THE HEALTH NUGGET

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Getting the Most Bang Per Bite

Fall has passed, leaving traces of its farewell strewn along the way. The glorious shades of gold, red and orange leaves of weeks past heralded the coming of winter and the departure of chlorophyll. Chlorophyll, the green pigment in leaves, is crucial to life on this planet. Its role in that wonderful process of photosynthesis impacts you and me on a daily basis, even in the dead of winter.

Chlorophyll captures the energy of sunlight and channels it into chemical energy. This energy then enables plants to take water and carbon dioxide and turn them into oxygen and hydrated carbon, or what we call carbohydrate. The oxygen is released into the air and the carbohydrate is stored in the plant. This is photosynthesis. Without chlorophyll photosynthesis wouldn't happen. The dictionary defines photosynthesis as "the production of carbohydrates from carbon dioxide and water, using sunlight as the source of energy and with the aid of chlorophyll."[1]

If we were to make an equation of photosynthesis, it would look like this:

Water (H_2O) + carbon dioxide (CO_2) + energy = carbohydrate/hydrated carbon (CH_2O) + oxygen (O_2)

$$H_2O + CO_2 + \text{energy} = CH_2O + O_2$$

Though rearranged, there are two hydrogen atoms on both sides, three oxygen atoms on both sides and one carbon atom. The equation is equalized except, what happened to the energy? The energy is stored in the carbohydrate, holding it together. Hydrated carbons unite with each other to form carbohydrates that range from very simple to indigestibly complex. Glucose is a very simple carbohydrate. It consists of six hydrated carbons united together. Fiber is an indigestible complex carbohydrate. Humans do not have the enzymes needed to break down its bonds or structure.

So how does this impact you and me? Simple. As we consume plants containing carbohydrates, our body goes through the process of digestion, breaking down large food molecules into smaller molecules that can be used by cells. Since glucose is the fuel that our bodies run on, one of the goals of digestion is to provide this form of usable carbohydrate. As the bonds holding the carbohydrates are broken, guess what is released? Energy! Carbohydrates are the main energy source for the human body.

An equation illustrating the metabolism or breaking down of glucose that occurs in digestion would look like this:

$C_6H_{12}O_6$ (glucose) + 6 O_2 (oxygen) = 6 CO_2 (carbon dioxide) + 6 H_2O (water) + energy

Energy is the end product of glucose being metabolized or digested. The energy in glucose is used to produce adenosine triphosphate (ATP) which is "the major energy currency molecule of the cell."[2] In fact, all fuel sources of nature, all foodstuffs of living things produce ATP, which in turn powers virtually every activity of the cell and organism. As far as we know, all organisms from the simplest bacteria to

humans use ATP as their primary energy currency.

Nature has stored its energy in the carbohydrate-rich plants in the form of fruits, nuts, grains, vegetables, roots and legumes (beans, peas). Carbohydrates are not the only nutritional value of these plant foods. In varying amounts, they are loaded with protein, vitamins, minerals and phytochemicals. Much of the carbohydrates in these foods are stored in very complex forms, with several hydrated carbons connected together.

Carbohydrates are not all the same. They are packaged very differently. Some are rapidly digested, providing available glucose very quickly. Others are slowly digested and release their energy over a longer period of time. Other varieties are so complex and put together in such a way that our digestive system cannot break them down. We call these kinds of carbohydrates fiber. Even though we do not have the necessary enzymes to digest fiber, it is still so very important for our health. As these undigested starches pass into the large intestine and are fermented by the body's bacteria, they then become fuel, or energy, for the friendly bacteria. Metabolism of fermentable fiber yields nutrients that are absorbed by the large intestine. The byproducts of the fermentation process actually contribute to our health by lowering insulin resistance, reducing inflammation, maintaining healthy cholesterol and keeping the colon healthy.

Somewhere along the line mankind became confused. I guess we thought (or didn't think) that if energy is what we need, and glucose (a sugar) is the pure source of fuel, the gasoline for our bodies, then wouldn't it make sense to take a short cut and consume straight sugar? We took nature's packaged goods and broke them down in machines rather than in our bodies. Unfortunately, the resulting processed ingredients, such as white sugar, white flour, corn syrup, etc., create havoc in our bodies. Instead of energizing us, they leave us depleted and tired. You see, the body is affected by how food is metabolized even though it cannot differentiate between whether the glucose it is utilizing is from brown rice or a soda pop. How the carbohydrate is packaged when it enters the body makes a big difference.

The pendulum has also swung in the other direction. Carbohydrates in the form of these processed sugars have been blamed for our weight problems, disease and bad moods. Misunderstood and maligned, carbs have had to take a back seat in the estimation of many.

But carbohydrates, as found in nature, are powerful and essential for a healthy life. The key is to eat them as close to how nature packaged them as possible. For example, the complex carbohydrates packaged in whole grains are varied. There is the bran (indigestible fiber), germ (high in protein, B vitamins, vitamin E), and endosperm (starchy part) in the whole grain. This means there is more to break down. This results in a steadier, better regulated, greater energy supply.

Originally it was God's intention that man fuel his body with the highest quality, most health promoting food.

"Then God said, 'Behold, I have given you every plant yielding seed that is on the surface of all the earth, and every tree which has fruit yielding seed; it shall be food for you'" (Genesis 1:29, NASB). Even in Eden we see God's original plan was for us to eat plants—carbohydrates.

Today, minimizing refined and processed carbohydrates and choosing whole food carbohydrates as found in nature will help you lose excess weight, provide fabulous nutrition, promote good health and give you the most energy bang per bite than anything else.

[1] "Let's Eat." Real Trees 4 Kids! *The National Christmas Tree Association*. 1999-2008. http://www.realtrees4kids.org/sixeight/letseat.htm.

[2] Bergman Ph.D., Jerry. "ATP: The Perfect Currency for the Cell." *Creation Research Society Quarterly*. 1999. http://www.trueorigin.org/atp.asp.

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