**INSTRUCTOR GUIDE**

**ACTIVITY TITLE: Diseases in the DNA**

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| \***Theme**: | DNA, disease |
| \***Objective**(s):  *(What key learning do you want students to come away with?)* | Neurological disease can be caused by mistakes in your DNA. This lesson/activity will focus on one disease in particular-- PolyQ.  Key lessons   * Establish flow from chromosome, to DNA, to gene as a section of DNA, and finally to nucleotides that are the building blocks of DNA. * Specific triplets of building blocks (nuceotides) |

**LESSON OUTLINE:**

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| **1. Introduction:**  *Plan a script of what you will say to start.*  *- What will this be about? Why’s it interesting?*  *(Hook)* | Q: What do you know about DNA?  After getting baseline of their knowledge base, go through the flowchart (see image at bottom of guide) on the poster board from chromosome, to DNA, to nucleotides that code for gnes |

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| **2. Building Background:**  *List questions you can use to immediately engage your audience and prepare their thinking for your activity.*  *-What prior knowledge might they have about/related to your topic?*  *-What prior knowledge (background) do they need for your activity?* | * DNA is the genetic material that determines not only what we look like, but the diseases we might get. Nucleotides are the building blocks of DNA - Three of them code for different amino acids, which turn into the proteins that make up our body. DNA is in every one of our cells. * In genes, triplets of nucleotides code for proteins. Certain triplets can be toxic if they are repeated over and over again! * PolyQ disorders, like Huntington’s Disease happen when there are too many CAG’s, which code for glutamine, repeated in the wrong place. The amount of extra insertions often determines how debilitating the disease will be. |

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| **3. Lesson & Activity:**  *Outline the key components of your lesson.*  **Plan/Note**:  - key ideas/ vocabulary  - scaffolds  - images/media  - extension questions  \*Consider how to best deliver your content!  \*Plan interactive components that encourage active thinking in your students. | After giving the introduction of DNA, play the PolyQ game.  Explain that the number they role on the die corresponds to the number of triplets they have, showing that with more triplets, the task becomes harder and harder.   * Give the student one die, based off of the number they get, the have a certain level of difficulty to write their name. * Remind them that the number they roll corresponds to how many triplets they get, and that the more they get, the harder it will be to play.   + 1: write their name like they usually would   + 2: write their name with their eyes closed   + 3: write their name in their non-dominant hand   + 4: write their name without their thumb   + 5: write their name by holding the pencil with their wrists   + 6: write their name by holding the pencil in the crook of their elbow |

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| **4. Wrap Up:**  *- Review key ideas*  *- Share takeaways and final thoughts*  *- Discuss connections to other questions and ideas. Extensions.*  *- Ask: Who could you teach what you learned here today?*  *- Ask/Suggest: What can I do to learn more?* | Connect this game back to the disease. If you don’t get very many repeats, someone might be able to live a perfectly healthy life. But someone else with the exact same disease might have a much harder time if they ended up with more repeats. If you have time, talk to them about how people get these diseases. Remind them that you get your genes from your parents, so this is a familial disease. |

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| **MATERIALS NEEDED: *\*\*(please list all items and quantities necessary for preparation)*** |
| 1 table, 3-5 dice, sheets of paper, pencils/pens, blindfold/cloth |

\*\*attach any printouts to end of document here

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| **Other Notes** |
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**Extra Resources:**

