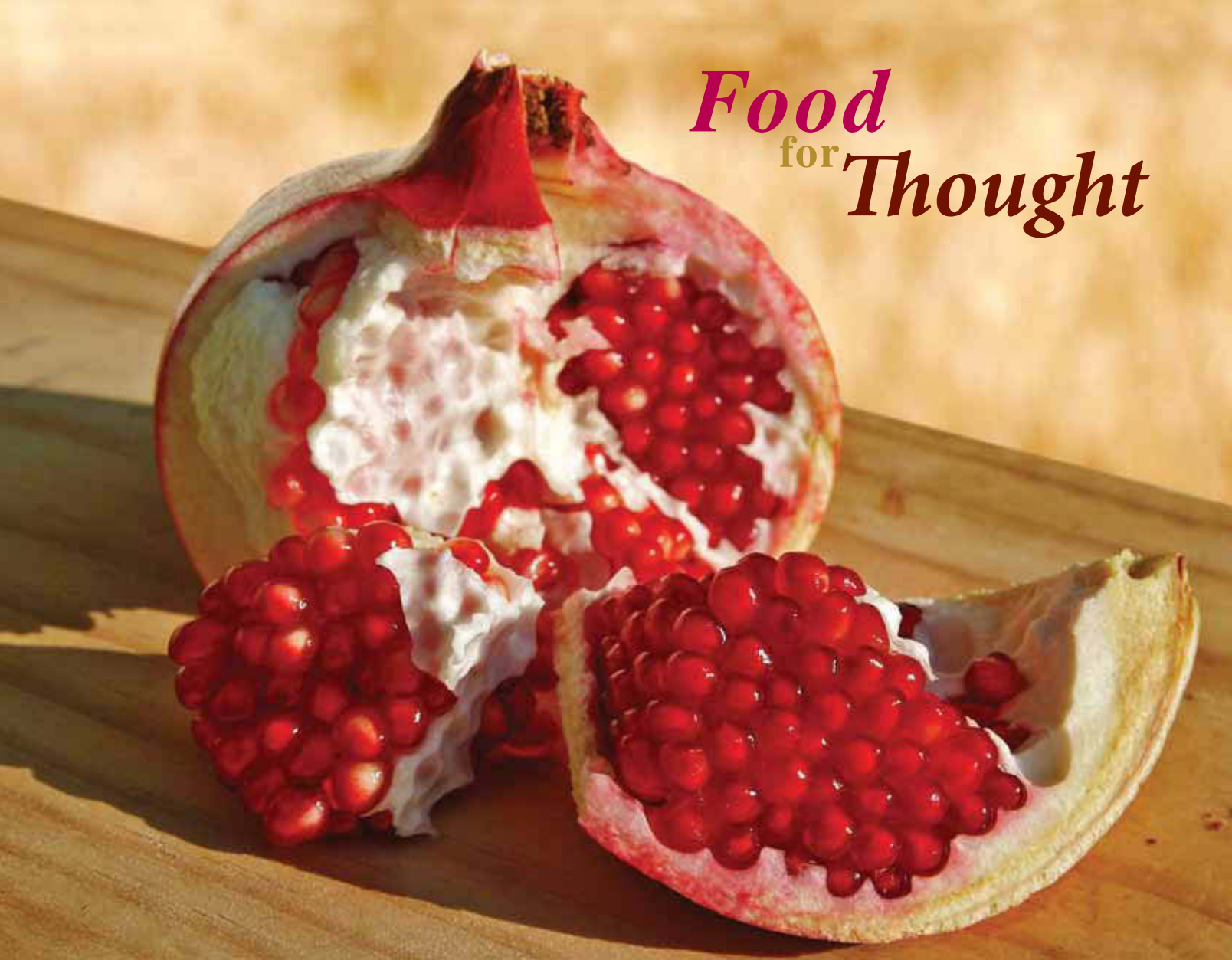


Food for Thought



Pomegranate Juice and Tomato Products Show Promise for Protection against Prostate Cancer

Mark L. Dreher, PhD

Nutrition Science Solutions, LLC

INTRODUCTION

It has been estimated that 35% of cancer incidence can be explained by diet ¹. Diets rich in fruit and vegetables as part of an overall healthy diet can help lower chronic disease risk and aid in weight management ². The phytochemical antioxidants present in fruit and vegetables evolved with humans over the last 100,000 years and have provided oxidative and inflammatory protection against damage from the environment and stress. In fact, the World Health Organization has identified low fruit and vegetable intake as among the top 10 risk factors contributing to chronic disease worldwide ³. Although population studies suggest that fruit and vegetable intake could potentially prevent 5 to 12% of cancers ^{4,5,6}, these studies tend to under-estimate the benefit because of inconsistencies in the investigated population, the lack of accuracy in estimating the dietary intake, and the statistical methods used to evaluate the data.

Although it is important to eat a wide variety of fruit and vegetables to ensure you get a range of protective phytochemicals, the American Institute of Cancer Research ⁷ provides scientific evidence that specific fruit and vegetable phytochemicals may uniquely affect specific cancers more than others. It appears that consumption from the “red and red / purple groups” have the most promise for prostate health.

This article is a “case for action” for both:

- more fruit and vegetable consumption for optimal protection against cancer, and
- specific emphasis on pomegranate juice and tomato products for protection against prostate cancer.

The Critical Evolutionary Contribution of Fruit and Vegetables

Originally the earth’s atmosphere contained little oxygen. Beginning hundreds of millions of years ago, bacteria developed photosynthesis to use sunlight energy to convert carbon dioxide from the air and hydrogen and oxygen from water to glucose for cell energy ^{8,9}. With this new energy source, these bacteria now had a competitive advantage and evolved, over time as a dominant life form. They also created lots of oxygen as a by-product of photosynthesis. The oxygen, when exposed to heat and light, produced free radicals, which were highly disruptive to cells over time. As higher plants evolved this gave rise to the development of phytochemical antioxidants in fruit and vegetables as protection against the hazards of oxidative damage. These phytochemicals made it possible to stop free radical reactions before they did cellular damage. They appear as natural colored compounds because their chemical structure absorbs light in the visible range.

Humans have been always been dependent on colorful fruit and vegetable phytochemicals to help supplement their innate systems to protect cells from free radical and related inflammatory damage. The requirement for these plant antioxidants and anti-inflammatory compounds increases as humans age and become overweight, since the body’s innate protective systems become less effective and more free radicals escape to attack cells. Each type of fruit and vegetable has unique beneficial phytochemicals, so it is best to eat a wide variety for optimal protection.

Fruit and Vegetables are Lacking in the Modern Diet

In contrast to the diet of our ancient human ancestors, modern human diets frequently fall far short of the daily recommended consumption of fruit and vegetables, which is 5 to 9 servings or 400 to 600 grams per day. In the United States ¹⁰, more than 70% of women and 80% of men do not



meet the minimum daily intake of five servings of fruits and vegetables and 50% of adults do not eat a single serving of fruit. In fact, over the last decade the mean frequency of the consumption of fruit and vegetables has declined slightly (-0.22 times/day). A study from the United Kingdom

showed that people consuming close to recommended daily levels of fruit and vegetables had about 4 times more antioxidant intake than people consuming the typical low number of servings. ¹¹

A clinical study from Germany demonstrated in healthy, non-smoking men a dose response effect of fruit and vegetable intake on enhanced immune function as measured by plasma C-reactive protein (CRP) after 4 weeks ¹². At least 8 servings of fruit and vegetables were required for a significant reduction in CRP, a commonly measured blood biomarker of inflammatory health.

For prostate cancer protection, consider eating pomegranate fruit or drinking 100% pomegranate juice or consuming tomato based products such as soups, pasta sauces and juices to increase the antioxidants ellagitannin metabolites and lycopene, respectively, in the prostate gland. However, it must be noted that some blended juices are almost devoid of these phytochemicals as they are not present in sufficient quantities to have a benefit. Please read the label and note the type and placement of ingredients. *(Continued on Page 14)*

Fruit and Vegetables Help Control Calorie Intake and Provide Natural Sweetening

Many western people are sedentary and consume too many refined calories depleted of protective phytochemicals, which generally turn into weight gain and excess body fat storage^{3,8}. The excess fat, especially around the body middle, has been clearly associated with an increased risk of many diseases, including prostate cancer. Even moderate amounts of body fat can contribute to increased levels of cancer risk. Body fat is actually a functional organ that produces negative effects. It secretes hormones and specialized proteins that can increase oxidation and inflammation in the cells of your body. Both natural processes can contribute to development and progression of prostate cancer. In fact, the presence of inflammatory cells is found in all prostate cancer tissue. Diets rich in fruit and vegetables can protect against these inflammatory cells and help control weight by diluting the calorie density compared to highly refined foods^{3,9}.

Mark Dreher, PhD



Mark Dreher, PhD is President / Chief Science Officer at Nutrition Science Solutions, LLC, a strategic nutrition and clinical science consulting firm he founded in 2009. He has 30 years of food and nutrition experience in both the food and pharmaceutical industry. Mark was previously Vice President of Medical Research for POM Wonderful and Vice President of R&D for McNeil Nutritionals. He has a BS in Biochemistry from the University of California and a PhD in Agricultural Biochemistry and Nutrition from The University of Arizona. Mark has published numerous research papers and authored several technical books on Dietary Fiber and Health. He is a leading technical expert on polyphenol antioxidants and health.

Over the last several decades, the intake of added sugars to foods has gone up dramatically and contributed to the current global obesity epidemic. Sugar is also the main energy source for many cancers, such as prostate cancer. Normal cells can generally adapt to an environment low in sugar. However, cancer cells do not have the same ability to adapt to low sugar levels. Thus, it appears that the more excess sugar concentration in the blood the more potential there is for tumor stimulation.

Fresh or 100% authentic fruit and vegetable products contain natural types and levels of sugars and other compounds such as soluble fibers and phytochemicals that slow the absorption of sugar to a healthy rate. For example, the glycemic index (GI) research on 100% pomegranate juice (Wonderful variety) was determined to be a low GI at about ½ the rate of blood sugar increase compared to that of 100% glucose¹³.

Even modest changes in diet such as increased fruit and vegetable intake and exercise can change body composition enough to help reduce chronic disease risk such as prostate cancer development and progression.

The Scientific Evidence for Pomegranate Juice and Tomato Products

The best fruit and vegetables for prostate cancer protection appear to come from the “red and red-purple groups”. A review of the two most promising follows:

100% Pomegranate Juice (Wonderful Variety)

UCLA researchers observed that drinking an eight-ounce glass of 100% Wonderful variety pomegranate juice (equal to 2 fruit servings) daily increased the period during which PSA levels in men treated for prostate cancer remained stable¹⁴. The study involved 48 men who had undergone surgery or radiation but quickly experienced increases in prostate-specific antigen or PSA, a biomarker that indicates the presence of cancer. The researchers measured “doubling time,” how long it takes for PSA levels to double, a signal that the cancer is progressing. The patients experienced no side effects and none of the participants had cancers that metastasized during the study.

Stabilizing the doubling time is crucial in prostate cancer because patients who have short doubling times are more likely to die from their cancer. In this study, the average starting doubling time was about 15 months but at the end of 3 years of pomegranate juice intake there was observed increases in doubling times to 54 months, an almost four-fold increase. More than 80 percent of the study participants experienced improvement in doubling times. This is not a cure, but pomegranate juice may be able to slow prostate cancer growth.

The new results from the long-term continuation of the UCLA pomegranate prostate cancer research was presented at the 2009 Annual Scientific Meeting of the American Urological Association (AUA) ¹⁵. In the sixth year of treatment, participants continue to experience a significant increase in PSA doubling time following treatment, from a mean of 15 months at baseline to 60 months post-treatment, with a median PSA slope decrease of 60 percent, 0.06 to 0.024. Researchers compared active patients, who remain on the study, with non-active patients, who no longer remain on the study. They found that the doubling time prolongation was 51 months for inactive and 88 months for active participants or about a 70% improvement. Also, the decline in median PSA slope was greater in active patients when compared to non-active patients.

“This study suggests that pomegranate juice may effectively slow the progression of prostate cancer after un-

successful treatment,” said Christopher Amling, MD, an AUA spokesman. “This finding and other ongoing research might one day reveal that pomegranate juice is an effective prostate cancer preventative agent as well.” ¹⁶

Pomegranate juice contains ellagitannin polyphenols, natural antioxidant compounds, which also have anti-inflammatory effects. Pomegranate polyphenols are known to selectively concentrate in the prostate and block redox sensitive cell signaling pathways that might trigger excessive inflammatory responses ¹⁷. *In vitro* assays comparing pretreatment and post treatment patient serum on the growth of prostate cancer showed a 12% decrease in cell proliferation and a 17% increase in apoptosis ($P = 0.0048$ and 0.0004 , respectively), and significant ($P < 0.02$) reductions in oxidative state compared to before pomegranate juice consumption ⁽¹⁴⁾. Pomegranate juice has been shown not to impair the clearance of drugs via the cytochrome P450-3A pathway and has

the same drug interaction activity as water. ¹⁸

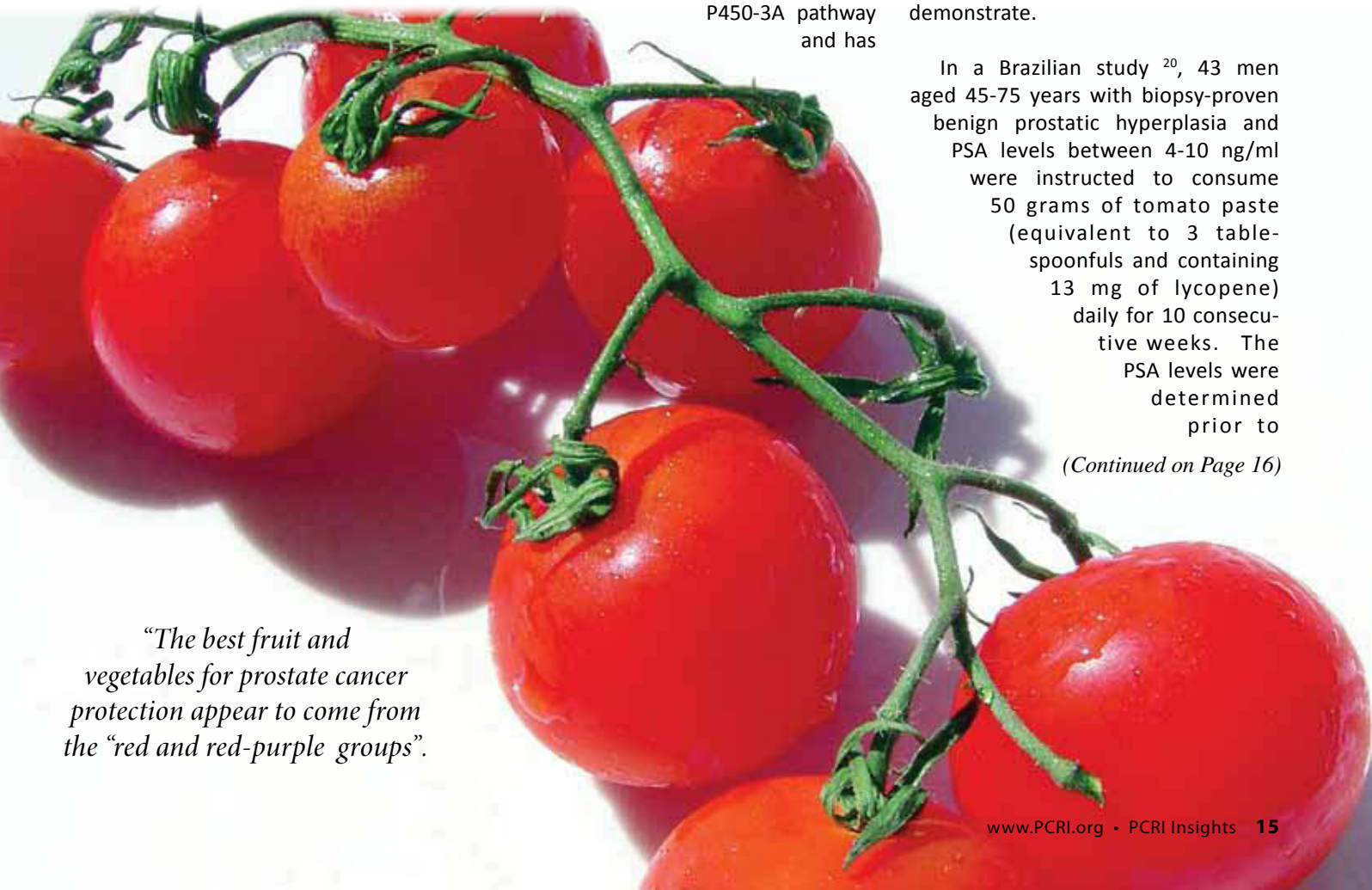
Tomato Products

There have been many population-based studies on tomato products and prostate cancer. An assessment of 21 observational studies of tomato, tomato product and lycopene intake was conducted to determine whether intake of tomato products reduces the risk of prostate cancer ¹⁹. The results show that tomato products play a role in the prevention of prostate cancer but the effect was modest and restricted to high amounts of tomato intake. Other observational studies conducted when prostate cancer was diagnosed at more advanced stages demonstrated that increased blood levels of lycopene and increased intake of tomato products were associated with a reduced risk of aggressive prostate cancer ⁸. However, with populations of prostate cancer patients in early stages, the risk reduction associations were harder to demonstrate.

In a Brazilian study ²⁰, 43 men aged 45-75 years with biopsy-proven benign prostatic hyperplasia and PSA levels between 4-10 ng/ml were instructed to consume 50 grams of tomato paste (equivalent to 3 table-spoonfuls and containing 13 mg of lycopene) daily for 10 consecutive weeks. The PSA levels were determined prior to

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the consumption of tomato paste (baseline) and at 4 and 10 weeks of consumption. The mean plasma PSA levels at 4 weeks were not significantly different from those at baseline ($p = 0.876$), but levels at 10 weeks were 11% less than baseline which was significantly lower ($p = 0.005$). In several other short-term studies in which tomato paste or lycopene supplements were given to men prior to prostatectomy⁸, lycopene was identified in the prostate tissue after surgery and there were reduced inflammation and cancer growth in prostate cells suggesting a benefit.

It is also clear from several studies that the benefits of lycopene are more readily available when absorbed from cooked tomato products and juices than from whole tomatoes⁸. More than 80% of the lycopene in the American diet comes from cooked tomato-based products such as pasta sauces, tomato soup, tomato juice and ketchup.

As with pomegranate juice, consumption of tomato products is not a cure but they may be able to slow prostate cancer growth.

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