Higher Tier — Separate Science

Full Higher Separate content. ★ = Higher Tier. ◆ = Separate Science only.

Q1. Define stem cell and explain why stem cells are important in medicine.

[2 marks]

Q2. Compare embryonic and adult stem cells in terms of their potency, source and ethical status.

[4 marks]

★ HIGHER TIER

Q3. ★ Evaluate the therapeutic use of embryonic stem cells to treat conditions such as Parkinson's disease.

[4 marks]

Total: 10 marks

Q1 (2 marks)

Define stem cell and explain why stem cells are important in medicine.

• Undifferentiated cell that can divide and differentiate into specialised cell types [1]

• Can potentially replace damaged or diseased tissue — e.g. treat leukaemia, Parkinson's, diabetes [1]

Q2 (4 marks)

Compare embryonic and adult stem cells in terms of their potency, source and ethical statu…

• Embryonic: totipotent — can become any cell type; adult: limited range e.g. blood cells only [1]

• Embryonic: from blastocyst stage embryo; adult: from tissues such as bone marrow [1]

• Embryonic: ethically controversial — requires destruction of embryo [1]

• Adult: less controversial — harvested from living donor [1]

Q3 (4 marks) [★ HT]

★ Evaluate the therapeutic use of embryonic stem cells to treat conditions such as Parkins…

• Embryonic stem cells are totipotent — could differentiate into any neuronal cell type needed [1]

• Could provide a cure rather than only symptom management [1]

• Obtaining embryonic stem cells destroys a human embryo — raises ethical concerns about destroying potential human life [1]

• Risk: immune rejection unless therapeutic cloning used; risk of tumour formation; long-term effects unknown [1]