UCSF Helen Diller Family
Comprehensive
Cancer Center

advancing health worldwide

Health and Wellness:
Living with Prostate Cancer

PART 2: DIET RECOMMENDATIONS

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This guide was developed as a companion to complement the Prostate Cancer Foundation's **"Health and Wellness: Living with Prostate Cancer"** document. For a broader introduction and our overarching lifestyle recommendations, please see this document at PCF: **https://www.pcf.org/guide/** or at UCSF: **https://urology.ucsf.edu/lifestyle-studies**

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* All words with an asterisk (*) are defined in the glossary on page 25.

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NUTRITION & PROSTATE CANCER

A healthy diet may reduce the risk of developing prostate cancer and possibly prevent or delay prostate cancer progression. Good nutrition also reduces the risk of developing other major chronic diseases, such as diabetes, obesity, hypertension and heart disease. It is estimated that one-third of cancer deaths in the United States can be attributed to adult diet and physical activity, including their role in obesity.[1] Scientific evidence suggests that differences in diet and other lifestyle behaviors, such as exercise and smoking, may account for much of the variability in the rates of major chronic diseases across countries, including many cancers.[2]

Guidelines for a Healthy Diet & Lifestyle

- **Plant-based diet.**
  - o Rich in fruits and vegetables.
  - o High fiber – beans/legumes, nuts, seeds, whole grains.
- **Include lean protein with every meal** – aim to include plant protein daily.
  - o **Plant proteins:** beans/legumes, soy products (e.g., edamame, tofu, tempeh).
  - o **Lean animal proteins:** fish, skinless poultry.
- **Choose healthy fats** when cooking/baking, on salads, or at the table, such as extra-virgin olive oil, nut oils (e.g., macadamia nut oil, almond oil), avocados, and nuts/seeds.
- Choose **whole grains** such as quinoa, wild rice, brown rice, oatmeal, amaranth, and teff, over processed and refined grains.

- **Limit added sugars.**

- **Drink a sufficient amount of water** (~ 8 cups/day).

- **Do not drink sugar-sweetened beverages.**

- If you choose to drink alcohol, **limit to 2 drinks per day** or fewer for men (one drink or fewer per day for women).

- **Be physically active.** Build up to 150 minutes/week or more of aerobic exercise and 2-3 sessions/week of resistance exercise, balance training, and flexibility exercises.
- Achieve and/or **maintain a healthy weight**.

Food Category	Summary	Recommendation
Fruits and vegetables	One serving = ½ cup fruit or vegetable, 1 cup raw leafy greens, ¼ cup dried fruit or vegetable, 6 oz. vegetable juice. Eat 1 serving or more vegetables with every meal and snack.	At least 5, preferably 8-10, total servings daily 5 or more vegetable servings/day 2-3 fruit servings/day
Fiber	Choose breads with 3 or more grams of fiber per slice. First ingredient on the label should be whole or sprouted grain flour, not white flour, unbleached white flour, or enriched wheat flour. Note that white whole wheat flour is a whole grain – the "white" refers to the type of wheat. Examples of whole grains include oats, barley, brown rice, quinoa, amaranth, bulgur, millet, wild rice, buckwheat, spelt, and teff.	30-45 grams daily This goal can be achieved by meeting your fruit and vegetable goal plus one serving of chia/flax seeds (1 Tbsp), one serving of legumes (½ cup cooked), or at least two servings of whole grains (1 cup cooked).
Refined carbohydrates and added sugars	Dietary sources include products made with refined flours (for example: white bread, white rice, white pasta) or refined grains, alcohol, sodas, drinks containing added sugars, and desserts, such as candy, cookies, cakes, and pastries.	Limit or avoid consumption.

Plant-Based Diet

A plant-based diet consists primarily of fruits, vegetables, beans/legumes, nuts/seeds, whole grains, and other plant protein sources. Meat, dairy, eggs, fish, and other seafood can still be consumed, but should make up a small proportion of the total food. For example, an ideal plate is filled with ½ or more vegetables and fruits, ¼ lean protein sources, and up to ¼ starchy vegetable (e.g., sweet potatoes, winter squash, corn) or whole grains. Healthy fats are also an important component; at least one serving should be included each day (1 ounce of nuts, 1 Tbsp of olive oil, ⅓ medium avocado).

A plant-based diet is associated with improved cardiovascular health, lower risk of diabetes, healthier body weight, and lower risk of death. Moreover, emerging science indicates that a lifelong commitment to a plant-based diet may lower a man's risk of developing prostate cancer and, after prostate cancer diagnosis, reduce the risk of cancer recurrence or progression. Preliminary evidence suggests that dietary and lifestyle changes are associated with a decrease in PSA and prostate cancer cell growth in men on active surveillance for low risk prostate cancer.[3] One study assessing the risk of recurrence of prostate cancer found that a plant-based diet, in combination with stress reduction and moderate physical activity, may slow prostate cancer progression, but these results are not definitive.[4] PSA doubling time, a measure of risk of prostate cancer recurrence, increased from 11.9 months (pre-study) to 112.3 months (after the study), indicating slower progression. Additionally, individuals who made comprehensive lifestyle changes improved their quality of life.[5]

Read below for more information about specific components of a plant-based diet.

Fruits and Vegetables

- Healthy diets should include plenty of vegetables and fruit; aim for 5 or more vegetables and 2-3 fruits daily.

- Fruits and vegetables contain vitamins, minerals, fiber, and phytonutrients* (for example: carotenoids, lycopene, indoles, isoflavones, and flavonols).

- Vibrant, intense COLOR is one indicator of phytonutrient* content.

- Consumption of fruit juice should be minimal, if consumed at all. Smoothies comprised of whole vegetables and fruits are fine to include in the diet.

- The fiber in juice has been removed, and fruit juices are high in quickly-digested carbohydrates. These carbohydrates cause a spike in blood sugar without creating a sense of fullness, and can lead to over-eating. The fiber in whole fruits and vegetables slows the digestion of natural sugars and fills you up, making it hard to eat too many calories from these foods.

Healthy Plate Diagram

Fill your plate with approximately 50% (or more) vegetables, 25% (or more) lean protein, and up to 25% starchy vegetable or whole grain.

Include at least one serving of healthy fats (1 ounce of nuts, 1-2 Tbsp olive oil, ⅓ medium avocado) each day.

VEGETABLES AND FRUITS

LEAN OR PLANT PROTEIN SOURCE

STARCHY WHOLE VEGETABLES/ VEGETABLES

HEALTHY FATS

Plant Foods & Prostate Cancer:

Food & Food Compound	Function	Dietary Sources	Recommendation
Allium vegetables	Rich in flavonoids and organosulfur compounds that have anti-cancer properties	Onions, garlic, leeks, chives, scallions, shallots	Populations who consume high amounts of allium vegetables have been reported to have a lower rate of overall cancer.[6-9] More research is necessary for a formal recommendation regarding their effects on the risk of prostate cancer, but evidence suggests regular consumption of these vegetables benefits overall health.
Beta-carotene-rich fruits & vegetables	Converted to vitamin A; antioxidant* activity helps protect cells from damage	Carrots, cantaloupe, sweet potatoes, winter squash, mango	The protective effects of fruits and vegetables against cancer may be related to high levels of carotenoids.[7, 10-15] Higher plasma carotenoids may contribute to a reduced risk of prostate cancer, but no association was observed between carotenoids and disease progression.[16] More research is necessary for a formal recommendation regarding prostate cancer, but evidence suggests that consuming these vegetables daily is good for overall health. Do not take a beta-carotene supplement.
Cruciferous vegetables	Rich in vitamins, minerals, and antioxidants*; glucosinolates, such as indole-3-carbinol and diindolylmethane (DIM) offer anti-cancer activity[17,18]	Arugula, broccoli, Brussels sprouts, cabbage, cauliflower, collard greens, kale, horseradish, kohlrabi, mustard greens, radishes, rutabaga, turnips, turnip greens, watercress	Include these vegetables in your diet daily.

Obtain nutrients from foods, not supplements

Flaxseed and lignans	Good source of omega-3 fatty acids and fiber; contains protein, calcium, potassium, B vitamins, iron, and boron May block tumor growth, enhance immune function, and inhibit angiogenesis*[19,20]	Flaxseed	Consider eating 2 Tbsp ground flaxseed daily. Flax can have a laxative effect so increase consumption gradually. Sprinkle into various foods and beverages, including hot cereals, tomato sauces, smoothies, or grains. Opt for ground flax seeds to increase bioavailability rather than whole flax seeds, flax seed oil, or flax supplements. Flax seeds may be ground in a coffee grinder, blender, or food processor. Store ground flax in the refrigerator or freezer.
Lycopene-rich fruits and vegetables	Lycopene is an antioxidant* that scavenges free radicals to reduce tissue damage; inhibits cell proliferation and increases apoptosis*[21-25]	Tomatoes (raw and cooked, such as tomato paste, sauce, juice, etc.), guava, watermelon	Include dietary lycopene from foods daily; do not take a lycopene supplement. Cooked tomato products or juices contain higher amounts of lycopene. Lycopene is best absorbed when consumed with fat, such as olive oil, avocado, or nuts. For example, marinara sauce cooked with olive oil is a good source of lycopene.
Soy and Isoflavones (i.e., genistein, daidzein)	Rich nutrient profile – good source of protein, fiber, calcium, and B vitamins Antioxidant*-rich; may prevent prostate cancer progression[26]	Soybeans, edamame, tofu, tempeh, miso, natto, soy milk, and soy nuts	Research suggests that soy may lower the risk of prostate cancer and inhibit prostate cancer progression, but more conclusive evidence is needed. Include soy regularly in the diet. Soy foods, such as those listed, are preferred over processed soy products using soy protein isolate or soy isoflavone extracts. Soy supplements or isoflavone extracts are not recommended.

Organic Produce

Organic fruits and vegetables have fewer pesticides, lower levels of total pesticides, and less overall pesticide toxicity than fruits and vegetables grown with chemicals. Although more research is needed, recent evidence indicates a significant increase in antioxidants* in organic and sustainably-grown foods versus conventionally-grown foods.[27-30]

Listed below are produce with the most and least pesticide contamination, both in terms of number of pesticides used and the level of pesticide concentration on an average sampling. Thus, for the fruits and vegetables shown on the most contaminated list, it is wise to buy organic. Alternatively, if organic choices are not available, you may want to consider substituting with produce least contaminated by pesticides.

It is most important, however, to eat a wide variety of fruits and vegetables every day – organic or conventional.

Produce most contaminated by pesticides:	Produce least contaminated by pesticides:
Strawberries	Avocados
Apples	Corn
Nectarines	Pineapple
Peaches	Cabbage
Celery	Sweet peas
Grapes	Onions
Cherries	Asparagus
Spinach	Mangoes
Tomatoes	Papayas
Bell peppers	Kiwi
Cherry tomatoes	Eggplant
Cucumbers	Honeydew

**Adapted from Environmental Working Group – A Shopper's Guide to Pesticides in Produce.[31]

SUGARS AND THE ROLE OF INSULIN*

High-sugar foods (e.g., candy, desserts, soda, etc.) are usually highly processed and refined, low in nutrient value, and low in dietary fiber. In addition, these foods may increase serum insulin* and serum insulin-like growth factor-I (IGF-I) levels, which appear to stimulate cancer cell growth.[32-40] Excessive sugar consumption is also linked with heart disease, diabetes, fatty liver, and weight gain.

While more research is needed to clarify the relationship between sugar and cancer, focus on fueling your body with nourishing foods – vegetables, fruits, beans/legumes, nuts/seeds, plant oils, whole grains, and lean protein sources. Avoid added sugars.

Sugars & Insulin* – The Bottom Line

To help control your insulin* level:

- Eat a **high-fiber diet** with limited refined/processed foods.
- Choose **whole grain** over refined grain products. When eating carbohydrate-rich foods (i.e., starchy vegetables, whole grains, and products made with whole, preferably sprouted, grains, such as bread, cereal, crackers, and pasta), combine them with lean protein & healthy fats.
- Include **healthy fats** in every meal, particularly those rich in omega-3 fatty acids (see below).
- Limit or **avoid alcohol**.
- **Exercise regularly.** Aim for at least 150 minutes per week.
- Maintain and/or achieve a **healthy body weight**.

Limit or eliminate

Sweeteners

What is a recommended sweetener? There aren't any. But we realize that elimination of all sweeteners may not be feasible. While added sugars are not recommended, this chart is included to help illustrate the glycemic differences between sweeteners. The glycemic index (GI) measures the rate and degree to which a particular food raises blood glucose levels. As noted above, having elevated glucose levels is detrimental to your health. A low GI-based diet improves diabetes control, reduces the risk of heart disease, controls appetite, and facilitates weight loss.[41-44]

Sweetener	Glycemic Index**
Stevia	0
Xylitol	7±7
Agave nectar	15±10
Coconut sugar	35
Maple syrup	54
Honey	55±5 (raw honey has a much lower GI than pasteurized honey)
White sugar	80

**Note that there is GI variability within an individual and among individuals; hence, the range for some GI values.

DIETARY FATS

Some research has linked diets high in fat with various health issues, including prostate cancer. Western diets, which are characterized by high fat content, particularly animal fat, are regularly associated with prostate cancer. Additionally, Western diets tend to result in higher testosterone values, which is concerning for men with sex-hormone dependent prostate cancer.[45] More research is needed to further elucidate the effect of dietary fat on the risk of prostate cancer as well as the specific mechanisms involved.

The type of fat is significant, and is likely of greater importance than total fat intake.

Fatty Acid	Recommendation – include in diet	Recommendation – limit or eliminate from diet	Dietary Sources
Saturated fatty acids		Reduce or eliminate red meat and whole milk dairy products. Remove the skin on poultry before eating.	Red meat, poultry skin, baked goods, and whole milk dairy products, including butter, cheese, and ice cream
Trans fatty acids		Avoid trans or hydrogenated fats. Look for "partially hydrogenated" oil in the ingredients list to determine if an item contains trans fats. Products labeled "trans fat free" may still contain up to 0.5 mg per serving.	Margarine, fried foods, commercial peanut butter, salad dressings and various processed foods, including breads, crackers, cereals, and cookies
Monounsaturated fats (omega-9 fatty acids)	Include these healthy fats daily. We recommend eating nuts daily; limit consumption to ¼ cup per meal or snack to keep calorie intake reasonable.		Extra-virgin olive oil, almond oil, canola oil, macadamia nut oil, almonds, hazelnuts, pecans, pistachios, and avocados

Fatty Acid	Recommendation – include in diet	Recommendation – limit or eliminate from diet	Dietary Sources
Polyunsaturated omega-3 fatty acids: **Eicosapentaenoic Acid (EPA)** **Docosahexaenoic Acid (DHA)** **Alpha-linolenic acid (ALA)**	Include these healthy fats daily through diet and/or supplements. Consume fish or fish oil supplements at least twice weekly to obtain an adequate amount of EPA and DHA. When possible, choose wild, cold-water fish. If you choose to use a supplement, opt for one that is highest in EPA and DHA concentration.	Avoid swordfish, shark, king mackerel, and tilefish due to high mercury levels.	Cold-water fish (for example: salmon, sardines, black cod, trout, herring) Flaxseeds, chia seeds, walnuts, hemp seeds, and pumpkin seeds
Polyunsaturated omega-6 fatty acids: **Arachidonic acid** **Linoleic acid**	If you currently use these oils for cooking, we recommend substituting with a mono-unsaturated fatty acid-rich oil.	Reduce or eliminate red meat and whole milk dairy products. Limit consumption of linoleic acid-rich oils.	Red meat, poultry skin, butter, egg yolks, whole milk, and whole milk dairy products (i.e., cheese, ice cream) Common vegetable oils, such as corn oil, safflower oil, sunflower oil, and cottonseed oil, and processed foods made with these oils

Fat – Bottom Line

- Eat healthy, plant-based fats.[46]
- Limit animal fats.
- Avoid hydrogenated and partially hydrogenated fats.
- Focus on extra-virgin olive oil, avocados, nuts/seeds, and fatty fish as healthy fat sources.
- Increase omega-3 fatty acids.

Animal Fat

Animal fats appear to increase cancer risk and possibly recurrence. Potential components of animal products/fat related to this heightened risk include:

- Saturated fat – red meat and whole-fat dairy products are key sources of saturated fat, which some studies have reported is associated with an increased risk of prostate cancer recurrence and mortality.[47-48]

- IGF-I – red meat and dairy is associated with higher levels of IGF-I in human studies;[49-50] increased IGF-I values values may increase risk of prostate cancer development and disease progression.

- Genotoxins – meat cooked at high temperatures by dry-heat methods is a source of heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs) – cancer-causing compounds.

- The most important variables that contribute to the formation of HCAs include:
  - Cooking temperature (greater than 300°F/150°C).
  - Cooking time (greater than 2 minutes).
  - Cooking method (frying, oven grilling/broiling, barbecuing).
  - Charring of food (charcoal-broiled or smoked foods) contributes to PAHs.
  - Note, if you like to consume grilled meats, grill lean poultry with the skin on and remove the skin before consumption to limit your intake of HCAs.

- Conventionally-raised livestock is treated with growth hormones and antibiotics
  - If you choose to eat red meat, we recommend eating meat from grass-fed-only animals, as it will have a healthier nutrient profile.
  - Organic foods maximize nutritional value while decreasing toxic exposure to harmful pesticides and other dangerous chemicals that have been linked to a variety of health issues, including cancer.

Limit or eliminate

Choose skinless and unprocessed poultry

Eliminate

Animal Based Foods	Recommendation	Summary
Fish	Eat at least 2 servings of fish each week. Wild, cold-water fish, such as salmon, black cod, trout, and herring are excellent sources of omega-3 fats. Avoid swordfish, shark, king mackerel, and tilefish due to high mercury levels. Avoid wood-smoked fish that would contain carcinogenic PAHs. Cold-smoked fish is ok, but check the label for nitrates/nitrites and avoid products with those additives as they are also cancer-causing.	Eating fish regularly has been associated with a lower risk of prostate cancer development, progression, and metastasis.[51-54]
Poultry	Avoid processed poultry and remove skin on poultry before eating. Choose organic poultry whenever possible for a better nutrient profile and to reduce intake of added antibiotics. Avoid barbecued and fried poultry.	While the relationship between poultry consumption and prostate cancer is not conclusive, evidence suggests that skinless poultry may be inversely associated with the risk of prostate cancer.[55-56] Substituting 30 g/day of poultry or fish for total or unprocessed red meat was associated with a significantly lower risk of recurrence.[57]
Red meat	If you choose to eat meat, opt for organic, grass-fed meat whenever possible for a better nutrient profile and to reduce intake of added hormones and antibiotics. Avoid barbecued and fried meats.	Red meat can be a significant source of saturated fat. The consumption of saturated fat from mammal origins such as red meat may increase the risk of dying from prostate cancer.[56,58,59] Examples of red meat include beef, lamb, pork, and game meats.
Processed meats	Avoid processed meats.	Some research has linked processed meat consumption and risk of advanced or lethal prostate cancer.[58] Regular consumption of processed meats increases risk of multiple chronic illnesses and death. Processed meats include deli meats, bacon, hot dogs, sausages, and meats smoked, cured, or preserved with nitrates or nitrites.

Eggs	Limit egg consumption, particularly egg yolks.	While more research is necessary, egg consumption during adulthood (pre-diagnosis) may increase risk of developing aggressive prostate cancer.[55] Current research related to post-diagnosis egg intake and prostate cancer progression is limited. Research suggests that the choline in eggs may be the component that increases cancer risk; choline is concentrated in the egg yolk.
Dairy	Reduce or eliminate dairy consumption, particularly whole milk. Consider non-dairy alternatives, such as soy, coconut, and/or nut-based products. If consuming dairy, low-fat organic dairy is recommended.	Some evidence has suggested that dairy consumption is linked with the risk of prostate cancer.[60] High-fat dairy has been associated with prostate cancer progression and mortality.[48,61-63] Men who consumed 3 or more dairy servings daily had a 76% increased risk of overall mortality and a 141% higher prostate cancer-specific mortality compared to men who consumed less than 1 dairy serving daily.[61]

Limit or eliminate

BEVERAGES

Beverages	Summary	Recommendation
Alcohol	Evidence on alcohol and prostate cancer is mixed. While more research is needed, some data suggest that high consumption of alcohol may increase the risk of high-grade prostate cancer[64,65] and/or progression.[66]	Avoid heavy drinking. If you choose to drink alcohol, limit to no more than 2 drinks daily.
Coffee	While drinking coffee is safe, current evidence is not strong enough to recommend taking up coffee drinking to lower risk of advanced prostate cancer and prostate cancer progression.[67,68]	If you choose to drink coffee, opt for no more than 2 cups daily. Coffee contains caffeine and can impair sleep quality, particularly if consumed later in the day. Avoid adding high-fat dairy or sweeteners to your coffee.
Green tea	Green tea contains polyphenols* (i.e., EGCG) that have antioxidant*, anti-diabetic, anti-inflammatory, anti-bacterial, and anti-cancer properties. Research is currently insufficient to draw robust conclusions.[69-71] Green tea contains caffeine, though much less than coffee or black tea has. If opting for decaffeinated green tea, opt for those naturally decaffeinated with water, as typical caffeine extraction results in a significant loss of phytonutrients*.	While study findings have varied, drinking green tea may reduce the risk of prostate cancer. Tea drinkers can continue their intake, but current evidence is not strong enough to recommend that non-drinkers take up tea to lower their risk of prostate cancer progression.

NUTRIENTS

Nutrient	Recommendation	RDA/AI UL**	Preferred Dietary Sources	Nutrient Summary
Calcium	High calcium intake >2000 mg has been linked to advanced and fatal prostate cancer.[60] It is recommended to obtain adequate amounts of calcium in the diet (800-1200 mg daily), but to avoid high calcium intakes.	19-50 yrs: 1000 mg Over 50 yrs: 1200 mg Upper Limit: 2500 mg	Leafy greens (especially collard greens, bok choy, and kale), canned fish with soft bones, beans, tofu, almonds, fortified products such as soy milk	Increased calcium absorption and bioavailability from foods (rather than supplements), especially plant sources. Vitamin D is essential for calcium absorption.
Selenium	The relationship between selenium and prostate cancer is complex. While many studies suggest higher serum selenium is associated with a lower risk of prostate cancer, selenium supplementation of >140 mcg/day has been reported to increase prostate cancer death.[72] Selenium supplements for prostate cancer are not recommended. Consider testing RBC selenium levels to better assess your selenium status; aim for 120-300 mcg/L.	70 mcg Upper Limit: 400 mcg	Brazil nuts, seafood, enriched brewer's yeast, and grains	Trace mineral and antioxidant*; strengthens immune function. Selenium content depends somewhat on the amount of selenium in the soil in which the products are grown.
Vitamin C	There is no consistent relationship between vitamin C and prostate cancer.[73] Include a wide variety of fruits and vegetables rich in vitamin C daily.	90 mg Upper Limit: 2000 mg	Various fruits and vegetables, including papaya, citrus fruits, kiwi, cantaloupe, mango, strawberries, bell peppers, broccoli, and tomatoes	An antioxidant* with cancer-fighting properties – reduces oxidative DNA damage.

**RDA – Recommended Dietary Allowance, AI – Adequate Intake, UL – Tolerable Upper Intake Level.

The nutrients in the table above are commonly asked about for prostate cancer. We are not recommending supplements for any of these nutrients; please discuss with your healthcare practitioner.

Nutrient	Recommendation	RDA/AI UL**	Preferred Dietary Sources	Nutrient Summary
Vitamin D	Research is mixed, but vitamin D does appear to play a protective role in prostate cancer and prostate cancer survival.[74] 1000-5000 IU daily Maintain serum 25(OH)-vitamin D >40 ng/mL and <100 ng/mL. The bioavailability of vitamin D3 (cholecalciferol) is much greater than vitamin D2 (ergocalciferol). Ask your doctor to check your vitamin D level, and discuss whether a vitamin D supplement may be appropriate for you.	Under 50 yrs: 5 mcg or 200 IU 50-70 yrs: 10 mcg or 400 IU Over 70 yrs: 15 mcg or 600 IU Upper Limit: 100 mcg or 4000 IU	Cold-water fish and fortified products, such as soy milk	A fat-soluble vitamin that we generate via skin exposure to sunlight (ultraviolet rays). Important for bone health, immune system, muscle function, cardiovascular function, anti-inflammatory effects, and anti-cancer effects. Vitamin D absorption declines with age, and vitamin D deficiency is not uncommon among older adults.[75, 76] If you take a supplement, it is best to take with food for optimal absorption.
Vitamin E	The use of vitamin E supplements for prostate cancer is not recommended.[77] Eat vitamin E-rich foods regularly.	15 mg 33 IU dl-alpha (synthetic) 22 IU d-alpha (natural) Upper Limit: 1000 mg 2222 IU dl-alpha 1493 IU d-alpha	Avocados, sweet potatoes, nuts, seeds, and wheat germ	Vitamin E generally refers to a group of fat-soluble compounds that include tocopherols and tocotrienols. As a cellular antioxidant*, vitamin E's possible anti-cancer actions include its ability to reduce DNA damage, inhibit cancer growth, and induce apoptosis*.
Curcumin	Despite intriguing preliminary research, more evidence is needed to recommend the use of curcumin supplements specifically for prostate cancer.[78] Use turmeric liberally in cooking.	NA	Turmeric	Curcumin, the yellow pigment and active component of turmeric, has antioxidant*, anti-inflammatory, and anti-cancer activity.

Saw Palmetto	Saw palmetto is not recommended to reduce risk of prostate cancer.[79]	NA	Saw palmetto	This botanical, composed of flavonoids, water-soluble polysaccharides, and free fatty acids, is believed to function as an anti-androgen and anti-inflammatory agent.[80]

**RDA – Recommended Dietary Allowance, AI – Adequate Intake, UL – Tolerable Upper Intake Level.

The nutrients in the table above are commonly asked about for prostate cancer. We are not recommending individual nutrient supplements, except for vitamin D; please discuss with your healthcare practitioner.

HORMONE DEPRIVATION THERAPY AND NUTRITION

Patients who undergo hormone deprivation therapy may experience various side effects, including hot flashes, night sweats, weight gain, loss of libido, and a decline in bone mineral density (BMD). Men on androgen deprivation therapy (ADT) report significant gains in body mass, notably as increased fat mass accompanied by a decrease in lean body mass.[81-88] This change is concerning given the evidence regarding increased body mass and prostate cancer risk.

Multiple prospective studies have examined the relationship between ADT for prostate cancer and BMD. Bone density reduction is a serious consequence of ADT, with the frequencies of osteopenia and osteoporosis (mild and significant loss of bone density, respectively) being directly proportional to treatment duration. Studies suggest that significant bone loss is clearly observed within the first year of ADT.[89-93]

Dual-energy x-ray absorptiometry (DEXA) screening for osteoporosis is recommended prior to initiation of ADT, again at one year, and then at appropriate intervals thereafter, which may be every two years. Additionally, serum vitamin D (25-OH), among other bone-building nutrients, should be assessed with these patients. Patients should be encouraged to maintain adequate, but not excessive, amounts of dietary calcium. Furthermore, exercise, particularly resistance training, may reduce the risk of osteoporosis and increase muscle mass.[86]

Bone-Building Nutrition

We encourage daily consumption of the following bone-building nutrients from healthy dietary sources consistent with the recommended plant-based diet; individual dietary supplements are not recommended unless advised by your healthcare practitioner.

Nutrient	Dietary Sources	Function	Recommendation**
Boron	Apples, avocados, beans, milk, peanuts, peanut butter, pecans, raisins, prunes, and potatoes	Improves calcium absorption. ↓ effects of vitamin D and magnesium deficiencies.	2 mg daily
Calcium	Beans, leafy greens (especially collard greens, bok choy, and kale), tofu, almonds, canned fish, dairy products, and fortified products such as soy milk and cereals	↑ calcium absorption and bioavailability from foods, especially plant sources. Vitamin D is essential for calcium absorption.	800-1200 mg daily
Magnesium	Whole grains, nuts, seeds, spinach, and most fruits and vegetables	Important in calcium and potassium uptake.	420 mg daily
Phosphorus	Meat, poultry, fish, eggs, milk products, legumes, and nuts	Combines with calcium to strengthen bones.	700 mg daily

**Values based on Recommended Dietary Allowances (RDA) for adult males.

Potassium	Bananas, strawberries, prunes, tomatoes, potatoes, spinach, and beans	Associated with ↓ urinary calcium and phosphorus excretion.	4700 mg daily
Vitamin D	Cold-water fish and fortified products such as soy milk	Helps absorb and retain calcium and phosphorus.	1000-5000 IU daily
Vitamin K	Dark leafy greens, liver, tomatoes, soybeans, and garbanzo beans; also produced by intestinal bacteria	Associated with ↓ bone turnover and ↓ urinary calcium excretion.	120 mcg daily
Zinc	Fish, oysters, chicken, turkey, tofu, whole grains, black-eyed peas, and wheat bran and germ	Important in calcium uptake and immune function.	15 mg daily

SUMMARY – HEALTHY PROSTATE CANCER DIET

- **Eat 8 to 10 colorful fruit and vegetable servings daily.**
    - o   Two to three pieces of fruit.
    - o   One or more servings of vegetables with every meal and snack.
    - o   8 fl oz vegetable-only juice.
- **Consume 30 to 45 grams of fiber daily.**
    - o   You can meet your fiber goal if you eat 8 to 10 servings of fruits and vegetables plus one serving of beans/legumes, one serving of chia and/or flax seed (1 Tbsp), or at least two servings of whole grains daily (1 cup cooked quinoa, wild rice, or brown rice, 1 cup whole grain pasta, 1 cup oatmeal).
- **Avoid processed and refined grains/flours/sugars. Choose whole grains over refined grain products.**
    - o   Keep WHITE off your plate: white bread, pasta, white rice, cream sauces, cakes, and more.
- **Eat protein with every meal; plant protein (beans/legumes, soy) at least once daily.**
- **Limit or eliminate fatty meats (red meat, poultry with skin) and processed meats, and full fat dairy; limit low fat dairy to one serving or less daily.**
- **Include healthy fats every day, such as cold-water fish, chia seeds, flaxseeds, walnuts, soybeans, olive oil, and avocados.**
- **Consume herbs & spices daily.**
- **If you choose to consume alcohol, limit to 2 drinks per day or fewer for men.**
- **Maintain serum 25(OH)-vitamin D levels above 40 ng/ml and less than 100 ng/ml.**
- **Drink plenty of water. Green tea and coffee (unsweetened and without high-fat dairy added) may have some health benefits.**
- **Engage in daily physical activity. Build up to 150 minutes/week or more of aerobic exercise to achieve and/or maintain a healthy body weight.**
- **For stress reduction, consider yoga, meditation, a support group, or other activities.**

Frequently Asked Questions

■ Can you discuss coffee further?

Coffee is rich in antioxidants*, and research suggests it has some protective qualities against cancer.[67, 68] One concern about coffee is that the additives people commonly use – sugars, non-nutritive sweeteners, and creamers – are not advised. Additionally, the caffeine in coffee may disturb one's sleep, particularly at high amounts or if consumed late in the day.

■ What about tea?

Black tea, oolong tea, green tea, and white tea are all made from the same leaf: Camellia sinensis. Tea contains polyphenols* that have antioxidant*, anti-diabetic, anti-inflammatory, anti-bacterial, and anti-cancer properties. Green and white teas contain a greater amount of polyphenols than black and oolong teas do. Additionally, green and white teas contain caffeine, though much less than black tea does. Research is currently insufficient to draw robust conclusions regarding tea and prostate cancer. While not all studies agree, drinking green tea may reduce the risk of prostate cancer.[69-71] Tea drinkers can continue their intake, but current evidence is not strong enough to recommend that non-drinkers take up tea to lower their risk of prostate cancer progression.

■ I've heard that pomegranate may offer protection against prostate cancer.

Pomegranate has anti-inflammatory and antioxidant* effects;[94] inhibiting tumor-associated angiogenesis* is one of several potential mechanisms for slowing the growth of prostate cancer in chemo-preventive applications.[95] More research is necessary for a formal recommendation regarding its effects on the risk of prostate cancer. Consider including pomegranate seeds or pomegranate concentrate on a regular basis. Pomegranate concentrate contains all of the beneficial properties of pomegranate without the sugar. Avoid pomegranate juice due to the high concentration of sugars. Note that pomegranate interacts with some medications; please discuss with your healthcare provider if you use pomegranate products regularly.

■ Do people with diabetes have a greater risk of prostate cancer?

If you have diabetes or elevated blood glucose levels, it is most important to include an abundance of vegetables, a small amount of fruit, adequate protein, and high fiber in your diet. Following this kind of diet will help you balance your glucose and insulin levels. It is wise to avoid added sugars and processed foods, which frequently contain hidden sugars. Engage in daily physical activity, and aim to achieve or maintain a healthy body weight. Of note, some studies have reported that those who have been diagnosed with diabetes for less than 3 years may have an increased risk of prostate cancer, while those diagnosed for 4 or more years may have a reduced risk of prostate cancer.[96]

■ Is it ok to cook with olive oil?

Yes, olive oil is considered one of the healthy oils. Olive oil may be heated to a medium temperature. If you need to cook something at high heat, an oil with a high smoking point, such as organic canola, peanut, coconut, macadamia nut, almond, or avocado oil, would be preferred.

■ I've been hearing about intermittent fasting. Would this be recommended?

Evidence indicates that excess caloric intake (that is, calories above what you need to maintain a healthy body weight) increases your risk of various cancers, including prostate cancer[97,98] and fatal prostate cancer.[99-100] Additionally, there is some evidence suggesting that intermittent fasting (IF) has demonstrated efficacy for various health issues, resulting in weight loss, lower insulin resistance, and other cardiovascular improvements.[101] Moreover, data from animal studies have shown non-significant trends toward improved cancer survival with some IF regimens.[102] IF encompasses eating patterns in which individuals go extended time periods (for example: 16-48 hours) with little or no energy intake, with intervening periods of normal food intake. A common IF protocol consists of five days of typical caloric consumption with two non-consecutive days of 500 calories or fewer. If interested in IF, please discuss with your healthcare practitioner.

Glossary

Angiogenesis	The formation of new blood vessels. Tumors are made up of fast-growing cells that require lots of blood carrying oxygen and nutrients, and rely on these new blood vessels for survival. Angiogenesis is one of the targets of anti-cancer therapies to slow or stop tumor growth.
Antioxidant	In simplified terms, oxidation refers to a certain kind of chemical reaction involving oxygen (think oxy-dation). Some oxidation reactions are harmful because they create compounds that can damage cellular components and tissues in the body. So, an anti-oxidant is an agent that can stop these harmful reactions from happening.
Apoptosis	The textbook definition of apoptosis is "programmed cell death." Think of a cell as having an engineer in charge of it. If the machinery of the cell is malfunctioning and cannot be fixed, then rather than allow the malfunction to cause widespread damage, the engineer shuts down the cell to contain the damage. Cancer is caused by abnormal regulation of cell growth, so apoptosis is a natural mechanism for preventing unregulated growth.
Insulin	Insulin is a hormone that lowers the body's blood sugar level. It also plays a role in storing the sugar glucose as glycogen, which can be used later by the body for energy.
Lignans	Compounds found in plants that have a similar chemical structure to estrogen and may have anti-inflammatory or antioxidant properties.
Phytonutrients	Plant compounds that appear to have health-protecting properties.
Polyphenols	A substance that is found in many plants and gives some flowers, fruits, and vegetables their color. Polyphenols have antioxidant activity, which may prevent damage to cells.

Three Day Menu Plan: 3 Meals + Snack

This menu is based on 2000 calories per day. Calories can be adjusted by altering portion sizes. The menu has been designed to serve as a guide in making healthy food choices. Experiment with substitutions as desired.

Day 1	Day 2	Day 3
Breakfast		
OATMEAL Oatmeal, cooked (1 cup) Non-dairy, unsweetened milk (1 cup) Flaxseed, ground (1 tbsp) Chia seeds (1 tbsp) Blueberries (½ cup) Lox/Lettuce Wrap Lox (2 oz) Lettuce (1 leaf) Capers (1 tsp)	**GREEN SMOOTHIE** Greens (3 cups) Berries, frozen (½ cup) Protein powder (1 svg) Ground flax (1-2 tbsp) Chia seed (1 tbsp) Non-dairy milk, unsweetened (1 cup)	**TOFU SCRAMBLE** Tofu (4 oz) Onions (¼ cup) Spinach (1 cup) Mushrooms (½ cup) Sweet potatoes (1 cup) Apple (1 med) Almond butter (1 tbsp)
Lunch		
SALAD Spinach (3 cups) Broccoli (½ cup) Carrots (½ cup) Tomato (½ cup) Chicken breast (4 oz) Quinoa, cooked (½ cup) Avocado (¼ med) Olive oil (1 tbsp) Vinegar, balsamic (1½ tbsp) Orange (1 med)	**VEGETABLE BEAN SOUP** (2 cups) **CORN TORTILLAS** (2 med) **GREEN SALAD** (2 cups) **OIL/VINEGAR DRESSING** (1 tbsp)	**SUSHI** (8 piece roll with fish) **MISO SOUP** (1 cup) **SEAWEED SALAD** (1 cup)

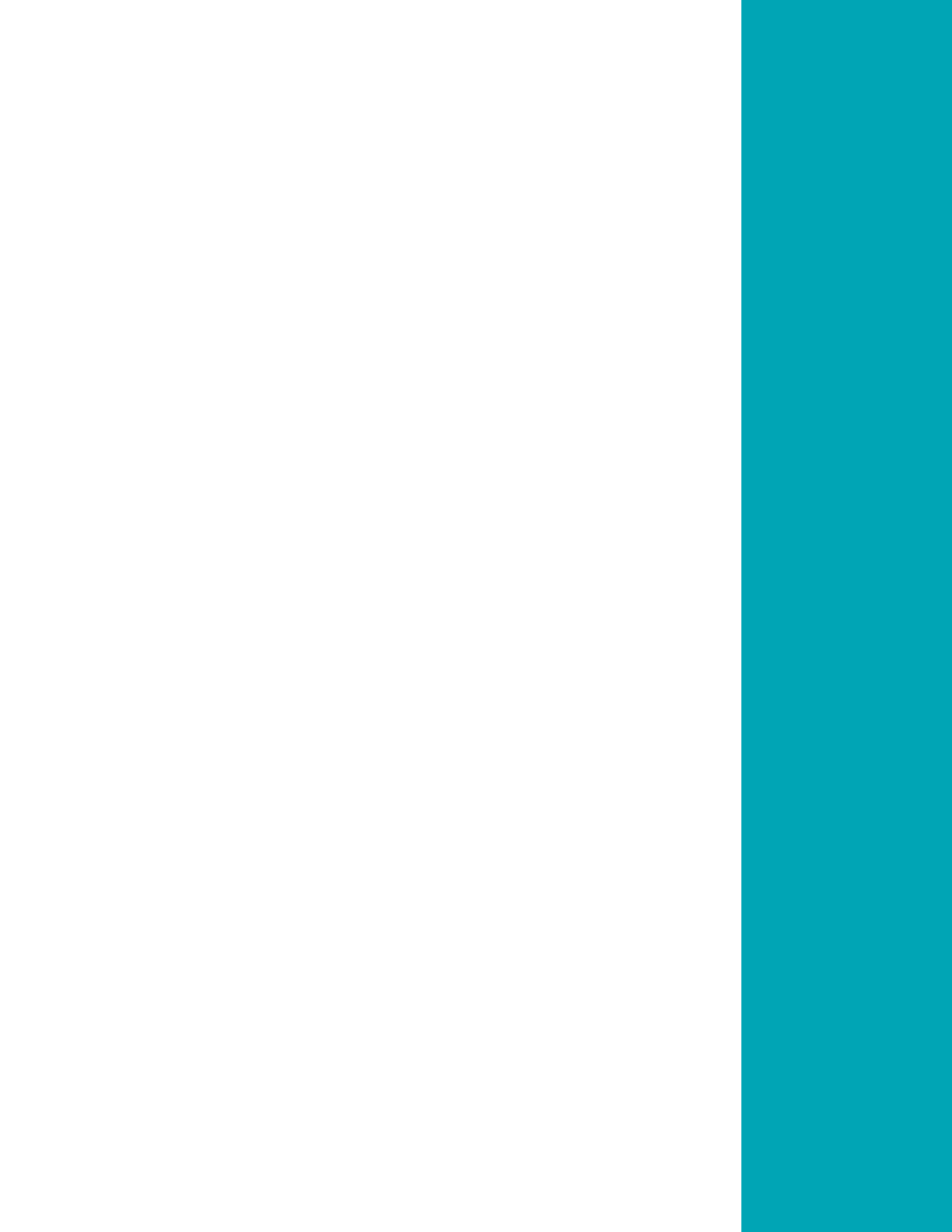| Snack		
VEGETABLE JUICE (12 oz) **POPCORN, AIR-POPPED** (2 cups)	**FRUIT SALAD** (1 cup) **ALMONDS** (¼ cup)	**FRUIT SMOOTHIE** Banana (½ med) Berries (½ cup) Flaxseed, ground (2 tbsp) Chia seeds (1 tbsp) Protein powder (1 svg) Non-dairy milk (1 cup)
Dinner		
TEMPEH FAJITAS Tempeh (4 oz) Onions & peppers (1½ cups) Greens (1 cup) Salsa (¼ cup) Avocado (¼ ea) Corn tortillas (2 each)	**SALMON** (4 oz) **QUINOA, COOKED** (1 cup) **ASPARAGUS** (2 cups)	**CHICKEN & VEGETABLE STIR-FRY** Chicken breast (4 oz) Mixed vegetables (2 cups) Walnuts (2 tbsp) Olive oil (½ tbsp) Brown rice, cooked (1½ cup)

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