Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block \_\_\_\_\_\_\_\_\_\_ Student # \_\_\_\_\_\_\_\_

**Disease #: \_\_\_\_\_\_\_\_\_ Connect the dots…DNA to DISEASE**

**Introduction**

We’ve learned that DNA is the genetic material that organisms inherit from their parents, but have you ever thought about what exactly this DNA encodes for? How do our cells use DNA as a set of instructions for life? How is the information in our DNA/genes used by our bodies? And what happens when the DNA is mutated or not used properly?

**DNA Template Sequences**: \****Refer to the chart at end of this WS to determine which sequence to use***

1) TACGAGTGTAAGTACCGGAGACTGTCGCTCCTTCTTCACACACTA

2) TACCTACATAAGTACTTTCCTGAAAGTTTCCGGTTCCTCCCTCAA

3) TACGCGAAGGCGAAACCCCACCACCACGGTGGGCGGCACCGGCCG

4) TACGTAACCCCTTGGGACACGCCTAAGAACACCGAAACCGGGATA

5) TACGGATAACCTAGGTTTCTCTCCGGTTGTAAAAAACTTTAAAAA

6) TACTTTTTATAGTACCGACCTAACGTTGTTTGGTTGTCACTTTTC

7) TACTTCCAAGACACCCGACGCAACGACCAGTGTAAGGACCGTCCT

**Materials**

DNA sequence; Computer with an internet connection

**Procedure**

1. Obtain your DNA sequence from your teacher *(\*see chart on last page).*
2. Convert your DNA sequence into a complementary mRNA sequence.

EXAMPLE: DNA: T A C G G C T A G

 ↓

 mRNA: A U G C C G A U C

*Your DNA sequence*:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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*mRNA sequence*:

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1. Determine the codons.

EXAMPLE: mRNA: A U G C C G A U C

 ↓

 Codons: AUG CCG AUC

*Codons*:

\_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_ \_\_\_\_\_\_

1. Translate the codon sequence into an amino sequence. Use the Codon chart given at the end of this document

Codons: AUG CCG AUC

 ↓

 Amino Acids: Methionine Proline Isoleucine

*Amino Acid Sequence:*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Write out the one-letter abbreviations for the amino acids in the sequence. Use the chart provided at the end of this document.

\_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_

6. Go to <http://www.ncbi.nlm.nih.gov/BLAST/> and choose Protein-Protein BLAST (should be the top of the second column).

7. Enter the one-letter abbreviations for your amino acid sequence in the SEARCH box – be sure to enter them in the correct order!

8. Click on the “BLAST” button.

9. At the next page, click on the “FORMAT” button. It may take a few minutes to process your sequence.

10. At the next page, scroll down to the list of proteins that matched your sequence. Choose one that matches one on the list of possible proteins that was given to you.

11. The protein the DNA sequence encodes is (should be in the list provided on last page of this doc): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. Now search [www.google.com](http://www.google.com) with the name of your protein to find out the disease your protein is involved in.

12. This protein is involved in the following disease: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. Write a paragraph (clear, concise & COMPLETE SENTENCES) explaining the disease caused by this protein or a mutation in this protein.

14. List 3 NEW things you learned in this activity (Exp: technical concepts; scientific concepts; etc).

 (1)

(2)

(3)

 **REFERENCE CHARTS**



\*The students in right column are **NOT** working together (as normally done in lab groups). Instead, find your # in right column to determine

which DNA strand from page 1 you’ll use to complete this assignment

|  |  |
| --- | --- |
| **DNA Template #** (pg. 1) | **Student #**  |
| 1 | 1, 8, 15, 21 |
| 2 | 2, 9, 16, 22 |
| 3 | 3, 10, 17, 23 |
| 4 | 4, 11, 18, 24 |
| 5 | 5, 12, 19, 25 |
| 6 | 6, 13, 20 |
| 7 | 7, 14, 20 |

|  |  |
| --- | --- |
| **AMINO ACID** | **abbreviation** |
| **Alanine** | **A** |
| **Arginine** | **R** |
| **Asparagine** | **N** |
| **Aspartic acid** | **D** |
| **Cysteine** | **C** |
| **Glutamine** | **Q** |
| **Glutamic acid** | **E** |
| **Glycine** | **G** |
| **Histidine** | **H** |
| **Isoleucine** | **I** |
| **Leucine** | **L** |
| **Lysine** | **K** |
| **Methionine** | **M** |
| **Phenylalanine** | **F** |
| **Proline** | **P** |
| **Serine** | **S** |
| **Threonine** | **T** |
| **Tryptophan** | **W** |
| **Tyrosine** | **Y** |
| **Valine** | **V** |

|  |
| --- |
| **Possible proteins (no specific order)** |
| **Laforin**  |
| **Dystrophin** |
| **Presenilin 2** |
| **Leptin** |
| **BRCA 2** |
| **Synuclein**  |
| **Apolipoprotein E** |