GENE CONTROL

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- Define Gene Control
- Define Gene Control in Enzyme
- Disscus Gene Control in Prokaryotes
- Disscus Gene Control in Eukaryotes
- List Defect in Gene Control

Introduction

This Presentation talks about gene control in: Enzyme, Eukaryotes and Prokaryotes, moreover the defects in gene control.

Define Gene Control

- Is a term used to describe any mechanism used by a cell to increase or decrease the production of specific gene products.
- Cells can modify their gene expression patterns to trigger developmental pathways, respond to environmental stimuli, or adapt to new food sources.
- All points of gene expression can be regulated. This includes transcription, RNA processing and transport, translation and post-translational modification of a protein, and mRNA degradation.

Define Gene Control in Enzyme

- Genetic control of enzyme activity refers to controlling transcription of the mRNA needed for an enzyme's synthesis.

- In prokaryotic cells, this involves the induction or repression of enzyme synthesis by regulatory proteins that can bind to DNA and either block or enhance the function of RNA polymerase, the enzyme required for transcription.

Discuss Gene Control in Prokaryotes

- Prokaryotic genes that encode the proteins necessary to perform a coordinated function are clustered into operons.

- The lac operon consists of one regulatory gene (the i gene) and three structural genes (z, y, and a). The i gene codes for the repressor of the lac operon.

- The z gene codes for β-gal, for the hydrolysis of the disaccharide (lactose) into its monomeric units (galactose) and glucose.

Discuss Gene Control in Prokaryotes

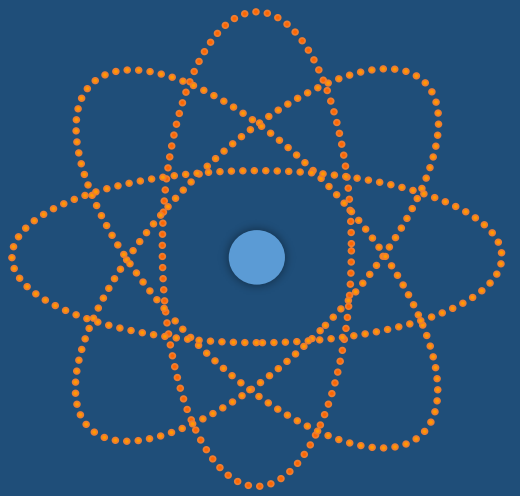
- y gene codes for permease increases the permeability of the cell to β-galactosides. The gene encodes a transacetylase.
- During normal growth on a glucose-based medium, the lac repressor is bound to the operator region of the lac operon, preventing transcription.
- The presence of an inducer of the lac operon, the repressor protein binds the inducer and is rendered incapable of interacting with the operator region of the operon.

Q & A

- **All points of gene expression can be regulated?**
  - **True**
  - **False**

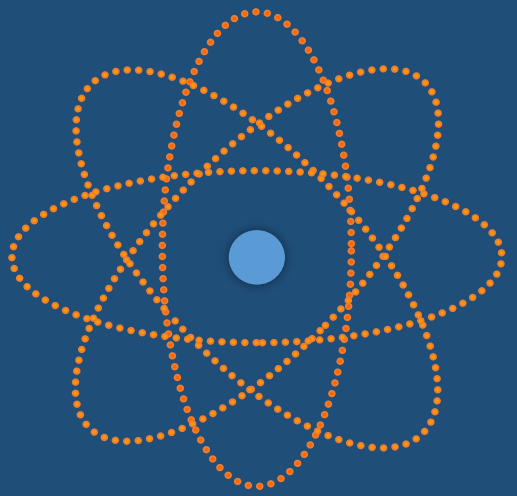
Discuss Gene Control in Eukaryotes

1. Chromatin Structure
2. Epigenetic Control
3. Transcriptional Initiation
4. Transcript Processing and Modification
5. RNA Transport
6. Transcript Stability



Discuss Gene Control in Eukaryotes

7. Translational Initiation
8. Small RNAs and Control of Transcript Levels
9. Post-Translational Modification
10. Protein Transport
11. Control of Protein Stability



List defect in Gene Control

- Cystic fibrosis.
- Alpha- and beta-thalassemias.
- Sickle cell anemia.
- Marfan syndrome.
- Fragile X syndrome.
- Huntington's disease.
- Hemochromatosis.

Summary

- Gene control Is a term used to describe any mechanism used by a cell to increase or decrease the production of specific gene products.
- Genetic control of enzyme activity refers to controlling transcription of the mRNA needed for an enzyme's synthesis.
- Prokaryotic genes that encode the proteins necessary to perform a coordinated function are clustered into operons.

References

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Thank you!