

# Neurochemistry of Addiction



FAITHFUL  TRUE

In this article, we would like to cover the basics of how our brain health is essential to our recovery. The field of neuroscience has been making great strides in the last 20-30 years and it can be very technical. Here we will share some basic truth that we all need to know, not a complex anatomy of terms, but a foundation for a layperson's basic understanding.

by  
Mark Laaser, M.Div., Ph.D.  
& Debbie Laaser, MA, LMFT



## **Neurochemistry of Addiction**

The science of neurochemistry is pouring into much research and understanding of why we do what we do. At our counseling center, we know it is an integral part of assessing wellness. “When our brains work well, we work well.”<sup>1</sup> While we do not want to get into lengthy descriptions of brain chemistry, we would like to give you a working knowledge of this important organ that affects everything you think, feel, and do.



## Neurochemistry of Addiction

In this chapter, we would like to cover the basics of how our brain health is essential to our recovery. The field of neuroscience has been making great strides in the last 20-30 years. It can be very technical and we have tried to distill from it some basic truth that we all need to know. We are not going to give you complex anatomy or terms. Rather, we will try to give you a layperson's basic understanding. More thoroughly scientific, rigorous explanations are available. One of the earliest and still one of the best is Dr. William Struthers's book, *Wired for Intimacy*.<sup>1</sup>

We want this explanation to be hopeful. We can change the very physical structures of our brains and mold them in such a way to be congruent with and constructive to our recovery. One of our favorite neuro-scientific terms is "neuroplasticity." That means that the brain is plastic, moldable, changeable, and such that we can shape it according to our purposes. When we were in school we were taught that the brain was "finite" with billions of cells that began dying off as we age and that they couldn't be replaced. Our teachers said, "Don't worry about it, you'll still have plenty." The truth is that there are more nerve cells in our brain than there are stars in our solar system. They do have the ability to regenerate and create new connections. How we do that is a product of our intentional thought life, patterns of meditation, fellowship in a community of other men or women, nutrition, exercise, and perhaps medication for mental health issues. Regenerating new connections can also be a matter of receiving counseling help for

---

<sup>1</sup> William Struthers, *Wired for Intimacy: How Pornography Hijacks the Male Brain* (Madison, WI: Intervarsity Press, 2009)

underlying wounds and trauma in our lives, experiences that caused us to form core beliefs about ourselves, others and the world that were just not healthy for our brains.

## **Tolerance, Abstinence, and Detox**

Men and women who have developed sexual addiction have developed neurochemical tolerance to the neurochemicals that sexual arousal and activity creates in the brain. Tolerance is a dynamic function of the brain that allows it to adjust to whatever chemicals we put into it. God created in our entire body ways that we cope with changes. We get a fever and the body works to return to normal temperature. We get an infection and our immune system works to heal it. Bones break and natural healing agents in the body repairs them.

In the brain, we can ingest various foods and liquids which change the balance in the brain. The brain has mechanisms to return us to the normal state of balance. When you drank your first cup of coffee, you felt an immediate buzz and sense of agitation, but your brain worked to return you to normal and you came down from it. That would continue if your use of coffee were occasional. If you start drinking coffee every day, however, your brain would adjust to it and virtually create a new state of normal. After a while, one cup of coffee would no longer create the same effect. This is because the brain adjusts. This is called tolerance. The neurons in the brain, billions of them, communicate with each other by the transmission of neurochemicals sent from one end of a neuron to another. The receiving neuron has receptor sites in it. The brain adjusts by building new receptor sites. The result is that more neurochemicals will be needed to achieve the same effect.

Tolerance is a factor in all addictions. Alcoholics and drug addicts know about it. Their use of alcohol or drugs of any kind will increase over time. One cup of coffee leads to two every day and so forth. One cigarette leads to two and then to a pack and then to two packs. One beer leads to a six-pack and sometimes to increasing levels of hard liquor. Pain killing drugs if overused can actually lead some into heroin addiction.

Behaviors can also create or stimulate neurochemicals in the brain. Gambling can be an addiction because the risks and excitement of gambling stimulates adrenalin in the brain. Gradually more adrenalin will be needed to achieve the same high and before he or she knows it, the gambling addict has lost a great deal of money and spent large amounts of time at the casino or online. Work can also create stresses leading to adrenaline production. Workaholics become tolerant to adrenaline leading to long days without breaks or rest. Food addicts know that certain foods, like chocolate, sugar, even complex

carbohydrates create certain neurochemicals in the brain to which a person can become tolerant.

Sexual arousal, just thinking about sex, produces and is dependent on adrenaline. Adrenaline is the chemical that sends signals throughout the body to get ready to be sexual. Breathing gets faster, blood pressure goes up, and certain parts of the body like the penis and vagina experience the changes necessary for sexual intercourse. Sexual arousal also produces the neurochemical dopamine that is called the 'pleasure chemical' in the brain. It stimulates the *pleasure center* in the brain and brings with it powerful and very pleasurable feelings. The combination of dopamine and adrenaline has been compared to the effect of cocaine on the *pleasure center*.

The *pleasure center* of the brain is part of our *deep limbic system*. It is in the very core of the brain and right on top of the spinal column. Imagine making a fist. As you do so, enfold your thumb under your other four fingers. Your arm is the spine column, your thumb is the *deep limbic system* and your fingers are the outer *cortexes* of your brain. The functions of the *deep limbic system* are many and it is a part of the autonomic part of the brain. This means that its functions are automatic. You don't have to think about them to activate them. For example, your heart rate and body temperature are controlled there. The *emotional center* of your brain is also in the *deep limbic system*. As you know your feelings are often involuntary and just happen. They can be triggered by various stimuli in your life. The *pleasure center* and the *emotional center* sit next to each other.

When we experience human touch, our brain produces the neurochemical oxytocin; this gives us a feeling of well-being and connectedness. Babies, for example, are held and fed and the touch of it produces oxytocin. If babies don't get enough oxytocin they can experience a failure to thrive and may stop growing or developing. Human beings never lose this need to be touched. We believe that when we don't receive enough touch we can experience an emotional failure to thrive. In part, sex addicts are touch deprived. Even acts of masturbation can be seen as part of the search for touch. Sexual activity with a partner is, of course, a way to get touch. We believe that sex addicts confuse their two legitimate needs, the one for human touch and the other for sexual touch. They may believe that the only way to receive touch is by being sexual. This can partly explain their sexual energy and aggressiveness.

At the end of the sexual arousal cycle the act of orgasm also produces a collection of neurochemicals, a part of the family of neurochemicals called catecholamines, that give that powerful feeling of pleasure in the *pleasure center*. This combination of neurochemicals has been compared to heroin in its effect. God has created the *pleasure*

*center* and the powerful neurochemicals of sex that stimulate it as part of our survival brain. He directs us to be “fruitful and multiply.” Sex is an integral part of the survival of the species. God intended it for good and for it to be experienced between a husband and wife in the covenant of marriage.

The brain can become neurochemically tolerant to all of these neurochemicals: Adrenaline, dopamine, oxytocin, and the catecholamine. In effect the sexual arousal cycle from thought to orgasm can be like a rush of cocaine and heroin. This dynamic explains why sex addicts can experience a growing tolerance and, therefore, an escalation of sexual activity over time. This may be very simple as for those who start out masturbating occasionally and wind up doing it daily. It may be that escalation leads to crossing the flesh line and having sex with partners. It may be that usage of pornography increases over time and perhaps escalates to more explicit forms of it. Adrenalin can be a major factor in this escalation in that it demands more and more excitement and even danger to achieve the same effect over time.

This factor of tolerance means that there is never enough sex. Sex addicts may believe that there is. They will often think to themselves that if they could only get more sex or different kinds of sex, they would be satisfied. The truth is that while the brain will experience that temporary high of sex and new forms of sex will bring more adrenalin with it, the effect soon wears off. Eventually even new forms of sex will get old or boring. While there are some in the Christian community who have advocated that a man must have sex with a spouse frequently in order to stay pure, there is no neuroscientific basis for this.

The very good news is that just as the brain will adjust up in terms of its expectations it will also adjust down. Simply, this is called detoxification. In order to heal, alcoholics and drug addicts will need to stop drinking or using. When they do, the brain will go into a detox phase. In severe cases this can be rather difficult and may require medical management in a hospital. Having used coffee as an example previously, imagine (or maybe you have experienced) what it is like to just stop drinking coffee. In the first few days the brain will go into a rebellious phase. A person may have jitters, headaches, or other symptoms but eventually the brain will adjust itself in such a way that it returns to its normal expectation for coffee, which is none.

All addicts know this detox dynamic. That is because at various times they may have attempted to stop some substance or behavior and discover that in a few days their brain feels like a ‘five alarm fire’. Many sex addicts know that they have been able to refrain from sexual activity for seven to fourteen days. Then they may experience this

heightened sense of demand and return to masturbation or other sexual activity. This means that it is not uncommon for sex addicts to experience one to two weeks of sobriety before they disappoint themselves again.

The length of time it takes the brain to fully detox from the tolerance of the neurochemistry of sexual arousal is roughly 14 to 21 days. If an addict can get past that, he or she will experience a heightened demand for a time. That can be experienced as agitation, anxiety, and restlessness. After this period, however, demand will decrease and it will become easier to maintain the addict's definition of sobriety.

Detox requires that there is no sexual activity with self or others. Bottom line, there can be no orgasm. If the addict is married, of course, achieving this will need the consent and cooperation of the spouse. We believe that a husband and wife should agree not to be sexual for at least the 2-3 weeks necessary for detox. So that the addict can also experience the lowering of demand, it can also be very helpful to extend this to a longer period of time.

We believe that there is a very vital second benefit of abstinence. Please see our earlier chapter, Abstinence Contract, to review the discussion of spiritual and emotional growth that we focus on when we ask a couple to be sexually abstinent. Our definition of healthy sexuality states that sex is the expression of emotional and spiritual intimacy between the couple. The abstinence period is a time for them to really pursue their emotional and spiritual connection.

Sex addicts will find the obvious benefit of detox in that making healthy choices about sexuality will become easier. The brain's demands will have gone down and the addict can now choose to engage in sexuality with his spouse for healthy reasons of connection.

## **Mental Health Issues**

It is hard to make healthy choices if the brain is not cooperating due to mental health issues. This means that some addicts struggle with attention deficit hyperactivity disorder (ADHD), anxiety, obsessive-compulsive disorder, mood swings, depression, post-traumatic stress disorder (PTSD), and sleep disorders. Getting the right kind of help to treat these problems can be a key part of brain health and, therefore, an inherently important component of recovery.

Years ago, we began noticing that a good number of the male addicts we were seeing seemed to be struggling with what is called 'inattentive' ADHD. They had a hard time focusing or paying attention. They were easily distracted. They didn't plan ahead. They

struggled with internal supervision and impulse control. That list of symptoms makes it hard for anyone to make healthy choices.

To research this particular condition, Mark administered an ADHD test to 100 men who attended our 3-day workshop for men struggling with sex addiction. Well over half of them tested positive and could be diagnosed with ADHD.

Since so many of our men, and women, have experienced various forms of trauma in their growing up years, it is also common for a diagnosis of post-traumatic stress disorder to be present. This diagnosis is a composite of obsession, anxiety, mood instability, and depression.

Over the years we have partnered with Dr. Daniel Amen who is one of the pioneers in the field of brain radiology for the purpose of making definitive mental health diagnosis. Brain scans give us a real picture of brain activity from which very accurate diagnosis of mental health disorders can be made. Well over 50 of our men have been able to get a brain scan and the results confirm some trends. A good deal of ADHD has been seen. Various levels of anxiety and depression have been present in some. A majority of them also have the PTSD pattern.

We have also had a few of our couples get brain scans. We call this the 'his and hers' scan. It is not uncommon for both spouses to be struggling with mental health issues such as depression, anxiety, obsessive-compulsive disorder, PTSD, ADHD, sleep disorders, etc. Some of these issues pre-date the marital relationship. Some may be the result of the current trauma in the marriage. We find that when these are not diagnosed and treated, they continue to get in the way of the counseling process and of a couple growing closer.

Having said all of this about brain scans, we recognize that to date the use of them for psychiatric diagnosis has not become the standard of care in psychiatry. We firmly believe that it will in the future. For now, insurance is not likely to cover the cost of it and a series of scans will usually be paid for out of pocket. As of this writing, that is around \$3500. Therefore, it will be a few who can afford to do this, particularly as couples.

What remains for most is to participate in the local counseling and medical systems. Licensed psychologists, social workers, and marriage and family therapists are able to make diagnoses and prescribe counseling treatments that would be helpful. Prescribing medications is ultimately the province of psychiatry. And it is not that uncommon for



other medical specialties to prescribe medications for mental health issues. Family practice doctors are perhaps the most common and the most used for this purpose.

Remember that the main theme of this section is about how we can make sure that our brains are healthy enough to allow our rational thoughts and, most importantly, our spiritual self to make healthy choices for ourselves. We are mindful of the Scripture that says, “I do not understand what I do. For what I want to do I do not do, but what I hate I do.” (Rom 7:15). Healthy brains cooperate with our vision and our goals to be the person God calls us to be. They also allow us to be more effective in healthy relationships.

These days you can visit any bookstore and find multiple titles about brain health. Many of these books emphasize taking control of our brain health through a variety of methods. Here is a very general list of ways we have found helpful to do so:

- **Medication:** Particularly in serious cases of depression, anxiety, bi-polar disorder, and obsessive-compulsive disorder, it will be important to consider the life giving effects of medication. Again, qualified psychological and medical professionals can guide us in knowing when this approach is necessary.
- **Nutrition:** These days there is growing evidence that eating right and adding nutritional supplements to our daily regimen can be very helpful. There is a field emerging that believes so much in nutrition they have coined a term, “nutraceuticals.” There are those who believe that the right combination of diet and supplements can be just as effective as pharmaceuticals.
- **Exercise:** In one very early and classic study a group of depressed people were divided into two groups. One was given conventional medications for depression, the other was told to aerobically exercise every day. The exercise group was shown to have better rates of improvement than the drug group. There is no doubt that regular aerobic exercise can be very powerful in the treatment of a variety of mental health conditions.
- **Meditation:** Meditation is a spiritual discipline. It involves calming oneself by sitting in a quiet place, breathing deeply, and learning how to train the brain to focus on certain thoughts. There are countless methods of meditation that have been described over the centuries. We invite our clients to find one that they can relate to and to practice it every day. Some will focus on a Bible reading. Some

will read more general spiritual material, such as the meditations of others in written form. The key is stillness. Focusing on the Bible means allowing ourselves to be still enough to invite the voice of God to speak to us through His Word. One Benedictine form of meditation that we have found particularly helpful is the Lectio Divina, Latin for “divine reading.” It is a four-step process of quieting, breathing, contemplating, and reflecting on one particular passage of Scripture. A number of our men have been using it. One of our great friends, Pastor Jay Dennis, has used it in his men’s ministry and tells us that, to this point, over 1,700 men are practicing it. He says it has transformed the men’s ministry at his church. Of particular relevance, meditation like this has a way of training the brain to not be focused on sinful thoughts, such as sexual temptations, but rather to focus on things of God.

- **Counseling:** Certain mental health disorders can definitely be treated with therapy. There are many types of therapy and many different types of therapists. Finding the right match for the particular disorder is often a search and sometimes a matter of trial and error. We believe that it is often our role to be an advocate in the system to help our clients find the right match. Sometimes it involves the kind of work we do and sometimes it involves referring to other specialties. Of particular value to us, as we found out for ourselves in the early days of our recovery, is the role of groups in counseling. Counseling groups are not support groups, as in a 12-Step group, but are led by a therapist and guided. Numerous studies and our own experience have definitively shown us that there is great healing power in community. Social support, people who know the struggle and the journey, and truth tellers and encouragers are vital members of community. This prevents the loneliness of isolation and the downward cycles of our own thoughts.

As you can see, there are a variety of options to pursue mental health. We encourage all of our clients to take this very seriously as untreated issues can be a major roadblock to both individual and marital recovery. Community, which also provides accountability, can be one of the most vital elements.

## **Trauma Work**

Much has been written about the role of trauma in addiction. The occurrence of physical, sexual, and emotional abuse is quite common. Victims of trauma grow up with distorted

core beliefs about themselves, relationships, the world, and God. The pain of memories can plague a person and drive some to medicate those feelings with addictive activity.

Trauma that happens early in the life of a person has been shown through research to have a profound effect on how the brain develops. For example, people who grow up without a sense of safety will develop those parts of the brain that control anxiety more acutely. Obsessing, worrying, and controlling behavior can, therefore, be something the brain is more developed to do.

Healing trauma is, obviously, an inherently important part of brain health. Remembering that the brain is plastic, we can literally retrain it or, in some very real way, develop it towards greater health in the future. There are many strategies for healing trauma. Early work in our field emphasized recognizing the trauma, becoming angry about it, and often confronting those who hurt you. This could involve recurrent experiential exercises of giving voice to the trauma, recreating scenes of how the abuse happened, and physical or verbal expression to the anger. Recent brain research, however, has shown that if all we do therapeutically is recreate the trauma over and over again, it will continue to injure the brain, literally re-traumatizing it.

We believe that it is important to recognize and accept that traumatic events happened. It is vital at the same time that the person is helped to see that any core beliefs about themselves are not accurate. One of the most common is, “I must be a bad person for these things to have happened.” Or, very spiritually significant, “Where was God when all of this was happening?” The therapist and the therapeutic community will always be quick to reframe those beliefs into what is true about the person. For us this is consistent with God’s truth about how we are all fearfully and wonderfully made and how much He loves us today. Truth repeated and reminded continually in the journey of recovery will begin to teach the person new core beliefs and these will be wired into the brain and can actually override the old ones.

For us, the eventual goal of trauma treatment is to help people find meaning in the pain. We have both learned to “count it all joy when we experience various trials,” (James 1:2). We know that God does not waste pain. He uses it to mold and shape our character. This, again, is how the therapist and therapeutic community encourage the person to understand ways in which they are stronger. We also want to help our clients know how he or she has used the skills of surviving to be alive and, perhaps, to have achieved many of their life’s accomplishments.

Instead of continuing to experience PTSD, a person can retrain his or her brain to see the meaning in the pain, a dynamic which has come to be called posttraumatic growth (PTG). Ultimately, this is a deeply spiritual journey of surrendering loss and finding new passion and purpose in life. Wives who have been sexually betrayed experience a great deal of trauma. With guidance, resources and support, the shattering of their early beliefs about themselves, their husbands, the world and God can lead to new and more spiritually healthy beliefs.

Trauma work is a painful, emotional and spiritual journey and one that can lead all of us to be stronger individuals with deeper faith and richer relationships. All of it is marvelous for the brain.

### **Affective Regulation or “Mood Management”**

Earlier, we described that in the *deep limbic system* of the brain there is the *pleasure center* and the *emotional center*. They are connected by millions of neurons. One of our favorite neuroscientific sayings is, “neurons that fire together, wire together.” This means that if these two parts of the brain are stimulated at the same time, the neurons will form connections. Another way of saying this is by describing the result as an association of the feelings in the two different centers.

There was a young man who described to us that when he was seven years old, his ADHD, stress, and anxiety prevented him from going to sleep at night. He would toss and turn. He found himself hoping that his mother would come to him and comfort him, perhaps by giving him a back rub. No doubt the oxytocin of that activity would have had a calming effect. For whatever reason, his mother was never able to provide this kind of comfort. His *emotional brain* was firing because he was lonely, anxious, frustrated with himself, and angry. One night he discovered that touching himself, mainly in his genital area, was a pleasurable sensation that did, in fact, help him get to sleep. He provided himself with his own oxytocin. This activity was not yet an act of orgasmic masturbation, but it did excite the *pleasure center* of his brain. Now his *emotional brain* and *pleasure center* were firing at the same time. Neurons were forming connections that would become an association. This association, genital touching and relief of emotional pain, became one that he would carry with him into his adult years. Of course, that association was reinforced by countless times of self-touching, later acts of actual masturbation, and eventually pornography use to help facilitate it as his brain became tolerant to the neurochemicals involved.

The brain also contains centers that store or archive every memory of emotional and physical activity we have ever experienced. Associations are part of this memory center. Whenever the young man above felt lonely, frustrated, angry or anxious, his brain remembered the association and masturbation became the way to manage those emotions. Managing emotions is referred to today in our field as “affective regulation.” When the associations are not healthy ones, we call it “affective dysregulation.”

Addicts can often be surprised by how fast sexual temptation overcomes them. We know it is often because of the firing in the *pleasure center* that is associated with the historic ways of managing painful emotions. These associations can be very old. We don't consciously remember when they started. It takes education and history retelling to discover when they first occurred. Often a spouse wants to know, “how could you do this, and why did you do this?” Discovering the history of mood management or affective regulation is an important piece of answering those questions.

There is good news! Healthy, new associations can be established. The brain is like a computer in some ways. It comes from the factory with certain programs already installed. We often call these instincts or primal desires or traits. We all inherit certain propensities. Our sexual desire is one of those original factory installed instincts that we all have. Over time, our life experience begins to add new software programs. Our family life, our friendships, our education, and hundreds of other life experiences form new associations. Our sexual experiences begin to either embrace our sexuality in healthy ways or we learn dysfunctional patterns that are terribly unhealthy.

Recovery can, in many ways, be like making a decision to install new software in our brain. This means to literally create new associations. Like a computer, this new software will override the old ones. This is a rewiring project. It takes time, discipline, and a lot of encouragement from others. The same young man we described previously came into a counseling group for his first time really afraid that telling his story of sexual addiction would cause other men there to judge and reject him. That was an old core belief in his brain. Instead of that happening, when he told his story, the men were unanimous in their affirmation of his courage for being honest. Several of them came over to him and gave him a hug. He faced his fear, his *emotional brain* firing, and instead of needing his old drug in the *pleasure center*, he found a new experience of emotional management through the support and, yes, the physical touch of others. That night was the first experience of his rewiring project. He will need many more and gradually, the new association will replace or override the old one. Now rather than turning to masturbation, he will become more likely to turn to his community of men to manage his temptations and his emotions.

Do you hear the really good news in all of this? We can be the architects of our own brain. There is truth in the power of positive hope and thought. Our spiritual journey of drawing closer to Christ is a dramatic part of brain health. Community offers us new associations, truth, encouragement, and hope. Gradually, our unhealthy temptations will not be so frequent and will lose their power. We do need to remember that the old software remains in the brain and it can resurface if we stop reinforcing our new software. It is a lifetime journey and it's worth it.

Finally, addicts have historically been selfish and been driven by their motivations to medicate their pain. As they heal that pain in the healthy ways we have tried to describe, they will gradually be able to become selfless. Their motivations will be to serve. They will look to God for their calling, plan and purpose in life. Spouses will notice the changes and learn gradually, slowly how to trust. Spouses will also learn how to be partners in the journey by examining their own brain health issues.

Couples will eventually learn how to create new vision for their relationship. This can be an exciting time of being proactive. It is a deeply spiritual time of searching for God's direction in their lives. As they do so, they are literally transforming their brains and their lives.



# FAITHFUL & TRUE



Mark Laaser, M.Div., Ph.D., & Debbie Laaser, MA, LMFT are the founders of Faithful & True, a leading Christian treatment center for sexual addiction and compulsive behavior located in Eden Prairie, Minnesota. As husband and wife, Mark & Debbie know from nearly 30 years of personal experience, the healing journey from the devastation of sexual addiction and relational betrayal.

Dr. Laaser is the author of *Healing The Wounds of Sexual Addiction*, *Taking Every Thought Captive*, *Becoming a Man of Valor*, *The 7 Principles of Highly Accountable Men*, and *The Fight of Your Life* written with Dr. Tim Clinton.

Debbie Laaser is the author of *Shattered Vows* and *The Seven Desires of Every Heart*, which she co-authored with her husband, Mark.

Visit [faithfulandtrue.com](http://faithfulandtrue.com) for more information on their intensive 3-Day Workshops for men, spouses and couples, as well as, access to additional healing resources.

[faithfulandtrue.com](http://faithfulandtrue.com) 952.746.3880  
2016 Faithful & True