

What Alcohol Really Does to Your Brain.

David DiSalvo, 10/16/2012

What happens once that vodka cranberry works its way through your bloodstream and hits the control center behind your eyes?



Chris Goodney/Bloomberg News/Getty Images

We hear many different things about how alcohol affects the brain and body, most notably that it is a depressant. That's only part of the story. Alcohol is a depressant, but it's also a sort of indirect stimulant, and plays a few other roles that might surprise you.

Alcohol directly affects brain chemistry by altering levels of neurotransmitters — the chemical messengers that transmit the signals throughout the body that control thought processes, behavior and emotion. Alcohol affects both “excitatory” neurotransmitters and “inhibitory” neurotransmitters.

An example of an excitatory neurotransmitter is glutamate, which would normally increase brain activity and energy levels. Alcohol suppresses the release of glutamate, resulting in a slowdown along your brain's highways.

An example of an inhibitory neurotransmitter is GABA, which reduces energy levels and calms everything down. Drugs like Xanax and Valium (and other benzodiazopenes) increase GABA production in the brain, resulting in sedation. Alcohol does the same thing by increasing the effects of GABA. This, by the way, is one reason you don't want to drink alcohol while taking benzodiazopenes; the effects will be amplified, and that can slow your heart rate and respiratory system down to dangerous levels.

So what we just discussed accounts for the depressant effects of alcohol: it suppresses the excitatory neurotransmitter glutamate and increases the inhibitory neurotransmitter GABA. What this means for you is that your thought, speech and movements are slowed down, and the more you drink the more of these effects you'll feel (hence the stumbling around, falling over chairs and other clumsy things drunk people do).

But here's the twist: alcohol also increases the release of dopamine in your brain's “reward center.” The reward center is the same combination of brain areas (particularly the ventral striatum) that are affected by virtually all pleasurable activity, including everything from hanging out with friends, going on vacation, getting a big bonus at work, ingesting drugs (like cocaine and crystal meth), and drinking alcohol.

By jacking up dopamine levels in your brain, alcohol tricks you into thinking that it's actually

making you feel great (or maybe just better, if you are drinking to get over something emotionally difficult). The effect is that you keep drinking to get more dopamine release, but at the same time you're altering other brain chemicals that are enhancing feelings of depression.

Research suggests that alcohol's affect on dopamine is more significant for men than women, which may account for men drinking more than women on average. According to results from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), alcoholism affects men more than women: About 10 percent of men, compared to 3 to 5 percent of women, become alcoholics over the course of their lifetime.

Over time, with more drinking, the dopamine effect diminishes until it's almost nonexistent. But at this stage, a drinker is often "hooked" on the feeling of dopamine release in the reward center, even though they're no longer getting it. Once a compulsive need to go back again and again for that release is established, addiction takes hold. The length of time it takes for this to happen is case-specific; some people have a genetic propensity for alcoholism and for them it will take very little time, while for others it may take several weeks or months.

After the fold, there's a great summary from the website HowStuffWorks explaining how alcohol affects different parts of the brain:

Why drinking makes you less inhibited:

- **Cerebral cortex:** In this region, where thought processing and consciousness are centered, alcohol depresses the behavioral inhibitory centers, making the person less inhibited; it slows down the processing of information from the eyes, ears, mouth and other senses; and it inhibits the thought processes, making it difficult to think clearly.

Why drinking makes you clumsy:

- **Cerebellum:** Alcohol affects this center of movement and balance, resulting in the staggering, off-balance swagger we associate with the so-called "falling-down drunk."

Why drinking increases sexual urges but decreases sexual performance:

- **Hypothalamus and pituitary:** The hypothalamus and pituitary coordinate automatic brain functions and hormone release. Alcohol depresses nerve centers in the hypothalamus that control sexual arousal and performance. Although sexual urge may increase, sexual performance decreases.

Why drinking makes your sleepy:

- **Medulla:** This area of the brain handles such automatic functions as breathing, consciousness and body temperature. By acting on the medulla, alcohol induces sleepiness. It can also slow breathing and lower body temperature, which can be life threatening.

[Source: HowStuffWorks]