LEARING MODULE I

Seminar # 7

Substance Use Disorder is a Brain Disease

Learning Objectives

1. What is the issue.

2. How can the issue impact the family?

3. What are the options.

Substance Use Disorder is a Brain Disease

This is an incredibly involved topic of reviewing how the brain functions. To dive into this topic, the family member needs to be prepared to become educated in the following:

1. The different parts of the brain and how each function
2. The neuronal firing process and what stimulates our reward system.
3. Memory and how recall are part of the decision-making process.
4. The synapse and how each drug type function differently.

The list is extensive, your search will be exhausting if you are doing this at the same time you are getting a diagnosis. We recommend you get the diagnosis then research how the brain functions in that type of condition by stages of progression. This will make your learning more focused on what you need to know from all the other general information which may not apply.

Addiction is defined as a disease by most medical associations, including the American Medical Association and the American Society of Addiction Medicine.

Like diabetes, cancer and heart disease, addiction is caused by a combination of behavioral, environmental, and biological factors. Genetic risks factors account for about half of the likelihood that an individual will develop addiction.

Addiction involves changes in the functioning of the brain and body. These changes may be brought on by risky substance use or may pre-exist.

The consequences of untreated addiction often include other physical and mental health disorders that require medical attention. If left untreated over time, addiction becomes more severe, disabling and life threatening.

People feel pleasure when basic needs such as hunger, thirst and sex are satisfied. In most cases, these feelings of pleasure are caused by the release of certain chemicals in the brain. Most addictive substances cause the brain to release high levels of these same chemicals that are associated with pleasure or reward.

Over time, continued release of these chemicals causes changes in the brain systems involved in reward, motivation, and memory. When these changes occur, a person may need the substance to feel normal. The individual may also experience intense desires or cravings for the addictive substance and will continue to use it despite the harmful or dangerous consequences. The person will also prefer the drug to other healthy pleasures and may lose interest in normal life activities. In the most chronic form of the disease, addiction can cause a person to stop caring about their own or other's well-being or survival.

These changes in the brain can remain for a long time, even after the person stops using substances. It is believed that these changes may leave those with addiction vulnerable to physical and environmental cues that they associate with substance use, also known as triggers, which can increase their risk of relapse.

A chronic disease is a long-lasting condition that can be controlled but not cured.

About 25-50% of people with a substance use problem appear to have a severe, chronic disorder. For them, addiction is a progressive, relapsing disease that requires intensive treatments and continuing aftercare, monitoring and family or peer support to manage their recovery.

The good news is that even the most severe, chronic form of the disorder can be manageable and reversible, usually with long term treatment and continued monitoring and support for recovery.

References:
CASAColumbia. (2012) Addiction medicine: Closing the gap between science and practice.

Addiction is like other chronic diseases in the following ways:

- **It is preventable.**
- **It is treatable.**
- **It changes biology.**
- **If untreated, it can last a lifetime.**

The brain can experience pleasure from all sorts of things we like to do in life; eat a piece of cake, have a sexual encounter, play a video game.

The way the brain signals pleasure is through the release of a neurotransmitter (a chemical messenger) called dopamine into the nucleus accumbent, the brain's pleasure center.

This is generally a good thing; it ensures that people will seek out things needed for survival. But drugs of misuse, such as nicotine, alcohol, and heroin, also cause the release of dopamine in the nucleus accumbent, and in some cases these drugs cause much more dopamine release than natural, non-drug rewards.

*Ref: The brain's nucleus accumbent activated by alcohol (Gilman et al., 2008***)**

Addictive drugs can provide a shortcut to the brain's reward system by flooding the nucleus accumbent with dopamine. Additionally, addictive drugs can release 2 to 10 times the amount of dopamine that natural rewards do, and they do it more quickly and reliably.

Over time, drugs become less rewarding, and craving for the drug takes over. The brain adapts to the effects of the drug (an effect known as tolerance), and because of these brain adaptations, dopamine has less impact. People who develop an addiction find that the drug no longer gives them as much pleasure as it used to, and that they must take greater amounts of the drug more frequently to feel high.

Altering the Brain's Reward System

Addiction affects your brain's reward, motivation, memory, and related circuitry to the extent that your motivations are altered so that your addictive behaviors replace healthy, self-care behaviors.

The brain's reward system is also altered in such a way that the memory of previous rewards—be it food, sex, or drugs—can trigger a biological and behavioral response to engage in the addictive behavior again, in spite of negative consequences, and sometimes even though you no longer even find pleasure in the activity.

Addiction also affects the frontal cortex of your brain in such a way as to alter your impulse control and judgment. This results in the "pathological pursuit of rewards," ASAM says when addicts return to their addictive behavior to "feel normal."

The frontal cortex is involved in inhibiting impulsivity and delaying gratification.

Because this area of the brain continues to develop into young adulthood, the ASAM experts believe this is why early-onset exposure to substances is linked to the later development of addiction.

ASAM says that behavioral manifestations and complications of addiction, due to impaired control, can include:

- Engaging in more addictive behavior than you intended
- Increased time lost from work or school.
- Continued substance use despite physical or psychological consequences[1]
- Narrowing of your addictive behavior repertoire; for instance, you only drink one brand of a certain type of alcohol.
- Lack of readiness to get help, despite admitting a problem.
- Traditionally, people with addictions have sought and received treatment for a particular substance or behavior. This has sometimes resulted in the person substituting one addiction for another—what ASAM calls the "pathological pursuit of rewards"—because the underlying cause was not treated.[3]
- ASAM suggests that comprehensive addiction treatment should focus on all active and potential substances and behaviors that could be addictive. ASAM was careful to point out that the fact that addiction is a primary, chronic brain disease does not absolve addicts from taking responsibility for their behaviors.
- Just as people with heart disease or diabetes must take personal responsibility for managing their illness, if you have an addiction, you also must take the steps necessary to minimize your chance of relapse, ASAM said.

Liking and Wanting

There is a distinction between liking and wanting the drug; over time, the **liking decreases** and the **wanting increases**. Individuals with a substance use disorder continue to seek and use the substance, despite the negative consequences and tremendous problems caused for themselves and for their loved ones, because the substance allows them to simply feel normal.

How the brain recovers from addiction is an exciting and emerging area of research. There is evidence that the brain does recover; the image below shows the healthy brain on the left, and the brain of a patient who misused methamphetamine in the center and the right. In the center, after one month of abstinence, the brain looks quite different than the healthy brain; however, after 14 months of abstinence, the dopamine transporter levels (DAT) in the reward region of the brain (an indicator of dopamine system function) return to nearly normal function (Volkow et al., 2001).

There is limited research on the brain's recovery from alcohol and marijuana use. However, recent studies have shown that some recovery does take place. For example, one study found that adolescents that became abstinent from alcohol had significant recovery with respect to behavioral disinhibition and negative emotionality (Hicks et al., 2012). Lisdahl and colleagues propose that this could mean that some recovery is occurring in the prefrontal cortex after a period of abstinence. Furthermore, other research has found that number of days abstinent from alcohol was associated with improved executive functioning, larger cerebellar volumes, and improved short-term memory.

Most of your learning in this issue will come from watching the recommended video's in the Family Solution Finder Learning Seminar Workbook. Take the time to view each video and share with others. In the power point presentations are good sources of embedded videos. This will start your learning about substance use disorders being a disease of the brain.

Conclusion

In conclusion, no single source will be able to educate a person as to why substance use disorders are considered a brain disease. In the follow up workbooks and power point presentation a deeper understanding will be attempted but this is only a starting point for the family member to understand this is not just a matter of willing oneself out from this behavior. There is a lot more going on, it will take time, professional care, and a lot of love. The latter being the strongest therapy.