On Saturday, January 30, 2021 Gospel preacher and Neuroscientist Brad Harrub taught a series of lessons to the members of the Project Rescue Addiction Recovery Program.

Brad Harrub holds an earned B.S. degree in biology from Kentucky Wesleyan College, and an earned doctorate degree in anatomy and neurobiology from the College of Medicine at the University of Tennessee in Memphis.

Dr. Harrub is the executive director of www.focuspress.org

The significance of listening to and studying Brad Harrub's video clips and transcripts (below) is great because he is a Gospel preacher and a Neuroscientist.

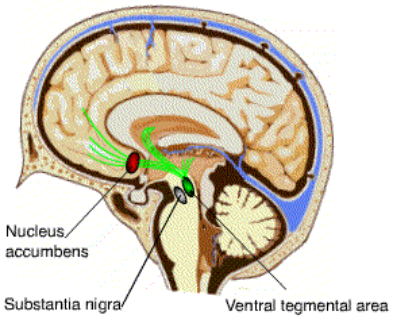
Since the Neurospiritual approach uses neuroscience to illustrate Scriptures about the heart, soul and mind, Brad Harrub's contribution to our study is very significant!

Video @ Communication Between Brain Regions – (1:09 minutes)

Transcript of Video

In order for you to understand all the different things that we've talked about. You got all those different portions. Basically, what is happening on a cellular level is, neurotransmitters are causing a neighboring neuron to fire. When we say fire, that means it's going to send that signal on down the line. A lot of times, people talk about the nervous system, like we do a telephone line. Where you're sending a call down the line. That would work if it were made up of a bunch of little pieces of telephone line. Because what you have to do is send it. When it gets to the end, I got to release enough chemicals that it's going to cause this guy to wake up and go, “Oh, I need to send a signal on down the line” and it picks it up and keeps it going. And it does all of that, that quick. Well, much much quicker than that.

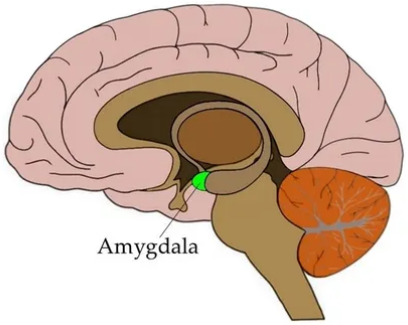
Pleasure Reward Pathway



Video @ Ventral Tegmental Area – (less than 1 minute)

Transcript of Video

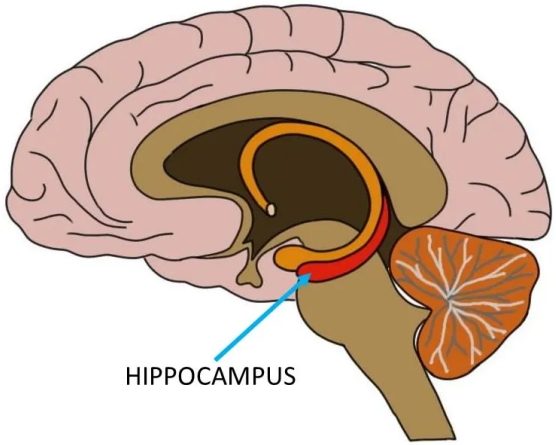
Ventral Tegmental Area I mentioned the VTA just a moment ago, the Ventral Tegmental Area. This is the other major player in the whole reward circuitry. Okay. It's located right here on the brain stem and it receives subcortical inputs on what's going on in your environment. What does this thing do? So, this is the origin of dopaminergic cells in the Mesocortical and Mesolimbic System. It is basically where the reward circuitry starts. It plays an important role in a number of processes including reward cognition. the VTA is a brain region centrally involved in the development and expression of variety of behaviors associated with drug use.



Video @ Amygdala - (1 minute)

Transcript of Video

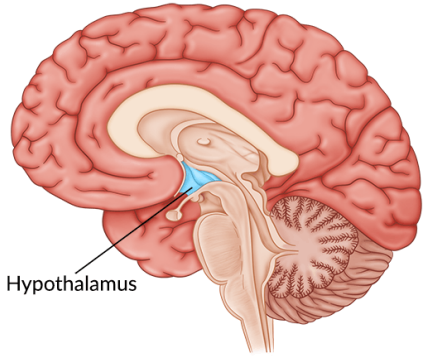
The amygdala, this guy is right dead center, and you'll notice looks like there's a single bean on this picture. That's why I like to always show try to show three dimensionally, that there is one on each side. One on each hemisphere. And again, this is one of those portions of your brain everybody in here has, everybody here needs, and everybody in this room has used, because I suspect everybody in this room has been in a fight or flight situation. You have probably been in one of those situations where you feel that massive adrenaline rush and all sudden you feel like you can do a whole lot more, you can do different things. We're talking about this portion of the brain right here the amygdala. It's responsible for response, fight or flight, and also for memory of emotions and especially for fear.



Video @ Hippocampus – (less than a minute)

Transcript of Video

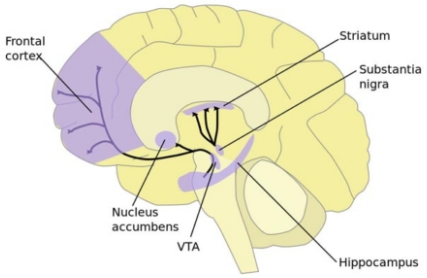
The Hippocampus has a major role in learning. It's plastic, which means, we know it can rewire. It's a very vulnerable structure that gets damaged and if it does get damaged, then you start having things like Parkinson's, Alzheimer's, dementia. Why would I point out the hippocampus to a group of guys in this kind of setting? If you damage it, whether you're using drugs, alcohol. Whether you're overstimulating with pornography. Whether you're doing anything. What's that going to mean long term? Yeah, you're going to have trouble with your memory.



Video @ Hypothalamus – (less than 1 minute)

Transcript of Video

The Hypothalamus is located really, really, really, deep in your brain. You see the little bulb at the end? That's the pituitary gland, it basically leads down into it. What does it do? It is a link between the endocrine system and the nervous system.

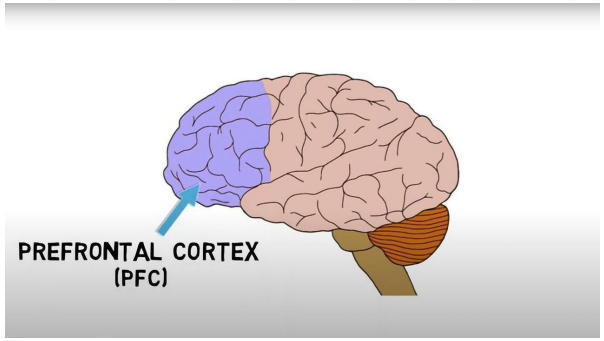


Video @ Nucleus Accumbens (2:12 minutes)

Transcript of Video

Nucleus Accumbens The next one is the nucleus Accumbens. Why is this guy right here important? Anybody know? Everybody in this room, myself included, you like this one. This is the place, not necessarily where dopamine is all generated. This is the place that when dopamine hits it, you get that feeling like “ahhh” These two things right here, we're going to talk about the VTA here in just a second, but this guy has got dopaminergic neurons that go to the Nucleus Accumbens. When those fire, that is the pleasure center. In fact, when they were doing experiments with mice, one of the things they did was they would drop very very fine electrodes down into the brain and they would hit it with electricity. And what they wanted to see is where's the reward center and where's this pleasure center at? And they trained the mice, “Hey, anytime you feel really good, hit this lever”. When they dropped it right here into the Nucleus Accumbens. Guess what the mouse did? He forgot about everything else. He just kept hitting that button. So, this plays a major role in the reward circuitry of the brain. It is the primary site mediating reward behavior. And it's thought to be directly involved in reinforcing and addictive behaviors in response to drug use. It's the core involved in cognitive processing of motor function. Basically, these two things that we're going to talk about

right here. That's where a lot of the problem and the solution happen. So, when you hear me say Nucleus Accumbens. What I want you to remember is, “That's the reward place. That's the pleasure place”. That's that mouse hitting that lever over and over again.

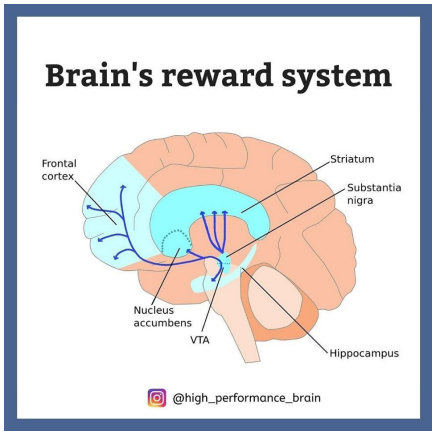


Video @ Prefrontal Cortex – (2 minutes)

Transcript of Video

Prefrontal Cortex Prefrontal Cortex is located right in the front. The very first question we've got to ask is, what does the prefrontal cortex do? Simply put this is the guy that helps you to focus your attention. So right now, if you're listening to me and you're having trouble listening to me, it may be because you got some prefrontal cortex damage. It also has a lot to do with consequences. Thinking about the fact that, if I do this then this is going to happen. The Prefrontal Cortex is also about impulse control. So, if you walk by something and you immediately want to go and either do an action or you want to do

something, buy something, get involved in something, it’s the Prefrontal Cortex. Also managing emotional reactions, planning for the future. So, what if we damage this area? If you damage this area, you're probably going to have problems making decisions. You probably are going to have problems behaving appropriately in social situations, because all of a sudden, you don't really know what is socially right and socially wrong. Patients with Prefrontal Cortex damage tend to perform poorly on tasks that require the use of longterm strategies and the inhibition of impulses. they often display short-term memory deficits, which may help to explain some of the difficulties in planning.



Video @ Drugs as Opposed to Senses Activating Reward System – (2 minutes)

Transcript of Video

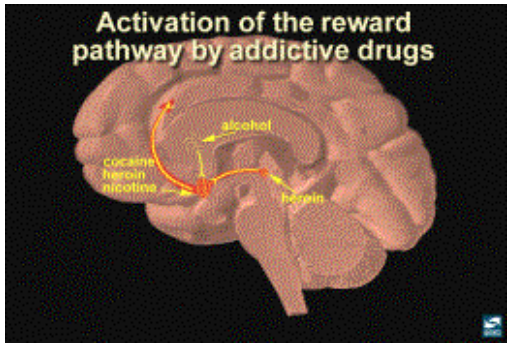
Drugs as Opposed to Senses Activating Reward System So, what happens if instead of getting something from your five senses, you get something chemically? Like for instance marijuana, methamphetamine and all of a sudden that hits this same area,

what do you think happens? So, you are going to have a situation where, and let me let me back up and show you, because I want to make sure you see this in context of the brain. So, you see the blue the green and the red areas? So, these are going to be nerves that go to those specific areas. The VTA, the Nucleus Accumbens. This is the Locus Cereuleus. If you look on this chart what you realize is, if I'm using nicotine or barbiturates, there's a good chance it's going to fire right here. It's going to innovate this particular place. That then is going to send a signal to the VTA to make dopamine. Or maybe I'm using opioids. So if you look up at the very very top, way up there. You got opioids, ethanol, benzodiazepines. So, if I'm using those I'm going to stimulate the VTA, produce dopamine, and it's going to go to the Nucleus Accumbens. What if I use something like cocaine or amphetamines? That's actually going to go straight to the Nucleus Accumbens and have an effect of there. All of these, at the end of the day, are affecting your dopamine reward circuit. That's the bottom line.

Attack on Reward System - ____ (1:02 minutes)

Transcript of Video

Nicotine's Direct Attack on Reward System What if I use something like cocaine or amphetamines, that's actually going to go straight to the Nucleus Accumbens and have an effect of there? All of these at the end of the day are affecting your dopamine reward circuit. That's the bottom lines. Yeah, believe it or not nicotine does too. So, you'll see some of these are going to both areas. Actually, if you look nicotine's going here, it's going here, and it's going there. What does that mean about the addiction of nicotine? Absolutely. There are some of you in this room who probably at a certain time in the morning, your body is physically craving and wanting to fire right here, because every morning you had that morning cigarette.



Video @ Activation Reward System Microscopic View - (2 minutes)

Transcript of Video

Activation Reward System Microscopic View So, here's what it looks like on a microscopic level. This is the end of a nerve. Do you remember those nerves that have all the little filaments coming off of it? This is just one filament. At the end of the

filament, it's going to have vesicles that hold different types of transmitters. Now, this is how amazing God is right here. You got this vesicle holding dopamine, but that same nerve may also have other neurotransmitters. It has to know which one to release at the right time. So, on this particular occasion, we're going to release dopamine. It comes all the way to the end of that particular nerve and when it does dopamine is released. It has to cross the cell wall, bilipid membrane cell wall. Molecules of dopamine are now in this intercellular space. You see how three-dimensionally specific that is? No, that's an artist's interpretation. It's not the real structure of dopamine, but they did it on purpose so you can see that fits perfectly right here, right? So, it fits perfectly on these guys and what that does is it tells this, “Hey, keep on sending the signal, because now I've bound to this receptor” the receptor says, “Okay, I'm supposed to be sending a signal”. Here's the important part. See these things are here the purple deals? What they are supposed to do is clear the dopamine out after it is landed here told this guy send the signal, then it clears out so it can reuse that dopamine. Incredible system, microscopic.

- (1:33 minutes)

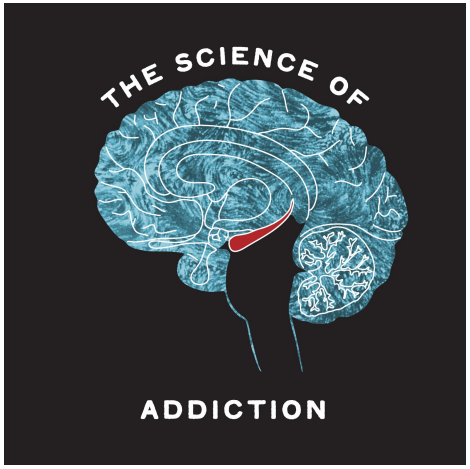
Transcript of Video

Cocaine Activating Reward Circuit What happens when cocaine either fits into there or what it realistically does more often, what happens when cocaine gets into the reuptake mechanism? It doesn't clear up. So, you see all these little X's, these little stars? They stick around. What do you think they keep doing? They keep landing back on these, telling the cell “Fire again, fire again, fire again”. So, where maybe God designed it to fire once or twice, now, you've introduced something that is causing this thing to fire 20-30 times. And you are being over stimulated. Now here's why you would use that cocaine. If this nerve right here is going to that Nucleus Accumbens we talked about. Pleasure center, mouse with the lever. Can you imagine if all of a sudden, you're telling that thing “Hit it again, hit it again, hit it again”? That's what’s happening. Basically, it's causing a buildup of dopamine in the synapse. Cocaine blocks the dopamine transporter, causing an intensified response within the receiving cell.

tem - (1:12 minutes)

Transcript of Video

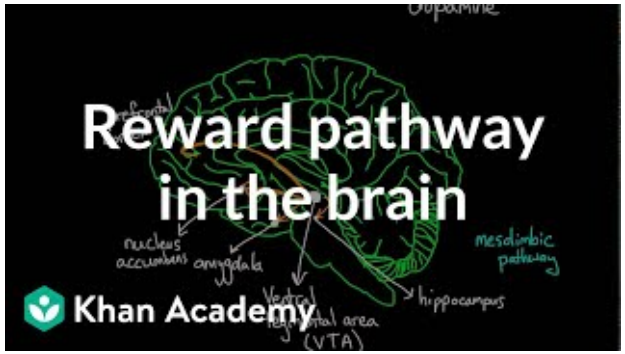
How Marijuana Hacks Reward System So, somebody tell me, what is THC? Okay, where's the found in? Marijuana, so if you look at those two molecules, the one on the right is THC. The one on the left is actually a neurochemical that your brain normally produces Anandamide. Basically, what it does is, it affects things like pain, appetite, memory, your mood. So, think with me for just a moment if there is a receptor that is specifically built three-dimensionally to accept that guy right there, but you're filling it with that. Anybody think that maybe that would alter things? So, if this is supposed to fit in it, but this fits in it, then all of a sudden, your brain is being sent a message that it shouldn't be getting.



Video @ Many Things Play Role in Addiction - (less than 1 minute)

Transcript of Video

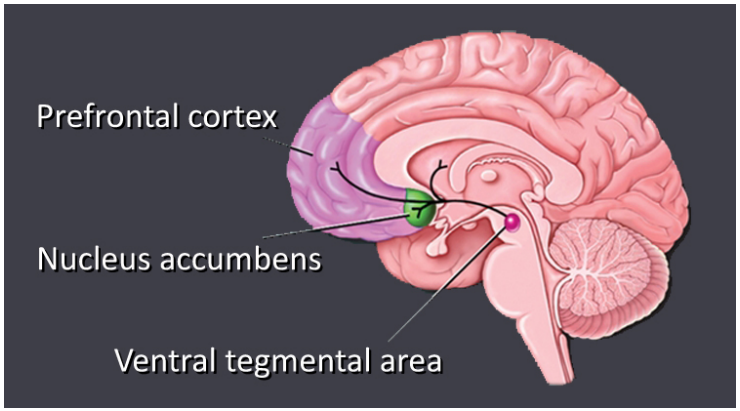
Many Things Play Role in Addiction So, for instance, your parents may actually play a role. Don't get all happy and go, “Yeah, I can blame everything on my parents”. No, Brad doesn't play that. That may work for some people. Your environment, because of some of the cues you're in, how you grew up. Different things like that. The drug itself. Depending on how much dopamine is released. You know, if it's a thing like methamphetamine, that's going to have a bigger effect than something like marijuana in your brain. Brain mechanisms that we've talked about. So all these different things that are going on in your brain, all of that plays a role in whether somebody will or will not get addicted to drugs.



Video @ [Reward Pathway Activates Motivation/Mesolimbic Pathway] - (less than 1 minute)

Transcript of Video

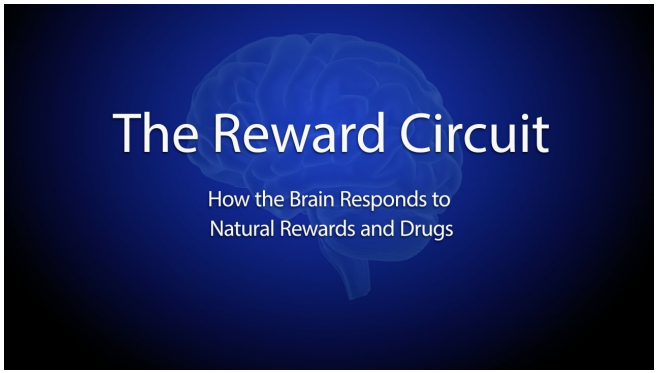
Reward Pathway Activates Motivation/Mesolimbic Pathway The Mesolimbic System also has something to do with motivation. So motivational properties. Why is that a big deal? So, let's say that you are not experiencing that high. That you're not feeling that pleasure. The Mesolimbic system is the one that tells you. “Hey, go get it”. It's the one that is basically firing to say, “Get off your bed and go find ‘X’”. Does that make sense? So, if this right here is wired a certain way, then lo and behold, guess what? you may have to end up rewiring.



Video @Reward Pathway Recovery Process - (2:02 minutes)

Transcript of Video

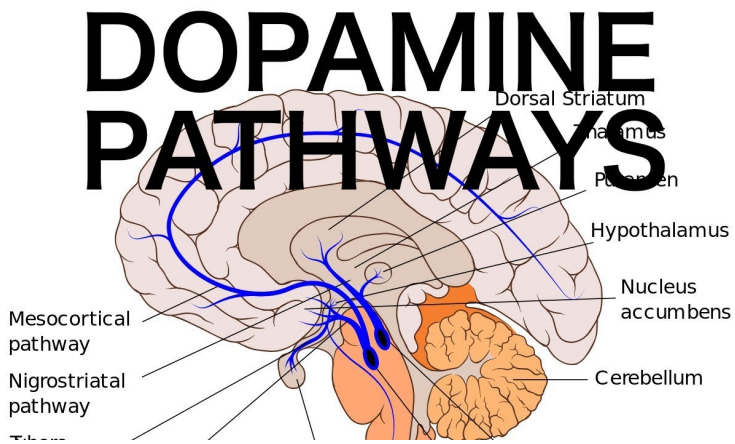
Reward Pathway Recovery Process If you start using cocaine once every three days. Your body is all of a sudden now going to have a lot more cocaine. Which means you're going to be binding this up a lot more and have a whole lot more dopamine. It means your nerves are going to fire more. What do you think is going to happen on this cell right here, this nerve cell? One thing it may do in response It may say, I need to produce some more receivers. Because we got all this dopamine and so instead of having 5 now, it has 15. So, that same hit of cocaine doesn't have quite the same effect. Here's the problem. You get clean. You got 15. You finish writing a book and your body says that's a great accomplishment and it releases some dopamine that when you only had five would give you a great rush and feel good. But you know, you got 15, so what happens? It doesn't feel as good. So, here's the positive side. Just like you can grow more. You can also have less. So, if you're not ingesting cocaine and having all this leftover dopamine. Then your body says, "you know what?" I don't necessarily need that many receptors. Or the way, I've been kind of communicating to you guys. I don't necessarily need a four-lane road here. Maybe I just need a two lane. Does that make sense?



Video @ Reward Pathway Stores Memory/Mesolimbic Pathway - (1:22 minutes)

Transcript of Video

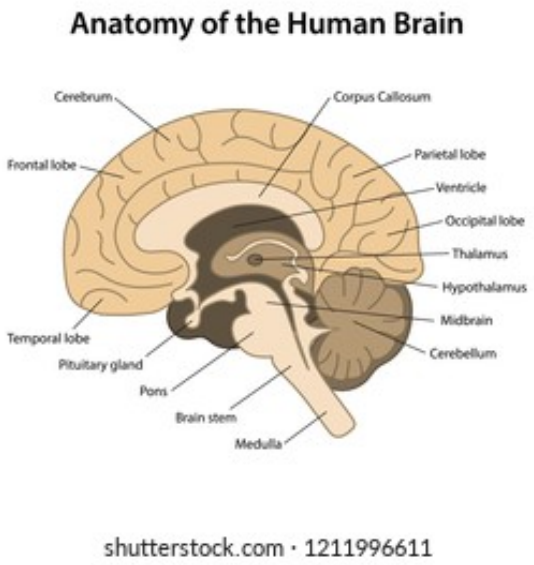
Reward Pathway Stores Memory/Mesolimbic Pathway Mesolimbic has to do with memory. Why is that important? So, this one right here, has to do with memory. What do you think? And so, if I know that going to this corner store, I could get a six-pack of whatever my favorite alcoholic beverage is, cheap. And I'm going to feel that rush of alcohol hitting my lips. There's a memory that is now stored that's associated with that system, with that track. It's the same thing. Remember, I was talking about motivational cues. Maybe you associate a $20 bill with rolling it up and snorting cocaine. That's part of what's going on right here. So, the Mesolimbic System hits your reward center, but it also is then going to store that in your memory. That's why what we do matters. Because if you have stored a memory that that $20 bill equals cocaine and reward, you're going to have to rewire that.



Video @ Reward Pathway to Prefrontal Mesocorticle – (1:24 minutes)

Transcript of Video

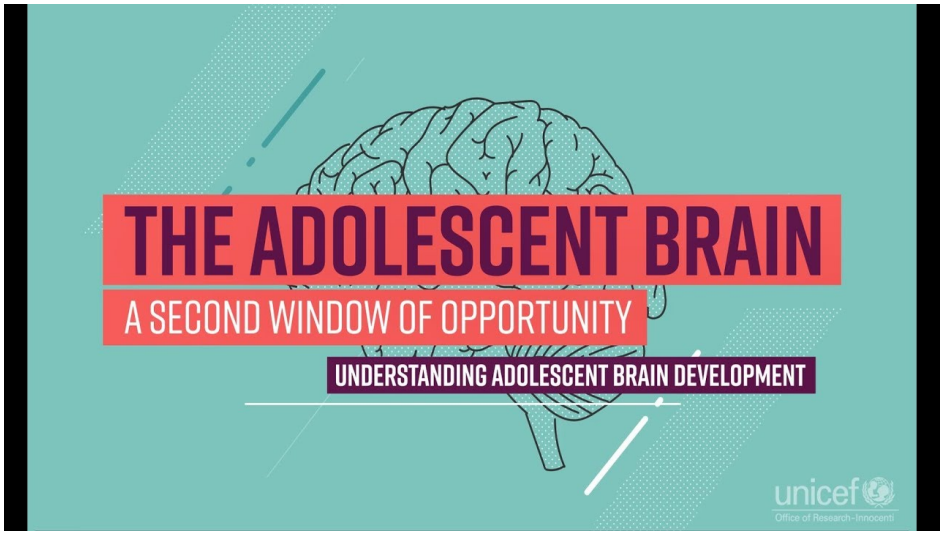
Reward Pathway to Prefrontal Mesocorticle So, we got to know about two different pathways that are involved in the Dopamine circuit. Probably words you've never heard before and that's okay. Mesolimbic, Mesocorticle pathways. The Mesolimbic pathway. Basically, it is responsible for the happiness. So, it is going to be the one, that if you look on the screen right here, it's blue. It goes from the VTA to the Nucleus Accumbens. It gives you that reward feeling the Mesocorticle follows a similar type path, but it's going to go out into the rest of the brain. Into the orbital frontal to the prefrontal cortex. Why would you have a Mesocorticle portion, and what role do you think it plays? Okay, so when I get a reward, when I feel that pleasurable feeling, there's a good chance that my actions or my attitude, my behavior, is going to follow that. So, you've got a portion of it that's going on to the rest of your brain that is going to control things like actions, memories, etc.



Video @ Thinking, Feeling, & Behaving Shapes Brain Anatomy - (1:16 minutes)

Transcript of Video

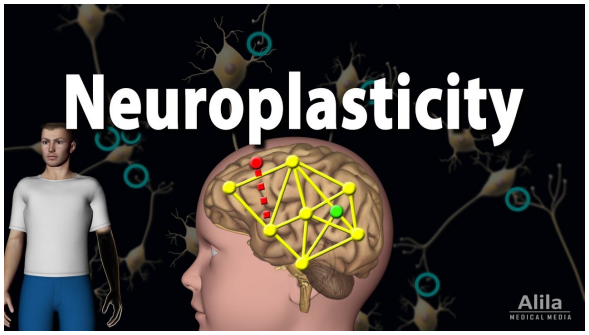
Thinking Feeling Behaving Shapes Brain Anatomy All right, let me put it in writing. So, you guys can memorize it or think about it at least. So, thinking, feeling, and behaving are produced by brain anatomy and chemistry. However, thinking, feeling, and behaving shape the development of brain anatomy. So, what I feel, what I think, and how I behave basically produces brain anatomy. Maybe I'm going to grow more dendrites on this particular neuron. Maybe I'm going to make this two-lane road a four-lane highway in my brain. So, in other words if dopamine is dumped in my system and I feel good for it, I'm likely to continue that behavior. But if I continue that behavior, it's going to ultimately alter the structure physical structure in my brain. That make sense? So, the brain is feeding your behavior, your thinking, and your feeling, but at the same time, how you feel, think, and behave alters the structure of your brain.



euroscience – (1:41 minutes)

Transcript of Video

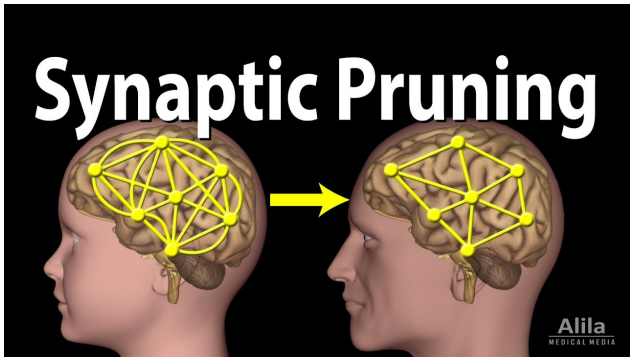
Why Preteens/Teenagers Must Know Neuroscience They also a developmental disease. It starts primarily in adolescents and in childhood. If you look on this screen, you'll notice the red is tobacco. The yellow line is marijuana. The green is alcohol. According to this chart? When are people more susceptible to getting addicted to those substances? From about 13 to 25. I'm going to ask this just out of my own curiosity. Does any of your history go back to ages 13 to 25? Okay. All right. That's important for a lot of reasons. Number one, from a neuroscience perspective, what's happening in this period right here, is you are having a lot more things that are kind of hard wiring or a lot more wiring going on. One of the reasons why insurance companies do not like to insure young males, is because your brain isn’t fully functioning until you're about 22-23 as a male. Okay, you still got some stuff going on. Which is why they wrap them around telephone poles. So ,if you think about it number one, things are wiring more but also from the other side of the spectrum. If I am a church, a government, a parent, when do I really want to be focusing time and attention to make sure somebody doesn't get addicted? Right here



Video @ Your Experience Shapes Brain Structure – (less than a minute)

Transcript of Video

Your Experience Shapes Brain Structure So, the brain is feeding your behavior, your thinking, and your feeling, but at the same time how you feel, think, and behave alters the structure of your brain. Which is why I keep coming back to this whole thing of transforming your mind. I think there's a reason Paul said, “think on these things” and he gave a long list. Things that are pure, things are noble, things are just, things that we need to focus our attention on to wire our minds in a certain direction rather than in this direction. Just as brain structures can affect behavior, likewise, personal experience can affect brain structure. So, what you physically do out in the world, actually affects the physical part of this.

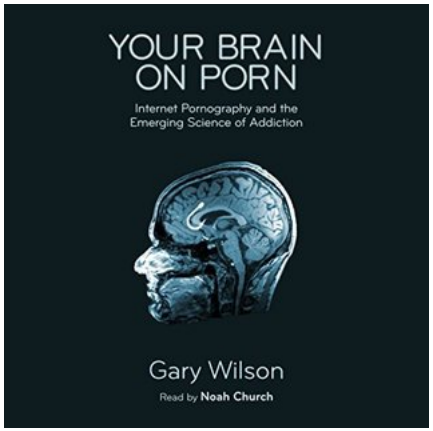


Video @ Brain Recovery, Healing, & Rewiring Plasticity – (1:08 minutes)

Transcript of Video

Brain Recovery Healing Rewiring Plasticity The bottom line is addiction alters the physical structure of your brain. So, what that means with you guys is you have to rewire, and you have to start associating pleasure and reward with good things. Let's talk about that rewiring it’s called neuroplasticity. Basically, what it means is, “Okay so, I've got these particular neuronal circuits in my head. I used heroin for 20 years and I stopped. Now what I've got to do is I've got to tell my brain ‘we're no longer needing that highway; we're not going to feed that highway anymore. In fact, we're going to let that highway turn into old weed covered dirt road that we don't use and we're going to use something else’”. The brain is constantly changing, reorganizing with the new experience. This is what we call neuroplasticity.

stand picture of what neuroplasticity is. So for instance, if this region has to do with the hand, you've got the little finger, the ring finger, the middle finger, index, thumb, and that's all in this portion of your cortex. What happens if all of a sudden, you're missing a hand? What do you think happens to this area? It's going to rewire to accommodate and instead of this right here being a big deal. We're going to move over here and we're going to shift the whole lot of our energy right here. We're going to grow more neurons, bigger neurons, more dendrites, everything because we don't have this anymore. We're not getting input from this. This is turning into a dirt road. By the way, since we only have one hand, we may also want to increase a little bit from the eye, and we may also want to increase a little bit from say the nose. Because now I'm going to need other input to take up for this right here, that I've lost.



Video @ How The Reward System Works When Pornography is Used

Video @ Process Activities Like Pornography Are Different from Drugs

Brad Harrub holds an earned B.S. degree in biology from Kentucky Wesleyan College, and an earned doctorate degree in anatomy and neurobiology from the College of Medicine at the University of Tennessee in Memphis. He was listed in Who's Who Among Scientists and Researchers. He is the author of Convicted: A Scientist Examines the Evidence for Christianity, Heart of the Matter, Dissecting the Truth, and the coauthor of the books, The Truth About Human Origins, Investigating Christian Evidences, Matters of Life and Death, Diamonds in the Rough: Nuggets of Truth from God's Word and has written many tracts and articles for brotherhood journals. He is a popular speaker on Christian evidences at lectureships, youth rallies, etc. and has spoken in over 47 states and on five different continents. He conducts over 40 "Truth About Origins" weekend seminars each year. In addition, he was an invited

speaker to the International conference on Creationism, and he has appeared on the television show “Origins” along with hosting the show “Think About It.”
Dr. Harrub has authored or co-authored numerous scientific publications in science journals and has done mission work in Russia, Ukraine, New Zealand, Ireland, Jamaica, and Nicaragua. Currently, Dr. Harrub serves as the Executive Director and co-founder of Focus Press and as co-editor of Think magazine, a monthly magazine on Christian evidences.