# Assignment Summary

For this assignment, you will choose and research a disorder that affects transcription and/or translation in eukaryotic cells. You will model transcription and translation and complete a graphic organizer on the disorder. You will answer written analysis questions where you will explain the causes and effects of the disorder on the processes of transcription and/or translation and protein synthesis as a whole. You will also predict and justify the effect of a malfunction of an important participant in the protein synthesis process.

Background Information

The central dogma of biology explains how proteins are synthesized. DNA is the genetic code for life, and is first converted into mRNA through a process known as transcription. Then, mRNA leaves the nucleus and unites with tRNA and ribosomes (including rRNA). tRNA and ribosomes use the mRNA code to make chains of amino acids. This is known as translation and results in a polypeptide chain. Polypeptide chains make up proteins that provide cells with necessary structures and functions.

Materials

* Computer with internet access
* Writing and drawing utensils

# Assignment Instructions

For this project, you are expected to submit:

1. A completed version of this guide, featuring graphic organizers, models, and written analysis questions.

**Step 1: Prepare for the project.**

1. Read through the guide before you begin so you know the expectations for this project.
2. If there is anything that is not clear to you, be sure to ask your teacher.

**Step 2: Research transcription and translation.**

1. Research the process of transcription and translation using the following resource:

<https://bio.libretexts.org/Courses/University_of_California_Davis/BIS_2A%3A_Introductory_Biology_(Easlon)/Readings/18.1%3A_Transcription%E2%80%94from_DNA_to_RNA>

1. Record your research in the graphic organizer in the Transcription and Translation section of this document.

**Step 3: Choose a disorder to research.**

1. Choose one of the two disorders below. Then, read the source to get familiar with the disorder. You can also choose your own sources to supplement the information given.
   1. MITF gene/Tietz syndrome:
      1. <https://ghr.nlm.nih.gov/gene/MITF>
      2. <https://rarediseases.org/rare-diseases/tietze-syndrome/>
   2. Diamond-Blackfan anemia:
      1. <https://ghr.nlm.nih.gov/condition/diamond-blackfan-anemia>
      2. <https://rarediseases.org/rare-diseases/anemia-blackfan-diamond/>
2. Record your information in the Disorder Graphic Organizer below.

**Step 4: Answer the analysis questions.**

1. Use your research to answer the questions in the Written Analysissection of this document.

**Step 5: Evaluate your project using this checklist.**

If you can check each box below, you are ready to submit your project.

* Did you complete a graphic organizer about transcription and translation?
* Did you construct a model of transcription and translation?
* Did you complete a graphic organizer about a disorder?
* Did you complete the Written Analysis section?

**Step 6: Revise and submit your project.**

1. If you were unable to check off all of the requirements on the checklist, go back and make sure that your project is complete. Save your project before submitting it.
2. Submit this handout to your teacher.
3. Congratulations! You have completed your project.

Transcription and Translation

|  |  |  |
| --- | --- | --- |
|  | Transcription | Translation |
| Overview of the Process |  |  |
| Location |  |  |
| Molecules Involved |  |  |
| Steps |  |  |

Draw a model below of both transcription and translation in eukaryotic cells.

|  |
| --- |
|  |

Disorder Graphic Organizer

|  |  |
| --- | --- |
| Name of Disorder |  |
| Description |  |
| Causes |  |
| Effects on Protein Synthesis |  |
| Other Interesting Facts |  |

Construct a diagram of the disorder below. Be sure to include the process of transcription and translation. Show where the process will not function correctly.

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| --- |
|  |

Written Analysis

Answer the questions below.

1. Which part of the protein synthesis process is affected by the disorder? How do you know?
2. How does the disorder affect the synthesis of proteins? Be as specific as you can.
3. Suppose a mutation was found in a gene that codes for the structure of RNA polymerase. Recall that RNA polymerase is an enzyme responsible for copying DNA sequences into RNA sequences. Predict how this will affect the processes of transcription and translation. Justify your prediction.