**I'm Dying to Remember...**

Jesse just turned 21 and his friends, Andy and Kevin, decided to celebrate by taking him out to a bar. Jesse did not drink alcohol prior to turning 21 and thought it might be OK to have some to celebrate. The guys each had a beer, and when they finished, they ordered another one. Jesse started to become giddy and talked very loud. Then he and his friends went over to play a few video games. Normally, Jesse was pretty good at these games, but after 2 beers, he was slow to react and kept missing the target on the screen. He blamed his bad score on the machine and started cussing at it. He went back to his table and he and his friends had another 2 beers. After he finished the beer, Jesse and his friends decided to leave. He was unsteady as they left the bar, but Kevin seemed to be walking OK. Andy was really having trouble walking, and kept bumping into tables on the way out.

Jesse convinced his friends to walk home since he knew he shouldn't drive after drinking any alcohol. On the way, Andy exclaimed, "I feel really nauseous, and everything's spinning." Then he vomited. The guys said, "Andy, you're really gross." Andy responded, "Sorry, I'm too tired to walk, I'm just going to sit down here for a minute." Andy sat down, and then he passed out. Jesse and Kevin tried shaking him to wake him up, but he was out cold. Kevin said, "come on, let's go, he'll catch up with us later".

The next day, they found Andy at the spot where they left him, but he wasn't breathing. Jesse was horrified, and turned to Kevin and said, "What happened to Andy?". Kevin responded, "Don't you remember?" Jesse said, "No, all I remember was walking home."

Jesse and his friends showed several signs of alcohol intoxication. Intoxication describes a state of altered physical and mental processes after consumption of alcohol.

1. Describe the signs of intoxication that Jesse and his friends exhibited.

The intoxication means that alcohol entered the brain, where it affected different areas to produce the different behavioral and physical symptoms.

**2.** Which areas of the brain were affected to produce the intoxicating symptoms shown by Jesse and his friends?

1. What about Jesse's memory loss (i.e., blackout)? Which brain region was affected to produce the blackout? How does alcohol produce a blackout ?

In order to produce effects in the brain, the alcohol needs to get there. First, the alcohol must move from the gastrointestinal tract, into the bloodstream. Then it travels up to the brain and moves across the "blood-brain-barrier" to actually get into the brain tissue. This barrier normally protects the brain from most foreign substances. Unlike some molecules, ethanol has no trouble getting across the blood-brain-barrier.

**4.** What type of cell actually forms the barrier? How is the barrier constructed? What other cellular components are part of the barrier to help protect the brain from foreign substances?

**5.** Why does ethanol move across the blood-brain-barrier so easily?

Once ethanol gets through the blood-brain-barrier, it can reach every cell in the brain. Ethanol produces its effects by interacting with neurons, the major cell in the brain. Neurons communicate with one another using electrical and chemical signals to pass information essential to the function of the brain. Ethanol interferes with this communication, resulting in the symptoms of intoxication. It acts specifically at the synapse, or the connection between two neurons.

**6.** Draw a picture of a typical neuron. Where are the electrical impulses generated? In what direction do the impulses flow?

**7.** How do the chemical signals or neurotransmitters help to transmit information from one neuron to the next?

**8.** What are the targets of ethanol at the synapse? How does ethanol affect these targets to change the function of the neuron?

The concentration of alcohol in the blood that produces the signs of intoxication can be different for everyone. However, the minimum concentration for alcohol in the blood (blood alcohol concentration or BAC) that produces intoxication is defined for legal purposes to be 0.08%. People below 0.08% can be intoxicated, and people above 0.08% might show very little intoxication.

**9.** Which intoxicating behaviors and physical signs can occur at BACs that are less than 0.08%?

**10.** List the progression of intoxicating symptoms; start with the earliest that can occur and end with those that are likely to be fatal. What actually caused Andy's death?

**11.** Provide a range of BACs that correspond to the symptoms of intoxications. Estimate the number of drinks consumed (ounces of alcohol) that would lead to these BAC levels in the average person.

Jesse, Kevin, and Andy had 4 drinks, but they each responded quite differently to the alcohol. Kevin didn't appear to be as intoxicated as his friends. Jesse and Andy both showed symptoms of intoxication, but only Andy's symptoms proved fatal.

**12.** Assuming the 3 boys were all about the same size, what biological factors could account for the differences in their response to ethanol?