This is Dr. Daniel Weiss from Your Diabetes Endocrine Nutrition Group. My topic today is grapefruit. Many of us enjoy eating this delicious treat or drinking its juice. But warnings abound about grapefruit. Your doctor or pharmacist may have cautioned you about grapefruit. And many popular magazines warn not to drink grapefruit juice if you take certain prescription drugs. Adding to the worry, a recent news report described an increased risk of breast cancer in women eating grapefruit. What should you do? Should you worry?

It seems to me that the media, likes to grab our attention by scaring people. Unfortunately mass media, especially television, offer a poor source of scientific information. Now I'd like to talk about the latest scare you might have heard about grapefruit.

Grapefruit and cancer risk

A recent study, published in the British Journal of Cancer, reported on postmenopausal women living in Hawaii and the Los Angeles area. In the 1990's these women filled out a food frequency questionnaire, which asked them how often and how much they ate of a variety of different foods. There was, of course, a question asked about how much and how often the person

ate grapefruit. Importantly, women in this study were not asked about grapefruit juice intake.

The researchers continued to check on these women over time, in fact, for an average of 7 years. Of the 50,000 or so women at the start who filled out the questionnaire, 1657 women developed breast cancer. These researchers found that those women who indicated on their questionnaire that they ate grapefruit daily were more likely to have been among those who developed breast cancer as compared to those who never ate grapefruit.

Now, this kind of study design like so many published reports in medical journals or reports in the news cannot prove anything. It does not provide good evidence of cause and effect, but simply describes an association.

For example, an association has been found between rates of ice cream consumption and murder in certain cities. Clearly eating ice cream does not cause murder, nor does murder make people eat ice cream. Another factor is more likely to explain this association. It may be, in this case, that both ice cream consumption and murder are increased in hot weather.

In contrast, a randomized controlled study can give evidence of cause and effect. If the grapefruit study were done as a randomized controlled trial, it would go something like this: find a large group of women, then using the

flip of a coin, assign each one of them, to either eat grapefruit or never eat any grapefruit. Keep all other factors about these women the same. Then some years later, determine if there is more breast cancer in one group as compared to the other.

This study is simply too impractical and unrealistic. So researchers turn to an association type of study and try to draw conclusions from that.

That's why I believe that when you hear reports like this reporting associations, you should be very skeptical. Wait for more evidence before coming to any conclusion. Wait before you worry.

And if you were a regular reader of the British Journal of Cancer you didn't have to wait long. You didn't hear this one on the news though.

Two months after the first report, another report came out, this time from the Nurses' Health Study or NHS for short. The NHS researchers gathered information on more than 73,000 postmenopausal women over about 8 years. Of these women, 3570 developed breast cancer. The NHS researchers factored in grapefruit juice intake as well as grapefruit and they found **absolutely no connection or association between breast cancer and grapefruit or grapefruit juice intake**. As you might expect, other studies have suggested benefit from grapefruit including a reduced risk of death from heart disease.

Grapefruit and interaction with prescription medications

Okay, so much for that. Now how about the interaction of grapefruit with your prescription medications? First you should understand that the body handles foods and medications in very complicated ways. Before food gets into the bloodstream, before it is absorbed, it goes through the stomach and then the small intestines. The intestines is the area of the digestive tract where food enters the bloodstream. Blood from the digestive tract passes through the liver before traveling to the rest of the body.

The liver and the kidney are the main organs that metabolize, change, breakdown, or eliminate the chemicals that are in our medications or the chemicals that make up our foods.

Our body is made up of chemicals in careful balance; food and medications also are made up of chemical molecules which affect that balance in many complicated ways.

It turns out that besides the liver and the kidneys, the intestines are also a place where medications are metabolized or changed. Grapefruit juice contains chemical substances which can reduce the amount of the intestinal enzyme called CYP3A4 which breaks down many medications. With less of

this enzyme, the levels of certain drugs in the blood can be higher, because less of the drug is broken down in the intestines before it can be absorbed.

On the other hand, recent evidence shows that grapefruit juice can also reduce absorption into the blood stream of some drugs by reducing the action of a transporter protein called OATP1A2. This reduced absorption would make levels of that drug lower.

So in theory, one chemical in grapefruit can raise blood levels of some medicines and a different chemical in grapefruit can lower blood levels of other medicines. Therefore, the grapefruit effect on blood levels of drugs, if any, may be difficult to predict.

But the key point here is that although changes in blood levels of certain drugs can occur with grapefruit consumption, reports of grapefruit actually causing problems or symptoms are almost non-existent. This whole issue, in my opinion, is overblown. Or in medical jargon, this issue is clinically insignificant.

For example, of all the medications for high cholesterol, called statins, only 2 list a caution for grapefruit juice in their official package insert. And

those, simvastatin and lovastatin, caution about drinking 1 quart or more per day if you are taking that particular drug.

Now there must be some people who drink this much grapefruit juice and also take simvastatin or lovastatin. But there are no published reports of people running into a problem doing this. Clinical problems from grapefruit juice must be exceedingly rare.

An extraordinary number of foods, probably all foods, not just grapefruit, affect our body chemistry and how we handle medications. All of this is very poorly understood at this point. The field of metabolomics is new and attempts to explore these issues.

In conclusion, my recommendations are to be cautious regarding grapefruit in three circumstances:

- If you are on chemotherapy for cancer OR
- If you are on drug therapy for HIV infection OR
- If you have an organ transplant

So be sure to consult your doctor if you have a question. For most people, my advice is: enjoy your grapefruit!

My goal in these pod casts is to bring you important new scientific findings about nutrition, diabetes and other medical issues. I want to remind you that scientific knowledge is always changing. What is known today may be seen from a different perspective or may be changed tomorrow. I will share with you my understanding of current research related to day to day decisions about your health.

Take care.

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