

# SUPPLEMENTAL LESSON – UNDERSTANDING ADDICTION AND THE BRAIN

## PART 1



### What is Addiction?

The term substance use disorder (SUD), is defined by the National Institute of Health as a treatable mental disorder that affects a person’s brain and behavior, leading to their inability to control their use of substances like legal or illegal drugs, alcohol, or medications. Addiction is a substance use disorder.

### What Changes Take Place in the Brain with Addiction?

With repeated exposure to a drug, the brain develops substantial changes that impact its ability to process information or regulate behaviors. These changes can be seen from studies using brain imaging.

**Terminology**  
Addiction typically occurs in advanced stages of substance use disorders (SUD)

Normally, our bodies produce their own “opioids” that are naturally released from cells during pleasurable activities such as hugging our kids or eating ice cream. Dopamine is a key neurotransmitter (chemical messenger) involved in the brain's reward system, playing a significant role in the development of addiction and then actually maintaining addiction. When drugs of abuse enter the brain, they disrupt the normal chemical balance and the result is the release of significant amounts of dopamine, well beyond what our bodies normally produce. This excess in the pleasure chemical dopamine, we call a “high” also known as “euphoria.” In rat tests, opioids have been shown to drive up dopamine levels 400 percent; methamphetamines can top more than a 1,000 percent increase. Now imagine doing this to the brain, dose after dose, hour after hour, day after day, and how this would affect the brain.

**Definition:**  
**Neuroplasticity**

the ability of the brain to form and reorganize synaptic connections, especially in response to learning or experience or following injury.

Let’s compare this scenario to that of a professional athlete. Many competitors when they are training focus on a target heart rate that’s 70–80 percent of their maximum rate achievable. What would happen if they increased their heart rate by 1,000 percent? Ask the morgue! No organ in the body is made to handle extremes — especially to this degree. Lucky for us, instead of shutting down, our brain remarkably adapts. Initially, there is a “rewiring” of brain centers that handle emotional processing, decision-making, reward, and memory; all these start to change through a process called neuroplasticity.

As a result, connections between distinct parts of the brain are altered and communication paths equivalent to the size of small dirt roads and bike paths quickly transition to six-lane freeways. This rewiring of brain pathways and increased accessibility between different parts of the brain results in faster urges, less inhibition, more paranoia, and an inability to make rational decisions. As there is more and more use of the drug, the brain’s ability to function normally decreases.

With these changes, the pleasure chemical dopamine cannot do its normal job. Normal activities do not produce anywhere near the amounts of dopamine produced from the use of the drug. This simply means that normal activities result in almost no pleasure. Imagine hugging your kids and feeling nothing. The drugs become your only reward. At the same time, the body itself, now dependent on the drugs, enters severe, debilitating withdrawal when the drugs wear off. Adding to the nightmare, your body also responds to this issue by producing more stress hormones. This increase in hormones significantly leads to a constant state of anxiety, and the decision-making area of the brain - the frontal lobe - has dramatic reductions in how it works.

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Essentially, the brain is now hijacked. To appease this now out of balance brain, it requires the person using these drugs to adapt his or her lifestyle. With full-blown addiction, obtaining the drug becomes an all-consuming priority. This is when you will see a person abandoning health, relationships, reputation, and even life itself. The result is someone chained in the lifestyle of addiction, trapped in a body that can't function without the drug and imprisoned by a mind that won't let them out — there is no darker place. No one chooses addiction. Who would?

The following is a tool used by professionals to evaluate substance use disorder. This is not a tool for you to use with your loved one but is presented for educational purposes. During an evaluation by an addiction specialist, the specialist will check all that apply.

### SUBSTANCE USE DISORDER CHECKLIST

- Using the substance in larger amounts or for longer than intended.**
- Wanting to cut down or stop using the substance but not managing to do so.**
- Spending a lot of time obtaining, using, or recovering from the effects of the substance.**
- Craving, or a strong desire or urge to use the substance.**
- Failing to fulfill major obligations at work, school, or home due to substance use.**
- Continuing to use the substance despite having persistent or recurring social or interpersonal problems caused or worsened by the effects of the substance.**
- Giving up or reducing important social, occupational, or recreational activities because of substance use.**
- Using the substance in situations that are physically hazardous (e.g., driving under the influence).**
- Continuing to use the substance despite knowing it has caused or worsened physical or psychological problems.**
- Tolerance: needing more of the substance to achieve the desired effect or experiencing diminished effects with continued use of the same amount.**
- Withdrawal: experiencing withdrawal symptoms or using the substance to alleviate or avoid withdrawal symptoms.**

***Mild SUD: 2-3 criteria***  
***Moderate SUD: 4-5 criteria***  
***Severe SUD: 6 or more criteria***

After reviewing how the brain works and how drugs of abuse affect the brain, we can see the connection to the behaviors listed on the above checklist. The good news is the brain can heal!

**Review:** Normally our bodies naturally produce chemicals in response to pleasurable activities. The pleasure chemical d \_\_\_\_\_ which has rewarding, reinforcing effects can be excessively produced well beyond normal limits making once pleasurable experience no longer feel pleasurable. This process in excess creates a “rewiring” of the brain which affects decision making. Many times, this appears as bad behaviors we never expected in our loved ones. This also leads to drug seeking becoming an all-consuming priority. A \_\_\_\_\_ occurs when these changes in the brain take place.