Alcohol's Effects on the Brain

An interview with William Shoemaker, Ph.D.

Q. Is the addiction to alcohol physical or mental?
A. Both. There are physical symptoms when people who chronically consume alcohol withdraw from it, and there is also a psychological dependence on alcohol. So it is both.

Q. Can people who experience the physical addiction also have the mental addiction, or are these both mutually exclusive?
A. They usually go together.

Q. Is there a difference in the brain chemistry of a long-time alcoholic and a nondrinker?
A. When someone has been an alcoholic for a long time, many of the cells in the brain die; as a result, their brain is going to be different. If you look at the constituents of the brain, you would see that certain cell populations have dropped out—disappeared—in the alcohols.
And if you do a CT [computed tomography] or PET [positron emission tomography] scan on these people, the total volume of brain is smaller. There has been some shrinkage; the shrinkage is due to death of cells that are not replaced.

Q. If an alcoholic stops drinking, does the brain return to its healthy size or does it remain shrunken?
A. Well, if it has gotten to the point where the cells have died, they do not come back. If it has gone to that extent then ceasing to drink is going to stop the neurodegenerative trend, but it is not going to go back to normal. Certainly, there are many people like this, and they can live happy and useful lives, even with a certain amount of brain damage.

Q. What kind of problems come about from a long-term change in the brain?
A. Many things change. The lesions from long-term alcohol use have a certain pattern. Many of the people who are in this situation are found to have Korsakoff's disease. Motor impairment and cerebellum impairment develop, so balance is affected. Memory and cognitive function are affected.
Many times people cannot take care of themselves, and they may need to be hospitalized or placed in nursing homes.

Q. Do brain cells regenerate once they are gone?
A. No.

Q. Does alcohol abuse have any affect on a person's physical appearance?
A. You really can't tell by looking at people whether they are addicted. Certain vascular conditions can show. This sometimes happens with alocholics, especially in the nasal area. Sometimes you'll see this, but there are other things that cause this vasculitis, not just alcohol. You will see it in long-term alcoholics. You have to do a medical work-up and a psychiatric work-up, with an emphasis on questions about substance abuse to determine whether a person has alcoholism.
Certainly, other kinds of chemical addictions, say cocaine or heroin addiction, in which the time course to reach the addiction state is much shorter, you can't tell by looking; there are no physical findings at all.

Q. What diseases or physical problems can come about from alcohol addiction?
A. Many, many things. Chronic alcoholism is related to liver disease and cirrhosis, which can be fatal. Pancreatic disease also can be life-threatening. People may also have cardiovascular complications. It is a number of different things.

Q. If you take a drink, what happens in the brain?
A. If it were easy to tell you this in "1, 2, 3," we wouldn't be studying it so intensely. But this gets technical.
Alcohol has affects on different neurotransmitter systems in the brain. In low amounts, it affects the GABA [gamma amino butyric acid] system. As the blood levels become higher, alcohol affects another common transmitter system, NMDA glutamate. This is a description of an acute alcohol effect, such as what happens if you go out drinking on a Friday night. These effects can be seen and felt. The next day, depending on how much you drink, the system would reset itself and it would be back to normal.
With chronic alcohol use, the cells in the brain and other tissue now find themselves maintained in a fluid that contains alcohol and they adapt to it. These adaptations have to do with neurotransmission in the brain and with the brain protecting itself from too much excitement or too much inhibition. You can see this when someone who has been consuming alcohol for a long time withdraws from it. Now, those cells have made these adaptations to an environment with a lot of alcohol, but now the alcohol

'Alcopops' Saturate Youth Market

In a relatively short amount of time, sweet-flavored alcoholic brews, or "alcopops," have swept across the country and have captured the attention of consumers under the legal drinking age of 21.
The American Medical Association (AMA) estimates that about 10 percent of all alcohol in America is bought by underage drinkers. Minors are believed to account for about $10 billion in annual sales. In 2002, sales of these types of drinks are up 43 percent, according to Chicago Data Analyst Resources, Inc. Alcopop advertising is everywhere. The products are thought to be successful because they are the classic "bridge" drink for people who do not like the taste of alcohol.
One of the newest brands of alcopops is Jack Daniel's Original Hard Cola, a beer-type beverage sold in a brown bottle that bears the name of the famous Kentucky distillery. The Hard Cola is not a cola at all but a brewed alternative with a 5 percent alcohol content. Bill Covaleski, a master brewer and president of Victory Brewing in Downingtown, Pa., told the Philadelphia Inquirer that the drinks "blur the line between alcohol and soda." He cannot believe that the government would approve a drink that is so "reckless and damaging" to the industry.
Alcohol makers do not believe that the new category of drinks is enticing to children. Both the Federal Trade Commission and the Bureau of Alcohol, Tobacco, and Firearms have rejected formal complaints about the drinks and found no evidence of wrongdoing in the brands' packaging and advertising.
Water Better Than Beer on Hot Days

An ice-cold beer may seem like the perfect answer to hot summer weather, but Dr. Christopher Keyes, associate professor of emergency medicine at the University of Texas-Southwestern, warns that water may be a more healthful option.

"When the weather is hot, your body needs more fluids to stay cool," Dr. Keyes says. "Alcohol actually contributes to dehydration, so you need to be consuming lots of water—and not alcohol—to keep your body hydrated and cool."

Alcohol also can increase blood pressure, which can cause your body to overheat. "The best thing to do is avoid alcohol when you're outside in the hot temperature," Dr. Keyes said.

Bad News From France

A French research institute, INSERM, in a 2001 report analyzed a large selection of scientific research concerning alcohol and its benefits and risks. The report, titled "Alcohol, Effects on Health," took one year to complete.

The researchers weighed the benefits against the risks of drinking in order to set up governmental standards that could not be questioned because of contradictory information. Currently, the health benefits of moderate drinking are coming under fire because of misleading data.

However, a French health education committee, financed an anti-alcohol television campaign to coincide with INSERM's findings. Along with the television ads, the CFES distributed information to doctors in the hopes that they would discourage their patients from drinking alcohol.

The French alcohol industry is reeling. Aside from the INSERM report, the French Health Secretary, Bernard Kouchner, set up a program to "accelerate the process of reducing overall alcohol consumption by targeting not only excessive drinking, but also moderate drinking, and no longer focusing just on the pejorative images associated with alcoholism."

The goal includes reducing the alcohol industry's influence on economic sectors and separating the association of the French national identity with the consumption of alcohol.

Some of the solutions offered to curb the widespread alcohol use include:

- warning labels
- enforcement of the law banning the sale of alcohol to minors
- revising the blood alcohol level (BAC)
- banning the sale of alcohol at service stations
- reinforcing the Loi Evin, which restricts tobacco and alcohol advertising in public areas.

Carrie Nation: Prohibitionist and Pioneer

The Prohibition movement of the late 19th and early 20th centuries grew out of a fear that society was harming itself beyond repair by consuming alcohol.

Early groups, such as the Anti-Saloon League and the Women's Christian Temperance Union, rallied citizens toward a Constitutional amendment to outlaw the sale, production, and consumption of alcohol. After America entered the First World War, Prohibition gained many proponents and became swept up in the huge patriotic boost of the times.

Carrie Nation, one of the first outspoken leaders of the Prohibition movement, was born in Kentucky in 1846. She married Dr. Charles Gloyd in 1867 but left him after their only daughter, Charlotte, was born disabled—something Carrie blamed on Lloyd's excessive drinking.

She remarried in 1877 and began lecturing on the vices of tobacco and alcohol. She often encouraged her followers to take hatchets, bricks, and iron rods to destroy saloons to disrupt the brewing industry. She stood nearly six feet tall and is often depicted as wielding a hammer, standing over broken beer barrels, like a turn-of-the-century folk hero.

Prizefighter John L. Sullivan, also known as "The Boston Strong Boy," reportedly cowered from Carrie Nation after she stormed into his New York City saloon. He eventually denounced his lifestyle and became a staunch supporter of temperance and prohibition.

The effects of the Prohibition movement on public health and wellness are debatable, but Carrie Nation holds the distinction of being the first successful female political activist in the U.S. In her time, it was unheard of for a woman to be outspoken with her beliefs. The fact that she helped pushed through a seemingly unpopular Constitutional amendment stands as a testament to her willpower and charisma.

Alcohol and the Brain

Continued from page 3

is gone. Those cells are not prepared and not adapted for an environment that does not contain alcohol. That is what causes withdrawal symptoms, and it takes several days to a week for them to go back to where they were before, in a certain way, and not misfiring or pathologically reacting.

Q. Do they ever go all the way back, or is there always some kind of damage?

A. It's hard to know on a cellular basis, but we know on the organism basis. People who have had long-term alcoholism and then managed to stop drinking are probably not going back to where they were before. They are changed somewhat, and they are much more sensitive to alcohol. It is a process we call "sensitization," and it happens with other psychotropic drugs as well.

Now, they can be sober for quite a long time—many years. If they then take a drink after all those years, it's not like they were just starting off as a teenager. They have the syndrome of craving and the syndrome of out-of-control drinking, and those reinitiate themselves very rapidly. These patients are very sensitive to alcohol, and they are out of control very quickly.

If you know anything about Alcoholics Anonymous (AA), these facts are understood from the very beginning. When people from AA introduce themselves, they say "Hi, my name is Joe, and I'm an alcoholic," even if they haven't had a drink in 30 years. They somehow understand that they are different and that they have to continue to work to stay sober because there is probably some irreversible change that has gone on.

These people are recovered in terms that they are not drinking, and they can lead a pretty normal life; however, it is never back to ground zero. They must always be careful. Many of them understand this and continue to go to AA meetings for their whole life. They feel that they need that support and that they are not how they were when they started.

Q. What is the difference between craving and an addiction?

A. That's a good question, actually. A "craving" is a subjective feeling of want or desire. A craving can be for anything. You can have a craving for candy bars or a glass of orange juice, but we don't consider you addicted to those.

An addiction has to do with chemical substances that have a profound effect on the brain. The [substance] takes over a person's life. The thoughts and actions of addicted persons are directed toward obtaining a drug or getting another drink, even though the world around them is crumbling. Cravings are just normal, everyday feelings, but they can also be for these drugs.

Q. How can we explain someone who can drink heavily for an extended period of time and then give it up abruptly?

A. I don't think that there is such a person. If people are drinking every day for a long period of time, they can't quit suddenly. The body is in this neuroadapted state. The whole nervous system is going to scream out. In fact, people shouldn't try to do that. Withdrawing from long-term alcohol use is a serious medical problem and it should be supervised med-
Alcohol and the Brain

Continued from page 7

ically, there are medications that people can take that ease this transition with the knowledge we have of what goes on with the cells. They can ease transition and make it less risky. The withdrawal process can be life-threatening. In the old days, before this was understood, many people died trying to withdraw from alcohol.

Q. How would they die?
A. If addicts were unable to obtain the substance, they went into withdrawal. Withdrawal can be very severe, and it affects the entire nervous system. It is not clear exactly why addicts might have died, although it is suggested that their sympathetic nervous system is highly activated in that condition, which might have affected the heart rate and the vascular system. In addition, the condition of the brain cells might be related to the occurrence of convulsions, so that's also serious. They can have an epilepsy-like fit—uncontrolled convulsions.

Q. Are drugs available to treat withdrawal symptoms?
A. Oh yes.

Q. How do they treat them?
A. I mentioned that alcohol affects the GABA system. A class of drugs called benzodiazepines act on GABA receptors by keeping the GABA receptor from getting too wild; these agents can then be tapered slowly. Sometimes an anti-convulsant called carbamazepine is also used. Chronic alcoholics may also have nutritional and metabolic deficiencies, and these problems must be treated as well. Alcoholics are almost always thiamine-deficient. Levels of niacin and folate, together with blood electrolytes, must be monitored. Other drugs might be given to control autonomic hyperactivity, which occurs during withdrawal. Finally, these patients should be under medical supervision.

Q. Do the relapse rates for people who are addicted to drugs like nicotine and differ from the rates for alcoholics?
A. Well, everything is different. One of the most addicting drugs is cocaine, and yet cocaine withdrawal is not associated with dangerous physical withdrawal symptoms, except for psychiatric symptoms, including depression, which can lead to suicide. Nicotine is one of the most severe addictions that people have; this substance is more addicting than alcohol. Nicotine withdrawal creates some symptoms, but they are not as severe and usually people can handle it. People can buy nicotine gum or nicotine patches, so withdrawal from nicotine doesn’t have the same physiological effect as alcohol withdrawal. Heroin withdrawal and addiction probably should be managed because there are uncomfortable and painful consequences. But none of them are as life-threatening as those of alcohol withdrawal.

Q. In movies, sometimes people treat withdrawal by locking themselves in a room, or a person is sedated until the symptoms go away. Is there any merit to these methods?
A. I don’t think you should sedate people for as long as that, because withdrawal might take several days or weeks. They can be given other kinds of support—psychological support. That’s what these detoxification centers can try to do. Everyone else there is trying to accomplish the same thing, so you have group support.

That kind of Hollywood view of withdrawal, where the person is just okay, isn’t exactly true. First, we mentioned that when people “come down” from an addiction to go clean, they are not the same as when they started. They have to be careful. Second, one of the things that will happen—especially in the time period close to when they withdrew—is that they will have very strong craving and will be very susceptible to trying to go back to re-experience the feelings that they had when they first started using the drugs.

Q. Does the brain of a person who craves alcohol differ from that of an alcoholic?
A. They are starting to use MRI scans for this. But it is unlikely that MRI would become routine for this purpose; it is a tool for research. You can’t see either addiction or craving by looking at the brain. If a person has been consuming alcohol for a long time, the brain cells start to die. You can tell that by using brain scans when the craving reaches a moderately severe level. But craving itself is not going to show up in a way that you can view it.

Q. Why does alcohol cause violent behavior?
A. In low doses, there is a release of behavioral inhibition, and that is why it’s such a popular drink. People who are sociably uninhibited become more friendly and outgoing after a drink or two. But for some people, the inhibition may be necessary to keep other kinds of feelings from coming out. So when they drink, now you’re seeing a different kind of person, one who might be prone to violence.

It is not just the alcohol. It is the combination of the alcohol with some kind of underlying personality structure.

Q. How does alcohol result in memory loss and motor impairment?
A. The long-term affects cause cell death. Some of those cells are related to memory, and some are related to motor impairment. For instance, on a temporary, one-night-of-drinking situation, a lot of people wake up the next day and cannot remember what happened. That is because alcohol, in higher doses, affects the NMDA glutamate system, which must operate correctly for memories to be incorporated. When people drink to excess, that system just stops working. The drinker loses the memory of what happened during that time.

Of course, too much alcohol can cause people to become sedated and to pass out; in such a situation, of course; they will not remember any of that.

Q. Some say that blackouts are a sure sign that you have a drinking problem. Is it possible to black out with occasional use and not be an alcoholic?
A. I suppose. A so-called binge-drinker might drink to excess on the weekends and might have blackouts. However, it is difficult to know where excessive binge-drinking ends and the start of more addictive drinking begins. The binges sometimes start on a Friday night and end on a Monday morning, but then maybe a person will want to get a head start on the weekend and start earlier. When you get to that point, you’re in the realm of becoming an alcoholic.

Q. How does alcohol raise the risk of stroke?
A. We mentioned that alcohol has cardiovascular effects. The blood vessels are highly innervated by sympathetic and parasympathetic and other aspects of the nervous system. As alcohol takes its toll on the nervous system, some suggest that that the plasticity and the elasticity of the blood vessels start to decrease. This event would contribute to a cerebrovascular accident.

Alcohol does many things to many organ systems. Alcohol affects the liver, which makes a lot of substances and chemicals that the brain and the rest of the body need. Now you’re cutting down on those, and perhaps the ratio of substances in the blood stream is changed in alcoholics. This may contribute to the building up of plaques and occlusions in the blood vessels.

Q. How much abuse can the liver take before the damage is irreversible?
A. Well, the abuse is not measured; we just treat the patient. The liver is tested to see how serious the disease is and to try to reverse it. There are other causes of liver disease, of course, but I would say that next to the brain, the liver is very complicated and very vital. If you don’t take care of it, you will pay a price. Even small amounts of dysfunction will be felt. The liver has certain regenerative properties. If you can get it treated in time, it is likely to recuperate.

Q. What effect does alcohol have on an unborn child in a mother who might not know that she is pregnant?
A. This is a real problem. Sometimes mothers did not know that they were pregnant; they were drinking regularly, then found out they were pregnant, stopped drinking, and still had a child who had growth retardation, small brain size, mild to moderate retardation—all signs of fetal alcohol syndrome.

Continued on page 16
"So much for intelligent life."

Alcohol and the Brain

Continued from page 8

So, heavy drinking at any time during pregnancy can be a problem. The effects vary in different periods of pregnancy when the alcohol is present. In most women who give birth to a child with fetal alcohol syndrome, the mothers have been drinking all the time. Embryonic development is highly regulated, and excess alcohol abuse can upset that regulation.

Q. What kind of damage can alcohol do to the developing brain of a child or teenager?

A. We are trying to learn the answer to this now. We learn about these things using animal models. There haven't been too many attempts to look at an animal model of teenagers. When researchers examine juveniles, they find that alcohol can be quite damaging. I don't know if the effects would be any different in adults, but the systems of younger people seem to be more sensitive. Usually, individuals in that age range will sample alcohol and drink it from time to time, but they are not usually alcoholics. It isn't the same kind of problem as with adults. Adolescence is still a vulnerable time, and since the evidence is that more and more young people are drinking alcohol, we are paying more attention to the consequences of adolescent drinking.

William Shoemaker, Ph.D., is an associate professor of psychiatry at the University of Connecticut Health Center. He is a member of the Alcohol Research Facility, a federally funded research center in Connecticut.

Yeast Connection

Continued from page 11

juice in it or something. Cane is a natural substance, but it is sugar and it will be a problem.

Q. What are some common misdiagnoses of yeast-related illnesses?

A. The ones that first pop into my mind are mental health conditions. I think that when people feel sick all over and cannot get better and their blood work looks normal, they may well be told that "it's all in their head."

In the Yeast Connection, we talk about yeast-related illnesses; these are illnesses that are related to yeast overgrowth. We don't say "this is a yeast illness, as opposed to that."

Q. When was the first Yeast Connection published?

A. In 1984.

Q. What has changed since then?

A. I think that a number of things have changed. There has been a huge shift in individuals seeing themselves as active participants and partners with their health care professional. People do not have a notion that there is a silver bullet out there, and they understand that health is more complex than that and that it is more about diet. There has been a huge shift in the past 20 years with diets. When my father (Yeast Connection author William G. Crook, M.D.) wrote the Yeast Connection Cookbook 10 years ago, it was important to give people some sense of how to think about food and how the food they take into their body is going to make them feel.

I think that we are more knowledgeable and open about the increasing emphasis on the integration of our emotions with our physical well-being. I think that people now understand this relationship better.

I think that one of the shifts that we see, support, and promote is that individuals have their own feelings and intuitions about their bodies. We are coming to respect that, we hope. Intuition has been disrespected by mainstream medicine, and we have been told that the person with the answer is somebody out there in a white coat. Again, I think people are saying that they have a sense of what is wrong.

Elizabeth Crook is the daughter of William G. Crook, M.D., the author of the first Yeast Connection and Women's Health, and a pioneer in the field of candida yeasts. Ms. Crook currently works on behalf of women's health issues as a consultant to physicians, nurse practitioners, nutritionists, and other health care professionals.

Carolyn Dean, M.D., N.D. is medical advisor on Yeast Connection and Women's Health. She is the author of two other medical books.

From Vegetus Books

EATING FOR LIFE: The Ultimate Diet

By Nathaniel Altman

Thousands of books and pamphlets have been published extolling the latest diet, the most miraculous way to lose weight. Sometimes the regimens are temporarily successful in effecting rapid weight loss, only to disappoint the dieter by long-term inadequacy. Others are outright dangerous.

EATING FOR LIFE describes the ideal regimen, a simple approach to healthful eating that enables the body to adjust to its natural effective weight level.

Vegetus Books

P.O. Box #406, Haverford, Pa. 19041

Now available for $5.95, $1 off the list price. Learn how you can take responsibility for your own well-being and be an empowered patient. Send me a copy: Enclosed is my payment. (Please add $1.50 for postage and handling.)

Name

City

City

State

Zip Code

"The kids are all healthy, except for having athlete's feet."