



# Dietary Change for Cancer Risk Reduction

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# Introduction

- Discuss dietary factors that reduce prostate cancer risk
- Provide examples of healthy food choices
- Provide guidelines to maintain a healthy and happy body

# Topics of Discussion

- Dietary fat and fatty acids
- Dietary fibre
- Fruits and vegetables
- Lycopene
- Soy
- Selenium



# Topics of Discussion

- Calcium
- Vitamin C
- Vitamin D
- Vitamin E
- Green Tea

# Dietary Fat and Fatty Acids

- Epidemiological studies show a link between high-fat intake increases man's risk for advanced prostate cancer
- Giovannucci & colleagues (HMS) who ate high fat diets (large amounts of red meat) had sig.. higher rate of advanced prostate cancer

# Dietary Fat and Fatty Acids

- Journal of NCI: per capita fat consumption correlates directly with increased prostate cancer rates.
- Animal study by Wang & assoc. showed that reducing fat intake inhibits androgen-dependent prostate cancer growth & decreases prostate tumour sizes in animals.

# Dietary Fat and Fatty Acids

- Current studies assessing fatty acids and risk of prostate cancer
- Conclusion: much controversy
- Why? Some studies show that omega 3 f.a. (including ALA) have increased prostate cancer growth in vitro (in test tubes)
- Another study U of Michigan found ALA promoting prostate cell growth

# Dietary Fat and Fatty Acids

- Omega 3 is an essential f.a.
- Three types:
  - ◆ ALA-alpha-linolenic acid- flaxseed, flaxseed oil, walnuts, canola
  - ◆ EPA-eicosapentaenoic acid-fish & seafood
  - ◆ DHA - docosahexaenoic acid- fish & seafood

# Dietary Fat and Fatty Acids

- Omega-3 may reduce risk:
  - ◆ Induces apoptosis (cell death)
  - ◆ Suppress cancer cell initiation
  - ◆ Compete with arachidonic acid (omega 6) which limits harm from omega 6

# Dietary Fat and Fatty Acids

- Our diets are traditionally lower in omega 3 and higher in omega 6
- Average ratio of omega 6 (linoleic): omega 3 (linolenic) ratio in N.A. is 8:1.
- Ideally: ratio should be 4:1.
- Studies shown Japanese (3:1) & Inuit (1:3) have lower prevalence of cancer and CVD

# Dietary Fat and Fatty Acids

- Experimental models show consistently protective effects of omega 3 on the development of carcinogen induced tumors, growth of solid tumors, cachexia and metastatic diseases.

# Dietary Fat and Fatty Acids

- Omega 6: linolenic acid which can be converted to arachidonic acid may stimulate growth of prostate cancer cells
- High intake of omega 6 may interfere with the role of omega 3 and inhibit its protective effects.

# Dietary Fat and Fatty Acids

- A pilot study of 15 men who consumed 30 gm of ground flaxseed and a lower fat diet for 6 months
- PSA levels lowered from 8.5 to 5.7 on average (*Urology, 2004*)
- We do not eat isolated nutrients
- Ground flaxseeds are rich in lignans -a fibre rich estrogen

# Dietary Fat and Fatty Acids

- Yet, fish oils have not shown an increase in prostate cancer
- Studies show that omega 3 fatty acids inhibit prostate cancer cell growth
- Animal study by Cohen and Rose, mice were fed diet rich in omega 3 and prostate cancer tumors growth was inhibited.

# Dietary Fat and Fatty Acids

- Men consuming fish 3 or more times per week also has lower risk of prostate cancer - esp. metastatic prostate cancer where the effect was greater.
- Researchers in New Zealand reported men with higher levels of EPA and DHA, omega 3 found in fish, had a 40% lower risk of prostate cancer

# Dietary Fat and Fatty Acids

- Omega 6 fatty acids promotes the growth of human prostate cancer
- Specifically linoleic acid (safflower) and arachidonic acid (found in all meats and whole dairy)
- Ghosh & Myers study showed that linoleic acid stimulated the growth of prostate cancer cells in culture

# Dietary Fat and Fatty Acids

- What does this mean for YOU?
- Avoid flaxseed oil supplements
- Consume no more than 2 servings of red meat/week
- Eat 1 -2 servings of fish/week, such as salmon, whitefish, halibut, tuna fish (canned in water)
- Consume low fat dairy products

# Dietary Fat and Fatty Acids

- Incorporate one of the following foods on a regular basis to achieve sufficient omega-3 f.a.
  - ◆ 1-2 tbsp. ground flaxseed
  - ◆ 1 oz walnuts
  - ◆ 1/2 - 1 cup cooked soybean

# Dietary Fat and Fatty Acids

- Trans Fatty Acids
- Direct link between trans fat and prostate cancer not studied
- May cause imbalance in hormonal systems that regulate healing & encourage development of cancer
- However, it does act as a saturated fat - better to eliminate from diet

# Dietary Fibre

- May have ability to lower risk of prostate cancer progression
- HOW? Decreases levels of testosterone
- Increase consumption of soluble fibre (fruits/legumes/oat bran, barley)
- Lowers plasma levels of testosterone

# Dietary Fibre

- As a result: less testosterone available to stimulate tumor growth
- Tariq & assoc. PSA was lowered by 10% after 4 months on a diet high in soluble & insoluble fiber (fruits, fresh & cooked vegetables, wheat bran and whole grains)
- Testosterone was excreted in feces

# Dietary Fibre

- Increase fibre intake: 25-35 gm/day
- Sources: whole fresh fruits & vegetables, whole grain breads and cereals and beans
- Avoid supplements
- Good source of fibre: 4 gm fibre/serving

# Fruits and Vegetables

- Contain antioxidants which can destroy carcinogens
- Contain phytonutrients which protect cells against damage
- Contain dietary fibre which may lower testosterone levels - taking away a stimulus for tumor growth

# Fruits and Vegetables

- Eat seven or more servings of fruit and vegetables/day
- Eat a variety of fruit and vegetables/day
  - ◆ 1 cup raw vegetables
  - ◆ 1/2 cup cooked vegetables
  - ◆ 1 medium sized fruit
  - ◆ 3/4 cup canned fruit
  - ◆ 1/4 cup diced fruit

# Lycopene

- Categorized as a carotenoid
- Strongest antioxidant in nature found in red fruits and vegetables
- Mechanism that protects prostate is not understood well
- Binds to free radicals and prevents damage to DNA, RNA, lipids and proteins in normal healthy cells

# Lycopene

- Giovannucci & coll. Men consuming more than 10 servings of tomatoes and tomato products/week had a 35% lower risk of prostate cancer than men who ate less than 1.5 servings
- The consumption of tomato products also decreased risk of being diagnosed with advanced or aggressive prostate cancer

# Lycopene

- Wayne State University study:
- Patients who had chosen surgery as their primary treatment were asked to take lycopene
- Discovered smaller tumors at time of prostatectomy.
- Also, 73% of lycopene treated group had organ confined prostate cancer vs. 18% in untreated group

# Lycopene

- Sources of Lycopene:
  - ◆ Tomato juice, 8 oz: 22 mg
  - ◆ Canned spaghetti sauce, pasta, tomato sauce, 1/2 cup: 20 mg
  - ◆ V8 100% vegetable juice, 8 oz: 17 mg
  - ◆ Canned diced tomatoes, 1/2 cup: 12 mg

# Lycopene

- Sources of Lycopene:
  - ◆ Watermelon 1 cup: 8 mg
  - ◆ Guava, 1 medium: 5 mg
  - ◆ Ketchup, 2 tbsp.: 5 mg
  - ◆ Fresh tomato, chopped, 1/2 cup: 3 mg
  - ◆ Pink or red grapefruit, 1/2 cup: 2 mg
  - ◆ two medium slices fresh tomato: 1 mg.

# Lycopene

- Eat 1-2 servings of lycopene rich foods/day
- Aim for 30-60 mg of lycopene/day
- Avoid lycopene supplements.  
Some studies supplements appear to increase cancer risk
- Cook tomatoes - lycopene is more available to the body

# Soy

- Contains various nutrients: protein, fiber, calcium, and B vitamins
- Rich in antioxidants: isoflavones: genistein and daidzein
- Prevents prostate cancer:
  - ◆ decrease blood androgen levels
  - ◆ bind to hormone receptors
  - ◆ restrict other enzymes associated with cell growth
  - ◆ cause direct tumor destruction
  - ◆ decrease insulin growth factor (IGF-1)

# Soy

- Prostate cancer rates low in Asia (increasing dramatically)
- Soy consumption in Asia: 50 g/day
- Western diet: 2-3 g/day
- No large studies in N.A. because people do not consume enough soy
- Most studies are conducted on animals

# Soy

- Genestein: more than 100 studies in vitro have shown to inhibit growth of wide range of cancer cells including prostate (*Messina*).
- Animal studies have also shown this effect (*Messina*)
- Only 2 small trials in humans have tested soy or its isoflavones

# Soy

- First study: elevated PSA's: PSA did not move when the men consumed 69 mg of isoflavones for 6 weeks
- 2nd study: 41 men advanced prostate cancer
  - ◆ consumed 200 mg isoflavones everyday for 6 months
  - ◆ PSA's continued to rise but not at the same rate
  - ◆ 24 men: PSA increased less than 50%-disease stabilized

# Soy

- Consume 1 or more servings of soy/day
- Avoid soybean oil
- Avoid isoflavone supplements
- Consume:
  - ◆ tofu (4 oz): 13 gm
  - ◆ soymilk (8 fl oz): 10 gm
  - ◆ tempeh (1/2 cup): 19.5 gm
  - ◆ soybeans, edamame (1/2 cup): 11 gm
  - ◆ soyburger (1): 10-12 gm
  - ◆ soy nuts (1/4 cup): 19 gm

# Selenium

- Antioxidant which increases the level of the enzyme glutathione peroxidase that helps to block free radicals
- Works with Vitamin E to prevent damage to the body
- May repair damaged cells or cause death to damaged cells
- Therefore, tumor growth is delayed

# Selenium

- May reduce levels of prostaglandins, which cause inflammatory response in body which may stimulate cancer growth
- Clark & coll. : men taking daily selenium supplement of 200 micorgrams had a 63% reduction prostate cancer risk
- Most studies deal with prevention rather than treatment

# Selenium

- NCI is funding Selenium and Vitamin E cancer Prevention Trial (SELECT), 32,000 participants.
- Results due: 2013.
- Most research studies; 200 mcg supplement.
- 2 Brazil nuts: 200 mcg selenium

# Selenium

- Selenium supplement is not recommended. If you take one, should be selenomethionine
- Sources: seafood (canned tuna), bran, wheat, barley, brown rice, soybeans, onion and garlic, chicken
- Too much selenium is toxic: hair loss and dizziness.
- Do not exceed 200 mcg. a day

# Calcium

- Earlier studies: 4 X the risk of advanced prostate cancer only in men who consumed at least 2,000 mg of calcium/day, compared than men who consumed less than 500 mg/day.
- Risk is double for those who exceed 1500 mg (unpublished)
- WHY? Lowers levels of Vitamin D which may cause cells to lose their normal structure and to proliferate

# Calcium

- Be aware that many foods are now fortified with calcium
- Account this in your overall intake

# Vitamin D

- Active form: 1,25 dihydroxyvitamin D
- it is involved in the control of cell growth and death
- Receptors can be found on prostate cancer cells
- Vitamin D receptors - slows down the cancer growth (in cancerous and normal prostate cells)

# Vitamin D

- Ahonen and coll. Vitamin D deficiency increases the risk of prostate cancer progression
- men with high levels of Vitamin D had delayed the appearance of clinical cancer by 1.8 years.
- Animal & in vitro- active form of Vitamin D, slow the growth of prostate cancer
- Pittsburgh Cancer Institute: inhibited growth in a metastatic line of prostate cancer cells

# Vitamin D

- Sources:
  - ◆ Sunlight (10-15 minutes)/ 2-3 x /week
  - ◆ fortified soy milk products and fortified non fat milk
  - ◆ dark green leafy vegetables: spinach and broccoli
  - ◆ cereals: dry or cereal grain bar (fortified with at 40 IU)
  - ◆ inadequate intake of Vitamin D in diet: a multivitamin: only contain 200-400 IU.

# Vitamin E

- Fat soluble vitamin and an antioxidant
- It protects cells by eliminating free radicals by stabilizing cell membranes thus protecting tissues in the body.

# Vitamin E

- Alpha-Tocopherol Beta-Carotene Cancer Prevention Study (ATBC study), vitamin E shown to reduce prostate cancer by 30% and reduce death by 40%
- Studies have shown as little as 50 IU/day is needed. Some found 800 IU. Use the lower amount.

# Vitamin E

- Studies: long term Vitamin E (alpha tocopherol) supplementation decreases serum androgen concentrations, which reduces incidence and mortality of prostate cancer

# Vitamin E

- Sources:
  - ◆ Whole grains
  - ◆ Wheat germ
  - ◆ Green leafy vegetables
  - ◆ Nectarines, peaches, apricots, mangos and avocados
  - ◆ Pumpkin - cooked
  - ◆ Salmon - baked, broiled or steamed

# Vitamin E

- Choose a supplement that has a natural form of Vitamin E (gamma tocopherol, d-alpha-tocopherol)
- More Vitamin E does not mean it is better. Get it from natural food sources.
- More studies need to be done on nonsmokers.
- SELECT trial: men taking 400 IU of alpha tocopherol)

# Vitamin C

- No consistent relationship between Vitamin C and prostate cancer
- It is an antioxidant, preventing nitrates into cancer causing substances
- Controversy surrounding their relationship

# Vitamin C

- Case control studies reported a 23% reduction in prostate cancer risk from daily vitamin C use.
- Earlier cohort studies found no protective effect for Vitamin C
- 30 year follow up study observed no association between consumption of Vitamin C and prostate cancer

# Vitamin C

- Do not take a Vitamin C supplement.
- Diets rich in fruits and vegetables - you will be getting enough
- RDA: 90 mg/day in males

# Zinc

- Researchers found double the risk of advanced prostate cancer in men who got more than 100 mg a day from supplements, compared with those who got less than 25 mg. (*J. Nat. Cancer Inst.*, 2003)
- Number 1 touted product for the prostate and there is no good evidence for taking it.

# Green Tea

- Contains antioxidants called polyphenols
- EGCG- Epigallocatechin gallate - more powerful antioxidant properties than Vitamins C & E
- Studies on mice - 6 cups/day stopped the spread of cancer (metastatic cancer)

# Green Tea

- Studies:: North Central Cancer Tmt Group: 6 cups of tea a day (1 gm of green tea powder) to 42 cancer patients whose PSA levels had not dropped with hormones. PSA levels continued to rise. (*Cancer 2003*)
- Another study discovered those Chinese men who had prostate cancer were less likely to be tea drinkers (*Int. J. Cancer, 2004*)

# Green Tea

- Drink tea in place of sodas and other drinks that are nutrient deficient
- To lower caffeine intake, choose decaffeinated green tea.
- To prevent tumor growth - 3-10 cups of green tea must be consumed

# Exercise

- Research supports the link between regular physical activity and lower cancer risk for prostate cancers.
- Protective:
  - ◆ regulate productions of a range of hormones & growth factors
  - ◆ decrease the over-production of sex hormones
  - ◆ reduce fat deposits making it harder for dietary carcinogens to be stored long term

# Exercise

- Recommendation:
  - ◆ Minimum of 30-45 minutes of moderate to vigorous intensity activity per day for at least 5 days/week

# Meal Plan

- Breakfast:
  - ◆ Oatmeal (1 cup)
  - ◆ Soy milk (1 cup)
  - ◆ Flaxseed, grd. (2 tbsp.)
  - ◆ Dried Cranberries (1/4 cup)
  - ◆ Brazil Nuts (2 each)

# Meal Plan

- Lunch:
  - ◆ Whole grain bread (2 slices)
  - ◆ Turkey (2.5 oz)
  - ◆ Lettuce (1 cup)
  - ◆ Tomato (4 slices)
  - ◆ Red Peppers (1/4 cup)
  - ◆ Onions (1/4 cup)
  - ◆ Mustard (1 tsp.)
  - ◆ Peach (1 medium)

# Meal Plan

- Snack:

- ◆ Vegetable Juice (12 oz)
- ◆ Granola Bar (1 each)

Dinner:

- ◆ Pasta, whole grain (2 cups)
- ◆ Tomato sauce (1 cup)
- ◆ Mushrooms (3/4 cup)
- ◆ Broccoli (1 cup)
- ◆ Green salad (2 cups)
- ◆ Light dressing ( 2 tbsp)
- ◆ Mixed fruit (1 cup)

# Meal Plan

- Calories: 2100
- Provided by: UCSF Medical Centre
- Adjust for calories: alter portion sizes
- Experiment with substitutions.

# Nutritional Summary

- Consume 1-2 servings of fish weekly
- Consume 1 to 2 servings of soy/week
- Eat tomatoes and tomato products several times per week
- Eat 7 or more servings for fruit and vegetables per day
- Fibre intake: 25-35 gm/day
- Drink green tea in place of soda
- Supplements: are not necessary
  - ◆ Discuss with your physician the role of a multivitamin in your diet
  - ◆ Avoid calcium supplements



# Practice Precaution

- Always discuss changes in diet and supplement use with your physician.