Lesson 7: Feel Good Chemicals

Today I'm going to talk a little bit about science. And I always joke that I was an English major in school, so I know enough science to think about how these things affect us. But if you need more in-depth science information, there are lots of resources. You could look up more information about the things I'm going to discuss today.

But I want to talk about a few structures in our brain, and why they're important to us as far as eating, and hunger, and cravings and things like that. So, first I want to talk about a part of our brain that is kind of in the deep, inside part. So it's part of our limbic system, and it looks a little bit like this. And inside of this is the amygdala, and I just love that word. But it's an almond-shaped structure.

And what it does is, it gets our senses from environmental cues and it is what controls our fight or flight mechanism, or even freeze. This is where we start to process emotions; danger, warning, and this will affect then how we respond to stimuli. So, this will affect us in stressful situations, and even other emotional situations.

We have this part of our brain, this frontal part of our brain, which is called the prefrontal cortex. And this is a newer part of our brain, and it's a part of our brain that is responsible for rational thought, decision making. It's kind of like the computer motherboard. It can take all of the information from the other parts and the environment, and make sense of it, and then come up with decisions. The issue is, often times we struggle with activating this part, or engaging this part of our mind. And up until about the age of 22, we don't completely have that part developed or on board with us. This is why adolescents tend to make a lot of difficult decisions.

Another part of our brain is our hypothalamus, and our hypothalamus controls the neurons, and they control things like sexual behavior, rage, body temperature, our circadian rhythm. And there's a part of the hypothalamus that activates paradoxical effects, helps us to control the urge to eat. Kind of, we have a go, no-go mechanism. Get food, don't get food, do this, don't do that.

So we have this system, and that is greatly affected by the cues that we give it. It determines more or less desire about eating. It helps us set meal times and frequency, which is really important for us here. And also predicts hunger. So, this is an important part of the brain.

Our endocrine system also affects hunger. So you hear a lot in The Fasting Method about insulin. Insulin will drive hunger. When we have our insulin resistance, we have our insulin too high, too often, we are going to be hungrier and we're going to have more cravings.

One reason we have cravings is because our body senses a need. And if it doesn't sense that there's enough energy available, it will cause us to be hungrier, and it will want food that gives it energy quickly. The brain in that moment is not going to say, Hey, let's eat a great big bowl of broccoli, that would be great. That doesn't give it that instant energy. So it is going to give you messages about wanting certain things. And, unfortunately, in our society now, with such highly palatable food, it's going to ask for problematic things.

The other parts of our endocrine system that affect our hunger, you may hear about Leptin. Leptin is a hormone that is stored in our fat cells, and it actually tells the body, there's enough energy, you can stop eating now. This should be our best friend, right? It can let us know we have enough. The challenge is, that as we gain more weight and increase our health problems, we often decrease our sensitivity to leptin, so we don't get that signaling that we have had enough.

This makes it harder for us to recognize satiety, having enough food, and being able to go without food. And then the last one I want to talk about in the endocrine system is ghrelin. And I still love this word because it just reminds me of a gremlin. But ghrelin is our hunger hormone. So, it really has a large role to play in our seeking food behaviors or not.

So when our body recognizes that there's not enough energy stored or available, it increases ghrelin. It releases more ghrelin. So this controls when, or if at all, we eat. It's released in our GI tract, and it increases our desire eat. It stimulates some of the areas in the brain that make you want to eat, and it creates food anticipatory signals in neuron systems to get you starting to think about food.

It's very tied to an internal clock. So if eat your meals at noon and six, you are going to get hungry probably about 11:45. So the ghrelin activates, it's very based on habit. Now, this is a struggle for many of us, but it's really a good thing. Because our ghrelin timing can be stretched to change our meal times fairly easily. You can start by moving it a half hour to 45 minutes a day. It actually will reset and start to signal at that later time. So we actually do have quite a bit of control over that.

But ghrelin is active. So last week when I talked about hunger signals and what to do about it, sometimes just recognizing it, ah, this is just ghrelin. It's letting my body know, it doesn't think it has energy available because I haven't eaten. But I know I have energy available. I have stored body fat. Some of our neurons that fire in our brain about hunger, food, when to eat, when not to eat, and when to stop eating is innate.

And it's really important that we have these signals because they let us know things like, maybe ancestrally, if we found berries and put those in our mouths, if they were bitter this let us know that they were poisonous and dangerous. So we would stop eating them. Unfortunately for all of us, we don't have that same mechanism with things that are sweet and savory. Instead, we lean into those and we want more of them. Because they're pleasing, and it signals safe food. Again, more of a problem nowadays with all of our highly processed, highly palatable food.

The Vagus Nerve is one of our primary nerves that goes from the base of our brain all the way down to our extremities. And it reaches organs, interacts with heart rate, gets us active, and it can also calm us. The Vagus Nerve is involved in the sympathetic, meaning the activating nervous system, and the parasympathetic nervous system, the calming nervous system.

It also has receptors in our throat, in our mouth. It tells us a lot of sensory information about continuing to eat, fullness, and then some of those things activate calm. The Vagus Nerve is what really helps us communicate between our brain and our motor system. So all of the sensory information that comes into the body is taken to the brain with the Vagus Nerve, and then decisions that we make or needs that we have get communicated back out to our motor system. This greatly affects our movement toward eating and not eating.

It activates certain pathways. And so then we start talking about these neuron pathways. Neurons that fire together, wire together. They become stronger. So, thoughts that we have more often, behaviors that we do more often, habits that we do more often, those neurons get more strongly bound together so that our brain is more likely to use those again.

So when we want to break habits, we want to fire neurons on a different pathway. We can't keep firing on those same ones. So this is important around eating behaviors. Generally we like sugar because it tastes good. Sweetness is a flavor that we like, it's a sense that we get, and so it's attractive to us. The thing with this that's so important is

it's less about the flavor. It sends signals in a certain pathway in our brain that activate reward. So, we get a bigger reward for that.

They've tested, even when they remove the sense of taste so people cannot tell that they're having something sweet, those reward pathways are still lit up. So our brain gets certain chemicals based on this. It activates more dopamine. So it's not just that they taste good. So helping yourself to recognize, it's not just that I want those things because they taste good, I'm getting a chemical response from it. And that's an important thing to understand because we can help affect that.

We have a system in our body that creates stress, or tension, or anxiety. That makes us do things, that makes us motivated to seek things. So for example, getting a sense of hunger teaches our body to react and go get food. And then we have kind of a calming system, and this is when we are calm and we can digest and rest.

So dopamine is a neuromodulator. It moderates what signals are going back and forth in our neurons, and what gets communicated from this one to this one. Dopamine is a precursor to adrenaline and epinephrine. And if you know about the word adrenaline, it's excitatory, it gives us energy. When you're full of adrenaline, you have energy to do things.

So dopamine is really intended to motivate us toward things, because it gives us energy to move, and get things, and achieve things. Mainly, one of the reasons it was created is to get us to safety and get us to eat. It activates our reward pathway. So we get a reward for doing that behavior, so we will continue to do it, to continue to have food and safety. It also is the pathway of desire that makes us want to do the activity to get what we need.

And I'll share an example from some research. What they did is, they looked at rats and gave them highly palatable food. And of course, the rats were more interested in this food, they enjoyed it, so they got the positive effect from it. But if they interfered with the dopamine receptors, so if they kind of blocked or blunted the dopamine receptors, the rats still enjoyed the food.

The rats who had their dopamine receptors interfered with did not move to get the food if it was just a little bit further away. And in one study it was one rat's length away. So they only needed to move this much to get that highly-rewarding food, and they didn't. Because dopamine is what motivates us to get it. It's not just, ooh, that feels good, and

so there's where we get the dopamine. We get dopamine responses when we are moving towards something.

So it actually is something that we're getting small pulses of. And then when we achieve the end result, so when we get the food or the activity, we get a larger surge of dopamine. Earlier I mentioned the prefrontal cortex, our kind of rational thinking. That part of our brain serves as a little bit of a break system for our dopamine response. It can kind of slow it down, it can determine how much and how frequently.

So this is why it's really important that we work on our thought patterns and what we're giving our brain, as far as information. Our motivation for behavior is really based on moving between reward or pleasure, and leaving pain. So we go back and forth with this. Dopamine obviously moves us towards seeking pleasure, seeking things that will help us to feel good if we get that dopamine response. Pushes us to avoid the things that don't feel good.

Now interestingly, with the dopamine response, we can't just keep getting the positive response and keep moving in that direction. We actually need to back off from it. We need to experience some tension, pain, discomfort, because that motivates us to move forward again. We have kind of this pleasure and then pain.

Now, the reason why the dopamine system gets so complicated for us, and why we all talk about it, is that one of its primary purposes is to activate us to get away from the pain, the discomfort. So the more we're describing that going without pancakes for breakfast is horrible, our brain is going to work harder to get that. We need to be able to have this pleasure, this reward, and we need to be able to experience the pain that creates us to move forward.

But here are some ways that that gets problematic in our brain. The more we keep pursuing things, over time we get less of a dopamine response for it. So it's hard to replicate that big charge that we get the first few times. The more that happens, the more pain or tension we experience because we want that bigger dopamine response. The pain gets greater so we want to avoid that more, and the actual satisfaction or pleasure gets smaller.

So you can see why we get addicted to drugs, alcohol, and food that moderate this dopamine response. Let's say, for example, I'm addicted to cookies. What happens is when I first eat them, I get a really big dopamine response. And then I'm always seeking that, but I can't quite replicate it. And you might even experience this if you eat one

cookie, get a little bit of a hit, then you get the pain response. So you keep trying to get that back. By the time you've eaten two rows of the cookies, you realize you're not getting the same response.

So I want to talk a little bit about this excitatory, anticipatory effect of dopamine rate, and that the dopamine fires in our reward pathway. And it can increase up to 30 to 40 times. This is what activates us toward things. So for example, sex increases the rate of firing this reward pathway a hundred percent. So at rest our reward pathway, we're having dopamine released three to four times a second. That still seems like a lot to me, but just think. If sex increases at a hundred percent, we're having twice that, we're increasing that quite a bit.

So food has a 50% increase in the frequency of our dopamine responses. Nicotine has a 150% increase in that rate over baseline. Cocaine has a 1000% increase. That's why it's so addictive. Video games, and especially those that have kind of novelty to learn new things and move between different environments, they have somewhere between nicotine and cocaine, as far as the increase in our dopamine responses in our neural pathways.

So again, this is why we have so much addiction to these things. And even social media. We're not really sure how much, we haven't been able to measure that yet, but it's likely pretty high. And it does taper off in time. Thinking about these substances or activities can increase the dopamine response just as much as actually doing them.

So if you are on social media, and you're scrolling through and looking at pictures of food, or maybe even a recipe book, or something while you're fasting, you are still reinforcing that dopamine. So you're driving yourself toward wanting to achieve that goal of getting that food. So I would encourage you to be really careful. Thinking about highly palatable food still interacts with that dopamine system, and keeps the addiction, keeps the drive, the craving going.

The other neuromodulator that's really important in all of this for us is serotonin. The calming neuromodulator gives us a sense of satiety, bliss, or contentment. It keeps us focused on enjoying what is already here, and dopamine makes us go toward things outside of ourselves. So, serotonin is also important.

Mindfulness activities really help with serotonin. Good gut health helps with our production of serotonin. And something that a lot of us probably don't like to hear in this community is that dairy has a pretty strong a connection with serotonin. It actually

increases our serotonin level. Which may sound like a good thing, but it helps to reinforce why we feel so addicted to dairy products. Why cheese is really hard to let go of if you're having problems with it, or why you want to put cream in your coffee all day. Because it helps with a little bit of serotonin.

So really important to work on other ways to build your serotonin. Exercise, getting morning sunlight, doing things that are healthy for you, eating well, good gut health. This will help with serotonin so that you're not reaching for the dairy to get that serotonin response.

There's another part in the brain that's somewhere in between that limbic brain and our prefrontal cortex, it's called the habenula. And research shows that it's very involved in our dopamine response and our movement toward things. Things that we anticipate a higher response, a higher reward from motivate more activity. And things we expect or anticipate less dopamine less positive reward from, we have less movement toward, we have less that activates us to achieve it.

So for example, a really healthy meal for me, salmon and broccoli. If my brain is being activated to get highly palatable sugary, flowery things, it is going to anticipate less reward with a healthy meal. So I will be less likely to have the energy, the motivation, the drive to seek that. And instead, I'm going to have more energy and drive to seek the thing that I expect a higher reward from.

So a lot of us in here think that there's something wrong with us, we shouldn't have this drive toward these foods, we should be able to control this. It's all about learning how to kind of manipulate this information about how our brain and body work together. Most of these things that I'm describing, we can be physiologically predispositioned to them. Some people have more of a reward mechanism than other people, so they have more risk to become addicted to these foods.

About 15 to 20% of people have a higher propensity toward addiction. But if you come into this community, you hear everyone saying that they have food addiction and sugar addiction. It's really a much smaller number physiologically, but behaviorally we train that into ourselves. The good news about that, if we can train it in, we can train it out.

So I hope this little bit about some of the brain mechanisms, some of the chemicals in our body, and learning about that can help you start to change some behaviors, and recognize that you are not victim to things. That you have ways that you can control

things by using certain foods, doing certain activities, avoiding certain activities, and avoiding certain foods.