

## ACTION POTENTIAL EXTENSION EXERCISE 2

NAME \_\_\_\_\_ PERIOD \_\_\_\_\_ DATE \_\_\_\_\_

### Designing a Drug to Treat Seizures

The neurotransmitter gamma-aminobutyric acid (GABA) suppresses action potentials. GABA binds to chloride channels, causing the channels to open and permit chloride ions to flood into the cell. This inhibitory postsynaptic potential, or IPSP, holds the dendrites and the cell body at a voltage below the threshold. Therefore, any wave of potential that is generated is too small to reach threshold when it arrives at the axon.

GABA-mediated inhibition is thought to act as a "shock absorber" to prevent the excessive excitation of networks of neurons. In an epileptic seizure, the inability of the brain to dampen "overstimulation" may be the result of a combination of events, including a lack of GABA-mediated inhibition of action potentials.

Almost all drugs that affect the nervous system act by causing channels in certain neurons to open or close. Ethyl alcohol may be the only exception, but this is a subject of continuing study by neuroscientists and pharmacologists.

1. Based on what you know about how neurons transmit information, how might a drug be "designed" to treat epileptic seizures? How might such a drug act on the neurons? Make diagrams to illustrate your idea (if it will be helpful to you).

2. Do some research to learn the names and mechanisms of the action of the most up-to-date and commonly used types of drugs used to treat epilepsy. Use the Internet or the library but be sure to include citations of sources.

3. Were there differences between the drug you "designed" and the drugs currently in use? Explain how these drugs work to control seizures.