

Join the national conversation!

# SHOULD THE GOVERNMENT FUND STEM CELL RESEARCH?

Word Generation - Unit 2.07

## Focus Words

embryo | paralyzed | theory | investigate | obtain



## WEEKLY PASSAGE

In summer 2003, toddler Kai Harriott of Boston was sitting on her porch, singing with her sister. A gang member shot into the air to scare Kai's neighbors. Kai was hit by a bullet. After being shot, Kai was **paralyzed**. She could not move from the waist down. Because of her injury, Kai must use a wheelchair. But scientists have an idea that might help. They have a **theory** that stem cells can someday help people like Kai.

Stem cells are found in different parts of the human body, including in our blood. Stem cells are also found in fertilized human eggs, called **embryos**. Stem cells from embryos can develop into cells that do many different jobs in the human body. With more research, we may be able to grow replacement parts for humans from stem cells.

If doctors can grow spinal cord cells, people like Kai might walk again. New brain cells could help people who have had strokes or Alzheimer's disease. Scientists might also learn to grow the cells that make insulin. This could help people with diabetes. But to **obtain** some stem cells, scientists must destroy a human embryo.

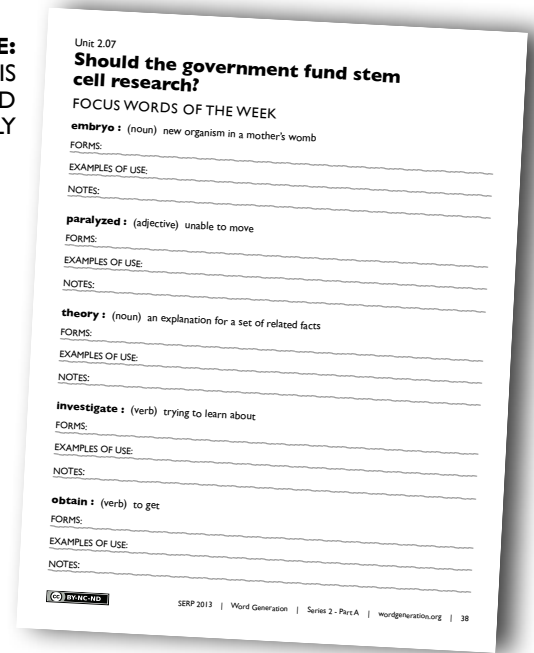
Many people think that human life begins when an egg is fertilized. They think destroying a human embryo is like murder. They say scientists should only work with stem cells from adults. But most scientists find that stem cells taken from adults won't grow into the many different kinds of human cells the way that stem cells from embryos do. Stem cells from embryos may be our only hope of curing some diseases.

**Investigating** stem cells will take years and cost millions. Should the government pay for stem cell research?

### TEACHER - Discussion Questions

- ▶ How was Kai Harriott paralyzed?
- ▶ What theories do doctors have about how stem cells could help people?
- ▶ What is an embryo?
- ▶ Why do some people think we shouldn't obtain stem cells from embryos?
- ▶ Should the government pay for the work of scientists who are investigating stem cells?

**PLEASE NOTE:**  
THE STUDENT VERSION OF THIS  
PAGE IS FORMATTED  
DIFFERENTLY



## Unit 2.07

### WORD CHART FOR TEACHERS

This chart is not in the student book. It is a resource for teachers to support students in the use of the focus words each week. Students are provided one page in each unit immediately following the weekly passage with a basic definition printed and space for taking notes.

Word	Meaning	Forms			Related Words
		Inflectional	Basic Word Classes	Prefixes/ Suffixes	
embryo	(n.) - new organism in a mother's womb	embryos		embryonic	
paralyzed	(adj.) - unable to move	paralyzes paralyzing paralyzed	paralyze (v.)	paralysis paralytic	
theory	(n.) - an explanation for a set of related facts	theories		theoretical theorist theorize theorizer	
investigate	(v.) - trying to learn about	investigate investigates investigated		investigation investigatory investigator	vestige
obtain	(v.) - to get	obtains obtaining obtained		unobtainable obtainable	detain retain sustain

# Should the government fund stem cell research?



## PROBLEM OF THE WEEK

President George W. Bush restricted government funding on stem cell research. On August 9, 2001, he said that scientists could not **obtain** federal money for research on embryonic stem cell lines created after that date. This **paralyzed** certain areas of research. Scientists put some scientific **investigations** on hold.

President Bush believed he had a moral duty to stop new **embryos** from being destroyed. Each embryo, he pointed out, is a potential human being. His **theory** was that using embryos for research cheapens human life.

President Obama has a different moral theory. He says human beings have a moral duty to help people who are suffering. ~~Therefore, they should use science to fight disease. In 2009,~~ President Obama lifted President Bush's restrictions.

**Option 1:** Each embryo needed to start a stem cell line is made up of about 100 cells. Its mass is about one ten-millionth of a gram. Which of the following shows one ten-millionth?

- A) .0001
- B) .00001
- C) .000001
- D) .0000001**


Bush, G.W. (2001, August 9). *Address on stem cell research*. Speech broadcast from Crawford, TX. Retrieved on July 21, 2010 from <http://archives.cnn.com/2001/ALLPOLITICS/08/09/bush.transcript/>

Reinberg, S. (2009, January 23). FDA OK's 1<sup>st</sup> embryonic stem cell trial. *The Washington Post, HealthDay News*. Retrieved on July 18, 2010 from <http://www.washingtonpost.com/wp-dyn/content/article/2009/01/23/AR2009012302168.html>

Lite, J. (2009, March 9). Obama ends embryonic stem cell research ban. *Scientific American*. Retrieved on July 14, 2010 from <http://www.scientificamerican.com/blog/60-second-science/post.cfm?id=obama-ends-embryonic-stem-cell-rese-2009-03-09>

**Option 2:** Each embryo needed to start a stem cell line is made up of about 100 cells. Each person is made up of about 100 trillion cells. Write both numbers in scientific notation. How many orders of magnitude separate the two numbers?

**Answer:**  $100 = 10^2$  and  $100 \text{ trillion} = 10^{14}$ . Each power of 10 represents an order of magnitude, so 12 orders of magnitude separate the two numbers.

 **Discussion Question:** In 2009, the FDA approved the first clinical trial using **embryonic** stem cells. A company called Geron Corp planned to inject embryonic stem cells into 8-10 people whose legs were **paralyzed** by a spinal cord injury. The Geron scientists had a **theory** that these cells could help repair damaged nerves. **Obtaining** subjects for the trial would take time, because the scientists wanted to inject the cells within a few days of the injury. They said the trial was primarily an **investigation** into whether injecting stem cells would be safe. But they also hoped to see whether the stem cells would help patients recover some movement in their legs.

Pretend that you are against stem cell research. What would you say to these researchers to convince them to give up this project?

# Should the government fund stem cell research?

## THINKING SCIENTIFICALLY

Ms. Kahn's class is discussing stem cell research.

"If a human life begins when an egg is fertilized, then **obtaining** stem cells from **embryos** is wrong," says Gabriel.

"But think about all the good that can be done with stem cells," says Toni. "People who are **paralyzed** or have other major medical problems could finally live full lives again!"

"Has anyone **investigated** other ways to retrieve stem cells other than from embryos?" asks Gabriel.

"Actually," says Sylvia, "there are also stem cells in adult bone marrow and scientists have some exciting **theories** about how these stem cells can help improve many health problems, such as heart attacks!"

"Fascinating," says Ms. Kahn. "Let's take a look!"



→ Ms. Kahn and her class found this topic very interesting and did some research on the Internet. Sylvia took notes on information from a study that tested if bone marrow stem cells were effective.

Scientists theorized that injecting bone marrow stem cells would help the heart to heal and rebuild itself after suffering from a heart attack.

They collected 53 patients who had suffered a heart attack in the past. Half received bone marrow stem cells and half received a placebo (or a fake medicine that neither helps nor harms the patient). None of the patients knew whether they got the real injection or the fake one.

Six months after the treatment, the scientists tested the patients' hearts to see if they had improved or noticed any differences. This is what they found.

	Stem cell Patients	Placebo Patients
# adverse events / patient	5.3	7
irregular heart rhythm	No	Yes
muscle size	Increased	Decreased
muscle strength	Increased	Decreased

✍ Did the patients who received injections of stem cells instead of a placebo benefit from the treatment? If so, how?

Yes, they had fewer adverse events, regular heart rhythm, and increased muscle size and strength.

✍ Stem cells from bone marrow are slightly different than stem cells from embryos; they cannot develop into as many different types of cells as embryonic stem cells can. Can you summarize your position on whether scientist should focus only on research that does not involve human embryos?

Answers will vary.

Source: J. M. Hare et al (2009 - *Journal of the American College of Cardiology*)



# Should the government fund stem cell research?



## DEBATING THE ISSUE

### Get ready...

Pick one of these positions (or create your own).

**A** Scientists should focus on finding cures using adult stems cells instead of stems cells from embryos. There are valid ethical concerns about using embryonic stem cells.

**B** Destroying an embryo to get the stem cells is like murder. This should be a crime.

**C** The government should pay for embryonic stem cell research. This could be our only hope for treatment of many injuries and diseases that cause suffering and death.

**D** Scientists should be allowed to do research on embryonic stem cells, but the government should not pay for it because many taxpayers oppose it.

**E** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

#### TEACHER

Whatever debate format you use in your class, ask students to use academically productive talk in arguing their positions. In particular, students should provide reasons and evidence to back up their assertions. It may be helpful to read these sample positions to illustrate some possibilities, but students should also be encouraged to take their own positions on the issue at hand.

### Get set...

Be ready to provide evidence to back up your position during your class discussion or debate. Jot down a few quick notes:

---

---

---

---

---

---

---

---

# GO!

Be a strong participant by using phrases like these.

*You make a good point, but have you considered...*

*I believe that...*

*I agree with you, but...*

*Can you show me evidence in the text that...*



Support your position with clear reasons and specific examples.  
Try to use relevant words from the Word Generation list in your response.

## embryo | paralyzed | theory | investigate | obtain

Put the writing prompt on the overhead projector (or the board) so that everyone can see it. Remind students to refer to the word lists in their Word Generation notebooks as needed.

- » [www.en.wikipedia.org/wiki/Stem\\_cell](http://www.en.wikipedia.org/wiki/Stem_cell)
- » [www.stemcells.nih.gov/info/basics/basics1.asp](http://www.stemcells.nih.gov/info/basics/basics1.asp)
- » [www.stemcellresearch.org](http://www.stemcellresearch.org)
- » [http://www.boston.com/news/local/articles/2006/04/14/i\\_still\\_forgive\\_him/](http://www.boston.com/news/local/articles/2006/04/14/i_still_forgive_him/)