

The Culprit of All Addictions – Dopamine?

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Polishing off an entire pint of Ben & Jerry's ice cream while you indulge in a marathon viewing session of the latest season of Downton Abbey or Game of Thrones may all have been driven by one culprit – dopamine, a powerful neurotransmitter that governs the reward and pleasure centers of our brain.

Dopamine sends us a signal when a reward is present, and motivates us to continuously seek further rewards by being sensitive to reward-related cues and respond accordingly. Certain foods and sensory stimulations act very much like cocaine and heroin, hijacking our reward system and keeping us in a vicious cycle of anticipation (i.e. cravings) and satisfaction (i.e. getting the fix). If satisfaction is not achieved, symptoms of withdrawal ensue. These symptoms could trigger so much pain and discomfort that we eventually give in and once again indulge in the said vice so these symptoms temporarily stop.

One study discovered that obese individuals had far fewer dopamine receptors in their brain's reward center, which means they had to eat more to experience the satisfaction, or "high," compared to normal weight individuals. This begs the next question: Are obese individuals born with less dopamine receptors or did the number of receptors somehow change with lifestyle behaviors? One animal study suggested that the latter might be true. They discovered that lab rats, when fed with a hyperpalatable junk food diet (i.e. sugary, starchy, fatty and salty foods), there was a significant reduction of their dopamine receptors. To make matters worse, as these receptors decrease, the level of activity in our prefrontal cortex, the center that governs impulse, patience and irritability, also reduces. This makes it harder to stop after that first bite of chocolate cake, even if common sense tells us that we should practice moderation.

Of all the hyperpalatable foods, sugar maybe one that we should be most concerned with. One study showed that lab rats eagerly quadrupled their daily

sugar consumption in one week. When the sugar was taken away, they were extremely irritable, shaky and started fighting with the other rats. They also became instantly addicted to other substances like amphetamines, alcohol and even cocaine. The scariest part was when given the choice between sugar, alcohol and cocaine, the rats always chose – SUGAR!

What are we to make of all these salient findings? First off, I often hear people say "Oh I have an addictive personality," which suggests that some people are born more susceptible to developing addictions while others are immune. I also hear "Oh I have my mother's thighs or my dad's love handles," which again points to our DNA as the dictator of our destiny. The latest research in epigenetics (i.e. the study of genes) is proving quite the contrary. One significant study was conducted on a special breed of mice with agouti gene, which gives them yellow fur and causes them to be obese and exposes them to a higher risk of heart disease, diabetes and cancer. While the controlled group continued to produce obese mice with yellow fur, the group fed with a diet supplemented with vitamin B12, choline, betaine and folic acid produced healthy lean mice with brown fur. These findings proved that while we cannot alter our genes, we can change "the expression" of them. More importantly, these genetic expressions are passed onto the next generation.

In summary, now that we understand how addictions work and that the expression of our genes can be altered by our lifestyle choices, we should be armed and empowered to surround ourselves with the environment that enables us to be the best selves we can be.

Reference

Peeke, P. 2012. Food and Addiction: The Dopamine Made Me Do It. IDEA Fitness Journal, 9(10).