Nutrition & Cancer

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Cancer includes all **types**, **sites** and **stages of cancer**. Stages of cancer include prevention, diagnosis, treatment, survivorship and end of life care.

Nutrition is the set of integrated processes by which **cells, tissues, organs** and the **whole body** acquire the **energy and nutrients** for **normal structure and function**, which is achieved at body level through **dietary supply**, and the capacity of the body to transform the **substrates and cofactors** necessary for **metabolism**.

All of these domains (**diet, metabolic capacity, body composition** and level of demand for **energy** and **nutrients**) are influenced by levels of **physical activity** and can vary according to different **physiological** and **pathological** or **disease states**.

INTRODUCTION

- Because carcinogenesis occurs over years, most data linking diet and cancer is epidemiological (case control, cohort, or cross-sectional studies)

- It is estimated that one third of the cancer deaths each year in the US can be attributed to nutrition and other lifestyle factors (including smoking)

Causes of Cancer

Lifestyle Choices

- Weight
- Physical Activity
- Eating Habits
- Tobacco Use

- Energy restriction inhibits cancer and extends life span in animals. Positive associations between overweight and cancers of the breast, endometrium, kidney, colon, prostate, and others
- Overweight increases risk of cancer recurrence and decreases survival
- Physical activity is inversely associated with cancer

Nutrition in the Etiology of Cancer

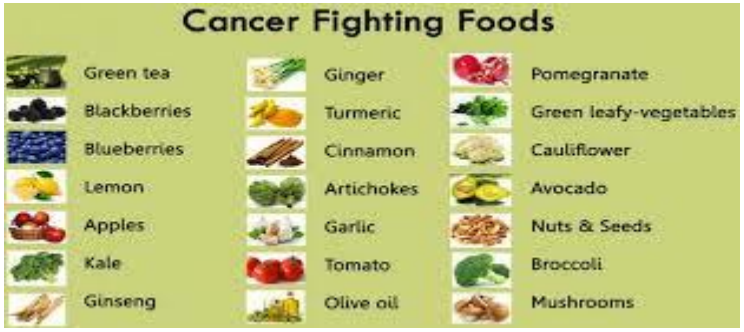
Complex relationship:

Dietary carcinogens: naturally occurring and added in food preparation and preservation. Eg Food additives- flavours, stabilizers etc.

Inhibitors of carcinogenesis: antioxidants, phytochemicals

Enhancers of carcinogenesis

Latency period between initiation and promotion



Energy Intake, Body Weight, Obesity, and Physical Activity

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Nutrition and Cancer Etiology

- Fat
- Protein
- Soy and phytoestrogens
- Carbohydrates: fiber, sugars, and glycemic index
- Fruits and vegetables
- Non-nutritive sweeteners
- Alcohol
- Coffee and tea
- Methods of food preparation and preservation
- Cancer chemoprevention
- Cancer prevention recommendations: nutrition and physical activity

Nutrition in Cancer Prevention

Fat

- High intake of total and saturated fat is associated with increased risk of breast, colon, lung and prostate cancer
- High fat diets are associated with obesity, which is linked with cancer of the colon, rectum, esophagus, gall bladder, breast, endometrium, pancreas, and kidney
- Animal fat (from meat and dairy) was associated with increased risk of breast cancer in the Nurses Health study and others
  Higher omega-3 vs omega 6 may reduce risk of breast cancer
- Low fat diet (<20% fat) may reduce risk of recurrence of breast cancer

Protein

- Difficult to isolate effects of protein, since ↑ protein diets are ↑ in fat and ↓ in fiber
- Low protein diets seem to reduce the risk of cancer, while risk is increased by very high protein intakes
- Increased meat intake is associated with increased risk of colon cancer and advanced prostate cancer

Carbohydrate and Glycemic Index

- High glycemic-index diet associated with increased risk of cancers including ovarian, endometrial, breast, colorectal, pancreas, and lungs
- Limit processed foods and refined sugars and emphasize whole grains and low GI foods

Fiber

- Observational studies and case control studies indicate that fiber-rich diets are associated with a protective effect in colon cancer
- Higher intakes of vegetables were inversely associated with colon cancer risk in one study
- But high fiber diets also tend to be lower in meat, fat, and refined carbohydrates
- Recommendation is to eat high fiber foods despite lack of conclusive evidence re cancer

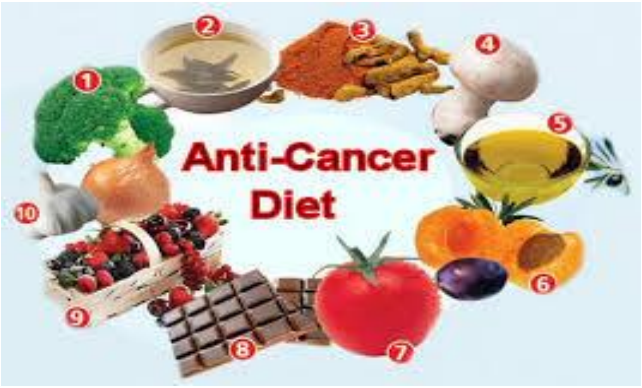
Color Code System of Vegetables and Fruits

Color	Phytochemical	Vegetables and Fruits
Red	Lycopene	Tomatoes and tomato products, pink grapefruit, watermelon
Red/purple	Anthocyanins, polyphenols	Berries, grapes, red wine, prunes
Orange	α-, β-carotene	Carrots, mangoes, pumpkin
Orange/yellow	β-cryptoxanthin, flavonoids	Cantaloupe, peaches, oranges, papaya, nectarines
Yellow/green	Lutein, zeaxanthin	Spinach, avocado, honeydew, collard and turnip greens
Green	Sulforaphanes, indoles	Cabbage, broccoli, Brussels sprouts, cauliflower
White/green	Allyl sulphides	Leeks, onion, garlic, chives

Guidelines for Cancer Prevention

1. Choose a diet rich in a variety of plant-based foods.
2. Eat plenty of vegetables and fruits.
3. Maintain a healthy weight and be physically active.
4. Drink alcohol only in moderation, if at all.
5. Select foods low in fat and salt.
6. Prepare and store food safely.

And always remember . . . Do not use tobacco in any form.

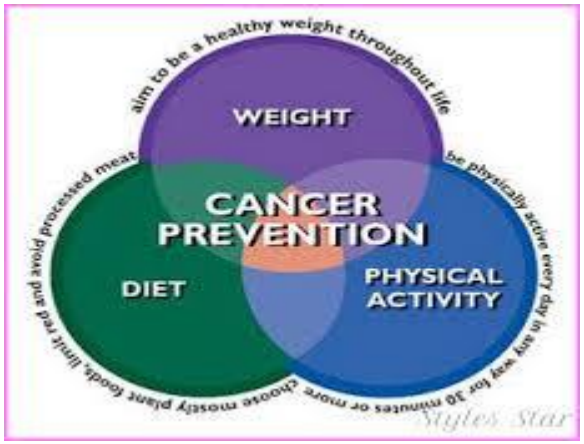


Energy Intake and Physical Activity

- Total energy intake is strongly associated with breast cancer in postmenopausal women

- Physical activity may have a protective effect

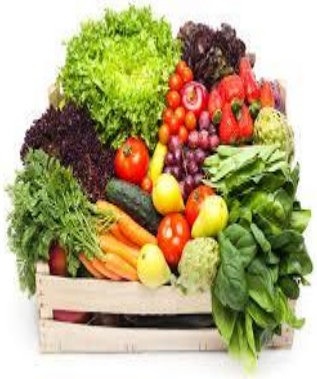
  Women who spent an average 3.8 hours per week in physical activities had lower risk of colon, reproductive cancers



Obesity is a Risk Factor for:

- Breast cancer (among postmenopausal women)
- Colon
- Endometrium
- Esophagus
- Gallbladder
- Pancreas
- Kidney
- Is also a risk factor for cancer recurrence

Fruits and Vegetables



- Fruits and vegetables found to be associated with lower risk in 128 of 156 dietary studies
- Increased consumption of fruits and vegetables is associated with lower risk of cancers of the oral cavity, esophagus, stomach, colon, rectum, and bladder
- Evidence less strong for hormone-related cancers such as breast and prostate cancer
- People who develop cancer tend to have low intakes of Raw and fresh vegetables, Leafy green vegetables Lettuce, carrots, raw and fresh fruit. Cruciferous (cabbage family) vegetables
- Flavonoids and lignans (soy, grains, vegetables) are associated with lower risk of sex hormone-related cancers

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Fruits and Vegetables

- Low in energy, good sources of fiber, vitamins, minerals,etc
- Good sources of antioxidants (vitamins C, E, selenium, phytochemicals such as carotenoids, flavonoids, plant sterols, allium compounds, indoles, phenols, terpenes
- Do not yet know what is the protective agent(s) so best to use food sources

Plant based foods may prevent cancer

- Inhibiting hormone-dependent steps in tumor formation and protecting genetic material from carcinogenic agents Suppressing free radical production

- Serving as bulking agents to dilute carcinogens and decrease gastrointestinal transit time

- Stimulators of physiologically active and anti-cancer enzymes

Mobley C. Nutrition and cancer prevention. In McCallum and Polisena, The Clinical Guide to Oncology Nutrition. Oncology Nutrition Dietetic Practice Group, 2000.

Calcium and Cancer Risk

- Several studies suggest that foods high in calcium may reduce the risk for colorectal cancer and that calcium supplements may reduce the formation of colorectal polyps
- However, there is evidence that high calcium intake, especially supplements, is associated with increased risk of prostate cancer
- Bottom line: get calcium through food sources

Lycopene and Cancer Risk

- Lycopene is a red-orange carotenoid found in tomatoes and tomato-based foods
- Several studies show that consuming tomato products reduces the risk of some cancers, but unclear whether lycopene is responsible
- Absorption of lycopene is enhanced when lycopene-containing vegetables are cooked and eaten with fat
- No evidence that supplements are safe and effective in cancer prevention.

Source: American Cancer Society, accessed 2005

Soy and Cancer Risk

- Soy contains several phytochemicals (phytoestrogens) which have weak estrogen activity and appear to protect against hormone-dependent cancers in animal studies
- No evidence shows soy supplements reduce cancer risk
  High doses of soy may increase the risk of estrogen-responsive cancers, such as breast or endometrial cancers in certain women.
- Breast cancer survivors should consume only moderate amounts

Food Safety and Cancer

- Naturally occurring carcinogens (aflatoxins in peanuts, safrol in plant oils, tannins in grains and grapes, benzopyrene formed by smoking meat and fish)
- Naturally found in plant foods like celery, parsley, figs, mustard, pepper, citrus oils, Pesticides
- Choose in-season, locally grown produce
  Rinse fruits and vegetables and remove outer leaves before eating
- Use proper food storage to prevent growth of fungal carcinogen
- Marinate protein foods to decrease cooking time

Use cooking methods to avoid contact of foods and food drippings with flames

Use lower cooking temperatures with protein foods

SUMMARY

- It is very important to maintain proper nutrition before, during, and after cancer treatment. Such treatments may involve radiation
- Sometimes, the dietary recommendations you receive from your nutritionist may sound like the opposite of a healthy diet. Your care team may encourage you to follow a high-calorie, high-protein diet, especially if you are feeling weak or are underweight.
- Careful food choices will help support your immune system's fight against cancer. The foods you choose to eat during active cancer treatment will vary according to any side effects you may be experiencing.
- Overall, try to make food choices that provide you enough calories (to maintain your weight), protein (to help rebuild tissues that cancer treatment may harm), nutrients such as vitamins and minerals, and fluids (essential for your body's functioning). Also, exercise can help with appetite and digestion issues related to treatment.

PREVENTION IS BETTER THAN CARE

References:

www.slideshare.net