



# Nutrition, Exercise and Prostate Cancer



## Authors

### **David Heber, MD, PhD**

Professor of Medicine and Public Health  
Director of the UCLA Center for Human Nutrition  
University of California, Los Angeles

### **Stephen J. Freedland, MD**

Associate Professor of Urology  
Duke University Medical Center

### **Lee W. Jones, PhD**

Associate Professor, Department of Surgery  
Duke University Medical Center

### **William G. Nelson, MD, PhD**

Marion I. Knott Director and Professor of Oncology  
Director, The Sidney Kimmel Comprehensive Cancer Center  
Johns Hopkins School of Medicine





## Prostate Cancer Foundation

The Prostate Cancer Foundation (PCF) was founded in 1993 to find better treatments and a cure for recurrent prostate cancer. Through its unique model for soliciting and selecting promising research programs and rapid deployment of resources, the PCF has funded more than 1,500 programs at nearly 200 research centers in 20 countries around the world.

As the world's leading philanthropic organization for funding prostate-cancer research, the PCF is now a foundation without borders. Its advocacy for increased government and private support of prostate cancer programs has helped build a global research enterprise of nearly \$10 billion.

Today, 40 percent fewer men are dying from prostate cancer compared to what was once projected. The PCF is a force of **HOPE** for more than 16 million men and their families around the world who are currently facing the disease.

Studies have shown that lifestyle — especially nutrition and exercise — has a significant influence in prostate cancer prevention and treatment. This guide presents the latest information for men who want to maintain a lifestyle that promotes prostate health.

# Nutrition, Exercise and Prostate Cancer



## Table of Contents

<b>2</b>	<b>Introduction</b>
<b>3</b>	<b>Understanding the Links Between Nutrition, Exercise, and Prostate Cancer</b>
3	Effects of Oxidation and Inflammation
4	The Contribution of Carcinogens
5	Effects of Excess Sugar
6	Putting It All Together
<b>8</b>	<b>Obesity and Metabolism — Where We Went Wrong</b>
9	The Metabolic Syndrome
9	Effects of Excess Body Fat
10	Effects of Muscle Loss
<b>11</b>	<b>Nutrition at the Molecular Level</b>
12	The Contribution of Antioxidants and Phytochemicals
12	The Color System of Antioxidants
<b>15</b>	<b>The Delicate Balancing Act of Supplement Use</b>
15	Avoiding Toxicity and Overdosing
16	Making the Smart Choice
<b>18</b>	<b>Implementing a Plan for Success</b>
18	Building Strong Muscles
19	Restoring a Healthful Caloric Balance
<b>20</b>	<b>Incorporating Good Nutrition and Exercise Into Your Everyday Routine</b>
20	Reviewing the Benefits Stage by Stage
20	Adopting a Healthy Approach
<b>23</b>	<b>A Commitment to Change</b>
23	The Decision to Change
<b>25</b>	<b>The Four S's of Success</b>
<b>27</b>	<b>Suggested Reading</b>



## Introduction

**T**reatment options for prostate cancer are more effective than ever before. Yet, for many men, the diagnosis and treatment of cancer brings to their attention the need to change their diet and exercise behaviors. While the primary focus of the prostate cancer survivor is to live a life free of cancer, more men are beginning to realize that a healthy diet and regular exercise can be an important step toward preventing other diseases that commonly occur with aging, including heart disease and diabetes. Exciting new data suggest that this same approach may also slow prostate cancer growth. This guide takes the best published evidence from population studies, basic science, and limited human studies, and puts them together in ways that make practical sense — with the overall goal of helping you achieve “thrivership” not just survivorship.

What is thrivership? The Merriam-Webster dictionary defines *thrive* as one who progresses toward a goal despite circumstances, and flourishes. The diagnosis of prostate cancer can lead you in one of two directions. Some will react to this diagnosis with a sense of resignation and fatalism. This view can lead to helplessness — waiting for the other shoe of cancer recurrence or progression to drop. On the other hand, thrivership puts you in the

driver’s seat — making you as vital to your care and treatment as any doctor or nurse. You may have had prostate cancer, but now you are in charge of your life, adopting new healthy habits and enjoying each day to its fullest. As a prostate cancer thriver, you can use the latest knowledge about nutrition and exercise to improve your overall health and quality of life. Your diagnosis of prostate cancer can be the beginning of a healthier lifestyle.

*As a prostate cancer thriver, you can use the latest knowledge about nutrition and exercise to improve your overall health and quality of life*

A working group of the leading experts and scholars in nutrition, exercise, and prostate cancer were gathered from across the United States and asked to provide their advice to us in developing this guide. It is our hope that you will benefit from the recommendations in this guide for a healthy diet and regular exercise, and that you will achieve a better understanding of the roles of diet and exercise in the prevention of age-related diseases, as well as in the recurrence and progression of prostate cancer.



## Understanding the Links Between Nutrition, Exercise, and Prostate Cancer

**O**ur modern society is characterized by a lifestyle with low levels of exercise coupled with consumption of foods that are high in calories, fat, sugar, and salt. But your body still responds in the only way it knows — it stores excess food as fat to prepare for times of prolonged starvation. Of course, because prolonged starvation typically does not happen in modern society, this safety mechanism means that we just continue to gain weight and store more fat.

This excess fat, especially the fat around the middle of your body, has been associated with an increased risk of many diseases, including prostate cancer, and particularly aggressive prostate cancer. But you don't have to be 50 pounds overweight to suffer the ill effects of excess body fat. Body fat is actually an organ with functions. It secretes hormones and specialized proteins that can increase inflammation and oxidation in the cells of your body — two natural processes that are strong contributors to the development and progression of prostate cancer.

### Effects of Oxidation and Inflammation

Oxygen is essential to life, but the chemistry of oxygen and oxidation drives cancer development. Oxidation is a normal chemical reaction that occurs when *free radicals* form within the cells of the prostate. Each oxygen atom contains two electrons that cling together. When heat or light breaks apart the atom, the electrons are separated, leaving unpaired oxygen radicals. These radicals are free to roam around and initiate a process of breaking down normal cellular structures, causing damage

and promoting the development of cancer. The more free radicals present, the more cancer-causing damage occurs.

This process is similar to what happens during the browning of an apple after it is sliced open and the flesh of the apple is exposed to the oxygen in the air. The oxygen atoms in the air interact with the sugar in the apple, forming oxygen radicals. These radicals break down the flesh of the apple, or oxidize it, and the apple begins to rot.

As long as the outer peel of the apple protects the inner flesh from oxygen, it is not oxidized. But when protective “antioxidants” are removed, the damage from oxidation is allowed to occur unimpeded. Likewise, our bodies have many sophisticated defenses against oxidation. But when these defenses break down, cancerous cells form and are allowed to grow.

One of the most common causes of the loss of protective antioxidants is inflammation, a biochemical process that your body initiates when fighting off an infection. If the body senses invaders, such as bacteria, white blood cells are mobilized to go to the site of the invasion and to release oxygen and nitrogen radicals to help kill the invaders. Unfortunately, if they remain unchecked, these same oxygen radicals can also break down normal tissue and promote the development of cancer. Oxygen radicals damage normal DNA, causing errors that allow cancer growth.

In fact, investigators have noted the presence of inflammatory cells in virtually all prostate cancer

tissue that is removed surgically, and have found that inflammation leads to the atrophy, or wasting away, of normal prostate tissue adjacent to precancerous and cancerous areas of prostate tissue.

Based on these and other observations, evidence is mounting that inflammation and oxidation play key roles in the development of prostate cancer. Why is this important? Because although other contributory factors such as aging and altered hormone secretions are difficult or impossible to change, nutritional and exercise habits that reduce the development of inflammation and oxidation can be changed.

*Although some factors that contribute to prostate cancer are difficult or impossible to change, nutritional and exercise habits that reduce inflammation and oxidation can be changed*

There are many anti-inflammatory and antioxidant substances found in colorful fruits and vegetables, whole grains, and spices — nearly all of which are absent from the processed foods that rely on sugar, salt, and fat for flavor. By focusing your diet on fresh fruits and vegetables, ocean-caught fish, and whole grains, you can increase the protective anti-inflammatory components of your diet and begin to benefit from their effects.

For example, tomato-based products such as soups, pasta, and juices can increase levels of the antioxidant lycopene in the prostate gland. Drinking beverages such as pomegranate juice and green and black tea can increase levels of antioxidant-containing polyphenols. The cruciferous vegetables such as broccoli, Brussels sprouts, bok choy, wasabi mustard, and horseradish all contain substances that may induce protective proteins in your liver and tissues, while vitamins, minerals, extracts of fruits

and vegetables, herbs, and spices can all act against both oxidation and inflammation.

Finally, recent research has suggested that regular exercise may be one of the best natural antioxidants. Regular exercise causes many changes in your body that help reduce circulating levels of reactive oxygen inflammation. Beyond burning calories, endurance-type exercises, such as walking, running, cycling, and swimming, are particularly effective at increasing the body's natural levels of antioxidants, eliminating inflammatory molecules that drive cancer.

*Endurance-type exercises, such as walking, running, cycling, and swimming, are particularly effective at increasing the body's natural levels of antioxidants*

### The Contribution of Carcinogens

Inflammation and oxidation are two of the body's natural processes, which, when they are allowed to proceed unchecked, can influence the development of prostate cancer. But external substances also play an important role — and can also be thwarted by keeping to a healthy diet.

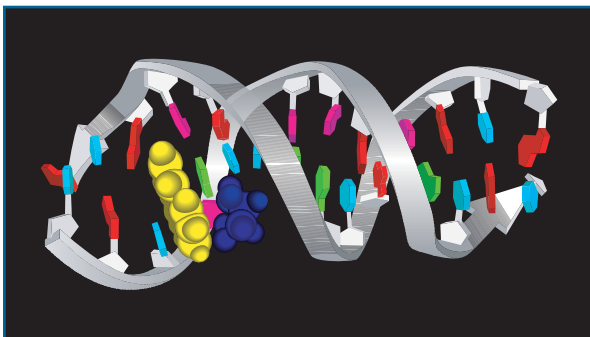
A carcinogen is a chemical that directly or indirectly causes or leads to more aggressive forms of cancer. Hundreds of chemicals have been definitively linked to cellular changes that lead to cancer development, and hundreds more have been implicated in processes that might be involved. In today's industrial society, it's hard to avoid all exposure to carcinogens. But by focusing on a healthy diet and on healthy eating practices, you can avoid increasing your exposure to carcinogens that contribute to the development of prostate cancer.

For example, overcooking of any type of meat at very high temperatures produces a set of

carcinogens called heterocyclic amines, one of which, known as PhIP, has been shown to cause prostate cancer in animal studies. In addition, charbroiling red meat or chicken, with its skin intact, produces yet another set of carcinogens, called polycyclic aromatic hydrocarbons.

The deleterious effects of these two carcinogens are well known — when tobacco leaves are burned in cigarettes, heterocyclic amines and polycyclic aromatic hydrocarbons are produced and inhaled, playing a role in the development of lung cancer. Remarkably, by eating overcooked and charbroiled meats, the average American consumes the same amount of carcinogens (as PhIPs) as are inhaled in a pack-and-a-half of cigarettes a day.

Laboratory research findings have suggested that intake of these charred meat carcinogens triggers mutations in prostate cell DNA and leads to a chronic inflammatory response in the prostate. This combination of mutations and inflammation appear to be a key to the development of prostate cancer.



**PhIP (depicted in yellow and dark blue) has the same DNA mutational capacity as cigarette smoke but the carcinogen accumulates only in the prostate. This finding has triggered major new studies on the healthiest way to cook meats in order to protect the prostate from accumulating carcinogens over a lifetime.**

Switching to alternate sources of protein that are not prone to forming carcinogens when cooked, such as soy, is an important first step in minimizing the damage caused by overcooking and

charbroiling meats. Also, using alternate methods to cook meat can significantly cut down on the amount of carcinogens produced: choose steaming or baking over charbroiling or pan-frying, marinate the meat, and turn the meat frequently to prevent overcooking. Finally, increase your consumption of cruciferous vegetables, which have unique properties that enable them to help “sponge up” carcinogens and possibly even counteract some of the damage caused by these carcinogens.

### Effects of Excess Sugar

Over the last 20 years, as intake of sugars from processed foods has gone up, obesity rates have skyrocketed, leading many researchers to implicate excess sugar in the current obesity epidemic. In fact, recent work suggests that high-fructose corn syrup — a form of sugar frequently found in processed foods such as soft drinks — is converted to fat much more quickly than is naturally occurring glucose.

Yet, the negative effects of excess sugar begin even before it is stored as fat. Sugar is a prime energy source for many cancers, including prostate cancer. Most normal cells can adapt to an environment low in sugar and use other energy sources — a process developed through evolution when people would go through periods of starvation. However, cancer, which grows faster than normal cells, does not have the same ability to adapt to low sugar environments. Thus, the more excess sugar consumed, the more the tumor is stimulated. Indeed, several animal studies suggest that cutting simple sugar intake can slow prostate cancer growth.

Excess sugar intake is further linked to prostate cancer growth through its interactions with insulin. Upon consumption of sugar, the body produces insulin, which helps to break down the

sugar, ensuring that the sugar is stored as needed. When too much sugar is consumed and the body constantly produces high levels of insulin to help process it, the cells can become immune to the effects of insulin, resulting in too-high levels of sugar in the blood — a common sign of metabolic syndrome and a strong risk factor for diabetes. In addition, high insulin levels have been linked to an increased risk of diabetes, heart disease, and prostate cancer growth, independent of its interaction with sugar.

Putting this evidence together, research is beginning to suggest that the more processed sugars you eat, the higher your insulin levels, and the more likely it is that your prostate cancer will grow.

*Research is beginning to suggest that the more simple sugars you eat, the higher your insulin levels, and the more likely it is that your prostate cancer will grow*

Yet, cutting back on sugar intake is only one important step. Studies of animals with prostate cancer have shown that restricting overall caloric intake can slow advancement of their disease. Maintaining a healthy diet and engaging in a regular exercise regimen will not only help you achieve and maintain your goal weight, it might also help slow the growth of cancer. Working with a qualified nutritional counselor will help

you identify “good” and “bad” foods, while working with a qualified exercise physiologist will help you develop an exercise regimen to keep you fit.

### Putting It All Together

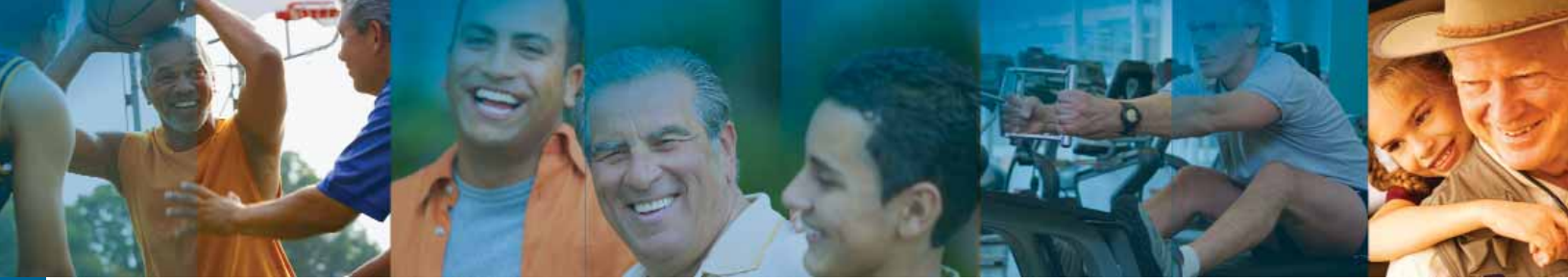
The modern diet and sedentary lifestyle can lead to an accumulation of body fat, which, in turn, can contribute to the development of inflammation and raise insulin levels. At the same time, a high-calorie, high-sugar, pro-inflammatory diet can promote age-related chronic diseases and may prove an important link between nutrition and prostate cancer development and progression. Even modest changes in body fat composition through changes in diet choices and regular exercise can be beneficial — a 5% weight loss has been shown to decrease markers of inflammation by 30% in obese diabetic patients and to reduce insulin levels by 20% in non-diabetic people.

While excess weight has been associated with more severe and rapidly progressive prostate cancer, up to 60% of men at normal body weight and with an average-sized waist carry excess body fat around their abdomens. Focusing on a diet that is rich in antioxidants, low in pro-inflammatory and carcinogenic substances, and low in simple sugars — coupled with a regular exercise regimen — can make an important difference in improving the overall health of every prostate cancer *thrivers*.



**Key Points to Remember**

- 1** Oxidation and inflammation play important roles in the development of prostate cancer
- 2** Anti-inflammatory and antioxidant substances found in colorful fruits and vegetables can counteract the damage caused by oxidation and inflammation
- 3** Carcinogens from charred meat can trigger chronic inflammation in the prostate
- 4** Using alternate methods to cook meat and increasing cruciferous vegetables can minimize intake of and damage from carcinogens
- 5** Sugar is a primary energy source for cancer and stimulates production of insulin, which is linked to an increased risk of diabetes, heart disease, and prostate cancer
- 6** Cutting back on sugar intake, maintaining a healthy diet, and engaging in a regular exercise regimen can help slow the growth of cancer



## Obesity and Metabolism — Where We Went Wrong

**T**he human genome dates back more than 50,000 years, to a time when man was a “hunter-gatherer,” consumed a diet consisting of about 90% plant-derived foods, and engaged in constant physical activity to survive. In the modern, post-industrial era, our level of physical activity is dramatically reduced and our diet has increasingly shifted toward a meat-based diet: the average adult in the United States consumes close to 200 pounds of meat, poultry, and fish per year, an increase of 50 pounds per person from 50 years ago. Compared with plant-based protein sources, animal-based protein sources are higher in saturated fat, lower in fiber, and poorer in micronutrients, especially antioxidants.

More than 50% of adults in the United States do not eat a single piece of fruit per day and more than 80% do not meet the recommended intake of five servings of fruits and vegetables per day. In fact, if one eliminates potatoes (and French fries), the average American eats fewer than two servings of fruits and vegetables per day. At the same time, only about 20% of American adults meet the minimum exercise guidelines of at least 30 minutes per day, three times per week.

*More than 80% of adults do not eat the recommended five servings of fruits and vegetables per day; eliminating potatoes (and French fries), the average American eats fewer than two servings of fruits and vegetables per day*

The modern Western diet has virtually eliminated malnutrition in the majority of the population. However, many of the food choices for individuals of limited means, or for those uneducated in the relationship between food and health, are of poor nutritional value and are lacking key vitamins and minerals. In fact, the least expensive foods available today provide fewer nutrients per calorie than do the more expensive foods.

Thus, in the process of solving the problem of malnutrition through industrialization, we’ve created a low-cost food supply that promotes a global epidemic of obesity. In addition, the largely sedentary lifestyle indicative of an “advanced” society effectively means that we now have to pay for exercise — with money, time, or both — because exercise in the form of hard physical work, as part of daily living, is scarce.

Multiple studies in the past decade have shown an increased incidence of obesity, chronic diseases of aging, heart disease, and cancer in populations eating a Western diet and having a sedentary lifestyle, versus populations that are physically active and eat fewer calories, less refined carbohydrates, less meat, and more fruits, vegetables, cereals, and whole grains. To understand why this lifestyle shift would have such a profound effect on human health, investigators have begun to look more closely at the true effects of the metabolic syndrome and its co-conspirators, excess body fat and muscle loss, on the human body.

## The Metabolic Syndrome

For many years, doctors noticed that overweight or obese patients often had the following common diseases — high blood pressure or hypertension, increased blood sugar or diabetes, and high levels of blood fats, specifically triglycerides. In addition, these patients were at greater risk of developing insulin resistance and type 2 diabetes.

Because these different conditions are so common, their coexistence seemed to be a simple coincidence — after all, common diseases occur commonly. However, in the last two decades, the coexistence of these conditions, collectively known as metabolic syndrome, has been found to have a very specific underlying cause — increased abdominal fat and insulin resistance.

Metabolic syndrome affects up to 50% of Americans between the ages of 45 and 65. Since an estimated 65% of adults in the US are overweight or obese, it is not surprising that metabolic syndrome and the detrimental effects of its component chronic diseases is so common.

## Effects of Excess Body Fat

Obesity is the result of an imbalance of food intake and exercise. When you eat more and exercise less, fat accumulates in the body. The first place that fat accumulates in men is in the middle of the body around the belly and abdomen.

Belly fat is specially evolved to store fat quickly and release it quickly. Thus, this is the first place the fat settles when you gain weight and the first place it leaves when you lose weight. Since this fat grows so quickly, it can sometimes outgrow its blood supply, causing the fat cells to die. When this happens, the body's immune system sends out scavenger white blood cells to clean up the

debris — which, as we described earlier, sets off a cascade of inflammatory and oxidative events that can ultimately promote heart disease, diabetes, and certain types of cancer, including prostate cancer.

But the effects of belly fat on prostate cancer growth are not limited to its impact on inflammation. Hormones produced by belly fat affect the ability of cells to properly take up insulin. In turn, this resistance to insulin results in the overproduction of insulin and insulin-like growth factor (IGF), both of which are potent stimulants for prostate cancer growth. When applied to human prostate cells in the laboratory, IGF prevents prostate cancer cells from dying and helps them grow. At the same time, the release of special proteins that “sponge up” and reduce the levels of IGF is decreased, thereby exacerbating the effects of the increased circulating IGF. Of note, one of these special binding proteins (IGF binding protein-3) has been shown to directly stimulate prostate cancer cell death — compounding the effects of the loss of IGF binding proteins resulting from insulin resistance and excess belly fat.

*Hormones produced by belly fat lead to an overproduction of insulin and insulin-like growth factor, both of which are potent stimulants for prostate cancer growth*

Beyond the effects of the excess body fat, the consequences of caloric imbalance that leads to fat accumulation can be significant. Cancer cells grow faster than do normal cells and require excess energy for their growth. Thus, excess calories — above your body's need — will help feed tumor growth.

Also, rapidly growing tumors live on the edge of survival due to a lack of an adequate blood supply and low levels of oxygen. Without oxygen, the cells can't break down fat but instead rely on sugars and carbohydrates for energy. Thus, the higher your sugar intake, the more nutrients you are providing to the tumor.

In animal studies, cutting down on carbohydrate intake has been shown to dramatically slow tumor growth. In human studies, cutting down on carbohydrate intake has been shown to be one of the best ways to lose weight, which, in turn, has dramatic health benefits and can slow tumor growth.

Despite some very promising research, the degree to which cutting all carbohydrates is helpful in the long run remains unknown. But what is not disputed is that eating simple sugars has no real benefit, promotes obesity and possibly tumor growth, and should be avoided.

### Effects of Muscle Loss

Muscle plays a number of roles in maintaining health. Not only are muscles critical to posture, balance, and movement, but they maintain healthy bones by putting a physical stress across the bones. Hormonal therapies often used in men with advancing prostate cancer can have a detrimental effect on muscle, leading to muscle atrophy or wasting. Thus, with muscle loss from aging, inactivity, and hormonal therapies, the bones become more brittle and the loss of balance can lead to bone fractures.

In addition, the loss of muscle can undermine a potential mechanism to alleviate insulin resistance. The uptake of sugars into the muscle can occur via a process that is independent of insulin. Therefore, in men with metabolic syndrome, the loss of muscle mass precludes their ability to effectively control blood sugar control and overcome insulin resistance through exercise.

#### Key Points to Remember

- 1 Excess fat promotes insulin resistance, which reduces levels of IGF binding proteins that stimulate prostate cancer cell death
- 2 Cutting carbohydrate intake can cut down on excess fat and weight and slow tumor growth
- 3 Muscle loss due to aging, inactivity, and hormonal therapies can weaken bones and undermine a mechanism to alleviate insulin resistance



## Nutrition at the Molecular Level

It has been only a few years since the human genome was sequenced, and what we learned through this process has radically altered our understanding of human genetics. As a general rule, scientists thought that each gene contained the information needed to produce one protein, a key element used in nearly every bodily process. And, given the complexity of humans compared with other animals and with plants, it was estimated that the human genome would have 100,000 genes or more that coded for proteins. In fact, the human genome has only about 30,000 genes that code for proteins; at least 98% of the genome does not code for proteins at all.

It turns out that most of our DNA is the *software* involved in determining how and when 30,000 genes are expressed. Regulation of this expression can be affected by environmental, nutritional, and other factors. These changes to the genome by external factors, called epigenetic changes, can have significant effects on a wide variety of molecular processes.

*Most of our DNA is involved in determining how and when genes are expressed, and can be affected by environmental and nutritional factors*

For example, one of the most important nutritional factors modulating gene expression is folic acid: a lack of folic acid has been linked to an increased risk of heart disease and cancer. Folic acid, which is found in dark green leafy vegetables such as

spinach and green lettuce, participates in a pathway leading to the stabilization of DNA. Early man evolved on a rich plant-based diet, so our metabolism came to depend upon a rich supply of folic acid to assist in multiple processes protecting against disease. However, as humans began to migrate out of agricultural lands, the ability to grow enough green plant food to provide adequate folic acid was reduced. As a result, it is believed that changes occurred in the genome of individuals to conserve folic acid for DNA integrity while sacrificing its other roles in metabolism — ultimately contributing to an increased risk of heart disease and cancer.

If this sounds far fetched, consider the Agouti mouse. This type of mouse has been specially bred to make a mutated protein called the Agouti protein. The protein disrupts the brain's ability to signal that the stomach is full and control appetite, so the mice eat to excess and become obese. At the same time, the Agouti protein interferes with the action of another protein that turns the coats of the mice brown. Because of these genetic changes, the Agouti mouse has a yellow coat, as well as a lifetime increased risk of diabetes and some forms of cancer. However, if you supplement the diet of a pregnant Agouti mouse with folic acid and other similar compounds, the yellow-coated mother will give birth to a lean brown mouse with no increased risk of disease. The addition of folic acid silenced the expression of the abnormal Agouti gene — no Agouti protein is produced, and the mouse is born normal.

Similarly, in the development of human prostate cancers, the tumor silences production of a protein

called GSTP1, which plays a critical role in defending DNA against mutation caused by oxidation in the prostate. It is believed that the on-off switch for this protein is mediated by epigenetic changes similar to that which allows folic acid to mediate the change in the Agouti mouse, enabling a healthy brown mouse to be born from a diabetic yellow mouse.

The mere existence of these and other epigenetic changes demonstrates that your DNA is not set in stone. It is a living part of the cells in your body and its *software* code can be influenced by nutritional and environmental factors. In fact, it is estimated that only 30% of processes normally associated with aging are dictated by genes, while 70% are under your personal control — through diet, exercise, and other lifestyle behaviors.

### The Contribution of Antioxidants and Phytochemicals

Early bacteria living in Earth's oxygen-poor atmosphere learned to extract energy from the sun — by combining the energy with carbon dioxide from the air and water from the ocean, they were able to form the glucose they needed for their cells to function. This process, known as photosynthesis, gave these bacteria a huge advantage over competing species, but created a problem: the oxygen they produced as a byproduct of this chemical reaction threatened to destroy them through oxidation of their DNA. So, they developed specialized antioxidants called phytochemicals, which have properties that enable them to absorb the extra electrons found on oxidized chemicals and oxygen radicals. Phytochemicals are truly sponges for oxygen radicals.

In the human body, different types of antioxidants are found in specific locations where they can be most effective. For example, some act only in the oily environment of fat cells while others act in the

liquid, water-like environment of muscle cells. This latter adaptation is particularly important, as the primary energy producers within muscle cells, the mitochondria, also leak oxygen radicals in oxygen-poor environments. The ability of antioxidants to mop up these radicals enables them to play an important role in the fight against cell damage and the development of cancer. This is where exercise can be particularly useful — exercise increases the levels of many antioxidants in the muscles, thus reducing the levels of dangerous free radicals.

*The ability of antioxidants to mop up free radicals enables them to play an important role in the fight against cell damage and the development of cancer*

### The Color System of Antioxidants

The different types of antioxidants can, for the most part, be grouped by color. For example, the antioxidants found in red tomatoes are identical to those found in red watermelon or pink grapefruit. Although the system is by no means perfect, organizing phytochemicals by color is an easy way to help you differentiate between the different types of antioxidants and learn how to get a variety of phytochemicals and antioxidants into your diet.

*Organizing phytochemicals by color is an easy way to differentiate between the types of antioxidants and to get a variety of antioxidants into your diet*

**The red group**, including tomatoes, pink grapefruit, and watermelon, contain lycopene, one of the most well-studied antioxidants in the fight against prostate cancer. Population-based studies that were

conducted when prostate cancer was diagnosed at more advanced stages clearly demonstrated that increased blood levels of lycopene and increased intake of lycopene-containing foods were associated with a reduced risk of aggressive prostate cancer. In recent years, as the population of prostate cancer patients has shifted to the identification of cancers at earlier stages, and as the population of patients has changed, some of these associations can no longer be demonstrated.

There are several short-term studies in which tomato paste or lycopene supplements were given to men prior to prostatectomy. Lycopene was identified in the prostate tissue after surgery and there were changes in prostate cells suggesting benefit. Multiple animal studies have also demonstrated the ability of lycopene to reduce tumor growth as well. It is also clear from multiple studies that the benefits of lycopene are more readily available when absorbed from cooked tomato products and juices than from whole tomatoes. In fact, more than 80% of the lycopene in the American diet comes from cooked tomato-based products such as pasta sauce, tomato soup, tomato juice, and ketchup.

Ultimately, studies focused on the ability of lycopene to prevent the initiation and progression of prostate cancer have not yet established definitively the benefits of increasing the intake of lycopene-containing foods or supplements. More research is needed to clarify the potential benefit of this nutritional component.

Importantly, some animal studies have shown minimal or no benefit to lycopene alone for slowing prostate cancer growth, while whole tomato extracts have been shown to slow tumor growth. Thus, the benefits to the red group are likely due to more than just lycopene, and simply taking a lycopene supplement will not confer the same benefit as eating whole fruits and vegetables. Again, this is a simple reminder that there are no shortcuts to a healthy diet and regular exercise.

**The red/purple group**, including pomegranates, grapes, plums, and assorted berries, all contain anthocyanins, which accounts for the color of the group. However, different berries in this group have unique properties. For example, pomegranates have ellagitannins, which inhibit inflammation and may have benefits for heart health, cancer prevention, and dementia, while cranberries have proanthocyanidins, which target a bacteria common in urinary tract infections. The full benefits of blackberries, strawberries, and raspberries are still being studied, but they all have antioxidant power and work together with the other red/purple berries.

**The orange group**, including carrots, mangoes, apricots, cantaloupes, pumpkin, and sweet potatoes, contain alpha and beta carotenes. Beta-carotene, the more well-studied of the two, is converted by the body into vitamin A, which is important for vision, and works together with the red, green, and yellow/green antioxidants. Note that carrots provide about half the alpha and beta carotene in the average American diet, with significant contributions from tomato-based products.

**The orange/yellow group**, including oranges, peaches, papaya, and nectarines, contain beta-cryptoxanthin, a minor carotenoid that accounts for only a minute amount of the daily intake of all carotenoids by the average American. About 87% of cryptoxanthin comes from orange juice, oranges, and tangerines. However, one must be cautious about relying on processed juices as some of the nutrients are removed during production and high amounts of sugars are often added.

**The yellow/green group**, including spinach, collard, yellow corn, green peas, avocado, and honeydew melon, contain lutein and zeaxanthin. These carotenoids concentrate in the eye and contribute to eye health. Lower intakes have been

associated with cataracts and age-related macular degeneration, the primary preventable cause of blindness in America.

**The green group**, including broccoli, Brussels sprouts, cabbage, bok choy, and kale, contain sulforaphane, isothiocyanates, and indoles. These compounds stimulate genes in the liver to produce enzymes that break down carcinogens, including those that are produced when overcooking and/or charbroiling meats.

**The white/green group**, including garlic, onions, asparagus, leeks, shallots, and chives, contain allyl sulfides, which activate an antioxidant response in cells.

Plant foods that don't fit into the color system can also have unique benefits. For example, celery has salicylic acid, which is closely related to the active ingredient in aspirin and has been used for centuries to relieve headaches. Mushrooms are a complex group of plant foods with possible effects on the immune system at the level of the intestines.

Also, keep in mind that because the color of the fruit or vegetable is tied to its chemical properties, foods with deeper, richer colors are typically more nutritious. Compare, for example, a regular store-bought tomato with one bought from a local farm. To be able to ship a firm tomato by truck, the tomato is picked while it is still green and is rapidly ripened by being blasted with ethylene gas, a substance normally produced by the plant as a signal to ripen. While ripening, the family of lycopene compounds accumulates, especially in response to heat and light. However, once ripening stops, the accumulation of lycopene stops. Because the ripening process is stilted, the color of the typical store-bought tomato is often somewhat washed out. By contrast, the tomato that ripens naturally on the vine at the local farm is typically deeper in color and richer in taste — and thus more nutritious.

Incorporating a variety of both colorful and colorless phytochemicals in fruits and vegetables can help to maximize intake of key chemical elements required to maintain healthy tissues and reduce the risk of disease.

Key Points to Remember		
<i>Color Group</i>	<i>Examples</i>	<i>Antioxidants</i>
<b>Red</b>	Tomatoes, pink grapefruits, watermelon	Lycopene
<b>Red/purple</b>	Pomegranates, grapes, plums, berries	Anthocyanins
<b>Orange</b>	Carrots, mangoes, apricots, cantaloupes, pumpkin, sweet potatoes	Alpha and beta carotenes
<b>Orange/yellow</b>	Oranges, peaches, papaya, nectarines	Beta-cryptoxanthin
<b>Yellow/green</b>	Spinach, collard, yellow corn, green peas, avocado, honeydew melon	Lutein and zeaxanthin
<b>Green</b>	Broccoli, Brussels sprouts, cabbage, bok choy, kale	Sulforaphane, isothiocyanates, indoles
<b>White/green</b>	Garlic, onions, asparagus, leeks, shallots, chives	Allyl sulfides





## The Delicate Balancing Act of Supplement Use

For more than thirty years, there have been comprehensive multivitamin/multimineral tablets on the market that provide what scientists have agreed are the adequate amounts of vitamins and minerals for prevention of vitamin-deficiency diseases. True vitamin-deficiency diseases are also rare in the United States today because of the wide variety of available foods and because so many staples are fortified with additional vitamins to ensure that at least the bare minimum requirements are met. Thus, researchers have identified a new purpose for multivitamins, multiminerals, and other specialized supplements — providing optimum nutrition for the prevention of chronic diseases through improved cellular nutrition.

This is an area of continuing controversy among opinion leaders in nutritional science. In fact, USDA dietary guidelines contain no recommendations for a multivitamin, instead offering an outline of which types of foods contribute which types of nutrients. Nevertheless, the public has embraced the idea of benefit in pill form, as evidenced by the continued purchase of supplements in health food stores, grocery stores, and drug stores.

### Avoiding Toxicity and Overdosing

Because some vitamins can be toxic if taken at extremely high doses and/or in the wrong form, learning how they are formed, how they act, and how they are cleared from the body can help in understanding how best to ensure the safe use of

supplements. Vitamin A, for example, offers an excellent lesson in how excess intake, particularly in the wrong form, can have toxic consequences.

*Learning how vitamins are formed, how they act, and how they are cleared from the body can help in understanding how best to ensure the safe use of supplements*

Vitamin A is actually a hormone, which the body forms from the beta-carotene found in bright orange carrots, pumpkin, or squash. Because the body will only convert the orange pigment beta-carotene to vitamin A when it is needed, if you eat too many orange plant foods, your skin might turn orange, but you will not be subject to vitamin A toxicity.

By contrast, vitamin A toxicity is possible when vitamin A or vitamin A containing foods are eaten directly. For example, eskimos, who eat whale liver that is rich in stored vitamin A, could develop health issues from vitamin A poisoning, such as liver disease or bone disease.

Toxicity occurs with intakes of greater than 25,000 international units (IU) of vitamin A, which is only five times the required amount or RDA of 5,000 IU. At one time, multivitamins could contain up to 10,000 IU of vitamin A. However, after reports from Harvard population scientists that nurses taking more than 8,500 IU of vitamin A from foods and supplements had evidence of bone disease, the

vitamin industry reduced or eliminated vitamin A from multivitamins and replaced half or all with beta-carotene, which could be safely converted to vitamin A without leading to vitamin A toxicity.

Of note, although beta-carotene is safe when ingested from foods, some have questioned its safety when taken in mega-doses as supplements. After noting a lower incidence of lung cancer in people who had high levels of beta-carotene in their blood, investigators at the National Cancer Institute gave beta carotene supplements to smokers in an effort to prevent the development of lung cancer. The study was stopped prematurely because the subjects actually showed an *increased* risk of lung cancer. However, the dose was so high that subjects were, in effect, given six times the amount of beta-carotene found in a healthy diet. Thus, although the study results led to questions of whether excessive intake of beta-carotene is safe in smokers, the vitamin remains safe when ingested from foods or when taken at standard doses in multivitamins.

### Making the Smart Choice

Dietary supplements are just that — a supplement to a healthy diet, not a replacement for one. Taking megadoses of any vitamin is never a good idea. The body's own protective mechanisms have ensured that it's nearly impossible to get to toxic levels when ingesting vitamins and minerals from eating fruits and vegetables. Start with these natural plant sources, the ideal way to receive the right amounts in the most absorbable form. Then, if you wish, supplement with a multivitamin/multimineral and educate yourself on the scientific literature and so you can make an informed choice.

*Dietary supplements are just that — a supplement to a healthy diet, not a replacement for one*

Keep in mind that multivitamin formulations that include a mix of different complexes of vitamins and minerals can offer a reasonable way to get some additional nutritional value into your diet in the most efficient way possible. For example, because high levels of zinc can block absorption of copper and can lead to a copper deficiency anemia, the ratio of these two minerals is controlled in multivitamins.

Be careful not only to avoid taking toxic doses, but also to avoid supplementation of a single vitamin or mineral if there is no specific deficiency. For example, taking a single B vitamin in high doses instead of a B vitamin complex can lead to what is called a conditioned deficiency: the high dose of the single B vitamin causes an increase in the breakdown of the B vitamins that are not being supplemented. In extreme cases, the breakdown of these B vitamins to low enough levels can cause neurologic problems, such as seizures.

Ultimately, it is important to remember that you should not rely on supplements to make up for a poor diet. Fruits and vegetables are rich sources of mixed vitamins, minerals, antioxidants and other specialized substances in combinations that cannot be duplicated in most supplements. A colorful diet, with representation every day from as many color groups as possible, remains the best way to ensure you receive a well balanced set of key nutrients.

Recommended Ranges for Key Vitamins and Minerals		
	<i>Recommended Intake*</i>	<i>Upper Level Intake†</i>
<b>Vitamin A</b>	900 µg/day	3,000 µg/day
<b>Vitamin B6</b>	1.7 mg/day	100 mg/day
<b>Vitamin B12</b>	2.4 µg/day	ND
<b>Vitamin C</b>	90 mg/day	2,000 mg/day
<b>Vitamin D</b>	400 IU/day	2,000 IU/day
<b>Calcium</b>	1,200 mg/day	2,500 mg/day
<b>Folic acid</b>	400 µg/day	1,000 µg/day

ND=not determinable.  
 \*Recommended dietary allowances or adequate intakes to be used as goals for individual intake.  
 †The maximum level of daily nutrient intake that is likely to pose no risk of adverse effects; represents total intake from food, water, and supplements. Values are for healthy males aged 51-70.  
 Source: Institute of Medicine of the National Academies. Dietary reference intakes.  
 Available at <http://www.iom.edu/Object.File/Master/21/372/0.pdf>.



## Implementing a Plan for Success

**P**ersonalized nutrition advice goes beyond the general dietary guidelines for a population and hones in on the needs of an individual. Body composition determination can provide information on total energy needs, lean body mass, protein requirement, deviation from healthy body fat, and a personalized target weight. The diet can be analyzed at three levels: (1) the overall caloric content and macronutrient profile (ie, protein, carbohydrate, and fat composition); (2) the vitamin and micronutrient adequacy for prevention of deficiency diseases; and (3) the adequacy of vitamin and mineral intake from a combination of foods and supplements for optimized nutrition.

The science of optimized nutrition and personalized nutritional advice is still evolving. The new field of gene-nutrient interaction drawing from basic science and studies of populations is in its infancy, and efforts to improve the science and its application to personalization of nutrition advice are underway.

In the meantime, it is critical to focus on the benefits of a healthy diet and regular exercise. While the relationships between diet and exercise and cellular processes within the prostate gland are not yet fully established, it is clear that antioxidants found in many foods can play a role in protecting against cancer cell growth while substances that promote inflammation and oxidation can stimulate prostate cancer cell growth. In addition, the overall status of your diet and exercise can affect the development of other diseases that are common among older men with prostate cancer, including heart disease and diabetes.

### Building Strong Muscles

Increased protein intake at the upper end of the range recommended by the Institute of Medicine (10% to 35% of total calories) has been shown, in several clinical studies, to reduce hunger and improve lean body mass during weight loss. Exercising for durations of approximately one hour each day is an excellent strategy for weight maintenance, while progressive resistance training has been shown to build muscle, increase resting metabolism, improve glucose tolerance, increase strength, muscle function, and aerobic fitness, contribute to increased bone density, and improve quality of life.

Note also that *maintaining* muscle mass can have a positive impact on metabolism. A pound of muscle burns 14 calories for every 3 calories burned by a pound of fat. Thus, the number of calories burned per day is at least in part determined by the ratio of muscle to fat.

Avoiding the muscle loss common in aging, inactivity, and hormonal therapies and/or gaining muscle through increased protein intake and exercise can help you achieve and maintain a healthy body weight, giving you more energy and an ability to enjoy active sports more fully.

***Avoiding muscle loss and/or gaining muscle can help you achieve and maintain a healthy body weight, giving you more energy and an ability to enjoy active sports more fully***

## Restoring a Healthful Caloric Balance

Concentrating on fruits and vegetables can pay dividends immediately. The average vegetable serving is only 50 calories and the average fruit serving is only 70 calories, while the average serving of refined carbohydrates such as potatoes, rice, pasta,

bread, bagels, or cakes is more than 200 calories. Considering that you have to run 3 miles in 30 minutes to burn off the calories in a medium potato and bicycle 8 miles in 30 minutes to burn off the calories in a donut, minimizing your caloric intake from these types of refined carbohydrates can help you maximize the effects of regular exercise.

### Key Points to Remember

- 1 Avoiding muscle loss and/or gaining muscle through increased protein intake and exercise can help in achieving and maintaining a healthy body weight
- 2 Increase intake of fruits and vegetables and minimize caloric intake from refined carbohydrates



## Incorporating Good Nutrition and Exercise Into Your Everyday Routine

**M**edia stories often provide confusing and contradictory advice in their effort to make the latest study results sound exciting, and typically don't offer the context required to understand how the different pieces fit together.

There is no nutrient or exercise for which a survival benefit in prostate cancer has been demonstrated in a controlled, randomized study — the gold standard of clinical trials. Nevertheless, there is a great deal of evidence that balanced nutrition and regular exercise, coupled with weight loss, can lead to better overall health while reducing your risk of common chronic diseases of aging, including diabetes, heart disease, and stroke.

Thus, by combining the insights gained from many different studies with what is known about prostate cancer and the underlying disease processes that promote its development, we've compiled a logical set of diet and exercise recommendations for prostate cancer thrivers.

### Reviewing the Benefits Stage by Stage

In the majority of cases, when prostate cancer is detected early, primary surgical or radiation treatment is curative and taking additional steps to prevent the growth of the cancer might seem unnecessary. Nevertheless, men at this stage would do well to take an opportunity to inventory and tune-up their nutritional habits. Remember, maintaining a healthy diet and regularly exercising can be important steps toward preventing other

diseases that commonly occur with aging, including heart disease and diabetes.

Men with advanced prostate cancer or with disease that has recurred can begin incorporating healthy diet and regular exercise into their regular routines to help slow the progression of disease, while recognizing that there is limited direct proof of the effectiveness of such changes. The key in this phase of the disease is to rationally make dietary and exercise changes in a way that *complement* any ongoing treatments.

Men who have received hormonal treatments are at particularly increased risk of developing weaker bones and muscles. For these men, endurance training to keep the cardiovascular system strong, and resistance or weight training to keep the muscles strong, coupled with healthy dietary choices focusing on achieving a goal weight, can be integrated into the treatment plan on an ongoing basis.

Finally, in men with metastatic or advanced disease, supportive nutrition is most important. Because weight loss and loss of appetite is common in men at this stage of disease, healthy nutrition and ensuring adequate calories is critical to the success of therapy and to the support of a healthy immune system.

### Adopting a Healthy Approach

It is a lot easier than you think to incorporate good nutrition and exercise into your everyday routine.

The key is to recognize that implementing dietary changes does not mean giving up things you love and that exercising does not mean spending additional time that you don't have. The key is to see your life in a new way — with a new set of lifestyle changes all designed to turn you from a prostate cancer survivor into a prostate cancer thriver.

### 1. Lose the body fat

Losing fat is a simple equation: eat fewer calories per day than you burn. This can be done by changing your dietary pattern away from high fat foods, sweets, fast foods, and savory snacks and eating more colorful fruits and vegetables, low-fat proteins from poultry, fish, and seafood, and fewer refined carbohydrates. Here are some practical examples of places you can cut calories:

- Substitute white meat of turkey or chicken for high-fat red meats and farmed fish
- Substitute colorful fruits and vegetables for rice, pasta, potato, and breads
- Substitute mixed berries and fruits for ice creams, cakes, pastries, snack chips and high-fat, high-sugar desserts
- Substitute non-fat and low-fat dairy and soy products for cheese and full-fat dairy products
- Substitute water for soft drinks
- Reduce the use of added fats, oils, margarine, butter, and salad dressing

### 2. Maintain muscle mass

In order to maintain muscle mass as you age, it is important to take in adequate amounts of protein and to exercise muscles adequately to maintain them. As you age, the body's metabolism slows down due in large part to the decrease in muscle mass that is seen with inactivity. It is harder to build muscle as you age and it breaks down more quickly with inactivity than in younger individuals. However, it is possible to build and maintain muscle mass well into your 90s by simply

eating adequate protein and doing muscle building exercises.

Also, building muscle mass is one of the most effective ways to change your metabolism: build 10 extra pounds of muscle, and you will burn an extra 140 calories per day. However, to maintain that muscle you need to do more than simply provide the extra 140 calories per 10 pounds; you must also supply the right amount of the right kinds of protein to nourish the muscles.

Your lean body mass determines how much protein you need each day. In fact, it's about twice what was recommended by government advisory groups until recently, when the Institute of Medicine broadened its recommendation to 10% to 35% of calorie intake. It takes about 1 gram of protein per pound of lean body mass or 29% of resting energy expenditure, which is the number of calories you burn at rest to build and maintain muscle. For example, a typical man with 150 pounds of lean body mass will burn 2100 calories at rest per day and will need about 150 grams of protein per day.

Here is a list of some low-fat, high protein choices you can make:

- 7 egg whites: 25 g protein and 115 calories
- Chicken breast (4 oz): 25 g protein and 140 calories
- Ocean-caught fish (4 oz): 25 g protein and 140 calories
- Canned tuna in water (3.5 oz): 25 g protein and 110 calories
- Two veggie burgers: 28 g protein and 180-220 calories
- Soy protein shake with fruit: 25 g protein and 200 calories

### 3. Exercise every day

Regular exercise will help you lose fat, build muscle, and improve your outlook overall.

A combination of cardiofitness and weight lifting will not only help to round out the benefits, but the variety will help make it more interesting. This is key to sticking to a regular routine: choose an exercise you like and/or one that you can do with friends to make it more enjoyable. For example, walk 30 minutes every day at a comfortable pace and lift weights three times each week, alternating different body parts and allowing a day of rest between weightlifting days. If you work on your chest muscles and triceps one day, switch to your back muscles and biceps on the next, followed by leg muscles and shoulders on the third day.

Most important, obtain professional instruction on how to perform exercises for each of these muscle groups and consult with your doctor before starting the exercise program to be sure it is safe for you. A certified fitness instructor, exercise

physiologist, or physical therapist can provide exercise instruction and ensure that you are maximizing the benefit from your workouts.

#### 4. Eat colorful fruits and vegetables

The USDA recommends eating 9 servings of fruits and vegetables every day, equivalent to about one cup or 100 grams per serving. Why is this important? A typical serving of vegetables has about 50 calories and a typical serving of fruit has about 70 calories, making them some of the least calorie-dense food ounce per ounce. So by simply increasing the amount of fruits and vegetables you eat each day, you will be decreasing the number of calories per bite of food even while packing in high levels of nutrients. Also, fruits and vegetables are rich in fiber, so five servings of fruit and vegetables can easily get you to the recommended 25 grams of fiber per day.

### Key Points to Remember

- 1 Lose body fat: eat fewer calories per day than you burn
- 2 Maintain muscle mass: increase protein intake and exercise
- 3 Exercise every day: combine cardiofitness and weight lifting
- 4 Eat colorful fruits and vegetables: recommended nine servings a day





## A Commitment to Change

**M**aking a commitment to change is a first step in successful thrivership. Changing dietary patterns and exercise habits is not easy. You need to have the time, the resources, and, most important, the commitment at a deep level to make these changes. Taking lifestyle change gradually and only committing to the changes you can sustain over the long-term is critical to success in this process.

### The Decision to Change

When it comes to healthy behaviors, everyone knows what they should do. Eat well, exercise regularly, get enough sleep, stop smoking, and minimize stress. But if everyone knows this, why doesn't everyone do it?

The simple reason is that change is one of the most difficult things for an individual to do. And lasting change is even harder. Unless you are ready and willing to modify behaviors — eat healthier food and exercise regularly — no amount of counseling or education will be effective. That's why evaluating your readiness to change is a key step in the lifestyle decision-making process.

Readiness to change can be determined using the different stages of change theory, which proposes that lifestyle change is a gradual evolution in thought process and action. An individual's stage of readiness can change overnight — a heart attack or a diagnosis of prostate cancer can be an extremely motivating event. Yet change based on

fear and crisis do not lead to lasting change. The key is to utilize the “teachable moment” after such an event to turn motivation into action, and action into lasting change.

The transtheoretical model of change assumes that the average person goes through five steps in moving toward lasting adoption of new behaviors.

The first stage, known as **pre-contemplation**, is that necessary stage when you are not even thinking about changing as yet, at least not within the next six months. Some people can get stuck in this stage, and are resistant to obtaining information, discussing, or even thinking about the issue at hand. Obviously, one has to move beyond this stage to effect any significant changes.

When you can clearly state an intent to change within the next six months, you have moved to the second stage, known as **contemplation**. In this stage, you are aware of the benefits of changing, but also aware of the costs or barriers to change. Those who are stuck in this stage are often procrastinators who are mulling over the idea of change but are not ready to make the change.

**Preparation**, the third stage, is when you intend to take concrete or well-defined steps to change within the next month. Since this stage is a prelude to the next stage of action, it is more of a transition and most people do not stay in this stage for long.

**Action**, the fourth stage, is when you have made real and easily perceived diet and lifestyle changes

over the past six months. At this point, actual changes in biomarkers such as body weight, waist circumference, or cholesterol can be measured.

In the final stage of **maintenance**, the changes have been made and a goal has been reached; the work at this point is to keep the diet and lifestyle benefits you have achieved. The stage is characterized by active steps taken to prevent relapse and to firm up any gains made during the action phase. Passive acceptance of any changes made is not sufficient for successful maintenance and long-term stability. Constant daily efforts are needed to keep from sliding back into old habits.

As you progress through each stage, you will find that different skills and strategies are required to achieve your goals. For example, exercise on a regular basis is the most important strategy to maintain weight but it is not sufficiently effective without dietary changes in the action phase, when weight loss is the goal.

The process of cycling through relapse and recovery and then maintaining behaviors for six months to a year gives a realistic view of the process of lifestyle change. This is not something you do once and

forget. The changes are not earned until they are maintained for at least a year. Relapse is expected and planning for relapse prevention is critical. As you adopt healthier lifestyle choices, you will move through the stages, making progress and losing ground, learning from mistakes made over time, and using those gains to move forward.

Research has shown that individuals who regain weight do not ruin their metabolism but lose weight at the same rate on repeated attempts when the same diet is used. Cancer patients are often far more motivated than those who are simply overweight or have high cholesterol, and it is important to realize that a cancer diagnosis can be a very powerful motivator and may push you from “pre-contemplation” to “action” overnight. However, some cancer survivors have the urge to push the cancer out of their minds and behave as though it had never occurred. A realistic balance between the short-term stress of a cancer diagnosis that motivates behavior change over a few months, and the long-term realization that better diet and lifestyle can improve your quality of life, can lead to both real and important changes and the maintenance of those changes over the long-term.

### Key Points to Remember

- 1 Making a commitment to change is a first step in successful thrivership
- 2 Effective change can only be accomplished in stages
- 3 Learn from mistakes made over time and use the gains to move forward



## The Four S's of Success

There are four S's of general behaviors that you can use to make lifestyle change more successful — stress reduction, stimulus control, self-monitoring, and social support.

### 1. Stress Reduction

Express your feelings. If feelings of stress, sadness, or anxiety are causing physical problems, keeping these feelings inside can make you feel worse. It's okay to let your loved ones know when something is bothering you. However, remember that your family and friends may not be able to help you deal with your feelings appropriately. At these times, ask someone outside the situation — such as your family doctor, a counselor, or a religious advisor — for advice and support to help you improve your emotional health.

Live a balanced life. Try not to obsess about the problems at work, school, or home that lead to negative feelings. This doesn't mean you have to pretend to be happy when you feel stressed, anxious, or upset. It's important to deal with these negative feelings, but try to focus on the positive things in your life, too. You may want to use a journal to keep track of things that make you feel happy or peaceful. Research has shown that having a positive outlook can improve your quality of life and give your health a boost. You may also need to find ways to let go of some things in your life that make you feel stressed and overwhelmed. Make time for things you enjoy.

Calm your mind and body. Relaxation methods, such as meditation through exercising, stretching or breathing deeply, are useful ways to bring your emotions into balance.

Take care of yourself. To have good emotional health, it's important to take care of your body by having a regular routine for eating healthy meals, getting enough sleep, and exercising to relieve pent-up tension. Avoid overeating and under-exercising, and don't abuse drugs or alcohol.

### 2. Stimulus Control

Plan ahead. If you knew that you would be waking up to a cold floor when you got out of bed, it would make sense to prepare by leaving a pair of slippers at the side of your bed. *Similarly, if you are going to eat at a restaurant, plan ahead and think about how to ensure you eat healthy foods.* If you are going to be stressed, you may need to have a heightened level of determination to stick with your plan. If you can plan your week and make an appointment with yourself for exercise and relaxation at appropriate times, you will be more likely to follow through.

### 3. Self-Monitoring

A conscience is said to be the knowledge that someone is watching you. While implementing change behaviors, be your own conscience and monitor your actions. Set up a food and exercise log to track your progress. Use an established

computer-based program or just a paper journal. Try to record the behaviors as they happen in terms of foods, exercise, and lifestyle behaviors and set a time to review the record so that you can chart your performance weekly.

### 4. Social Support

Social support is available from family, friends, relatives, religious groups, hobby groups, or prostate cancer survivor groups. It is important

that you maintain a healthy relationship with individuals who understand what you are going through. In particular, prostate cancer support groups can be helpful in finding fellowship among others who are dealing with the same issues you are facing now.

Lifestyle changes carried out in a balanced fashion can lead to optimum health in the physical, mental, and spiritual realms — establishing for you a healthy approach toward thrivership.

#### Key Points to Remember

- 1 Reduce stress: live a balanced life and take care of yourself
- 2 Control your environment: plan ahead to eat healthfully and minimize stress
- 3 Monitor your action: track your behaviors to help chart your progress
- 4 Establish a support system: maintain healthy relationships with people who understand what you are going through



## Suggested Reading

Cross AJ, Peters U, Kirsh VA, et al. A prospective study of meat and meat mutagens and prostate cancer risk. *Cancer Res.* 2005;65:11779-11784.

Freedland SJ, Mavrououlos J, Wang A, et al. Carbohydrate restriction, prostate cancer growth, and the insulin-like growth factor axis. *Prostate.* 2008;68:11-19.

Galvão DA, Newton RU, Taaffe DR, Spry N. Can exercise ameliorate the increased risk of cardiovascular disease and diabetes associated with ADT? *Nat Clin Pract Urol.* 2008;5:306-307.

Jones LW, Demark-Wahnefried W. Diet, exercise, and complementary therapies after primary treatment for cancer. *Lancet Oncol.* 2006;7:1017-1026.

Nakai Y, Nelson WG, De Marzo AM. The dietary charred meat carcinogen 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine acts as both a tumor initiator and promoter in the rat ventral prostate. *Cancer Res.* 2007;67:1378-1384

Ornish D, Magbanua MJ, Weidner G, et al. Changes in prostate gene expression in men undergoing an intensive nutrition and lifestyle intervention. *Proc Natl Acad Sci U S A.* 2008;105:8369-8374.

Segal RJ, Reid RD, Courneya KS, et al. Resistance exercise in men receiving androgen deprivation therapy for prostate cancer. *J Clin Oncol.* 2003;21:1653-1659.

Shai I, Schwarzfuchs D, Henkin Y, et al. Weight loss with a low-carbohydrate, Mediterranean, or low-fat diet. *N Engl J Med.* 2008;359:229-241.







Prostate  
Cancer  
Foundation

[pcf.org](http://pcf.org)

1250 Fourth Street Santa Monica, CA 90401 Tel 800.757.CURE (2873) Fax 310.570.4701

© 2009 Prostate Cancer Foundation