cell guy to be?"

Choose 2 cells that you want stem cell guy to become. Fill in the chart!

cell "dialed"	Type of cell(s) stem cell guy will become (list specific cell names)	Function of new cells/key terms/notes	I viewed the corresponding animation! (check here when complete)

II. Click on " What are some different types of stem cells". Go through the tutorial and write the answers in here:

1. List the 5 different sources of stem cells (Hint: look at the bottom left corner!)

a)

b)

c)

d)

e)

Early embryonic cells:

2. Define these terms:

a) zygote:
b) embryo:
c) totipotent:

3. What is a good way to remember the definition "totipotent"?

Blastocyst Embryonic Cells:

4. What is a blastocyst?

5. Describe each part of the blastocyst and what is becomes:

inner cell mass-

trophoblast-

6. What does the phrase " blastocyst cells are pluripotent" mean?

Fetal Stem Cells:

7. After the _____ week of development, we call the developing embryo is called a _____

8 . Like blastocyst embryonic stem cells, fetal stem cells are _____(multi, pluri, toti?)

Umbilical Cord Stem Cells:

9. What is the function of the umbilical cord?

10. Umbilical cord stem cells are multipotent. Describe the term **multipotent**:

11. Stem Cells from the umbilical cord are **genetically identical/not genetically** identical to the newborn child. **(circle one)**

12. Could stem cells from the umbilical cord be used by any person or just the person they are derived from? Explain:

Adult Stem Cells:

13. Why is the term "adult stem cells" misleading?

14. Where do adult stem cells reside?

15. Are adult stem cells : **pluripotent? Multipotent?Totipotent? (circle one)**

16. What are the common locations of adult stem cells? (look at the picture…they list 5)

17. **Take the lab coat quiz.**
sign here when finished_____

18. <u>Quiz Reflection</u>: What did you know? What did you get wrong?

III. Click on: Goals of Stem Cell Research

1. How could stem cell therapy work? Describe in your own words:

IV. Click on: Stem cell Therapies: Recipe for success-(Treating Parkinson's with Stem Cells)

<u>Step 1: Define the Problem</u>

1. What are the characteristics of Parkinsons disease?

2. Dead nerve cells do not make the neurotransmitter called _____

3. The next step would be to implant _____ _____ at the problem site.

4. The dopamine from the implanted stem cells will now transmit _____ _____.

5. After watching the animation, describe in your own words how stem cell therapy can help this disease:

<u>Step 2: Finding the right type of stem cell</u>

6. Which type of stem cell was chosen by the researcher to cure parkinson's? Why?

Step 3: Match the stem cells with the transplant recipient

7. Briefly explain in your own words, why this step is important. Explain:

Step 4: Put the stem cells in the right place

8. Briefly explain this step:

Step 5: Make the transplanted stem cells perform

9. What is the ultimate goal of this step? What future hurdles might there be?

V. Click on: Stem Cell Therapies in the Future

Today, stem cell therapies usually rely on cells donated by another person. This raises the possibility of donor cell rejection by the patient's immune system.

Please read this section list two key facts /good notes about where stem cell therapy might go in the future.

1.

2.

3. What is plasticity? Explain how this might be useful in creating new stem cell therapies (hint: look at the diagram on the right)

4. What are some limitations/problems with stem cells?

VI. Creating Stem Cells for research

1. Observe the pictures at the right of the screen. What are the three ways scientists can create/obtain stem cells for research?

a)

b)

c)

2. **Therapeutic Cloning**, also known as **SCNT** (somatic cell nuclear transfer) can be quite controversial since you are essentially creating a cloned embryo of the person, to make specific body cells for that person. Using the pictures at the right, please describe the steps involved in this process:

3. What would be the immunological advantage of SCNT?

VII. What are some issues with stem cell research?

Read this module and reflect on the potential issues that come with the science of stem cell research. What viewpoints might be considered? Write your thoughts here…….