

The Association for the Cure
of Cancer of the Prostate

NUTRITION & PROSTATE CANCER

A Monograph from the CaP CURE Nutrition Project

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Dear Friend of CaP CURE:

In 1999, approximately 180,000 American men will learn they have prostate cancer — that's one new case every 3 minutes. **CaP CURE's mission is to encourage and support scientific research and, ultimately, to create hope in the lives of people who are facing, fighting and living with prostate cancer.**

Cancer is a group of diseases in which certain genes that regulate cell growth or death are abnormal and/or the protein products of these genes are overexpressed or underexpressed. Cancer is caused by a complex, but incompletely understood, interaction between heredity and environment. Research on prostate cancer indicates that nutritional factors could have an important influence on the development and progression of the disease.

The information included in this monograph, *Nutrition & Prostate Cancer*, has been prepared for CaP CURE by leading nutritional researchers. While CaP CURE strongly believes the study of nutritional factors will provide important clues to understanding prostate cancer, CaP CURE does not endorse any specific recommendations or treatments. Rather, CaP CURE's role in nutritional investigations is to support scientists and clinicians conducting clinical trials in patients with prostate cancer. The purpose of these trials is to determine whether nutritional intervention (based on the best and most current information available) can alter the progression of the disease.

Clinical trials are being conducted at the centers listed below:

- | | |
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Contact any of the principal investigators listed above if you are interested in participating in a clinical trial. Only through these and similar clinical trials will we obtain the critical scientific information required to ultimately control this dreaded disease.

The CaP CURE website (www.capcure.org) contains the full text of this nutrition monograph and a list of all clinical trials sponsored by the CaP CURE Therapy Consortium.

We appreciate your interest and support.

Best regards,



Stuart Holden, M.D.
Medical Director

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I would also like to thank Michael Milken, the founder of CaP CURE, who remains an inspiration to researchers, patients and their families and all those touched by prostate cancer. His vision remains a potent stimulus to new and innovative research in nutrition and prostate cancer.

The Nutrition Project is part of the CaP CURE Therapy Consortium. CaP CURE is a nonprofit public charity dedicated to finding a cure for prostate cancer by rapidly funding promising basic science and clinical research.

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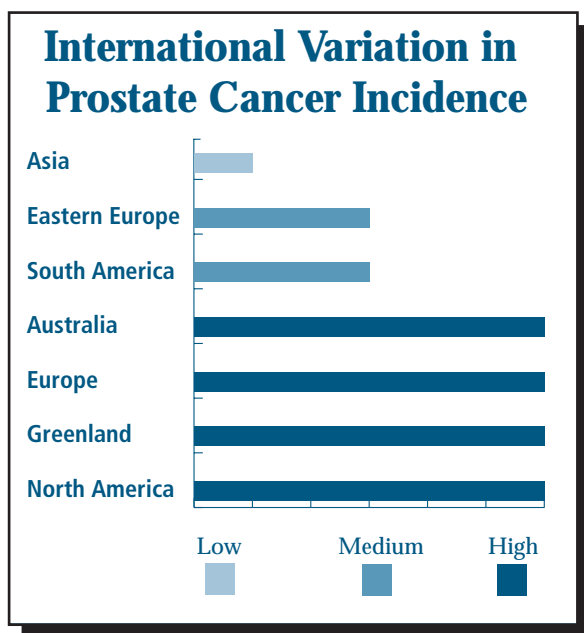
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Executive Summary

Every year, researchers gain a more complete understanding about the role of nutrition and lifestyle in the fight against prostate cancer. As information is disseminated in the media, the Internet, scientific reports or even by trusted sources at local health food stores, it is important that patients evaluate each recommendation and identify the risks and benefits for prostate cancer, other chronic diseases and overall peace of mind.

In this report, *Nutrition & Prostate Cancer — A Monograph from the CaP CURE Nutrition Project*, we review a significant amount of scientific evidence. This evidence provides few absolute truths. However, there is a strong consensus on many points, based on emerging patterns in human population studies (epidemiology), research on animals and cell culture systems (basic science studies) and tests of specific nutrition and lifestyle changes in people (clinical trials).



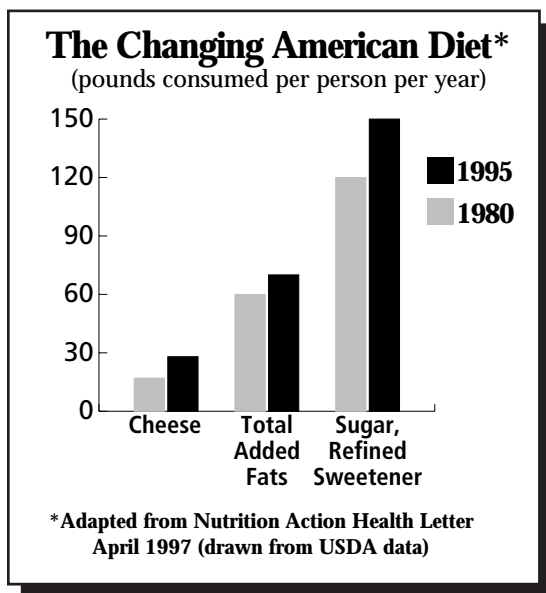
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Scientific evidence suggests that differences in diet and lifestyle may account in large part for the variability of prostate cancer rates around the world. The international variations in the rates of prostate cancer are striking. The county of Qidong in China has the lowest recorded incidence rate, 0.5 per 100,000 men. By comparison, Sweden has a rate of 55.3 per 100,000 men and the U.S. has a rate of 102.1 per 100,000 men (2).

Scientific evidence suggests that differences in diet and lifestyle may account in large part for the variability of prostate cancer rates in different countries.

executive summary

Of all the risk factors for prostate cancer, only nutrition seems to explain the differences in global distribution of this disease. The actual impact of dietary changes on the progression of cancer can only be determined in large, lengthy, multicenter studies similar to those that have been conducted over the past four decades that link diet to heart disease. It has been estimated, however, that 75% of all cases of prostate cancer could be prevented by changes in diet and lifestyle (3). The results of these nutrition investigations, population studies and animal experiments deserve attention from all those concerned with the prevention and treatment of prostate cancer.



It has been estimated that 75% of all prostate cancer could be prevented by changes in diet and lifestyle.

Cancer is a group of diseases in which protein products of certain genes that regulate cell growth or death are abnormal. Accumulating evidence from studies of cancer cells and human tumors implanted in animals suggests that components of diet can influence the expression of these genes. Based on the evidence, we strongly believe that patients can benefit from additional information about the links between nutrition and prostate cancer.

In this report, you will find a significant amount of evidence about the following areas affecting nutrition and lifestyle:

- Dietary Fat Intake
- Total Caloric Intake
- Fatty Acids
- Dietary Effects on Hormones
- Obesity and Hormones
- Dietary Fiber Intake
- Fruits, Vegetables and Antioxidants
- Vitamin D and Calcium
- Soy Protein Intake
- Natural Therapies and Dietary Supplements

For this second edition of the monograph, we have added new sections outlining the relationship between nutrition and hormone ablation, chemotherapy and radiation.

While considerable evidence exists, more research still must be completed before the impact of diet and lifestyle on prostate cancer can be proven absolutely. Until then, we suggest you evaluate the information in this report and discuss it with your family and health care providers.

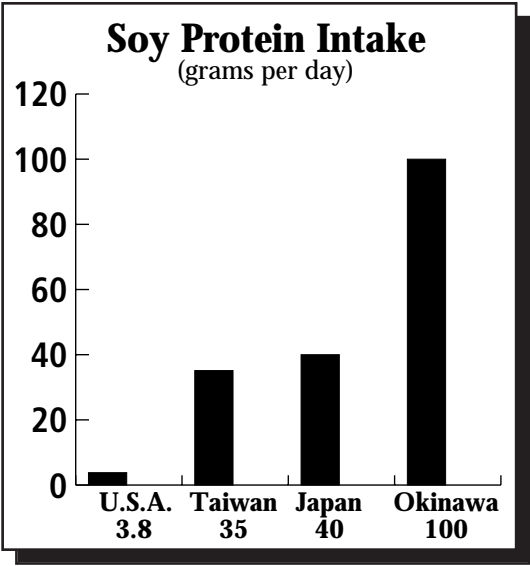
WHAT YOU CAN DO

While doctors determine medical and surgical therapies, nutrition and lifestyle changes are entirely within your control. The following are nutritional changes that are beneficial for prostate cancer and other chronic diseases (such as heart disease) and may also improve your overall quality of life:

- Decrease percentage of dietary fat to 15% of total energy intake
- Increase fruit and vegetable servings to 5 or more per day
- Increase dietary fiber intake to 25 to 35 grams per day
- Increase soy protein intake to 40 to 60 grams per day

The following are simple ways you can achieve these overall goals:

- Minimize consumption of nuts
- Limit or eliminate salad dressings made from oil
- Hold the mayo, butter and margarine
- Reduce or eliminate red meat
- Eliminate high-fat fish
- Say no to cheese
- Eliminate nonfat yogurt and ice cream
- Watch the portions you consume
- Exercise!



(ref. 4)

TAKE RESPONSIBILITY

Fighting prostate cancer by making changes in nutrition and lifestyle requires a personal commitment. You may need to change what you eat every day. You may need to increase your activity level by getting involved in an exercise program. This report will help you immediately change your diet and lifestyle.

the case for nutrition

The Case for Nutrition

Among the risk factors for prostate cancer, nutrition best explains dramatic differences in global distribution of the disease. Analysis of the Western diet, epidemiological studies and animal experiments have yielded compelling results that deserve attention from those concerned with the prevention and treatment of prostate cancer.

Population studies have provided some of the most compelling evidence establishing the link between nutrition and prostate cancer, but the value of these studies is limited. Since the late 1960s, for instance, we've known that there is a strong mathematical association between dietary intake patterns (especially fat intake) and the age-adjusted rate of prostate cancer, breast cancer and colon cancer (5). In these association studies, no direct cause-and-effect evidence exists that a particular nutrient affects the incidence of prostate cancer. For example, eating red meat is a marker of a particular dietary pattern that may include other behaviors such as eating fewer fruits, vegetables, cereals and grains. It is important to carefully evaluate the data emerging from population studies, realizing that only future studies can definitely prove that certain dietary patterns can delay or prevent the progression of prostate cancer.

STATISTICAL DATA PAINT THE PICTURE

While the causes and courses of each case of prostate cancer are unique, every patient can take personal steps to fight the disease and improve his overall health.

Diagnosis of prostate cancer has improved in recent years due to the development of the PSA test, which detects prostate cancer before it is physically palpable as a mass on rectal examination (6). Approximately 180,000 men will be diagnosed with prostate cancer in 1999 (7).

Prostate cancer develops as a result of both inherited and environmental factors. It is associated with aging, and it occurs in a latent or clinically inactive form in 30% to 40% of men between the ages of 30 and 50 and in 75% of men by age 80 (8, 9). Because latent or clinically inactive cancers were not as effectively diagnosed prior to the development of the PSA test, some uncertainty exists as to the predicted behavior of prostate cancer after diagnosis.

The cause of this disease is not fully understood, but a family history, the effects of androgens and other hormones, and environmental and dietary factors may all be involved. While the causes and courses of each case of prostate cancer are unique, every patient can take personal steps to fight the disease and improve his overall health.

Approximately 60% of all men have latent or clinically silent prostate cancer, and the incidence of this latent form is the same in the United States and Japan (10). These estimates are based on autopsies of men who die for reasons other than prostate cancer. At the same time, clinically significant prostate cancer is much more common in the United States than in Japan. When Japanese men migrate to the United States, their incidence of clinically detected prostate cancer rises within one generation. We believe, therefore, that nutrition and lifestyle practices in lower-risk countries arrest the growth of prostate cancer so that it is never clinically discovered.

Global Variations

The international variations in the rates of prostate cancer are considerable. The county of Qidong in China has the lowest recorded incidence rate, 0.5 per 100,000 men. By comparison, Sweden has a rate of 55.3 per 100,000 men and the U.S. has a rate of 102.1 per 100,000 men (2).

Other studies show that global differences in incidence are probably not due to genetics. If individuals with the same genetic background are raised in two different environments, the risk of prostate cancer is associated with the country in which they are raised (11). Examples of reverse migration from high-risk countries to low-risk countries also exist, and again the evidence suggests that diet and lifestyle are important. Japanese men, who have a low incidence of clinical prostate cancer, also have a less aggressive form of the disease when it develops (12).

We can also learn from comprehensive studies on the role of diet in preventing heart disease. In the late 1970s and early 1980s, as men became more aware of the risks of heart disease, many changed their lifestyles, leading to a 30% decrease in the incidence of heart disease. In addition, countries that have a high incidence of heart disease also have a high incidence of prostate cancer. While many factors account for this, diet is a major variable, and by analogy to its effect on heart disease, it may be one element you can change to prevent the growth of prostate cancer (13). Unlike heart disease, the risk factors for prostate cancer are poorly understood (14).

Nutrition alone cannot cure prostate cancer. Rather, nutrition may help fight prostate cancer by slowing or inhibiting its growth and by strengthening the immune system.

DIETARY FAT

Fat has two functions in the food supply — it provides calories and enhances taste. Increased calorie intake is important in societies where people work hard and are widely exposed to infectious disease and poor sanitation. In developed countries such as the

United States, however, we have eliminated nutritional deficiency diseases like rickets, beriberi and scurvy by food fortification. Therefore, fat intake is not essential.

Unfortunately, fat consumption in the United States increased significantly between 1910 and 1980. This increase occurred through hidden fats in vegetable oil, margarine, butter and processed baked goods (cakes, donuts, etc.), as well as through the consumption of red meat and snack foods (nuts, chips, etc.). Red meat sources such as beef, lamb, pork and veal are marbled meats with high fat content — even after visible fat is trimmed away. The taste-enhancing properties of fat guarantee that higher-fat foods compete more successfully for consumer acceptance than lower-fat foods.

In the United States, we snack more than people in other countries, eating fast foods that are high in fat and engineered to provide good taste at the lowest possible cost. Today, high dietary fat intake is an indicator of a rich, modern Western food supply. As a society, we have so thoroughly eliminated malnutrition that we have created an epidemic of obesity (overnutrition).

Given this scenario, it's no surprise that in the past 10 years the incidence of obesity and its associated diseases — including prostate cancer — has increased. The incidence of obesity in the U.S. has increased 30% over the past decade, from 24% of the population to 32% of the population, according to the latest National Health and Nutrition Examination Survey conducted by the National Center for Health Statistics (15). One of the factors in the increased incidence of obesity is increased dietary fat.

Obesity Increases the Risk

One American Cancer Society survey of 750,000 individuals demonstrated that being obese increased the risk of prostate cancer (16). How obesity stimulates the growth of prostate cancer is discussed in a later section, but the association of obesity with increased dietary fat intake is clear.

Among the various nutritional factors examined, per capita total fat consumption correlates with increased prostate cancer incidence in cross-national studies (17). In Japan, an increase in prostate cancer risk has been noted as the per capita intake of dietary fat has increased (18). In Hawaii, a correlation was found between saturated fat intake and prostate cancer incidence (19). In the U.S., counties with higher prostate cancer incidence have higher per capita fat intake (20).

Using questionnaires that ask how often a particular food is normally eaten, scientists have found clues to the association of dietary fat with cancer. In a retrospective study by West et al. (21) and a prospective study by Giovannucci et al. (22), the more aggressive prostate cancers in patients were significantly correlated with high fat intake.

...a diet in which only 15% to 20% of total calories come from fat may lower the risk of fatal prostate cancer.

Studies Confirm Association

In the Giovannucci study, those individuals eating the highest amount of meat had a risk of developing prostate cancer 2.64 times that of those eating the least. The course of prostate cancer may also be affected by fat intake. Kolonel et al. (23) found a significant relationship between dietary fat and prostate cancer mortality in men 70 years and older in Hawaii. In addition, several studies have demonstrated a positive association between saturated fat intake from meat and dairy products and prostate cancers (24-29).

Other factors in the diet may enhance or diminish the risk for prostate cancer. Several retrospective and prospective studies have found an association between prostate cancer and dietary fat; however, none has shown a negative correlation. The actual association may be even higher than these studies indicate, due to the inherent problems in studying individual diets.

More Evidence

The association between fat intake and prostate cancer may be a significant factor in differences in incidence and mortality around the world. Evidence from international studies suggests that a diet in which only 15% to 20% of total calories come from fat may lower the risk of fatal prostate cancer (30). The current percentage of calories from fat intake in this country is between 30% and 40% of total calories, while 30 years ago it was between 40% and 50%. With the reduction in fat intake, we have seen a decrease in the risk and incidence of heart disease in our country, but it may require further reductions in dietary fat intake to reduce the rate of prostate cancer in the U.S.

Finally, important information is emerging from countries such as Japan where American fast foods have been introduced in previously low-risk populations. The rate of obesity has gone up in Japan from 5% to 20% over the past 20 years, at a time when the incidence of prostate cancer has also increased markedly. In industrially developed countries, these foods promote the development of obesity and chronic diseases such as diabetes, heart disease, hypertension and commonly occurring cancers, including prostate cancer.

CALORIE RESTRICTION

Rats or mice that are calorie-restricted live considerably longer and have fewer cancers at the time of death than animals that are allowed to eat at will (31). Obesity in laboratory rats and mice can be prevented by restricting food access or by allowing the animals to exercise. Animal studies, in fact, support the association of excessive calorie intake with obesity and prostate cancer in humans.

If you are overweight, reduce total fat and calorie intake and increase exercise and physical activity. Fasting and severe calorie restriction to the degree carried out in animal experiments leads to negative health effects in humans. The number of calories humans eat must be suited to their individual requirements. For example, a worker running an air hammer all day can eat 4,500 calories per day and remain lean, while a person sitting at a computer all day can become obese on 2,500 calories per day. Absolute calorie levels cannot be recommended, but must be adjusted to the individual.

FATTY ACIDS

Corn oil, safflower oil, soybean oil and other polyunsaturated fats contain a large percentage of a fatty acid called **linoleic acid**. In laboratory tests, linoleic acid stimulates the growth of prostate cancer cells (32). Compared with other fats, linoleic acid is considered the most potent stimulator of tumor metastasis.

Trans-hydrogenated fatty acids are chemically modified to be more solid at room temperature. These fats are typically listed on packaged foods as “partially hydrogenated oil.” These fats can damage DNA and other cell components.

In laboratory animals with implanted human prostate cancer cells, changes in dietary fat content may affect prostate cancer growth (33). In such studies, increasing amounts of linoleic acid enhance the growth of prostate tumors (34). Essential fatty acids affect cell proliferation, immune defenses, tissue invasiveness and metastatic spread of tumors, as well as membrane fluidity, which could affect cell surface receptors and cell-cell interactions (35). Unsaturated fatty acids have also been shown to alter the activity of 5-alpha-reductase, which converts testosterone into dihydrotestosterone, a potent stimulator of prostate tumor cell growth (36).

Hamalainen et al. (37) reduced the total fat consumption of healthy Finnish male volunteers aged 40-49 years from their customary level of 40% to 25% of total calories, and increased the ratio of dietary polyunsaturated to saturated fat. This intervention, which involved no change in energy intake and no deliberate effort to alter dietary fiber, produced significant decreases in both the total serum testosterone and the nonprotein-bound testosterone.

We surmise that certain androgens stimulate prostate cancer growth. It is plausible, therefore, that a diet that results in decreases in specific androgens or changes in the ratios of various sex hormones should impede the growth of prostate cancer (38). Low-fat, high-fiber diets have the potential to reduce circulating levels of certain fatty acids, which in turn may reduce the progression of prostate cancer.

...obesity was shown to significantly increase the risk of fatal prostate cancer compared with ideal weight.

HOW DIET AFFECTS HORMONES

Diet may influence prostate cancer in part by changing the levels of certain hormones (38-41). Androgens are required for the normal growth, maintenance and functional activity of the prostate gland, and early prostate cancer has been shown to be androgen-dependent.

In rats, prostate cancer can be induced by prolonged administration of testosterone. The ablation of androgens has formed the basis for first-line therapy of metastatic prostate cancer. It has also been proposed that hormones play a role in the progression of prostate cancer from silent to clinically significant forms.

Since diet can influence circulating sex steroid hormones, diet and androgens may alter prostate cancer biology via common pathways. Urinary levels of androgens and estrogens were decreased in a group of Caucasian and African American men fed a diet in which fat content was reduced from 40% to 30% of total calories (42). A very low-fat, high-fiber diet has been shown to reduce sex steroid levels in a group of normal men (43). Therefore, changes in sex hormones may mediate in part the effects of diet on prostate cancer growth.

HOW OBESITY AND HORMONES AFFECT PROSTATE CANCER

As sedentary men age, they often experience an increase in fat mass, a decrease in lean body mass and a change in hormone levels. These factors have been shown to increase the risk of prostate cancer. In a study of Seventh-Day Adventists, obesity was shown to significantly increase the risk of fatal prostate cancer compared with ideal weight (44). This association was also noted in the American Cancer Society's study of 750,000 individuals (16).

With aging, the prevalence of benign prostatic hyperplasia (BPH) increases; this is an androgen-dependent chronic disorder (40). Dihydrotestosterone (DHT) formed from testosterone in the prostate and in the testes appears to promote hyperplasia in humans, dogs and rats. Horton et al. (41) found increased levels of circulating DHT in elderly men compared with young men (89 ng/dl vs. 49 ng/dl); in this study, nearly all the elderly men had BPH.

Since the prostate can convert testosterone to DHT, some studies have proposed that increased metabolic conversion of testosterone to DHT may account for the increased DHT levels in elderly men. Therefore, the effects of a high-fat diet on prostate cancer are partially explained by the changes in hormones resulting from that diet and by a decreasing lean body mass (25).

DIETARY FIBER

Dietary fiber promotes the clearance of hormones and fats from the body. Reproductive hormones, including testosterone and estradiol, circulate through the liver and the intestine and back into the bloodstream. Reduction in the level of these hormones may have a dramatic impact on the progression of primary prostate cancer. Plasma testosterone and estradiol levels were found to be lower in middle-aged men eating high levels of dietary fiber from cereals, grains, fruits and vegetables in comparison to men eating a typical American diet (45).

Most Americans eat too little fiber, averaging about 10 grams per day. The National Cancer Institute and other government agencies recommend that Americans eat 25 to 35 grams of dietary fiber per day from cereals, grains, fruits and vegetables. One of the easiest ways to increase your dietary fiber intake is to eat a high-fiber cereal for breakfast (such as All-Bran, Bran Flakes or Raisin Bran) with nonfat milk and fruit. This easy habit will provide a critical 7 to 15 grams of fiber per day. The amount of fiber in each cereal portion is listed on the nutrition label found on the edge of the box. All-Bran can also be used as a supplement by including it in recipes.

This base of fiber intake each day will allow you to obtain additional recommended fiber by eating over 5 servings per day of high-fiber fruits and vegetables. Without eating cereal, it is difficult to get the recommended levels of dietary fiber.

FRUITS, VEGETABLES AND ANTIOXIDANTS

In addition to providing fiber, fruits and vegetables contain properties called micro-nutrients. These vitamin components have the ability to act as antioxidants, protecting the body's cells from potentially cancer-causing oxidation. For this reason, the National Cancer Institute recommends that eating at least 5 daily servings of a variety of fruits and vegetables may help the body fight the onset and progression of prostate cancer (46).

The Process of Antioxidant Defense

Let's examine a common example of oxidation: the browning of an apple when it is sliced and exposed to air. Because the inside of the apple does not contain adequate amounts of antioxidants at its surface to stop the oxidation process, the apple soon becomes brown. The red-colored skin of the apple stops this process by limiting the oxygen that contacts the outside of the apple. Even the inside can stop the process at some point. If you slice away the brown surface of the cut apple, you will find white apple underneath. This process of antioxidant defense is highly developed in humans and its failure is thought to play a part in the aging process and its associated disorders, such as prostate cancer.

A number of anti-tumor phytonutrients are found in fruits and vegetables.

Our bodies have both water-soluble and fat-soluble antioxidant systems. A well-known example of the water-soluble system is vitamin C. We do not make vitamin C in our bodies and have to obtain it from the fruits and vegetables we eat. Today, many Americans eat too few fruits and vegetables to get adequate vitamin C.

Other Antioxidant Systems

Vitamin E is an example of a fat-soluble antioxidant. This antioxidant is found in small amounts in oils, where it stops them from becoming rancid. The rancid taste of stale oils is due to oxidative damage to the oil. In our bodies, cell membranes are made of lipids (another term for fats) and can be protected by vitamin E and other fat-soluble antioxidants. Other well-known antioxidants include beta-carotene and other carotenoids such as lycopene, the red pigment found in tomatoes (see below).

There is a relationship between oxidant damage and prostate carcinogenesis. Recently, androgen stimulation of prostate cancer cells was shown to increase oxidative stress (47). Increased dietary fat can enhance carcinogen-induced prostate cancer through a pro-oxidant mechanism (48-50). What is known about the oxidative properties of individual fruits, vegetables and phytonutrients, including soy protein, is discussed below.

Tomatoes and Lycopene

Lycopene consumption from tomato sauce is associated with reduced risk of prostate cancer (51). One easy way to get lycopene is with a tomato juice drink. It is also found in spaghetti sauce and catsup. There is no recommended specific quantity, but one 6-oz. glass of tomato juice or V-8 per day (remember: low-sodium variety only) will significantly raise lycopene levels in the blood. Eating low-sodium tomato sauces and drinking low-sodium tomato juices is harmless and may be a potentially helpful practice.

Some dietary fat is needed for the efficient absorption of lycopene from the intestine into the bloodstream. By consuming a balanced diet, such as the one recommended here, you will automatically consume enough fat for absorption to take place.

Garlic and Other Allium Vegetables

Garlic, onions, leeks, shallots and chives contain a number of compounds that have been associated with lower incidence of gastric and colorectal cancers (52). The mechanism by which garlic may inhibit tumor growth in humans and animals is unknown.

However, garlic's aqueous extracts, called alliin and allicin, have been found to inhibit human tumor cell proliferation in culture (53, 54). There is as yet no evidence that these substances will reduce prostate cancer growth in animals or humans. However, garlic is one of the oldest natural medicines known to man and can easily be included in recipes or taken as a tablet supplement.

Broccoli and Other Cruciferous Vegetables

Broccoli and other cruciferous vegetables (e.g., Brussels sprouts, cabbage, kale, cauliflower) contain sulforaphane, a compound that increases the activity of enzymes that inactivate cancer-causing chemicals. These vegetables also contain compounds that affect estrogen metabolism, which interferes with carcinogen action (55).

Since most research with cruciferous vegetables has been related to breast and colon cancer, no specific evidence is available that links their importance to prostate cancer. Nonetheless, these dark green vegetables should be included in any general dietary program for cancer prevention. Supplements made with dried cruciferous vegetables have not demonstrated the same efficacy as the whole fresh vegetables.

Phytonutrients

A number of anti-tumor phytonutrients are found in fruits and vegetables. Six such substances are described below:

Sulforaphane: Found in broccoli, the nutrient activates enzymes that inactivate carcinogens found in charred meats (56). You can also reduce these carcinogens by microwaving meats instead of grilling them. Johns Hopkins University researchers have developed a variety of broccoli sprouts having a higher-than-normal concentration of sulforaphane, providing an efficient way to bolster one's diet with anti-carcinogenic nutrients (57).

Indole-3-carbinol: This compound, found in broccoli and other cruciferous vegetables, interferes with the production of estrogens from androgens, and may affect sex-hormone metabolism involved in the progression of prostate cancer (58).

Conjugated linoleic acid: While never studied in humans, in cell culture this substance inhibits prostate cancer growth (59). Conjugated linoleic acid is formed by bacteria on spring grass. When the grass is digested by cows, linoleic acid is found as a minor component of milk and cheese (60). These bacterial strains generating conjugated linoleic acid have been isolated, and this substance has been prepared as a dietary supplement.

Modified citrus pectin: In an animal-model experiment, the metastasis of rat prostate cancer cells to the lung were inhibited by feeding the rats drinking water containing 1% modified citrus pectin (61). More research needs to be completed to determine whether modified citrus pectin has the ability to inhibit human prostate cancer metastasis. This substance has been prepared as a dietary supplement from citrus fruit pulp.

Resveratrol: Found in red wine and in the skin of grapes, this antioxidant has demonstrated anti-tumor activity in cell culture (62).

Cholesterol-lowering agents: In cell culture, it is possible to kill cancer cells by starving them of cholesterol, which is needed to make cell walls and steroid hormones. A number

Spices not only add taste to food — they may also have properties that help fight prostate cancer.

of substances present in soybeans and the skins of citrus fruit can lower cholesterol levels in the body. The active ingredient in some of the most common cholesterol-lowering prescription drugs (Mevacor, Zocor and other so-called statins) can be found in a red-rice yeast called *monascus purpureus* and in oyster mushrooms. While toxicity has limited broad use of the prescription drugs in prostate cancer patients, cholesterol-lowering substances from yeast are not toxic in animals receiving 1,000 times the recommended human dosage (63).

The above examples show that a number of beneficial substances can be found in fruits and vegetables, but there are probably many more cancer-fighting foods that go uneaten. Of the 50,000 to 100,000 edible plant species on earth, humans consume only 150 to 200 of these. Eating rice yeast, fungi, broccoli sprouts and other plants atypical to the diet may help prevent cancer and increase lifespan.

Spices

Spices not only add taste to food — they may also have properties that help fight prostate cancer. Turmeric, found in curry and cumin, gets its yellow pigment from curcumin, a property found to have anti-cancer effects in cell culture (64). Some of the world's lowest rates of cancer occurrence are found in parts of India, where a variety of spices is used. Capsaicin in chili pepper also has anti-cancer properties.

Lemon and Orange Oils

Lemon and orange oils contain limonene and geraniol, components shown to inhibit tumor growth (65). Because these oils are contained only in the peels of the fruit, researchers are looking at ways to include rinds in filtered juices. You can grate some of the peel with a cheese grater to add to recipes. However, modified forms of citrus pectin, found in fruit pulp, have been found in one study to inhibit the spread of prostate tumors in mice (61). Much more study is needed before the benefit of lemon and orange oils is proven in human cases.

Selenium and Vitamin E

Studies suggest that the mineral selenium and vitamin E may be beneficial for prostate cancer patients. In an important study, people with skin cancers received a supplement of 200 micrograms (mcg) per day of selenium from yeast. There was no effect on skin cancers, but the selenium-supplemented group experienced fewer occurrences of prostate and breast cancers (66). As a result of this observation, the National Cancer Institute is supporting a study of selenium's relationship to prostate cancer.

Selenium can also be found in garlic grown in selenium-rich soil. The active compounds in garlic include sulfur-containing molecules where selenium supposedly substitutes for sulfur to exert its beneficial effects.

Vegetable oils and vegetables containing oil are the major natural sources of vitamin E, an antioxidant and an immune system enhancer. While there are no completed studies in which vitamin E is administered for reduction of heart disease or prevention of prostate cancer, in one study of older patients, administration of 200 IU per day of vitamin E resulted in an improved immune response (67). Most nutrition scientists believe that between 200 IU and 800 IU per day constitute an adequate dose of vitamin E. One can only get this amount of vitamin E from supplements.

Calcium and Vitamin D

Some forms of vitamin D have been shown to convert cancer cells to normal cells. This was first observed in laboratory experiments where vitamin D analogs were added to malignant white blood cells. Vitamin D converted these malignant white blood cells to normal cells (68). Vitamin D is involved both in calcium metabolism and in the control of cell growth and death (69). Dietary vitamin D can come from a plant sterol (ergosterol) or from milk and other foods supplemented with the nutrient. Vitamin D can also be produced by the action of the sun's ultraviolet radiation on the skin.

Thousands of vitamin D analogs have been synthesized to maximize cell-normalizing activity. There are currently studies of vitamin D analogs as a treatment for advanced prostate cancer.

Multivitamins are the only firmly recommended way to supplement vitamin D in the diet. Some people worry that the sun exposure required to synthesize vitamin D will cause skin cancer. In fact, the amount of sun exposure needed to induce vitamin D production is far less than that needed to trigger skin cancer.

Based on an unpublished observation of a large group of men, excessive intake of calcium from dairy products or supplements was associated with an increased rate of prostate cancer progression (70). The Recommended Dietary Allowance (RDA) for calcium is 800 mg per day for men. Larger doses have been used in treating osteoporosis.

The manufacturer of a soy formula currently used by many patients (Take Care High Protein Powder — to order, call 800/445-3350) made a reduced calcium version available in Spring 1998. The reduced-calcium product provides 200 mg of calcium in two scoops or 400 mg per day in four scoops. The new product allows men to get the balance of the RDA from diet or supplements. **As of this writing, evidence to implicate calcium in the progression of prostate cancer is inconclusive. More critical and systematic research is required to clarify this issue.**

The 5-fold decrease in prostate cancer mortality in Japanese men compared with those in the U.S. has been attributed, in part, to the high soy protein content of the Japanese diet.

SOY PROTEIN

Compared to men in the U.S., men in most Asian countries have low prostate cancer incidence and mortality rates. Japan, for example, has a prostate cancer mortality rate 5 times lower than that of the U.S. (71). Research suggests that the critical difference may be the Japanese population's staple diet of soy-based foods like tofu, tempeh and soy milk.

The beneficial effects of soy have been attributed to isoflavones, one of several plant pigments found in soybeans. These isoflavones, most significantly genistein and daidzein, have been shown to inhibit the growth of prostate cancer cell lines. Studies show that Asian diets are rich in these cancer-fighting nutrients. In Taiwan, for example, the average consumption of soy protein is 35 grams per day, per capita (4). Genistein and daidzein, and their beta-glucoside conjugates, are present in concentrations up to 3 mg per gram, resulting in an intake of these isoflavones of as high as 100 mg per day. Elsewhere in Asia, the average isoflavone intake is estimated at about 50 mg per day. Blood and urinary levels of isoflavonoids are related to lower incidence of hormone-dependent cancers (72).

Genistein Slows Tumor Growth

In immune-deficient mice implanted with human prostate cancer cells, genistein has been shown to slow tumor growth (73). Observations of prostate cancer cell cultures indicate that genistein may also inhibit the development of a tumor's nutrient blood supply (angiogenesis), a critical requirement for tumor growth and metastasis (74). Fotsis et al. (75) have demonstrated that genistein inhibits the growth of proliferating endothelial cells. In addition, genistein inhibits several other enzymes that regulate cell growth (76-78).

More Proof Required

The mechanisms of action of genistein are still under active study, but its virtual absence from the American diet suggests strongly that this may be an important cancer-preventing substance that can be practically obtained through controlled soy supplementation of the diet.

MULTIVITAMINS AS SUPPLEMENTS

A multivitamin/multimineral will provide adequate amounts of folic acid, most of the B vitamins and the trace minerals needed for overall health. Most supplements, however, do not provide adequate vitamin E or vitamin C. Vitamins E and C need to be taken separately in doses of 400 IU to 800 IU of vitamin E daily and 500 mg to 1,000 mg of vitamin C daily. Beta-carotene and vitamin A, both of which act as strong antioxidants, can be obtained in most multivitamin/multimineral supplements. Beta-carotene can be converted to vitamin A, but will not cause vitamin A toxicity that can result from taking as little as 25,000 IU of vitamin A daily for prolonged periods. Remember that a multivitamin/multimineral is not a substitute for a healthy diet, but is a good basis for any supplementation program.

Diet and Prostate Cancer in African American Men

African American men suffer a disproportionate burden from prostate cancer when compared with the White male population. Prostate cancer is the leading cause of malignancy in African American men.

STUDIES CONFIRM THREAT

The fact that prostate cancer hits African American communities particularly hard has been well documented. Three national cancer surveys; four registries; the Surveillance, Epidemiology and End Results (SEER) of the National Cancer Institute; and surveys completed by the American College of Surgeons provide a solid database from 1949 to the present (79). The latest SEER statistics illustrate the point: African American men have a 34% greater chance of being diagnosed with prostate cancer and a 123% greater chance of dying from it than White men (80). Epidemiological studies of prostate cancer in African American men suggest the disease is far more devastating in these men independent of diagnostic stage or socioeconomic status (81, 82).

EXACT REASONS UNKNOWN

The exact reasons for the discrepancies in incidence and mortality between African American men and White men is unknown, but it appears that African American men are either exposed to different cancer promoting agents or they are more susceptible to prostate cancer-promoting events (83, 84). Whittemore et al. (17) recently reported that among groups of men who consume high amounts of saturated fat, African Americans consume the most, compared to Whites, Chinese Americans and Japanese Americans. Since the prostate is a target for hormonal action, there have been many attempts to demonstrate abnormalities in serum hormone levels, principally androgenic and estrogenic steroids, in prostate cancer patients.

Consistent with the hormonal hypotheses is the report by Ross et al. (85) that college-aged African American males, who have an extremely high prostate cancer risk relative to other populations worldwide, have significantly higher serum total and nonprotein-bound (biologically available) testosterone concentrations than do corresponding White American males.

The goal is to change your taste buds permanently so that unhealthful foods are no longer appealing.

Putting It All Together

The diet and lifestyle plan described below is supported by the studies reviewed in this paper, plus the existing public health initiative, “Healthy People 2000” (86), which emphasizes increased intake of fruits, vegetables, cereals and grains within a nutrient-dense diet that is low in fat and high in fiber. The intervention diet proposed here is as follows:

- Decrease percentage of dietary fat to 15% of total energy intake
- Increase fruit and vegetable servings to 5 or more per day
- Increase dietary fiber intake to 25 to 35 grams per day
- Increase soy protein intake to 40 to 60 grams per day

Practical Approaches to Changing Your Diet and Lifestyle

Some practical hints for eating less fat and fewer calories have been useful to prostate cancer patients seeking nutritional advice from CaP CURE. Achieving the above nutritional goals can be difficult, since food is sold on the basis of taste, cost and convenience. Many foods are adulterated with unnecessary fat simply to enhance the taste. By cutting your intake of foods with hidden fats, you will also cut your total calorie intake. You should also be able to supplement your diet with two servings of soy protein per day without gaining weight. If you simply add soy protein to your diet without making any other changes, you are likely to gain weight.

Before implementing any of these recommendations, check with your doctor and be sure you have some excess body fat to work with. If you are malnourished due to advanced prostate cancer, then this diet must be modified significantly to work well. If you have been given androgen ablation therapy with GnRH agonists or androgen-receptor antagonists, then this diet will help you avoid gaining fat. You will gain some fat, however, as your muscle mass decreases secondary to the effects of these hormone therapies.

In previous studies, men with advanced prostate cancer gained weight to 10% above their starting weight one year after beginning androgen ablation therapy (87). This was an average, and some men gained more weight. The following advice will help to keep you from gaining this extra weight.

Keeping It Simple

The suggestions outlined below are simple and easy to remember. A gradual change is like stretching a rubber band; it can always jump back to its old position. The recommended changes below are like breaking a rubber band. The goal is to change your taste buds permanently so that unhealthful foods are no longer appealing.

Minimize Nuts

The first step is to reduce the fat in your diet. To do this, begin by **minimizing the consumption of nuts of all kinds**, including peanuts, macadamia nuts, peanut butter and pistachios. These nuts are high in fat. It is true that they contain monounsaturated fatty acids in common with olive oil and avocados, but to cut fat calories, you have to cut the fat.

It is true that if you keep total calories constant while substituting olive oil, nuts or avocados for dairy and meat products, your cholesterol levels will fall. Also, monounsaturated fatty acids are neutral in terms of stimulating cancer growth compared to polyunsaturated fats, which effectively enhance tumor growth, as reviewed earlier.

If you are confident you can burn off 140 calories per tablespoon of olive oil, go for it — and carefully read the exercise section below. For some patients who have reduced muscle mass, three tablespoons of olive oil is all that stands between losing a pound a week or staying the same weight.

Limit/Eliminate Salad Dressing

Consider giving up salad dressings made with oil. Switch to wine vinegar, rice vinegar, balsamic vinegar or lemon. You may also mix mustard and rice vinegar to make a Dijon-style dressing. Some vinegars now have various spices or fruits mixed into them to enhance their flavor. The key to using fat-free vinegar is to make the salad out of dark green, leafy lettuce with plenty of taste while adding different ingredients such as red pepper, green pepper, alfalfa sprouts, cucumbers, etc.

By making the salad tasty, you won't rely on the added taste of the salad dressing. For example, experiment with lettuces other than Iceberg lettuce. Iceberg lettuce can be considered "Italian dressing-deficient," because you have to douse it in dressing to liven up the watery taste. It is also not a good source of micronutrients such as folate, which are found in great amounts in darker green lettuces. Remember to exclude beans and croutons from your salad, as they add extra calories. Practice these habits going through a salad bar and you will end up with a much healthier meal.

Hold the Mayo . . . and More

Consider giving up mayonnaise, margarine and butter. Did you know that ultra fat-free margarine is 100% fat? There are 5 calories per serving and 5 calories from fat. The U.S. Department of Agriculture says that if something has less than 0.5 grams of fat per serving (which is 5 calories), it can be called fat-free. This is the only place in mathematics that you can round down from 0.5 to 0. You can substitute fruit jam for margarine in the morning and eat your bread warm so that it is moist. The taste is different, but using margarine, butter and mayonnaise is an acquired taste. Even a strict Pritikin adherent gets about 10% fat calories, so you are in no danger from fat deficiency!

The most important thing you can do to lower your dietary fat and calories is to consider giving up red meat.

The Key to Lowering Dietary Fat — No Red Meat

The most important thing you can do to lower your dietary fat and calories is to **consider giving up red meat**. This includes veal, beef, pork and lamb. For most types of red meat, even when you cut away the visible fat, fat lurks between the muscle fibers. A 9- to 14-ounce piece of prime rib served in most steak houses and restaurants can be more than 1,200 calories and 50 grams of fat. This adds up to all the calories and fat needed by an average five-foot-tall woman for the whole day and more than half the calories needed by an average five-foot-ten-inch-tall man. When the USDA talks about a serving of meat, they are referring to a 3-ounce portion — which is rarely served in restaurants.

Consider making red meat a rare part of your diet or consider even giving it up entirely. If you've been told you need to eat red meat for its iron content, be assured that most multivitamins contain all the iron you need. You can give up red meat for good.

Some Seafood Goes

Among the food choices classified as seafood, you should **consider giving up salmon, trout and catfish**. These are high-fat, farm-fed fish that sit around all day in fish tanks eating fishmeal. They don't swim a lot or catch other fish. They just sit around and get fat. Ocean-caught salmon is lower in fat and can be found in some stores and restaurants for part of the year. Most of the salmon purchased in stores is farm-fed.

No Cheese, Please

Consider minimizing or giving up all cheese and cheese pizza. Cheese is between 60% and 80% fat. Fat-free cheeses are now available in stores, but these so-called fat-free cheeses suffer from the same problem as fat-free margarine and are cheese foods, not real cheese. You can have some real cheese on occasion. Your body will metabolize it. But try to avoid making it a regular part of your diet. In other words, don't be fooled into thinking you are adding protein to your turkey sandwich by adding a cheese slice.

Say Goodbye to Nonfat Yogurt and Ice Cream

Consider minimizing or giving up desserts of nonfat yogurt and ice cream. Yogurt couldn't sell in this country until it was made to taste like ice cream. The fruit added at the bottom has the equivalent of 16 teaspoons of sugar or about 130 refined sugar calories. Not only does that add up to a lot of refined sugar that the body can turn into fat, but the eating behavior associated with nonfat yogurt is exactly what you find with ice cream. Yogurt and ice cream are comfort foods and relaxing habits. They are just the type of foods that are easy to reach for when you feel stressed. The simple solution is to keep them out of your refrigerator. The so-called nonfat yogurt is the type you should avoid. Plain unsweetened yogurt can be eaten alone or on a baked potato as a substitute for sour cream.

All Is Not Lost

If you think these suggestions leave you with nothing to eat, here's the good news: By following the above strategies, you can still have the white meat of chicken or turkey (just breast, not dark meat), any white fish (halibut, swordfish, scrod, cod, sole, ahi tuna, canned tuna in water, etc.) and shrimp, scallops, crab, clams and lobster — as long as they are not deep-fried. You can broil or roast these or put them on a skewer over the barbecue in the summer.

A Quick Review

To review, eliminate the following from your diet:

- Nuts, including peanuts, macadamia nuts, peanut butter and pistachios
- Salad dressings made with oil
- Mayonnaise, butter and margarine
- Red meat, including veal, beef, pork and lamb
- Fatty fish, including salmon, trout and catfish
- Cheese and cheese pizza
- Nonfat yogurt and ice cream

It will take time and self-discipline to limit — and eventually eliminate — these items from your diet. You've had a lifetime to develop eating habits, so it will take time to break the negative ones. Make eliminating each of these from your diet a goal to work toward and don't give up.

Sizing It All Up — Portions Count

Portion size counts. For breakfast, try eating premeasured instant oatmeal and a full 8-oz. glass of nonfat milk or nonfat soy milk and half a grapefruit. Another healthy breakfast would consist of two to three hard-boiled or poached eggs with as little yolk added as possible (that's where the cholesterol and the fat are) along with an English muffin and fruit jam. One serving of bran cereal with nonfat milk and a banana is also a satisfying breakfast.

If you hate to eat breakfast, have a soy protein supplement. Keep a baggie filled with soy protein powder and a container of juice in the back seat of your car and drink the combination in case you forget a meal or get hungry on the road.

For lunch, try a half to a full sandwich (depending on whether you are tall or short) made with any kind of bread (don't sweat the small stuff) and filled with water-packed tuna, white meat of chicken or white meat of turkey. You can use mustard and relish but no mayonnaise in the sandwich. For a change, you can have a salad with the white meat cut up on top. Supplement this with a piece of fruit.

An easy way to begin to enjoy exercise is to take a brisk walk in the morning or after dinner.

Mid-afternoon, you should have another soy protein drink. This afternoon snack will counteract that low-energy feeling in the afternoon and make you less likely to overeat at dinner.

Dinner consists of three components. Start with either 3 oz. (shorter people) or 6 oz. (taller people) of white meat of chicken or turkey, white fish or shrimp, scallops, crab, clams or lobster. You should have one-half cup (shorter people) or one cup (taller people) of rice, pasta, potatoes, beans, corn or peas (starchy veggies) and one cup of vegetables (such as carrots, asparagus, broccoli, Brussels sprouts or string beans). Finally, add a large salad with no beans or croutons and wine vinegar, rice vinegar or balsamic vinegar instead of salad dressing. If you are hungry after dinner, either go for a walk or have some air-popped popcorn with no oil and no salt. Don't buy the microwave popcorn — there is a block of vegetable fat in each package. Don't buy the artificial fat spray to spray on your popcorn. You will just pollute your taste buds and make it harder to break your high-fat habits.

It's Been Proven Successful

The above diet has been successfully used with many prostate cancer patients. It meets or exceeds the fat reduction advice contained in most government recommendations for diets in healthy populations where a guideline of 30% or less is used. The above diet clearly provides less than 30% of total calories from fat and falls within the official recommendations.

Eat healthy snacks — fruits and vegetables — to increase phytochemical intake. Using garlic in cooking and drinking 6 to 8 cups of green (not black) tea may be helpful. Also remember to drink 8 full glasses of water, and chew each bite of food slowly and thoroughly to help your digestive process. (You will eat less this way, too.)

Exercise and Stress Reduction

In many cases, exercise is also important for weight loss and increased muscle mass. Both aerobic exercise and weight lifting (or heavy-resistance exercise) can be incorporated. An easy way to begin to enjoy exercise is to take a brisk walk in the morning or after dinner. Always consult a physical therapist before starting your exercise program if you have any aches or pains.

Lifestyle changes should also include stress reduction, which will occur to some extent as the result of more frequent exercise. Transcendental meditation, visual imagery, Tai Chi and other relaxation methods can be very valuable additions to the diet and exercise program described above.

Other Nutritional Approaches

Many other nutritional approaches have been suggested for prostate cancer prevention and treatment. The following is a partial list of such approaches, with a summary of the evidence for each. You will have to decide, together with your physician, which, if any, of these substances is right for you. Many of the following are classified as dietary supplements or natural medicines that can be taken in addition to the diet described above.

Soy

Soy protein isolate powders containing the ingredient SUPRO can be obtained in many nutrition stores and whole food markets. One product, called “Take Care,” is a high protein, flavored powder that can be mixed with juice, water or other ingredients for a flavored drink. A soy protein isolate supplement for home cooking is also available. (These items can be obtained by calling 800/445-3350. Be sure to order the low-calcium product.) Two scoops of these products taken twice daily will provide 40 gm of soy protein and approximately 40 mg of isoflavones rich in genistein.

Green Tea

Consumption of 3 to 10 cups of green tea a day has been associated with reduced rates of common forms of cancer. Green tea contains antioxidants called polyphenols (88). Research completed in 1997 shows that certain polyphenols (ECGC) provide greater antioxidant protection in cell cultures than vitamin C or vitamin E (89). The same benefit does not seem to accrue from drinking black tea, but more research is needed before recommendations can be made about the role of tea in prostate cancer prevention.

Saw Palmetto in Prostate Health

Saw Palmetto consists of the partially dried, ripe fruit of a low scrubby palm that grows in the southeast U.S., from South Carolina to Florida. It was a commonly available medicine from 1906 to 1950 and was used for a variety of genitourinary problems. Studies in Europe have shown that an extract of the fruit can reduce the uptake of testosterone or DHT by 40% (90) which, in turn, will reduce the proliferation of normal or malignant prostate cells. Studies in the European literature demonstrate beneficial effects of this product on urinary flow rates in men with benign prostatic hyperplasia (BHP). This product is supposed to reduce the production of dihydrotestosterone from testosterone in the prostate. This effect, however, has not been scientifically demonstrated, and no studies show that it has beneficial effects in prostate cancer.

The nutrition studies supported by CaP CURE are attempting to define new strategies for using diet and lifestyle changes to prevent the progression of prostate cancer.

Shark Cartilage

No evidence exists to show that this natural product helps patients with prostate cancer. However, some information suggests that a component of shark cartilage might reduce the development of blood vessels (angiogenesis) that feed tumors and tumor metastasis. The fact that the shark lacks a sophisticated circulatory system is indirect evidence for this material's anti-angiogenic activity (91).

Hormone Ablation and Nutrition

In many patients with prostate cancer, medications are used to decrease sex hormones. This hormone ablation therapy refers to treatment with Lupron (LHRH antagonist) with or without anti-androgens (Flutamide, Casodex). This medical treatment has several adverse effects on the nutritional status of prostate cancer patients.

First, muscle mass is decreased and fat mass is increased. In the absence of a healthy diet, men usually gain weight to about 110% of their usual weight one year after hormone ablation begins (87). While not yet proven, it seems possible that men treated with these agents can build muscle through careful physical training. As a result, the weight and fat gain observed in sedentary men receiving hormone ablation therapy can be avoided. Ongoing studies supported by CaP CURE are evaluating the degree to which diet and exercise can prevent fat gain and muscle loss during this treatment.

Osteoporosis, or thinning of the bones, is another problem faced by patients undergoing hormone ablation therapy. Exercise can help avoid this problem, as can the consumption of soy protein, which has been shown to strengthen bone in postmenopausal women (92). Ongoing research supported by CaP CURE will examine the effects of soy on bone mass in men with prostate cancer. Also, many patients have been advised to supplement their diets with calcium in order to prevent osteoporosis. Please refer to the section on calcium and vitamin D for more information. Remember, the evidence linking calcium and the worsening of prostate cancer is not yet conclusive. Previously, osteoporosis had not been adequately assessed in prostate cancer patients undergoing hormone ablation therapy.

Nutrition During and After Chemotherapy and Radiation

Both chemotherapy and radiation therapy fight prostate cancer by causing local oxidative damage within tumor cells. Many oncologists and radiation therapists advise patients to avoid antioxidants and vitamin pills during their chemotherapy or radiation therapy for fear of compromising their treatment — an unproven recommendation that appears to be in direct conflict with the cancer-fighting potential of antioxidants.

The effects of antioxidants on patients undergoing chemotherapy and radiation therapy is being actively examined in research studies, including several sponsored by CaP CURE. One important CaP CURE-sponsored study is carefully examining the effects of antioxidant supplements on both therapeutic response and the toxicity of the radiation treatment.

The Argument for Change

CHANGING DIET AND LIFESTYLE FOR PROSTATE CANCER PREVENTION/TREATMENT

Is there definitive proof that changes in diet and lifestyle can prevent prostate cancer? Not yet. But the good news is that you can do something right now.

If nutrition becomes a proven factor in the disease process, physicians and their patients will more openly accept its importance and, one hopes, millions of lives can be saved.

Here are facts to consider supporting the case for good nutrition:

- Improved nutrition is not harmful (unless you take toxic amounts of vitamins).
- It is something you can do now without waiting for additional research. Advice to stop smoking was given long before we could prove the connection between smoking and lung cancer.
- Improved nutrition usually improves overall quality of life. You may look younger, wear your clothes better and have an extra bounce in your step if you adopt a healthier diet.
- It may help prevent prostate cancer progression. We do not know this yet, but we are working hard to complete studies that will provide the evidence that nutrition makes a difference.

We urgently need to address two problems:

- Most doctors are not up-to-date on current nutrition studies and therefore will not regularly urge or reinforce nutritional changes in their patients.
- While scientific information that supports the influence of nutrition on prostate cancer is suggestive, solid proof is still required. If nutrition becomes a proven factor in the disease process, physicians and their patients will more openly accept its importance and, one hopes, millions of lives can be saved.

Conclusion

THE ROLE OF CaP CURE IN SUPPORTING NUTRITION RESEARCH ON PROSTATE CANCER

The nutrition studies supported by CaP CURE are exploring new strategies for using diet and lifestyle changes to prevent the progression of prostate cancer. The evidence presented in this report strongly suggests that the same dietary factors involved in the development of prostate cancer may be involved in the growth and metastasis of prostate tumor cells following radical prostatectomy.

Nutrition may also be an important nontoxic adjuvant therapy for patients who have had treatments for clinically localized prostate cancer and are at a high risk for disease recurrence. In addition, many patients elect not to undergo aggressive therapy for their prostate cancer (93), instead opting for a period of “watchful waiting.” These men could benefit from nutritional therapy to slow the progression of their prostate cancer.

CaP CURE-sponsored studies have shown that sound nutrition and regular exercise offer tangential benefits for the prostate cancer patient as well. Diet and exercise can help stimulate the immune system, help the body more quickly recover from chemotherapy, radiation therapy and hormone therapy, and improve general quality of life.

Still, only a comprehensive, long-term study can prove the potential for nutrition to directly treat or prevent prostate cancer. Before such a clinical study is organized and funded, we must develop more information on the relationship between nutrition and prostate cancer. Variables such as clinical presentation, sites of involvement, co-morbid diseases affecting detection and the age of the affected population could interfere with the success of a trial.

Through CaP CURE, we are planning three studies to better evaluate the role of nutrition in prostate cancer patients. These studies will have the following components:

Nutritional Biomarkers: It is important to verify that patients participating in research are complying with the dietary and exercise guidelines required by the study. This can be achieved by tracking indicators related to diet. In our ongoing studies of soy protein, for example, we measure urine levels of isoflavones to confirm that soy protein is ingested. Muscle mass, body weight and cholesterol levels also offer proof of lifestyle change.

Statistical Power: It is not possible to answer in a single study every question relating to the relationship between nutrition and prostate cancer. Each study will target one specific aspect of the relationship, providing more accurate results.

Clinical Relevance: Each study will have an important application to patients. If some aspect of diet is useful, research on the means to effectively deliver this element into the diet will be conducted. CaP CURE is committed to making information on new nutritional products available so that they can be incorporated into the diets of prostate cancer patients. CaP CURE is also working to make healthy recipes and food information available to prostate cancer patients.

Finally, if intensive nutrition intervention is found to delay prostate cancer progression in these studies, this may have implications for primary prevention of prostate cancer in the general population. The fact that the incidence of “latent” or microfocal prostate cancer is similar in Japanese and American males, but that the clinical incidence differs markedly and may be associated with dietary habits, implies that dietary factors may be important for the progression from subclinical to clinical prostate cancer. A positive finding in these studies will form the basis for further studies investigating whether very low-fat, high-fiber diets enriched in soy protein may prevent the development of prostate cancer.

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