



SPECIAL REPORT: The Genetics of Alcoholism



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Can you stop the gossip?

**OF
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G
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X-PLORE
X-TECH
X-It!

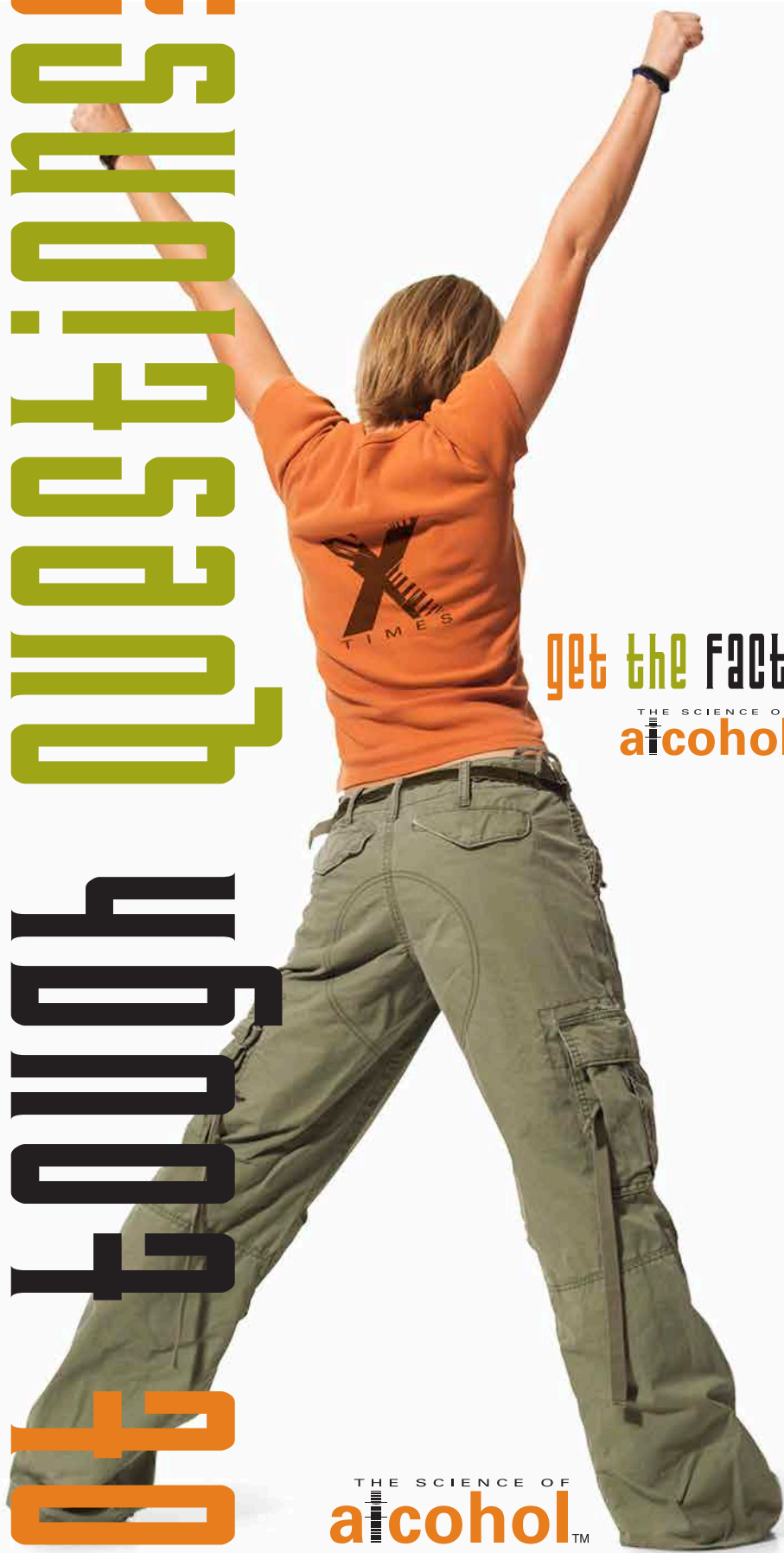


**WHAT'S IN
YOUR BODY?**

**21 WAYS TO
AVOID AN
ARGUMENT**

**MY PARENTS'
PROBLEM IS
MY PROBLEM**

get the facts
for
students
and
teachers



THE SCIENCE OF
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get the **FACTS**
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BioEd: The Science of Alcohol

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ON THE COVER: AAMOF

AAMOF is cell phone text that stands for the words “As A Matter Of Fact.” And that’s just what you’ll get in this issue. Getting the facts about all kinds of things helps us make better choices in our lives. Getting the straight facts is crucial before making any important choice. As a matter of fact, read on . . .



FEATURES

06 WHAT'S IN YOUR BODY?

Little known facts about alcohol



08 SPECIAL REPORT

The Genetics of Alcoholism



14 ANGER MANAGEMENT

Twenty-one ways to avoid an argument



16 REAL LIFE

My parents' problem is my problem . . .

18 THINK BEFORE YOU LEAP!

What are you afraid of?

22 CHOICE X 5

Which would you choose?



DEPARTMENTS

04 X-PLORE

What do ginger ale and vanilla extract have in common—besides sugar?

20 X-TECH

How do breath analyzers and driving simulators work?

23 X-It!

It's all in how you look at things.

XOPLORE



FERMENTATION

Fermentation is what happens when you mix yeast with sugar—a carbohydrate. Combine them and you get a fizzy mixture of carbon dioxide bubbles and alcohol. Nature's own magic! You can see this for yourself by making old-fashioned ginger ale. (Don't worry, it contains almost no alcohol.)

TRY THIS AT HOME

You will need a clean, plastic, soft drink bottle (2-liter size) with the cap, a sheet of paper, sugar, some fresh ginger root, a couple of limes (or lemons or an orange), and a package of dry or fresh yeast. You can buy most of these items in the produce section of a grocery store.

Measure out one cup of sugar. Make a paper cone and use it to funnel the sugar into the bottle.

Finely grate the ginger root until you have two tablespoons. Mix the grated ginger root and 1/4 teaspoon of yeast together in a measuring cup.

Squeeze and add juice from the

limes to the mixture. Spoon the mixture into the bottle, making sure to get all the yeast and ginger.

If some of the yeast mixture clings to the sides of the measuring cup, add a little water, gently swish it around and pour the contents into the bottle.

Last, fill the bottle with water, leaving an inch or two of empty space at the top. Screw the bottle cap tightly on the bottle and shake it. Leave the bottle on a counter (at room temperature) for 24 to 48 hours. Check the bottle frequently. As soon as the bottle feels hard, put it in the refrigerator (see Safety Note). Once it's thoroughly chilled, you have ginger ale!

You've done something most kids don't do until high school biology lab. You have combined yeast, ginger and sugar to produce carbon dioxide gas (CO_2) and a tiny amount (0.4%) of alcohol. This is less than 1/10 the concentration of alcohol in beer. In fact, small amounts of alcohol are in a few substances we use every day, like mouthwash, some flavors of ice cream and medicines. Still, anyone who abstains from alcohol, or whose body is unable to handle tiny amounts of alcohol, should sit out any taste tests.

SAFETY NOTE

The ginger ale *must* be refrigerated as soon as the bottle feels hard because the yeast does not immediately stop producing CO_2 . If left at room temperature (or warmer) for more than a few days, the bottle may explode.

In 1617, while the Scottish mathematician John Napier was simplifying multiplication

(and you thought it was hard now!), he became irritated that his next door neighbor's pigeons were eating all

his grain. Napier threatened to restrain the pigeons.

"Do so, if you can catch them," his neighbor said. Napier smiled. The next morning, according to legend, Napier's field workers were seen stuffing hundreds of semi-conscious pigeons into sacks. He had scattered peas soaked in wine to get the birds drunk!



Pasteur discovered how yeast works. A single-celled fungus, yeast feeds on sugar and produces carbon dioxide as waste.



THE SCOOP ON Vanilla Ice Cream

Vanilla pods come from an orchid plant, called *Vanilla planifolia*. The pods, which contain vanilla beans, are 7 to 8 inches long and look like extra-long green beans. Spanish conquistadors found vanilla in the 1500s on the Gulf Coast of Mexico. The Totonaca Indians who lived there were probably the first to grow and use it.

At first, the Spanish thought the spice had value only as a perfume. But then they saw Aztec Emperor Montezuma drinking a vanilla-flavored beverage similar to what we now know as chocolate. Vanilla-flavored chocolate quickly became popular among the Spanish, Dutch and French.

It wasn't until 1836 that vanilla successfully was grown outside of Mexico. Botanist Charles Morren discovered that a single kind of bee, found only in Mexico, could pollinate the vanilla orchid. He developed a hand-pollination technique. Later, Edmund Albius developed a method of pollinating the orchid with a bamboo splinter. His method still is used today. The three most popular kinds of vanilla come from Mexico, Madagascar and Tahiti. In 2004, Madagascar bourbon vanilla beans sold for \$170 per pound.

To make vanilla extract, beans are harvested from the vanilla orchid plant, dried and aged for up to two years. The beans are chopped and soaked in a solution of ethyl alcohol and water. During this process, the chemicals responsible for the taste of vanilla are dissolved into the alcohol solution.

Ethyl alcohol is a component in many foods, medicines, flavorings and perfumes.

Vanilla makes ice cream taste great! Here's an easy recipe to make at home.

INGREDIENTS

- 4 cups milk
- 1 cup sugar
- 2 cups whipping cream
- 1 tablespoon vanilla extract

DIRECTIONS

1. In a mixing bowl, whisk together the milk, sugar and vanilla until the sugar is dissolved.
2. Gently blend in the whipping cream.
3. Transfer the mixture to a 1/2 gallon ice cream maker and freeze, following the manufacturer's instructions. Makes two quarts.

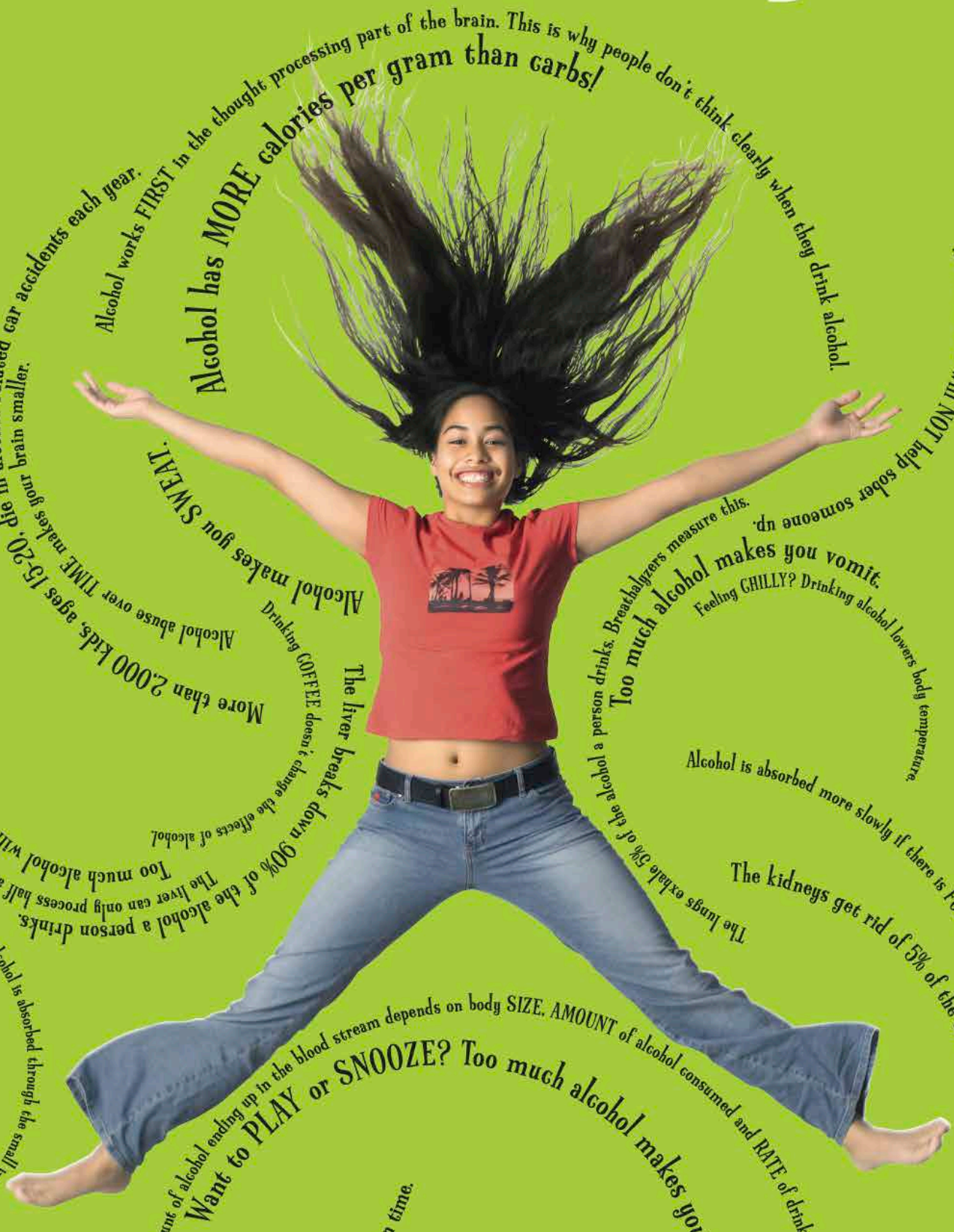
If you don't have an ice cream maker, pour the mixture into a shallow container (like a single-layer cake or pie pan) and place in the freezer. Stir about every 30 minutes until thickened. Yum!

OPTIONAL

Substitute 4 cups of half-and-half (a blend of equal amounts of milk and cream) for the 4 cups of milk.



What's In Your Body?



Too much alcohol messes up muscle coordination and **SLOWS** your reaction time.

A person **CAN** die from drinking too much alcohol.

The amount of alcohol ending up in the blood stream depends on body **SIZE**, **AMOUNT** of alcohol consumed and **RATE** of drinking.

Want to PLAY or SNOOZE? Too much alcohol makes you **sleep**.

Did You Know?

The liver can only process half an ounce of alcohol an hour.

Too much alcohol will damage the liver forever.

Most alcohol is absorbed through the small intestine.

More than 2,000 kids, ages 15-20, die in alcohol-related car accidents each year.

Alcohol abuse over **TIME** makes your brain smaller.

Alcohol works **FIRST** in the thought processing part of the brain. This is why people don't think clearly when they drink alcohol.

Alcohol makes you **SWEAT**.

Alcohol has **MORE** calories per gram than carbs!

The liver breaks down 90% of the alcohol a person drinks. Drinking **COFFEE** doesn't change the effects of alcohol.

Alcohol makes you **SWEAT**.

Too much alcohol makes you vomit.

Feeling **CHILLY**? Drinking alcohol lowers body temperature.

Alcohol is absorbed more slowly if there is **FOOD** in the stomach and intestines.

The kidneys get rid of 5% of the alcohol a person drinks.

The lungs exhale 5% of the alcohol a person drinks. Breathalyzers measure this.

A cold shower will **NOT** help sober someone up.

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THE GENETICS OF ALCOHOLISM

by Suzanne O'Malley

I like to get the big news out of the way first, and here it is. Scientists have figured out that the genes we inherit from our parents account for about half of our risk of becoming alcoholics.

Since it's not possible to be sure if a family has a history of alcohol problems, we can't know the amount of risk passed on from our parents. Even if we could, there is no way to control the genes we get.

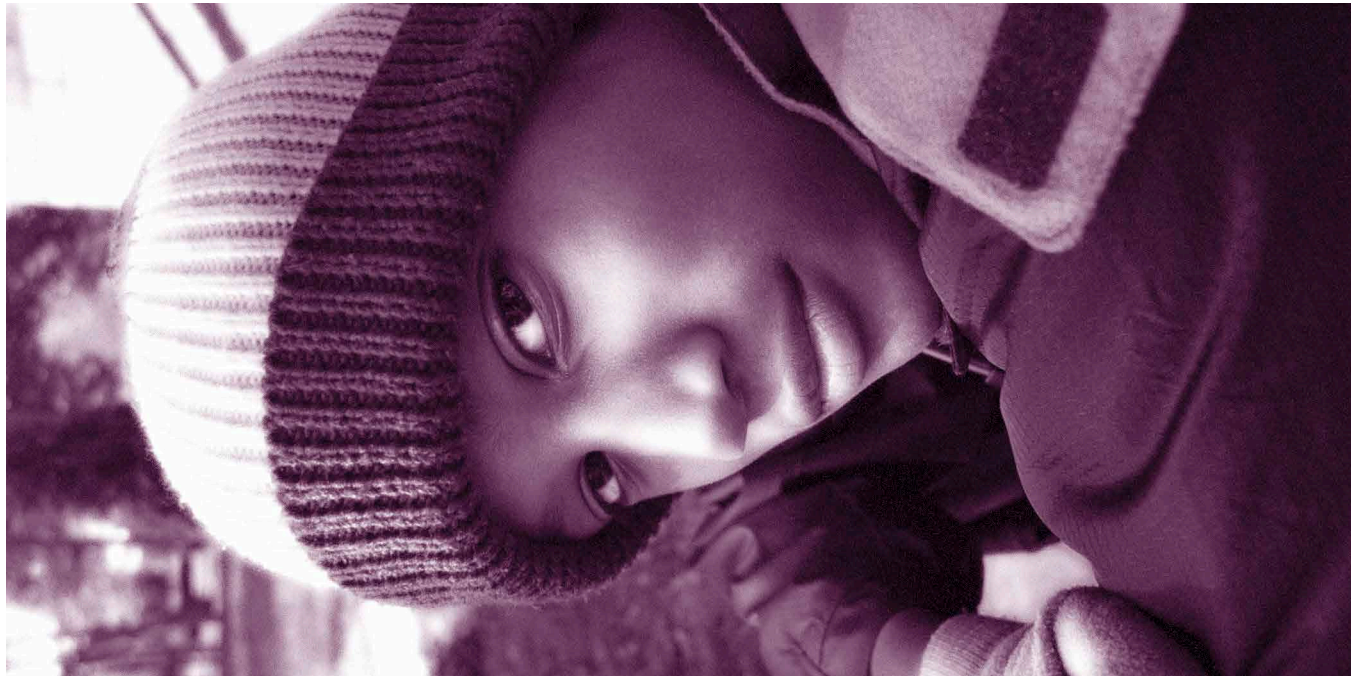
But we can control the very important choices we make about using alcohol. These decisions are as important as genetics in determining the risk of becoming addicted to alcohol.

But let's **backtrack a minute**. We're talking about genes. Where does the story of genetics begin? Some people say it started with the discovery of DNA in the 1950s. Actually, it goes back even



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Scientists use illustrations, called maps, to indicate where areas on chromosomes associated with specific diseases are found.



farther—all the way back to Gregor Mendel in 1822. It's practically ancient history.

Mendel was a monk who lived in what is now the Czech Republic. He studied ordinary pea plants—28,000 of them! He also taught math, physics and Greek to high school-aged kids.

Mendel found several features, or “traits,” of pea plants that were easy to see. Each trait could turn out in one of two ways. For example, a plant could have purple or white flowers, or it could have yellow or green peas. Mendel studied what happened to certain traits over many generations.

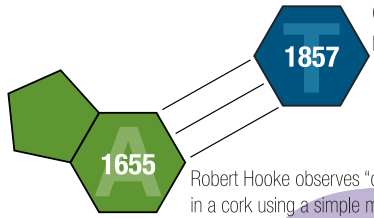
When he cross-bred a plant that produced yellow peas with a plant that produced green peas, all the “children” plants had only yellow peas. But when he cross-bred yellow-pea plants with each other, they produced yellow-pea “children” and surprisingly, some green-pea “children,” too. This showed that the parents had a green-pea trait, but that it was hidden. It didn't appear until the next generation (in the “children” peas). Hmm. Mendel thought this was very interesting.

From these experiments, he learned that parent plants pass on traits to their offspring. He concluded that each new plant gets just one set of instructions for each trait from each parent. He also figured out that even if the trait doesn't show up in a “child” plant, it still can show up in a “grandchild” plant (like the green-pea plants in the example). This happens because sometimes one version of a trait hides, or is dominant over, the other. Which version a child gets from each parent is random. Mendel figured out how heredity worked, but he didn't know why it worked that way. Now, we know it's because instructions for each trait are contained inside each cell on pairs of special structures, called chromosomes.

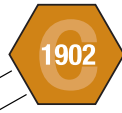
GENES ARE INSTRUCTIONS

We see and read about genes, genetics, chromosomes and DNA all the time in the news and on TV shows. For example, we often hear about crimes being solved with DNA evidence. So let's

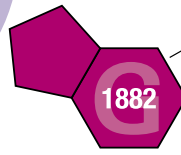
A CHILD OF AN ALCOHOLIC HAS A 75% CHANCE OF BEING VULNERABLE TO ALCOHOLISM.



Gregor Mendel, the "Father of Genetics," begins experiments with pea plants, explaining for the first time why kids look like their parents.



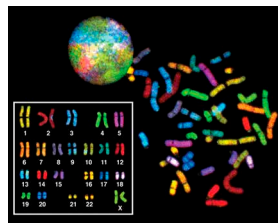
Biologists discover that chromosomes come in pairs.



Walter Fleming discovers and names chromosomes (rod-like shapes inside individual cells).

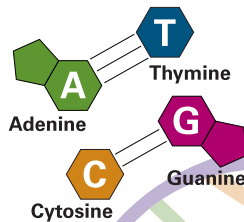
take another detour and I'll tell you something about DNA, genes and chromosomes.

"Chromosome" is the name given to the tiny—but very important—parts in each cell in your body. Each of us has 23 pairs of chromosomes inside each cell. Each chromosome contains a long, tightly coiled molecule called "DNA" (deoxyribonucleic acid).



Human chromosomes labeled with different colors.

What is DNA? It's a chain of four building blocks. Remember the alphabet blocks you played with as a young kid? DNA would be built from the A, C, G and T blocks. "A" is for Adenine, "C" is for Cytosine, "G" is for Guanine, and "T" is for Thymine. If you memorize the words Adenine, Cytosine, Guanine and Thymine, and tell your teacher that four blocks with these names combine over and over again in different orders, forming two chains that nature twists into a spiral shape called the "double helix," your teacher will think you're a genius. You might even get an automatic "A."



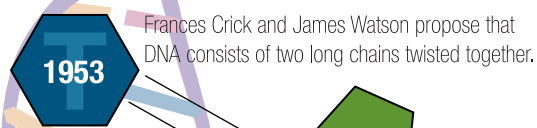
DNA provides the code for life. Different sections of DNA contain the spelling, or code, for

different traits. These sections are the genes that you always hear about. You even could think of them as different words spelled along the length of the DNA molecule. Every gene has a specific place somewhere on the DNA strand, just like your home is on a certain street. If you unraveled the DNA in just one of your cells, it would be about six feet long!

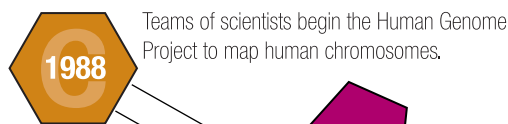
HEY, EVERYONE MAKES CHOICES

Here's where Mendel's work connects with today's research about the disease of alcoholism. Mendel examined only a few genes in pea plants, such as the gene that determines flower color. The disease of alcoholism in humans may involve hundreds of genes—each of which has a slightly different, tiny effect. This means the study of alcoholism is very complicated.

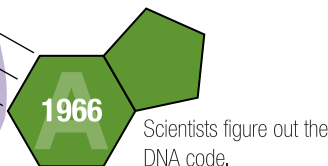
None of us can know which gene combinations we have inherited from our parents. That's why our own choices are so important. While half of the risk of becoming an alcoholic is inherited, the other half is determined by our own decisions and actions. Risky behaviors, such as regular binge drinking, can increase a person's chances of becoming dependent on alcohol. Combine such dangerous activities with an inherited risk for alcoholism, and the possibility of becoming an



Frances Crick and James Watson propose that DNA consists of two long chains twisted together.



Teams of scientists begin the Human Genome Project to map human chromosomes.

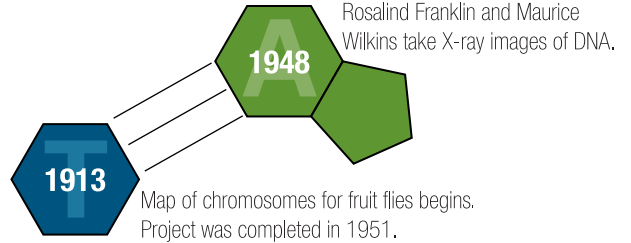
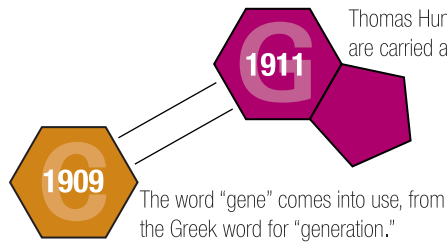


Scientists figure out the DNA code.



DNA fingerprinting, comparing blood or other body material to crime scene evidence, is developed.

DNA contains the codes for different traits. It is a chain of building blocks that can form two chains in a spiral called the "double helix."



alcoholic increases dramatically.

A person can develop alcoholism even if no one else in his or her family has a drinking problem. On the other hand, not all children of alcoholic families get into trouble with alcohol. But there is no doubt that one’s choices and actions can have a big impact on whether or not a person drinks too much or becomes an alcoholic.

So, what is alcoholism? Basically, it’s a disease that makes a person feel strong urges to drink alcohol, such as beer, wine, vodka, bourbon, scotch, or spiked punch. An alcoholic finds it difficult to stop drinking, even if he or she wants to stop. Today, there are more than 14 million adult alcoholics in the United States. That’s one of every 13 adults.

WHAT DOES ALCOHOLISM DO?

Alcohol is one of many addictive substances, including some that might surprise you. We’ve all heard about people being addicted to things like heroin, cocaine, pain medications, and to the nicotine in tobacco products. However, did you know that people also can be addicted to the caffeine in coffee and soft drinks?

Some Typical Signs of Alcoholism

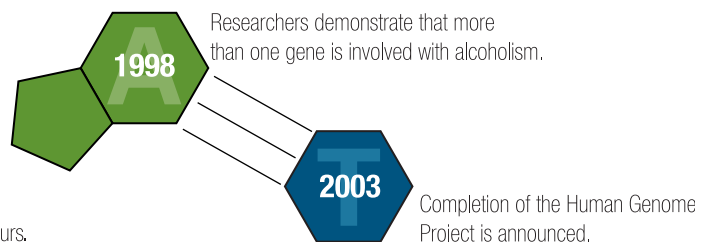
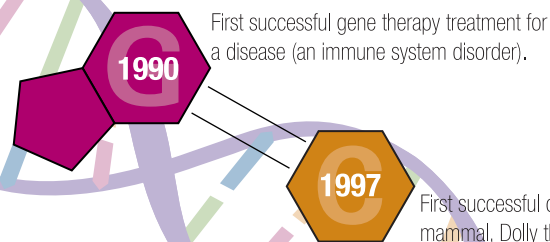
- **Craving:** A strong urge to drink.
- **Loss of Control:** The inability to stop drinking once a person has begun.
- **Physical Dependence:** Withdrawal symptoms, such as nausea, sweating, shakiness, and anxiety, when alcohol use is stopped after a period of heavy drinking.
- **Tolerance:** The need for increasing amounts of alcohol to get the desired effect.

Scientists know that alcohol and other addictive drugs can cause pleasurable feelings or relieve stress. Alcohol can activate a “feel good” center in the brain. When drinking gets the “feel good” center going, the brain wants it to happen again.

Sort of like when your dog does a trick. You give him a treat and he keeps doing the trick because he wants more treats.

The human brain can get used to alcohol. Over time some people need larger amounts of alcohol—more and more treats—to feel anything at all. Others may develop a craving for alcohol. This means they just have to have it, like they need food and water. Sometimes, without alcohol, their bodies begin to shake. In fact, alcoholism is not just a behavioral problem. It’s a disease that affects the brain and damages many organs of the body.

Doctors or other healthcare providers can identify possible alcohol problems by asking patients how much and how often they drink. Based on patient responses, doctors can ask more questions to find out whether a patient has signs of alcoholism (see box, above) or other



Unlocking the genetic code holds promise for understanding and treating a variety of diseases, including alcoholism.

alcohol problems. It may seem obvious that alcoholics should simply not drink—and many people have stopped with the help of groups like Alcoholics Anonymous. But others need professional help. Luckily, there are behavioral treatments with therapists as well as anti-craving medications to help people with alcoholism to stop drinking. New medications, now in development, are likely to be available in the near future. These drugs are based on understanding the genetics and molecular biology of alcoholism.

HOW DO YOU KNOW YOU HAVE IT?

So how do you tell if you have it? What does it feel like? Some alcoholics describe their disease as being like a song you can't get out of your head. You know how one morning you wake up and the Sponge Bob song is playing in your head? "Sponge Bob, Square Pants, Sponge Bob, Square Pants . . ."? You didn't put the song in your brain. You try to get rid of it, but it keeps playing over and over. For some, the craving

for alcohol is like that: a thought someone can't control.

And, speaking of brains, did you know your brain is still growing? You won't have all the brain cells you're meant to have until you're about 20. Because your brain is developing and changing all the time, some scientists call it "plastic." Alcohol and other drugs affect your brain like they do an adult's brain, but there is one important difference. Your brain isn't finished developing yet. So alcohol changes how your brain grows—or more accurately, how it doesn't grow. It can damage memory and word skills forever. This spells trouble no matter how you look at it.

Most of you reading this article don't know if you have a family history that places you at risk for alcoholism. But you're exactly the right age to begin learning about this disease. About one of three kids begins to drink before she or he turns 13. That makes NOW a very important time to learn and think about the choices you will make about drinking. Kids who use alcohol

DO YOUR
GENES MAKE YOU
VULNERABLE TO
ALCOHOLISM?



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Did you know alcohol is a drug? Genetic factors also play a role in the risk for addiction to other drugs, like cocaine or nicotine.



before they turn 15 definitely have a higher risk for alcohol problems later in their lives—four times higher than a person who waits to drink until the legal age of 21. Early drinkers also have less success in stopping drinking if alcohol begins to control their lives.

NOT EVERYONE BECOMES AN ALCOHOLIC

Each person's brain and body respond differently to alcohol. For example, most people who drink do not become alcoholics. Many Asians have a gene that protects them from becoming alcoholics. It causes them to feel hot or sick before they drink enough to become addicted.

In fact, it's possible for most adults to drink safely. About one drink per day for women and two drinks per day for men is not harmful in most cases. A drink is one 12-ounce bottle or can of beer or wine cooler, one 5-ounce glass of wine, or one mixed drink that has only 1 to 1.5 ounces of hard liquor in it (depending on the type of liquor).

GENES DON'T ALWAYS DETERMINE DESTINY. YOUR CHOICES DO MAKE A DIFFERENCE.

Today, scientists are searching for genes that change the risks of developing alcoholism. They study families, just as Mendel studied peas. They are only beginning to understand the many genes involved in the genetics of alcoholism. One day, genetics research may help us to identify people who are at risk for this disease. Research also may lead to prevention methods, medications and treatments made for each person's unique brain.

No matter what scientists find, remember, genes don't always determine the future. They play a role, of course, but WE control a large part of the risk for alcohol addiction through the choices we make about drinking.

We can protect ourselves by making solid decisions, like not drinking until the legal age of 21. Even then, we can drink moderately (having a glass of wine at dinner, for example) or not at all. If we come from a family that is at risk for alcoholism, we may decide not to drink alcohol ever. Being informed about how genes and actions contribute to (or help prevent) alcoholism is a very good start. ✕

ANGER

management



21 Ways to Avoid an

ARGUMENT

- 1 Decide to be part of the solution, not part of the problem.
- 2 Don't call names, blame, yell or interrupt the other person.
- 3 Say what I mean and mean what I say, but don't say it in a mean way.
- 4 Choose to act, not react.
- 5 Look at how I act when I get mad. Maybe next time I'll try something else.
- 6 Zip my lips.
- 7 Take care of my own feelings, not those of my friends.
- 8 Mind my own business.
- 9 Brainstorm for solutions with others.
- 10 Remember that what I do speaks louder than what I say.
- 11 See and hear anger without becoming angry.
- 12 Remember: If I keep doing the same thing, I'll keep getting the same result.
- 13 Consider the other person's point of view.
- 14 Count to ten before I speak. If very angry, count to one hundred.
- 15 Worry less about being right all of the time.
- 16 Change the subject.
- 17 When in doubt, leave it out.
- 18 Stop. Think.
- 19 Quiet myself on the inside, so that it's easier to be quiet on the outside.
- 20 Walk away.
- 21 Figure out what I'm really angry about.

real

by Suzanne O'Malley

Bridget didn't look at all happy.

"Yes, they talk about drugs at school," she said. "All the time."

Every wall at her school seemed to have an anti-alcohol or drug poster on it, Bridget said. She wanted a vacation from alcohol and drug awareness!

I asked why these reminders bothered her.

She thought for a minute. "My parents do drugs," she said at last. "They smoke cigarettes. It's scary."

When people talked about drugs, I usually thought of alcohol or marijuana. I didn't think of cigarettes. But Bridget had learned that cigarettes contain a drug even more difficult than alcohol to quit: nicotine. I knew Bridget's parents. They both had smoked cigarettes since they were teenagers. They had tried to quit many times. They used "stop-smoking" patches, special gum, and even acupuncture. It seemed they had tried everything.

I Can't Stop

"My mom talks to me about it," Bridget said. "She told me, 'don't ever



Illustration © 2005 ImageZoo Media Inc.

start smoking, Bridget. Whatever you do, don't ever start. I have tried and tried and I can't stop smoking. I don't want that to happen to you."

What made things worse was that three of Bridget's four grandparents died before she ever knew them. They all smoked cigarettes and all died of smoking-related cancer. Now she had only one grandparent left—the one who had never ever smoked.

Bridget didn't want to say it, but in the back of her mind she was worrying. What if her parents died from smoking, too? What would happen to her and her 11-year-old brother? What could she do to make her parents stop? And if she couldn't make them stop, couldn't she at least get those anti-drug posters out of her mind?

Bridget felt frightened and alone when she had these thoughts. She didn't realize that many kids felt exactly the same way.

You're Not Alone

Literally around the world, kids just like Bridget are wondering similar things about their parents, loved ones, or friends. Some kids are afraid that adults they love drink too much. Some fear they are losing their parents to marijuana, cocaine, or heroin. Others worry that someone they love might be addicted to pills, gambling, or certain Internet activities.

The great news for Bridget was that she was talking about her feelings. Many times, family members don't talk about loved ones' problems.

They wind up pretending the problem isn't there. Like that's going to work! You might as well have a giant pink elephant sitting in the middle of your living room and pretend it doesn't exist.

Writing It Down

Some kids feel better if they write a letter explaining what they aren't able to say to their loved ones. Even if they don't send the letter, it can help to express their thoughts. "I was afraid to tell you how much the drinking and fighting bothered me," John wrote. "I thought constantly about what was going on at home. It got in the way of my homework and friendships. I was so embarrassed that I was afraid to bring my friends over, and at times I didn't even want to go home myself. I felt it was my fault we had so many problems, but I learned that alcoholism can be a family illness. I realized it wasn't you

I hated, but the disease."

"It seemed you didn't care about me," Andrew wrote. "Your arguments made me feel lonely and scared. When you were tense, you'd snap at me and I felt lost."

"When I was yelled at, I would scream back, run to my room and slam the door," Mary Sue wrote. "I learned that I can calm down and detach from the situation without having to react."

"I don't know where I'd be without Alateen," William wrote. William participates in Alateen, a free fellowship for young people who have been affected by a loved one's alcoholism. These teens help each other by sharing their experience, strength and hope. "Here I can express my feelings without fear of being ridiculed," William added. He learned that he could:

- ◆ Have an opinion without insisting that others share it.

- ◆ Care for people without having to take care of them.
- ◆ Understand that teachers can make the same mistakes as other people.
- ◆ Always have choices—even if they were difficult to see.

You Didn't Cause It

Kids cannot cause the problems that someone they love may have with drinking, drugs, or their behavior. No one can. Kids can't cure problem drinking, and they can't control it any more than they can control the weather. There is absolutely NOTHING a kid can do about someone else's problem. When you think about it, what a relief!

Realizing that you can't do anything is the first step toward feeling better about yourself. It doesn't mean you don't care. It just means that you can't change someone else's behavior. Lecturing your parents, teaching them what you learned in school, making them feel guilty, shouting, giving them the silent treatment, bargaining, reasoning with them, or threatening them will do no good. Not even saying, "If you loved me, you'd quit" will work.

Focusing on yourself *does* work. You are the one person you have the power to change.

That's what Bridget decided to do. Instead of thinking those alcohol and drug awareness posters at school are ordering her to save the world, she now sees them as gentle reminders to herself. By learning about alcohol and other drugs, she can make wise choices—for herself.



Some readers of *X-Times* may be in home situations that are dangerous because of physical or sexual abuse. Many successful adults, like talk show host Oprah Winfrey, have had similar experiences and grown up to lead happy, healthy lives. Your safety *always* comes first.

If your parents or a relative or friend drink too much or have similar problems, you may find the Alateen website helpful.

www.al-anon.alateen.org

To locate an Alateen meeting near you, call toll free:

888-4AL-ANON / 888-425-2666

Portions of this piece are courtesy of "Dear Mom & Dad" ©1991, Al-Anon Family Group, 1600 Corporate Landing Pkwy., Virginia Beach, VA 23454.

THINK BEFORE

Define the problem. Write down as many options as you can think of.



You **LEAP**

Think carefully about each option.

Is it unkind? Is it unfair? Is it dangerous?

*Pick the best option.
Make a plan and do it!*

X-TECH

HOW DOES IT WORK?

breath analyzers

Blood Alcohol Content (BAC) is the percentage of alcohol present in someone's blood. The more a person drinks, the higher his or her BAC can become. Someone is considered legally drunk (or intoxicated) when BAC is greater than 0.08. A BAC of 0.08 means that there are 0.08 grams of alcohol for each 100 milliliters of blood. How many drinks it takes to reach this level depends on several factors, especially body



Number of Drinks in One Hour	Body Weight in Pounds									Effects
	90	100	120	140	160	180	200	220	240	
None	.00	.00	.00	.00	.00	.00	.00	.00	.00	No Effects
☐	.05	.05	.04	.03	.03	.03	.02	.02	.02	Effects Begin
☐☐	.10	.09	.08	.07	.06	.05	.05	.04	.04	Judgment & Driving Significantly Affected
☐☐☐	.15	.14	.11	.10	.09	.08	.07	.06	.06	Legally Intoxicated
☐☐☐☐	.20	.18	.15	.13	.11	.10	.09	.08	.08	
☐☐☐☐☐	.25	.23	.19	.16	.14	.13	.11	.10	.09	

FEMALE

weight and gender. Check out the two BAC charts on this page. *See any differences?*

BAC can be estimated in a number of ways. The most accurate measurement is made from a blood sample. However, breath samples also can be used to estimate BAC. Since blood circulating through the body passes through the lungs, alcohol is exhaled with every breath.

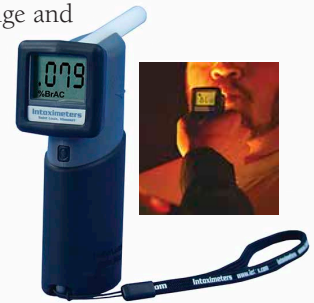
Several inventors created devices to gauge BAC from breath samples. Robert Borkenstein invented one such device in 1954. No larger than a cell phone, the device is commonly known as a "breathalyzer." Portable breath analyzers are routinely carried by police in order to estimate BAC.

An officer has a person blow into a straw-like mouthpiece for five seconds. The person's breath is captured inside the device, where it mixes with sulfuric

acid and other chemicals that remove the alcohol content in liquid form. This liquid interacts with a reddish brown chemical sensor—potassium dichromate—which turns green if alcohol is present. A photo cell system compares the color change and produces a read-out of the percentage of alcohol in the sample.

Newer devices, such as the Alco-Sensor (right), rely on an internal electric current to estimate BAC based on a person's breath.

So, how do breath alcohol levels relate to blood alcohol concentrations? Answer: The ratio of breath alcohol to blood alcohol is about 2,100:1. This means that 2,100 milliliters of exhaled air will contain the same amount of alcohol as 1 milliliter of blood. To reach a 0.08 BAC level, a 170-lb man would have to drink about four drinks, and a 137-lb woman would have to drink about three drinks in one hour on an empty stomach.



Alco-Sensor FST

Photograph of the Alco-Sensor FST and model courtesy of Intoximeters Inc. Image use does not constitute product endorsement.

one inventor's story

Robert Borkenstein developed a breathalyzer without having gone to college. He did it while he worked as a police captain in charge of laboratory services, before retiring from the force after 22 years. After that, at age 46, he went on to earn his Bachelor's degree from Indiana University. He later became the



MALE

Number of Drinks in One Hour	Body Weight in Pounds								Effects
	100	120	140	160	180	200	220	240	
None	.00	.00	.00	.00	.00	.00	.00	.00	No Effects
☐	.04	.03	.03	.02	.02	.02	.02	.02	Effects Begin
☐☐	.08	.06	.05	.05	.04	.04	.03	.03	Judgment & Driving Significantly Affected
☐☐☐	.11	.09	.08	.07	.06	.06	.05	.05	
☐☐☐☐	.15	.12	.11	.09	.08	.08	.07	.06	Legally Intoxicated
☐☐☐☐☐	.19	.16	.13	.12	.11	.09	.09	.08	

Alcohol Impairment Chart data source: Pennsylvania Liquor Control Board Female; University of Wisconsin Center for Health Sciences, 1988, and U.S. Department of Transportation, National Highway Traffic Safety Administration, 1992; Male; *Journal of Studies on Alcohol*, Vol. 42, No. 7, 1981.

first chairman of the University's Department of Forensic Studies. Borkenstein wanted to make life better for people by finding a way to control alcohol consumption. The invention of a breath analyzer was part of his life's work.

driving simulators

Modern driving simulators use interactive computer technologies better than the best video games. A



driving simulator usually includes a steering wheel and dashboard, foot pedals, gear shift, and video screens that work together to "simulate" the experience of driving a real car. Simulators are popular tools for teaching people to drive. If an accident occurs, no one gets hurt!

Today's simulators seem like space vehicles compared to those first used around 1910 to evaluate the skills of public transit drivers. Early simulators used a conveyor belt carrying random objects toward the driver to test reaction skills!

By World War II, the first generation of what we now recognize as driving simulators was developed by the University of California at Berkeley. These simulators used films, and later videos, of highway scenes to imitate the driving experience.



The mother of all simulators is at The University of Iowa. The National Advanced Driving Simulator (NADS) cost about \$60 million to build and is big enough to hold not only different vehicles, but also



This is the high-bay area that houses the NADS simulator. The Jeep Cherokee module is inside of the white structure in the air—NADS is huge!

monitoring equipment, a huge projector, and data collection stations. Different vehicles, or modules, can be put inside the giant simulator (one at a time). There's a Chevy Malibu, Ford Taurus, Jeep Cherokee—and even an 18-wheeler truck cab! NADS has a 360° field of view and sits on six immense hydraulic legs that simulate pitch, roll, and spin.

Some NADS researchers study the effects of various BAC levels on drivers. Obviously, this cannot be done safely on the open road. Volunteers of different ages and drinking practices pretend to drive under different roadway conditions, such as dense traffic. Sometimes, drivers are given realistic tasks to perform while driving. For example, eating, changing a CD or talking on a cell phone can take place under a variety of road conditions. It's not quiet in there either. The NADS is equipped with 3-D sound to simulate real, and sometimes unexpected, loud noises.

Other research using NADS involves testing drivers of various ages, like seniors or teenagers. But don't count on using NADS when you take Drivers' Ed. The NADS is way too big to be moved anywhere!

student drivers

The great thing for any student using a driving simulator is that it allows the student to make his or her mistakes during practice. This increases the odds that students will execute correct responses when confronted with real driving conditions in a motor vehicle.

To learn more about the national driving simulator and current studies, visit The University of Iowa NADS website at <http://www.nads-sc.uiowa.edu/>.



CHOICE

X5

Think you've only got one choice?
Test that idea in the situations below.

LINDSEY



Lindsey's dad is an alcoholic. He stopped drinking, went to rehab, and now is going to AA. Lindsey and her family are about to visit family—many of whom drink. She's terrified that her dad will start drinking again during the

trip. Which is the best choice for Lindsey?

1. Do nothing and worry.
2. Stick close to her dad so she can try and stop him if he does try to drink.
3. Hide or pour out all the alcohol she can find.
4. Talk to her dad about her feelings.
5. Go to Alateen.

KATE & JARON



Jaron likes a girl named Kate. His friend Mike also likes Kate. Tomorrow, Mike is going to ask her to sit with him at lunch. Jaron really wants Kate to be *his* girlfriend. Which is the best choice for Jaron?

1. Tell Mike how he feels.
2. Talk to his own parents. They've probably had something like this happen to them and might have some good suggestions.
3. Consider that while this seems really important now, Kate isn't even old enough to date. By the time she is ready, he might like someone else.
4. Try to forget about the whole thing.
5. Remember that it's not just up to Mike and him. Kate has her own feelings and may just want to be friends with both.

MATT



Matt's friend John is going to fight Grant after school. Kids from their class are going to watch it. Matt knows fighting is against the rules—and that he should tell someone. But he doesn't want to report his friend. Which is the best choice for Matt?

1. Try to talk the guys out of it before the fight.
2. Tell a teacher about the fight.
3. Pretend he doesn't know and go home.
4. Go to the fight and support John.
5. Go to the fight and try to stop it.

Sometimes, what might appear to be the best solution isn't really best. For example, Matt went to the fight to try and stop it. But he couldn't stop the fight before John

was badly hurt. John's mother called the school principal. Everyone who showed up to watch the fight got detention. John and Grant were suspended.

Lindsey went to Alateen. What do you think happened with Jaron and Kate? Were there other options any of them might have considered?





Attitude is the paint brush of the mind-it colors every situation.

Cut out your favorite attitude on this page.

Use it as a bookmark or put it where you can see it.

