**Teenage Brains and Addictions Frank Kros August 2, 2013**

**-Studying the brain gives us insights into the negative behaviors that often become maladaptive or even criminal. The teenage brain; however, is a very unique entity. It is not just a younger or smaller size. There are a number of biological facts that will never be the same before or after. Our best bet is to work with its strengths.**

**-Addiction: it has nothing to do with intelligence or social/economic status. It has to do with each particular brain’s individual response to a particular intoxicating chemical or behavior (gambling).**

**-When the brain makes associations, they are very real and physical structures that cause “Myelination”. This white material is the 3rd strongest component in our bodies. Multiple Sclerosis eats away the myelin sheath.**

**- \*\*\*\*It’s much harder to unlearn something than it is to learn it. *This is why early intervention is crucial.* If we can’t stop the negative behavior, we need to at least try to interrupt it.**

**-Why do we study the brain? 1. It involves everything we do, even our spiritual side. We now have neuro-theology, because we can see how strongly the brain reacts on scans in one *specific* area when we have a spiritual moment. 2, Brain Science has taught us that adolescence is getting longer. The brain is not developed until age 25 and puberty starts earlier. What used to take 4 to 6 years, now we realize takes over a decade. Car rentals have increased their rental age to 25. Instead of losing money from the younger age group, they have found they save money from fewer accidents. “Keep ‘em alive til 25.”**

**-Myelination: Once you learn something, you can do it much faster. We are much faster at writing with our dominant hand than the other. Driving also becomes very fast and smooth. Myelination is one way that the brain remains efficient and saves energy. The *disadvantage* is that the brain is neutral about what it is learning. Therefore it is efficient with good things we learn AND bad things we learn. Like soil, the b rain will produce whatever you put in it.**

**-Knowledge of what is good and bad is not enough. We KNOW things aren’t good for us. WE know it is good to learn to play the sax, and we know it is NOT good to get high.**

**-\*\*\*\*Habits from the teen years are likely to be lifetime habits. If the child is getting high, it is a very powerful high and the addiction will continue to progress. You can fight all of these negative behaviors better if you know that there are physical reasons behind all of this.**

**-All behavior is either avoidance of the negative or the pursuit of pleasure.**

**-To survive, we need short spurts of dopamine to keep us going. To continue our species we find dopamine bursts from eating, sleeping, sex & social interactions.**

**-Observe dendrite slide.**

**-On the end of the dendrites there are receptors to pick up nerve messages. During the teenage years, there are many more of them than will ever be in their life. It can contribute to the teen’s fuzzy thinking. It also means that what is learned will really stick. This is why we don’t want teens to drink and smoke.**

**-If molecules aren’t picked up, they go back into the reuptake receptors.**

**-Some drugs/medications work by having the receiving receptors shut down, others work by having the reuptake receptors shut down. Either way, if the substance has nowhere to go, it remains in the synapse and interrupts the normal flow of things. In medicine for depression, this is actually helpful because the serotonin is in the synapse area longer and has a better chance of finding a receptor that will take it. (Depression is the lack a serotonin.)**

**-The reason nature gives us small amounts of dopamine is because it is safer as demonstrated by the rat experiment. Rats quickly learned how to self-administer dopamine without limit. They (both male and female) would hit the lever 5,000 times a min. and would continue to do so until they died. They ignored the food and sleep needs, they even crossed over painful electrical grids to get the dopamine and eventually died. Dopamine highs are powerful!**

**-We get natural shots of dopamine anytime we do something that makes us happy. Essential activities that guarantee dopamine are those that are essential to the survival of the species: sex, eating, sleep. Research shows that there is actually more dopamine administered when we are in the stage of expectation. Getting ready for a date, or vacation is stronger than actually being on the date or vacation. Yeah! The weekend is coming!**

**Chemically Induced Highs**

**The brain isn’t made to handle the HUGE amounts of dopamine that drugs import and therefore the result is physical damage. Scans show brains on alcohol develop huge holes in the outer membrane, and you can see the results in reduced cognitive functioning.**

**-For the optimal high, the substance that causes it (caffeine, chocolate, alcohol, amphetamines, nicotine, and meth) should have periods of abstinence in between administration. However, those who are addicted to the high cannot wait and keep taking more and more, Therefore; it takes more and more to get high.**

**-a regular dopamine boost might be 15%. Cocaine gives you a 400% high on the first hit. Meth Amphetamine gives you a 1500% boost on the first hit. This is why this drug is so lethal from the first hit.**

**-Remember that the teenage brain has more dendrites than it ever will and continues to blossom with them. That means it has SO MANY more receptors! Teenagers are extremely vulnerable! Highs are more powerful and seductive to teens. Unfortunately, this stage of development in the brain is so highly stimulated with the dendrite blossoming that it has the effect of “fuzzy thinking”. The overstimulation slows down their processing and this is why it takes them longer to answer our questions. However; they are very impulsive and make very poor decisions. They feel pressure to process and the amygdala fires out lies and “stupid” answers.**

**-Years ago it was hard to overindulge. Since the industrial age, things have changed dramatically and the controversial substances are now in abundance…this is against the nature.**

**How substance abuse alters the brain:**

 **Direct impact: There is an increase in dopamine molecules. Therefore, the receptors and the synapse are full. You will find this with *nicotine* and the *stimulants*. Meth does this, but *Meth* also is part of the indirect group.**

 **Indirect impact: Suppresses the dopamine molecules, but blocks the reuptake so they hang out in the synapse area longer. You will find this with *opioids, alcohol,* and *meth.***

1. **There is physical damage when the receptors are repeatedly shut down**
2. **Tolerance: the need for more of the drug to get the same high**
3. **When you keep using drugs, your body slows down its natural production of dopamine. That is why once you stop the drugs, there is a powerful depression. If the damage is serious, you will never get normal happy feelings again and always feel depressed. With adolescent drinking, it will take a full year to get back to baseline…if then.**
4. **Genetic Protection: Your genes can physically change. Your body finds it necessary to tamper down neurons to avoid the huge highs. It is the “wet blanket” effect. If this happens enough, NOTHING will make the person feel excited anymore…except more drugs.**
5. **Craving: Your body adjusts the level of glutamate (which helps your brain to think). Too much of this causes you to think non-stop and to obsess and act compulsively. Too little causes your thinking to slow way down. That is why talk therapy is so difficult with addicts. This craving also interferes with what might have otherwise helped with your cravings.**
6. **Relapse:**
7. **You begin using the same drug again or one that is similar (addicts go to another drug believing they are only addicted to one drug).**
8. **They are exposed to triggers such as advertisements, others using or seeing druggie friends.**
9. **Stress or depression; even off drugs you still have financial problems or a hard job.**

**-The neurological architecture of the brain has been changed with substance abuse. If the abuse continues, the damage becomes permanent and it is possible that you will never feel happy again.**

**-Addicts respond to too much dopamine and the thought is that some of us have genetic mutations that exacerbate the effect (runs in families).**

**Treatment Implications**

1. **DELAY experimentation**
2. **Early intervention (Damage is faster in younger brains.)**
3. **Abstinence (with motivation) can repair receptors if damage is not too severe**
4. **Medication is the future (ironic). They are working on bonding agents that will help the functioning of dopamine. Chantix for smokers is an example of this.**
5. **We need to identify and reinforce healthy activities that encourage dopamine uptake.**

**-Check out You Tube. “Montana Meth Project”. These TV ads have reduced the Meth use by 40%. They are graphic.**

**-SPECT Scans of the brain which measure the glucose and oxygen metabolism have shown the following:**

1. **A normal brain has a smooth covering with some slightly shadowed areas. Brains that have used substances such as alcohol have holes. The more use, the more holes. You can tell what the symptoms will be by where the holes are located. Poor nutrition can also cause these holes.**
	1. **A child who was unsupervised ate chips and sodas from the gas station every day for his meals and had holes in his brain. He was found to have a low level of functioning and a high level of behavioral problems. After 9 weeks of proper nutrition his brain was normal again. Think about the diets in our schools.**
	2. **Brains on Meth and Cocaine have huge holes on the top of the brain and therefore have many cognitive and learning deficits.**
2. **Weekend warriors (usually teenagers) have huge holes. The earlier they start, the worse it is.**

**-Share this information with kids as facts, do not preach to them.**

**Encourage kids:**

1. **To keep good friends because that is big dose of dopamine, and helps people to live longer and happier.**
2. **Get involved in physical play.**
3. **Set goals to achieve (dopamine from anticipation!)**
4. **Get involved in the Expressive Arts…music, dancing etc.**
5. **Learn to help other because you will get dopamine AND serotonin boosts!**