

Sugar, Sweet Suicide - Part I

by Gary Null, PhD

With only 16 calories per teaspoon, what's the harm in a little sugar? Problem is, we can't get enough of the stuff. In a world where soft drinks and processed foods have become dietary staples in lieu of fresh fruit and vegetables, fiber-rich grains, and pure water, people are swallowing an average of 41 teaspoons (or 201 grams) of sugar daily, 31 teaspoons more than the maximum amount recommended by the United States Department of Agriculture (USDA). Over time, that adds up to a whopping 162 pounds per person per year. And when you consider that part of the population eats far less or no sugar at all – diabetics or babies, for instance – that figure further soars. Thanks to their love affair with soft drinks, many children are at the higher end of this scale, consuming an additional 21 teaspoons of sugar daily.¹

Sugar's pervasiveness is a relatively new phenomenon. Decades before food-processing techniques revamped the modern diet, people didn't eat a lot of sweets. Wholesome, home-cooked fare was the norm and no one heard of fast food chains or packaged meals. Since the post World War II era, the amount of sugar added to what we eat and drink has steadily grown to the point of now being found in practically every store-bought food. According to the 2000 USDA Economic Research Service: "The per capita consumption of caloric sweeteners increased by 28 pounds, or 22%, from 1970 through 1995...and continues to increase." From 1985 to the present, sugar production and consumption has risen by almost two percent a year.²

The problem of too much sugar in our foods is compounded by the national trend of "value sizing" – offering more food for the dollar. Serving sizes have grown, not just in fast food establishments, but in most restaurants, and even at home, according to a new large-scale study of the super-size phenomenon. Soft drinks have increased in size by 52%, snacks by 60%, and hamburgers by 23%. Of the 60,000 Americans studied, everyone served more food adjusted to the bigger amount without even noticing that their portion sizes had grown. The only clue: their waistlines were expanding.

With soft drinks and table sugar being two of the top four carbohydrate sources for Americans, it appears that most of us are in the dark about sugar's dangers. This remains true despite attempts by alarmed public interest groups to increase

general awareness of how much sugar we are eating through food labeling and the US Surgeon General's call for sweeping change. "Unfortunately, our society is experiencing the results of the sugar industry's rather successful advertising campaign to promote the healthy and natural aspects of sugar," says Ron Lord in a 1998 *Agricultural Outlook Forum* article. "Sugar at one time had a rather negative public image, if I remember the 1970's correctly," he explains. Then in the 1980's, public attention became focused on fat as something to avoid; and about the same time a rather successful advertising campaign to promote the healthy and natural aspects of sugar was conducted. The result: gains to carbohydrates, and sugar in particular."³ In short, we are being manipulated by the sugar industry and paying a dear price for it. Our sugar-saturated diets cause rampant obesity, premature aging, and life-threatening diseases in adults and children.

Sugar Addiction

In the 1960's, the Frito Lay corporation advertised its corn chips with the slogan, "Bet you can't eat just one." Anyone who has ever eaten a snack food knows how true this is. Even dieters find their best intentions to give up "junk" thwarted by intense cravings. That need for a food, the initial comfort in eating it, and the low mood that inevitably follows, is a sign of addiction.

Still we continually fool ourselves into believing that we can control our cravings if only we put our minds to it. We understand that certain drugs can be addictive, but we do not think food can have the same strong hold on us. We judge overweight people as lazy and think they either don't care about themselves or don't try hard enough. And when we give in to a craving, we blame ourselves for lacking will power.

In reality, a sugar craving can be physically overpowering. In *The Hidden Addiction: And How to Get Free*, addictions expert Janice Keller Phelps writes, "A non-addictive person will often eat some 'sugar food' and after eating a reasonable portion...will feel satisfied for a prolonged period....In contrast, the addictive person finds that something else happens. Feeling hungry, he or she eats a reasonable portion of sugar food, but immediately wants more. The physiological hunger is not quieted and

continues to signal for more for some time. Some such people will proceed on a veritable sugar binge, gorging on sugar or simple carbohydrates even when they know it is going to make them feel terrible."⁴

Sugar's addictive nature is the reason why food manufacturers place it in their products. They know that by doing so, we will buy their merchandise again and again. Even if you are avoiding the obvious offenders, candy and cakes, for instance, you may be getting too much. Surprisingly, salad dressings, catsup, and non-dairy creamers often contain more sugar than a cup of ice cream or a chocolate bar. Companies fool us with their "all natural" labels or ingredient lists that categorize sugar types. Consider a label that reads "wheat, vegetable oil, dextrose, corn syrup solids, and malt powder"; the last three ingredients are pure sugar. It is listed this way to keep sugar out of the spotlight, even though its rightful place is as the first ingredient.

Sugar addiction walks hand-in-hand with alcoholism and drug addiction, meaning one addiction can easily substitute for another. It is not unusual for a person who stops drinking to become a sugarholic. In his classic book, *Sugar Blues*, William Duffy reminds us that "1923 was the heyday of Prohibition. When booze became illegal here, sugar consumption zoomed. The whole country acted like a gathering of arrested alcoholics spending the evening at AA; they couldn't keep their mitts out of the candy jar."⁵ Phelps, a former alcoholic herself, observed heroin addicts consume enormous amounts of simple sugary carbohydrates while undergoing treatment. This seemed to alleviate heroin withdrawal symptoms.

The reverse can also occur, where cravings for sugar can progress to other addictions, says Phelps: "Sugar addiction is the world's most widespread addiction, and probably one of the hardest to kick," she says. "Because it is shared by so many addictive patients, I believe it is the 'basic addiction' that precedes all others. Most of my addicted patients tell me that at one time they craved sugar almost daily."⁶

Only recently has sugar's addictive qualities been confirmed by scientists. In one study, Colantuoni et al. found that rats fed excessive amounts of sugar developed an opioid dependence, with withdrawal symptoms occurring when sugar was removed. They concluded that

withdrawal from sugar was similar to withdrawal from morphine or nicotine.⁷ In another, Bartley et al. found that certain foods release dopamine, a chemical messenger in the brain that plays a major role in addiction. Eating certain foods triggers a pleasurable sensation that soon shifts, as addictions ultimately give way to depression and unhappiness. The body then responds by craving more of the foods or drugs that restore mood. The study determined that ready sources of legal dopamine-releasing products could be found in sugar-sweet milk products, caffeine, alcohol, and cigarettes. Their conclusion was that rich foods, found in every workplace, tempt people to binge on fat and sugar, leading to obesity and eating disorders.⁸ Other researchers have discovered the opioid antagonist Naltrexone to suppress a desire for sweets, another finding that affirms the addictive nature of sugar.⁹⁻¹¹ Pecoraro et al. concluded that sugar intake leads to addiction and anticipation of sugar in a group of undernourished rats. His study implies that the poor become hooked on sugar because it is readily available in sodas and fast foods.¹² With such a wealth of studies coming to the same conclusion, we must wonder whether it is possible for the sugar industry to be unaware of sugar's addictive properties.

Most sugar addicts will vigorously deny their compulsion and the need to change. Says Phelps, "Only when you recognize the thoroughly unpleasant ways that sugar addiction can affect your life and health will you understand how real the addiction is and how important it may be to you to recover from it."¹³

Loss of Health

We think of sugar as food, and don't usually believe it is harmful. But the white crystalline substance is an unnatural substance with no nutritive value. Sugar cane or sugar beets are refined to pure sucrose after all the vitamins, minerals, proteins, enzymes, and other beneficial nutrients are stripped away. All we get is a concentrated sweet that the human body is not able to handle, at least not in the massive quantity that is now ingested.

Damage from sugar is slow and insidious, taking years to ruin health. Over time, the cost is huge, as sugar harms us in many ways. This is what research into sugar's side effects reveals:

Overweight and Obesity

Despite billions of dollars spent on diets each year, our nation is growing fatter and fatter. These days, more than half of all Americans are overweight or

obese and, as a result, increasingly susceptible to disease. Among other illnesses, complications from being overweight include diabetes, gallbladder disease, hypertension, hyperlipidemia, sleep apnea, coronary artery disease, osteoarthritis, gout, breast, endometrial, pancreatic, or colon cancer, and low back pain. With an estimated 1,200 people dying daily from weight-related illnesses, the crisis has reached epidemic proportions.¹⁴

A radical decline in our nation's health starts with its youngest members. Compared to the 1980's, we have twice the number of overweight and obese children, according to the Centers for Disease Control and Prevention. A recent study of weight trends among US children reported in the *Journal of the American Medical Association (JAMA)* found that from 1986 to 1998 the number of overweight white children doubled from 6 percent to 12 percent. For African American and Hispanic children, that amount increased by 120 percent in 12 years.¹⁵ Consequently, hundreds of thousands of children are suffering from gallbladder disease and sleep-related breathing disorders. Adult onset diabetes used to strike people an average of 60 years old. Nowadays, the disease afflicts 300,000 American children, increasing their risk for serious complications, such as blindness, kidney failure, and stroke.

According to government sources, soft drinks are the leading source of added sugars in the diet of youngsters. Recently, studies have correlated obesity in children and adolescents to how much soda and sugar-sweetened beverages they consume. One study by Ludwig et al. determined that about 65% of adolescent girls and 74% of adolescent boys consume soft drinks daily and that one soda per day increases the risk of obesity by 60%.¹⁶

Grave health risks associated with excess weight are universally acknowledged by government health agencies, including the World Health Organization, the American Heart Association, the National Institutes of Health, the US Surgeon General, and the US Centers for Disease Control and Prevention. Still, disturbing statistics on obesity show that we continue to ignore the dangers. The problem is complex, note Hall and Jones in their *American Journal of Hypertension* editorial, "What can we do about the 'epidemic' of obesity?" One problem is the limited range of healthy food options found in many American restaurants. They believe that government industry regulations for the food industry might have a public health impact similar to that of laws governing seat belt and tobacco use. Another

recommendation is for doctors to take a less passive approach by initiating discussions on nutrition and weight control rather than immediately recommending drug management of high blood pressure and other disorders. They state, "An urgent 'plan of action' is required to help people combat obesity, based on cooperation among scientists, insurance companies, healthcare professionals and the government."¹⁷

Diabetes

When refined sugar is introduced into a society, the incidence of diabetes increases after a latent period of about 20 years. So notes Cleve, one of the first investigators to recognize the dangers of sugar. In his book, *The Saccharine Disease*, Cleve notes, "The virtual absence of diabetes in primitive communities who live on complex carbohydrates, such as various grains and tubers compared with populations eating carbohydrates which are refined, is anthropological proof that sugar is a leading cause of diabetes."¹⁸

It should come as no surprise then to learn that we are paying dearly for our love affair with sugar with an exceedingly high incidence of diabetes, and that the figures are growing. Between 1990 and 1998, the number of people diagnosed with diabetes in America increased by 33% to 6.5% of Americans in all age groups.^{19,20} According to Dr. James P. Boyle from the Centers for Disease Control (CDC), 29 million Americans will be diagnosed with diabetes in 2050, compared to about 11 million today.²¹

As was mentioned earlier, the childhood obesity epidemic in the United States is accompanied by an increase in the prevalence of type 2 diabetes among children and adolescents. One in four extremely obese children under 10 and one in five obese adolescents under 18 have impaired glucose tolerance, a precursor to type 2 or adult-onset diabetes, which increases their risk for heart disease, kidney failure, blindness, and limb amputations.²²

As if that weren't bad enough, the problem extends further to harm the newborn. Obesity and diabetes increase the risk of birth defects that hinder a child's chance for a normal, healthy life. In a study of 23,000 pregnant women, obese women with type 2 diabetes were three times more likely than non-obese, non-diabetic women to have babies with birth defects and seven times more likely to give birth to a child with a craniofacial defect, such as cleft palate or abnormal



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► limb development. Nearly 6% of babies from women with type 2 diabetes had major defects as compared to 1.34% of babies from women without the disease.²³

According to the *New England Journal of Medicine*, nine out of ten cases of type 2 diabetes could be prevented if people exercised more, ate better, stopped smoking, and adopted other healthy behaviors. Though all risk factors should be diminished, the most important of these is overweight.²⁴ Other studies reveal a significant reduction in diabetes risk among people who are prime candidates for developing the condition, when they receive diet and exercise counseling.^{25,26}

Aging

Life extension experts say ingesting sugar is one of the quickest ways to make us old before our time. After sweets pass our lips and enter our system, glucose binds with collagen, and a process called glycation occurs. The result may be thickened arteries, stiff joints, pain, feeble muscles, and failing organs. One investigator, Melton, studied the phenomenon and concluded that, "After years of bread, noodles, and cakes, human tissues inevitably become rigid and yellow with pigmented glycation deposits."²⁷ High blood sugar levels found in a diabetic's body create advanced glycation endproducts (known as AGE). This is why diabetics age prematurely and suffer nerve, artery, and kidney damage. Pharmaceutical companies are looking for medicines to break AGE bonds, when the best antidote is to eat less sugar.

Cancer

The tragedy of this killer disease is that it is easily preventable through diet, yet most people are unwilling to change what they eat. It is well established that a diet rich in cruciferous vegetables, like broccoli and cabbage, keeps the disease at bay, while other foods promote cancer development. One of the main fuels for cancer cells is sugar, a discovery first made by the Nobel laureate in medicine, Otto Warburg in the 1930's. Warburg noted that cancer cells have a different energy metabolism from healthy cells and that their production could increase when sugar intake is high. As glucose causes a build-up of lactic acid and an acidic pH, an internal environment is created where cancer cells can thrive.

Since Warburg's discovery, several studies have confirmed the equation that increased sugar intake equals increased cancer. In one such investigation, mice

were induced with an aggressive form of breast cancer and fed diets to create high or low blood sugar levels. Ten weeks later, only 33% of the hyperglycemic mice survived while 95% of the hypoglycemic mice lived.^{28,29} Another investigation that studied European, American, and Asian countries found sugar to be a significant contributing factor to higher breast cancer rates, especially in older women.³⁰ A European study of biliary tract cancer patients concluded that sugar intake more than doubled the risk of contracting this form of the disease.³¹ In another long-term study of over 150,000 people, obese and underactive individuals were at a higher risk for pancreatic cancer. The report published in the *Journal of the American Medical Association* concluded that keeping fit through diet and exercise is essential to this cancer's prevention and treatment.³² In a different study, the same team concluded that abnormal glucose metabolism generates pancreatic cancer, particularly in women with insulin resistance.³³

Cardiovascular Disease

Compromised heart health due to obesity has been long documented. Over the years, overweight adult populations have been extensively studied, and recently, obese adolescents were found to have coronary atherosclerosis, a precursor to adult coronary heart disease.³⁴ Even the conservative American Heart Association acknowledges that obesity is an undeniable cause of cardiovascular disease and death,³⁵ and doctors routinely recommend losing excess weight to cut down heart attack risk. One investigation found that obese individuals who lose 10% of their weight (about 22 pounds) dramatically reduce their levels of inflammatory cytokines, markers that indicate increased risk of heart attack and stroke.³⁶

While being overweight and underactive is a clear detriment, recent studies show how too much sugar, in itself, contributes to cardiovascular disease. One investigation linked a sugary drink, the equivalent of two cans of cola, to an increase in a part of an enzyme that promotes free radical generation and lowers levels of protective Vitamin E. Such an effect causes an accumulation of plaque that can harden the arteries and produce cardiovascular disease.^{37,38}

Like diabetes, cardiovascular disease is the result of elevated glucose. A blood sugar above 125 mg/dl diagnoses diabetes. A slightly lower level of 100-125 mg/dl greatly increases one's chance of coronary heart disease. In a large, diverse sample of the population, people in this category had a 300% greater risk of contracting

cardiovascular disease than people with a blood sugar level below 79 mg/dl.³⁹ In a similar study published in the *Lancet*, many people hospitalized for a heart attack were found to have undiagnosed diabetes or prediabetes, an elevated glucose level close to the diabetes range. Over two-thirds of the study's heart attack patients had blood sugar abnormalities.⁴⁰ Once again, the message is that diabetes and heart disease can be prevented or reversed by keeping one's blood sugar within reasonable limits.

Hyperactivity and Learning Disorders in Children

We are seeing more cognitive problems and emotional distress in children today than ever before. In a world where millions of children are "diagnosed" with behavioral and learning problems and routinely medicated for attention deficit hyperactivity disorder (ADHD) or attention deficit disorder (ADD), a diagnosis for lack of attentiveness without the acting out component, one must consider the effect of sugar. These days, except for the first grade teacher who experiences the monstrous metamorphosis of 25 children after snack time, most educators, psychologists, counselors, and doctors do not believe there is a connection. One teacher, in fact, reported that at a meeting to discuss "problem" children, one girl's antsy behavior was brought up. When the teacher suggested looking into how much sugar the child was eating, one of her coworkers snapped, "That has nothing to do with it. My sister is controlling her son's ADHD through food, and sugar is low on the list. He could eat as many chocolate chip cookies as he wants." This woman's comment is typical of public opinion reflecting ignorance of the topic. While there are several ingredients that trigger systemic and nervous symptoms, sugar is not low on the totem pole, but a major player.

The belief that sugar is benign can be traced to the sugar industry's misinformation campaign developed decades ago. Their aim was to prove that sugar does not cause hyperactivity in order to quell objections to increasing amounts of sugar in the diet. To make their point, the sugar industry financed studies with one intent: to prove their hypothesis true. Their studies contain several serious flaws. Consider the following:

- The amount of sugar used per trial was unrealistically low. In one investigation, a mere 13 teaspoons per day (the amount in a single 10-oz can of soda) was studied, when the average child

takes in closer to 47 on average and twice that at a birthday celebration.⁴¹

- The trial size was extremely small, with no more than 30 children followed at a time.⁴²⁻⁴⁶ (Independent studies that linked sugar to hyperactivity followed hundreds of thousands of school children over a period of years.)⁴⁷⁻⁵⁵

- Trials were short, observing children for only a few hours before concluding that sugar had no relationship to hyperactivity.^{56,57}

- Children's diets were unchanged. They were given a sugary drink in lieu of their usual breakfast. Since the drink contained as much sugar as the average breakfast cereal, the variable was not manipulated, and researchers should not expect to find a change in behavior.

- Control groups were given artificial sweeteners instead of nutritious food or nothing at all. Sweeteners, like aspartame, can produce side effects, such as changes in neurological behavior. How then can the researchers determine the effect of sugar versus the effect of aspartame? Yet, they conclude, "compared to the control group (on aspartame), there was no difference in behavior."⁵⁸

- Sugar drinks contained artificial colors and flavors, ingredients that are known to alter neurological behavior. How could the researchers know whether the children were reacting to sugar or these components?^{59,60}

- The "Hawthorne Effect," where an unnatural setting and routine may skew the results, could influence outcomes. The possibility that the children were acting differently than they normally would for the investigators was never taken into account.

- The premise of the studies were faulty as they were giving more sugar to children suspected of already having too much. In studies by Schoenthaler and Schauss, it was assumed children were already wired from too much sugar. When sugar was taken away from them for long periods of time, the improvement in behavior was remarkable.

It is hard to believe that the sugar industry was able to convince the public that sugar has no effect on behavior with such careless research. Giving a small number of children a few teaspoons of sugar and observing them for just a few hours is considered sufficient proof that sugar does not affect mood or behavior, while long-term, large-sample, correctly controlled studies go unnoticed. Consider Schoenthaler's landmark study of a million school children in over 803 New York City public schools over a seven-year period. After gradually eliminating synthetic colors and flavors and the preservatives BHA and BHT, along with

refined sugar, significant gains in learning were seen. Among 124,000 children who, before the dietary changes, were unable to learn grammar and mathematics, 75,000 were able to perform these basic tasks after dietary changes alone. There was a 15% gain (from 39.2% to 55%) in learning ability compared with other schools during the years in which these changes were introduced.⁶¹ In another study on refined carbohydrates and cognitive function, Lester et al. concluded that consumption of foods low in nutrient density and high in sucrose may significantly contribute to childhood learning disorders.⁶²

Some sugar industry-sponsored studies has also claimed that sugar improves memory.⁶³ This conclusion is based on the fact that when a person's blood sugar is low, some dietary sugar helps thinking in the short term because the brain functions on glucose. Sugar in the diet, however, will have an appetite-suppressing effect. Not enough calories will come from foods that build muscle and bone, make enzymes, and provide nutrients for tissues and organs.

Delinquency

Sugar indulgence has a most serious consequence for society, as fascinating

Sugar

research connecting sugar to antisocial behavior shows. Schoenthaler conducted several long-term, double-blind, well-controlled studies on the subject and consistently found a strong correlation between food and criminal activity. In one of his studies of 68 young criminals, antisocial acts diminished by 80% within seven months after changing the diet. A follow-up study of 276 children had one group stay on junk food diet and another group switch to healthy foods. The difference in antisocial acts between the two groups was almost 50%. The worst class of offenses showed the most dramatic reduction: assault fell by 82%, theft by 77%. The delinquents guilty of the most serious crimes (assault, rape, robbery, and vandalism) benefited the most. All institutions that cooperated in these studies decided to maintain the new dietary program.⁶⁴

Schoenthaler also worked with the Los Angeles Probation Department's Diet-Behavior Program and observed 1,382 incarcerated delinquents at three juvenile detention halls. They showed a 44% drop

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► in antisocial behavior on a low sucrose diet. The greatest reductions were seen in repeated offenders (86%), narcotics offenders (72%), rape offenders (62%), burglars (59%), murderers (47%) and assault offenders (43%). The second part of the study followed 289 juvenile delinquents at three juvenile rehabilitation camps. They exhibited a 54% reduction in antisocial behavior after sugar consumption was reduced.⁶⁵

In the Alabama Diet Behavior study, Schoenthaler observed 488 incarcerated delinquents for 22 months to see if their rate of antisocial behavior after reducing sugar would drop as previous studies had shown. The decline in antisocial behavior ranged from a low 17% to a high of 53%, with an average of 45%, depending upon gender, race, and type of offender.⁶⁶

In yet another investigation, Schoenthaler followed 3,399 incarcerated juveniles on a "junk food-free" diet during a 24-month comparison study (12 months before diet change and 12 months following) in Northern California. The results showed a 100% reduction in suicide attempts, a 75% decrease in the use of restraints to prevent self-injury, a 42% lowering of disruptive behavior, and a 25% drop in assaults and physical fights.⁶⁷

Mrs. Reed, a probation officer in Ohio observed the diet-behavior connection when she gave her clients a questionnaire regarding their diet and then instructed them to restrict their choices to lean meat, fresh and frozen fruit, fruit juices, vegetables, herb teas, milk, nuts, seeds, and cold-pressed oils. They were strictly forbidden white sugar, white flour (and any product made with either, such as pastries), soda pop and cola, processed foods, and alcohol.

Two years later, the probation department, recognizing the effects of these dietary changes, was sending its worst cases to Mrs. Reed, with an injunction from the court in some cases to choose "jail or diet." Out of 252 prisoners she had put on her diet, which included vitamin supplements, none of those who stayed on the diet had been back in court. The physical and mental improvements of her clients were sometimes dramatic.⁶⁸

Alexander Schauss, whose book, *Diet, Crime, and Delinquency*, a hard-hitting scientific as well as anecdotal account of the effects of diet on crime has lectured worldwide on the effects of diet on behavior. When Schauss spoke in London in 1984, the Governor of Britain's Maidstone Prison listened attentively and commented: "We shouldn't be doing this in prisons. The changes have got to happen (a lot sooner) with the parents and in the schools." As we have seen, the Schoenthaler study published in 1986 supported the governor's observation.⁶⁹

Dental Caries

Tooth enamel, the strongest substance in the body, will wear away in the presence of sugar, the chief cause of dental caries. How much sugar you consume and how often you consume it both play a role. According to one study, eating more than 60 grams of sugar daily (for young children, half that amount) and having sugar more than four times a day puts a person at an increased risk.⁷⁰ Since most foods today contain sugar, it is particularly difficult to eliminate this risk factor. Eating sugar before bedtime is also correlated with a greater incidence of dental caries. The study's author believes children should be introduced to the concept of a sugar-free zone for the hour before bedtime.⁷¹ Not surprisingly, dental diseases are more prevalent in people whose oral cleansing routines are lax.⁷²

Sugary, carbonated beverages are especially bad for teeth, notes Jones et al. in a study examining the association between dental caries and drink consumption in a group of 6,014 teenagers.⁷³ Regardless, soft drinks are the largest source of sugars consumed in the United States, accounting for one-third of our total sugar intake.⁷⁴

Rather than educate youngsters on wiser food and beverage choices, schools are selling themselves to the highest bidder for exclusive contracts with soft drink companies. In exchange for payment, a quota of sales must be met by the institution. This, of course, motivates schools to encourage soft drink consumption.

Bad eating habits are being reinforced in our youngsters that will weaken not only their teeth, but contribute to a variety of health problems later in life. Osteoporosis, for one, is associated with soft drinks, as the sugar and caffeine in these products leach calcium from the bones. Parents and health-care providers should be outraged at schools for pushing "liquid candy," writes W.T. Spruill, and do everything possible to return these beverages to their former reasonable role as an occasional treat.⁷⁵

Lowered Immunity

Our immune system has the all-important task of protecting us from disease organisms (such as bacterial and viral invasions) and other foreign bodies. Unfortunately, its vital work is seriously compromised by all the sugar we eat. Sugar raises insulin levels, which inhibits the release of growth hormones, which, in turn, depresses the immune system.

Sugar's interference with immune function is clearly demonstrated in scientific studies. In one investigation, eating 100 grams (24 tsp) of carbohydrates from glucose, sucrose, honey, and orange juice paralyzed neutrophils, rendering them incapable of engulfing bacteria, while starch from complex carbohydrates (found in such foods as potatoes and rice) had no such effect.⁷⁶ In another, Yabunaka found sugar to increase a protein that inhibits macrophages, the large cells that surround and digest foreign substances in the body, such as bacteria or protozoa. Without a robust immunity to protect us optimally from the pollutants and infectious disease particles that surround us, we increase our susceptibility to danger and most certainly shorten our lives.

An abnormally high amount of glucose in the blood, due to too many sweets, processed foods, diabetic or pre-diabetic conditions, increases the risk of infectious conditions, such as Candidiasis. This disorder, caused by an overgrowth of the yeast *Candida albicans*, secretes a large volume of toxins throughout the body, thus weakening the immune system. In addition to Candidiasis, elevated glucose levels feed gram-negative bacteria that promote cystitis and other urinary tract infections (UTIs). Along with antifungal medications, glycemic control should be an integral part of treatment for these conditions.

Next issue: Part II - Studies on Sugar's Detrimental Effects

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