

Ghost Towns: Abandoning the Great Plains

U.S. News & WORLD REPORT

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Alcohol and the Brain

**New breakthroughs in
understanding society's
most common addiction**

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Re-creation of an MRI image of the brain
of an alcoholic viewing a drink

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Your brain on



alcohol

A new understanding of how alcohol alters brain chemistry may transform treatment of the disease

BY SUSAN BRINK

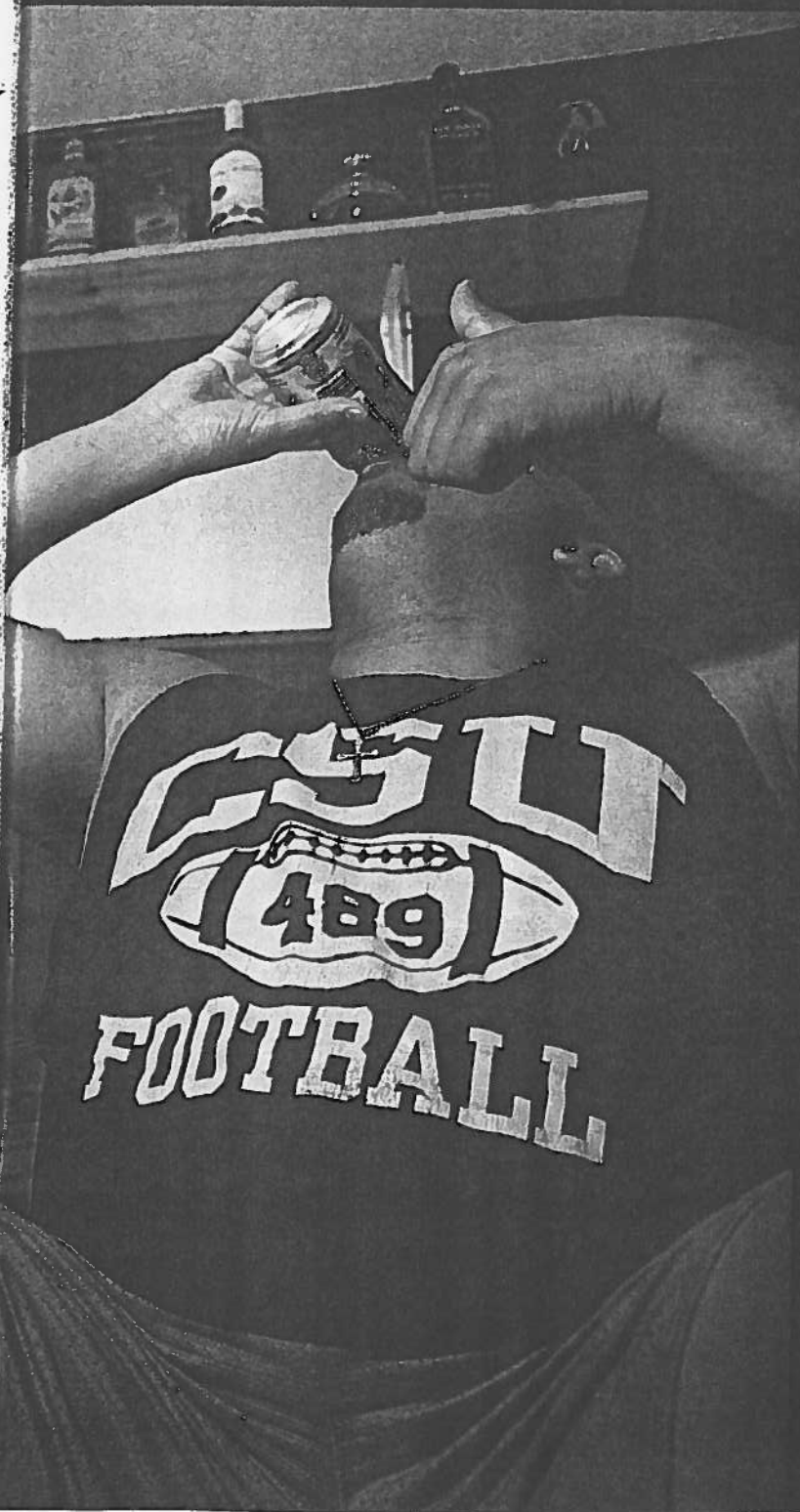
Ask any alcoholic trying to take it just one day at a time, and he'll tell you that compulsive drinking is a disease—period. That's what the Big Book said, after all, the groundbreaking tome by Alcoholics Anonymous that came out way back in 1939. And that's what just about everyone has believed ever since.

But hold on. Technology, not for the first time, is forcing doctors and therapists to see things in a new light. With the aid of sophisticated new imaging techniques, scientists can look inside the brains of alcoholics at the very moment they're being tempted by thoughts of cold beers, crisp martinis, or fully ripened cabernet francs. The new science shows just how alcohol can rewire the circuitry of the brain, eroding its ability to feel pleasure and act wisely, and replacing it with a locus for intense craving and destructive behavior. "Alcoholism is a disease that interferes with home life, work, interpersonal relationships, and eventually with health," says James West, medical director emeritus of the Betty Ford Center in Rancho Mirage, Calif. "It's biological, but it's also psychosocial."

The picture is a scary one. But the good news is that it's changing the way doctors and specialists are thinking

Three college chums soon to enter the working world feel sure they can cut back on drinking when jobs, families and responsibilities demand it.

PHOTOGRAPHY BY MARK PETERSON • CORBIS SABA FOR USM&WB



about the treatment of alcoholism. Until recently, largely believing they had nothing to offer, physicians have left such treatment to counselors, recovering drinkers, and clergy. The result has been a hodgepodge of therapies, some with good results, others merely good intentions.

Now doctors are weighing in—big time. The most promising area of research is the new drugs that target specific areas of the brain to help ease the craving for liquor. One such drug—the first of its kind—has shown promise in quelling the terrible yen for a drink. Naltrexone has been approved by the Food and Drug Administration and is available by prescription. Two more drugs that also may ease craving are being tested in clinical trials.

But even proponents of pharmaceutical treatment say drugs aren't the whole answer. Most alcoholics will still need counseling or 12-step programs to help confront the harm they may have caused or the growing up they need to do. Yet just as Prozac got general practitioners interested in depression, anticraving drugs might get more physicians involved in alcoholism treatment. Says Keith Humphreys, a psychologist and addiction researcher at Stanford University: "Doctors want to be able to do something medically."

Brain pain. The new brain-imaging technology will be the key to determining how much, and how effectively, doctors can help. Some 14 million people in the United States are alcoholics or abuse alcohol. They are skid-row bums and lace-curtain drunks, senseless rebels and charming rogues. They chill Louis Roederer Cristal champagne in silver buckets and swill Budweiser from plastic cups. They tell themselves they are not alcoholics because they never drink before 5 p.m., or because they make it to work every day, or because dinner is always on the table on time.

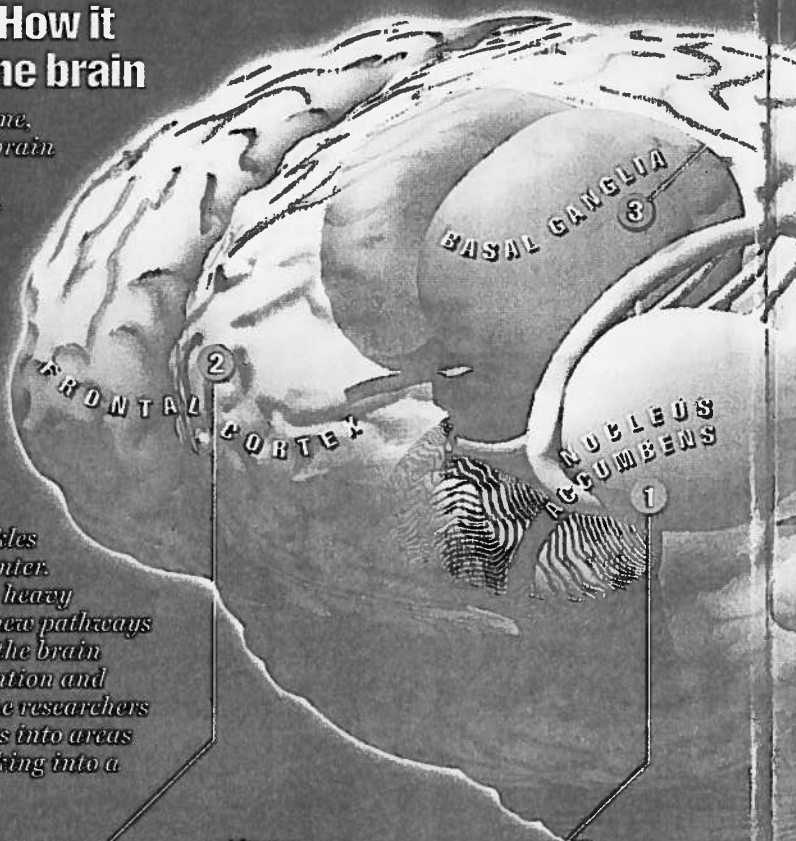
But their excuses can't overcome the damage they do. Inga fell down a flight of stairs with her infant in her arms. Mark had five wives, and five divorces. Betty polished off a pint of vodka, then car-pooled fourth graders from soccer practice. Jeffrey committed strong-armed robbery. April, once shy, took off her clothes and danced for money. Martha threatened her husband with a carving knife. Paula slipped into the kitchen during dinner parties to swill down the last drops of wine left in dirty goblets. All are recovering alcoholics and they are ashamed of these recollections.

For active alcoholics, drinking trumps reason. It distorts judgment. It severs the connection between behavior and consequence. It lays waste to marriages, friendships, and careers. It leaves children stranded. For alcoholics, love and logic

Alcohol: How it affects the brain

For the first time, sophisticated brain imaging techniques can present stark, real-time pictures (shown below) that provide insight into how chronic alcohol use may change the brain.

Initially, it tickles the pleasure center. But long-term, heavy drinking cuts new pathways to the areas of the brain involving attention and judgment. Some researchers believe it moves into areas that turn drinking into a compulsion.



Memory

Where we learn about the world, make judgments, and control impulses. After years of drinking, the initial hit of pleasure becomes old hat, but the frontal cortex has encoded a memory of the experience of pleasure.

Pleasure

Once in the bloodstream, alcohol heads for the nucleus accumbens. The brain's most primitive center, it looks to satisfy hunger, thirst, and lust. Alcohol stimulates pleasure, and human beings tend to repeat any action that provides pleasure.

VISUAL STIMULANTS

Study participants viewed photos of alcoholic and nonalcoholic drinks while lying in an MRI scanner. The pictures of alcoholic beverages activated parts of the frontal cortex linked with attention and memory, mechanisms of craving, in the brains of alcoholics, but not in moderate drinkers.

Alcoholic's response

The colored areas show that alcoholics paid a lot of attention to images of alcohol.



Alcohol photo

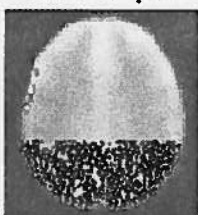


Nonalcoholic's response



Alcoholic's response

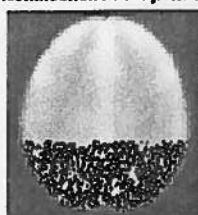
Images of non-alcoholic drinks did not attract much attention.



Nonalcohol photo



Nonalcoholic's response



PHOTOS AND SCANS COURTESY OF CASE AND MEDICAL UNIVERSITY OF SEATTLE, CANADA

Compulsion

This area controls movement, repetitive tasks, and, in the extreme, obsessive/compulsive behaviors. Some researchers believe that alcohol may capture the same pathways as does O/C disorder, leading to compulsive drinking despite the drinker's wish to stop.

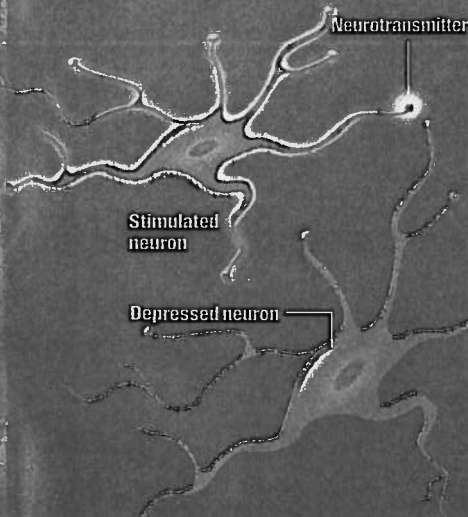
Stress relief

Helps the body respond to stress. Alcoholism in some may start because it calms stress. But continued abuse may alter brain chemistry to chart a course of encoded memory and compulsive use.

Source: Raymond Anton, Medical University of South Carolina
 ROD HUBLE / USGWA

A TRIGGERED RESPONSE

All addictive drugs affect the neurotransmitter dopamine, one of several brain chemicals that make us feel pleasure. Alcohol in low doses stimulates neurons, one reason that people feel high. In higher doses it depresses them, leading to drowsiness.



can't hold a candle to liquor.

And the damage is not limited to others. Over time, addiction becomes an enervating trial for the drinker. "I would always drink out of glasses that were opaque so my husband couldn't tell what I was drinking," says Jackie Clarke, sober for 16 years. "I would put vodka in my wine because wine seemed more acceptable. I was always thinking about what I was going to drink, when I was going to drink, hiding bottles so my husband wouldn't know how much I drank. It was exhausting."

Just where alcohol abuse crosses the line into addiction remains blurry. John Schwarzlose, president of the Betty Ford Center, has his own simple criterion: An alcohol abuser might get stopped once while driving under the influence, and the experience will be mortifying—and sobering. For an alcoholic, however, the embarrassment is not enough. "Two or more DUIs—that is an alcoholic," says Schwarzlose. But it is often a meaningless distinction to family members, loved ones, and employers. They know that excessive drinking can ruin lives through betrayal, broken promises, lost jobs, car accidents, and a host of other personal tragedies.

Pure pleasure. Alcoholism is a disease that can start with a first drink. With that drink, one fork in the road appears, leading some to a future of alcoholism and others to a lifetime of enjoyable, moderate drinking. The brains of people genetically predisposed to alcoholism may be unable to naturally produce adequate dopamine—one of the brain chemicals that make us feel pleasure. For them, the first drink is a hit of dopamine, and of pleasure, they haven't felt as strongly before. And then, it's love at first tittle. "The first time I got drunk, I was 11 years old," says Clarke, of Falls Church, Va. "I was babysitting with a girlfriend. We broke into her father's liquor cabinet, and then we had a food fight. I never had so much fun in my life."

Only 1 in 9 people who drink continues the path to alcoholism. Those who do succumb are disproportionately related to alcoholics; an estimated 50 percent to 60 percent of those who become alcoholics have a genetic predisposition. "My father was an alcoholic," says Mark Abel, 50, in

treatment for alcoholism at Operation Par Village in Largo, Fla. "He worked hard and he drank hard." But environment plays a significant role, too. "When I was a kid, I used to get my dad beers," recalls Abel. "I'd get the first couple of sips on the way back from the refrigerator. I loved the taste."

That's because alcohol heads to the mind's seat of emotion and pleasure, called the nucleus accumbens, which also houses gratification of hunger, thirst, and sex. There, like other addictive drugs, it increases the concentration of dopamine, a pleasure-causing chemical, in the brain's reward circuits. But recent research shows that alcohol also opens the floodgates on other feel-good chemicals, including serotonin. It disturbs levels of glutamate, which can make people feel high, and then



BARBARA HALSEY

Sober for almost a year, she plays with son Billy, 5. "I found myself losing jobs, too hung over to go in."

it interferes with other chemicals that can make people feel tired. Enoch Gordis, director of the National Institute on Alcohol Abuse and Alcoholism, calls alcohol "the most widespread and damaging substance we have in society."

Once excessive drinking begins, the new research shows, alcohol begins resculpting the brain regardless of family history. "In even nonsusceptible individuals, chronic use may create addiction," says psychiatrist Raymond Anton, scientific director of the Charleston Alcohol Research Center at the Medical University of South Carolina. People who binge several times a week—five or more drinks in a day for a man, four or more for a woman, according to the National Institute on Alcohol Abuse and Alcoholism—are clearly at risk, and they can also suffer other consequences like impaired concentration, slowed reflexes, disrupted sleep, and high

blood pressure. There's no evidence, however, that moderate drinking—two drinks a day for men, one drink for women—alters brain chemistry.

Want becomes need. People often start down the road to alcoholism in their teens or 20s. But stress later in life—a divorce in their 30s, a job loss in the 40s, the death of a loved one anytime—can also push a life off course. At this point, the amygdala, the part of the brain that helps the body respond to stress, may be calmed by alcohol. But though these drinkers may start later in life, heavy drinking likely causes similar brain alterations. Barbara Halsey, 47, didn't begin to drink heavily until she divorced in her early 30s. At first, it was for the relief and fun of partying. Pretty soon, she was drinking almost every night. "I'd stay out late. I found myself losing jobs," she says. However it starts, heavy drinking eventually robs alcohol of its value as a brain treat. Want becomes need. The drinker needs ever more alcohol to provide the same high until, eventually, the high is gone. "There was a time in my life when chemicals did something for me. And then one magical day, they stopped," says Jay Ehrlich, who has been sober for 16 years. "And I spent an inordinate amount of time trying to cross back over and get it back."

At this point, recent brain-imaging studies show, the primitive nucleus ac-

SCOTT CAMPAGNA

The 23-year-old Atlantan says a new drug may have helped him. "I feel I could quit or cut back if I wanted to."

cumbens, with its hunger for pleasure, may ultimately not be the main player. New pathways have been formed, adapted to function in alcohol's service. Now, researchers believe, the frontal cortex, the brain's executive branch responsible for decisions and memory, holds a mere memory of pleasure, as insistent as the original pleasure, and demands another drink. Alcohol may also put its stamp on areas of the frontal cortex involved in judgment and impulse control.

From the frontal cortex, it's a short hop to the basal ganglia, the brain center that when wired differently makes obsessive-compulsive people continually wash their hands or avoid stepping on cracks. The latest results from laboratory-animal studies suggest that alcoholism may use the same neural pathways that lead to compulsive behaviors. The brain then demands more and more alcohol, regardless of reason and consequences. "In the end, I'd drink by myself. I'd hide beer in the closets, under the porch of the house. It wasn't fun anymore. It went from a luxury to a must," says Michael Small, 40, of Zephyrhills, Fla., who drank for more than

TEEN TIPPLERS

When being first isn't best

Nicole is blonde and ponytailed, the fatherless child of a Tampa waitress who struggles with addictions to drugs and alcohol. The eighth grader, who chose to be called Nicole for the sake of anonymity, has already been handed a lot to overcome, including her own alcoholism. "When I was about 10, I got pretty drunk," she says. But before she got sick from the beer she had sneaked from her mother's refrigerator, she felt a little slice of heaven, a respite from a chaotic household. "It felt warm and cozy and comfortable," she says.

Three years later, at 13, she's in alcohol treatment in a juvenile center. In the years she drank, she pilfered alco-

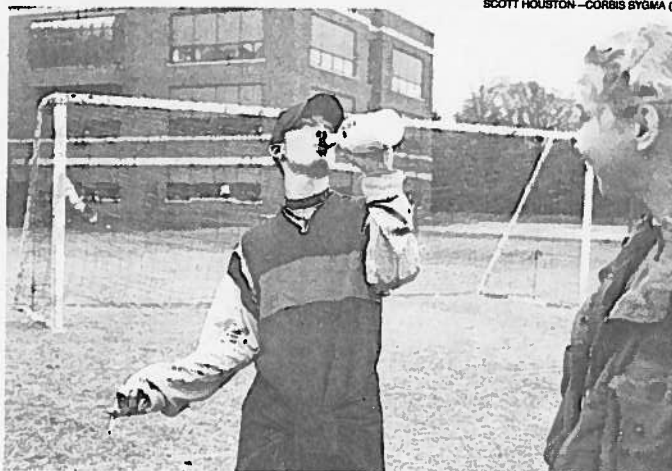
hol at home, stole money from her mother to buy liquor, ran away more than once, and felt popular with

older boys. She was going downhill in school and was in danger of launching herself into a tragic life.

Nicole's story is the classic parental nightmare. There are plenty of reasons to worry: Alcohol and young

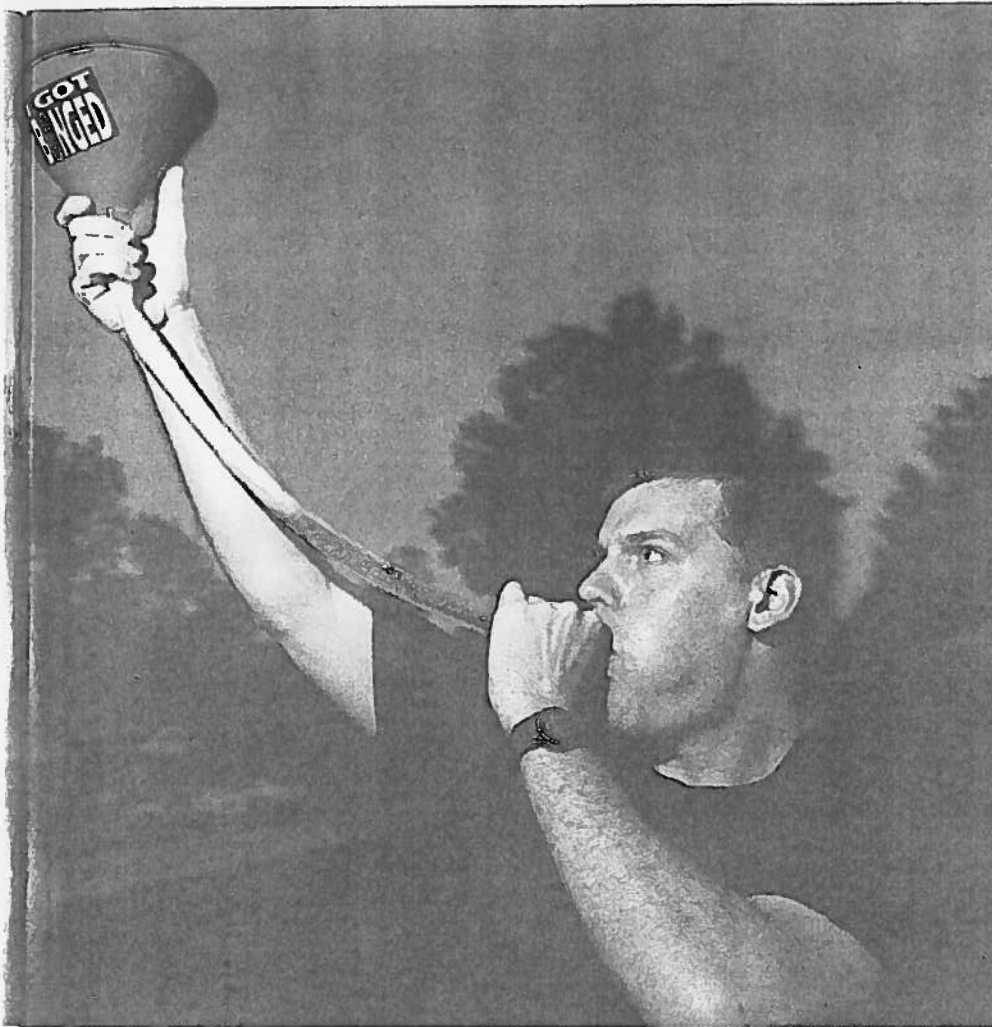
drivers are a deadly combination, and there's the possibility of damage to young brains. Recent studies have shown that the sooner kids begin drinking, the greater the chance they will develop alcoholism. Among adolescents, 4 percent to 10 percent are full-blown alcoholics.

Watch out. Teenage experimentation with liquor doesn't inevitably lead to later drinking problems, but parents should watch for warning signs, such as a new set of friends whom the child never brings home. "Adolescents who use hang with other users so they can keep that code of secrecy," says Deborah Deas, director of the adolescent substance abuse program at the Medical University of South Carolina. Other signals include being unusually argumentative, testy, or sad, or losing motiva-



SCOTT HOUSTON—CORBIS SYGMA (2)

Biochemistry offers good reasons to hold off drinking.



20 years before entering treatment.

Some people summon the will to stop from within. "What shocks people is that the vast majority of people who recover from alcoholism never sought any treatment at all," says Stanford's Humphreys. But a lot of people can't quit on their own. The ability to stop is as individual as each person's internal motivation. Ehrlich, for instance, had spent much of his adulthood drinking and using drugs while he lived the high life of a rock-and-roll promoter. He tried quitting on his own, tossing pills and bottles into a casket at an elaborate "wake" for his addictions. Finally, he went to the Betty Ford Center for treatment.

Banishing the pink elephant. About half a million people each year make a similar decision, seeking a treatment slot at Betty Ford, the Hazelden Foundation, Par Village, Delancey Street in San Francisco, and a host of other inpatient and outpatient treatment centers. Up to a million more get in touch with Alcoholics Anonymous. For the most impaired, the first step is to get weaned from alcohol. This is the time when patients can become leg-jiggling, arm-scratching, face-touching, whirling dervishes of inattention, seeing the "pink elephants" of lore. They can have tremors, hallucinations—even seizures. The brain has grown accustomed to an artificial balance between chemicals that cause excitation and those that cause in-

tion in school, even if grades remain good.

Children like Nicole have the deck stacked against them. Nicole has never met her father, and her mother is an alcoholic in treatment as a condition of retaining custody. Children of alcoholics are from two to four times more likely to develop the disease. The genetic underpinnings of alcoholism are not well understood, but one contributor is the body's inherited ability to make a liver enzyme that is good at metabolizing alcohol. A high enzyme level gives even young people the ability to drink their peers under the table.

Growing up in an alcoholic family seems to play a role apart from genes. Nicole was used to seeing her mother drink with roommates and friends. "A lot of kids from addicted families say that

the first time they ever felt normal was when they drank," says Jerry Moe, who runs prevention programs for at-risk children at the Betty Ford Center in Rancho Mirage, Calif.

Even in families without a

legacy of alcoholism, starting to drink later seems to better the odds of avoiding addiction. By eighth grade, 52 percent of adolescents have consumed alcohol, according to a Robert Wood Johnson survey. A 1998 study in the *Journal*

of *Substance Abuse* estimated that for each year a teen delayed drinking between ages 13 and 21, the likelihood of developing addiction decreased by 5 percent.

Experts say children in alcoholic families must realize that they are at an increased risk for the disease and figure out how to say no to drinking until adulthood. "They can say, 'I'm allergic to it' or 'It makes people in my family sick,'" says Moe. And alcohol may be less of a lure if kids get involved in activities like music or sports.

Nicole is hoping to play on a soccer team when she goes home. She recognizes she has to find new ways to have fun. "I know what can happen, and I'm scared," she says. "All the time, I think, I'm only 13 and I have to put away all that fun—the only fun I know how to have." —S.B.



Peer pressure makes it hard to just say no.

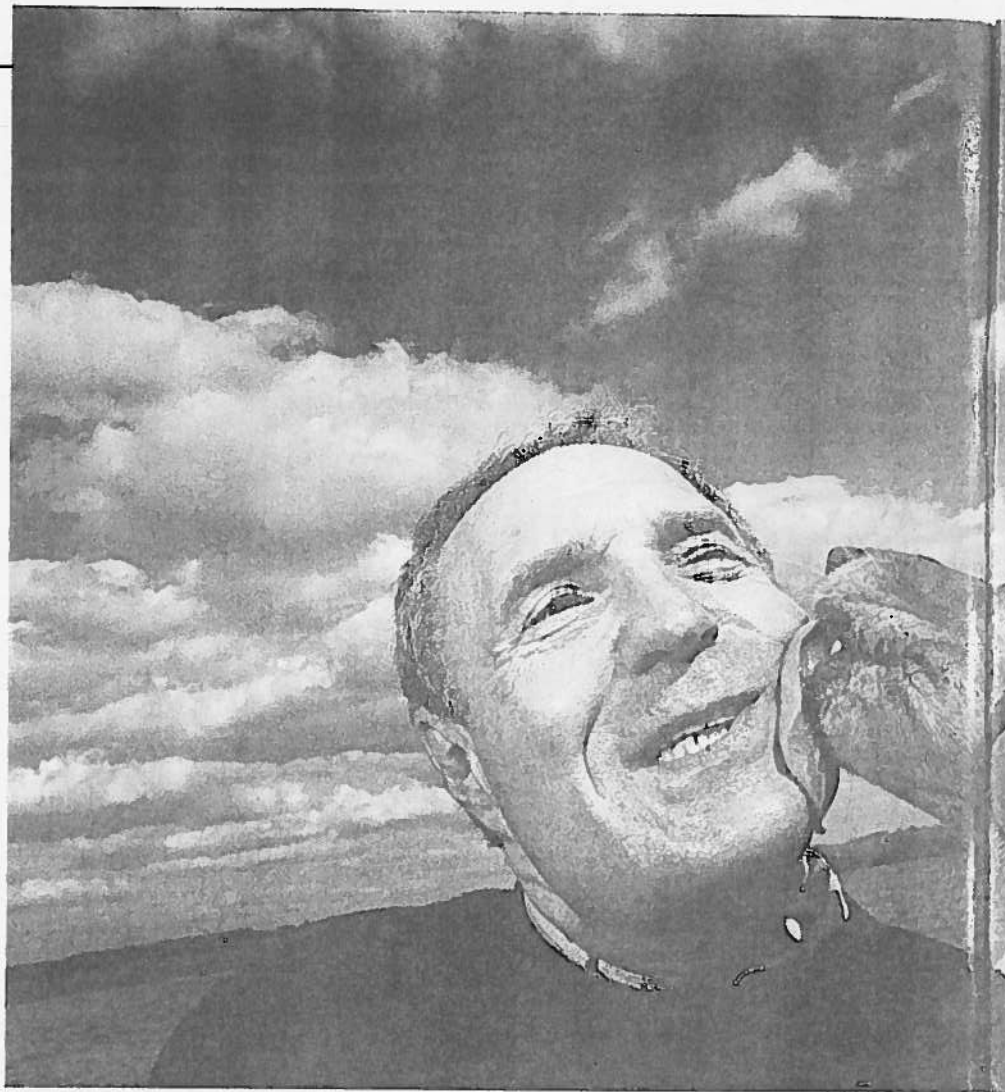
hibition. Sudden withdrawal of alcohol alters the balance in favor of excitation. Valium can help, but it, too, is addictive. Some nonaddictive anticonvulsants, like carbamazepine, divalproex, and gabapentin, can also ease the passage.

Withdrawal is the relatively easy part, generally lasting three days or less. Dealing with the ongoing verbal dual between the devil on one shoulder and the angel on the other is the hard part. The brain has been reprogrammed to compulsively want a drink, and hundreds of individual thoughts or actions can trigger the craving—a walk past the neighborhood tavern or even seeing a beer commercial.

Subconscious desires. Craving can haunt recovering alcoholics even in sleep. “I had a dream last night that my friend met me at the airport with a huge glass of champagne,” says Monica, 40-ish, tall, slim, and regal, who is checking out after 28 days at the Betty Ford Center. Such dreams are an indication that craving never rests. “Dreams are drives that call out for satisfaction,” says Brian Johnson, a Boston psychoanalyst who specializes in addiction treatment.

Mark George, along with Anton, at the Medical University of South Carolina has done some of the first brain imaging showing the power that the mere thought of a drink can have on a recovering alcoholic’s brain. He put alcoholics and non-alcoholics inside an MRI, then showed them photographs of martinis, beer bottles, or glasses of wine. They were also shown pictures of soft drinks and coffee, and a third set of neutral images. In alcoholics, the frontal cortex lights up with desire at the alcohol images.

Drugs can help dampen that desire, although no one knows exactly how. An early drug called Antabuse, now little used, made patients sick when they took a drink but didn’t kill the craving. Naltrexone appears to. Originally used to



counteract opiates like heroin, it might work by blocking a pleasurable surge of natural opiates released in the brain by an image or thought of alcohol. The drug may have worked for Scott Campagna, 23, of Atlanta, who participated in an ongoing trial. Campagna says he binges about twice a week—seven or eight beers and two or three hard drinks. “I feel I could quit or cut back if I wanted to,” he says. He

believes he got the drug, not a placebo, because he thought less about drinking the week he took it.

Another substance, acamprosate, has shown promising results in Europe. And ondansetron was found to reduce drinking and increase days of abstinence in clinical trials. Yet for now, alcoholism treatment centers are reluctant to prescribe drugs. At the Betty Ford Center, for ex-

BEYOND EXCUSES

How to help an alcoholic

The old wisdom held that alcoholics must hit bottom and find their own way back. And, indeed, treatment odds improve the more the drinker wants to change. But there are steps that friends, family members, and doctors can take to convince an alcoholic that it’s time to get help:

- Stop making excuses and getting the drinker out of jams—a broken social engagement, a suspended driver’s license. When an alcoholic experiences these consequences, he or she may be motivated to stop.
- Talk about your concerns during what may be rare moments of calm sobriety.

And provide details of recent personal disappointments and calamities.

- Put your foot down—but only if you’re certain you will follow through on your threats, such as moving out of the house.
- Ask a trusted friend to reinforce your concerns with the drinker.
- Get advice about how to stage an intervention in which friends, family, and a therapist confront the alco-

holic. Up to 80 percent confronted in this way agree to get help.

- Enlist the help of a family doctor. Studies have shown that even brief discussions with physicians can persuade alcohol abusers to moderate their drinking or seek treatment.
- Gather information on treatment programs so that you’re ready with a plan when the drinker is willing to get help. —S.B.



JAY EHRLICH

Getting high on the pleasure of a kiss. "Chemicals did something for me. And then one magical day, they stopped."

ters, such as Betty Ford, have success rates of more than 60 percent.) Other chronic diseases, such as diabetes and asthma, have similar relapse rates after medical treatment, according to a study published last fall in the *Journal of the American Medical Association*. A setback isn't cause to give up. "There is no, I repeat no, treatment [for alcoholism] that is finished at the end of a residential stay," says A. Thomas McLellan, author of the JAMA study. "There aren't cures here."

Treatment experts say patients and families should be skeptical of programs that promise much higher success rates—say 80 percent or more. Experts also caution against programs that forbid drugs of any sort, even such nonaddictive medications as some antidepressants, which can help some alcoholics.

No matter how much scientists learn about the brain changes behind alcoholism, much of the work of recovery still will fall to patients. And so will the rewards. "When I was drinking, my life was a roller coaster, and when I was first sober, I thought sobriety would be a dull, flat line," says Clarke. Yet since she stopped drinking, she has lived in Hawaii for a year, traveled to sunny climes with friends, and painted desert scenes in California and cherry blossoms in Virginia. "Now, instead of just daydreaming, drunk on the couch, about wonderful things I would do, I do wonderful things." ●

U.S. News spoke to dozens of alcoholics. Some agreed to be fully identified, others by their first names only. For those who requested confidentiality, fictional names are used.

ample, counselors might sometimes suggest naltrexone to fight cravings if follow-up contact shows that a patient has repeatedly relapsed. But the drug is not used during the stay there. Helping heavy drinkers cut back may not be enough to treat actual alcoholics, say counselors. Most experts think moderate drinking is not an option for a true alcoholic

Talk therapies. Experts are betting that new generations of drugs will work best when combined with counseling and group therapy. These talking therapies, researchers believe, help the brain learn to compensate for the damage done, just as rehabilitation helps a stroke victim's brain relearn speech or movement. Many alcoholics must relearn how to accept responsibility for themselves and how to behave toward others. Almost all group programs incorporate the 12 steps of AA, which help people just starting their recovery get support from veterans of the struggle.

A large-scale study in 1997 that tested three kinds of treatments—cognitive therapy, motivational therapy, and group AA meetings—found that roughly half the patients in each group reduced their drinking or avoided heavy drinking. (Some cen-

WHERE TO LEARN MORE

- **Treatment.** For a list of programs as well as a discussion of approaches, visit the American Society of Addiction Medicine at www.asam.org.
- **Support.** Find a comprehensive listing of support groups for alcoholics and their families at mentalhelp.net/selfhelp.
- **AA.** Track down a nearby meeting at www.alcoholics-anonymous.org.
- **Questions.** For answers to questions such as how to tell if you are an alcoholic, see www.niaaa.nih.gov.

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