



Health and Wellness: *Living with* Prostate Cancer

DIET & LIFESTYLE RECOMMENDATIONS



University of California
San Francisco



**HARVARD
T.H. CHAN**
SCHOOL OF PUBLIC HEALTH

A Special Acknowledgement

The Prostate Cancer Foundation (PCF) has always recognized that nutrition and a healthy lifestyle are integral aspects of the prostate cancer journey. Indeed, these have been of major interest to PCF's Founder and Chairman, Michael Milken and a distinguished member of the PCF Board of Directors, Shmuel Meitar for many years. Since 1993, PCF has been a pioneer in research on exercise and nutrition. The recommendations presented in the following guide may sound simple—for example, just 30 minutes of daily exercise may help prevent prostate cancer recurrence. But that's just it—simple changes make a profound difference in the lives of men with prostate cancer.

It is with deep gratitude that PCF applauds the tireless efforts and significant achievements of Michael Milken and Shmuel Meitar that improve survivorship for all men with prostate cancer diagnosed at any stage. The impact of PCF-funded research will lower the risk of prostate cancer for some men, prevent recurrence in others and prolong the lives of many.

PCF is very appreciative of the enormous leadership and scholarship of the authors.

SHARED AUTHORSHIP

Stacey A. Kenfield, ScD

Assistant Professor, Department of Urology
University of California, San Francisco
Visiting Scientist, Department of Epidemiology
Harvard T.H. Chan School of Public Health

Meir Stampfer, MD, DrPH

Professor of Epidemiology and Nutrition,
Harvard T.H. Chan School of Public Health
Professor of Medicine, Harvard Medical School
Physician and Associate Director, Channing Division of Network Medicine,
Department of Medicine, Brigham and Women's Hospital

Erin L. Van Blarigan, ScD

Assistant Professor, Departments of
Epidemiology & Biostatistics and Urology
University of California, San Francisco

Sam Peisch, BA

Research Assistant, Channing Division of Network Medicine,
Brigham and Women's Hospital/Harvard Medical School

June M. Chan, ScD

Professor, Departments of Epidemiology & Biostatistics and Urology
Christine Burd-Safeway Distinguished Professor, Urology
University of California, San Francisco

Introduction

Your health. Your fight. Our research.

Making mindful dietary and lifestyle decisions is an important part of your life as a prostate cancer survivor. Your everyday choices make you as vital to your care and treatment as any doctor or nurse. You may have been diagnosed with prostate cancer, but you are in charge of your life, adopting new healthy habits and enjoying each day to its fullest. By applying the latest findings in lifestyle, nutrition, and exercise, you can take concrete steps to improve your health.

You are not alone in your prostate cancer journey: 1 in 7 men in the United States (U.S.) will be diagnosed with the disease in his lifetime. It is the most common cancer among U.S. men (excluding non-melanoma skin cancer), and the 4th most common tumor diagnosed worldwide. With screening and advances in treatment, the vast majority of men diagnosed with prostate cancer will not die from it. This means that, if diagnosed early, you will likely live for years—if not decades—beyond your initial prostate cancer diagnosis.

Your primary goal as a prostate cancer survivor may be to live a cancer-free life, but a healthy diet and regular exercise are important steps toward preventing other diseases that commonly occur with aging, including heart disease and diabetes. For this reason, the major health and disease-prevention focus for men with prostate cancer, especially those diagnosed with treatable localized disease, is the same for men without prostate cancer.

In addition to the many benefits of adopting healthy behaviors, there is growing scientific evidence that suggests that diet and lifestyle practices may slow the growth and progression of prostate cancer. This guide focuses specifically on lifestyle factors for the prevention of prostate cancer progression.



WHAT IS PROSTATE CANCER PROGRESSION?

Prostate cancer progression includes disease recurrence after therapy (e.g., PSA rise after surgery or radiation therapy), tumor progression while on active surveillance, development of metastases, and death due to prostate cancer.

Prostate cancer is a highly variable disease, with both indolent and lethal sub-types. “Lethal” prostate cancer is defined as metastatic or fatal prostate cancer. While the prevention of biochemical recurrence is important, many men who experience PSA rise after therapy do not go on to develop metastatic or fatal prostate cancer. Our ultimate goal is to eliminate death due to prostate cancer; therefore the focus of this guide is on diet and lifestyle factors associated with lethal prostate cancer. When it is noted that a factor has been associated with “development of lethal prostate cancer,” this refers to studies completed in a population of initially healthy men, and the lifestyle exposure was reported prior to prostate cancer diagnosis.

Nutrition, Exercise, and Prostate Cancer: Your Best Self, Your Best Hope

This guide is primarily designed for men with prostate cancer. These diet and lifestyle recommendations provide guidelines for maintaining and improving your overall health, reducing the risk of prostate cancer progression, improving quality of life, and increasing longevity.

As a prostate cancer survivor, it is important to understand how everyday lifestyle and dietary choices can impact your treatment outcome. However, with all the information available, identifying concrete recommendations for nutrition, exercise, and lifestyle can be confusing and overwhelming. It can be difficult to determine how much is *too much*, *too little*, or *just enough* of any given food, nutrient, or behavior.

We have tried to simplify the available data by first offering our recommendation for each factor, and then providing a brief summary of the scientific evidence that is the basis for that recommendation.

In addition to summarizing the scientific evidence regarding well-established lifestyle risk factors for disease progression, this guide also mentions:

1. Factors that have gained popular attention **but lack sufficient data to base sensible recommendations**; AND
2. Factors that have been reported to influence initial prostate cancer development, recognizing that **these may not influence disease progression**

Throughout this guide you will see that each recommendation is assigned 1-4 stars to designate the strength of the current scientific evidence. The greater the number of stars for a lifestyle factor, the greater our confidence in this recommendation. Recommendations may change as new data emerge. Please check the PCF website (www.pcf.org) for updated guidance periodically.



Overview of Diet Recommendations to Lower Risk of Prostate Cancer Progression

See additional resources for information on general disease prevention at the end of this guide.

	Recommendation	Star Rating
	TOMATOES: Consume a variety of vegetables, including cooked tomatoes. Do not take a lycopene supplement.	★ ★
	CRUCIFEROUS VEGETABLES: Eat 1 serving (1/2 cup) of cruciferous vegetables on most days.	★ ★
	SOY: Limited available data does not suggest much impact of soy on prostate cancer progression.	★
	PROCESSED MEAT: Avoid processed meat.	★
	COFFEE: Current evidence is not strong enough to recommend taking up coffee drinking to lower risk of prostate cancer progression.	★
	FISH: Eat at least 2 servings of fish each week.	★ ★
	DIETARY FAT: Replace foods high in saturated fat with healthy sources of vegetable fats, such as olive oil and nuts.	★ ★
	POULTRY: Avoid processed poultry and remove skin on poultry <i>before</i> eating.	★
	EGGS: Egg consumption during adulthood may increase risk of <i>developing</i> aggressive prostate cancer. Avoid supplements with lecithin or phosphatidylcholine.	★
	CALCIUM/DAIRY: Get adequate calcium from low-fat dairy products, vegetables, and fortified whole-grain cereals or soy/nut milks. High fat dairy foods and single calcium supplements should be avoided.	★ ★
	TEA: Current evidence is insufficient to recommend taking up consumption of tea to lower risk of prostate cancer incidence or progression.	★
	SUPPLEMENTS: Apart from a regular multivitamin, the use of any single nutrient supplement is not recommended, unless specifically recommended by a physician.	★

SUMMARY OF DIETARY FACTORS AND RISK OF PROSTATE CANCER PROGRESSION

The following section includes several recommendations for diet and nutrition based on the most up-to-date clinical trials and long-term studies of men with prostate cancer.

Many of the recommendations listed below are based on data from the Health Professionals Follow-Up Study and the Cancer of the Prostate Strategic Urologic Research Endeavor (CaPSURE) Diet & Lifestyle Sub-study.



The Health Professionals Follow-Up Study (HPFS), started by Dr. Walter Willett and colleagues in 1986, is a long-term study of 51,529 men with the goal of evaluating nutritional and lifestyle factors in relation to cancer, heart disease, and other vascular diseases among men. The HPFS is sponsored by the Harvard School of Public Health and funded by the National Cancer Institute. Every two years, members of the study receive questionnaires about diseases and health-related topics like smoking, physical activity, and medications taken. Questionnaires querying detailed dietary information are administered every four years. To date, scientists working with data from the study have published more than 700 research articles. Over 7,500 men with prostate cancer are followed in a separate sub-study within the HPFS.

Launched in 1995 by Dr. Peter Carroll at the University of California, San Francisco (UCSF), the Cancer of the Prostate Strategic Urologic Research Endeavor (CaPSURE™) is a longitudinal, observational prostate cancer registry study of over 15,000 men with prostate cancer. Patients have enrolled at 44 community urology practices, academic medical centers, and Veterans Affairs hospitals in the U.S. Data are provided from physicians and participants. Between 2004-2006, participants were asked to provide detailed diet and lifestyle information, using a similar questionnaires utilized by HPFS. CaPSURE™ research findings published in over 179 peer-reviewed journal articles have expanded knowledge of prostate cancer progression risk factors, prognostic risk prediction, diagnostic trends, treatment patterns, outcomes, and quality of life. CaPSURE is led and managed at UCSF and has been supported historically by TAP Pharmaceuticals, an unrestricted educational grant from Abbott Laboratories, several U.S. federally-funded grants, and currently receives support from the U.S. Dept. of Defense Prostate Cancer Research Program.

Tomatoes

We recommend that men—with or without prostate cancer—consume a healthy diet rich in a variety of vegetables, including cooked tomatoes. It is not recommended that men take a separate lycopene supplement.

Tomatoes are rich in lycopene, which is one of the most well-studied antioxidants in the fight against prostate cancer. Recent research suggests that lycopene may inhibit prostate cancer growth and the development of metastases. Cooking tomatoes and consuming them with healthy fats (such as olive oil) increases the body's ability to absorb lycopene.



ANTIOXIDANT: A molecule that protects cells from the damage caused by free radicals. Free radicals may play a part in cancer, heart disease, stroke, and other diseases related to aging. Examples of antioxidants include lycopene, beta-carotene, and vitamins A, C, and E. “Antioxidant” reflects a chemical property—not all antioxidants enhance health.

LYCOPENE: An antioxidant nutrient found in high amounts in tomatoes, as well as certain other red fruits/vegetables (for example, watermelon).

Some studies of tomato products, such as tomato sauce, indicate that these foods are associated with a **reduced risk of developing aggressive prostate cancer**. A recent analysis revealed that men who consumed the most lycopene had nearly a 30% lower risk of developing lethal prostate cancer than men who consumed the least. This same study reported that lycopene intake from tomato products was associated with biological markers of good prognosis in prostate tumors such as large, regularly shaped blood vessels. This observation supports the idea that tomato products have an effect on the prostate and may reduce the risk of developing aggressive prostate cancer.

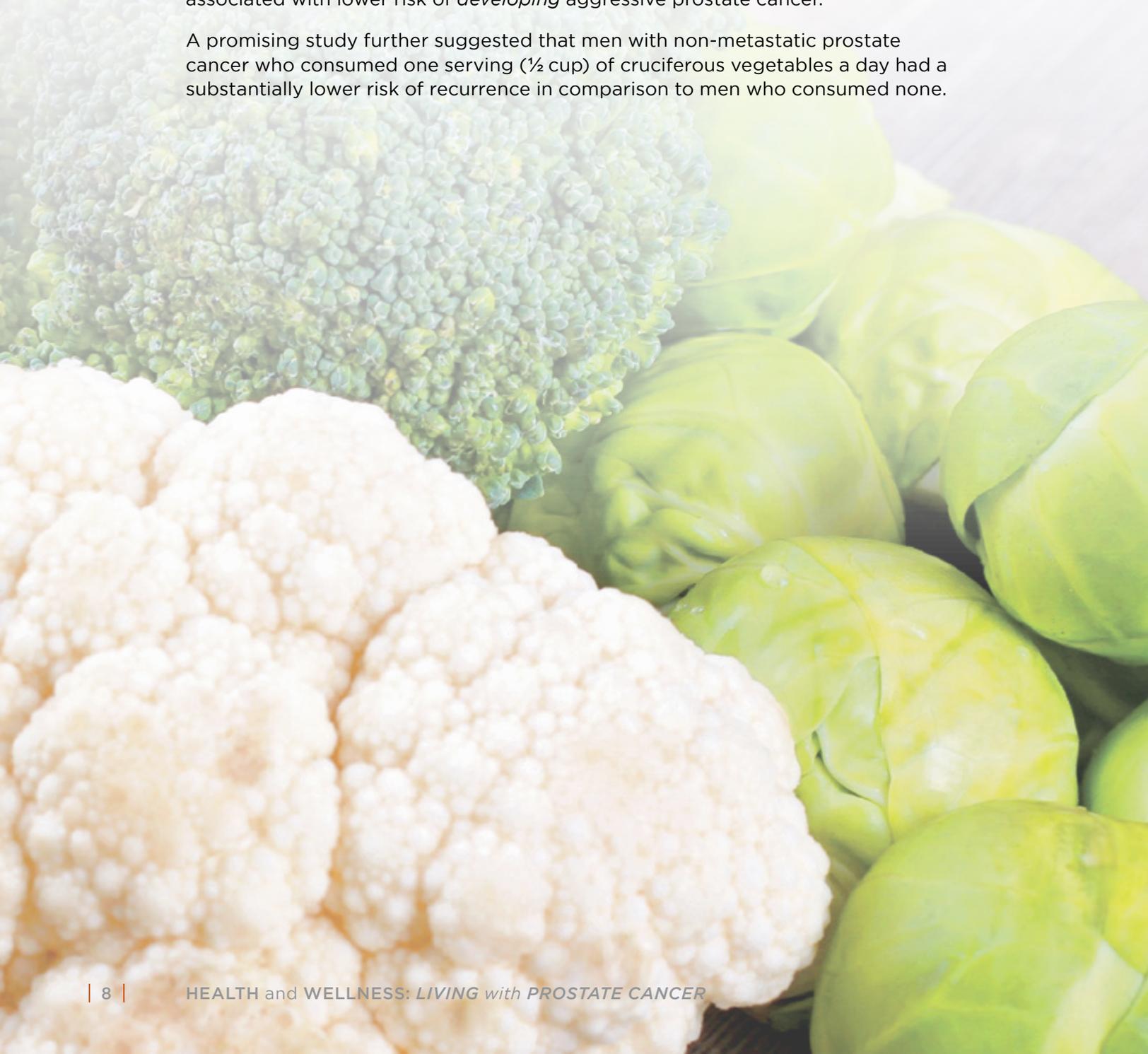
While a number of studies have linked cooked tomatoes and tomato-based products (such as tomato sauce) with a reduced risk of developing prostate cancer, it is not currently known whether these foods are specifically beneficial for men *after* they have been diagnosed with the disease. Fewer studies have examined *post*-diagnostic tomato intake in relation to prostate cancer progression. In the first study, 2 servings of tomato sauce per week *after* diagnosis was associated with a 20% lower risk of prostate cancer recurrence. However, no such association was found in a second study. Yet, tomatoes—along with other fruits and vegetables—are part of a healthy diet that is recommended for all men, with or without prostate cancer.

Cruciferous Vegetables

We recommend that men with prostate cancer eat 1 serving (½ cup) of cruciferous vegetables, such as broccoli, cauliflower, and cabbage, on most days.

Common cruciferous vegetables include broccoli, cauliflower, cabbage, Brussels sprouts, kale, mustard greens, chard greens, bok choy, and arugula. Cruciferous vegetables yield compounds that may detoxify carcinogens (cancer-causing agents), stop cancer cells from growing and dividing, and even cause cancer cell death. As with tomatoes, greater consumption of cruciferous vegetables is associated with lower risk of *developing* aggressive prostate cancer.

A promising study further suggested that men with non-metastatic prostate cancer who consumed one serving (½ cup) of cruciferous vegetables a day had a substantially lower risk of recurrence in comparison to men who consumed none.



Soy

Limited available data on soy does not suggest much impact on prostate cancer progression or death; however consuming soy instead of less healthful sources of protein, such as processed meat, may offer some overall health benefits (see next topic).

Laboratory studies have shown that compounds in soy called isoflavones inhibit prostate cancer cell growth, invasion, migration, and metastasis. Studies in Asian populations (with higher soy intake than Western populations) also tend to suggest that soy intake (e.g., tofu, soy milk, soy beans) is inversely associated with the risk of *developing* prostate cancer; and one study reported an inverse association between total legume intake and risk of advanced prostate cancer. In particular, there was a protective effect of soy intake specifically. However, there is little information on the relationship between soy consumption and the risk of *lethal* prostate cancer or prostate cancer progression. While additional research on soy is needed, the available data suggest that increasing soy intake will not affect the risk of prostate cancer progression.



ISOFLAVONES: Naturally occurring compounds often found in plants such as soybeans. In humans, they frequently act as phytoestrogens due to their structural and functional similarity to estradiol.

Processed Meat

We recommend that everyone choose skinless poultry, fish, legumes, and nuts as protein sources instead of processed meat.

Processed meat is a broad category that includes foods such as lunchmeats (salami, bologna, and turkey deli meat), sausage, bacon and hot dogs. Some studies have indicated a link between processed meat consumption and risk of advanced or lethal prostate cancer. Others, however, have reported no association. Nevertheless, there is substantial evidence that suggests regular eating of processed meat products increases the risk of chronic illnesses and death. While the exact mechanisms remain unclear, processed meats often contain preformed N-nitroso compounds, nitrites, nitrates, and added salt, which have cancer promoting properties.

Coffee

Drinking coffee is safe and may even improve overall health. However, current evidence is not strong enough to recommend that non-drinkers take up coffee to lower their risk of prostate cancer progression.

Several studies have reported that regular consumption of coffee *before diagnosis* is associated with a significant reduction in the risk of developing lethal prostate cancer. In fact, one study observed a 60% reduction in the risk of lethal prostate cancer among men who drank 6 or more cups of coffee per day versus men who drank the least amount of coffee. Interestingly, the results were similar for both regular and decaffeinated coffee. This association may be due to coffee's antioxidant effects, which may stave off tumor formation.

Unfortunately, data on coffee intake *post-diagnosis* are lacking, and more research is needed on its effect on prostate cancer progression. Nevertheless, coffee consumption is associated with lower risk of a number of illnesses, including gall bladder disease, diabetes, Parkinson's disease, and overall mortality. The main drawback to frequent coffee drinking is that consumption later in the day can impair sleep quality.

Fish

We recommend that all men—with or without prostate cancer—eat at least 2 servings of fish each week.

Several studies have examined fish intake in relation to risk of *developing* prostate cancer. Among healthy men, these studies suggest that men who regularly consume more fish have a lower risk of dying from prostate cancer. In one study, for example, men who ate 1 or more servings of dark meat or other fish per week were 30% less likely to die from prostate cancer. In addition, a combined analysis of 4 separate studies reported a 63% reduction in prostate cancer mortality in men with the highest levels of fish consumption. Other studies, however, have not identified an association between fish intake and the risk of advanced or aggressive prostate cancer. Nevertheless, when taken together, the data suggest that fish consumption—especially fish with high levels of omega-3 fatty acids (salmon, sardines, mackerel, and herring)—is beneficial for reducing the risk of clinically significant forms of prostate cancer.



OMEGA-3 FATTY ACIDS: Long-chain omega-3 fatty acids are a type of fat obtained in the diet, primarily from fatty fish. Also called n-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are long chains of n-3 fatty acids contained in fish and shellfish.

Fewer studies have examined *post*-diagnostic fish intake in relation to prostate cancer progression. In the first study, 2 servings of fish per week *after* diagnosis was associated with a 17% lower risk of prostate cancer recurrence. However, no such association was found in the second study. A clinical study among men scheduled for prostatectomy reported that taking fish oil 4-6 weeks *before* surgery inhibited prostate tumor growth. Among men on active surveillance, another study reported that EPA (a long-chain omega-3 fatty acid found in fish) measured in men's prostate tissue was associated with lower risk of prostate cancer progression, as well as a lower risk of dying from the disease.

Dietary Fats

Given the strong evidence that plant-based dietary fats lower the risk of cardiovascular disease and diabetes, we recommend that all men—with or without prostate cancer—replace foods high in saturated fat with healthy sources of vegetable fats, such as olive oil and nuts.

Studies consistently show that replacing saturated fat with unsaturated fat is beneficial for overall health. Additionally, several studies have reported that saturated fat intake is associated with an increased risk of *developing* advanced or lethal prostate cancer, while long-chain omega-3 fatty acids (found in fish such as salmon) are associated with lower risk. While the data on dietary fat *after* prostate cancer diagnosis are limited, they generally agree that consumption of fat from mammal origins (such as red meat or high-fat dairy) may increase the risk of dying from prostate cancer.

Additionally, one study reported that consuming high amounts of fat from vegetable sources *after* diagnosis of non-metastatic prostate cancer was associated with lower risk of *developing* lethal disease. Vegetable fats are primarily composed of unsaturated fats (monounsaturated or polyunsaturated fatty acids) and are liquid at room temperature. These fats are found in foods such as nuts, olives, and avocados.



Poultry

We recommend that men with prostate cancer avoid all processed meats, including poultry, and remove the skin on poultry before consumption. It is okay to cook the meat with the skin on, if desired.

Studies consistently report that the consumption of skinless poultry is not associated with risk of *developing* aggressive prostate cancer, and 2 studies reported that eating skinless poultry *after diagnosis* is not associated with a risk of prostate cancer progression. In contrast, men who reported consuming higher amounts of poultry *with skin* (about 3 servings/week) *after prostate cancer diagnosis* had more than twice the risk of recurrence in comparison to men who consumed less (0 servings/week). Similarly, higher consumption of poultry sandwiches (1½ or more servings per week) was associated with an increased risk of developing metastases or dying from prostate cancer. Importantly, researchers believe this observation was due to intake of processed luncheon meats made from poultry, and not sandwiches made with sliced pieces of whole skinless poultry. These associations may be related to intake of nitrates or nitrites (discussed under Processed Meat) or chemical compounds known as heterocyclic amines, which have been linked with cancer formation.



HETEROCYCLIC AMINES: Chemical compounds containing a ring with at least two different elements and a nitrogen-containing (amine) group. Heterocyclic amines have a variety of biological functions, most notably as carcinogenic compounds created from high temperature meat cooking.

In the U.S. diet, poultry is a common source of heterocyclic amines because chicken and turkey must be thoroughly cooked to be consumed safely.

Eggs

Egg consumption during adulthood may increase the risk of developing aggressive prostate cancer. We recommend that men avoid supplements with lecithin or phosphatidylcholine.

Greater egg consumption has been linked to increased risk of aggressive prostate cancer. In the Health Professionals Follow-Up Study, healthy men who consumed the most eggs (more than 2½ eggs per week) were nearly twice as likely to *develop* lethal prostate cancer when compared with men who ate fewer than ½ eggs per week. This same study also examined egg intake *after diagnosis* of non-metastatic prostate cancer, and found no association between egg consumption and risk of lethal prostate cancer.

One hypothesis for this association relates to the choline content of eggs. Choline is an essential micronutrient found in most foods, but is particularly concentrated in egg yolks. Choline has many important roles in the body, including the structure and function of cell membranes, methylation reactions, and neurotransmitter synthesis. However, one study found that high levels of choline intake were associated with an increased risk of *developing* lethal prostate cancer, and another reported that high levels of choline in the blood were associated with an increased risk of prostate cancer. This is an emerging area of study and further data are required to substantiate the observations about eggs and choline and risk of lethal prostate cancer.



LECITHIN: A general term that describes fatty substances comprised of phosphoric acid, choline, fatty acids, glycerol, glycolipids, triglycerides, and phospholipids. Lecithin is often found in soybeans, eggs, milk, and seeds and contains phosphatidylcholines.

PHOSPHATIDYLCHOLINES: Refers to a class of phospholipids that contain choline as a headgroup. Choline is an essential nutrient, as it serves as a precursor to acetylcholine which performs critical functions related to muscle movement and memory.

Dairy/Calcium

Men should get adequate calcium intake from healthy sources, including low-fat dairy products, vegetables, and fortified whole-grain cereals or soy/nut milks. High fat dairy foods and single calcium supplements should be avoided. The widely held belief that *extra* calcium builds strong bones is not true; adequate amounts of vitamin D, calcium, and exercise build and maintain strong bones.

Studies generally agree that high intakes of calcium (more than 1,000 mg per day) increase the risk of *developing* prostate cancer. Among men diagnosed with non-metastatic prostate cancer, the data suggest that consuming whole milk may increase the risk of disease progression or prostate cancer death. In contrast, consumption of *low-fat* dairy foods has not been consistently linked to adverse outcomes following a prostate cancer diagnosis.

It is important to keep in mind that all men—with or without prostate cancer—need to consume some calcium for general health, and should not exceed 1000 mg per day. For example, consuming 500-700 mg per day, versus consuming less (< 500 mg/day) of calcium is associated with a lower risk of *developing* colorectal cancer. One cup of skim milk has approximately 300 mg of calcium and one cup of yogurt has approximately 450 mg of calcium.



Tea

Current evidence is insufficient to recommend taking up consumption of tea to reduce risk of prostate cancer incidence or progression.

Several studies, conducted mostly in Asian populations, suggest that tea consumption may possibly be associated with a reduced risk of prostate cancer. However, a recent analysis combining data from several studies (a “meta-analysis”) found no overall association between tea consumption and prostate cancer. Another meta-analysis found green (but not black) tea consumption to be beneficial, but the findings were mainly from less reliable case-control studies. Small clinical trials of tea extracts have yielded promising initial results, but more work needs to be done *before* definitive recommendations can be made regarding tea.



Vitamins & Supplements

Apart from a regular multivitamin, the use of any single nutrient supplement is not recommended, unless specifically recommended by a physician.

It is generally accepted that the use of a regular multivitamin is safe and may be beneficial. One recent large randomized controlled trial demonstrated a modest (8%) reduction in overall cancer risk among men who regularly took a multivitamin supplement. However, there is currently no convincing evidence that supports the use of any single supplement for protection against prostate cancer—neither its initial development, nor its progression.

Simply because a product is “natural” does not mean it is safe, and some single nutrient supplements may be harmful. For example, selenium supplementation *after* prostate cancer diagnosis may actually *increase* the risk of dying from prostate cancer.

One potential exception is vitamin D. Vitamin D is produced in the body when the skin is exposed to sunlight. Many men are vitamin D deficient, especially older men, those with less sun exposure or who live in northern latitudes, and men with heavily pigmented skin. We do not recommend supplements for men with sufficient vitamin D. All men should consult with their physician *before* taking a vitamin D supplement.

LIFESTYLE FACTORS

In addition to nutrition, several other lifestyle factors may be associated with prostate cancer risk and progression. Factors of greatest relevance are listed below.

	Recommendation	Star Rating
	<p>EXERCISE: Exercise as much as you are able and aim for a vigorous intensity. If you walk for exercise, walk as briskly as you can (3+ miles per hour), and try to add bouts of jogging. Vigorous exercise requires close to maximal effort in which your heart beats rapidly and you are sweating. Such activity includes running, vigorous swimming, or fast bicycling. Aim for vigorous exercise for 30 minutes on most days if you are able.</p>	
	<p>BODY MASS INDEX (BMI)/BODY WEIGHT: Achieve and maintain a healthy weight through a nutritious diet and regular physical activity.</p>	
	<p>SMOKING: Do not smoke.</p>	
	<p>METFORMIN: For prostate cancer survivors who have diabetes and require medication, metformin may be worth considering in preference to other medications. Men with metabolic syndrome or pre-diabetes might also consider using metformin. Metformin use should only be initiated in consultation with your physician.</p>	
	<p>STATINS: It is not recommended that prostate cancer survivors begin taking statins solely to reduce risk of prostate cancer progression. However, statin use prescribed to lower cholesterol and cardiovascular risk could be appropriate for men with prostate cancer.</p>	
	<p>ASPIRIN: For most men over 60, the balance of risks and benefits favors regular aspirin use. However, the decision to take aspirin regularly should only be made in consultation with a physician, and should consider possible interactions with other medications.</p>	

Exercise

Men with prostate cancer should exercise as much as they are able. Exercising at a vigorous intensity, where you are able to speak only a few words at a time but not complete sentences, for 3 or more hours per week, may be needed to achieve the full benefit of exercise. However, brisk walking for 30 minutes on most days yields substantial benefits.

Mounting evidence suggests that physical activity—specifically vigorous activities that cause you to sweat and your heart rate to increase, such as jogging or bicycling—is associated with a reduced risk of lethal prostate cancer. In addition, engaging in vigorous aerobic exercise may reduce the risk of dying from prostate cancer. Among prostate cancer survivors in the Health Professionals Follow-Up Study, men who performed 3 or more hours per week of vigorous activity had a 61% lower risk of dying from prostate cancer compared to men who reported less than 1 hour of activity per week. Importantly, these findings were independent of clinical, demographic, and other lifestyle factors.

A second study conducted in CaPSURE™ found that men who walked 3 or more hours per week at a brisk pace (3 mph or faster) *after* diagnosis had a 57% lower risk of prostate cancer recurrence compared to men who walked fewer than 3 hours per week at an easy pace (slower than 2 mph).

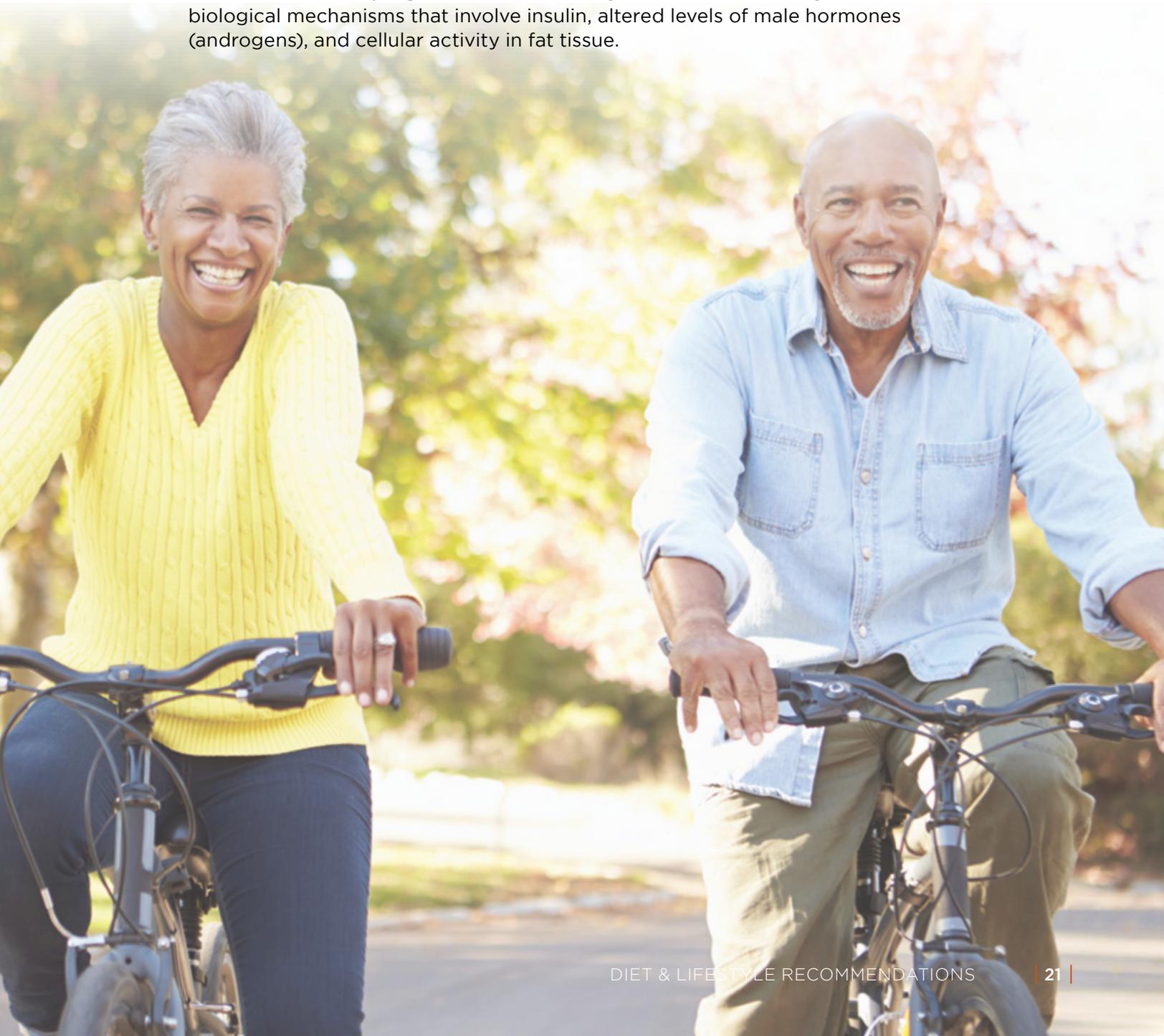
Many studies have demonstrated that exercise improves cardio-respiratory (heart-lung) function, muscle strength, fat and muscle mass, fatigue, anxiety, depression, and overall quality of life among prostate cancer survivors, particularly among men on hormonal therapy. Researchers hypothesize that exercise affects energy metabolism, inflammation, oxidative stress, immunity, and androgen signaling pathways; and is therefore beneficial for men with prostate cancer.



Body Mass Index (BMI)

We recommend that all men achieve and maintain a healthy weight through a nutritious diet and regular physical activity.

Body mass index is a measure of body fat calculated by dividing an individual's weight (in kilograms) by height (in meters squared). A BMI of 18.5-24.9 is considered a healthy weight, while a BMI of 25-29.9 is considered overweight, and a BMI of 30 or higher is considered obese. High BMI is associated with increased risk of *developing* lethal prostate cancer, and increasing evidence suggests that obesity (either *before* or *at the time of diagnosis*) is associated with prostate cancer recurrence, progression and mortality. This association may be due to biological mechanisms that involve insulin, altered levels of male hormones (androgens), and cellular activity in fat tissue.



Smoking

Quitting smoking may reduce the risk of dying from prostate cancer, and reduces the risk of dying from any cause. The health benefits from quitting begin on the first day after smoking cessation.

Cigarette smoking accounts for nearly 1 in 5 deaths (approximately 443,000 deaths) in the U.S. each year. Smoking is associated with an increased risk of nearly all chronic diseases, including coronary heart disease, stroke, respiratory diseases, and cancer. Recent evidence further suggests that smoking is associated with more aggressive prostate cancer *at the time of diagnosis*. Furthermore, smokers have a higher risk of prostate cancer progression, including recurrence and metastasis, as well as an increased likelihood of death. Importantly, when compared to current smokers, men who quit smoking more than 10 years ago had prostate cancer mortality risk similar to those who had never smoked.



Metformin

For prostate cancer survivors who have diabetes, and require medication, metformin would be worth considering in preference to other medications. Men with metabolic syndrome or pre-diabetes might also consider using metformin. Metformin use should only be initiated in consultation with your physician.

Metformin is an FDA-approved drug that is widely used for the treatment of type 2 diabetes. Growing evidence suggests that metformin may reduce the risk of prostate cancer recurrence. Although metformin can cause side effects, it is generally safe and could potentially be used in low doses, even by men without diabetes. There is currently an urgent need for a large randomized controlled trial to test whether or not metformin can reduce prostate cancer progression. In the absence of these data, routine use of metformin is not recommended for men with prostate cancer who do not have diabetes. Any use of metformin should be done only with a doctor's supervision.



Statins

We do not recommend that prostate cancer survivors begin taking statins solely to reduce the risk of prostate cancer progression. However, statin use prescribed to lower cholesterol and cardiovascular risk could be appropriate for men with prostate cancer.

Emerging evidence suggests statins (cholesterol lowering medications) *prior to diagnosis* may lower risk of prostate cancer mortality. Studies have shown that men who have been taking statins for a significant duration (5 or more years) have a lower risk of *developing* advanced or lethal prostate cancer. However, current data do not provide any strong support for a benefit of statins on prostate cancer progression if initiated *after diagnosis*.



Aspirin

For most men over 60, the balance of risks and benefits favors regular aspirin use. However, the decision to take aspirin regularly should only be made in consultation with a physician, and should consider possible interactions with other medications.

Substantial data suggest—but do not prove—that regular use of aspirin may lower the risk of lethal prostate cancer. Researchers hypothesize that aspirin inhibits the spread of metastatic cells through its anti-coagulation effects. The evidence is strongest for use *before diagnosis*, though some studies indicate that *post-diagnosis* use is associated with a lower risk of disease progression.

It should be noted that aspirin has a wide range of health effects, both adverse and beneficial. In particular, aspirin increases the risk of gastrointestinal bleeds, some of which can be severe. Enteric-coated aspirin does not substantially reduce this risk, and lower doses carry only somewhat smaller risk. It is also currently unclear what dose of aspirin might best reduce the risk of prostate cancer progression. In sum, the balance of risk and benefit for aspirin will vary among men.



CONCLUSIONS

The goal of this guide is to provide a brief summary of specific diet and lifestyle practices that may reduce the risk of prostate cancer progression. Since most men diagnosed with prostate cancer will live for many years after diagnosis, it is important to maintain a broad perspective on health and disease prevention.

Making the commitment to change long-held behaviors is no easy feat, but it is your first step towards living a full and healthy life as a prostate cancer survivor. When it comes to healthy behaviors, you probably have an idea of what you “should” do, but bad habits are hard to break, and making lasting changes can be even more difficult. However, effective change is possible, and by modifying your behaviors gradually, you will achieve success in the long term. Remember, any decisions regarding changes in supplements or medication should be made in consultation with your physician.

Further Reading

For additional information, we recommend the book by Dr. Walter Willett, *Eat, Drink and be Healthy*. For detailed and updated information on diet and health, we recommend the Nutrition Source website (www.hsph.harvard.edu/nutritionsource/), maintained by the Department of Nutrition, Harvard T.H. Chan School of Public Health. This site provides up-to-date nutrition news, recommendations and further reading. All of the studies cited in this guide and details on the star rating system can be found on the PCF website.

While much remains to be learned, applying the current knowledge as outlined in this guide will help you reduce the burden of prostate cancer and live your best life following a prostate cancer diagnosis.

How You Can Help

Volunteer: We strongly encourage participation in randomized controlled trials and other research studies whenever the opportunity arises. Our knowledge is based on participation in research projects by men with, or at risk for, prostate cancer. More research is urgently needed to further advance our knowledge.

Advocate: Federal support for biomedical research has declined dramatically in recent years. With enhancements in technology, we are well positioned to make further advances in the field of prostate cancer research if funding support can be secured. In contrast to drug development, there is little financial incentive for private companies to support research on diet and lifestyle, so we must advocate for federal funding.

Get Educated: One of the best ways to support the fight against prostate cancer is to become educated about the disease and raise awareness among your friends, family and community. To learn more, visit www.pcf.org.



The Prostate Cancer Foundation (PCF) is the world's leading philanthropic organization funding and accelerating prostate cancer research. Founded in 1993, PCF has raised over \$615 million and has provided funding to more than 2,000 research programs at nearly 200 universities and university cancer centers in 19 countries. PCF advocates for greater awareness of prostate cancer and faster, more innovative investments in transformational cancer research.

Survival rates for prostate cancer have steadily increased in recent decades. For all stages of prostate cancer combined, the 5-year survival rates are now almost 100%. PCF is a force of hope for men and their families around the world who are currently facing this disease.

Mission Statement:

PCF's mission is to accelerate the world's most promising prostate cancer research for better treatments and cures.

There are several risk factors for prostate cancer, including family history, age, and race. Know your risks for prostate cancer and talk to your doctor about early detection and screening.



PROSTATE CANCER
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1250 Fourth Street, Santa Monica, CA 90401 | Tel 800.757.CURE (2873) Fax 310.570.4701 | www.pcf.org