

Gene Expression - Questions by Topic

Q1.

The internal conditions within the body are maintained by homeostatic mechanisms. The regulation of blood glucose involves homeostatic mechanisms.

Beta cells in the pancreas produce insulin when there is an increase in glucose levels in the blood.

Transcription factors are involved in the activation of the insulin gene.

Explain how transcription factors could activate insulin gene expression in beta cells.

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(Total for question = 3 marks)

Q2.

Induced pluripotent stem cells (iPS cells) are a new type of stem cell.

(a) To produce iPS cells, four genes that code for different transcription factors are added to the genome of somatic (body) cells. The transcription factors produced cause the somatic cells to be converted into iPS cells.

(i) Suggest why it may be better to produce differentiated cells from iPS cells than from pluripotent stem cells.

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(ii) Explain how these transcription factors may cause the somatic cells to be converted into iPS cells.

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(b) In 2013, it was discovered that a mixture of seven chemicals could be added to somatic cells to cause them to develop into iPS cells rather than the need to add genes to their genome.

Suggest how a valid comparison of these two techniques could be carried out to discover which may be more effective for converting somatic cells into iPS cells.

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(Total for question = 9 marks)