**STEAM PROJECT AINSLEY LADD 11/21/2019**

 **HUNTINGTON’S DISEASE**

One of the most critical functions of the human body is the ability to transmit commands from the nervous system to the rest of the body. This is accomplished by neurons, which are responsible for carrying an electrical charge, called an action potential, to the tissues they innervate. Huntington’s disease is a disease that affects these neurons in the central nervous system. My art work is a representation of how Huntington’s disease affects the neurons’ ability to carry an electrical charge.

Neurons carry electrical charges by using action potentials. Action potentials are caused by the movement of ions in and out of the plasma membrane of the cell. These ions are Na+(sodium), which has a higher concentration outside of the cell, and K+ (potassium), which has a higher concentration inside the cell. When the plasma membrane is stimulated, Na+ gates open and Na+ rushes into the cell. This is called depolarization. The K+ then rushes out of the cell, repolarizing the membrane until it is back at its normal resting state. This is how neurons carry an electrical charge. Huntington’s disease causes neurons to dysfunction or die, altering the way neurons carry electrical charges.

Huntington’s disease is a progressive autosomal disease that affects the fourth chromosome and results in the initial dysfunction and eventual death of neuron cells in the brain. The Huntington gene has a unique DNA trinucleuotide repeat. Normally this repeat should range between 10-35 repeats. However, when the repeat range reaches 36-39, HD results in reduced penetrance, and when the repeat range reaches 40 or over, HD results in full penetrance. Because the neurons cannot properly carry command signals throughout the nervous systems, many functions of the body are compromised as the neurons degenerate. The symptoms of HD may be motor, cognitive, or psychiatric. Patients diagnosed with HD may lose control of motor functions, resulting in involuntary muscle contractions, rigidity, and difficulty with speech or swallowing. Cognitive functions may be compromised, resulting in slower thought processing, lack of awareness and impulse control, and difficulty learning new information. Psychiatric symptoms such as irritability, sadness, social withdrawal, fatigue, OCD, suicidal thoughts, mania, and bipolar disorder may also occur.

My art work is a series of wood burning pieces representing the progression of Huntington’s disease.

The first piece of the artwork is a representation of a properly functioning central nervous system that is not diagnosed by Huntington’s disease. The black lines represent the command signals being sent through the nerves from the brain to other parts of the brain or body. These neurons are carrying electrical charges in the form of action potentials, and motor or cognitive responses are resulting from their signals.

The second piece of the artwork is a representation of a central nervous system that has been diagnosed with Huntington’s disease for a relatively short amount of time. The neurons are not functioning properly and are beginning to die. This is negatively affecting the patient’s ability to perform certain tasks.

The third piece of the artwork is a representation of a central nervous system that has been diagnosed with Huntington’s disease for a relatively long time. The neurons have not been functioning properly and have been degenerating for a good amount of time. There are now very few neurons alive in the brain and the patient is in critical condition.