

Cancer feeds on Sugar

It is a great puzzle why the simple concept ‘sugar feeds cancer’ can be so completely overlooked as part of a comprehensive cancer treatment plan. Of the millions of cancer patients being treated today, hardly any are offered any scientifically guided nutrition therapy beyond being told to “just eat good foods.” Most patients have a complete lack of nutritional advice.

Many cancer patients would have a major improvement in their outcome if they controlled the supply of cancer’s preferred fuel, glucose. By slowing the cancer’s growth, patients allow their immune systems and medical debulking therapies -- chemotherapy, radiation and surgery to reduce the bulk of the tumor mass -- to catch up to the disease. Controlling one’s blood-glucose levels through diet, supplements, exercise, meditation and prescription drugs when necessary can be one of the most crucial components to a cancer recovery program.

The sound bite -- sugar feeds cancer -- is simple. The explanation is a little more complex.

The 1931 Nobel laureate in medicine, German Otto Warburg, Ph.D., first discovered that cancer cells have a fundamentally different energy metabolism compared to healthy cells.

The crux of his Nobel thesis was that malignant tumors frequently exhibit an increase in anaerobic glycolysis -- a process whereby glucose is used as a fuel by cancer cells with lactic acid as an anaerobic byproduct -- compared to normal tissues. The large amount of lactic acid produced by this fermentation of glucose from cancer cells is then transported to the liver. This conversion of glucose to lactate generates a lower, more acidic pH in cancerous tissues as well as overall physical fatigue from lactic acid buildup. Thus, larger tumors tend to exhibit a more acidic pH.⁴

This inefficient pathway for energy metabolism yields only 2 moles of adenosine triphosphate (ATP) energy per mole of glucose, compared to 38 moles of ATP in the complete aerobic oxidation of glucose. By extracting only about 5 percent (2 vs. 38 moles of ATP) of the available energy in the food supply and the body's calorie stores, the cancer is 'wasting' energy, and the patient becomes tired and undernourished. This vicious cycle increases body wasting. It is one reason why 40 percent of cancer patients die from malnutrition, or cachexia.

Hence, cancer therapies should encompass regulating blood-glucose levels via diet, supplements, and non-oral solutions for cachectic patients who lose their appetite, medication, exercise, gradual weight loss and stress reduction. Professional guidance and patient self-discipline are crucial at this point in the cancer process. The quest is not to eliminate sugars or carbohydrates from the diet but rather to control blood glucose within a narrow range to help starve the cancer and bolster immune function.

The glycemic index is a measure of how a given food affects blood-glucose levels, with each food assigned a numbered rating. The lower the rating, the slower the digestion and absorption process, which provides a healthier, more gradual infusion of sugars into the bloodstream. Conversely, a high rating means blood-glucose levels are increased quickly, which stimulates the pancreas to secrete insulin to drop blood-sugar levels. This rapid fluctuation of blood-sugar levels is unhealthy because of the stress it places on the body.

Sugar in the Body and Diet

Sugar is a generic term used to identify simple carbohydrates, which includes monosaccharides such as fructose, glucose and galactose; and disaccharides such as maltose and sucrose (white table sugar). Think of these sugars as different-shaped bricks in a wall.

When fructose is the primary monosaccharide brick in the wall, the glycemic index registers as healthier, since this simple sugar is slowly

absorbed in the gut, then converted to glucose in the liver. This makes for ‘time-release foods,’ which offer a more gradual rise and fall in blood-glucose levels.

If glucose is the primary monosaccharide brick in the wall, the glycemic index will be higher and less healthy for the individual. As the brick wall is torn apart in digestion, the glucose is pumped across the intestinal wall directly into the bloodstream, rapidly raising blood-glucose levels.

In other words, there is a ‘window of efficacy’ for glucose in the blood: levels too low make one feel lethargic and can create clinical hypoglycemia; levels too high start creating the rippling effect of diabetic health problems.

The 1997 American Diabetes Association blood-glucose standards consider 126 mg glucose/dL blood or greater to be diabetic; 126 mg/dL is impaired glucose tolerance and less than 110 mg/dL is considered normal.

Meanwhile, the Paleolithic diet of our ancestors, which consisted of lean meats, vegetables and small amounts of whole grains, nuts, seeds and fruits, is estimated to have generated blood glucose levels between 60 and 90 mg/dL. Obviously, today’s high-sugar diets are having unhealthy effects as far as blood-sugar is concerned. Excess blood glucose may initiate yeast overgrowth, blood vessel deterioration, heart disease and other health conditions.

Glycemic index

The ‘glycemic index’ is a measure of how a given food affects blood-glucose levels, with each food being assigned a numbered rating. The lower the rating, the slower the absorption and digestion process, which provides a more gradual, healthier infusion of sugars into the bloodstream. On the other hand, a high rating means that blood-glucose levels are increased quickly, which stimulates the pancreas to secrete insulin to drop blood-sugar levels. These rapid fluctuations of

blood-sugar levels are not healthy because of the stress they place on the body.

One of sugar's major drawbacks is that it raises the insulin level, which inhibits the release of growth hormones, which in turn depresses the immune system. This is not something you want to take place if you want to avoid disease.

An influx of sugar into the bloodstream upsets the body's blood-sugar balance, triggering the release of insulin, which the body uses to keep blood-sugar at a constant and safe level. Insulin also promotes the storage of fat, so that when you eat sweets high in sugar, you're making way for rapid weight gain and elevated triglyceride levels, both of which have been linked to cardiovascular disease. Complex carbohydrates tend to be absorbed more slowly, lessening the impact on blood-sugar levels.

Understanding and using the glycemic index is an important aspect of diet modification for cancer patients. However, there is also evidence that sugars may feed cancer more efficiently than starches (comprised of long chains of simple sugars), making the index slightly misleading.

A study of rats fed diets with equal calories from sugars and starches, for example, found the animals on the high-sugar diet developed more cases of breast cancer. The glycemic index is a useful tool in guiding the cancer patient toward a healthier diet, but it is not infallible. By using the glycemic index alone, one could be led to thinking a cup of white sugar is healthier than a baked potato. This is because the glycemic index rating of a sugary food may be lower than that of a starchy food. To be safe, it is recommended to consume less fruit, more vegetables, and little to no refined sugars in the diet of cancer patients.

In a human study, 10 healthy people were assessed for fasting blood-glucose levels and the phagocytic index of neutrophils, which measures immune-cell ability to envelop and destroy invaders such as cancer. Eating 100 g carbohydrates from glucose, sucrose, honey and

orange juice all significantly decreased the capacity of neutrophils to engulf bacteria. Starch did not have this effect.

A four-year study at the National Institute of Public Health and Environmental Protection in the Netherlands compared 111 biliary tract cancer patients with 480 controls. Cancer risk associated with the intake of sugars, independent of other energy sources, more than doubled for the cancer patients.

Furthermore, an epidemiological study in 21 modern countries that keep track of morbidity and mortality (Europe, North America, Japan and others) revealed that sugar intake is a strong risk factor that contributes to higher breast cancer rates, particularly in older women.

Limiting sugar consumption may not be the only line of defense. In fact, an interesting botanical extract from the avocado plant (*Persea Americana*) is showing promise as a new cancer adjunct. When a purified avocado extract called mannoheptulose was added to a number of tumor cell lines tested in vitro by researchers in the Department of Biochemistry at Oxford University in Britain, they found it inhibited tumor cell glucose uptake by 25 to 75 percent, and it inhibited the enzyme glucokinase responsible for glycolysis. It also inhibited the growth rate of the cultured tumor cell lines. The same researchers gave lab animals a 1.7 mg/g body weight dose of mannoheptulose for five days; it reduced tumors by 65 to 79 percent. Based on these studies, there is good reason to believe that avocado extract could help cancer patients by limiting glucose to the tumor cells.

Since cancer cells derive most of their energy from anaerobic glycolysis, Joseph Gold, M.D., director of the Syracuse (N.Y.) Cancer Research Institute and former U.S. Air Force research physician, surmised that a chemical called hydrazine sulfate, used in rocket fuel, could inhibit the excessive gluconeogenesis (making sugar from amino acids) that occurs in cachectic cancer patients. Gold's work demonstrated hydrazine sulfate's ability to slow and reverse cachexia

in advanced cancer patients. A placebo-controlled trial followed 101 cancer patients taking either 6 mg hydrazine sulfate three times/day or placebo. After one month, 83 percent of hydrazine sulfate patients increased their weight, compared to 53 percent on placebo. A similar study by the same principal researchers, partly funded by the National Cancer Institute in Bethesda, Md., followed 65 patients. Those who took hydrazine sulfate and were in good physical condition before the study began lived an average of 17 weeks longer.

There is a crucial role of total parenteral nutrition (TPN) in cancer patients. Some 40 percent of cancer patients die from cachexia. Yet many starving cancer patients are offered either no nutritional support or the standard TPN solution developed for intensive care units. The solution provides 70 percent of the calories going into the bloodstream in the form of glucose. All too often, I believe, these high-glucose solutions for cachectic cancer patients do not help as much as would TPN solutions with lower levels of glucose and higher levels of amino acids and lipids. These solutions would allow the patient to build strength and would not feed the tumor.

The medical establishment may be missing the connection between sugar and its role in tumorogenesis. Consider the million-dollar positive emission tomography device, or PET scan, regarded as one of the ultimate cancer-detection tools. PET scans use radioactively labeled glucose to detect sugar-hungry tumor cells. PET scans are used to plot the progress of cancer patients and to assess whether present protocols are effective.

The irrefutable role of glucose in the growth and metastasis of cancer cells can enhance many therapies. Some of these include diets designed with the glycemic index in mind to regulate increases in blood glucose, hence selectively starving the cancer cells; low-glucose TPN solutions; avocado extract to inhibit glucose uptake in cancer cells; and hydrazine sulfate to inhibit gluconeogenesis in cancer cells.

The simple concept that ‘sugar feeds cancer’ is often overlooked as part of a comprehensive support plan for cancer sufferers. Of over 5 million cancer patients being treated in the U.S. today, few are offered specific advice or guidelines for using optimum nutrition, beyond being told to “just eat good foods.” Most cancer sufferers lack knowledge of what an optimal nutritional program is or how to implement it.

Many cancer sufferers could have a major improvement in the outcome of their disease if cancer's preferred fuel, glucose, was controlled. Eliminating refined sugar and adopting an optimal whole foods diet combined with top quality nutritional supplements and exercise, may be critical components in recovering from cancer.

Glucose: The Fuel of Cancer Cells

Malignant tumors frequently exhibit an increase in anaerobic (“without air”) glycolysis -- an abnormal process whereby glucose is used as a primary fuel by cancer cells and which generates large amounts of lactic acid as a byproduct. This vicious cycle increases body wasting – often in a downward spiral until death. This is one reason why almost 40% of cancer sufferers die from malnutrition (called cachexia or “wasting away”).

In contrast, normal cells predominantly undergo aerobic (“with air”) cellular metabolism. In cancer, the large increase in lactic acid generated by the cancer cells must be transported to the liver for metabolism and clearance. The lactic acid creates a lower, more acidic pH in cancerous tissues as well as overall physical fatigue from liver stress due to overworking to try to clear the lactic acid buildup. Consequently, larger tumors tend to have a more acidic pH. The goal is to return the body to aerobic metabolism as quickly as possible and to achieve an alkaline tissue pH (6.4 – 7.0). An alkaline environment is an unfavorable environment for cancer growth.

Glucose IVs Feed Cancer

In hospitals, the total parenteral (TPN) solution typically given to cancer patients intravenously provides 70% of the calories going into the bloodstream in the form of glucose. These high-glucose solutions for cachectic cancer patients may be a poor choice of I.V. nutrition and in effect, be serving to feed the tumor. A more nutritionally balanced I.V. solution with low glucose levels in addition to a broad spectrum of nutrients such as amino acids, vitamins, minerals, lipids and co-factors, may be a much better choice and allow the patient to build strength and would not feed the tumor.

The best way to regulate blood-glucose levels in cancer sufferers may be the following:

1. an optimal whole foods diet
2. top quality nutritional supplements with a broad spectrum of anti-infective, immune-supportive phytonutrients,
3. regular exercise and sunlight
4. gradual weight loss (if overweight) and
5. Stress reduction.

Professional nutritional guidance is crucial for cancer victims. The goal of nutrition therapy is not to eliminate all carbohydrates from the diet but eliminate all refined carbohydrates, and thus, control blood glucose within a narrow range to help starve the cancer and also bolster immune function.

Sugar depresses the immune system

We have known this for decades. It was only in the 1970's that researchers found out that vitamin C was needed by white blood cells so that they could phagocytize viruses and bacteria. White blood cells require a 50 times higher concentration inside the cell as outside so they have to accumulate vitamin C.

There is something called a 'phagocytic index' which tells you how rapidly a particular macrophage or lymphocyte can gobble up a virus,

bacteria, or cancer cell. It was in the 1970's that Linus Pauling realized that white blood cells need a high dose of vitamin C.

We know that glucose and vitamin C have similar chemical structures, so what happens when the sugar levels go up? They compete with one another upon entering the cells. The thing that mediates the entry of glucose into the cells is the same thing that mediates the entry of vitamin C into the cells. If there is more glucose around, there is going to be less vitamin C allowed into the cell. It does not take much: a blood sugar value of 120 reduces the phagocytic index by 75%. So when you eat sugar, think of your immune system slowing down to a crawl.

Here we are getting a little bit closer to the roots of disease. It does not matter what disease we are talking about, whether we are talking about a common cold or about cardiovascular disease, or cancer or osteoporosis, the root is always going to be at the cellular and molecular level, and more often than not insulin is going to have its hand in it, if not totally controlling it.

The health dangers which ingesting sugar on a habitual basis creates are certain. Simple sugars have been observed to aggravate asthma, move mood swings, provoke personality changes, muster mental illness, nourish nervous disorders, deliver diabetes, hurry heart disease, grow gallstones, hasten hypertension, and add arthritis.

Because refined dietary sugars lack minerals and vitamins, they must draw upon the body's micro-nutrient stores in order to be metabolized into the system. When these storehouses are depleted, metabolization of cholesterol and fatty acid is impeded, contributing to higher blood serum triglycerides, cholesterol, promoting obesity due to higher fatty acid storage around organs and in sub-cutaneous tissue folds.

Because sugar is devoid of minerals, vitamins, fiber, and has such a deteriorating effect on the endocrine system, major researchers and major health organizations (American Dietetic Association and

American Diabetic Association) agree that sugar consumption in America is one of the 3 major causes of degenerative disease.

Simple sugar

There are four classes of simple sugars which are regarded by most nutritionists as 'harmful' to optimal health when prolonged consumption in amounts above 15% of the carbohydrate calories is ingested: Sucrose, fructose, honey, and malts.

Although honey is a natural sweetener, it is considered a refined sugar because 96% of dry matter is simple sugars: fructose, glucose and sucrose. It is little wonder that the honey bear is the only animal found in nature with a problem with tooth-decay (honey decays teeth faster than table sugar). Honey has the highest calorie content of all sugars with 65 calories/tablespoon, compared to the 48 calories/tablespoon found in table sugar. The increased calories are bound to cause increased blood serum fatty acids, as well as weight gain, on top of the risk of more cavities.

Pesticides used on farm crops and residential flowers have been found in commercial honey. Honey can be fatal to an infant whose immature digestive tracts are unable to deal effectively with Botulinum Spore growth. What nutrients or enzymes raw honey does contain are destroyed by manufacturers who heat it in order to give it a clear appearance to enhance sales. If you are going to consume honey, make sure it is raw, unheated honey. Good to use in special cures, but not as an every day food. It is not much better than white or brown sugar.

Here is a list of ways sugar can affect your health:

- Sugar can suppress the immune system.
- Sugar can upset the body's mineral balance.
- Sugar can contribute to hyperactivity, anxiety, depression, concentration difficulties, and crankiness in children.

- Sugar can produce a significant rise in triglycerides.
- Sugar can cause drowsiness and decreased activity in children.
- Sugar can reduce helpful high density cholesterol (HDLs).
- Sugar can promote an elevation of harmful cholesterol (LDLs).
- Sugar can cause hypoglycemia.
- Sugar contributes to a weakened defense against bacterial infection.
- Sugar can cause kidney damage.
- Sugar can increase the risk of coronary heart disease.
- Sugar may lead to chromium deficiency.
- Sugar can cause copper deficiency.
- Sugar interferes with absorption of calcium and magnesium.
- Sugar can increase fasting levels of blood glucose.
- Sugar can promote tooth decay.
- Sugar can produce an acidic stomach.
- Sugar can raise adrenaline levels in children.
- Sugar can lead to periodontal disease.
- Sugar can speed the aging process, causing wrinkles and grey hair.
- Sugar can increase total cholesterol.
- Sugar can contribute to weight gain and obesity.
- High intake of sugar increases the risk of Crohn's disease and ulcerative colitis.
- Sugar can contribute to diabetes.
- Sugar can contribute to osteoporosis.
- Sugar can cause a decrease in insulin sensitivity.
- Sugar leads to decreased glucose tolerance.
- Sugar can cause cardiovascular disease.
- Sugar can increase systolic blood pressure.
- Sugar causes food allergies.
- Sugar can cause free radical formation in the bloodstream.
- Sugar can cause toxemia during pregnancy.
- Sugar can contribute to eczema in children.
- Sugar can overstress the pancreas, causing damage.
- Sugar can cause atherosclerosis.
- Sugar can compromise the lining of the capillaries.
- Sugar can cause liver cells to divide, increasing the size of the liver.
- Sugar can increase the amount of fat in the liver.
- Sugar can increase kidney size and produce pathological changes in the kidney.
- Sugar can cause depression.
- Sugar can increase the body's fluid retention.
- Sugar can cause hormonal imbalance.
- Sugar can cause hypertension.

- Sugar can cause headaches, including migraines.
- Sugar can cause an increase in delta, alpha and theta brain waves, which can alter the mind's ability to think clearly.
- Sugar can increase blood platelet adhesiveness which increases risk of blood clots and strokes.
- Sugar can increase insulin responses in those consuming high-sugar diets compared to low sugar diets.
- Sugar increases bacterial fermentation in the colon.

Hence, cancer therapies should attempt to regulate blood-glucose levels through diet, supplements, exercise, medication when necessary, and gradual weight loss and stress reduction. Since cancer cells derive most of their energy from anaerobic glycolysis, the goal is not to eliminate sugars or carbohydrates entirely from the diet but rather to control blood-glucose within a narrow range to help starve the cancer cells and boost immune function.

Sugar Is Poison!

The average person living in the Western world consumes about 150 pounds of refined table sugar every year! Did you know that sugar is poisonous to the body and that it leads to, or directly causes, 146 health problems and diseases? Here are just a few examples:

- Sugar can suppress the immune system and it contributes to the reduction in the body's defense against bacterial infection (infectious diseases). Scientists have proven that too much sugar is the death of the immune system.
- Sugar upsets the mineral relationships in the body. It also interferes with absorption of calcium and magnesium.
- Sugar produces a low oxygen environment = cancer and candida (fungal) growth environment.
- Sugar causes a loss of tissue elasticity and function.
- Sugar can cause and/or lead to appendicitis, atherosclerosis, arthritis, asthma, cancer, candida (fungal overgrowth), eczema, emphysema, gallstones, heart disease, hemorrhoids, multiple sclerosis, osteoporosis, periodontal disease, varicose veins, etc.

- Sugar weakens eyesight and it can cause cataracts.
- Sugar contributes to diabetes and obesity.
- Sugar can impair the structure of DNA (genes).
- Sugar is the #1 enemy of the bowel movement.
- Sugar can cause headaches, including migraine.
- Sugar can cause depression.
- Sugar causes indigestion and constipation.
- Sugar feeds cancer and other fungal diseases, i.e. candida (fungal overgrowth).
- Sugar is an addictive substance, and it can be intoxicating, similar to alcohol.
- Sugar causes high blood pressure in obese people.

Did you know that vitamin C and sugar have similar chemical structures so that means they compete with one another for entry into the cells? New research confirms Dr. John Ely's 30-year theory that sugar (glucose) competes with ascorbic acid (Vitamin C) for insulin-mediated uptake into cells.

Consuming sugar can effectively crowd out the ascorbate (vitamin C). The effect of the Pauling Therapy [high doses of vitamin C] is reportedly much more pronounced and immediate when sugar is eliminated.

If there is more sugar around less vitamin C is allowed into the cell, and vice versa. It is interesting that taking vitamin C also helps curb cravings for sugar, alcohol and carbohydrates. Since our bodies cannot make vitamin C on its own, it must be obtained from foods or supplements on a daily basis.

In his book *Sugar Blues*, Bill Dufty points out numerous examples of physical diseases and psychological disorders that can be traced back to diets that are deficient in whole unprocessed foods, and dominated by highly processed fats and sugars.

The problem with sugar consumption is not just limited to refined table sugar. Other types of sugars are just as damaging, i.e. corn syrup

and sweeteners, honey, maple syrup, molasses, glucose, fructose (fruits), and all artificial sugar substitutes and sweeteners, i.e. NutraSweet, aspartame, saccharin, etc. – see the partial list below.

Names for Sugars and Sweeteners (partial list)

- Aspartame
- Acesulfame-K
- alitame
- cane
- sugar
- carmel
- carob powder
- corn starch
- corn syrup
- crystalline powder
- carbohydrate
- cyclamate
- date sugar
- disaccharides
- dextrin
- dextrose
- erythritol
- fructose
- galactose
- glucose
- invert
- sugar
- lactitol
- lactose
- levulose
- malts of any kind
- maltitol
- maltodextrin
- maltose
- manitol
- mannitol
- monosaccharides
- Naturlose
- NutraSweet
- polydextrose
- polysaccharides
- ribose
- saccharin
- sorbitol
- sorghum
- suamiel
- sucanat
- sucrose
- tagatose
- talose
- trehalose
- Xylitol

Artificial sugars are particularly damaging to the body because they are neurotoxic, meaning they cause damage to the brain, spinal cord and nervous system. In *Sugar-Free Blues* Jim Earles writes this about aspartame:

“Researchers at Utah State University found that even at low levels aspartame induces adverse changes in the pituitary glands of mice. The pituitary gland is the master gland upon which the proper function of all biochemical processes depends.

When aspartame is digested it breaks down into the amino acids phenylalanine and aspartic acid, plus methanol. Methanol, or wood alcohol, is a known poison.

Methanol is also found in fruit juices, and our regulatory agencies have seized upon this fact to assure us that the methanol by-product of aspartame is not harmful. They fail to point out that the methanol content of a diet soft drink is 15 to 100 times higher than that of fruit juices.”

Fruit is mostly fructose sugar with some vitamins, minerals and other nutrients. Those vitamins and nutrients are easily obtained from meats, eggs, and vegetables.

Did you know there is more vitamin C in broccoli and peppers than in any fruits sold at the grocery store today, and that meats and eggs also contain vitamin C?

Even healthy people should limit fruit consumption to two per day and they should always be accompanied by plenty of saturated fats to slow the release of fructose into the bloodstream.

That is why strawberries and cream tastes so good together! Like all other sugars, fructose causes insulin resistance, as proven in scientific tests. Fruits that are lowest in sugar are grapefruit, lemon and lime.

Also a high carbohydrate diet is just as damaging to your body as sugar. Did you know you can obtain all of your body's blood sugar requirements by eating meats, eggs and saturated fats, and no carbohydrates!

That is because “58% of the protein and about 10% of the fat you eat are converted to glucose,” as stated by Prevention Magazine.