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UCLA Center for Integrative Oncology
Optimizing Wellness

Cancer and Nutrition: Lifestyle Matters

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Understanding nutrition can sometimes be difficult because of all the conflicting information presented by the media. It is important to stay informed yet remain skeptical about what you hear. There is a morass of information on the Internet; however, much of it is misinformation or findings based on anecdotal reports, small studies, or studies that are not well controlled. The best sources of information are those large-scale well designed clinical trials that have long follow-up periods. Of course, studies that have been replicated also help to provide credibility. It is important to remember that any particular dietary item is part of a complex picture and unlikely to play a major role in decreasing the risk of cancer or the risk of recurrence. Emphasis should always be on a varied healthy diet that includes physical activity and weight management.

There is a new field evolving called nutrigenomics. Nutrigenomics is the study of how foods affect the expression of genetic information in an individual. Each one of us is affected by the combination of our exposure to foods, our environment and our personal genetic make-up passed down from our parents and ancestors. We inherit unique responses to food and hence express unique metabolic responses based upon our genetic profile to nutrients in food and the environment. The goal in the future is to determine how particular nutrients will be able to prevent or mitigate disease on an individual basis. We hope to develop individual, personalized nutrition plans; however, we are not there yet. I know you have heard this all before, but I still want to emphasize the most important take home messages for each person reading this article, one that repeatedly comes up in various research studies is that you need to (1) maintain a good body weight, (2) maintain good lean muscle mass composition and (3) avoid obesity.

The Big Picture: Obesity

There are multiple studies that show a link between weight gain, increased risk of developing cancer and increased mortality from cancers. For many years, people have thought dietary fat was with a factor in breast cancer, but there is only a modest association between dietary fat and breast cancer risk. Abdominal obesity and percent of body fat also plays an important role, not just the fat in your diet.

In 2006, a study was published from the Nurses Health Study which assessed weight change after menopause in 49,500 women who had been followed for 24 years. We now know that there is a strong link between obesity and breast cancer, and weight gain, both pre- and post-menopause, contributes significantly to the risk of developing postmenopausal breast cancer. In a 2007 study, obesity was associated with increased mortality from cancers considered to be “obesity-related” which include colon, breast, esophageal, uterine, ovarian, kidney and pancreatic cancers. Also in 2007, increased body-mass index (BMI) was associated with increased risk for 10 of 17 cancers including endometrial, kidney, pancreatic, ovarian, postmenopausal breast, premenopausal colon, esophageal, leukemia, multiple myeloma and non-Hodgkin’s lymphoma. Weight gain after invasive breast cancer is also problematic; for each 11 pound weight gain, a woman who has had breast cancer increases her risk of death from breast cancer by 14%. After six years of follow-up, the risk of death was twice as high for women who were obese, having a BMI of 30 or higher (example 5’4” and 175 lbs). This study confirms the trend of increasing risk for death and recurrence with increasing BMI in breast cancer survivors. If you want to figure out your BMI, you can do a web search on BMI or go to (<http://www.nhlbisupport.com/bmi/>) to find programs that allow you to enter your height and weight.

Free Fatty Acids and Inflammation

There is growing body of research into Omega 3 and Omega 6 fatty acids and their role in inflammation, which is thought to be a promoter of cancer. Omega 6 promotes pro-inflammatory cytokine formation while Omega 3 results in decreased formation of inflammatory cytokines. Early man had a ratio of 2 Omega 6 fatty acids to every 1 Omega 3 fatty acids (2:1). However, our diet has changed substantially from the plant based diet of early man and the American diet has 20 Omega 6 to every 1 Omega 3 (20:1). In 2002, the Institute of Medicine (IOM) issued the first guidelines for the recommended intake of Omega 3 and 6. They recommend taking 1-2 grams per day of Omega 3 and 12 grams of Omega 6 per day. Sources of Omega 3 fatty acids include coldwater fish and plants such as walnuts, flaxseed and canola oil.

Fish

In 2006, both the IOM and the Journal of the American Medical Association determined that the benefits of eating fish outweigh the risks of contamination. Fish is high in protein and low in saturated fat. Eating fish reduces the risk of cardiovascular disease, arthritis, dementia, depression and macular degeneration. Their anti-inflammatory qualities also reduce the risk of cancer. It is recommended that Americans eat 2 serving per week of fish that are high in Omega 3 fatty acids and low in contaminants. The best choices include salmon (wild Alaskan or red sockeye), mussels, oyster, anchovies, rainbow trout (coldwater not farm raised), herring and sardines. Shrimp, pollack, catfish, clams, scallops and flounder also are low in mercury, but not as high in Omega 3 fatty acids. Fish such as swordfish, king mackerel, shark, tilefish, Chilean sea bass, grouper, and blue fin tuna should be eaten less frequently in order to minimize ingestion of contaminants like mercury.

Red Meat

In 2006, an analysis from the Nurses Health Study II with 90,000 premenopausal women suggested that eating more than 1.5 servings of red meat a day is associated with twice the risk for receptor positive breast cancer versus women who eat less than 3 servings per week. It is

important to note that a serving of red meat is 3 ounces -- about the size of a deck of cards. Most people eat considerably more red meat in their usual serving, so it is important to consider portion control in determining how much you eat of any item.

Soy

Soy has been a source of controversy over the past decade with regard to whether it is good for women who have had breast cancer. Soy is a phytoestrogen, i.e., an estrogen-like plant. Other phytoestrogens include soybeans, black cohosh and flaxseed. The American Cancer Society printed a study in 2007 that determined that soy has a complex relationship to cancer. There is evidence soy has both a protective role and a stimulatory role. The protective benefits of eating soy may depend on the timing of how old you are when you eat soy. We now think that eating soy may be most effective before and during puberty and that may be why Asian women, who consume soy from birth, have lower rates of breast cancer. It is also difficult to accurately measure how much soy individuals eat or should eat in order to get the protective benefits because there are so many individual differences in metabolism as well as in each person's hormonal environment. For example, an overweight woman already has more endogenous estrogens than a non-overweight woman,. The bioavailability of phytoestrogens from soy is also affected by how the plant itself was grown and processed. However, there is an absence of good quality studies related to soy.

Soy is a high quality plant protein and it appears safe to consume three servings per day as part of a balanced diet as long as it is consumed as a whole food. If you are undergoing treatment for cancer I recommend you eat only one serving per day. Avoid supplements and powders as there is no evidence that these are safe or effective. Examples of some servings of soy include:

- Edamame (1 and one-half cup of frozen in shells): It has 11 grams of soy protein, 28 micrograms of isoflavones, 70 mg of calcium and 110 calories with 20% of the calories from fat.
- Soy milk (one cup): It has 5 grams of soy protein, 150 calories and 30% calories from fat.
- Soy Nuts (1/2 cup or about 50): It has 25 grams of soy protein.
- Tofu (1/2 cup): It has 10 grams of soy protein.

On another note, women on tamoxifen should not be consuming soy as there is evidence that soy interferes with tamoxifen. It does not, however, interfere with other anti-estrogen treatments that are in the class of aromatase inhibitor drugs. Lignans which are found in flaxseed do not appear to interfere with tamoxifen.

Fruits and Vegetables

Eating a colorful diet of fruits and vegetables is still the most effective way to stay healthy. Fresh fruits and vegetables provide you with the most protective nutrients and, when consumed as whole food, they are more bio-available to your body. Unfortunately, the most commonly eaten fruits and vegetables in the United States do not have the optimum distribution or quantities of phytochemicals. The most common fruits and vegetables in the American diet are bananas, fresh and frozen potatoes (often eaten as French fries), onions, corn, iceberg lettuce, and tomatoes (as ketchup). A micro-nutrient rich diet should include servings from each color of fruit and vegetable. For examples, choices by color include: Red – tomato products, soups, sauces, juices; watermelon, pink grapefruit ; Red/Purple – grapes, berries, plums, pomegranate

juice; Orange – carrots, mango, apricot, sweet potato, butternut squash; Orange/Yellow – citrus fruits, papaya, peaches; Yellow/Green – spinach and leafy greens, corn, avocado, green beans; Green – broccoli, Brussel sprouts, cabbage, spinach, collard greens; and White/Green – garlic, onions and chives.

Many people wonder whether they should spend money on organic foods. I am often asked, “Is it worth the price?” A good web site for information about organic foods is www.foodnews.org. They have identified the “dirty dozen” which are fruits and vegetables that have the highest pesticide loads and thus, are worth the splurge for organic produce. The dirty dozen include the following fruits and vegetables: peaches, strawberries, nectarines, apples, spinach, celery, pears, sweet bell peppers, cherries, potatoes, lettuce, and imported grapes. One consistent recommendation is to buy organic apples because the wax that is put on apples to make them look good actually seals in the pesticides and, thus, cannot be washed off before eating. They list other fruits and vegetables including the amount of pesticide in them. Be sure to look for “Certified Organic” as this determines not only the use of pesticides at the time of growing, but how long the soil has been free from pesticide application as well.

Grapefruit is a fruit that has recently been in the news in relation to breast cancer. There was an associated 30% higher relative risk of developing breast cancer for women who consumed ¼ of a grapefruit per day. This finding came from a study published in the British Journal of Cancer in 2007 in which they found that grapefruit inhibits CYP 450(3A4), which increases estrogen levels. Women are cautioned not to eat grapefruit when taking hormone replacement therapy, otherwise it should be fine as part of a balanced diet. They did not look at consumption of grapefruit juice in this study. Note, some medications should not be taken at the same times as grapefruit, so be sure to read the labels.

Dairy Foods

Dairy is another somewhat controversial food group. While dairy products such as cheese are a good source of calcium and protein, they are often high in fat and calories which can be a problem if it leads to weight gain or maintains a person in an overweight state. There is some evidence to indicate that dairy foods may play a protective role against breast cancer in premenopausal women: however, it is unclear if the protection comes from the calcium and vitamin D in these foods or if there are other factors involved. A dairy-free diet has been proposed in the popular literature as a “cure” for breast cancer, but there is no data to support this. One problem with dairy foods is they may contain hormones, antibiotics or pesticides and when we eat these foods the toxins are stored in our fat. You can limit your exposure to toxins and fats by using non-fat, hormone-free organic dairy products.

Alcohol

Alcohol may be the one diet intervention you can make that will have a significant impact on the development of cancer, especially breast cancer. There are many studies that link alcohol intake with increased risk for breast and colon cancer. Alcohol increases estrogen levels and may have adverse effects on serum carotene levels. Plasma concentrations of selenium and vitamin E are decreased in alcoholics. It is recommended that alcohol is limited to an average of 3-4 alcoholic beverages per week. More importantly, remember that an alcoholic beverage is no more than 5 ounces (not a full goblet). If you do drink alcoholic beverages, you may consider taking a folic acid supplement(600 ug/per day), as there is some evidence from Walter Willet’s Nurses Health Study that this may help mitigate, but not eliminate, the additional risk.

Vitamins and Supplements

The quantity of vitamins sold each year is increasing at staggering numbers. But are all of these vitamins needed? There is no 'one size fits all' answer to this question. Some people get more micronutrients from their foods because of the way they eat, while others may be deficient. Having an expert design a personalized approach for you will save you money in the long term, optimize your supplement prescriptions and minimize purchase of unnecessary items. Most importantly, you will eliminate any potentially harmful products from your regimen. Some key thoughts and recommendations are discussed below on the topic of vitamins and supplements:

Folate. Foods containing folate (folic acid) may have protective qualities. These foods include avocado, bananas, orange juice, asparagus, fruits, green leafy vegetables, dried beans and peas and yeast. Many commercial grain products are also fortified with folate. Recommendation: 400-600 micrograms per day cumulative from diet and supplements.

Vitamin D. Some of the most exciting and potentially significant research has recently been published on the role of vitamin D and cancer. Low levels of vitamin D are associated with increased cancer risk especially in older women. Higher dietary intakes are also associated with lower breast density in premenopausal women. Research suggests that the current recommendation of 400IU/day is well below the dose need for chemoprevention. Many health professionals, me included, recommend 800-1000 IU per day. It can be combined with a multivitamin and calcium. A few examples of where vitamin D might exist in your diet include: Wild salmon (3 ounces) = 420 IU, Atlantic mackerel (3 oz) = 320 IU, Sardines (1 can) = 250 IU, Shrimp (3 oz) = 150 IU, skim and 1% low fat milk (8 oz) = 100 IU.

Fish Oil. Many people wonder about fish oil supplements, especially if they dislike fish. These can be good sources of Omega 3 fatty acids provided that you have a good quality supplement. The general recommendation is 1000-2000 mg per day. Remember that if you are taking fish oil, it has an anticoagulation effect (thins the blood and increases clotting time). It is important to discuss this with your doctor or an integrative medicine expert as you make these additions to your diet, especially if you are on other medications specifically for anti-coagulation or may have a side effect of anti-coagulation.

Calcium. Research on calcium suggests it has an important role in cancer prevention. Dietary intake is often suboptimal in many individuals, especially women. Dairy foods contain the highest concentrations of calcium but women often limit dairy due to calorie concerns. A calcium supplement is then indicated. Calcium should be combined with Vitamin D to increase absorption. Adults need 1200-1500mg per day with vitamin D.

Multivitamin. Multivitamins help to rectify nutrient gaps from your diet. It is important that you have a good quality multivitamin.

Quality of vitamins and supplements. Since dietary supplements and vitamins are not regulated by the FDA regarding what is actually contained in the bottle relative to the label, it can be risky picking items off the shelf of pharmacies and health food stores. Some vitamin companies manufacture to drug standards and test their products, while others do not. ConsumerLab.com selected more than 20 brands of multivitamins to be tested by independent laboratories. The vitamins that met standards included: Centrum Silver, Member's Mark Complete Multi, One A Day Women's and Flintstones Complete. Many others failed to meet the standards. Some of the findings of those that failed included the following difficulties:

- Vitamin Shoppe Multivitamins Especially for women: Contaminated with lead
- Hero Nutritionals Yummi Bears: Had twice the labeled amount of vitamin A
- Nature's Plus Especially Yours for Women: Took twice as long as allowed to disintegrate.
- AARP Maturity Formula: Took nearly twice as long as allowed to disintegrate.
- Enviva VIBE: had only 54 % of the claimed amount of vitamin A.

These findings show the variability that can be found and again underscore the importance of knowing how to select a high quality supplement.

Antioxidants. There is a growing consensus that antioxidants are best consumed as whole foods. For example, broccoli, cauliflower and carrots have antioxidant properties. A recent, widely publicized study published in the *New England Journal of Medicine* looked at antioxidant supplements containing vitamins E, C and beta-carotene to determine whether there were benefits to consuming these particular antioxidants as supplements. The study used a methodology called "meta-analysis" where multiple studies are combined to evaluate and determine a consensus. This study was published in 2007 and looked at mortality related to antioxidant supplements for primary and secondary prevention. The study has been criticized by some because the analysis contained many flaws. For example, it included both small and large studies. The period of follow-up ranged from as short as three months to as long as twelve years. The doses and combinations were vastly different with some doses being very high. The authors concluded that the following supplements when taken singly or combined significantly increased mortality: beta carotene (7%), vitamin A (16%) and vitamin E (4%). Vitamin C and selenium had no significant effect on mortality. Again, these findings suggest that antioxidants taken as supplements should be used judiciously, and only after getting information from someone who has read and evaluated this literature carefully.

Genetically Modified Foods and Functional Foods

Many foods are modified to help resist disease, insects, increase nutrients and lengthen the shelf life. Currently, there are no labels required to indicate that a food has been genetically modified. There are situations where genetically modified foods could be very important for sustaining the health of a population. One example is golden rice, modified with genes from a daffodil and beta carotene and has been used in Africa for children to help correct the vitamin A deficiency. Seventy percent of food in the market may contain one genetically modified ingredient. However, despite these benefits, one of the concerns about genetically modified foods is that they may be a problem for people with allergies since the information is not on the label. Foods that are "certified" organic do not have genetically modified genes because the USDA standards do not allow it. If you are concerned about this, you may want to check with Whole Foods Market and Trader Joe's, which have a policy to not carry genetically modified foods.

Functional foods are foods that have added nutrients to offer extra health benefits, e.g., orange juice with calcium, eggs with vitamin E and pasta with added omega 3 fatty acids. The food industry has been adding nutrients to foods for many years and there has been an effort to add antioxidants to foods as well. While these ideas sound potentially beneficial and these "wellness" foods now exist in the market place, there is no known proven benefit.

Macrobiotic Diet

Macrobiotic diets claim to both prevent and treat cancer, especially breast cancer. A macrobiotic diet is typically made up of the following; whole grains (50-60%), vegetables (25-30%), beans/soybeans, nuts, herbal teas (5-10%) and a minimum of white meat or fish. Dairy, eggs, processed foods and red meat are discouraged. Individuals who strictly observe this diet are often deficient in calcium, vitamin D, zinc, folate, and vitamin B12. Macrobiotic diets tend to be calorie restrictive which can be a problem for individuals needing to maintain their weight. At this time, there is no solid evidence to support claims that cancer risk or progression is reduced by eating a macrobiotic diet; however, proponents state this claim often citing anecdotal or poorly designed studies. There are many things that are healthy about a macrobiotic diet (e.g., whole grains, fruits and vegetables); however, it is essential that sufficient protein and calories are included in the diet.

Probiotics

Probiotics have exploded in the marketplace. Probiotics are a preparation or product that contains a defined single or mixed culture of live microbes that may exert beneficial effects by altering the gastrointestinal (GI) micro flora (normal bacteria). The goal is to restore the balance of good bacteria and bad bacteria in the GI tract. There is no consensus on the mechanism of action but the best current data suggest probiotics aid in the prevention of antibiotic-induced diarrhea and viral diarrhea. These products are strain specific, such as lactobacillus, acidophilus, GG, casein and BB12. The products must have an appropriate type and number of microorganisms to colonize and survive in the GI tract.

ConsumerLab.com found that 44% of the supplements they tested had too few organisms to be effective. To be effective, 1 billion live organisms/servings per day are needed.

Artificial Sweeteners

Many people use artificial sweeteners. How safe these are for consumption?

Aspartame (Equal). There is growing evidence that the FDA needs a new review of this product. A recent study showed an increased risk of lymphomas and leukemia in rats fed very large doses. Smaller doses found an increased risk but it was not statistically significant. The smaller dose in rats would be equivalent to a 50 pound child consuming 2-3 cans of diet soda per day. Aspartame is ubiquitous in the food supply in yogurts, jello and other foods. Neotame, which is 40 times sweeter than aspartame, is used in baked goods. Stevia. This sweetener is 100 times sweeter than sugar and is obtained from a shrub (yerba dulce) that grows in Brazil and Paraguay; thus is sometimes promoted as a "healthy alternative." It is widely used in Japan and other countries; however, Canada and several European countries have not allowed it as a food additive. Small amounts, added to beverages, appear to be safe, but it has also been shown in the lab to alter DNA.

Splenda. This sweetener is sucralose and is 600 times sweeter than sugar. It is manufactured by the selective chlorination of sucrose (table sugar), in which three of the hydroxyl groups are replaced with chlorine atoms. Although some biochemists have voiced concern over safety, this sweetener appears, at least to date, to have the fewest health concerns. However, it has not been on the market very long, so stay tuned. The best advice is to avoid all these sweeteners as much as possible. The growing obesity epidemic has shown the introduction of artificial sweeteners has done little to reduce calorie consumption or aid individuals in weight management.

Exercise: Presented by Marie Murphy

There is a growing body of literature that supports the importance of exercise in the prevention of cancer and possibly cancer recurrence. Exercise helps increase lean body mass, reduces fat and decreases the likelihood of weight gain. To lose weight, activity and exercise must be increased. Bodies with more muscle mass require more energy expenditure than bodies with more fat, thus the more muscle you develop, the greater the amount of calories you burn. Any increase in activity and exercise is likely to have some benefits and each person must increase their activity at a level that is appropriate for them. If you have been inactive, it may be important to check with your doctor about limitations, and then begin an exercise routine that starts slowly and increases in intensity and duration over a period of time. If you start too hard or too fast, you may injure yourself and stop exercising. Exercise really needs to be viewed as a lifetime process that has physiological and psychological benefits.

Exercise experts measure activity based on something called metabolic equivalent or METS. One MET is defined as the energy it takes to sit quietly for an hour. When at rest, each person uses the same amount of oxygen which is 3.5ml per kilogram per minute. For the average adult, this means that they will burn approximately one calorie for every 2.2 pounds (1 kilogram) of body weight per hour. A person who weighs 150 pounds, will burn about 68 calories while at rest. Moderate intensity activities are those that make you move fast or are strenuous enough to burn three to six times as much energy per minute as you do when you are sitting quietly. These types of exercises would include brisk walking (like when you are late and pushing yourself and at a pace of about 3-4 miles in an hour). Walking is an excellent exercise; however, it is important to do enough of it to increase the number of METS. While the Surgeon General has determined that people need 4-6 METS five days per week, some exercise research suggests that you need more and it is recommended that people strive for 15-20 METS per week. To figure out how many METS you are using and how to increase it, consider the following;

- Walking one mile in 30 minutes = 3 METS/hr, thus you would need to walk 5 hours per week to achieve 15 METS.
- Walking one mile in 15 minutes = 4.6 METS/hr, thus you would need to walk 3 ½ hours per week to achieve 16 METS.

In a 2004 study, women who exercised greater than 17.2 METS per week had a reduced likelihood of breast cancer recurrence compared to women who exercised less than that amount, suggesting that exercise may have benefits both in terms of prevention and recurrence. While more research is needed, there are many other benefits known from exercise including positive effects on the cardiovascular system as well.

Summary

Our bodies are complex systems and require many varied nutrients to be healthy. Understanding these needs is not always easy, especially in light of changing recommendations and media reports. When possible, find reliable sources for information to tailor your decisions regarding a healthy diet, complementary approaches, dietary supplementation and exercise.