

## Sweet Addiction

by author Robin Edelman, MS, RD, CDE



Late one night in 1999 in a research laboratory on the gothic, ivy-cloaked campus of Princeton University, a student saw something that casts a new light on sugar cravings.

Neuroscientist Bart Hoebel had been studying animals under the influence for years. For a month, the psychology professor and his research team fed rats a regular chow and a sugar solution, comparable to the sweetness of fruit canned in heavy syrup. As the researchers expected, the rats preferred the sugar water to the regular chow. But when a drug was used to block the effects of the sugar in the rats' brains, the results astounded the researchers.

Carlo Colantuoni, then an undergraduate working with the team, routinely entered the animal lab late in the evening to feed the rats or study their behaviour. On each visit, his arrival elicited a response like a jingling Pavlovian bell. "They would hear me open the door and immediately get excited. Some were so excited that they would rip apart the sipper bottles [filled with a 25 percent glucose solution]." After a month, the rats predictably went into a feeding frenzy when the sugar solution was refilled, consuming twice the amount they had at the beginning of the test.

On this particular night, Colantuoni and another student had arrived to observe the rats' reactions after the drug had been administered to block the effects of sugar in their brains. Colantuoni found the rats in an unusually agitated state, with their heads shaking, their teeth chattering and their forepaws quivering with tremors—in essence showing the telltale signs of withdrawal. Hoebel and his group had seen similar reactions in rats addicted to morphine and cocaine, but it was an unexpected moment in their experiments with sugar.

For close to 25 years, researchers have known that the human attraction to sugar and addiction to drugs occur in the same pathways of the brain. But the Princeton research now suggests that our attraction to sweeteners may have the potential to extend beyond a simple yearning into the realm of chemical dependence. As sugar consumption rises at an alarming rate, wreaking havoc with the nation's health, the question of culpability looms. Does overeating sugar constitute a mere failure of willpower or can sugar's sweet lure actually "hook" us?

### Bingeing to Survive

Hard-wired from birth to seek out sweet tastes, the human body evolved a survival instinct two million years ago that steered Homo sapiens to sweet foods dense with energy, such as ripe mangoes, clusters of berries, and honey seeping from the comb.

Thousands of generations later, that primitive impulse, in a land of overabundant processed foods and sedentary lifestyles, works against easy weight control and a healthy energy balance. Scientists are now asking if our natural inclination to eat sweets can go too far. Can we lose control of our hunger for sugar, the very taste that aided our ancestors' survival?

To understand just what happened in the Princeton lab, enter the brain's everyday pathways for a moment. When we eat a piece of cake, the sweet taste triggers the brain to produce opioids, chemical messengers that identify this taste as desirable. At the same time, the sweetness triggers the brain to produce dopamine, another chemical messenger that works with memory to urge us to pursue this rewarding taste in the future.

Opioids produce love at first bite. Through its effect on memory, dopamine produces love at first sight. So powerful is the response that the simple sight of a desirable food can elevate our dopamine levels and consequently our motivation to seek out the food, one reason that advertising can be so effective.

Researchers theorize that opioids played a key role for humans who foraged, keeping them alive during periods of famine by encouraging them to eat huge amounts of foods that were available—fruits in season, for example—urging them to gorge beyond satiety. Hominid researchers have observed wild apes bingeing on ripe figs and other fruits abundant during brief seasons. The weight gained because of such gorging helped the animals through leaner times.

But we modern humans, many of us who live in the land of plenty, don't have to worry about times of food scarcity. The excess weight that we carry, instead of helping us to survive, has become a physical and emotional burden.

### Added Sugars

North Americans crave sweets. Food marketers have capitalized on our collective sweet tooth by adding sugars, of one type or another, to virtually every type of prepared food we buy, from vegetable soups to bottled waters. We eat and drink an average equivalent of 20 teaspoons of these added sugars per day (80 grams), mostly in the form of sucrose (as table sugar) and fructose (as high-fructose corn syrup in soft drinks). Medical professionals say that the impact from constantly overindulging in sweets can be devastating, from obesity to diabetes, high triglycerides that can lead to heart disease and strokes, and disruptive spike-and-fall energy patterns as blood sugar (glucose) levels surge and plummet.

Fortunately, not everyone experiences strong sugar cravings. For some, sweets inspire only a mild preference, but the bottom line is that modern society as a whole often displays the evolutionary behavior of those apes under the fig tree: glucose gluttony. Current concerns have blossomed because we are bingeing not on the natural sugars in ripe produce, but on products packed with added sugars and little or none of the fibre, vitamins, minerals, and phytonutrients in whole foods. Although the human body responds indiscriminately to both natural and added sugars, the latter typically are found in higher amounts and in foods that offer quick energy but little of the beneficial nutrition needed for optimum health.

### Sugar Fixes

While the overconsumption of sugars is not in the same class of threats to health as heroin and other opiates, it does contribute directly to obesity and related diseases, which we pay for in health-care dollars at ten times the amount we spend on drug addiction. But does every chocoholic need a 12-step program? Although similar biological mechanisms are at play, sugar cravings and drug addiction are not equally burdensome. For most people, gradually altering lifestyle choices and seeking behavior-change therapy should be enough. Weaning oneself from overindulging in sweets is, according to the researchers, a challenge, but not quite in the same league as a heroin addict entering treatment.

Hoebel's Princeton research raises questions about whether sugar belongs with the classic addictive narcotics or with things we simply crave, such as love and affection. Since his latest research he has replaced the term "sugar dependency" with "sugar addiction," but he reminds the media that his findings are based on rats, not humans. Yet his research has opened a door that many hope will lead to more investigations and help for people who strive to control sugar cravings and who may have a chemical dependence that makes their dopamine moments more debilitating than those of someone with a mild attraction to sweets.

### **Breaking a Sugar Habit**

While overindulging in sweets can be a difficult habit to change, it is easier to separate the challenging task into small, manageable steps...once you know what to look for.

1. Become a sugar sleuth. Always read the ingredient lists of processed foods. If sugar or one of its cohorts—corn syrup, high-fructose corn syrup, sucrose, or dextrose—appears within the top three ingredients, consider choosing another brand.
2. Keep a food diary: jot down everything sweet you eat, as soon as you eat it. Note your mood, location, and activity. Be honest—this is not a public document.
3. After several days, review the diary. Are there obvious triggers leading you to overeat: office coffee breaks near a vending machine, pastries where you buy a morning paper?
4. Identify quick wins. Look at your habits and target one behaviour to change—substituting an apple for that mid afternoon Snickers bar, for example.
5. Fill up on healthy foods. A diet high in vegetables and whole grains, along with lean protein and healthful fats, provides long-lasting energy, controls hunger, and keeps you off the glucose roller coaster.
6. Add your own sweetener. Buy unsweetened products when available. Add half the sugar to unsweetened applesauce or rely on other flavours, such as cinnamon, to enhance the taste.
7. Cut back gradually. One timeless trick is to cut down by half. Instead of two heaping teaspoons of sugar in your coffee, use one. A few weeks later, switch to half a teaspoon.
8. Wean yourself off sweetened drinks (regular and diet). Quench your thirst with water, and add fresh lemon or lime juice to spark it up.
9. Dole out sweet indulgences selectively rather than attempting total abstinence. People who try to deny themselves all sweets too often give up.
10. Budget, balance, and get moving. When you enjoy an intentional indulgence, balance the extra calories at the next meal or burn the extra energy with a brisk walk or other exercise. People who succeed with long-term diet changes take lapses in stride by getting back on track quickly.

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