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And Now, Otto Warburg

Earlier in the series *Legit or Not*, I challenged you to look up Otto Warburg online. Some of you took it on and tried to find out who Otto Warburg was. Most had it correct—up to a point. Here's the rest of the story on Dr. Warburg, including how what's in the email and on the Internet goes wrong.

To set the stage, the emails that circulate on the Internet and talk about the cancer and pH hypothesis cite the work of Dr. Otto Warburg, a brilliant scientist who spent his life studying cellular respiration, the scientific term for how cells use oxygen to produce energy and sustain life. When I say he's brilliant, it may be an understatement—he won a Nobel Prize for his work in 1931 and was nominated numerous other times. His work led him to examine differences in energy production between normal cells and cancer cells. But most of that came later in his career. In his Nobel Prize Lecture and in his banquet speech, he never mentions pH or oxygen as it relates to cellular respiration. Most of the theory about pH and cancer seems to be attributed to a talk Warburg gave to other Nobel Prize winners in Lindau, Germany, in 1966. The only places his speech appears are on websites of people and companies that are promoting alkalizing the body as a treatment for cancer.

Having read several versions of the speech, I found that Warburg never talks about pH in that speech, only about cancer cells using fermentation to produce energy. What Warburg concluded from his experiments was that instead of the normal aerobic (oxygen-using) means of producing energy, cancer cells use fermentation, which doesn't need oxygen. In other words, he was saying that cancer will grow and produce energy without oxygen. He further states that the changes in how the cells produce energy permanently transform the cells and their behavior.

This is my interpretation of how Warburg's work relates to the alkalinity theory of cancer. Based on what's being stated on the Internet, it's the only explanation that makes sense. If cancer cells use fermentation to produce energy, the result is a by-product called lactic acid, which you've probably heard about before—muscle cells also produce lactic acid in a process called glycolysis when we exercise at a high rate.

This build-up of lactic acid from cancer cells yields a lower pH. In other words, those muscles or the area with cancer becomes a more acidic environment. Therefore, the solution is to change the body's environment from acidic to alkaline (basic) in order to prevent and treat cancer. That's the theory promoted in the emails and on the Internet.

The Problem

The problem with this reasoning is simple: how does a very localized and incredibly small group of cells using fermentation affect the pH of the entire body? The truth is we make cancer cells every day, and every day the body's immune system eliminates them. How can a few cells, at least initially, affect the entire body?

We know today that cancer cells use glycolysis as well as aerobic metabolism to produce energy (1); in fact, this is termed the Warburg Effect. The energy production of cancer cells is the subject of many research studies—if the power plant of cancer cells, and only cancer cells, could be turned off, the cancer would die. While one of the end products of glycolysis is lactic acid, pyruvic acid is another metabolite of that respiration and can be used to produce energy aerobically. But that doesn't change the problem of magnitude. It just doesn't work to have so few cells change the entire body's pH.

But there is one more thing. When you get so focused on trying to interpret the science of something, you often miss the obvious; Paula pointed it out as she edited the message. The change in pH occurs after the cancer has started and developed, not before. The pH is the effect, not the cause; no matter what you do to eliminate the effect, the cause hasn't changed. You can deal with the smoke from a fire, but that won't put out the fire or prevent another fire somewhere else.

Warburg didn't suggest that a decrease in pH caused the cancer—that's what others have suggested over the past 50 years. He discovered one of the ways that cancer cells can make energy. Period.

The Bottom Line

There's no evidence that changing the body's pH will eliminate cancer or prevent it from developing. That makes the email and Internet websites wrong.

But let's say that you feel that if there's a shadow of truth to this pH theory, it may be something worth pursuing. What could you do? Very simple: eat less meat and more fresh vegetables and fruit. In a number of studies, that seems to be the only way to change the pH of the body and make it very slightly more alkaline. Because those who eat more vegetables and fruit have cancer less often, that's probably a wise lifestyle choice—whether it has anything to do with the body's pH or not.

Any way you look at it, your mother was right: eat your vegetables. They're good for you in many ways.

What are you prepared to do today?

Dr. Chet

References:

1. J Bioenerg Biomembr. 2007 Feb;39(1):1-12. Review.

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