

# Genetic Mutations

What mistakes can occur when DNA is replicated?

## Why?

The genes encoded in your DNA result in the production of proteins that perform specific functions within your cells. Various environmental factors and spontaneous events can lead to changes in genes. These changes, called **mutations**, can lead to alterations in the structure and activity of the proteins your cells use in their daily activities. In other words, changes to your genotype can result in changes to your phenotype. We all have mutations in most of our body cells—yet we are, for the most part, normal and functional human beings. How can that be?

## Model 1 – Gene Mutations

### Sequence 1 (normal)

|                     |   |
|---------------------|---|
| DNA sequence        | ... T A C G T A G T C A C C T A A T G G A T C ... |
| mRNA sequence       | A U G C A U C A G U G G A U U A C C U A G         |
| Amino acid sequence | Met His Gln Trp Ile Thr stop                      |

### Sequence 2 (substitution)

|                     |   |
|---------------------|---|
| DNA sequence        | ... T A C G T A G T C A G C T A A T G G A T C ... |
| mRNA sequence       | A U G C A U C A G U C G A U U A C C U A G         |
| Amino acid sequence | Met His Gln Ser Ile Thr stop                      |

### Sequence 3 (insertion)

|                     |   |
|---------------------|---|
| DNA sequence        | ... T A C G T A T G T C A C C T A A T G G A T C ... |
| mRNA sequence       | A U G C A U A C A G U G G A U U A C C U A G ...     |
| Amino acid sequence | Met His Thr Val Asp Tyr Leu...                      |

### Sequence 4 (deletion)

|                     |   |
|---------------------|---|
| DNA sequence        | ... T A C G T A G T C C C T A A T G G A T C ... |
| mRNA sequence       | A U G C A U C A G G G A U U A C C U A G ...     |
| Amino acid sequence | Met His Gln Gly Leu Pro...                      |

1. How many nucleotides are present in the "normal" DNA sequence in Model 1?  
**21 nucleotides**
2. How many codons are contained in the mRNA that is produced by the "normal" DNA in Model 1?  
**7 codons (triplets)**
3. How many amino acids will be in the polypeptide produced by the normal DNA/mRNA sequence?  
**7 amino acids**

# Biology Activity Gene Mutation Answer Key

**Bryan Ballantyne, Timothy C.  
Marrs, Tore Syversen**



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*Methods in Genomic Neuroscience* Hemin R. Chin, Steven O. Moldin, 2001-09-26 The past few years have witnessed extraordinary advances in molecular genetic techniques and the accumulation of structural genomics information and resources in both human and model organisms With the development of new technologies and the availability of resources like the sequence of eukaryotic genomes problems of a previously unthinkable scope

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avenues particularly for relapse refractory cases and cancers with poor prognoses Additionally we will examine the current challenges in the design development and application of new cellular immunotherapies with a special emphasis on the approaches and experimental models used for their preclinical evaluation This initiative is supported by the IMMUNO model COST Action CA21135 a scientific network dedicated to advancing research and innovation in preclinical immuno oncology models with the ultimate goal of enhancing cancer treatment outcomes and improving patients quality of life [Prentice Hall Science](#) Anthea Maton,Jill D. Wright,Jean Hopkins,Susan Johnson,David Lahart,Maryanna Quon Warner,1994 [Human Biology](#) Craig H. Heller,1999 **Gunderson & Tepper's Clinical Radiation Oncology, E-Book** Robert L. Foote,Jeff M. Michalski,Akila Viswanathan,Joel E. Tepper,2025-12-21 Expertly written and meticulously edited to ensure scientifically accurate accessible content throughout Gunderson and Tepper s Clinical Radiation Oncology 6th Edition provides complete multidisciplinary coverage of this complex and dynamic field Concise templated chapters cover the basic biology of oncologic disease processes as well as updated treatment algorithms the latest clinical guidelines and state of the art techniques and modalities User friendly elements such as summarized key issues full color formatting extensive use of tables and figures and access to videos online make this reference an ideal resource for every member of the radiation oncology team Divides content into three distinct sections for quick access to information Scientific Foundations Techniques and Modalities and Disease Sites Disease Site chapters include overviews summarizing the most important issues and concluding discussions on controversies and problems Provides expert guidance on single modality and combined modality approaches as well as outcome data including disease control survival and treatment tolerance Contains a new chapter on artificial intelligence in radiation as well as up to date coverage of advancements in interventional radiology tumor ablation techniques and associated outcomes updated guidance on using Intraoperative Radiation Therapy IORT as a radiation dose escalation tool and increased coverage of proton therapy Features more than 1 000 images detailed anatomy drawings radiographic images and more that provide outstanding visual support for every area of the text Covers key topics such as brachytherapy precision radiation therapy palliative radiotherapy quality and safety image guided radiotherapy IGRT and stereotactic radiosurgery Includes access to videos on intraoperative irradiation prostate brachytherapy penile brachytherapy and ocular melanoma Any additional digital ancillary content may publish up to 6 weeks following the publication date **Gunderson & Tepper's Clinical Radiation Oncology, E-Book** Joel E. Tepper,2019-12-06 A comprehensive multidisciplinary resource for the entire radiation oncology team Gunderson Tepper s Clinical Radiation Oncology 5th Edition thoroughly covers all aspects of this complex and dynamic field Concise templated chapters cover the basic biology of oncologic disease processes as well as updated treatment algorithms the latest clinical guidelines and state of the art techniques and modalities More than 1 000 images detailed anatomy drawings radiographic images and more provide outstanding visual support for every area of the text Divides content into three distinct sections for quick access to information Scientific Foundations Techniques

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