



Stem Cells

1 Fill in the missing words

Stem cells are cells that have not undergone **differentiation**. This means that the cells have not yet become **specialised** and so they are called undifferentiated.

An **embryo** develops from a fertilised egg. All of the cells in an embryo start off identical and undifferentiated. These cells are called **embryonic stem cells** and can become specialised to form any type of cell. As the embryo grows into a foetus they lose these embryonic stem cells.

However, some stem cells do remain in the body of adults, and these are known as **adult stem cells**. These are only found in certain areas though, such as the **bone marrow**. Also, unlike embryonic stem cells they can't **differentiate** into any cell type, they are restricted to certain types such as blood cells.

[7 marks]

2 How could adult stem cells be used to cure a person who has a disease of faulty blood cells?

Bone marrow transplants transfer adult stem cells to a person with a disease. The bone marrow cells will differentiate into different types of blood cell. These will replace the faulty cells.

[2 marks]

3 Why could embryonic stem cells potentially cure more diseases than adult stem cells?

They can differentiate into a wider range of cells, so replace a wider range of faulty cells/diseases.

[1 mark]

4 Name a disease that embryonic stem cells could be used to cure

Type 1 diabetes

Multiple sclerosis, which can lead to paralysis

Cases of spinal cord or brain injury, that have led to paralysis

[1 mark]

5 Give two risks of using stem cells in medicine

1) The cells could become contaminated with viruses which will then be introduced into the patient.

2) There may be an adverse immune response, as the genes would be different.

[2 marks]

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6 What is the benefit of therapeutic cloning?

The cells would have the same genomes as the patient, so lower/no risk of an adverse immune response.

[1 mark]

7 Discuss the ethical concerns with using embryonic stem cells for research and medical treatment

Some people think it is unethical to use or experiment on embryos that have the potential for human life.

However, the embryos used are those that would otherwise be destroyed.

It saves a lot of lives overall.

[3 marks]

8 In plants, stem cells are found in the growing regions. What are these areas called?

Meristems

[1 marks]

9 Give two benefits of producing plants from stem cells

- 1) Clone identical crop plants that have useful characteristics
- 2) Replicate rare species

[3 marks]

10 Name three cell types that plant stem cells differentiate into

- 1) Leaf cell
- 2) Root hair cell
- 3) Xylem
- 4) Phloem

[3 marks]

[Total - 25 marks]