**Researcher Bio**

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**Lesson Plan Title, Grade Level, and Keywords: Neuroscience: Synaptic Transmission, 11th – 12th, neuron psychology, brain**

**Brief Description of Research Interests: Neuroscience, regeneration, genetics, and disease**

**Lesson Plan Information Sheet**

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| Author(s): | Kendall Clay |
| Author Affiliation and Location (e.g. UGA, Athens, GA) | UGA, Athens GA |
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| Introduction/Abstract to Lesson Plan (max. 100 Words)Include aspects of the lesson that are unique and innovative. | **This lesson reviews the components of a neuron and introduces students to synaptic transmission, allowing them to brainstorm and come up with ideas as well as giving them a case study to work through about neurotransmitters.** |
| List of Standards Addressed(This should be list of all full standards addressed by the lesson.)  | SSPBf: Explain the development, structure, and function of biological systems and their role in behavior, cognition, and emotion1. Identify the components and function of a neuron.
2. Explain the process of neurotransmission, include: action potentials and synaptic transmission

Constructing explanations (for science)Analyzing and interpreting data |
| Learning Objectives using Measurable Verbs (what students will be able to do) | Goal: recite 4 parts of a neuron, know that action potentials are the electrical signal, know that different neurotransmitters (chemical signals) perform different jobs |
| Appropriate Grade Levels | **11th – 12th / possibly an Honors or Advanced Class** |
| Group Size/# of students activities are designed for | **20-30** |
| Setting (e.g. indoors, outdoors, lab, etc.) | **Indoors (could be done virtually or in person)** |
| Approximate Time of Lesson (Break down into 20-50 minute periods) | **50 mins** |
| Resources Needed for Students (e.g. scissors, paper, pencils, glue, etc.) | Paper and pencil |
| Resources Needed for Educators (e.g. blackboard, Powerpoint capabilities, etc.) | PowerPoint/Google Slides capabilities, print worksheets |
| Apps/Websites Needed | **Youtube:** <https://youtu.be/hGDvvUNU-cw> (link is in slideshow as well)[**https://drive.google.com/file/d/1tlhUWLTMecfwEAfKaHfGf25Trgb9aAdR/view?usp=sharing**](https://drive.google.com/file/d/1tlhUWLTMecfwEAfKaHfGf25Trgb9aAdR/view?usp=sharing)**Click this for link to presentation, hand out, and quiz** |
| Lesson Activity (step by step description of activity) | IntroductionRefresher on parts of a neuron – have students raise their hands and name a part and what it does (soma/cell body, dendrites, axon, terminal buttons) |
| BackgroundBrains are made of specialized cells called neurons which can transmit electrical and chemical signals to communicate about sensory input and motor output. Different parts of the nervous system use different shapes of neurons to suit their purposes (form = function)Sensory inputs cause a rush of electrical signals to be sent along the axon. These electrical signals are called “action potentials”. At the terminal buttons, the action potential causes vesicles carrying chemical signals (neurotransmitters) to be released into the synapse, where they bind to receptors on the target cell. For example, sensory information comes into the brain, is integrated, processed, and motor output information is sent to muscles, making them contract. Discuss the functions of different neurotransmitters, the chemical signals used by neurons. Let them brainstorm possible functions of serotonin, dopamine, and epinephrine in groups of 3-4. Then go over the functions: dopamine (motor control, attention), serotonin (pain, stress, mood), epinephrine (fight or flight)Why does this phenomena matter? Neurotransmitters are important communicators of different information. People can manipulate them to treat disease, addiction, and mental illness. |
| Step by Step ActivityMatch neurotransmitters to case studies by effect (think, pair, share) |
| Reflection/Assessment Exit ticket: 3 things learned, 2 things they liked, 1 question they still have |
| Final Product/Assessment (e.g. quiz, presentation, essay, etc.) | **Quiz: see handout** |