From Soy to Selenium: Everything You Want to Know About Nutrition And Prostate Cancer

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Prostate Health

- Prostate is a male reproductive gland the size of a walnut
- Has one of the highest concentrations of trace elements zinc and selenium in the body
- Prostate secretions are important in reproduction
- Prostate health deteriorates with age; after age 60 almost half of men have some prostate health symptoms such as:
  - Benign prostate hypertrophy (BPH)
  - Pelvic pain, or
  - Prostate cancer

Prostate Health and Diet

- Factors increasing risk of prostate cancer:
  - weight gain during adulthood
  - central adiposity (*waist size of > 40 inches*)
  - obesity
  - high level of alcohol intake
  - age (rare in young men)
- Interplay between genes, inflammation and diet
- Vitamin D/ UV light exposure may play a role
  - key mediator of cell activity is Vitamin D Receptor

Source: American Cancer Society

Prostate Cancer

- 217,730 estimated new cases in US in 2010 (28%)
  22,640 new cases in California (24%)
- 22,060 estimated deaths in US in 2010 (10%)
  3,710 deaths in California (11%)
- 5 year survival increased to 100% for localized disease and 98.4% for all stages (31.9% for Stage IV)
- Median age at diagnosis was 68 years from 2000-2006 so half of men diagnosed were younger than 68 years old
- Average age at diagnosis is 72 years
- Risk of invasive prostate cancer 1 in 15 ages 60-69 but only 1 in 7 for those over 70 years of age
- Men are 33% more likely to be diagnosed with prostate cancer than women with breast cancer

Source: American Cancer Society

The Role of Nutrition in Maintaining Prostate Health

Primary defense

Healthy living including a diet that is plant based, rich in fruits, vegetables and beans.

Protects against mutation or DNA damage (first step of carcinogenesis)

Secondary defense

Focus on nutrients to prevent progression of DNA damage and induce repair mechanisms

- *anti-inflammatory*
- *apoptosis-inducing* (programmed cell death)

The Role of Nutrition in Prostate Cancer Therapy

- A diet rich in nutrients improves nutritional status and enhances therapy
- Protein needs are increased
- Phytonutrients (high ORAC score fruits, vegetables and culinary herbs) important
  - Good sources include blueberries, spinach, thyme
- Requirements for glutathione may be increased - Good sources include avocado and dairy products (whey is especially beneficial)

The Role of Nutrition in Prostate Cancer Surgery

- Avoid high dose supplements of Vitamin E (over 800 IU per day) or fish oil for 7 days before surgery due to anticoagulant (blood thinning) effects
- Physical stress of surgery requires additional protein, particularly its component amino acids glutamine, arginine and aspartate. Whey protein is a good source of these nutrients. Whey is also a rich source of cysteine which is essential for healthy liver function and effective detoxification
- 1 – 1.5 grams protein per kilogram protein usually recommended around time of surgery – adding a protein smoothie between meals is a good way to achieve this intake of about 100 grams total per day

Role of Nutrition in Radiation Therapy

- External beam teletherapy (EBRT) or brachytherapy (radioactive seeds) usually used today
- Many radiotherapists reconsidering earlier advice to avoid antioxidants and approve rich food sources during treatment
- Foods rich in antioxidants (with a high ORAC score) may be beneficial – berries, rosemary, thyme and other culinary herbs
- Antioxidant supplements may not be recommended but foods rich in antioxidants are encouraged
- Aronia (chokeberry), Açai, goji, mangosteen and noni may minimize the effectiveness of radiation treatment as they have such a high ORAC score Use these juices judiciously at this time (not more than 1 fluid ounce per day)

The Role of Nutrition in Hormone Therapy for Prostate Cancer

- Hormone therapy targets testosterone production and localized uptake to control prostate cancer growth and spread
- Hormone treatment side effects: hot flashes, bone loss, nausea, anemia, fatigue and gastrointestinal distress
- To offset anemia, include protein, zinc and iron rich foods such as lean red meat, dark meat poultry or sunflower seeds
- GLA rich foods may also be helpful, e.g. watercress

Which Foods are Helpful?

- Whole grains or foods with a low Glycemic Index (GI) such as beans, brown rice, pasta, oatmeal
- Protein: sulfur containing proteins such as those found in whey, eggs and whole grains are important
- Fats and oils; Avoid *trans* fats, limit saturated fat especially from animal sources (butter, fatty red meat). Add omega-3
- Vitamins, minerals and trace elements (especially selenium)
- Botanical factors or phytonutrients (fruit and vegetable colors)
- The 3 A's - Antioxidants, Anti-inflammatories and Anticarcinogens

Prostate Cancer and Fat

- Most prostate cancer is hormone (androgen) dependent
- High fat (from meat and dairy foods) , low dietary fiber diet is associated with high testosterone levels
- Sex hormone and cholesterol production is affected by type and amount of dietary fat intake. NIH panel recommends a ratio of Omega-6 to Omega-3 fatty acids of 5:1 for general health: typical American diet is ~15:1
- *Trans* fatty acids from hydrogenated oils may play a role in chronic diseases including cancer – avoid them!
- Gamma Linolenic Acid or GLA (found in Evening Primrose, Borage and Black currant seed oils) may modulate prostaglandins - beneficial

Prostate Cancer and Inflammation

- Several anti-inflammatory compounds currently being studied (COX-2 inhibitors)
- Foods rich in COX-2 inhibitors include red grapes (resveratrol), green tea (catechins and gallates) and citrus fruit (quercetin)
- Anti-inflammatory salicylates found in curry powder (turmeric), broccoli, apricots, raspberries, loganberries, pineapple, rosemary, thyme and tarragon

Omega-3's and Cancer

- Omega-3 fat (oil) is essential for health and have anti inflammatory properties
- 3 main dietary sources:
  - 18:3 (ALA)from plants (chia, flax, etc.)
  - 22:3 (EPA) and 24:3 (DHA) from fish, blue green algae and krill oil
- EPA and DHA formed by elongation of 18:3
- Most benefit from lowering omega-6 and raising omega-3 intake

Omega-6 and Omega-3 Fatty Acids

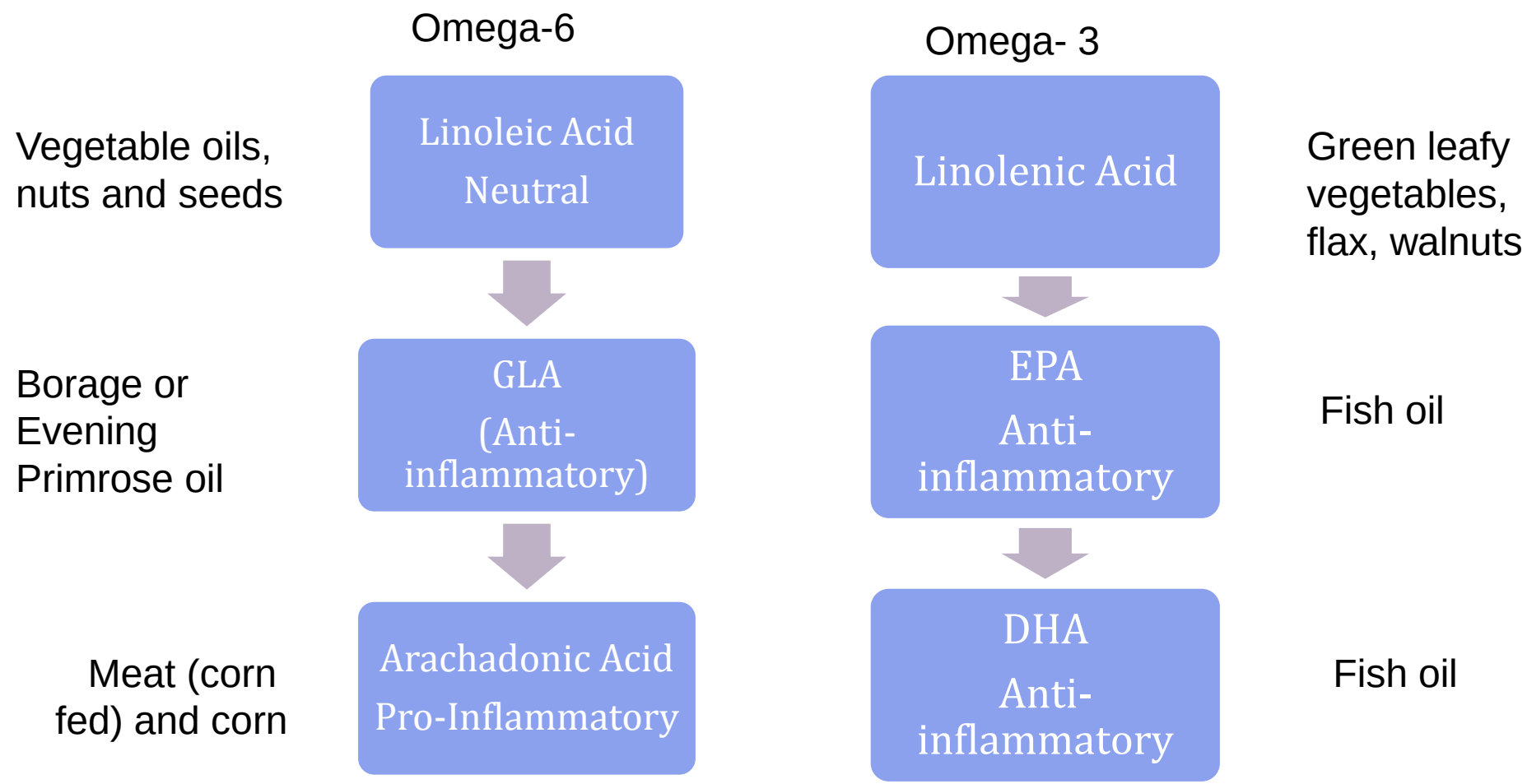


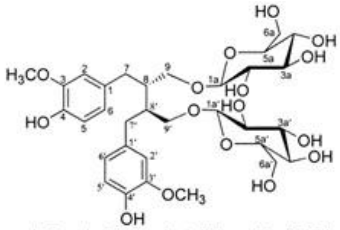
Table adapted from Simopolous, A (1998)

With Fat, It's all about Intake

- What we eat (type of fat) is reflected in our body fat
- Brain, retina and nervous tissue are about 1:1 omega-3 to omega-6 – other tissues vary more with diet (with a few exceptions)
- This applies to animals too
- Range or grass fed animals have higher Omega-3 oils in their fat than intensively farmed animals
- Almost all animals are now "finished" by eating corn prior to slaughter which raises the omega-6 content of their fat

Lignans in Prostate Health

- Lignans are widespread in the plant world
- Flax lignans are phytoestrogens (plant steroids with estrogen like activity) *Estrogens balance excess testosterone*
- Chia seed and flaxseed are particularly rich sources of lignans (as well as omega-3's)
- SDG is the main active component; this can be converted in the body to mammalian lignans e and enterodiol



1: Secoisolariciresinol diglucoside (SDG)

Nutrition as a Protection from DNA Mutations

Fruits, vegetables and legumes form the basis of a ***Cancer Protection Diet***

Colors of Protection

- Red and pink – carotenes, lycopene e.g. tomato, watermelon, pink grapefruit and guava
- Orange- carotenes. e.g. carrots, oranges
- Yellow – flavonoids, e.g. lemon
- Brown – turmeric, curry powder
- Green – chlorophylls, e.g. spinach, watercress
- Blue, indigo, violet – anthocyanins, e.g. blueberries

DNA Strand Breaks and Cancer

- Cancer arises when DNA strands break and are not repaired – this causes a mutation to occur. Mutations = cancer
- Some people are born with one copy of a deletion . Cancer can then occur more easily during a lifetime in such people
- One regulation of DNA synthesis involves methylation. Folate is an important part of the enzyme pathway that regulates this process called epigenetics
- DNA repair enzymes thrive when we rest and handle our stress

Botanicals: Natural Plant Defenses

- Black raspberries show protective effects against cancers of epithelial tissue (upper GI for example) – frozen make a good addition to smoothies
- Plants have active defense mechanisms to protect from molds and rot. Most are flavonoids. Many are highly active as anticarcinogens
- Resveratrol in red grapes a natural defense against mold. Found to be a cancer chemopreventive agent
- Glucans_ in mushrooms appear to have anticancer and immune stimulating activity (antiviral)
- Betalaines from cactus pear shows anticancer activity

Flavonoids and Antioxidant Activity

Proanthocyanidins, *e.g. blueberries*	5.0
Epicatechin, *e.g. green tea*	2.5
Resveratrol, *e.g. red grapes/wine*	2.0
Vitamin E	1.0
Vitamin C	1.0

Whole foods have synergistic antioxidant activity

*Measured as color change in Trolox Equivalents (TEAC) also called the **ORAC** score (developed at Tufts with USDA)*

Does a glass of wine a day keep Prostate cancer away?

- Fred Hutchinson Cancer Research Center, Seattle interviewed 753 newly diagnosed prostate patients and 703 healthy controls, aged 40 – 64 years
- Study results showed a 6% decrease for every glass of red wine consumed (up to 3)
- Study corrected for diet, family history of cancer, screening and tobacco use
- Red wine is a rich source of resveratrol

Botanicals: Apoptosis Inducers

- Astragalus (Chinese medicine)
- Saw palmetto (*in vitro* studies with prostate cancer cell line)
- Limonene, tangeretin, nobelitin and other flavonoids from rind of citrus fruits
- Pomegranate seed oil (Israeli research)
- Proteases (Bromelain from pineapple and papain from papaya)
- Apoptosis or Programmed Cell Death is how cells normally recycle their internal contents

Lycopene

- Red pigment found in many foods; a carotenoid with antioxidant capacity – best absorbed with oil (e.g. tomato sauce with olive oil)
- Lycopene is concentrated in liver, adrenals, prostate and testes
- Important for normal cell growth and differentiation
- Lycopene rich foods are recommended (at least 2 servings per week). Foods rich in lycopene include tomatoes, pink grapefruit, watermelon, guava and apricots

Folic Acid (folate)

- Folate (from *folio* - Latin for leaf) found in leafy vegetables, fruits, fish, eggs. Folate is essential for the integrity of DNA synthesis and repair and for healthy cell division. Alcohol destroys it
- MTHFR gene encodes for an enzyme that helps body to use folate and to maintain DNA integrity. Some individual variations may increase your requirement for folate and other methyl donors (MTHFR C677T for example)
- Methylation is an important regulator of gene expression (epigenetics)

Minerals and Trace Elements and Prostate Health: Selenium

Selenium repairs mutated p53 tumor suppressor gene[1]
(Loss of p53 activity is common in prostate cancer)

- Selenium is an essential trace element
- Brazil nuts are a rich source of selenium

  1 Brazil nut provides 140 mcg

  Dietary Reference Intake (DRI) 55 mcg

Selenium toxicity may occur if more than 400 mcg consumed daily

Source: Longtin, R. JNCI, 2003

Health Benefits of (Green) Tea
Camellia Sinensis

- Beneficial effects on reducing cancer risk and metastasis
- Beneficial to blood lipid profile (cholesterol, triglycerides, HDL and LDL)
- Beneficial effects on certain enzymes affecting health of liver

Anticarcinogens in Tea

- Ellagic acid - a tannate - very active anticarcinogen also found in berries
- Green tea epigallocatechin gallate (EGCG) anticarcinogen also found in cocoa
- Green tea polyphenols inhibit toxin formation in liver, inhibit urokinase
- Antioxidant polyphenol catechins

Nutrigenomics

- New field of nutrition and genetic expression
- Common finding in prostate cancer is loss of activity of a detoxification enzyme gene GSTP1
- Nutrigenomics suggests reducing the dietary load of substrates for the gene , e.g. avoiding charbroiled food (use marinades)
- Cruciferous and allium vegetables are especially beneficial as they induce other detoxification enzymes to compensate

Garlic and Cabbage Families of Vegetables

- Important inducers of detoxification enzymes

- Garlic or Allium vegetables include garlic, onions, scallions, shallots, leeks and chives
  - allicin, S-allyl cysteine (SAC) and aljoene

- Cabbage family or Cruciferous (cross shaped) vegetables include cabbage (red, white (cole slaw type), bok choy, broccoli, cauliflower, Brussels sprouts, turnips, kohlrabi and watercress
  - glucosinolates (hydrolyses to sulfurophane)
  - isothiocyanates

Of Special Benefit

- Artichokes excellent source of Cynarine (similar to Milk Thistle's silymarin) for liver health
- Curry powder - a combination of turmeric, cumin and other spices
- Green tea EGCG and other catechins
- Pomegranates especially the oil from the seeds
- Brazil nuts excellent source of selenium
- Tomatoes excellent source of lycopene
- Watercress rich source of carotenes and folate

What about Dietary Supplements?

73% Prostate cancer patients take dietary supplements [1]

Many men do not inform their physicians about their use of supplements

Most common supplements taken are Vitamin E, Selenium and Saw palmetto (*Serenoa repens*)

Vitamin E and Selenium are being investigated with SELECT trial

Vitamin E does not appear to prevent prostate cancer but most people don't consume enough Vitamin E rich foods and may benefit from a supplement (choose one with gamma-tocopherol which is protective for heart muscle)

[1] Wygul, JB et al, Urology, 2005

Critical Reviews of Nutrition and Prostate Cancer

Natural Standard is an international research collaboration uses evidence-based, consensus-based and peer reviewed methodology to look at integrative medicine.

www.naturalstandard.com

Natural Standard rates Selenium as Grade B (Good scientific evidence) for selenium in prostate cancer prevention. No other nutrient has this (or higher) recommendation for prostate cancer prevention

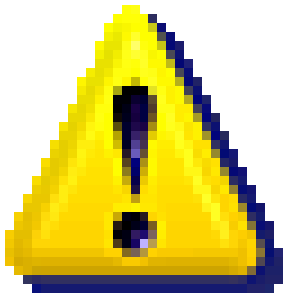
Cochrane Review also notes selenium having potential benefit www.cochrane.org

FDA Warnings

- FDA lists 125 Fake Cancer “Cures” Consumers should avoid [1]
- Red flags for consumers include:"Treats all forms of cancer"
  - "Skin cancers disappear"
  - "Shrinks malignant tumors"
  - "Non-toxic"
  - "Doesn't make you sick"
  - "Avoid painful surgery, radiotherapy, chemotherapy, or other conventional treatments"
  - "Treat Non Melanoma Skin Cancers easily and safely"

www.fda.gov/consumer/upates/cancerfraud061708.html

Herbs to Avoid with Prostate Cancer



- Some herbs increase testosterone levels and should be avoided
  - - Damiana *Turnera diffusa*
  - - Siberian ginseng *Eleutherococcus senticosus*
  - - Sarsparilla *Smilax Spp*
  - - Stinging nettle *Urticara dioica*

A Prostate Support Formula

- **Vitamin C** (ac calcium ascorbate, magnesium ascorbate) 100 mg **Vitamin D-3** (as cholecalciferol) 500 IU **Zinc** (as OptiZinc, orotate) 10 mg **Selenium** (as selenomethionine, sodium selenate) 100 mcg **Prostate Support Proprietary Blend 1.367** g --Turmeric rhizome extract (Curcuma longa; BCM-95(R); 95% Curcuminoids), Quercetin (98% Bioflavanoids), Saw palmetto berry (Serenoa repens; 25% fatty acids), Grape skin extract (Vitis vinifera), Pomegranate extract (Punica granatum, 40% ellagic acid), Pumpkin seed oil extract (Cucurbita peop; 25% fatty acids). Chinese Smilax rhizome extract (Smilax glabra), Pygeum bark extract (Prunus Africana; 13% sterols), Lycopene, Resveratrol, Berbine **Immune & Hormonal Support Proprietary Blend 378 mg** --Stinging nettle leaf extract (Urtica dioica), Alpha Lipoic Acid, Green tea Leaf (Camellia sinensis; 40% EGCG, 95% Phenols, 70% Catechins), Astragalus membranaceus root extract, Citrus bioflavonoid complex, Eleuthero (Eleutherococcus senticosus), Job's tears seed extract (Coix lacryma-jobi), Chinese golden thread rhizome extract (Coptis sinensis) **Liver Support Proprietary Blend 235 mg** --Broccoli extract (Brassica oleracea), Skullcap herb extract (Scutellaria barbata), Chinese skullcap root extract (Scutellaria baicalensis), Dandelion root extract (Taraxacum mongolicum) MycoCaid Organic Herbal Enhanced Mushroom Proprietary Blend 250 mg --Phellinus linteus, Ganoderma lucidum (Reishi), Coriolus versicolor (Coriolus) Beta sitosterol (90% phytosterols) 150 mg Di indolylmethane (DIM) 75 mg Supplement Facts **Serving Size: 6 capsules** Servings per Container: 30 Amount per Serving: **Price $179.50 retail**

Nutrition for Treatment of Androgen Independent Prostate Cancer (AIPC)

- Use a team approach and request nutrition advice for specific chemotherapy
- Wise food choices reduce side effects of typical chemotherapy
- Maintain even weight as possible during treatment schedule
- Stay hydrated throughout treatment
- Exercise may improve appetite and help with sleep

PartinTables

- Predictions are based on PSA, Gleason score and clinical stage *don't include your nutritional status*
- Stress management not assessed
- Activity levels not assessed
- Tip the scales in your favor – make positive lifestyle choices
- Choose healthy food choices and an active lifestyle as they are invaluable tools for your recovery

Nutrition Advice for Typical Symptom Management

- *Fatigue and general malaise*
  - green or black tea, dark chocolate, cocoa
- *Nausea*
  - whole grain crackers, melba toast
  - drink cool, clear beverages and soups
- *Constipation*
  - prune juice, dried fruit or fruit compote
  wheat bran or Benefiber®
- *Burning during urination*
  - avoid caffeine, alcohol and spicy foods

Rebuilding Resilience

- Maintain lean muscle mass
- Remain active
- Eat sufficient protein
- Get plenty of rest and sleep
- Use stress reduction techniques
  - yoga
  - breathing
  - music and art
  - T'ai Chi
  - swimming

Food Choices for Prostate Health

- Choose **fish** at least three times a week
- Choose **fruit** as dessert and for snacks
- **Eat vegetables at both main meals**
- **Choose 4 or more servings of tomatoes or other lycopene rich foods (pink grapefruit, watermelon, guava) each week**
- Take a multivitamin and mineral supplement daily for **Vitamin D**, folate, **selenium** and zinc. Avoid mega doses of zinc and calcium

Summary

- Choose to eat foods with anti-inflammatory, antioxidant and anti-carcinogenic properties for general health
- Berries and other darkly colored, aromatic plant foods and culinary herbs are especially beneficial
- Be cautious about supplements – look instead for nutrient rich foods
- Eat well and be well!

Carolyn Katzin