Nutrition for Prostate Cancer:
Update on Evidence-Based Recommendations

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Image source: https://www.washingtonpost.com/rf/image_1484w/2010-2019/WashingtonPost/2015/01/05/Editorial-Opinion/Images/bigstock-Green-And-Red-Healthy-Food-14588906-170.jpg?t=20170517

Disclosure: This event is intended as a support service in an educational format. This event does not establish a patient-provider relationship and is not meant to provide patient-specific clinical direction.

Agenda

1. Introduction
2. Nutrition for Prostate Cancer Survivors
3. Medical Nutrition Therapy for specific prostate cancer treatments
4. Nutrition for Cancer Survivors (general)
5. Dietary Supplements
6. Questions

Nutrition and Prostate Cancer Risk

- Why talk about nutrition in relation to prostate cancer?
  - Differences in diet and lifestyle play a role in the variability of prostate cancer rates worldwide
  - Body fatness, dietary patterns, and physical activity patterns influence factors that have been implicated in the development of prostate cancer
  - Observational studies suggest dietary components may affect prostate cancer risk, progression, and mortality

Macaire, G. (2020). Medical Nutrition for Prostate Cancer. In V. Williams & A. Voss (Eds), *Oncology Nutrition in Clinical Practice: Oncology Nutrition Dietetic Practice Group*. Academy of Nutrition and Dietetics.
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Image source: https://secure.i.telegraph.co.uk/multimedia/archive/02499/veg_2499288c.jpg

Prostate Cancer Risk Factors

Factors not related to diet and lifestyle

- Age
- Ethnicity
- Heredity

Diet/Lifestyle Factors that Increase Risk

- High BMI
- Smoking
- Consumption of:
  - → Dairy (specifically calcium)
  - → Processed meat
  - → Eggs (specifically choline)
  - → Poultry with skin, animal fat, other saturated fat
  - → Selenium supplementation

Diet/Lifestyle Factors that Decrease Risk

- Physical activity
- Diet high in lycopene
- Consumption of:
  - → Cruciferous vegetables
  - → Vegetable fat
  - → Fish
  - → Soy
  - → Tea
  - → Coffee

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Nutrition for Prostate Cancer Survivors Topic Overview:

1. Plant-based diets & the New American Plate Model
2. Cruciferous vegetables
3. Allium vegetables
4. Soy
5. Tomatoes
6. Additional foods being studied for anti-prostate cancer properties
7. Fat consumption & types of fat
8. Dairy products, calcium, and vitamin D
9. Eggs & choline
10. Body weight & physical activity

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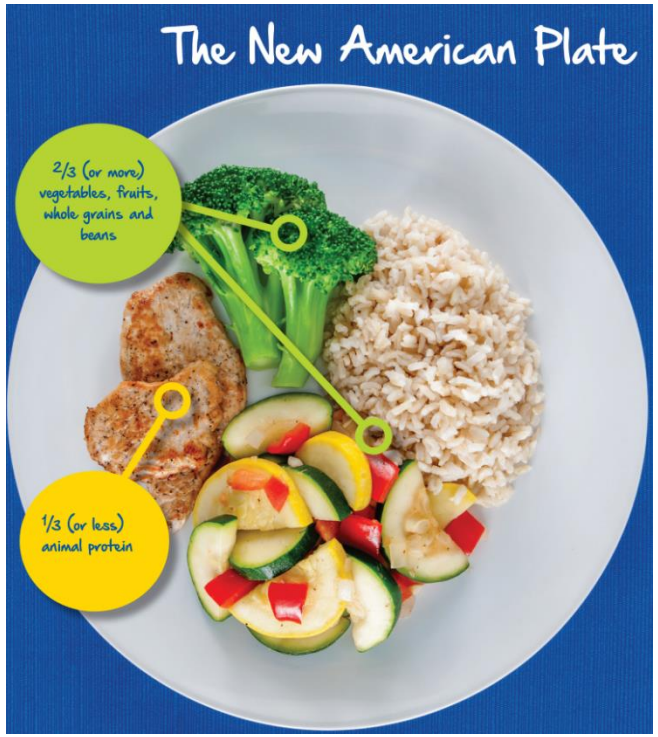
Plant-Based Diet & the New American Plate Model

- Plant-based diets provide vitamins, minerals, fiber, and phytochemicals
- Associated with a decreased risk for prostate cancer and recurrence
- This does not mean exclusively following a vegan or vegetarian diet



2/3 of the plate: plant foods

- Whole grains
- Fruits and vegetables
- Beans

1/3 of the plate: animal-based lean protein sources

- Seafood, poultry, eggs, dairy
- Occasionally lean red meat
- Avoid processed meat

AICR's New American Plate. (2020, January 24). American Institute for Cancer Research. Retrieved July 7, 2020 from https://www.aicr.org/cancer-prevention/food-facts/aicrs-new-american-plate/
Image source: https://i0.wp.com/blog.aicr.org/wp-content/uploads/2015/09/new-american-plate-model-2015.jpg?resize=473%2C532

Cruciferous Vegetables

Contain isothiocyanates and indoles

- Have been shown to inhibit growth of prostate cancer cells
- Intake of cruciferous vegetables have been linked consistently with decrease risk for prostate cancer, as well as it's recurrence and metastasis

Sources

- Arugula, Brussels sprouts, cabbage, cauliflower, collard greens, kale, horseradish, kohlrabi, mustard greens, radishes, rutabaga, turnips, turnip greens, watercress

Recommendation: **At least 1 serving per day**

- Great when roasted or sautéed
- Use raw in salads (arugula, cabbage, kale, radish, watercress)
- Add to stews/soups

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Image source: https://health.trythis.co/wp-content/uploads/sites/2/2018/05/Cruciferous-Vegetables.jpg

Allium Vegetables

Contain organosulfer compounds

- Decrease risk for prostate cancer by inducing cell cycle arrest and apoptosis (programmed cell death)
- Pungent and flavorful

Sources

- Garlic, onions, leeks, shallots, chives, scallions

Recommendations:

- Use to help flavor sauces and dishes
- Sautee with vegetables
- Add shallots to salad dressing
- Garnish dishes with raw chives and scallions

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Image source: https://foodrevolution.org/wp-content/uploads/iStock-958870638-Stephen-Ackerman.jpg

Soy

Contain an isoflavone called genistein

- Genistein may inhibit prostaglandins that promote inflammation
- Recommend whole food sources; do not recommend processed sources (processed soy products use soy protein isolate or soy isoflavone extracts)

Sources (whole food)

- Soybeans, edamame, tempeh, tofu, soy milk, soy nuts, miso

Recommendation: **Include regularly in the diet (no specific amount has been determined)**

- Edamame can be steamed and eaten alone or added to salads, rice dishes or pureed to form a dip
- Tofu and tempeh can be used as a vegan protein sources instead of meat, poultry, or fish
- Soy milk is a non-dairy alternative; use in the same way as milk
- Soy nuts can be eating alone as a snack or used in a snack mix
- Miso soup

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Image source: https://www.vegkitchen.com/wp-content/uploads/2013/05/Soy-products.jpg

Tomatoes

Rich in lycopene, a carotenoid

- May convey a particular benefit against prostate cancer
- Has effects on cell cycles that are believed to inhibit prostate cancer growth and metastasis
- Health Professionals Follow-Up Study:

  → 66% decreased risk for metastatic prostate cancer in men consuming >/=2 servings cooked tomato sauce per week

  → 28% decreased risk for developing lethal prostate cancer in healthy men whose diets contained the most lycopene

Sources

- Raw and cooked tomatoes (tomato sauce, tomato paste); guava, watermelon
- Lycopene absorption is enhanced when consumed or cooked with fat (olive oil, nuts, avocado)

Recommendation: **Include 2 cooked sources of tomato products per week**

- Pasta dishes with tomato sauce, pizza, beans or vegetables stewed in tomato sauce, curries
- Salad with tomatoes drizzled with olive oil or paired with nuts or avocado
- Watermelon: fresh, grilled, or in salads

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Image source: https://fieldfood.eu/Communities/Common/Images/FieldFood/Tomato%20products.jpg

Additional Foods: Research Ongoing for Prostate Cancer

Contain polyphenols: show cancer-fighting potential

Coffee and Tea

- **Recommendation: Include 1 cup or more of green tea per day**

Flaxseeds

- Better absorbed when ground
- **Recommendation: Include 2 tablespoons ground flaxseeds daily**

  → Add to smoothies, banana bread, pancakes, yogurt, cereal/oatmeal, mix with breadcrumbs

Pomegranate

- Seeds are the edible portion; can also drink juice
- Eat alone, add to salads, soups, smoothies; add juice to glazes for protein/vegetables, in dressing

Turmeric

- Use spice, not supplement; pairing with black pepper may enhance effects
- Add to curry and lentil dishes, soups, in rice, on roasted vegetables, in smoothies, salad dressings
- Golden milk: milk (can be non-dairy) steamed with turmeric, cinnamon, nutmeg, black pepper

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Image source: http://2.bp.blogspot.com/-qBC2z8VsqsI/ULLrUotTIEI/AAAAAAAAACM/j4KRrL4azKc/s1600/pomegranate.jpg; https://happyhealthymama.com/wp-content/uploads/2015/11/PB030301.jpg

Fat Consumption

Western Diets

- High intake of animal fats and sweets
- Tend to increase testosterone levels

Type of Fat is More Important than Total Fat Intake

- Positive association between prostate cancer and intake of saturated fat from meat and dairy foods
- Increased risk of recurrence with high intake of poultry with skin and processed meat after diagnosis
- Meat cooked at high temperatures may contribute to prostate cancer risk
- Intake of trans-fat have been correlated with increase risk of prostate cancer
- Higher fish consumption is correlated with decrease risk of prostate cancer

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Image Source: https://www.heartandstroke.ca/-/media/images/selection-of-healthy-fat-sources.ashx?h=1080&w=1920&la=en&hash=722BB45E825C57BA4CB6AC773FF95AA4374D6D41

Fat Sources: Recommendations

Saturated Fat

- Found in animal products: red meat, processed meat, poultry with skin, whole milk or 2% dairy, baked goods)
- Limit to < 6% of energy intake; for example for 2000 calorie diet, intake should be < 13.5g saturated fat per day
- Substituting 30g/day (or ~1.1 oz per day) of poultry or fish for red meat is associated with a significant decreased risk for prostate cancer recurrence
- Limit red meat to < 18 ounces per week, avoid processed meats
- Choose poultry without the skin, fish, low-fat dairy, plant-based protein sources (beans, lentils, nuts and nut butters, seeds, whole food soy products)

Trans Fat

- Most are artificially made; inexpensive, last a long time, give food desirable taste/texture
- Found in fried foods, baked goods, frozen pizza (depending on brand), cookies, stick margarine, some crackers
- Limit as much as possible; avoid packaged goods with “partially hydrogenated oil” in ingredients list

Smoking and Grilling Meat

- Cooking red meat at high temperatures (and smoking or grilling meat) can produce cancer-causing compounds

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Image Source: http://cdn.ruled.me/wp-content/uploads/2019/06/graphic_long-chain-saturated-fatty-acid-sources.png

Fat Sources: Recommendations

Omega 3 Fatty Acids: Eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA) and alpha-linolenic acid (ALA)

- Sources of EPA/DHA: salmon, sardines, black cod, trout, herring, DHA-enriched eggs
- Sources of ALA (plant-based omega 3): flaxseeds, chia seeds, walnuts, hemp seeds, pumpkin seeds
- **Recommendation: consume cold water fish twice weekly**

Omega 6 Fatty Acids: Arachidonic acid and Linoleic acid

- May stimulate growth of prostate cancer cells
- Limit intake of meat, butter, egg yolks, whole milk dairy (arachidonic acid sources)
- **Recommendation: limit vegetable oil (corn, safflower, sunflower, cottonseed, soybean) intake to 1 tablespoon/day (linoleic acid)**

Omega 9 Fatty Acids: Oleic acid

- Intake appears to have a slight inverse association with risk of prostate cancer
- Sources include olive oil, avocado oil, canola oil, macadamia nut oil, almonds, hazelnuts, pistachios, pecans, avocados
- **Recommendation: include daily (limit nuts to ¼ cup per meal or snack to keep calorie intake reasonable)**

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Image souce: https://retireenews.files.wordpress.com/2016/06/samon.jpg

Dairy: Calcium & Vitamin D

High intake of total calcium, dairy calcium (>/= 1500mg/day) and dairy products has been shown to have a positive association with increase risk of prostate cancer

- Less is known about the effect of calcium and dairy products after diagnosis, though studies have linked a higher consumption of whole milk with a higher risk for prostate cancer recurrence in men with non-metastatic prostate cancer
- Most studies that analyzed the effect of Vitamin D intake/levels on prostate cancer produced null or conflicting results
- Race, disease stage, and calcium intake may affect the role of Vitamin D in men with prostate cancer

Calcium supplementation may be recommended for **bone health**, depending on the individual and treatment regimen; for example, individuals on androgen-deprivation therapy (ADT)

- **Calcium Recommendation: Include the RDA of 1000-1200mg/day from diet; do not exceed 1500mg/day**
- **Vitamin D Recommendation: Include the RD of 600-800IU/day***

*Include more if low serum Vitamin D level (discuss supplementation with MD)

*Do not exceed 4000IU/day unless instructed by MD

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Sources of Calcium & Vitamin D

Calcium

- Non-fat or low-fat dairy (up to 1 serving daily): yogurt, cheese, milk
- Canned fish with soft bones: sardines, canned salmon with bones
- Beans: red kidney beans, great northern beans
- Leafy greens: kale, turnip greens, broccoli
- Tofu: firm and soft
- Almonds
- Calcium fortified non-dairy beverages (ex: orange juice, soy milk)
- Calcium fortified foods: breakfast cereals

Vitamin D: very few foods naturally contain Vitamin D

- Fatty fish: salmon, tuna, mackerel
- Small amounts in beef liver, cheese, egg yolks
- Vitamin D fortified foods: cow's milk, soy and nut milks, orange juice, breakfast cereals
- The SUN!

National Institutes of Health: Office of Dietary Supplements. (2020, March 26). *Calcium: Fact Sheet for Health Professionals.* https://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/
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Image Source: https://plantbasedjuniors.com/non-dairy-calcium-for-babies/; https://dancingwithfools.files.wordpress.com/2009/11/sun-face.jpg

Eggs

Choline

- An essential nutrient
- Involved in many body processes: cell structure and messaging, fat transport and metabolism, gene expression, healthy nervous system
- Found in egg yolks

Relation to Prostate Cancer

- Choline highly concentrated in prostate cancer cells
- Studies have correlated high dietary choline intake and higher than normal blood levels of choline with increased risk for prostate cancer
- A meta-analysis found no association between egg consumption and risk for prostate cancer
- Other studies have linked a higher egg intake with increased risk for fatal prostate cancer
- **Recommendation: Limit to 2 egg yolks per week; egg whites are fine**

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Image Source: https://foodallergycanada.ca/wp-content/uploads/egg-2.jpg; https://www.vvsupremo.com/wp-content/uploads/2017/08/Three-Cheese-Egg-White-Omelet-900x570-sRGB.jpg

Body Weight & Physical Activity

Body Weight

- There is inconsistent evidence associating obesity with total or non-advanced prostate cancer risk, though greater body fatness is strongly associated with advanced prostate cancer
- Gaining 2.2kg (~4.9lb) after prostatectomy has been associated with doubling risk of recurrence
- Weight gain of >/= 5% has been associated with nearly a 2-fold increased risk for prostate-cancer specific mortality
- 2011 meta-analysis: a higher BMI was associated with increased mortality from prostate cancer
- **Recommendation:** If overweight, aim for 1-2 lbs of weight loss per week

Physical Activity

- 3 or more hours per week of vigorous activity is associated with reduced prostate cancer recurrence and mortality
- Combination of aerobic and resistance training may help decrease side effects of ADT
- **Recommendations:**

  - Physical activity of 30 minutes per day, most days of the week

  - If medically appropriate, >/= 3 hours of vigorous activity per week

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Physical Activity Continued

Moderate Activity

- Brisk walking
- Dancing
- Gardening
- Housework
- Games/sports with children
- Walking dog
- Building tasks (painting)

Vigorous Activity: **need MD's approval**

- Running
- Walking/climbing briskly uphill
- Fast cycling, fast swimming
- Aerobics
- Competitive sports/games
- Heavy shoveling/digging ditches

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World Health Organization. (2020). *Global Strategy on Diet, Physical Activity, and Health. https://www.who.int/dietphysicalactivity/physical_activity_intensity/en/*
Image Source: https://noahapopka.com/2019/10/02/5-reasons-to-walk-your-dog/; https://www.switchbacktravel.com/best-trekking-poles

Medical Nutrition Therapy for Specific Treatments

Surgery

- Adequate energy (calories), protein, and micronutrients (vitamins/minerals) for healing
- Calorie and protein needs are increased in the post-operative setting
- Small, frequent meals recommended for low appetite

Radiation Therapy

- Diarrhea is the most common side effect of pull pelvic radiation therapy
- Modify fiber intake (transition to low fiber diet) and fat intake for rectal urgency and loose stools
- Anti-diarrheal medications as needed as prescribed by MD
- Consider probiotics to help lessen gas and diarrhea from treatment*

  * >/= 10 billion CFU per day with *Lactobacillus* or combination *Lactobacillus* and *Bifidobacterium*

  * Can start with 1 serving of probiotic-rich dairy per day such as yogurt or kefir

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Image Source: https://www.culinary-cool.com/yogurt-mousse-with-sweet-summer-peaches/

Medical Nutrition Therapy for Specific Treatments

Androgen Deprivation Therapy

- Bone Loss

➢ Weight bearing plus resistance exercise 2-3 times per week

➢ 1000-1200mg/day Calcium (food [emphasis on non-dairy sources] +/- supplements); adequate vitamin D level (discuss supplementation with doctor if low)

- Sarcopenia (gradual loss of muscle mass)

➢ Resistance exercise 2-3 times per week

➢ Consider protein supplementation (whey protein isolate); may assist with protein synthesis, particularly when combined with resistance exercise

- Elevated Lipids (cholesterol and triglycerides) and decreased insulin sensitivity

➢ Weight management interventions

➢ American Heart Association (AHA) , American College of Cardiology (ACC), National Lipid Association (NLA) and Academy of Nutrition and Dietetics (AND) guidelines for diet and exercise to reduce cardiovascular disease risk

➢ If experiencing high blood sugar levels, may need to regulate carbohydrate intake (discuss with MD and RD)

- Hot Flashes

➢ Maintain a healthy weight

➢ Add moderate exercise

➢ Limit/avoid hot beverages, spicy foods, caffeine, and smoking to decrease vasomotor symptoms

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Image Source: http://www.gymproject.co.uk/resistance-training-vs-ageing/

Medical Nutrition Therapy for Specific Treatments

Chemotherapy and Immunotherapy

- Nutrition therapy is individualized based on nutrition impact symptoms (NIS) of treatment
- Wide variety of treatment regimens with various potential side effects
- Nutrition plan is designed to promote weight maintenance and preservation of lean body mass (muscle mass), which helps combat fatigue and treatment-related side effects*
  - *Previously discussed recommendations may not apply in setting of poor appetite/intake or if initial presentation included weight loss and decreased intake
  - Individuals that present with weight loss and decreased intake have a higher risk for experiencing NIS and weight loss during treatment

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Image source: https://harvesthealthfoods.com/news/harvesthealthfoods/protein-shakes-101

Nutrition for Cancer Survivors

Recommendations by the American Institute for Cancer Research

- Most already have been discussed:
  - Be a healthy weight
  - Be physically active
  - Eat a diet rich in whole grains, vegetables, fruits, and beans
  - Limit consumption of red and processed meat
  - Limit consumption of “fast foods and other processed foods high in fats, starches, sugars

- To be discussed:
  - Limit consumption of sugar-sweetened drinks
  - Limit alcohol consumption
  - Do not use supplements for cancer prevention

Image Source: https://preventcancer.aicr.org/new/infographic-web-images-450x450/Cancer-Reccomendations-thumbnail.jpg

Limit Consumption of Sugar-Sweetened Drinks

Consuming soda and other sugary drinks increases the risk for weight gain, overweight, and obesity

Sugar-sweetened beverages:

- Regular soda, juice, sports drinks, energy drinks, tonic, fruit punch, lemonade, sweetened iced tea, sweetened coffee/tea

Healthy alternatives:

- Still or sparkling water, flavored water or seltzer that do not contain added sugar, infused water with fruit, unsweetened tea or coffee

There is no strong research to suggest that artificially sweetened drinks with minimal calorie content cause cancer

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Image Source: https://www.wellbeing.com.au/body/nutrition/sugar-sweetened-beverages-unhealthy-diets.html

Limit Alcohol Consumption

The less you drink, the lower your risk for cancer

1 drink = 12 oz beer, 5 oz wine, 1.5 oz liquor

Especially harmful when combined with tobacco

Recommendation: Limit intake of alcoholic beverages to 2 per day for men

Image Source: https://www.dietdoctor.com/wp-content/uploads/2016/04/Alcohol-grams-per-drink_top5-1.jpg

Dietary Supplements with Consideration for Prostate Cancer

Whole foods are best

- Foods are complex – nutrients work synergistically for better utilization/absorption
- Studies examining anticancer effects of single nutrient supplementation have produced negative results

➢ Lack of significant evidence to recommend any single supplement to decrease risk for prostate cancer

Certain supplements may increase prostate cancer risk

- SELECT (Selenium and Vitamin E Cancer Prevention Trial)

➢ Slight increased risk for prostate cancer in men randomly assigned to take Vitamin E supplements

➢ Selenium supplementation in men with higher than normal baseline selenium levels increased the risk for high grade prostate cancer

➢ Men who reported selenium intake >140mcg/day or more after diagnosis had an increased risk for prostate cancer mortality

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Image Source: https://nextlevelrebel.com/wp-content/uploads/2017/08/how-the-supplement-industry-scams-you.jpg

Dietary Supplements Continued

Beneficial for:

- Identified nutrient deficiency
- Malabsorption or restricted diets

Per the Physicians Health Study II, a regular multivitamin is considered safe

- Associated with 8% reduction in total cancer incidence in men

Important information to consider:

- OTC supplements are not regulated by the FDA before they reach the market
- More is not always better: high doses of some supplements may be harmful
- Some vitamins/herbals may enhance or weaken effects of pharmaceutical medications

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Resources

Prostate Cancer Foundation

- www.pcf.org

American Institute for Cancer Research

- www.aicr.org

American Heart Association

- www.heart.org

Oncology Nutrition

- www.oncologynutrition.org

Cook for Your Life

- www.cookforyourlife.org

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Questions