

# STEM CELL RESEARCH

## 1. Introduction. Answer the following questions in small groups.

- What are stem cells?
- How are they different from other cells?
- Where are they found?
- In what areas are they useful?

## 2. Vocabulary - deriving meanings

<http://www.thefreedictionary.com>

A. Have a look at the descriptions of some words. Then try to guess meanings of derived expressions. Write a synonym or an explanation for them.

omnipotent (adj.) - having unlimited or universal power, authority, or force; all-powerful

multipotent –

harvest (v.) - to gather (a ripened crop) from the place where it has been growing

harvested blood cells -

difference – the state or quality of being unlike

differentiate –

screen – to test or examine for the presence of disease or infection

screened –

induction – the process of initiating, stimulating the occurrence of; causing

induced -

B. Here are some more words and their opposites. Guess the meanings of the words.

distinguished from -	.....	<i>opposite</i> identical with
hollow (e.g. ball)	.....	full, solid, convex
assay (e.g. chemical assay)	.....	synthesis, combination
underlie	.....	neglect, give way, mismanage

C. Medical expressions concerning the development of foetus in woman's body: choose a noun for each adjective and try to guess the meaning of the phrase. *No translators, please.*

*Czech / Slovak equivalent*

fertilized	cord / egg / fluid	.....
umbilical	cord / egg / fluid	.....
amniotic	cord / egg / fluid	.....

### **3. Reading. Answer the questions from the introduction at the beginning of the lesson.**

Scientists have known of the existence of stem cells - the foundation of every organ, tissue, and cell within the human body - for over a century. In the late 1990s human embryonic stem cells were first cultured in the laboratory. Stem cells are undifferentiated, 'blank' cells that do not yet have a specific physiological function. When the proper conditions occur in the body or in the laboratory, stem cells begin to develop into specialized tissues and organs. Stem cells are also distinguished from other cells by their ability to self-renew. In other words, to divide and give rise to more stem cells.

There are several sources of stem cells used in research. Embryonic stem cells are obtained from the inner cell mass of a blastocyst. The blastocyst is formed when the fertilized egg, divides and forms two cells, then again to form four, and so on until it becomes a hollow ball of about 150 cells. The inner cell mass contains the pluripotent stem cells that can be isolated and cultured.

Stem cells are also found in differentiated tissues and organs throughout the body. Often referred to as adult stem cells, or tissue-specific cells, they have not been identified in all tissues and organs, but in many cases they do exist and have a confirmed role in repairing and maintaining tissue that has been injured or damaged by disease. The adult stem cells can be isolated from samples of the tissue.

Blood from the umbilical cord of a new-born baby also contains blood stem cells and is often harvested and banked for future use, either for the benefit of research or for future treatments that the donor may require. The amniotic fluid is another rich source of stem cells that are multipotent and often more robust than stem cells derived by other means.

Lastly, induced pluripotent stem cells (iPS cells) can be derived from the large pool of differentiated cells in the body (e.g. skin, fat, muscle, etc.), which are transformed into an embryonic-like stem cell state.

Stem cells are the source of all tissues of the body. Understanding their properties is fundamental to our understanding of human biology in health and disease. In particular, stem cells offer a renewable source of replacement cells to treat a wide variety of diseases and disabilities, including diabetes, neurological disease, cardiovascular disease, blood disease and many other conditions.

Stem cells can also provide a source of material for growing cells in the laboratory for specific tissues, or even with specific diseases, enabling more relevant and informative biological assays. Thousands of chemical compounds can be screened for their safety and effectiveness in treating disease. Defective stem cells also appear to underlie many forms of cancer, and by understanding their properties it should be possible to develop new types of anti-cancer therapy.

Stem cells also play an important role in expanding our understanding of embryonic and fetal development, helping us to identify the cells and molecules responsible for guiding the patterns of normal (and abnormal) tissue and organ formation.

So stem cells are more than just a source of potential replacement parts. They provide us today with an essential tool for better understanding normal and disease biology, and evaluating other modes of treatment.

D. Find synonyms for: *produced in lab* (par.1), *established* (par.3), *help/use* (par.4), *collection* (par.5), *standard way of acting* (par.8)

**Listening: STEM CELL RESEARCH**

[http://www.bbc.co.uk/worldservice/learningenglish/newsenglish/witn/2007/01/070110\\_stemcell.shtml](http://www.bbc.co.uk/worldservice/learningenglish/newsenglish/witn/2007/01/070110_stemcell.shtml)

**Match the words and their definitions**

versatility	eating the flesh of your own species
tissue	young animal (here human) in the earliest stage of development
hamper	very similar or identical set of genes
ethical concerns	are produced or developed from
are derived from	the same as something else (especially something bad), equal in meaning
embryo	hinder, inhibit, affect the progress of
tantamount	flexibility, being capable of many different uses
cannibalism	moral problems, or worries relating to professional conduct
genetic match	a collection of cells with a similar structure and particular function in an animal/plant

**1. You are going to hear a report from Mat McGrath, a BBC Science correspondent. Answer the question about the message of the report:**

What are the scientists working on?

**2. Circle the right alternative.**

A. The effect of ethical concerns on the research is:

- 1. stopping it
- 2. limiting it
- 3. encouraging it

B. Amniotic and embryonic stem cells

- 1. have different potential
- 2. seem to be identical
- 3. share many properties

C. Mice in the test had ill

- 1. liver
- 2. muscles
- 3. brain

D. Which of these amniotic stem cells characteristics is low?

- 1. number
- 2. potential
- 3. versatility

### Listening script

Scientists believe that stem cells offer real hope of treating illnesses like diabetes, Parkinson's and Alzheimer's. Stem cells act like master cells and can grow into the types of **tissue** that are destroyed by the progression of these diseases. But this field of research has been **hampered** by **ethical concerns** over the source of stem cells.

Scientists say the most useful types **are derived from** specially grown human **embryos**. Opponents say that because these embryos are destroyed in the process, this is **tantamount** to **cannibalism**.

Now scientists in the United States, after a seven year research effort, say they have found a ready source of useful stem cells in amniotic fluid, the liquid that surrounds a growing baby. The researchers say that these cells seem to have many of the qualities of embryonic stem cells. The team have managed to turn them into functioning muscle, fat, blood vessel, nerve and liver cells. In tests, these newly made cells seemed to restore some function in brain damaged mice.

Although amniotic fluid derived stem cells are small in number, their ability to renew themselves and their **versatility** gives the researchers great hope. They say that a bank of 100,000 of these stem cells could supply a **genetic match** for 99 percent of the US population.

### Questions:

1. What hope do stem cells offer?
2. What kinds of concerns hamper the research?
3. What do opponents say about destroying embryos?
4. What properties of amniotic stem cells are promising?

### Word formation. Complete the adjectives (from Reading p.2):

<i>noun</i>	<i>adjective</i>
Physiology	
Umbilicus	
Amnion	
Fundament	
Renewal	
Neurology	
Information	
Defect	
Embryo	
Foetus, fetus	

### Explain the benefits and limits of stem cell research: