

TEACHER PREPARATION

KEY CONCEPTS

1. Smoking has immediate and long-term negative effects on many body functions.
2. Smoking is one of the most difficult addictions to overcome because nicotine, a key ingredient, is so highly addictive.
3. Many, but not all, negative effects of smoking can be reversed by overcoming the addiction.

OBJECTIVES

By the end of this lesson, students should be able to:

1. Identify at least one disease or disorder of each physiological system affected by smoking.
2. Identify several of the 4,000 toxins contained in tobacco smoke.
3. Describe the process and effects of nicotine addiction.
4. Describe how it feels to experience some of the physical limitations caused by smoking.
5. Be able to describe the effects of quitting the addiction.
6. Be able to make an informed choice about smoking.

BACKGROUND INFORMATION

- The life expectancy for smokers is at least 10 years shorter than for nonsmokers.
- People who start smoking as children are almost four times more likely to be regular users of an illicit drug and three times more likely to use cocaine regularly than those who do not smoke as children.
- There are more than 4,000 chemicals present in tobacco smoke, a significant number of which are toxic. The list includes nicotine, acetone, lead, and ammonia.
- Research suggests that children and teens may be especially sensitive to nicotine, making it easier for them to become addicted. The younger smokers are when they start, the more likely they are to become addicted. In fact, about three out of four high school smokers will become adult smokers.
- Smoking can make it harder for a woman to become pregnant and can present other pregnancy complications.
- Smoking damages blood vessels and can make them thicken and grow narrower. This makes the heart beat faster and blood pressure go up.

- Quitting smoking before the age of 40 reduces the risk of dying from smoking-related disease by about 90%.
- For more background information:
 - Centers for Disease Control and Prevention.
http://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/
http://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/tobacco_related_mortality/index.htm#cigs
 - World Health Organization.
<http://www.who.int/mediacentre/factsheets/fs339/en/>
 - Campaign for Tobacco-Free Kids.
<http://www.tobaccofreekids.org/research/factsheets/pdf/0106.pdf>
 - Medical News Today.
<http://www.medicalnewstoday.com/articles/215420.php>

MATERIALS / PREPARATION

- Several examples of tobacco advertisements showing how “sophisticated” it is to smoke.
- Set up some sort of simple aerobic activity such as jogging in place or going up and down stair steps to raise students’ heart rates.
- A stopwatch or other means of measuring heart rate.
- Enough drinking straws for each student to have one for the aerobic activity.
- Body Systems Chart (see page 419)
- Recovery Timeline (see section “ENDING THE LESSON”).
- For “Going Deeper” section: a mirror with a flat edge

LESSON

BEGINNING THE LESSON

FALSE IMPRESSIONS

5 MINUTES

Some possible responses might be that the models look beautiful, sophisticated, happy, cool, prosperous, carefree, etc.

[Invite students to look over the advertisements you have brought in. Ask them to use what they have learned about advertising to analyze the ads for subliminal or subtle messages about smoking. How is smoking presented? How do the people look? What are they doing? Where are they? What do these ads say about smoking and those who smoke?]

HOW DOES SMOKING REALLY MAKE YOU FEEL?

AEROBIC ACTIVITY
5 MINUTES

You may have all students participate, or you may choose a few volunteers who are willing to exert themselves in aerobic activity and then share honestly about their experiences when they are done.

If you choose to use a few volunteers, have the rest of the class serve as observers to make sure that the subjects are not “sneaking” air through their noses or around the straws in their mouths.

Now that we have seen what the tobacco companies have to say about the effects of smoking, including warning labels about cancer and death found on cigarette packs, etc., we’re going to experiment to get some sort of idea of how smokers are really affected by tobacco.

We’re going to do five minutes of vigorous aerobic activity and measure our heart rates before and after.

[Have the participants take their resting heart rates and record them on a piece of paper or on the board. To measure resting heart rate, place fingertips on a pulse point in the wrist or neck and count the number of beats in one minute. This is the resting heart rate. Then begin the activity. At the end of five minutes, measure each student’s heart rate and record that also.]

I am now going to give each of you a drinking straw. We’re going to do the activity again, but this time you will only be allowed to inhale air through the drinking straw. Smoking reduces your lung capacity by about 30 percent and the straw will simulate that reduction. Take your heart rate before you begin and again when you are finished. We’ll go for another five minutes.

[While the students are working out, share some of facts from the background material with the class. It might also be effective to have those who are not working out compare how their classmates are feeling this time as opposed to the first time without the straws. When this activity is over, check to see whether anyone was sneaking in extra air through nose or mouth. Exclude these students from the experimental group and measure heart rates again.]

Let’s look at the heart rates again. They should be higher this time, because the heart has had to work harder to get oxygen to

the body when there is less oxygen going into the lungs.

[Have the participants describe the differences between how they felt the first time without the straw and how they felt the second time with the straw.]

This is only one effect of smoking, but there are many more that are even more dangerous. But first, let's take a look at what it is that causes these effects.

 = 15 minutes

EXPLORING THE LESSON

WHAT'S IN TOBACCO SMOKE? 10 MINUTES

Copy the following list of chemicals onto the board and have the students copy them into their Personal Journals. Leave space after each chemical for a phrase about that chemical.

Toluene:

Benzopyrene:

Phenol:

Arsenic:

Acetone:

Cadmium:

Lead:

Ammonia:

Benzene:

Formaldehyde:

Tobacco smoke contains more than 4,000 toxic chemicals, but we're just going to look at some of the ones you are most likely to be familiar with.

1. **Toluene** is a chemical used to make paint thinner.
2. **Benzopyrene** is made from coal tar and is one of the most potent cancer-causing chemicals.
3. **Phenol** is something you may have used in your chemistry lessons to do tests on other substances. You probably were not allowed to drink it.
4. **Arsenic** is a poison used in pesticides. It causes diarrhea, cramps, anemia, paralysis, and malignant skin tumors. In earlier times, women took arsenic to keep their complexions pale, but also suffered from the side effects of the drug.
5. **Acetone** is a primary ingredient in nail polish remover.
6. **Cadmium** is used in batteries. It damages the kidneys, liver, and brain, and stays in the body for years.
7. **Lead** stunts growth and causes brain damage.
8. **Ammonia** helps to increase the amount of nicotine your body can absorb. This makes the addiction even stronger than it otherwise might be.
9. **Benzene** is used to make pesticides and gasoline.
10. **Formaldehyde** is a cancer-causing substance that damages the lungs, skin, and digestive system. Embalmers use it to preserve bodies.

If you asked a smoker whether he or she would voluntarily ingest any of these substances, the answer would probably be no. But every time one smokes, more of these substances are introduced into one's bodies, along with thousands of other deadly chemicals. Let's take a look at how these chemicals affect the human body.

 = 25 minutes

WHAT DOES SMOKING DO TO YOUR BODY?

12 MINUTES

The first system I want you to list in the "System" column is "The Brain." The brain is immediately affected by smoking and as the addiction develops, the effect becomes ever stronger.

[Draw the Body System Chart on the board and have the students copy it into their notebooks. As you share the specifics with them, have the students copy them onto their charts as well.]

Body System	Effects of Smoking
1. Brain	
2. Circulatory	
3. Respiratory	
4. Gastrointestinal	
5. Immune	

6. Metabolic

Dopamine: a chemical produced in the brain that when released gives a feeling of pleasure at appropriate times.

Tar: Describes the toxic chemicals found in cigarettes. In solid form, tar is the brown, tacky substance that is left behind on the end of the cigarette filter.

1. The Brain

Your brain produces a chemical called dopamine, which is released to give a feeling of pleasure at appropriate times. Nicotine increases the production of dopamine in the brain, increasing the feelings of pleasure. At first, this might seem like a good thing, but another effect of nicotine on the brain is that it also reduces the number of dopamine receptors, so that the brain can't absorb as much dopamine as it would normally. When the effects of a cigarette wear off, the amount of dopamine produced by the brain isn't as effective as it was before the smoker began smoking. In order to get the same effect as a nonsmoker, the smoker must smoke more tobacco to increase the dopamine release. This cycle continues, making the smoker more and more dependent upon nicotine for feelings of pleasure and consequently making the addiction to nicotine even stronger. This is why nicotine addiction is one of the most powerful drug addictions there is.

2. The Circulatory System

The next system we'll look at is the circulatory system. Smoking has an immediate effect upon blood pressure and heart rate. As you saw earlier, the smoker's heart has to work much harder than a nonsmoker's heart. Heart rate and blood pressure go up as do LDL (bad cholesterol) and triglycerides. Smoking also causes the blood vessels to constrict and damages their inner lining. Circulation efficiency decreases and the likelihood of heart attacks, strokes, and sudden death greatly increases.

3. The Respiratory System

Now let's look at how smoking affects the respiratory system. As soon as you begin to smoke, the linings of all of your air passages are damaged. The tar in cigarette smoke destroys the cilia, which filter out anything that is not supposed to enter the lungs and increases mucous production. The breathing passages constrict in response to the toxins, and oxygen absorption goes

Cilia: Fine hair-like projectors from cells that line the respiratory tract and move in rhythmic unison to “sweep” away fluids and particles within the lungs.

down. The delivery of oxygen to the body, especially to the extremities, is cut down resulting in eventual nerve damage. Not only does aerobic efficiency go down as it did in our earlier experiment, but the incidence of cancer, emphysema, and other respiratory diseases also increase. Although many of these effects diminish or disappear if an individual stops smoking, there are two permanent effects in young people. Smoking stunts lung growth, and the lungs of young smokers never grow to their full size.

4. The Gastrointestinal System

The gastrointestinal system is also affected by smoking. We don't often associate a connection between the two, but there is. The body produces a base chemical to counteract the effects of digestive acids on the linings of the digestive organs. Smoking reduces the body's ability to do this, so heartburn, acid reflux, and ulcers are much more common in smokers than in nonsmokers. Even in the mouth, smoking promotes periodontitis and bone loss by making it easier for bacteria colonies to grow. Cancer of the mouth, lips, throat, esophagus, pharynx, and stomach are more common in smokers.

5. The Immune System

With these strains on all of the other systems, the immune system of the smoker is already stretched thin. But the toxins themselves weaken the immune system and make it much harder for the body to heal injuries and fight infections. Smokers also have a higher incidence of immune disorders like arthritis.

6. The Metabolic System

The last system we'll look at is the metabolic system. This is the system that regulates how your body burns fuel and maintains itself. Because smoking interferes with the absorption of important micronutrients, smokers suffer more from diseases caused by nutritional deficiencies. They are also more susceptible to things like vision and hearing loss, and also the loss of their smell and taste senses. Many smokers who quit report that they gain weight and assume that smoking helps to keep them thin. The fact is that smoking doesn't make you lose weight or keep it off, but it does change something in your system so that, once you have been a smoker, it is harder to keep extra weight off.

And one last thing: as powerful and destructive as these effects are to the smoker, for secondhand smokers (those who are around smokers but who don't smoke), the effects are intensified. This is because the "secondhand smokers" inhale the smoke completely unfiltered. Other nonsmoking victims are unborn and young children. Children of smoking mothers are more likely to suffer abnormal blood pressure, low birth weight, childhood leukemia, cleft palate, sudden infant death syndrome (SIDS), and attention deficit disorder (ADD) than those of nonsmoking mothers.

 = 37 minutes

ENDING THE LESSON

THE GOOD NEWS

8 MINUTES

Recovery timeline:

Even if you or someone you care about is already a smoker, there is some good news to remember. Copy this timeline into your notebooks. Next to each time label, write down the positive changes that occur when someone stops smoking.

Recovery timeline

When you quit smoking, you will notice the following effects within the timeframe below:

20 minutes: Blood pressure, heart rate, and the body temperature of the extremities return to their regular levels.

8 hours: Carbon monoxide levels in the bloodstream fall and oxygen levels rise.

24 hours: Chance of heart attack and sudden death begins to decrease.

48 hours: All body nerve endings begin to grow back and taste and smell improve.

72 hours: The bronchial tubes relax and lung capacity increases.

2-3 weeks: Circulation improves, lung function increases by 30 percent, and walking becomes easier.

4-9 months: Sinus congestion, fatigue, and shortness of breath decrease; the cilia regrow, improving the body's ability to handle mucous and fight infection, and overall energy level increases.

5 years: The lung cancer rate decreases from 137 per 100,000 people to 72 per 100,000 people – almost by half!

So what do you think? Do these people have a reason to look this happy?

 = 45 minutes

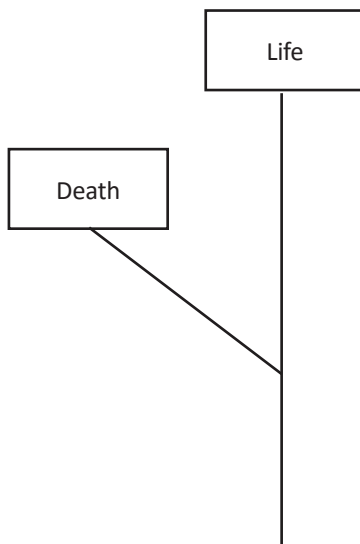
RESOURCES

GOING DEEPER

Visual Aid

You will need a mirror with a straight edge that can be placed flat against the board or other drawing surface to reflect the picture of a straight line back at the students.

Before the students come into class, draw this picture on the board or a piece of paper:



Use a piece of paper to cover the part of the drawing with the fork from the line (death line), so that students only see the straight part of the line (life line).

Knowledge without wisdom is of little use to anyone. You can feed a fool knowledge, but he won't know what to do with it. If you give a wise man knowledge, however, he will benefit by applying it properly. This is the difference between knowledge and wisdom – wisdom is knowing how to apply the knowledge correctly.

In this lesson, you have learned a lot of facts about the effects smoking has on the human body — temporary and permanent. No one who smokes will ever be entirely free of the damage smoking inflicts upon them, but those who quit sooner will suffer fewer ill effects than those who quit later in life or who never quit at all.

[Call the students' attention to the partially revealed line.]

As you can see, this line is straight. It represents a life. As we live our lives, we make decisions about how we will conduct ourselves, and then we live with the consequences of those decisions. Ideally, we will apply truthful information wisely and make good life decisions. Unfortunately, sometimes we let pressure from other people or the attraction of immediate gratification lead us into making foolish decisions – like choosing to smoke.

[Remove the paper cover from the drawing.]

In the book of Proverbs, Solomon observed, “There is a way which seems straight to a man, but its end is the way of death” (Proverbs 14:12). And: “Foolish behavior is joy to the unwise, but a man of good sense makes his way straight” (Proverbs 15:21).

How does this picture represent the meaning of these two proverbs?

[You will receive various answers, but the general sense of the discussion should lead to the following concepts:

- *Our choices often determine our fate.*
- *We have the power to make wise or foolish choices.*
- *Sometimes choices that look wise are really foolish and destructive.*
- *Unwise people delight in making bad choices.*

- *Wise people use good sense to make good choices.]*

How do the facts we have learned about smoking apply to each of these truths?

How can the choice whether or not to smoke affect our fate?

[When we choose to smoke, we immediately begin to damage our bodies and set ourselves on a course to develop serious, often fatal conditions later in life.]

How can the choice to begin smoking LOOK wise, but really be destructive?

[It may look good to an adolescent to join others in smoking to be accepted by a particular social group, but it's really a very destructive decision – because a youth is choosing a peer group that has unhealthy behaviors as an “entrance fee” and because a youth is embarking on a physically destructive course that will affect him or her for the rest of life.]

How do smokers delight in their bad choices and urge others to do the same?

[Because they are quickly addicted, they seek the frequent gratification of smoking despite the negative effects on their health. Particularly among young people, smokers use their habit as a status symbol and try to get others to adopt it as well.]

How do people use good sense to make good choices about smoking?

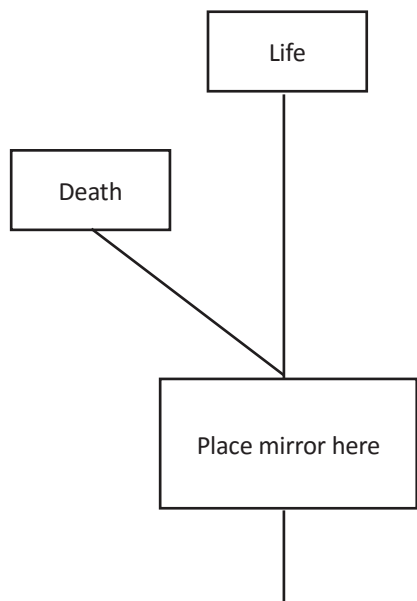
[They look past the immediate “pleasures” of smoking to the consequences of it, using facts, not feelings, to make the wise choice not to smoke or to quit smoking if they have already begun.]

Let me illustrate the decision-making processes of the foolish person vs. the wise person.

[Place the flat edge of the mirror in such a way as to hide the fork in the drawing and to make it look like one long, straight line.]

“Foolish behavior is a joy to the unwise.” By looking at only the part of the path reflected back at him, he thinks he’s choosing the straightest path, but he’s fooling himself into taking a road that leads to death.

Quite often, a foolish person will ignore the facts of a situation and will delude himself or herself into thinking that there are no negative consequences to a foolish decision. He or she looks ahead and tells himself or herself that the way looks straight, but he or she is really ignoring the truth of the matter.



Looking at only the part of the path reflected in the mirror is like looking at our present physical condition and thinking that we will stay that way even if we smoke for the rest of our life because that's the way we are now. For a young person deciding whether or not to smoke is very foolish. The path seems straight, but it's only because he or she is choosing not to look at the whole picture.

Instead, he or she chooses to find joy in yielding to peer pressure to be cool, to fit in with certain groups of friends, and to think that he or she is invulnerable to the effects of smoking.

[Remove the mirror and consider the entire diagram with the students.]

But some people are so foolish that they look ahead to the negative consequences and still take joy in making a bad decision. They decide that the temporary, immediate gratification that goes along with smoking outweighs the dire consequences down the road. They choose NOT to make their way straight!

A wise person will look down the entire road and consider all the long-term and short-term consequences. He or she will weigh the wisdom of seeking immediate acceptance among friends against the potential long-term suffering smoking will cause. He or she will consider the facts of the entire situation and weigh them against the feelings of the moment. He or she has the good sense to make a straight way and choose the best fork in the road of life.

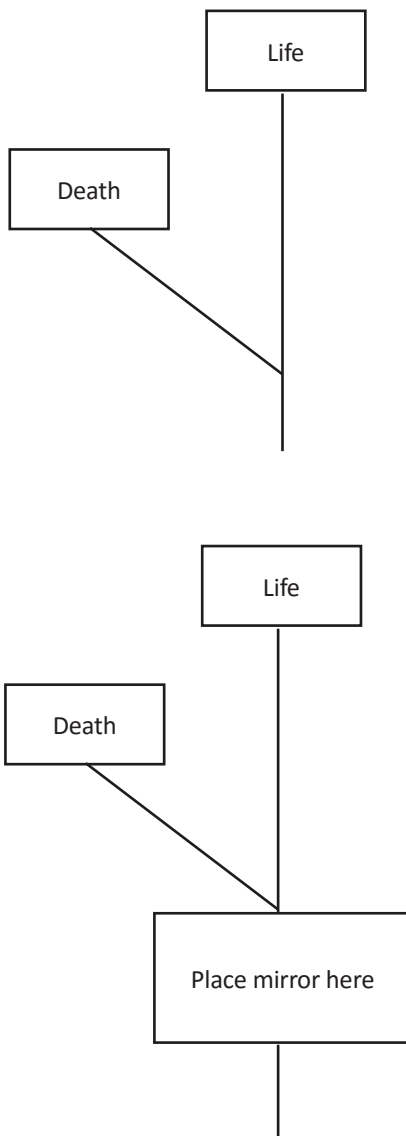
Now I would like each of you to copy this diagram onto a page of your notebook or journal. Make sure you leave plenty of room to write words and phrases along the lines. At the fork in the line, write "To smoke or not to smoke."

Along the left-hand side of the portion before the fork, write down a few reasons people choose to start smoking and reasons they don't quit smoking.

On the other side of the line, write down reasons they should not choose to start smoking or reasons they should quit if they already started.

Along the fork leading to "Death", write in the physical consequences of smoking that most impressed and surprised you when you learned about them.

Along the fork leading to "Life", write in the positive consequences of not smoking.



**JOURNAL
ACTIVITY**

In your Personal Journals, copy down the proverbs from the Resources Section:

“There is a way which seems straight to a man, but its end is the way of death” (Proverbs 14:12).

“Foolish behavior is joy to the unwise, but a man of good sense makes his way straight” (Proverbs 15:21).

Choose one or both, and write about how your decisions about smoking are reflected in the words of Solomon.

PARENT-TEACHER CONNECTION

Today we discussed the effects of smoking on the body. Please discuss the following items with your adolescent.

1. Ask your adolescent about the aerobic activity we did in class today.
2. Have your adolescent share how smoking affects different body systems.
3. If you are a smoker yourself, have you ever tried to quit? Share with your adolescent what it is like to try to quit smoking. If you have not quit, is there someone you know who has tried to quit that you can tell him or her about?
4. Help your adolescent calculate the amount of money that could be saved in a year if a smoker quit the habit. Figure on the cost of one to three packs per day.
5. Of relatives and friends who smoke, have your adolescent identify the tobacco-related health problems they are experiencing. What is the percentage of people who are experiencing no adverse or addictive effects? (0 percent)