

# Edexcel (A) Biology A-level

## 3.11 to 3.14 - Stem Cells and Epigenetics

Flashcards



# What is a stem cell?



# What is a stem cell?

Undifferentiated cells, that can divide indefinitely and turn into other specific cell types.



What is meant by pluripotent and totipotent stem cells?



# What is meant by pluripotent and totipotent stem cells?

- Totipotent = can develop into any cell type **including** the placenta and embryonic cells.
- Pluripotent = can develop into any cell type **excluding** the placental cells.



Give some uses of stem cells.



Give some uses of stem cells.

- Treat diseases, such as Parkinson's and multiple sclerosis.
- Replace damaged tissues, such as spinal cords.



# Why is use of stem cells controversial?





## Why is use of stem cells controversial?

- Involves killing embryos.
- There is a risk of infection after transplant.
- However; could save lives and greatly improve quality of life.



# How do cells become specialised?



## How do cells become specialised?

1. Some genes become switched on while others are switched off.
2. The active 'switched on' genes are transcribed and translated into proteins, which are then used for the specific function of that cell.



Define phenotype.



Define phenotype.

The expression of an organism's genes,  
combined with its interaction with the  
environment.



# What is meant by epigenetics?



What is meant by epigenetics?

A heritable change in gene function  
**without** change to the base sequence of  
DNA.



# How does DNA methylation affect gene transcription?





How does DNA methylation affect gene transcription?

Involves addition of a  $\text{CH}_3$  group to one of the bases. Prevents transcription factors from binding. Therefore gene transcription is suppressed.



# How can histone modification affect gene expression?



## How can histone modification affect gene expression?

- Addition of an acetyl group activates chromatin, allowing transcription.
- Addition of a methyl group can either activate or inactivate chromatin depending on the position.



# How are epigenetic changes passed on?



How are epigenetic changes passed on?

Because the changes affect cell division, all cells that arise from the altered cells will possess the modifications. This includes gametes, meaning the changes are heritable.

