

Stem Cells – A Revolution in Medicine

“Basics of Stem Cells” Cumulative Worksheet

Use the word bank below to fill in the blanks!

Pluripotent	Embryonic Stem Cells	CIRM	Embryonic stem cell line
Mesenchymal Stem Cells	Multi-potent	Omnipotent	Regenerative
Cancer Stem Cells	Adult Stem Cells	Differentiation	Stromal
MicroRNAs	Alexander Maximow	Totipotent	Feeder Layer
Germ Layer	Hematopoietic Stem Cell	Fertilization	DNA
Proliferation	Good Manufacturing Practice	Transduction	Vectors (as Viruses)

- Cells which can differentiate into bone, cartilage, or fat cells are called _____.
- One of the first scientists to identify stem cells, the “precursors” of all cells, is _____.
- _____ are known to control the pathway through which stem cell differentiation takes place.
- The _____ of a stem cell into different types of cells is one of its main characteristics.
- _____ is the largest stem cell research organization in the State of California.
- All cells have _____ inside their nucleus. It is the “blueprint of life”.
- The culturing of stem cells on a dish requires a _____ of cells (usually murine embryonic stem cells).
- Stem cells can make large quantities of other cells and large quantities of themselves – this is known as _____.
- It is necessary to use _____ when producing clinical-grade stem cell products.
- _____ are used to insert factors and genetic material into cells and stem cells by a process known as _____. They are usually weakened.
- Stem cells which proliferate *too* rapidly and uncontrollably, _____, have been known to cause tumors in the body.
- _____ stem cells, also known as _____ stem cells, can differentiate into any type of cell in the human body.
- Also known as mesenchymal stem cells, _____ cells form the connective tissues in the body.
- _____ medicine deals with cures and therapies derived from stem cells and tissue regeneration.
- A family of embryonic stem cells from which cells used for experimentation are derived is known as a _____.
- Union of an egg and a sperm for production of offspring is a process called _____.
- Stem cells isolated from the bone or blood marrow, cable of regenerating themselves, are known as _____. They are _____ stem cells.
- Undifferentiated, developed stem cells in the human body are known as _____.
- Stem cells which can differentiate into any of the three human _____ (endoderm, mesoderm, or ectoderm) are known as _____ stem cells.

Answer the following questions.

1. Define:
 - a. Pluripotent
 - b. Multi-potent
 - c. Omnipotent
 - d. Embryonic stem cells
 - e. Adult stem cells
 - f. Mesenchymal stem cells
 - g. Induced Pluripotent Stem Cells (iPSCs)
 - h. Differentiation
 - i. Proliferation
2. What are stem cells? Why are they important for humans?
3. Name some common types of cells and their stem cell precursors.
4. Where would you expect to find hematopoietic stem cells? What types of cells do hematopoietic cells differentiate into?
5. What are some of the roles that mesenchymal stem cells fulfill?
6. Can stem cells “go wrong”/function abnormally? Give an example of a condition that could be caused by these abnormal stem cells.

Answer the following questions.

1. What types of stem cells do you think can be used for treatments and cures? How do you think they would be used? Can you hypothesize new treatments and cures? Share your discoveries with a partner.
2. Design a poster showing the different types of stem cells (embryonic stem cells, adult stem cells – mesenchymal stem cells, neural stem cells, etc.). Use the internet to find images and illustrations to paste on your poster, as well as interesting facts. Use color to decorate.
3. Think about the wide variety of stem cells scientists have to work with. If you were a researcher, and had the option to receive funding to study only one type of stem cell, which would you pick? Would you base your choice on basic science interests or the potential for treatments?