Food Cravings and Sugar Addiction

The Gut-to-Brain Axis

The gut-brain axis is a complex communication system between the gut and the brain that significantly influences eating behavior. This communication involves the vagus nerve, hormones, and various signaling mechanisms.

- **Vagus Nerve:** This nerve acts as a "superhighway" connecting the brainstem to the colon and is involved in calming and arousal. It also functions in digestion, heart rate, breathing, and reflexes.
- **Sensory Cells in the Gut:** The gut has sensory cells connected to the nervous system, allowing it to communicate with other body organs and the outside world.
- **Gut-Brain Signaling:** Eating triggers hormone release, and neuron sensing and feedback occur before eating (prediction/reward), in the mouth (taste), in the gut, and during digestion and nutrient absorption.
- **Sensing Mechanisms:** Sensing involves epithelial cells (slower) and neuropod cells (faster), with the body responding based on amino acids, sugars, fatty acids, food temperature, and micronutrients.
- **Sensory-Specific Satiety:** The brain and gut sensors signal when to stop eating based on the necessary macronutrients.
- **Chemical Signals:** Neurons in the mucus lining signal the brain about nutrient types and values. Chemicals in food bind to receptors on the tongue and send electrical signals to the insular cortex.
- **Hormonal Signals:** Ghrelin increases during fasting, signaling the brain to eat, while glucagon decreases appetite. Overeating can lead to high dopamine levels, potentially triggering vomiting.
- **Direct and Indirect Pathways:** Neurons signal directly from the gut to the brain, and the gut microbiota produces chemicals that influence the brain via dopamine and serotonin.
- **Hunger and Thirst Neurons:** Hunger neurons in the hindbrain are more active regarding the reward value of food and searching for food, while thirst neurons in the forebrain respond to

dehydration.

- **Subconscious pathways:** Even if the perception of sweet is eliminated by suppressing taste buds, one can still crave sweets due to neurons in the gut that sense sugar in food, signaling the brain to crave more and increase dopamine.

Taste, Smell, and Hormonal Systems Drive Cravings

The body uses taste, smell, and hormones in a multi-integrated way to drive cravings. Taste receptors identify flavors and send signals to the brain, and the olfactory system differentiates odors through learning and experience. Hormones like dopamine, epinephrine, ghrelin, glucagon, insulin, and leptin also influence appetite and cravings.

Taste:

- The tongue has taste buds all over it, each containing 100 receptors for the five hard-wired inputs: sweet, sour, bitter, salty, and umami. There are two more inputs for fat and metallic.
- Taste is based on quality and valence, with sweet having a positive valence and bitter having a negative valence.
- Signals go from the mouth to the brain stem, then to the front of the brain, and then to the cortex, where taste is identified.
- Taste neurons can be blocked or opened to increase food consumption.

Smell:

- The olfactory system is not hard-wired and differentiates odors through learning and experience.

Hormones:

- **Dopamine**, a reward hormone, is released in "feel-good" situations and is usually high when it comes to sugar and salt cravings, which can lead to overconsumption of low-nutrient calories.
- **Epinephrine**, a stress hormone, usually suppresses appetite in the short term but can facilitate appetite during long periods of fasting.
- **Ghrelin**, released by the stomach, stimulates appetite and signals the pituitary gland to release growth hormone.
- **Glucagon**, released by the pancreas when blood sugar is low, suppresses appetite and

increases energy expenditure.

- **Insulin**, released by the pancreas, controls blood sugar levels, reduces appetite, and stores excess carbohydrates as fat; chronically high levels facilitate fat storage.
- **Leptin**, released by fat stores, signals the hypothalamus to suppress eating when fat cells are full; when fat cells are decreased, leptin levels increase to promote food consumption. Obese people have high levels of leptin.

The Effect of Processed Foods on Health

Processed foods—especially ultra-processed ones—can have several negative impacts on health. Such foods often contain high levels of sugar, salt, and unhealthy fats, which can contribute to various health problems.

- **Weight Gain:** Ultra-processed food groups can lead to more weight gain even when calorie intake is the same as with whole foods.
- **Hidden Sugars:** Processed foods often contain hidden sugars under various names, which can lead to increased dopamine release and overconsumption.
- **Metabolic Health Issues:** A large percentage of grocery store food is highly processed and accounts for a large percentage of metabolic health issues.
- **Mitochondrial Dysfunction:** Obesity, which can result from consuming processed foods, is essentially mitochondrial dysfunction.
- **Liver Problems:** To manufacture any food for it to be healthy, it must protect the liver. Decreasing added sugar and emulsifiers, and increasing fiber and Omega-3s, is essential. If Food is not manufactured in a way that protects the liver; it is essentially poison.

NOVA Classification System

- Nova Class 1: Zero processing (e.g., an apple off a tree).
- Nova Class 2: Minimal alteration (e.g., skinned apple, fried green beans).
- Nova Class 3: Some processing (e.g., apple sauce, dry-roasted salted peanuts).
- Nova Class 4: Highly processed (e.g., McDonald's apple pie, Ramen noodles).

Limiting Nova Class 4 foods to only 7-10% of daily intake can still maintain good health.

Sugar Addiction

Several interconnected mechanisms contribute to sugar addiction, including taste preferences, subconscious gut-brain signaling, and metabolic consequences. The interaction of these elements fosters a cycle of craving and consumption.

Key factors contributing to sugar addiction:

- Hard-wired taste preferences: The taste system is inherently biased toward sweet flavors. Sweet tastes have a positive valence, making them good.
- Dopamine release: Consuming sugar triggers the release of dopamine, a reward hormone, in the brain. This dopamine release is a key factor in the desire for more sugar.
- Subconscious gut signaling: Neurons in the gut can sense sugar and signal the brain to increase dopamine and increase cravings, even if the sweet taste is suppressed.
- Metabolic consequences: The brain subconsciously seeks food that allows neurons to be metabolically active.
- Hidden sugars: Food manufacturers add hidden sugars to foods to encourage overconsumption by triggering dopamine release. 262 different names for sugar are often hidden on food labels.
- Insatiable appetite: People develop an insatiable appetite for sugar due to the cycle of liking versus wanting.
- Conditioned taste preference: Humans are Pavlovian in food intake.
- Brain Activity: Glucose consumption activates the Basal Ganglia. Fructose consumption activates the dopamine reward pathway in the Nucleus Accumbens (motivation/action) x 7 times (like Heroin, Cocaine, Nicotine). Furthermore, the preference for glucose is so strong that the CNS (central nervous system) can be described as a glucose-seeking machine, with the brain's preferred energy source being glucose

How to Control Hunger and Sugar Cravings

To control hunger and sugar cravings, strategies include managing glycemic levels, reducing sugary drinks, addressing sugar cravings, prioritizing sleep, and combining foods thoughtfully, among others.

- **Glycemic Level Management:** Combining high-fiber foods with fats can blunt dopamine

release and eating only low-glycemic foods can help.

- **Limit Sugary Drinks:** Decreasing sugary drink consumption is essential due to their high high-fructose corn syrup (HFCS) content.
- **Taste and Gut Signaling:** Even if the perception of sweetness is eliminated by suppressing taste buds, cravings can still occur due to neurons in the gut sensing sugar, signaling the brain to want more and increase dopamine.
- **Nutrition and Supplements:**
  - Essential Fatty Acids: Consume essential fatty acids and Omega-3s.
  - Amino Acids: Protein increases satiety. Therefore, increase amino acid intake, such as glutamine, as neuropods in the gut respond to them, which can decrease sugar cravings.
  - Lemon/Lime Juice: Consume lemon or lime juice post-meal for its post-digestion effect, which adjusts brain circuits due to the sour taste.
  - Cinnamon: Consume cinnamon in moderation of less than 1 tsp/day, as it may blunt blood glucose increases. High levels of cumin can be toxic.
  - Berberine: Use berberine in moderation (less than 1.5 grams/day) to decrease blood glucose, noting it can create hypoglycemia and lower cholesterol.
- **Artificial Sweeteners:** Consuming artificial sweeteners alone may be a better option than consuming them with real sugar products, which can disrupt insulin levels over time.
- **Brain Retraining:** Altering your perception of healthy foods and learning to like their taste can reinforce the dopamine pathway, making you more likely to choose them.
- **Conditioned Taste Preference:** Humans are Pavlovian in food intake.
- **Prioritize Sleep:** Disrupted sleep alters sugar metabolism, increasing the need for it. Therefore, getting enough sleep helps regulate sugar metabolism.
- **Food Combining:** Combine foods high in fiber. Insoluble fiber forms a fish net in the intestines, while soluble fiber forms a gel, and together they block the absorption of some calories.
- **Consider Medications:** Semaglutide medications like Ozempic and Wegovy can help with weight loss because they suppress appetite and facilitate adipose fat loss.
- **The Key to Fat Loss:** The key to fat loss is not a calorie deficit, but keeping chronic insulin levels down, which can be achieved by reducing sugar and refined carbohydrates.

Food Manufacturers and Government Regulation

Food manufacturers and government regulation are significant factors influencing public health, particularly regarding issues such as sugar consumption and obesity. The following factors illustrate the complex interplay among food manufacturers, government regulation, and public health underscores the need for informed choices and comprehensive strategies to address diet-related health issues.

- **Food Industry Practices:** Food manufacturers often add hidden sugars to foods to encourage overconsumption by triggering dopamine release. Two hundred sixty-two different names for sugar are often hidden on food labels. The food industry emphasizes the "calorie in/out" concept for marketing purposes, sometimes misleadingly labeling products as "low calorie," "low fat," or "no added sugar."
- **Public Health and Personal Responsibility:** Public health issues like smoking, STDs, and alcohol consumption, which were initially individual choices, required public health responses due to reaching epidemic levels. Addressing food-related health issues requires:
  - Knowledge of the problem, which the public is often kept from.
  - Access to alternatives.
  - Affordability.
  - Consideration of externalities, such as the impact on healthcare costs.
- **Government Regulation:** The American Legislative Exchange Council (ALEC), funded by big oil, big pharma, and big agriculture, writes bills that can influence food-related policies. There are 51 different food organizations that determine what people eat, but they often lack communication.
- **Food Tariffs and Exported Drugs:** Governments profit from food tariffs and exported drugs, which can disincentivize efforts to reduce fructose and added sugars in food. Decreasing the amount of fructose/added sugars in food will decrease both their profit and health care expenses.
- **School Food Programs:** Public school systems are the largest fast-food "chain" in the U.S., and since outside companies took over school food programs in 1971, there have been reported

decreases in I.Q. and increases in obesity and depression, linked to added sugars.

- **Government Silos Cost:** Nutrition-related healthcare, food industry profits, and environmental costs contribute to significant expenses. Nutrition-related health care costs $11 trillion per year, the food industry profit is $9 trillion per year, and ecological costs are $7 trillion per year.
- **Weight Loss Drugs:** The Government makes money on food tariffs and exported drugs, so simply decreasing the amount of fructose/added sugars in food will decrease both their profit and health care expenses.