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The Effects of Chronic Heavy Drinking on Brain Function Are Underdiagnosed

Alcohol-related cognitive decline may include impaired memory, decision-making and regulation of emotions and anxiety

By MELINDA BECK
Dec. 21, 2015 1:33 p.m. ET

Here's a sobering thought for the holidays: Chronic heavy drinking can cause insidious damage to the brain, even in people who never seem intoxicated or obviously addicted.

Experts say alcohol-related brain damage is underdiagnosed and often confused with Alzheimer's disease, other forms of dementia or just getting older.

Now, brain imaging is revealing how long-term alcohol abuse can change the structure of the brain, shrinking gray-matter cells in areas that govern learning, memory, decision-making and social behavior, as well as damaging white-matter fibers that connect one part of the brain with others.

"As we get older, we all lose a little gray-matter volume and white-matter integrity, but in alcoholics, those areas break down more quickly. It looks like accelerated aging," says Edith Sullivan, a professor of psychiatry and behavioral science at Stanford University, who has studied alcohol's effects for years.

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Long-term alcohol abuse also changes how the brain regulates emotion and anxiety and disrupts sleep systems, creating wide-ranging effects on the body. Increasingly, clinicians are diagnosing "alcohol-induced neurocognitive disorder" and "alcohol-related dementia."

How much is too much? The National Institute of Alcohol Abuse and Alcoholism says the probability of serious health issues is low for men who have no more than 14 drinks a week, or 4 on a single day, and women who have no more than 7 drinks a week, or 3 on a single day. *PHOTO: GETTY IMAGES*

How much is too much and over what period of time? Researchers are reluctant to say, because alcohol's effects are highly individual and based on genetics, age, sex, patterns of consumption and general health. The National Institute of Alcohol Abuse and Alcoholism (NIAAA) says the probability of serious health issues is low for men who have no more than 14 drinks a week, or 4 on a single day, and women who have no more than 7 drinks a week or 3 on a single day. Some people, though, experience severe effects at much lower levels.

Meanwhile, some studies show that people who drink moderately (generally defined as 1 drink a day for women, 2 for men) have a lower risk of cardiovascular disease, depression and some cognitive issues than those who don't drink at all. But the risks of harm rise sharply the more alcohol people consume. "Low levels of alcohol may improve blood flow to the brain—but there's a tension between that and reduced white matter," says Ian Lang, a dementia expert and senior lecturer in public health at the University of Exeter Medical School in England. "At some levels, there may be a tipping point where the harmful effects outweigh the benefits."

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Also unclear is whether heavy drinking during a person's teens and 20s, when important brain connections are still forming, has a lasting effect on brain function in later life.

Some researchers are bracing for a wave of cognitive problems as baby boomers age. "Sad to say, we think their increased exposure in the 1960s has put them at substantially higher risk for alcohol-related mortality and morbidity than the generation before them," says Gary Kennedy, chief of geriatric psychiatry at Montefiore Medical Center in Bronx, N.Y.

Imaging studies show that while long-term heavy drinking impacts the entire brain, the greatest damage occurs in the frontal lobe that controls executive function, which includes planning, controlling impulses and modifying behavior. "The very part of the brain that you need to change your alcoholic intake may be most impacted by drinking," says Catherine Fortier, an assistant professor at Harvard Medical School and researcher at the VA Boston Healthcare System, who has led many of the imaging studies.

THE GOOD, THE BAD, THE DANGEROUS

While the effects of alcohol consumption are highly individual, government researchers suggest these general guidelines.

'Moderate': Up to 1 drink a day for women, 2 for men. Drinking at this level can lower the risk of cardiovascular disease and depression, and help maintain cognitive function, according to some studies.

'Low risk': Up to 3 drinks a day and 7 a week for women; 4 a day and 14 a week for men. Staying within both the daily and weekly limits has a low risk of short- or long-term health issues. Experts say pregnant women, and people under 21, planning to drive, or taking certain medications should abstain.

Heavy or 'High Risk': More than 3 drinks a day and 7 a week for women; 4 a day and 14 a week for men. Exceeding these levels regularly runs the risk of long-term cognitive damage, memory loss, depression, cirrhosis of the liver, high blood pressure, stroke, Type 2 diabetes, cancer of the throat, esophagus, breast and colon, as well as drowning, falling and being hurt in motor vehicle accidents

Source: NIAAA, U.S. Dietary Guidelines

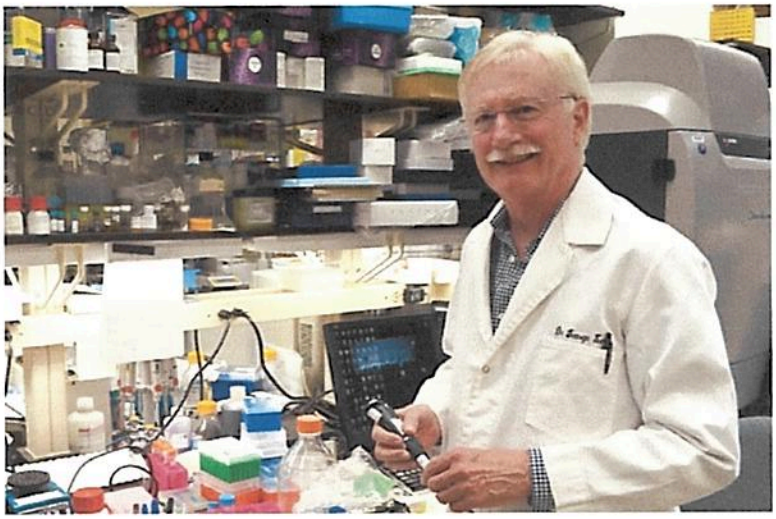
Many of alcohol's effects on the brain and behavior are similar to cerebral-vascular dementia, the second most common form of dementia, which reduces blood flow to the brain and affects thinking and reasoning more than memory, as Alzheimer's disease does.

That's important for families to keep in mind, says Dr. Kennedy. "A person may have only minor impairments in memory, so families can't understand why they aren't taking care of themselves, can't manage a checkbook, can't get out of the house or stay on a task."

Such damage to executive function is more subtle than the severe forms of alcohol-related brain damage known as Wernicke-Korsakoff Syndrome, in which chronic alcohol consumption causes a deficiency in thiamine that can lead to hallucinations, amnesia, psychosis and difficulty walking. Wernicke-Korsakoff is rarely seen today, experts say, because alcoholics are routinely given thiamine to prevent it.

Researchers are also shedding new light on alcohol's long-term impact on depression, stress and anxiety.

While it isn't clear whether heavy alcohol use also causes depression, or vice versa, experts say there is clearly a vicious cycle: "People often drink because they don't feel good, but drinking makes them feel worse, so they drink more," says NIAAA director George Koob.



Dr. George Koob, director of the National Institute for Alcohol Abuse and Alcoholism, is one of the researchers who have shown how heavy alcohol use hurts the ability of the brain's frontal cortex to control the amygdala, the center of emotions—which explains why drinkers often have mood swings and outbursts. *PHOTO: ERIN BRYANT*

Dr. Koob and other researchers have shown that heavy alcohol use hurts the ability of the frontal cortex to control the amygdala, the center of emotions—which explains why drinkers often have mood swings and outbursts.

"One minute you're putting your arm around a friend, and the next minute, you're crying or saying something you didn't intend," says Dr. Koob. With long-term heavy drinking, the amygdala becomes increasingly oversensitive to stress, he says.

Chronic imbibers might also become stuck in a state of high anxiety and fear, much like post-traumatic stress disorder, according to studies at the Bowles Center for Alcohol Studies at the University of North Carolina, Chapel Hill. In classic "fear learning" experiments, mice can be trained to freeze when a light cue is followed by a mild shock, and learn to relax again if the shock is discontinued. But mice fed the equivalent of six drinks a day for weeks were never able to feel safe again and were constantly fearful. "In short, chronic alcohol can block this form of learning and can negatively impact how you go through life," says Thomas Kash, an associate professor of pharmacology at UNC School of Medicine.

Researchers are also studying to what extent alcohol-related brain damage is reversible and finding mixed results. Some former alcohol abusers show permanent damage to the hippocampus, a region that regulates balance. But longitudinal studies tracking life-long drinking patterns show that some white- matter damage can repair itself—particularly if people stop drinking before age 50. "Fifty seems to be a critical threshold, probably because brain tissue is less able to recover after a certain age," says Dr. Fortier.

Studies at Stanford found that former alcoholics and people with no history of alcoholism can perform equally well on cognitive tests, although brain scans showed they used different brain pathways to do so. "The alcoholics used wider and additional areas of the brain to get the job done," says Dr. Sullivan. "My worry is that this may come at a cost. If you are recruiting different areas of the brain, it might be harder to switch your attention from one activity to another."

Studies have also found that for people who aren't dependent, even a five-minute conversation with a doctor about the risks of drinking can reduce problem drinking by about 25%.

Alcohol researchers say more health-care providers—and family members—should broach the issue with patients and point out the dangers. "One of the biggest problems in alcoholism is denial," says Dr. Sullivan. "Getting over that is the first step to recovery."

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