Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class Period:\_\_\_\_\_\_\_\_\_\_\_\_

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| --- | --- |
| **HS-LS1-1.** | **Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.** |
| **HS-LS1-2.** | **Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.** |

[Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells equipping them to carry out their unique tasks within the organism.](http://www.nap.edu/openbook.php?record_id=13165&page=143)  [Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.](http://www.nap.edu/openbook.php?record_id=13165&page=143)

For this activity, you will choose 1 hereditary disease from the list provided, and study how it affects organisms at each level of biological organization. Complete the chart below with as much information as you can to understand your disease.

|  |  |
| --- | --- |
| Disease |  |
| **Mode of Inheritance** (Choose 1) | Dominant Recessive Codominant Incomplete Dominance Sex-Linked |
| **Molecule Level** | What type of DNA Mutation is it? Circle 1. Which Chromosome is the mutation found on?   1. Point mutation 2. Missense 3. Nonsense 4. Frameshift Mutation 5. Insertion 6. Deletion   If you can find the original and mutated versions of the DNA sequence, include them here.  What protein is affected by this mutation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is the normal healthy function off this protein?  How does this mutation affected the protein. |
| **Cell level** | What type of cells are affected?  Neurons/ skin (epithelial) / muscle / blood cells/ other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is the normal healthy function of the cell?  How does the mutation affect the cells ability to do its job? |
| **Tissue Level** | What type of tissue is affected by the mutation? Circle one:  Epithelial Connective Muscle Nervous  What is the normal healthy function of the tissue?  How does the mutation affect the tissues ability to do its job? |
| **Organ Level** | What organ is affected by the mutation? If more than one organ is affected, list all affected organs here.  Choose 1 or 2 to focus on. What is the normal healthy function of the organ?  How does the mutation affect the organs ability to do its job? |
| **Organ System** Level | What organ System is affected by the mutation? Circle one  Digestive System/ Respiratory System/ Immune System/ Circulatory System/ Endocrine system / Musculoskeletal system/ Reproductive System / Nervous system/ Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is the normal healthy function of the organ system?  How does the mutation affect the organ systems ability to do its job? |
| **Organism** | How is the organism affected by this mutation? What are their symptoms? |

Does this disease typically affect a particular population of people (consider race/ ethnicity, religion, gender, socioeconomic status, etc.? If so who and why?

At the beginning of the year we discussed that key concepts in biology are organized around a few Big Ideas. For your disease, choose ONE of the Big Ideas listed below. Explain why this particular characteristic is important for an organism’s survival, and how the disease you discussed impairs it.

* + Information
  + Response to Environment
  + Matter & Energy
  + Growth & Development
  + Homeostasis
  + Structure & Function