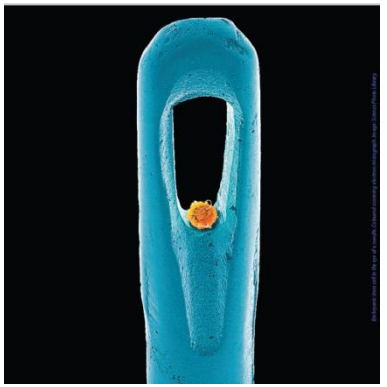
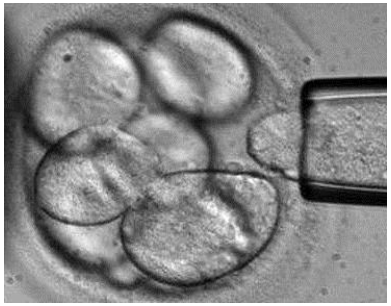
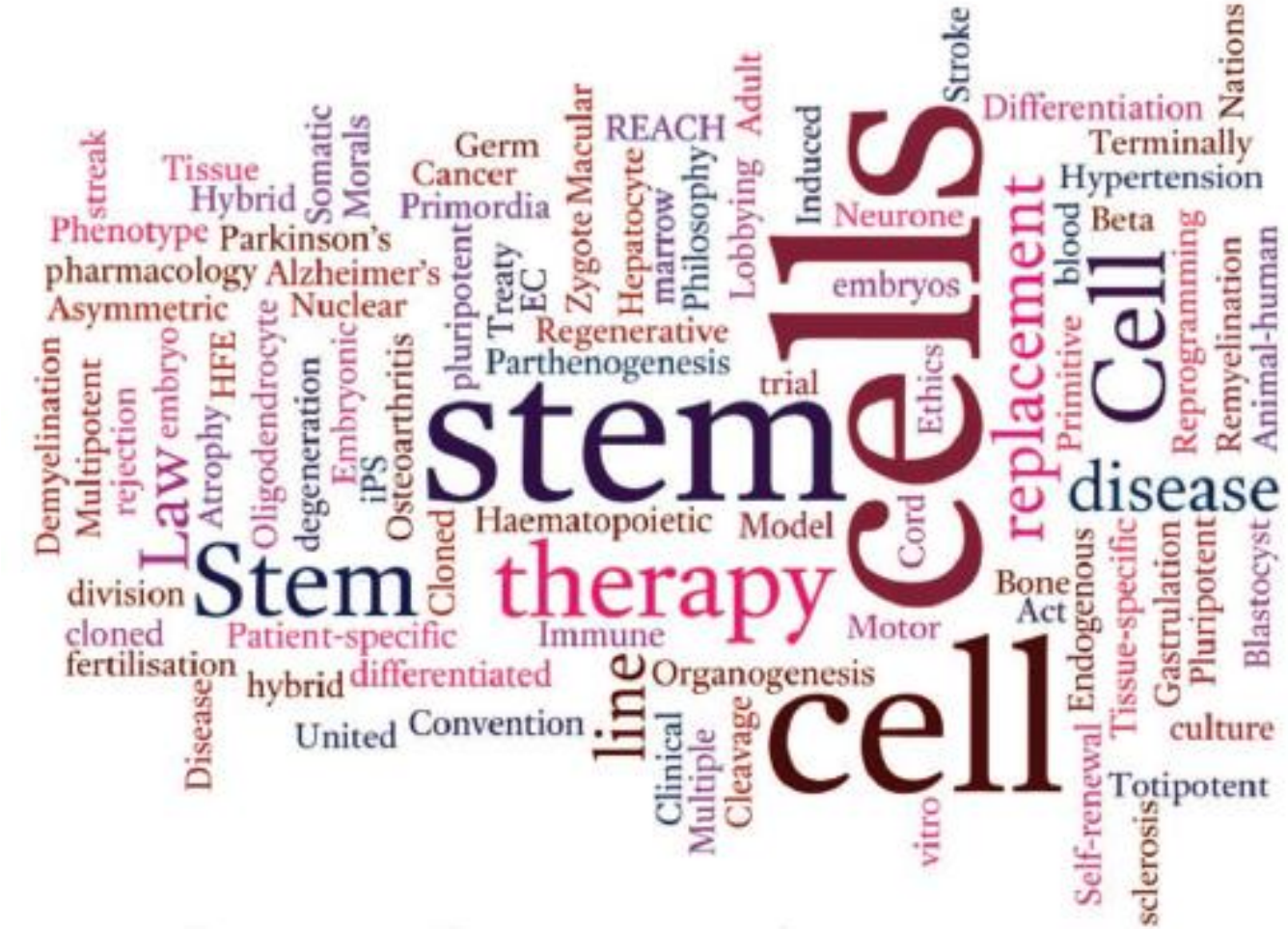
What are Stem Cells? How can they be used in medicine?

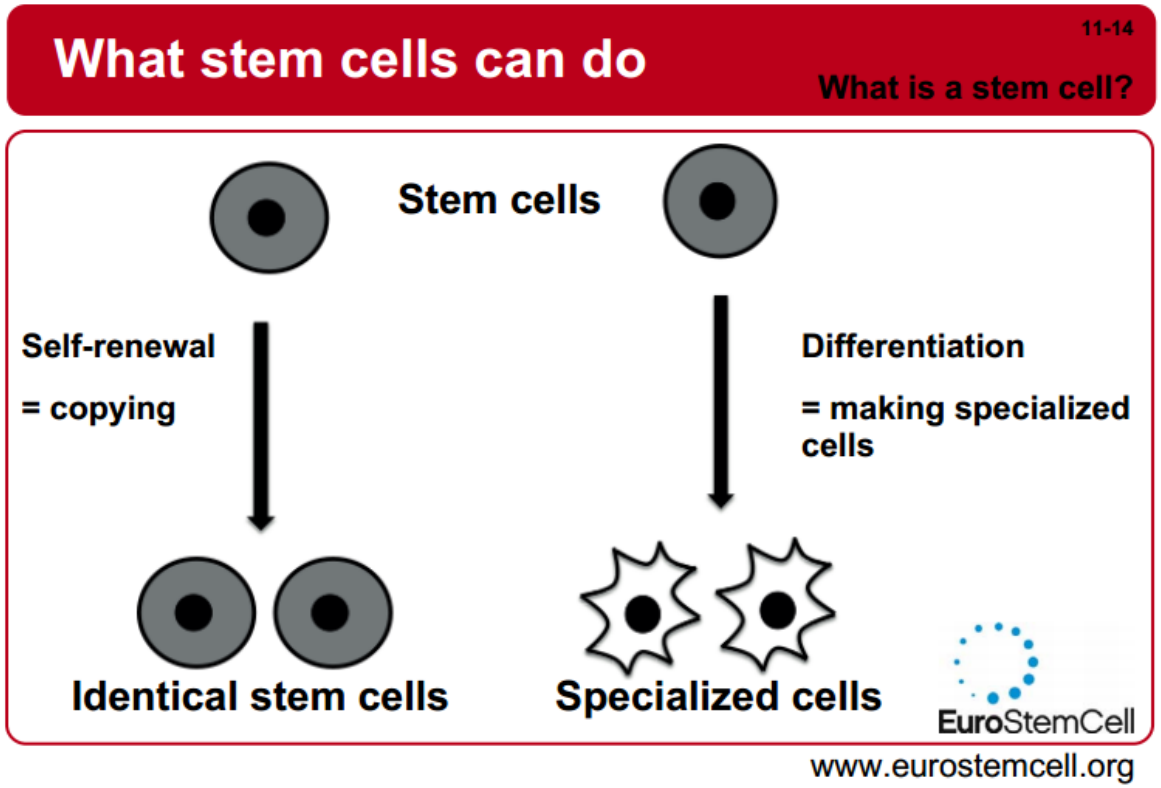




What is a stem cell????.....



What is a stem cell????.....

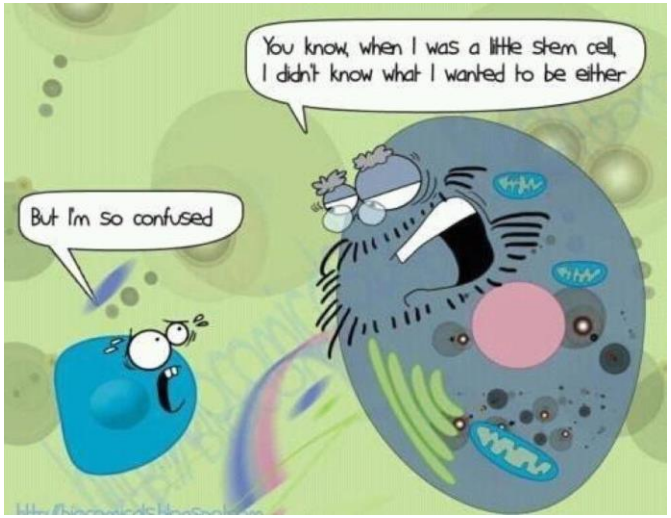


.....a cell with the ability to differentiate into specialized cells and renew to become more stem cells

THE BUILDING BLOCKS OF LIFE

What is a stem cell????.....

-what are the two major different types of stem cells and how are they different?



ADULT STEM CELLS

-multipotent= ability to produce a few types of specialized cells

EMBRYONIC STEM CELLS

-pluripotent= ability to produce all cell types of the human body (but not a whole new organism)

Can you think of any places in the body where we might have stem cells

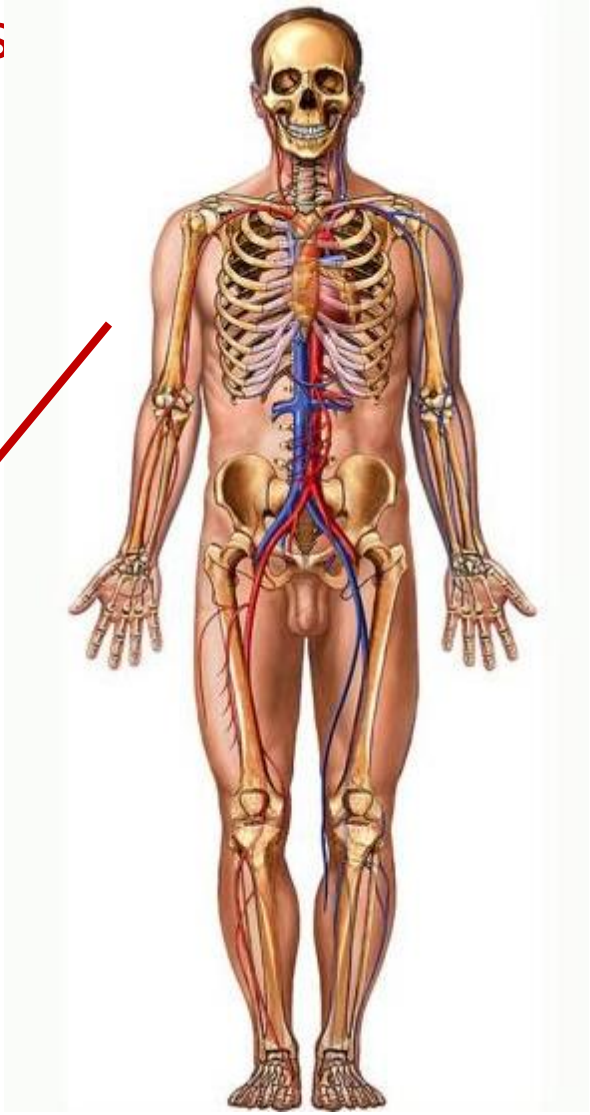
How about.....

-in the skin?

-hair follicles?

-bone marrow?

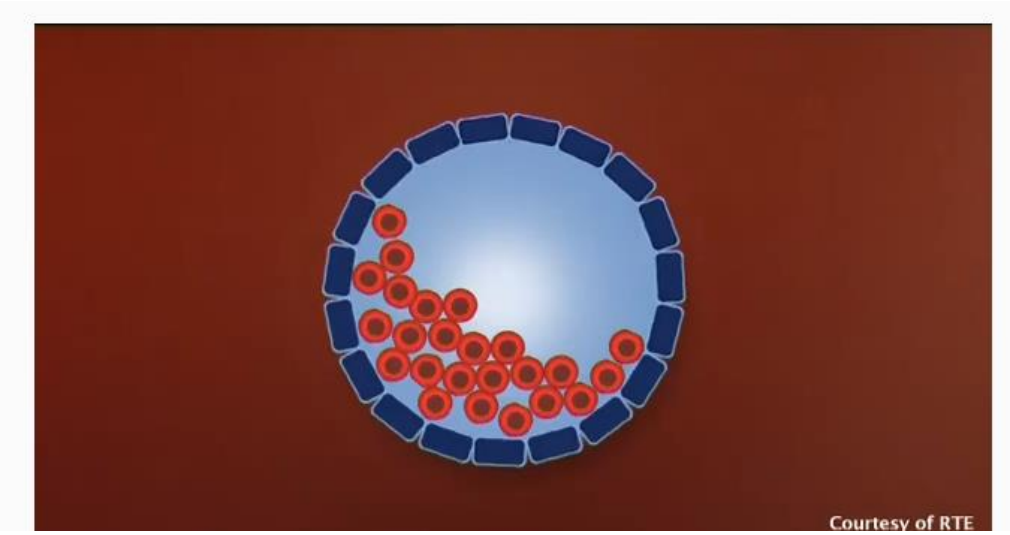
-...and many many more!



TASK ONE:

LISTEN TO THE FOLLOWING CLIP AND SEE IF YOU CAN COMPLETE THE EXERCISE ON YOUR WORKSHEET

What are stem cells and how can stem cells be used in medicine?



0:19-3:30

TASK ONE: Fill in the blanks, using the audio clip:

WORDS TO CHOOSE FROM- use these to help you fill in the blanks on your worksheet

- 2
- 200
- ADULT
- ADULT
- BLOOD
- BONE MARROW
- CANCERS
- CANCERS
- DEVELOPMENT
- DIFFERENT
- DISEASE
- DRUGS
- EMBRYONIC
- EMBRYONIC
- IVF
- SOME
- STEM CELLS
- STEM CELLS

TASK ONE-ANSWERS

WHAT IS A STEM CELL?

-The human body is composed of over **200** cell types such as skin cells, heart cells etc. It also houses cells called **STEM CELLS**. These cells are special because they can do two things: make more **STEM CELLS** and make **DIFFERENT** cell types.

ARE THERE MANY KINDS OF STEM CELLS?

-There are **2** main different types of stem cells. These are **ADULT** and **EMBRYONIC** stem cells. **EMBRYONIC** stem cells can produce all cell types, whereas **ADULT** stem cells can only produce **SOME** cell types and are therefore more limited. Embryonic stem cells are sourced from left over embryos from **IVF** treatments. These can be used to evaluate **DISEASE** and **DEVELOPMENT** in the laboratory.

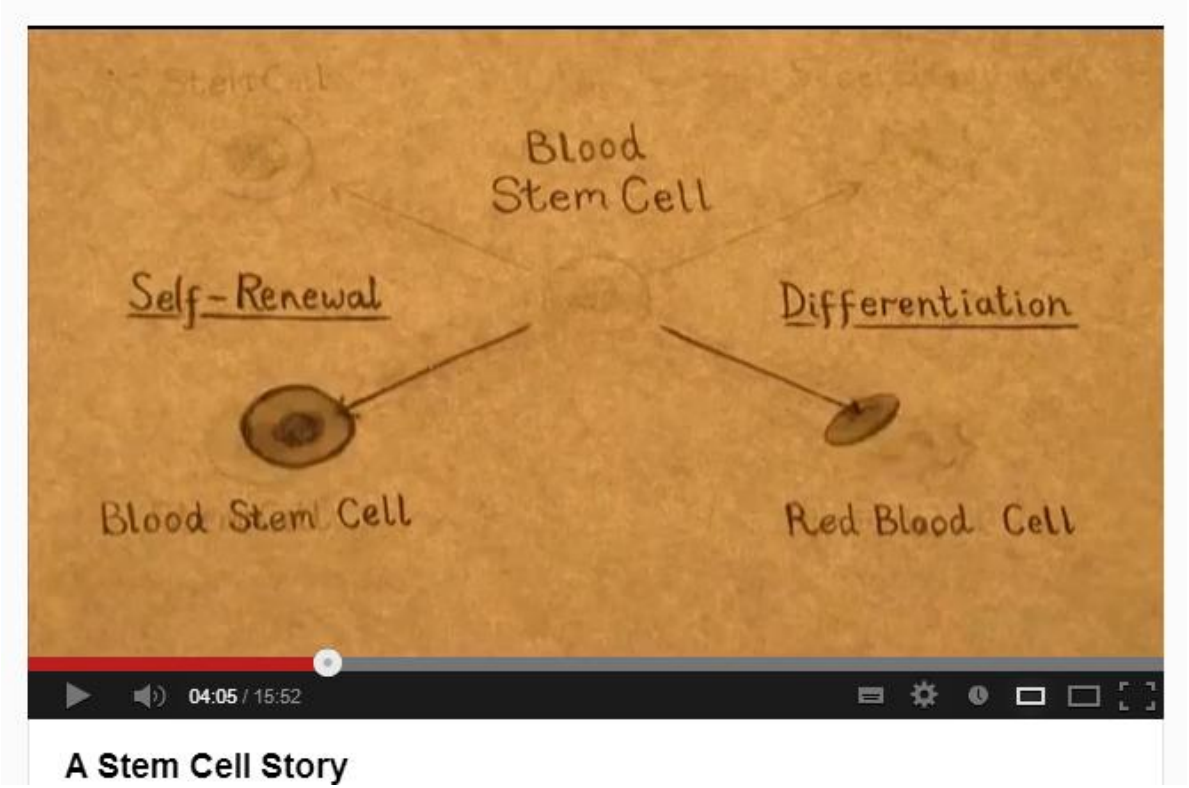
HOW DO DOCTORS USE STEM CELLS?

-**ADULT** stem cells have been used for years to treat cancers and rare blood diseases. Stem cells can be taken from the **BONE MARROW** to treat **CANCERS**. As well as being used to treat patients directly, stem cells can be used by doctors to understand disease and used to discover and test new **DRUGS**.

DID YOU GET THE ANSWERS RIGHT?

TASK TWO:

WATCH THE FOLLOWING VIDEO AND DECIDE WHICH ARE THE CORRECT ANSWERS TO THE QUESTIONS ON YOUR WORKSHEET



http://www.youtube.com/watch?v=2-3J6JGN-_Y&feature=g-list&list=PLMaNlhHedsI-NJwiWO1bKA5e7xiF5aimI

TASK TWO- ANSWERS

PAGE 1

1. Why are stem cells called a ‘reservoir’?

   A. Because they can replace the specialized cells that die/get used up in our body

2. Why are stem cells important in the blood system?

   A. Because we need to produce millions of blood cells every day

3. Where can blood stem cells be found in the body?

   A. In the bone marrow

4. Can stem cells be found in the brain?

   A. Yes

5. What is the decision a stem cell must make every time it divides?

   A. All of the above

6. What specialized cells can a skin stem cell make?

   A. Skin cells

TASK TWO- ANSWERS

PAGE 2

7. When using stem cells to treat burns, what do the stem cells actually produce?

A. The outermost layer of the skin (epidermis layer)

8. How can stem cells treat leukemia?

A. Transplant of blood stem cells into patient

9. What makes embryonic stem cells different to adult stem cells?

A. They can give rise to all cells of the body

10. What can neural stem cells make?

A. Cells of the brain

11. How could stem cells be used to treat diabetes?

A. Produce insulin making cells that can be transplanted into patient

12. What is the role of stem cells in our bodies?

A. Produce specialized cells to replace cells that are used up or damaged due to disease/injury

TASK THREE:

can you match the following stem cell related words with their definitions?

BONE MARROW TRANSPLANT

IN-VITRO FERTILISATION(IVF)

DIFFERENTIATION

DIABETES

CANCER

SELF-RENEWAL

ADULT STEM CELLS

EMBRYONIC STEM CELLS

REGENERATIVE MEDICINE

DRUG TESTING

PARKINSON'S DISEASE

TASK THREE- ANSWERS

BONE MARROW TRANSPLANT:

A. A procedure where stem cells are taken from the bone marrow (either of the patient themselves or a donor) and transplanted into the patient to replace faulty blood cells. This is a very successful procedure to treat diseases such as leukaemia.

CANCER:

A. A disease characterised as unregulated cell growth in the body. Stem cell therapies are a method used to overcome this disease.

EMBRYONIC STEM CELLS:

A. Undifferentiated cells that have the potential to differentiate into any cell of the body. This is very useful in regenerative medicine because they provide a source of cells that can become the cell type required on demand.

DIFFERENTIATION:

A. The process by which an unspecialized stem cell acquires the features of a specialized cell; such as a skin cell, muscle cell etc.

TASK THREE- ANSWERS

DIABETES:

A. Disease caused by the destruction of specialized cells of the pancreas that produce insulin (beta cells). Characterised by a lack of insulin leading to abnormally high levels of glucose in the blood. Methods using stem cells could one day be used to treat the disease by producing these beta cells.

IN-VITRO FERTILISATION (IVF):

A. A process where an egg is fertilised outside the body. Embryos that are produced by this process and that are not used can be donated to stem cell research. This presents an extremely valuable source of embryonic stem cells for research into drug testing, development and tissue regeneration.

SELF-RENEWAL:

A. The ability of a stem cell to divide to produce more undifferentiated stem cells. This ensures that a stem cell population is maintained within the body.

ADULT STEM CELLS:

A. Undifferentiated cells that have the potential to differentiate into a number of cell types of the body. Their main use in the body is to regenerate damaged cells or tissues in times of disease/injury.

TASK THREE- ANSWERS

REGENERATIVE MEDICINE:

A. The process of replacing cells or tissues in order to restore normal function to the body. This process usually makes use of stem cells.

DRUG TESTING:

A. The use of stem cells for toxicity screening of medicines in early development stages. This allows scientists to determine whether medicines have any harmful side-effects before they are produced for mass use. This method could reduce the need for animal testing.

PARKINSON'S DISEASE:

A. A disorder that occurs because of damage to dopamine producing nerve cells in the brain, causing the individual to twitch uncontrollably. Stem cell research may provide the answer towards treating the disorder by replacing these cells.

DID YOU GET THE ANSWERS RIGHT?

All that's left for me to say is a big....

....for all your hard work and attention today!!!!

Hope you found it interesting ☺