

“Sugar vs. Sugar Alternatives: Impacts on Brain Health, Obesity, and Addiction”

Webinar Questions Answered by Nicole Avena, PhD

Please note that these are brief answers to complex questions and are not meant as medical advice. Please seek medical advice from your personal healthcare professional for more complete information.

- Would you advocate for a different food label to easier identify a whole vs a processed food? Do you see that in future of food labeling?
 - I can see us moving towards food labeling that discloses excess sugar content, but I don't know about the processed food aspect itself- just because so many foods are “processed” that the criteria can get messy!
- What does the research say about monk fruit sweetener? What is your opinion on children using it?
 - Monk fruit is a great alternative to sugar and it comes from a whole food. I think children should avoid all sweeteners in general because it trains their taste buds to crave excessively sweet things.
- Do you know why the DGA has a higher sugar recommendation (10% calories vs AHA guidelines)?
 - The DGA are for use by generally healthy individuals. AHA guidelines focus more on those at risk of developing heart disease.
- Can you share references for your presentation so we can learn more?
 - Wiss DA, Avena N, Rada P. (2018) Sugar Addiction: From Evolution to Revolution. *Front Psychiatry*. 2018 Nov 7;9:545.
 - Wiss DA, Criscitelli K, Gold M, Avena NM. (2017) Preclinical evidence for the addiction potential of highly palatable foods: Current developments related to maternal influence. *Appetite*. Aug 1;115:19-27.
 - Murray SM, Tulloch AJ, Chen EY, Avena NM. (2015) Insights revealed by rodent models of sugar binge eating. *CNS Spectr*. Dec;20(6):530-6.
 - Schulte EM, Avena NM, Gearhardt AN (2015). Which foods may be addictive? The roles of processing, fat content, and glycemic load. *PLoS ONE* 10(2): e0117959.
 - Tulloch AJ, Murray S, Vaicekonyte R, Avena NM. (2015) Neural Responses to Macronutrients-Hedonic and Homeostatic Mechanisms. *Gastroenterology* 148(6):1205-18.
 - Avena NM, Potenza MN, Gold MS (2015). Why are we consuming so much sugar despite knowing too much can harm us? *JAMA* 175(1): 145-6.
 - Murray S, Tulloch A, Gold MS, Avena NM (2014). Hormonal and neural mechanisms of food reward, eating behaviour and obesity. *Nature Reviews Endocrinology* 10(9): 540-552. .
 - Bocarsly ME, Hoebel BG, Paredes D, von Loga I, Murray SM, Wang M, Arolfo MP, Yao L, Diamond I, Avena NM (2014). GS 45534 selectively suppresses binge eating of palatable food and attenuates dopaminerelease in the accumbens of sugar-bingeing rats. *Behav Pharmacol* 25(2): 147-57.
 - Avena NM, Murray S, Gold MS (2013). Comparing the effects of food restriction and overeating on brain reward systems. *Exp Gerontol* 48(10):1062-7.
 - <https://pubmed.ncbi.nlm.nih.gov/30882235/>
 - <https://pubmed.ncbi.nlm.nih.gov/28198207/#:~:text=Aspartame%20acts%20as%20a%20chemical,adverse%20effects%20on%20neurobehavioral%20health.>
 - [https://www.cell.com/cell-metabolism/pdf/S1550-4131\(20\)30057-7.pdf](https://www.cell.com/cell-metabolism/pdf/S1550-4131(20)30057-7.pdf)
 - <https://www.statista.com/topics/7428/sugar-substitutes-and-sweeteners-in-the-us/#topicOverview>
 - <https://www.sciencedirect.com/science/article/abs/pii/S1530891X21011575>
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8954878/>
 - <https://www.frontiersin.org/articles/10.3389/fnut.2020.598340/full>
 - <https://www.who.int/news/item/15-05-2023-who-advises-not-to-use-non-sugar-sweeteners-for-weight-control-in-newly-released-guideline#:~:text=Results%20of%20the%20review%20also,control%20in%20the%20long%20term.>
 - <https://www.sciencedaily.com/releases/2013/09/130922205933.htm>
- Can you provide the citation of the article from JAMA regarding depression?
 - <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2809727>
- Is there an amount of sugar substitutes that are considered ‘safe’?

- It is recommended by the FDA to only consume in “moderate amounts”, the specific amount is undefined.
- Do sugar alternatives like Sucralose cause a rise in blood sugars in people with diabetes since it dysregulates glucose metabolism?
 - Sugar alcohols (mannitol, sorbitol, xylitol) may cause a spike in blood sugar. Other sugar alternatives have not been shown to spike blood glucose, although the product they are in may (example- processed baked good).
- Is your definition for this presentation of “sugar” sucrose or all “sugars” such as high fructose corn syrup?
 - All sugars! Added sugars can be listed in an abundance of names on labels.
- Can you comment on sugar alcohols and their impact on food addiction, obesity, and/or diabetes?
 - In research, it has been demonstrated that our brains react similarly to anything that is sweet- whether it contains sugar or sugar substitutes. Therefore, if you are struggling with a sugar addiction (excessive cravings, feelings of pleasure/safety with sugar intake, etc.) then you should stay away from alternatives.
- Did you say limiting access to sugar increases bingeing?
 - In our early rodent studies, we developed a model in which we limited daily access to sugar to 12 hours per day, and this promoted bingeing when the sugar was given to the animals.
- When making healthier food swaps, after an extensive time of eating a diet heavy in added sweeteners, is there a period of time it takes for dopamine levels to rise again when eating healthy foods?
 - This is dependent on the person- there is no exact timeline! It will likely vary depending on the dietary history of the individual and their use of added sugars. Studies of dopamine in humans haven’t been conducted, so it is difficult to even speculate on a timeline.
- Do your studies show how long does it take for addiction to set in?
 - We didn’t assess that—we typically give 21 days of access to sugar before conducting studies.
- What are your thoughts on coconut sugar?
 - Coconut sugar is still sugar- it is metabolized the same way.
- How do you feel about date sugar, that contains fiber and such while not being as sweet as added/ artificial sugars?
 - It is still added sugar- but dates in general (because of the fiber) are a great fruit option to replace candy or sweets.
- The Academy of Nutrition & Dietetics position is that artificial sweeteners are considered safe in moderate consumption, what is your opinion?
 - That is also the FDA recommendation. I think they are a tool you can use to reduce your sugar intake, but not a crutch. I also don’t think we should rely on them long-term. In the end, the goal should be to reduce our dependence on sweetness in our foods.
- Any relevant findings from research using artificial sweeteners with mice or rats?
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7763677/>
 - https://ntp.niehs.nih.gov/sites/default/files/ntp/roc/content/appendix_b.pdf
- Do you know of a good protocol to help clients wean off sugar?
 - My book, Sugarless, has a 7-step guide to kick sugar addiction.
- What effect do non-nutritive sweeteners have on insulin resistance?

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6471792/#:~:text=Several%20studies%20have%20demonstrated%20that,of%20insulin%2Drelated%20signaling%20pathways>.
 - Concludes that NNS can have a gut-altering effect, therefore changing insulin sensitivity.
- Can you comment on the role of sugar & sugar substitutes with triglycerides?
 - Research so far finds no effect on triglycerides. <https://examine.com/research-feed/study/9LbZ51/>
- What is the best sugar alternative?
 - I would stick to stevia or monk fruit if anything at all. Allulose is also an option.
- For patients using weight loss medications that supposedly block dopamine response I wonder if they would be successful long term, especially if these patients return to eating the way they did before?
 - Weight loss medication should be paired alongside lifestyle change, or else long-term results are usually not the case.
- Given the increase of “keto” food in the retail market, that are often filled with non-caloric sweeteners, how does this impact hunger later in the day?
 - It depends- because often foods that are keto are higher in fat and protein. This therefore can reduce hunger throughout the day. You may also crave more sugary foods more often because the brain is still addicted to the sugar alternatives.
- How has the dopamine response to caffeine been compared to sugar. I'm thinking about the huge number of caffeine drinks available on the market that contain zero/low-cal sweeteners.
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6758129/#:~:text=Thus%2C%20caffeine%2C%20by%20antagonizing%20the,et%20al.%2C%201997>). Caffeine gives off the same responses, and can be addicting as well- although we are not “eating” caffeine all day long like sugar.
- Rodent studies that are nearly 20 years old were used in this presentation. It is well known that rodent studies do not always translate to findings in humans. Are there any more recent studies with proper controls or human studies to confirm these findings?
 - See above answers. Rodents are excellent models of human appetitive behaviors, and for this reason they continue to be used in academic research studies. Further, they are necessary to understand the effects of sugar on neurotransmitter release and receptor signaling, which cannot be assessed in humans. I did not have time to cover all of the clinical work in this area, or all of my recent papers on this topic due to time constraints. If you would like to read more, here is a [link](#) to my papers on Pub Med.
- So, being that it's sugar or artificial sweeteners that are spiking dopamine levels, what would be your recommendations if someone says...well, should I drink a diet coke or a regular coke or go cold turkey?
 - Go cold turkey. You can use the diet soda as a replacement at first, but wean off it quickly as our brain will not know the difference.
- If we know that it takes a few weeks for the taste buds to change when salt is reduced in the diet to enjoy foods with less, how long can we estimate for clients it will take for someone who is addicted to sweetness to enjoy real food again?
 - I think this will vary depending on the person and their mindset around food. My advice is to focus on the joy people can get from eating foods that are nourishing their bodies, not making it sick.
- Would eating protein with sweet foods help mitigate the craving for "more" when one eats sugar?

- Proteins and fats can promote satiety signals that can dampen our craving and desire to eat “more”, so yes, they are good to pair (preferably eating before) with sugars if you are trying to control the amounts consumed.
- If we find that the sweetness (from sugar or alternative sweeteners) are driving the rats to consume the sugar, is it specifically "sweetness" or could it just be that in general it just tastes better. Meaning could other flavors such as umami, salt flavors or even just well flavored food in general cause the same preference over the rat chow?
 - Sweetness is what our taste buds recognize, which triggers a dopamine response in the brain. Studies have been done using other novel flavorings, and they do not elicit this type of dopamine response.

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