

Regulation of the Lactase Gene



About This Worksheet

This worksheet complements the Click and Learn "Regulation of the Lactase Gene" developed in conjunction with the 2011 HHMI Holiday Lectures on Science "Bones, Stones, and Genes: The Origin of Modern Humans."

Author: Ann Brekaw, Rocky River High School, OH

Key Concepts

- Eukaryotic gene expression is regulated at the levels of transcription, RNA processing, translation, and post-translation.
- Proteins called transcription factors bind to DNA and control transcription. Different types of transcription factors can increase or decrease transcription.
- Mutations in DNA regions that control gene expression can alter the way genes are expressed.
- Infants have high lactase levels so that they can digest their mothers' milk, but lactase gene expression is turned off after weaning.
- Lactase persistence is the trait that allows adults to continue to digest milk. It results from a mutation in an enhancer region of the lactase gene.

Instructions

1. Go to Biointeractive.org.
2. In the menu bar under the masthead, mouse over Topics → Evolution → Interactive.
3. Scroll down the page and click on "Regulation of the Lactase Gene."
4. Proceed through the slides, watch the embedded video clips, and answer the following questions in the space provided.

Questions

1. What is the difference between lactose tolerance and lactose intolerance? Be specific.

Lactose tolerance is being able to digest Lactose into Glucose + Galactose with an enzyme called Lactase. Lactose intolerance is not being able to digest Lactose because your body cannot produce Lactase.

2. Why is lactose tolerance also called lactase persistence?

Because it's the trait that allows adults to continue digesting milk after infancy.

3. In which cells or tissues is lactase produced and what is its role?

Lactase is expressed in the cells of the small intestine.

4. What normally happens to the levels of lactase produced throughout a person's lifetime?

After weaning, humans normally stop producing Lactase and become lactose intolerant.

5. In general, why is it important for a cell to regulate protein production?

The system needs to have enough protein to function, but not to the point where it wastes energy.

Regulation Of Lactase Geen Interactive Answers

Edward John Hollox



Regulation Of Lactase Gene Interactive Answers:

Lactase gene expression Edmond Henri Herman Maria Rings,1994 **Lactose Intolerance** Dennis Savaiano,2014-10-01 Transcriptional Regulation of Lactase-phlorizin Hydrolase Kevin T. FitzGerald,1996 Molecular and Population Genetic Analyses of Variation Within and Surrounding the Human Lactase Gene Edward John Hollox,2000

Molecular and Population Genetic Analysis of Variation Within and Surrounding the Human Lactase Gene,2000 **The Origins of Lactase Persistence and Ongoing Convergent Evolution** Beth A. Keller,2011 As a primary factor in human evolution natural selection is an important component of genetic research Studies of lactase persistence suggest that positive selection has played a powerful role in the adaptation to a lifelong consumption of fresh milk Using multiple research studies of lactase persistence and suspected corresponding single nucleotide genetic polymorphisms this study combines data sources to determine whether evidence exists for natural selection of a specific cytosine to thymine genetic mutation located 13 910 base pairs T 13910 upstream from the lactase gene This polymorphism has potential to be a causal element for lactase persistence and data suggest that natural selection has played a role in the rising frequency and distribution of this allele if only in some regions European and neighboring regions appear to have the highest frequencies with little or no frequency in Asia Africa and Indonesia however the presence of lactase persistence in those areas suggests convergent evolution may be occurring on a phenotypic level To examine this possibility several other identified polymorphisms in the same region as the T 13910 will be included in this study

Unveiling the Magic of Words: A Report on "**Regulation Of Lactase Geen Interactive Answers**"

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Table of Contents Regulation Of Lactase Geen Interactive Answers

1. Understanding the eBook Regulation Of Lactase Geen Interactive Answers
 - The Rise of Digital Reading Regulation Of Lactase Geen Interactive Answers
 - Advantages of eBooks Over Traditional Books
2. Identifying Regulation Of Lactase Geen Interactive Answers
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Regulation Of Lactase Geen Interactive Answers
 - User-Friendly Interface
4. Exploring eBook Recommendations from Regulation Of Lactase Geen Interactive Answers
 - Personalized Recommendations
 - Regulation Of Lactase Geen Interactive Answers User Reviews and Ratings
 - Regulation Of Lactase Geen Interactive Answers and Bestseller Lists

5. Accessing Regulation Of Lactase Geen Interactive Answers Free and Paid eBooks
 - Regulation Of Lactase Geen Interactive Answers Public Domain eBooks
 - Regulation Of Lactase Geen Interactive Answers eBook Subscription Services
 - Regulation Of Lactase Geen Interactive Answers Budget-Friendly Options
6. Navigating Regulation Of Lactase Geen Interactive Answers eBook Formats
 - ePub, PDF, MOBI, and More
 - Regulation Of Lactase Geen Interactive Answers Compatibility with Devices
 - Regulation Of Lactase Geen Interactive Answers Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Regulation Of Lactase Geen Interactive Answers
 - Highlighting and Note-Taking Regulation Of Lactase Geen Interactive Answers
 - Interactive Elements Regulation Of Lactase Geen Interactive Answers
8. Staying Engaged with Regulation Of Lactase Geen Interactive Answers
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Regulation Of Lactase Geen Interactive Answers
9. Balancing eBooks and Physical Books Regulation Of Lactase Geen Interactive Answers
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Regulation Of Lactase Geen Interactive Answers
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Regulation Of Lactase Geen Interactive Answers
 - Setting Reading Goals Regulation Of Lactase Geen Interactive Answers
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Regulation Of Lactase Geen Interactive Answers
 - Fact-Checking eBook Content of Regulation Of Lactase Geen Interactive Answers
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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