The Neurochemistry of Relapse & Recovery
Worksheets to accompany the video by CNS Productions, Inc.

These worksheets will help you to examine more deeply the reasons for relapse and the challenges inherent in recovery. As you become more aware of your own triggers, you can develop strong strategies to protect yourself.

Treatment Progression - The four phases of treatment are 1. detoxification  2. initial abstinence  3. long-term abstinence 4. recovery.

1. How long did it take you to detoxify physically from your drug or compulsive behavior? ________________
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2. How long did it take you to detoxify mentally and emotionally? ________________________________
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3. How many times have you gone through detoxification? ____________________________________
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4. Which did you find more difficult - detoxification or the first month of abstinence?
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5. Is it getting harder or getting easier to stay abstinent?
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Memory & Relapse - Craving
Cravings are caused by the sight, smell, or taste of the drug, a using partner, a place where the drug was used, or any memory connected to use. Negative mood states like boredom, anxiety, anger, or depression (BAAD), can also trigger powerful cravings.

6. List the 5 most powerful physical triggers that initiate your craving. _____________________________
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7. List the 5 most powerful mental and emotional triggers. _____________________________________
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Memory & Triggers
Triggers activate memories, which then can activate cravings: the more intense the experience, the more powerful the memory. Wartime traumas as well as childhood traumas, particularly physical, sexual, and emotional abuse are deeply imprinted.
8. List 3 of your earliest non-drug memories.

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Memory Bumps
Memories are retained on nerve cell dendrites as tiny bumps, known as dendritic spines. The more the memory is recalled, the more permanent it becomes. A person might need a thousand of these memory spines to store a single piece of information. When a problem arises, our brain automatically searches these memory bumps for clues as to how we solved similar problems in the past.

9. You must ask a friend for a $50 loan. List 2 options for solving this situation.
#1 ____________________________________________________________________________
#2 ____________________________________________________________________________

10. It is your friend’s birthday and you want to come up with a gift that is meaningful. List two possible gifts and explain the thinking behind the choices.
First Gift ____________________________________________
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Second Gift __________________________________________
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Survival Memories
Some of the most important memories are survival memories which record ways we satisfied certain critical needs such as thirst, hunger, and sexual drive. When thoughts associated with these activities are activated a signal is sent through “the reward reinforcement pathway,” particularly the nucleus accumbens, also known as the go switch which generates a surge of pleasure and tells us to do it again. The stop switch, located in the prefrontal cortex, tells us when we’ve done it enough.

11. You are on your way home and extremely hungry but there is no store or restaurant in sight. How would you use your memory to solve this dilemma? ____________________________________________

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12. Besides thirst, hunger, and sexual drive, what are some other survival imperatives?
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Drug Memories
When psychoactive drugs are used or compulsive behaviors are practiced, millions of drug/behavior memories are imprinted via the reward/reinforcement circuit. This causes the brain to attribute the behavior to survival. Because the reward/reinforcement circuit has been hijacked, the nucleus accumbens or the “go switch” says, “Do it again, do it again,” and the user keeps doing it.
13. When you think about your drug or behavior of choice what memories come to mind? Is it a picture of the drug, a desire to use, a place you know you can get the drug or something else?
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14. When you used or were practicing your compulsive behavior did your brain say “Do it again”? Did it also say “oh, this is very pleasurable,” or did it just say, “Do it again.”
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The Stop Switch
When the reward/reinforcement circuit has been hijacked, the prefrontal cortex, “the stop switch” malfunctions, and users - encouraged by the reward reinforcement circuit to “do it again,” cannot and do not stop.

15. Did it ever occur to you to stop? Do you believe that you actually can stop? __________________
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16. Is it difficult for you to stop pleasurable activities? _________________________________________
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When a person’s balance and feelings are disrupted by anger, loneliness, physical or emotional pain, or simply boredom, the mind looks for ways that unwanted feeling was relieved the last time. If the person has been using his or her addiction as a way to relieve those feelings, the odds are that the brain will come up with a drug memory when it looks for a solution. Most addicts have ceased to participate in other activities making it even more likely that addiction memories will be chosen when challenged with an unwanted mood.

17. How do you relieve boredom? Do/did psychoactive drugs or compulsive behaviors factor into that relief?
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From Slip to Relapse
The sight of an old hangout, the feel of cash, or even a familiar smell can activate memories of use. At first, the effect of the environmental trigger is muted and the user might be able to resist, especially if they are in treatment or recovery, but if an unwanted mood allows that craving to grow, the person will most likely use. This activates the reward/reinforcement circuit and the addict can’t stop.

18. When a thought associated with using comes to mind, does the craving grow immediately or do you have to continue to think about it? Can you stop the thought or do you lose control of it?
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A study of people in recovery at the Haight-Ashbury Clinic in San Francisco found that in 95% of the cases, a single slip turned into a relapse. For this reason, treatment professionals strive to provide addicts and alcoholics with an arsenal of tools to help them avoid making the first slip.

19. Have you succeeded in keeping your slips from becoming relapses?
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20. Describe an incident when a slip did not become a relapse and what you did to prevent the relapse.
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Dopamine
Dopamine is the most important neurotransmitter related to the reward/reinforcement center. Prolonged use of drugs activates the go switch, interferes with the stop switch, and depletes the amount of dopamine and the number of dopamine receptors. Both these factors increase craving. All addictions cause a reduction in the number of the brain’s dopamine receptor sites which creates a craving for dopamine. Unfortunately, the fastest way to satisfy that craving is through the use of psychoactive drugs and addictive behaviors.

Each person has a unique response to a craving depending on how much, how often, and how long they use. Heredity, environment and the use of the drug itself or practice of the compulsive behavior also determine vulnerability. All of these factors determine how easily the go switch is activated and how quickly the stop switch is deactivated.

21. What part did heredity play in your drug use? Which of your relatives have a drug abuse problem?
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22. What role did your surroundings play in your drug use (e.g. drug use at home, school, or neighborhood)?
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23. Did it take many incidents of drug use to initiate compulsive use or just a few?
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Recovery - Neuroanatomy of Recovery
Most memory spines are permanent; they are with us forever and can’t be changed. What can change, however, is the strength of the connections from one spine to another. Strong memory spine connections encourage compulsive drug use and behaviors. Weak connections encourage recovery. When an addict is abstinent, the connections gradually weaken over a period of months. If a person relapses and drinks, uses, gambles, or overeats, the connections re-strengthen rapidly, often within hours, and remain overactive for days, weeks, and months, keeping the addict at a much higher vulnerability level than before the slip occurred.
24. The last time you slipped, did you feel more vulnerable later that day, the next few days, the next few weeks?
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25. How soon after your slip did relapse occur?
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Avoiding the first drink, the first hit, or the first bet is critical to those in recovery. Continuous abstinence is absolutely necessary to avoid reinforcing the addiction connections and just as important, to aid the creation of new recovery connections.

26. How convinced are you that you must avoid taking the first drink, the first hit, the first bet, the first cigarette, or the first bite of a rich dessert.
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Drug use impairs the stop switch, so abstinence from one’s drug of choice as well as from any psychoactive drug or any compulsive behavior critical. All addictions trigger the reward circuit and deactivate the stop switch.

27. List all the drugs that you have abused (more than once) and identify those you have abused or used in an addictive manner.
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28. How does using a drug other than your drug of choice trigger a desire to use your drug of choice?
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Halting the Craving
Craving is activated by dopamine. It takes 20 minutes to 2 hours for intense cravings to go away.

29. Think about the times you had a craving to do something (other than using your drug of choice) how long did it take for the craving to diminish?
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30. Is it more difficult for you to think rationally and make good decisions when in the midst of a craving? What feelings are associated with your craving?
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Physical exercise, calling a friend, doing something creative or spending time with loved ones dissipates craving. Journaling, prayer, 12-step meetings are other methods.
31. Describe 5 methods you use for dissipating craving.

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Any response to a craving should be automatic because craving arises in the old emotional brain which is more powerful and reacts faster than the new thinking brain. Researchers have developed various medications to help control craving. Other substances used to treat craving are psychiatric meds which include antianxiety drugs, antipsychotics, and antidepressants.

32. If you use any psychiatric or pain medications, is it easier or harder to stop a craving and why?
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Recovery of the Central Nervous System
Scans of recovering cocaine addicts show that even after 10 days of abstinence, much of the brain is still inactive. After 100 days, the brain is functioning at about half of its full potential. It takes months for brain chemistry to return to a semblance of normalcy. Studies indicate that it takes 8 months to a year for a cocaine, alcohol, or heroin user’s brain to return to a semblance of normal functioning. Because methamphetamine is so toxic to nerve cells, it can take up to 2 years or longer for the brain to recover. Fortunately the brain is very resilient, its plastic capacity gives it the ability to mold and reshape itself as long as a person stays in recovery. The brain starts to reform its functionality and grows healthier and healthier. It just takes many months to do so.

33. In addition to understanding ways to counteract the biologic or neurophysiologic mechanisms that lead to craving, it is important to involve those around you. What are the symptoms they should be looking for (e.g., excess anxiety, boredom, anger, depression, or pain)?
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34. List 4 friends or relatives who you would trust to recognize symptoms or behaviors that signal imminent relapse, and be willing to tell you.
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35. Another way to reduce cravings and potential relapses is to remember the consequences. How does a relapse affect significant others, family, friends, your work, your health, your mental health, your educational goals, and/or your finances?
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