

Base your answer to question 58 on the information below and on your knowledge of biology.

**For Teacher  
Use Only**

Stem cells present in an embryo are responsible for the formation of various tissues and organs. Recent research suggests that it may be possible to replicate stem cells from sections of skin taken from adult mice, rather than having to use stem cells from the embryos of mice. In the future, human stem cells may be used to replace human tissue damaged by diseases such as Parkinson's disease and multiple sclerosis.

58 Discuss why the use of stem cells taken from a patient to replace damaged tissues and organs may decrease the potential risk to a patient. In your answer, be sure to:

- identify the major problem that may occur when tissues and organs donated by another individual are used [1]
- explain why this problem may occur [1]
- explain why this problem will *not* occur if tissues and organs produced by stem cells from the patient are used [1]

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59 *Staphylococcus aureus* is a type of bacterium that lives on the skin and in the nostrils of most people. Generally, it is controlled by the immune system of the body. Occasionally, the antibiotic penicillin is needed to control the bacterium. However, some strains of *S. aureus* have a resistance to penicillin, which makes them hard to kill and infections difficult to cure.

Explain how the resistance to penicillin affects the *S. aureus* population. In your answer, be sure to include an explanation of:

- how the exposure to penicillin affects the survival of some bacteria in the population [1]
- why the frequency of penicillin-resistant bacteria can change over time within the population [1]
- how it is still possible to cure patients who are infected with penicillin-resistant bacteria [1]

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