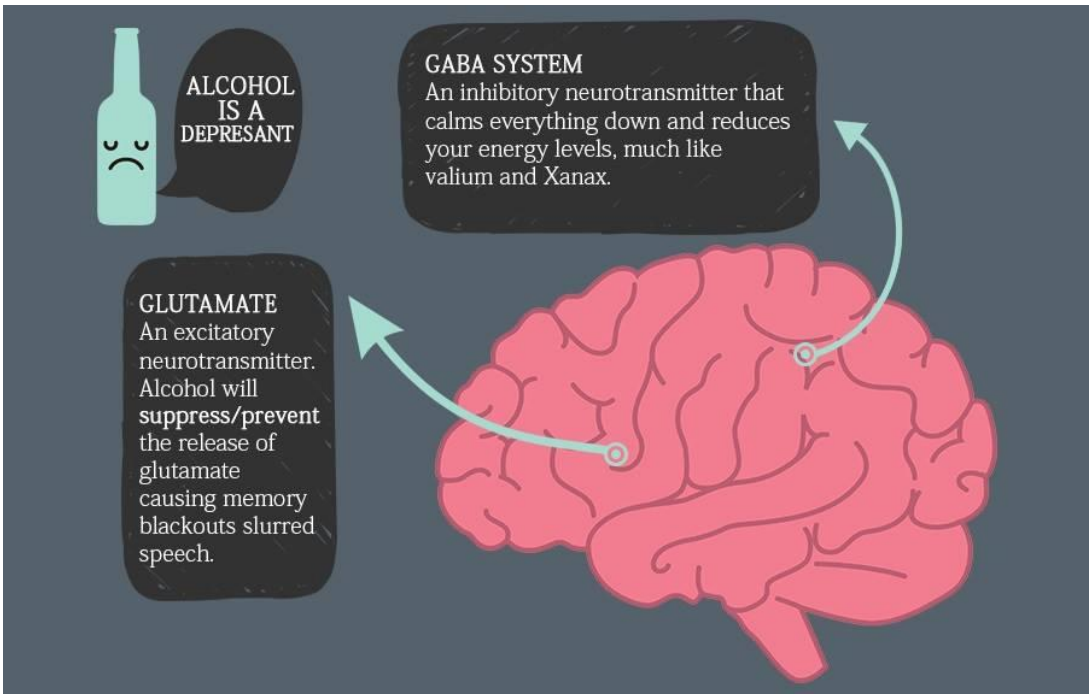
Daily Life with Christ-73: Understanding brain addictions (12): Psychoactive drugs: how alcohol changes the brain.



In examining psychoactive drugs, we have noted how caffeine and nicotine addictions change the brain. We now consider the physical changes in the brain due to alcohol addiction. Recall that psychoactive drugs refer to any substance that changes the chemistry in the brain—this means that alcohol is a psychoactive drug.

Let's review brain chemistry. Neurons in the brain communicate using special chemicals called neurotransmitters. One neuron releases a bunch of neurotransmitter molecules, and these molecules bind to receptors on neighboring neurons, which then actives those receptions and produces specific biological effects.

What happens with drugs of abuse is that they bind to the same receptors as natural neurotransmitters, but then produce abnormal levels of activity in those receptors. We have noted these effects in both caffeine and nicotine. It is precisely this abnormal activity that makes these drugs psychoactive as they give the user experiences of particular feelings, such a euphoria, excitement, or contentment.

Alcohol likewise binds to natural receptors and produces abnormal receptor activity. In fact, alcohol affects receptors for multiple neurotransmitters, and two of the most important are glutamate and GABA. Glutamate is the major excitatory neurotransmitter in the brain. It's the chemical that many neurons use to try to make neighboring neurons fire. The receptor of the Glutamate that is most affected by alcoholism is known as the NMDA receptor, which plays a major role in learning and memory. Alcohol binds to NMDA receptors and makes them less active. When alcohol binds, it actually changes the receptor and makes it less responsive to glutamate. In sum, alcohol inhibits glutamate and thus suppresses neural activity in the brain. This is why alcohol produces a sedative and hypnotic effect. Because NMDA receptors are affected, large doses of alcohol can produce blackouts and amnesia.

The second neurotransmitter that alcohol affects is GABA. While glutamate is the brain's major excitatory neurotransmitter, GABA is the major inhibitory neurotransmitter. When GABA receptors on a neuron are activated, they try to prevent the neuron from firing. So, increasing the activity of GABA actually suppresses neural activity.

A third effect in the brain are the effects on the nucleus accumbens and VTA (see illustration at Daily Life in Christ-59). Alcohol excites the nucleus accumbens, which brings more pleasure, and the VTA, which leads to increased dopamine release and thus more intensive craving. However, it should pointed out that although alcohol can be very addictive, it is not nearly as addictive as nicotine, cocaine, or heroin.

While there is nothing wrong or harmful with a moderate amount of alcohol, excessive alcohol is associated with a number of significant pernicious consequences. Excessive drinking, and drinking at inappropriate times, is associated with very significant health risks. For example, long-term, heavy drinking can lead to cirrhosis of the liver. It can also cause brain damage and shrinkage of the cerebral cortex. And, of course, drinking and driving can fatal consequences.

The first step in treating addiction to alcohol is typically detoxification, which means weaning the person off alcohol for a long enough period of time that physical dependence has subsided to the point of no longer experiencing withdrawal symptoms. In detoxification, a substitute for alcohol is given that mimics the effects of alcohol, like a Valium that activates GABA receptors like alcohol does.

After detoxification, the next step is generally psychosocial rehabilitation. This could be an individual or group therapy, or self-help ground like Alcoholics Anonymous. Those who participate are more likely to quit drinking than people who don't. However, they don't work for everyone. In fact, about 40-70 percent of people in these programs are drinking again after one years.

Another drug that is used to help alcoholism is called naltrexone. As we have seen, alcohol activates the nucleus accumbens, the brain's pleasure center. Naltrexone tries to help alcoholics quite by inhibiting the pleasure response. Reducing the pleasure associated with drinking can help alcoholics quit.

There is evidence from pottery jars in China that indicate people have been drinking alcohol since 4,000 B.C. Millions of people are able to drink alcohol on a regular basis without becoming alcoholics. However, for others, alcohol is extremely destructive. For example, the alcoholic has such an intense craving for alcohol that alcohol becomes an obsession. He continues drinking despite destruction of his health, like significant liver damage. He continues to drink to the point that it alienates friends and family. With the change in the brain chemistry, his brain is hijacked to the point where his mind is at war with his brain, a brain that injects its cravings into his "will," which the mind cannot ignore and oftentimes cannot resist. Moreover, science indicates that some are genetically more prone to alcohol addiction than others.

In terms of cost, alcohol abuse is the worst offender of all other drugs. It is estimated to cost about 235 billion dollars per year, which includes costs of health care due to treatment of alcoholism, significant productivity losses in job, and property damage due to crimes and automobile crashes, among other consequences. The cost in human lives is more tragic. Alcohol is involved in about half of all highway deaths.

Our society treats alcohol as a relatively harmless social lubricant, though its effects on the brain are similar to those of other addictive drugs. Like other psychoactive drugs, alcohol binds to natural receptors in the brain, which leads to abnormal levels of activity. Moreover, like drugs, alcohol can lead to physical dependence.

But what does the Bible say about alcohol? While space precludes me from going into details about what the Bible teaches about alcohol, it should be noted that the Bible does not prohibit the use of alcohol. However, it does strongly condemn drunkenness, abuse. The passage that comes to mind is Ephesians 5:18, "And do not be drunk with wine, in which is dissipation; but be filled with the Spirit". In this context, Paul contrasts drunkenness to the spiritual life. Instead of resorting to drunkenness for pleasure and escape, the believer is directed to the Holy Spirit who will provide joy and enable him to handle the problems of life. The believer should never have to resort to alcohol to find happiness. Paul directs the believer to the spiritual life, a joy-filled transcendent life in the Spirit, instead of looking for happiness in bacchanalian partying. Alcohol in moderation is fine. However, drunkenness is never OK. It is not cute. It is not funny. And it is never OK for a rational person made in the image of God to corrupt his own brain and in so doing become a victim of an abnormal brain with aberrant brain chemistry. How can it be OK for

any person to so abuse any substance that will corrupt his brain, which brain will then haunt and drive him to an enslaved, destructive life?

Again, moderation in alcohol is fine. Drunkenness is never OK—we do not have to take God's Word on it, empirically we can see that drunkenness, the abuse of alcohol, continues to be a major source of untold and unbelievable destruction and misery in the human race.

In His Grace,

Pastor Don