

Gene expression **HL only**

What is gene expression?

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Promoter, enhancer, transcription factor?

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How does mRNA degradation regulate translation?

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What is epigenesis?

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Genome, transcriptome, proteome?

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Two examples of epigenetic tags?

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What is epigenetic inheritance?

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Example of the environment changing epigenetic tags?

Promoter: where RNA polymerase binds.
Enhancer: site where activators bind.
Transcription factor: protein binding specific DNA sequences to regulate transcription.

The mechanism by which information in genes has effects on the phenotype: transcription, translation and function of the protein product.

The development of patterns of differentiation in the cells of a multicellular organism. Phenotype changes but not genotype.

Nucleases break mRNA down; mRNA lasts minutes to days, so controlling breakdown controls how much protein is made.

Methylation of cytosine in promoters (represses transcription) and methylation of histones (represses or activates transcription).

Genome: all DNA (same in all cells).
Transcriptome: all RNA transcribed.
Proteome: all proteins made. Last two differ between cells.

Air pollution alters methyl tags on DNA, for example more methylation of the FOXP3 promoter in immune cells of children with asthma in a polluted city.

Passing phenotypic changes to daughter cells or offspring without changing the DNA sequence, when tags stay in place through mitosis or meiosis.

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Why are ligers larger than tigers?

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What do monozygotic twin studies show?

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How does oestrogen change gene expression?

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How does lactose switch on the lac operon?

Identical genomes but methylation differences grow with age and time apart, so the environment affects gene expression.

Not all tags are removed from gametes (imprinting): a liger gets strong growth promotion from its lion father but only weak growth restraint from its tigress mother.

Lactose binds the repressor, which leaves the operator, so RNA polymerase transcribes the genes for lactose uptake and breakdown.

It enters target cells, binds a receptor, and the complex acts as a transcription factor on specific genes.