04 Unit Developing Brain

Content Area: **Science**
Course(s): **Neuroscience**
Time Period: **Semester 1**
Length: **4 weeks**
Status: **Published**

Standards

HS-LS1	From Molecules to Organisms: Structures and Processes
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.
	Structure and Function
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
	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.

Enduring Understandings

- Brain structures change throughout one's life.
- During critical periods of brain development, environmental stimuli from sensory, motor and emotional inputs affect how the brain develop.
- Both genes and environment exert strong influences during critical periods, forming neural circuits that affect learning and behavior.

Essential Questions

- How do environmental factors influence neural development?
- What factors affect the adolescent brain?
- When do we become adults?
- How does the brain age?

Knowledge and Skills

Knowledge:

- During embryonic development, signaling molecules “turn on” certain genes and “turn off” others, initiating the formation of immature nerve cells.
- During cell division, also called proliferation — the pool of early-stage brain cells increases by billions.
- During migration, these newly formed neurons travel to their final destinations. The nervous system

formed by these processes is active throughout life, making new connections and fine-tuning the way messages are sent and received.
- After the initial growth phase, neurons are pared back through the process of apoptosis.
- During adolescence, the brain undergoes much change. More synaptic pruning occurs, with stronger connections beating out weaker ones in a process called competitive elimination. At the same time, the brain is improving its connections, with neurons extending their dendritic branches and myelination of axons increasing, especially in the frontal lobes.

Skills:

- Research describe how stress and trauma affects the developing brain.
- Analyze and discuss data on the effects of alcohol on the adolescent brain.

Transfer Goals

- Both genetic and environmental factors play a role in shaping the developing brain.
- Chemical influences, like alcohol and drug abuse negatively affect brain development possibly be interrupting the mylination process.
- Better understanding normal brain function can lead to age-specific therapies for brain disorders.

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit?usp=sharing