

Stem cells, gene expression and phenotype

Define stem cell.

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Totipotent vs pluripotent?

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What is a morula?

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What is a blastocyst?

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Give two ethical objections to embryonic stem cell use.

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What is differential gene expression?

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How do proteins make a cell specialised?

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Exon vs intron?

Totipotent: any cell type including placenta, can form a whole organism. Pluripotent: any body cell type, but not placenta.

An undifferentiated cell that can divide by mitosis and differentiate into specialised cells.

A hollow ball of cells with a cavity, an outer layer forming the placenta and an inner cell mass of pluripotent cells.

A solid ball of about 16 cells formed by early divisions of the zygote.

Different genes are transcribed in different cell types, giving different active mRNA and proteins, so cells specialise.

Embryos are destroyed, and some believe an embryo has a right to life or object on religious grounds.

Exons are coding sections that are kept in mature mRNA; introns are non-coding sections removed by splicing.

They control cell processes (as enzymes) or determine cell structure.

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What is alternative splicing?

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Phenotype depends on?

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Effect of DNA methylation?

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Effect of histone acetylation?

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How are epigenetic changes passed to daughter cells?

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What are multiple alleles?

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What is polygenic inheritance?

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Continuous vs discontinuous variation?

An interaction between genotype and the environment.

Joining exons of pre-mRNA in different combinations, so one gene gives several different mRNAs and proteins.

Loosens the DNA from histones so the gene can be transcribed (activated).

Methyl groups added to cytosine usually switch the gene off (prevent transcription).

More than two alleles of a gene in a population (for example I^A , I^B and I^O for ABO blood groups).

The pattern of methylation is copied onto the new DNA after replication, so daughter cells inherit it.

Continuous: a range of values (polygenic and environment), bell-shaped, for example height. Discontinuous: distinct categories, for example blood groups.

A characteristic controlled by many genes at different loci, each with a small additive effect.