

Alcohol Abuse ©

<Lesson Plan>

Grade 8

H.E.L.P. for Kids 2008-2009

Teaching messages:

The Nervous System:

1. The nervous system is the command control of our body. It communicates, regulates, coordinates, detects, and responds.
2. The nervous system includes the central nervous system (CNS) and peripheral nervous system (PNS). The functional cell type in our nervous system is the neuron.
3. Neurons receive and transmit messages through neurotransmitters and receptors.
4. Neurons in the brain do not divide during their lifetime. Thus, damage to these cells is basically irreversible.

Alcohol Abuse:

1. Alcohol enters the blood through the gastrointestinal (GI) tract of the digestive system. It is broken down by the liver at about ½ ounce per hour.
2. Alcohol affects the nervous system. It slows down the transmission of messages leading to a variety of behavioral changes.
3. Alcohol slows down the time for the body to react. Thus, drivers who drink are more likely to cause accidents. Legally, there is zero tolerance for teenagers to have any blood alcohol level for driving.
4. Long-term alcohol abuse can lead to serious physical damage to liver and brain. Drinking a large amount of alcohol in a short time can cause sudden death.
5. Alcohol abuse can lead to social problems including loss of family, friends, and jobs.

Equipment:

- Laptop and Projector

Materials for Small Group Activity:

- Soft ball or projectile
- Drunken goggles (From Vaden Health Center)

The Nervous System

Activity 1 – Introduction to the Nervous System and Neurons (8 mins):

The purpose of this activity is to introduce students to the structure and functions of the nervous system.

Overall Teaching Message #1:

The nervous system is the command control of our body. It communicates, regulates, coordinates, detects, and responds.

Everything we do is controlled and regulated by our nervous system.

Even a simple activity that can be done in a fraction of a second takes a series of well-coordinated activities – all carried out by different cells in our body. Our nervous system acts as a big communicating system among these cells. It regulates and coordinates the activities our body does by detecting what is going on in our outside environment, inside our body, and coordinates our responses accordingly.

Our nervous system serves as the communicating center among different organs and cells within our body. It collects information through the **sensory** systems and responds to such information, allowing us to touch, smell, hear, see, and taste. It also controls our **motor** functions, allowing us to contract and relax our muscles to move around. A typical example is: We withdraw our hand quickly when we touch a hot stove. The sensory function of the nervous system tells us that the stove is hot, and the motor function allows us to withdraw our hand.

Our nervous system also acts as the liaison with the outside world. It detects and responds to the environment. Many factors in the environment affect nervous system functions.

In other words, everything we do is regulated and controlled by our nervous system, so if it breaks down or does not function properly, we could be in deep trouble. Therefore, it is something we must do our best to protect, not to abuse!

1. Show Slide 2 of “Alcohol Abuse” PowerPoint.

Point out the central nervous system and the peripheral nervous system.

Overall Teaching Message #2:

The nervous system includes the central nervous system (CNS) and peripheral nervous system (PNS). The functional cell type in our nervous system is the neuron.

The nervous system is made up of the **central nervous system** (CNS) and the **peripheral nervous system** (PNS). The CNS is the largest part of the nervous system and includes our brain and spinal cord. The PNS includes all the nerves, which extend throughout our body.

2. Show Slide 3 of “Alcohol Abuse” PowerPoint.

Ask students to remember what they learned about neurons from the Cell lesson. Explain that not all neurons look the same or carry out the same function, but they all have the same structures: axon, dendrite, and myelin sheath.

If our nervous system is a communicating system, how does it send and receive messages throughout our body and between the CNS and PNS?

The special functional cell type in our nervous system is the nerve cell, the **neuron**. The human brain contains about 100 billion neurons, which receive and transmit information throughout our body. They range from being microscopic to being several feet long!

There are three types of neurons:

Sensory neurons respond to light, sound, touch and other outside stimuli and send messages to the spinal cord and brain.

Motor neurons receive messages from the brain and spinal cord and send them to muscles to control movement.

Interneurons connect neurons to other neurons in the brain and spinal cord.

What do you remember about neurons and what they look like from looking at pictures of them in the Cell lesson?

Regardless of the shape and the size, all neurons have a similar basic structure. **Dendrites** receive messages and **axons** send out messages. The **myelin sheath** is an electrically insulated layer that surrounds the axons and speeds up the transmission of messages. These messages move through the cell as an electrical impulse from one neuron to the next. The messages of one neuron could be sent to another neuron, then another neuron, and so on to start a chain reaction. Or, they could be sent to the target such as a muscle.

Activity 2 – Interneuron Communication (10mins):

For this activity, explain the mechanism by which neurons communicate. Then, show an animated video to help students visualize the role neurotransmitters and receptors play in transmitting messages from one neuron to the next.

1. Show Slide 4 – Slide 8 of “Alcohol Abuse” PowerPoint.

These slides depict the mechanism of inter-neuron communication. As you progress through the slides, explain the active roles synapses, neurotransmitters, and receptors play in the transfer of a message from one neuron to the next.

Overall Teaching Message #3:

Neurons receive and transmit messages through neurotransmitters and receptors.

What is a neurotransmitter?

A **neurotransmitter** is a chemical that allows the neurons to communicate with each other. Communication of information between neurons is accomplished by the movement of neurotransmitters across a small gap called the synapse.

A **synapse** is the gap between the axon of one neuron and the dendrite of another neuron through which neurotransmitters are transmitted. A neurotransmitter released from one neuron travels across the synapse and attaches to a receptor on another neuron.

A **receptor** is a structure on the surface of a cell that binds to a specific chemical that wants to enter the cell. In the case of a neuron, there are specific receptors which bind specific neurotransmitters. The neurotransmitter and the receptor work like a key and a lock; they are selective and specific.

1. Show video “Neurons and How They Work”

< <http://www.youtube.com/watch?v=ysDGX6bOgAw&feature=related> >

Show the above animation from timestamp 1:28 until the end. During the video, ask students to identify structures of the neuron when possible as well as the neurotransmitters and receptors to reinforce what they have learned. Emphasize that every signal that is sent is specific to the situation we are in at the time, termed the fight or flight response.

Have you ever been really scared? How did you feel at that time?

Very alert, eyes wide open, heartbeat faster, breathing rate faster.

Why do you think our body does this?

Our body is preparing us to either fight what is scaring us or preparing us to run away. This is called the **fight or flight response**.

This response helped humans during prehistoric times. For example, consider a caveman who was confronted by a sabre-tooth tiger. Luckily for the caveman, millions of years of evolution had endowed him with a set of automatic weapons that take over in the event of an emergency. Within seconds, he could run faster, hit harder, see better, hear more acutely, think faster, and jump higher than he could only seconds earlier. His body prepared him physically to give him the best chance at survival. His heart beat faster, he breathed faster, and there was more energy for his muscles to use.

When the caveman saw the hungry tiger, he was thinking of how fast he had to run to avoid becoming the tiger's dinner. After the caveman had escaped the tiger and was finally safe, his heartbeat and breathing came back to normal, and he could return to thinking about other things such as what to eat for dinner. Our body is very specific and quick in its response to external and internal changes, and it depends on the situation.

Has anyone ever heard of adrenaline?

There are many different neurotransmitters that our body uses and recognizes. **Adrenaline** is the specific type of neurotransmitter used in the flight/response. Others can help with functions like memory, sleep, and emotion. Some illnesses are caused by the release of too much or too little of specific neurotransmitters or too few neurotransmitters. Many of these illnesses can be treated with medications to bring the neurotransmitters to normal levels.

Overall Teaching Message #4

Neurons in the brain do not divide during their lifetime. Thus, damage to these cells is basically irreversible.

What do you think would happen if we damaged our brain and spinal cord in some way?

Damage to the brain is often *irreversible*. This means that it will not heal if it gets damaged. Not only that, most of the neurons in our brain do not divide during our lifetime as most of our other cells do, so we only have a limited number of neurons that we were born with. So, if they are damaged, they are damaged or gone forever. These damages can be caused by accidents, injuries, diseases, and alcohol or drug use. Imagine not being able to move your arms or your legs, or to feel, see, hear, or think normally. Since our nervous system controls everything we do, we must protect it and not damage it.

Alcohol Abuse

Do you know people who drink alcohol on social occasions? Is that considered alcohol abuse? If not, how do you define “alcohol abuse”?

About 80% of adults in the United States drink alcohol, ranging from those who drink socially to those who abuse alcohol. **Abuse** of alcohol means that abusers drink so much alcohol on a regular basis their ability to function normally personally and professionally is impaired.

According to the law, it is illegal to drink before the age of 21. People under 21 are not allowed to buy alcohol in stores or order alcohol in restaurants including beer, wine, and anything containing alcohol.

Today, alcohol is the third leading cause of preventable death, trailing only behind tobacco and obesity. It is important to understand how this common and popular beverage can have such harmful effects.

Introduction to Alcohol (10mins):

Teaching Message #1:

Alcohol enters the blood through the gastrointestinal (GI) tract of the digestive system. It is broken down by the liver.

If alcohol is a beverage and travels through our digestive system, how do you think it enters our blood?

Alcohol gets into the blood mostly through the small intestines in the same way food does. Just like anything else, once in the blood, the alcohol is transported throughout the body to reach all organs. The liver is the major organ in the body that breaks down (metabolizes) alcohol, as it does other toxic materials in the body.

How quickly the alcohol disappears from the blood stream after drinking varies from person to person, depending on size, gender, and other factors. On the average, ½ oz of pure alcohol is broken down and removed from the blood every hour. To estimate the amount of pure alcohol in a drink, one needs to know how much alcohol the drink contains. For instance, a 12 oz can of beer containing 6% alcohol has 0.72oz of alcohol. So, it takes more than an hour to metabolize the alcohol after one drinks the can of beer.

If alcohol is broken down by the liver, what do the police measure in drivers who may be drunk?

During the length of time that the liver is trying to break down alcohol in our system, a portion is still circulating in our blood. The amount of alcohol in our blood is measured as the **blood alcohol content (BAC)** and it determines the effects of alcohol on our body. Police use measures of BAC to identify drunk drivers.

Activity 1 – Harmful Effects of Alcohol on the Body (8mins):

For this activity, discuss with students the behavior of people who have had too much to drink and explain the physiological reasoning for such behavior. The reaction time activity is designed to demonstrate the effects of delayed reaction time caused by drinking too much alcohol.

Teaching Message #2:

Alcohol affects the nervous system. It slows down the transmission of messages and is a depressant. It can lead to a variety of behavioral changes.

How do people who have consumed too much alcohol act or behave?

Heavy drinkers stagger when they walk, have slurred speech, fall over things, and cannot control when they urinate. They act this way because alcohol has affected their nervous system. This results in a loss of coordination, balance, and motor skills.

Alcohol is a **depressant**. It slows down the nervous system, i.e. the transmission of messages throughout our body. Mentally, alcohol also reduces inhibition (a feeling of fear or embarrassment that stops someone from certain actions in public) because it affects the neurons in the part of the brain that controls inhibition. When people have consumed too much alcohol, they may also talk a lot, even though their speech does not make any sense. In addition, their sense of judgment is also damaged so it is difficult for them to judge whether something is right or wrong.

Teaching Message #3:

Alcohol slows down the time for the body to react. Thus, drivers who drink are more likely to cause accidents.

Because alcohol causes messages to travel more slowly throughout our body, our reaction time also decreases. This may lead to car accidents, which hurt both the driver and anybody else involved in the crash.

Why is it dangerous to get into a car with somebody who has been drinking?

Drivers with alcohol in their blood are more likely to have accidents because it takes them longer to react to unexpected and dangerous situations. They could hurt not only other people but also themselves. In 2007 in this country, one person died every 40 minutes in an alcohol-related traffic accident, and one person injured every minute. About 40 percent of all deaths from car crashes were alcohol-related. About 3 in every 10 Americans will be involved in an alcohol-related crash at some time in their lives.

In California, there is a “zero tolerance” law for people under 21. That is, you are not supposed to have any alcohol in your blood when you are driving. For adults, they are considered intoxicated (high or drunk) if they have a BAC of more than 0.08.

1. **Ask for two volunteers. Have one student standing with his or her back against the wall. The other should stand 7 or 8 feet away with a projectile/ball.**
2. **Instruct the person with the ball to throw it at the person at the wall.**
3. **Instruct the person to get out of the way before he or she gets hit.**
4. **In the second trial, instruct the person against the wall to wait two seconds before moving to avoid the ball (the instructor should audibly count the two seconds). The student will most likely get hit by the ball.**

Explain that this is what happens when a person's reaction time is slowed down by a couple seconds after he/she has been drinking alcohol. Relate the activity to drunk driving. Equate the ball to a car, and equate the delayed two seconds to the slowed reaction time caused by alcohol. Car accidents hurt both the driver and anybody else involved in the crash.

5. Show Slide 9 of "Alcohol Abuse" PowerPoint.

Slide 9 shows a picture of a healthy liver and the liver of an alcoholic. Ask students to describe what differences they see (ex: unhealthy liver is darker in color, has a rough texture, etc).

Teaching Message #4:

**Long-term alcohol abuse can lead to serious physical damage to liver and brain.
Drinking a large amount of alcohol in a short time can cause sudden death.**

Long term alcohol abuse causes serious damage to the liver where alcohol concentrates. In addition, heavy drinkers have a tendency to not to eat properly and thus often suffer from malnutrition.

Has anyone heard stories about people who died from drinking too much alcohol in one sitting?

To take in a large amount of alcohol quickly can cause sudden death because the alcohol concentration in the blood can reach a toxic level; our liver can only metabolize ½oz of alcohol in one hour. There have been stories of college students who die from drinking too much at parties. When the blood alcohol level becomes too high, it can kill whatever cells it comes in contact with.

Activity 2 – Small Group Discussion (14mins):

For this activity encourage students to share their thoughts and experiences about alcohol and/or alcohol abuse in small groups.

1. Split the class into smaller groups with each teacher leading one discussion group.

Discuss the following:

- 1) Personal experiences. Encourage students to talk about what their and experiences with alcohol, not only with themselves but with their friends and family.
- 2) Discuss the pros and cons of drinking.

Teaching Message #5:

Alcohol abuse can lead to social problems including loss of family, friends, and jobs.

What other types of serious problems could be caused by alcohol abuse?

The social consequences of alcohol abuse could be serious, affecting a large population of people. Because of what alcohol could do to the nervous system of the drinkers, their behavior under the influence of alcohol could be out of control, unreasonable, violent, depressed, and generally difficult to deal with for others around them, such as family, friends, and colleagues. Oftentimes, they could lose their jobs.

It is important to distinguish between alcohol use versus abuse. At some point, the majority of people will try out alcohol. This does not mean that one should not drink it at all.

For example, there is some strong evidence that drinking a moderate amount of red wine can have beneficial effects on cardiovascular health, especially of older people. In addition to stimulating circulation, red wine contains chemicals that could affect lipid metabolism in a positive way and also might prolong life. It is our choice whether or not we want to drink alcohol. How much is the important issue.

Most people who do drink alcohol are aware of the amount that they take in. People who drink a modest amount of alcohol at a sitting are known as social drinkers. They drink because they like the taste of alcohol, enjoy the company to drink with, and/or feel the effect of relaxation. They know when to stop. If they have drunken too much, they make sure never to drive and will wait until they have sobered up.

Problems start when one drinks too much or becomes dependent on alcohol to “feel good” or to “solve problems.” They eventually become alcoholics, or alcohol abusers.

Activity 2 – Drunken Goggles (8mins):

1. Ask class to line up into two lines (one pair of drunken goggles per line).
2. Give each student a time limit to walk around while wearing the drunken goggles before they pass it on to the next person. Make sure there is enough space for the students so that they will not crash into desks, counters, or walls.

Explain that movement and vision through these goggles is similar to how vision and movement can be distorted when drunk.