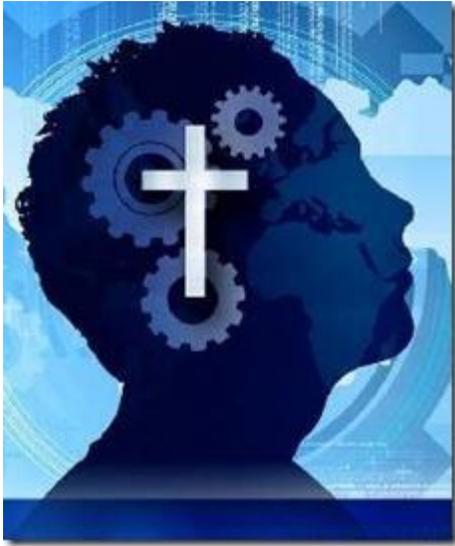


**Daily Life with Christ-63. Understanding brain addictions (3)—The 3 brain/mind changes/corruptions: (1) sensitization, (2) association, and (3) inhibition of the rational prefrontal cortex.**



There is no doubt that brain addictions profoundly compromise the believer's walk with the LORD. We know that there are three main dimensions to every human life—the mental, affectionate/emotional, and behavioral, and that brain addiction adversely affect each of these areas. The person with an addictive brain thinks differently, has different affections/emotions, and behaves differently. Through poor choices, the believer causes his brain to produce excessive dopamine (the craving molecule) that leads to excessive, and what often feels like irresistible, craving—whether or not he even likes the addictive substance.

We have noted that our VTA (ventral tegmental area) releases the chemical neurotransmitter called dopamine, which plays the central role in all brain addictions—whether alcohol, tobacco, cocaine, marijuana, pornography, and even gambling. We have also noted dopamine produces cravings due to reward prediction. Remember, dopamine does not create the pleasure—just the craving. Furthermore, a distinction must be made between craving/wanting and actually liking. As the VTA pours more dopamine in the nucleus accumbens, the nucleus accumbens gets increasingly numb. As this process continues, how much the addict actually likes diminishes over time. But how much he wants does not. In fact, drug cravings tend to increase even though the pleasure derived from the drug is declining. This is true regardless of the addiction, be it alcohol, nicotine, a drug, or even porn. In brief, the VTA fires its neurons when reward is expected. Again, it is about craving, not the pleasure. The more dopamine in the brain, the stronger the craving.

The dopamine system contributes to addiction by physically changing the brain in three ways. First, through what is known as “incentive sensitization.” In other words, with repeated use of addictive drugs, the brain's dopamine system becomes sensitized. This means that it becomes even more sensitive and easier to activate than it was before. This sensitization is the opposite of toleration. So, with repeated use of addictive drugs (or with addictive behavior), the dopamine

system responds more and more strongly. Since the dopamine system becomes more and more sensitized, the cravings become stronger and stronger. So, after the first few times of trying an addictive drug, the user might feel some urge to do it again, but those urges may not be particularly strong, and they can be resisted. But with repeated use, the dopamine system becomes sensitized, so the cravings become stronger and stronger, and pretty soon the urges are so strong that they're virtually irresistible. For a personal example, I used to be addicted to M&Ms peanut and cinnamon rolls. Anytime I would give into my cravings and stopped at Quick Trip, the more sensitized my VTA became and thus produced more and more dopamine, giving me greater and greater cravings. I am happy to say that I no longer have those cravings. I can't remember the last time I stopped at Quick Trip for a pack of M&Ms or a pastry. It is not a matter of me gaining more willpower! It is a matter of no longer having the cravings due to change in my brain chemistry—my brain physically changed with respect to cravings. However, this does not mean that I have not picked up other food addictions through recent holidays by overworking my VTA's production of dopamine with other associations (like delicious fruit cake and pie).

A second way addiction is strengthened through dopamine is what is known as “associative learning.” The release of dopamine signals that something important has happened, which leads to heightened learning. Since addictive drugs trigger the release of dopamine, they trigger learning too. In fact, they trigger larger-than-normal releases of dopamine and therefore produce strong learnings. Unfortunately, what he gets learned is more harmful than helpful. In any addict—whether the addiction is to alcohol, cocaine, nicotine, porn, sugar, or any other addictive substance—certain environmental cues become very strongly associated with the use of the drug and turns into triggers that lead to craving and continued use. In other words, the addict has a heightened sense of association with the addictive substance that triggers the production of dopamine very quickly, creating incredible urges based on associated memories. For example, a normal brain/mind could watch a person smoke a cigarette, take a drink, eat a cinnamon roll, or see a “sexy” woman/man and not suffer from strong urges. However, if the same person became an addict in any of these areas (the sexual addict from exposure to porn), the mere sight of them would set off a great dopamine rush and with it, powerful urges. The good news is that the brain can be changed from the addictive/abnormal brain back to a normal healthy brain over time through proper actualization of control over exposure or use of these substances (in the case of sexual addiction, this would require total abstinence from exposure to porn, fanaticizing, and masturbation). The bottom line is that what we actualize in our lives becomes the overwhelming and ever-present topic of our minds and brains, our thought life. We become what we do in thought, affections/emotions, and behavior.

A third way a brain is changed/corrupted by overproduction dopamine is related to the prefrontal cortex. As noted in previous articles, the prefrontal cortex is the CEO of the mind/ brain. It plays an important role in inhibiting undesirable behavior and in exerting self-control. While the VTA and nucleus accumbens represents more base urges, the prefrontal cortex is the place where the soul considers future consequences and makes rational decisions about what actions we should take, and not just actions we feel like taking at the moment. The prefrontal cortex plays a major role in inhibiting behavior suggested by base urges—what behavior would not be appropriate.

Unfortunately, chronic use of addictive drugs can lead to abnormalities in the prefrontal cortex that undermine our ability to exhibit this kind of self-control. Neuroimaging studies in humans have found reduced activity in prefrontal cortex in chronic drug users. In fact, even the volume of the prefrontal cortex is reduced in drug addicts. Drug addicts also exhibit many of the same cognitive impairments that patients with damage to the prefrontal cortex exhibit. For example, prefrontal patients typically perform poorly on tasks of working memory and decision making, as well as on tasks that require sustained attention. And chronic drug users have been found to exhibit these same cognitive impairments. Again, there is significant evidence that chronic drug use impairs prefrontal cortex function. The problem is that the prefrontal cortex is the logical, rational circuit that understands consequences and that inhibits inappropriate behavior; but with repeated drug use, it doesn't work as well as it normally does and therefore has a hard time overcoming the increasingly powerful urges coming from the reward circuit. Essentially, the drug addict's ability to exhibit self-control and override drug craving becomes weaker and weaker with time.

Our minds are most precious gifts from God. And in this life, our minds use our brains—even though they do not depend upon the brain for its existence—the mind is not a property of the brain. The mind is a property of the soul that uses the brain. However, impairment of the brain does affect our minds ability to live and thrive as rational beings made in the likeness of God.

If you are an addict to any substance, the wise, godly, and blessed thing to do is to reshape and thus restore your brain's health. This requires actualizing the good and avoid actualizing evil—do good, avoid evil in all things—in the life in three fundamental ways (1) avoid indulgence to stop sensitization to addictive substances, (2) stay away from temptations (associative triggers), and (3) be rational, use your prefrontal cortex. The best way to do all of this is to love God with all of one's heart, soul, and mind. This begins with giving Him our minds and bodies completely and totally without reservation: Romans 12:1-2, "I beseech you therefore, brethren, by the mercies of God, that you present your bodies a living sacrifice, holy, acceptable to God, which is your reasonable service. 2 And do not be conformed to this world, but be transformed by the renewing of your mind, that you may prove what is that good and acceptable and perfect will of God."

In Esse (Exod. 3:14),

Pastor Don