Sanford Medical Center and
Roger Maris Cancer Center

2013

Aunt Cathy's Guide to Nutrition:

Nutrition and Breast Cancer

(This is the shorter little-or no-references version;
a version with more references cited is also available)

Aunt Cathy
Cathy Breedon PhD, RD, CSP, FADA
Clinical and Metabolic Nutrition Specialist
Sanford Medical Center, Fargo, ND,
UND School of Medicine Dept. of Pediatrics
and Breast Cancer Survivor
(Roger Maris Cancer Center Class of '98)

This is a quick summary of some things in the nutrition news related to breast cancer. Although very few references are provided in this brief version, all the suggestions are based on reports in the legitimate scientific literature and the references are available on my more thorough papers that are also on MeritCare Medical Center's website. My recommendations are <u>not</u> based on goofy things found on the Internet.

When "researching" a topic on the internet, it is important to consider the reliability of the source. After all, there is no law against fiction in America! People can pretty much print anything. For example, websites that end in **.**edu (colleges and universities) tend to be more reliable than sites designed primarily to sell you something.

We are learning a lot of new things every day, so the information here is subject to change at any moment! ☺ (That's why there is always a date on my papers.) And of course, none of the following suggestions are intended to take the place of the advice of your health care provider.

Outline:

1. A PLANT-BASED DIET

Increasing the proportion of fruits, vegetables and whole grains in the diet reduces risk of many cancers. They provide an amazing assortment of cancer-fighters, including vitamins and certain **"phytochemicals"** (plant chemicals), some of which are potent protective substances called **"antioxidants."**

Although the word phytochemicals just means chemicals found in plants, and the term does not indicate whether certain ones are good, bad or neutral, there is another clear benefit of a primarily plant-based diet: it also decreases meat intake, a source of saturated fat. Additionally, it has been found that curing or grilling meats or cooking meat to a "well done" state can produce some substances that can increase risk of cancer, including cancer of the breast. [Note: Under-cooking meat is not safe either because of the risk of bacterial food-borne illness, so that won't help.]

Research reports can be very confusing with different conclusions reached based on different study designs. Additionally, the studies brought to our attention via media sound-bytes tend to be those perceived to be newsworthy because they are in disagreement with a lot of other studies. [As a rule of thumb, one study reporting a contradictory finding does not negate the findings of hundreds of other studies showing the opposite … it just makes for better headlines.]

One thing that makes things so confusing is that in nature nothing occurs in a vacuum. But research studies often try to study an issue by looking to see what happens when everything is kept constant except for one particular variable, like, say, "hot dog consumption." But since these food qualities can interact with other circumstances, the results may be only applicable under certain specific conditions. For example, a generous antioxidant intake like eating brightly colored fruits and vegetables with the hot dog (or even putting ketchup on it) decreases some of the negative effects of some components of cured meats.

An example of one of these potentially cancer-causing substances is called "sodium nitrite" which is used in curing meats to protect against certain bacteria and to preserve the red/pink quality of the meat. In the stomach nitrites can be converted to nitrosamines … which are the substances that appear to increase risk of cancer. However, eating foods at the same time that provide generous antioxidants can prevent the formation of nitrosamines. Some cured meats actually have some vitamin C (an antioxidant vitamin) added to prevent nitrosamine production.

In any case, we Americans tend to eat quite a lot of meat … some estimates are that we on average eat 3 times the suggested amount. And processed meats are usually very high in sodium. So simply filling up on more veggies and fruits can help cut back on the sheer volume of meats consumed. The fruits and veggies are the source of some of the most potent beneficial antioxidant phytochemicals.

Many of the beneficial plant chemical substances happen to be the brightly colored pigments that give fruits and vegetables their color. These pigments are very promising as agents of reducing risk of cancers and many other threats to health (such as the complications of diabetes or blindness due to macular degeneration.) As an example of how powerful these pigments are, consider that **lycopene, the red color in tomatoes, ketchup and tomato sauce, has 200 times the protective antioxidant capacity of the same amount of vitamin E**, a well-known antioxidant vitamin.

The research questions now are about figuring out
<u>HOW</u>, <u>WHEN</u> and <u>WHY</u>
various plant substances appear to be protective,

not <u>IF</u> there is a role for any of them.





So, a good rule-of-thumb is to eat all the brightly colored fruits and vegetables you can get your hands on!

They are low in fat and calories, and they have lots of other important substances like vitamins, minerals and fiber. Foods like these that have lots of goodies relative to calories are called **"nutrient dense" foods**, which is the opposite of much less desirable **"empty calorie" foods**, which have lots of calories but few nutrients or other health benefits.

Here are a few of the specific substances in the news that have been studied the most and which (in addition to their vitamin and mineral content) clearly have something special to offer in decreasing risk of cancer:

"Cruciferous" vegetables like cauliflower, Brussels sprouts, cabbage, and broccoli contain many anti-cancer substances, including one called **sulforaphane.**

Dark green plants have **lutein** that is a potent antioxidant that also has a special role in eye health.

Green plants like broccoli, spinach and asparagus also often have hidden orange pigment like the **beta carotene** that can be seen in **orange-colored plant** foods like **carrots, peaches, cantaloupe and yams.**

Green and black tea have **polyphenols**.

Limes have **limonene**

Blue/red colored fruits and vegetables like red grapes, blueberries, strawberries, beets, egg plant, cherries, raspberries, pomegranates, and cranberries have **anthocyanins.**

Yellow corn and squash have **zeaxanthin**, which also appears to be especially important in eye health.

Tomatoes and watermelon have **lycopene**, one of the phytochemical pig,ents that has been studied the most so far.

Tea, apples, onion, grapes, and green vegetables have a beneficial "flavonoid" called **Quercetin.**

Garlic has **Allicin** and **SAC;** they do not give it color but they certainly give it a smell. (I have also heard that it repels vampires. ☺)

Wine has several **polyphenols** and a very interesting substance called **resveratrol.**

The best thing about these phytochemicals is that they are being found to be beneficial in a broad range of health conditions, so eating these fruits and vegetables decreases our risk of much more than cancer. Many of these plant substances are not destroyed by heat, so fresh, frozen and canned fruits and vegetables all have something to offer. **There are MANY others** … literally thousands more in plant foods. Most have not even been studied yet.

So although claims are sometimes made for taking certain ones of these substances as supplements to reduce risk of cancer, (especially by people selling them) it is clear that it would be naïve to think that the few we have researched so far are "The Ones," or that supplementing large amounts of one or a few of them would likely substantially decrease risk of cancer for an individual.

Supplements of lutein and lycopene are common, and they have not been shown to be injurious. They may or may not be helpful, but they are fairly expensive and each provides only that one useful substance, so they are not as likely to be as beneficial as eating a wide variety of actual fruits and vegetables that provides so many more. This is in part because many of these substances are known to act most effectively together.

Fruits, vegetables and whole grains are also much less expensive than exotic supplements. They provide lots of other important nutrients, they more filling and they taste good, too! What's not to like?

If you don't like certain ones there are bound to be plenty of others that you WILL like. Preparing them in many different ways can help too. You can even make what I call "stealth vegetables" to sneak some into your family's meals.

[See my handout on line called "Some Ideas for Trying to Eat More of Those Terrific Antioxidant Phytochemicals . . . and Liking It."]

The complex composition of fruits and vegetables make it hard to tease out the substances of special importance. **In addition, it is not just what one eats, but the relative balance of many diet elements.** For example, one could follow a completely "vegetarian" diet but still eat way too much nutrient-poor (empty calorie) food. **After all, french fries, soda, candy and beer are "vegetarian."** In America, in fact, the french fry is THE most commonly eaten vegetable! ☹

The **ratio of vegetables-to-meat** consumption and the **ratio of the amount of calories-from-vegetables to calories-from-animal-products** have been used successfully to evaluate dietary patterns related to cancer risk. Research into these beneficial "phytochemicals" is absolutely spilling over with new exciting findings.

2. Soybeans … a Special Kind of Plant

Soybeans are in a class of plantfoods called "legumes" that includes dried beans (like kidney beans, black beans, navy beans, etc.,) peanuts, lentils and peas. **Foods made from soybeans, like soy milks, soy nuts, tofu and soy sauce**, provide a number of phytochemicals called **isoflavones** including one called **genestein** that may lower risk of many cancers. They have other health benefits as well. These substances are often described as "plant estrogens" and they are chemically and functionally similar to human hormones. One definition of a hormone is that it is a substance that causes your body to DO something, so hormones in general (plant or animal-based) are more likely to cause problems if they are not in balance than other food substances are.

Think about all the things your very own estrogen can give you: acne, cramps, babies, etc. ☺ Pretty important stuff. And it is well known that hormones have a lot of importance in breast cancer in particular, although the details are far from clear. However, is it reasonable to assume that a plant-based estrogen supplement in a generous dose is desirable or even safe? Recent studies have not found consistent relationships in the use of these products relative to breast cancer. Much of the data comes from animal research that tends to look at just the effect of varying one diet component at a time, which is not as easy to generalize to real people eating a varied diet. Large human studies are underway, and some have also reported conflicting results.

For example, it appears that there are certain personal genetic factors that affect whether soy intake has a role in various cancers. It was first found to be of potential benefit several years ago when it was noted that the incidence of breast and prostate cancer is about six times lower in some parts of the world where soy is a regular part of the diet. However, there are a great many other differences in the diets and lifestyles and genetic patterns of those population groups besides just the average soy intake.

That kind of large epidemiologic (population-wide) study is useful to stimulate questions and to guide further research, but it can never show that when two things are often found together, one of the things is the cause of another. For example, it is true that, overall, taller children have more math skills than short ones. Is that because being tall

makes you smart? No … it's actually because older children in higher grades at school have been taught more math … and they happen to also be taller than younger children. (But that doesn't keep me from trying to get taller to help me do better at math! ☺)

"Soy nuts" provide the most **soy isoflavones** found naturally in a small serving of food in the US. However, many other substances besides isoflavones in soybeans appear to be important as well, including fiber, protein, vitamins, and minerals. One of the most recently identified players on this team is the mineral **magnesium**. Large national studies indicate that the majority of Americans take in at less than 2/3 of the recommended amount of magnesium. Recently published studies of over 35,000 women in Iowa suggest that there is an inverse association of dietary magnesium intake with incidence of colorectal cancer. **That is, the highest intakes of magnesium were associated with the lowest incidence of colon cancer.**

Colon cancer risk factors have often been found to be risk factors for breast cancer and prostate cancer as well. So, paying attention to research in those areas also helps us learn how we might decrease risk of breast cancer. And, hey – we all have a colon, so reducing both kinds of cancer risk at once sounds like a smart idea!

It is recognized that **soy foods** are fine, certainly nutritious, and possibly helpful in decreasing risk of cancer. But it is not clear that taking concentrated isoflavone supplements (instead of just eating soy foods) is safe. In fact, some research suggests that taking one type of concentrated soy **isoflavone (daidzein)** may enhance the cancer-preventive properties of the drug tamoxifen, but another **(genestein)** may actually interfere with the protective effects of tamoxifen. Oh, fine!

It is interesting that people seem to perceive concentrated soy isoflavone products as being "natural" and therefore automatically safe and more effective. However, high concentrations of isolated plant chemicals (natural or not) put into pills and then taken out of a little bottle is a long way from nature. And of course, just because something is a plant, it is natural, and God made it does not mean it is safe or that it works to solve a particular problem. There are a million examples of this … poison ivy, cocaine and foxglove come right to mind. God may have made them all, but He does not want you to eat them.

At this time the best advice is to include soy FOODS as desired, but to avoid supplements that feature concentrated isoflavones until these issues are sorted out.

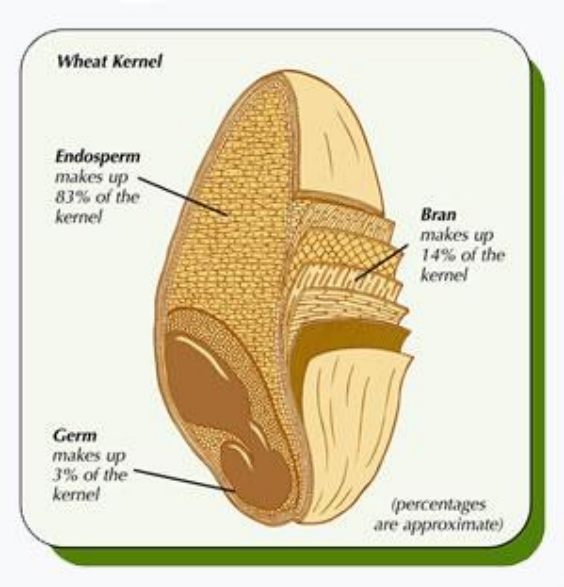
2. Bundles of Joy: "Baby Plants"

Nuts, Seeds, Legumes/Beans and the Germ of Grains

Because improving magnesium intake has the potential to improve cardiovascular health, diabetes incidence and management, and neurologic health, and it has many more benefits, there is clearly no reason NOT to be sure that you get the recommended amount. **The very best sources include the parts of the plants that will turn into the <u>baby plant</u>. That is … seeds, nuts, beans and the "germ" of grains.** Those are by far the best sources of magnesium and quite a lot of other critical nutrients.

"Refined" grains like "enriched white flour" are missing the highly nutritious <u>germ</u> part of the grain, and most of the lost nutrients are not added back when the flour is "enriched."

That process only adds back three B vitamins (thiamin, riboflavin and niacin) and iron. That is why there is so much interest now in helping people choose "whole grain" products instead of refined grains. Any whole grains will do … it does not have to be wheat.



To have a good amount of whole grains, the first or second ingredient on the list should have the word "whole" in it.

Just calling a product "wheat bread" does not mean that it is WHOLE wheat bread. Similarly, "12-Grain" bread has 12 different grains in it, but the name doesn't tell you if any of them are WHOLE grains.

If the word "whole" comes much later on the list than the first or second ingredient, it essentially means: **"a whole grain walked by when we were making this."**

To give you an example of the <u>amount</u> of some "baby plant" foods one might eat to obtain some benefit, consider that in large studies, for several health conditions measured, differences were shown between a pattern of eating about an ounce of nuts or peanuts four

times a week or more, or never or rarely eating these foods. The measurably better health outcomes were associated with eating those foods four or more times a week, and the worst health outcomes were associated with the pattern of rarely eating them.

If you are allergic to a lot of these "baby plant" foods or simply do not like to eat them, you should check into supplementing magnesium. These really are the richest sources of magnesium (and several other minerals,) and most multivitamins with minerals provide only about 10-25% of the recommended amount of magnesium. That may be enough if your diet is just a bit low, but some folks will definitely benefit from an additional supplement. But before you cross ALL these baby plant foods off your list, remember that cocoa powder comes from cocoa beans --- another baby plant!--- (see picture below) … and that means that chocolate covered peanuts might be considered a "health food" in certain circumstances. ☺




[Please see my Magnesium handout for all the details and specific recommendations about suggested forms and amounts.]

3. AMOUNTS AND TYPES OF FATS

Reducing total dietary fat is less important than previously believed, but **lowering the proportion of omega-6 fats** and **increasing the proportion of omega-3 fats and monounsaturated fats** appears to decrease risk of breast cancer**.**

Omega-6 fats are predominant in cornoil, safflower oil and many other cooking oils.

Omega-3 fats are most generous in flaxseed, canola oil, walnuts, fish and fish oils.

Monounsaturated fats are in nuts and legumes and in peanut oil and olive oil.

That's another benefit of eating nuts and peanuts: the fat tends to be "happy fat." That is, it has the same calories of other fat, but it does not increase your risk of heart disease or cancer. I like to think of them as "dangerous to your butt, but not to your heart!"

The fish-oil omega-3 fats (EPA and DHA) have important anti-cancer properties that are not available from the vegetable sources, especially among people who have been found to be less able to convert the plant-forms to these longer forms. The finding that some folks are more dependent on a ready-to-go source of EPA and DHA is

a fairly new discovery and it is often unrecognized at present. Inability to produce your own EPA and DHA from plant oils is a serious (and not uncommon) problem.

This is why flax oil and fish oil are not equally helpful to all people. Although both are omega-3 fats, some folks cannot convert the oil (linolenic acid) in flax and other plants to EPA and DHA, the omega-3 fats so important in humans and other animals.

However, the flax seeds themselves have some substances besides the omega-3-rich oil that may be useful in decreasing risk of cancer. First, because they are seeds (baby plants) they are very nutrient dense and good sources of magnesium. Second, they contain substances called "lignins" that may specifically reduce risk of breast cancer. This combination makes the flax seeds, but not flax oil capsules, a particularly good food to incorporate into the diet. Be creative … add ground flax to your meatloaf!

[Also, flax is a North Dakota product, so be sure to buy a lot! ☺]



Both EPA and DHA appear to be beneficial, and they also have benefits in a wide variety of health concerns from heart disease to MS, diabetes, arthritis, depression and dementia, so this seems like a prudent direction to go. [**EPA** stands for the molecular description of this fat (**E**icosa**P**entaenoic **A**cid), but I always think of it as standing for "**E**nvironmental **P**rotection **A**gency" because it helps protect our internal environment!] Fish oil is the source of both EPA and DHA, and the American Heart Association and others encourage most people to take 1000 mg fish oil capsule daily, in part because we can't readily tell who the individuals are who cannot make their own.

Omega-3 fatty acids also may increase the effectiveness of certain cancer treatments. Certain types of chemotherapy seem to work better when additional omega-3 fatty acids are provided in the diet.

Increasing the **ratio of omega-3 fatty acids relative to omega-6 fatty acids** in the diet has additional benefit in dealing with cardiovascular disease, diabetes and in autoimmune disorders like MS and arthritis. Most Americans eat a diet that provides 10 or more grams of omega-6 fat for every gram of omega-3 fat --- that is, a 10-to-1 ratio. **For most people it is recommended that we try to change the ratio to be closer to** 4-to-1, which is the ratio typically found in the "Mediterranean Diet" … a pattern associated with decreased risk of cancer and heart disease.

If a person has an inflammatory disease like multiple sclerosis, diabetes or arthritis, a ratio of 2-to-1 might be even better. [Please see my handout on line for more detail about oils and fats and omega-6:omega-3 ratios, and also my papers on nutrition for people with diabetes or MS for more information on this topic, including many references.]

"Monounsaturated" fats are a type of fat that also seems to be protective against cancer. They are mostly found in olive oil, peanut oil, nuts and avocados. Some of the protection is related to beneficial phytochemicals found in those foods. For example, olive oil is recognized as a source Of additional cancer-fighting phytochemicals. That is not a surprise, since these oils are also made from foods that are "baby plants!"

Using monounsaturated fats also can displace some of the less desirable omega-6 fats (like corn oil), saturated fats or trans fat in our diet.

Trans Fats

It appears to be beneficial to decrease intake of certain types of saturated fat (animal fat, coconut oil) and **especially trans-fats** (found in many types of shortening, margarine and commercial baked goods.) Trans fats are accidentally formed by the traditional process used to make vegetable oils into soft spreadable solids. The process is called "partial hydrogenation."

It turns out that trans fats are particularly not healthy to eat. Trans fats in foods are beginning to be banned in some places, such as in all New York City restaurants. Manufacturers are developing ways to get it out of our food supply, but for now we still need to check labels.

Since 2006, trans-fats in foods have to be listed on the food labels, but looking for the words **"partially hydrogenated"** in the ingredient list is the best indication of whether a food actually contains any trans fat.

This is useful because by law amounts under 1 gram "per serving" (like a teaspoon of margarine) can be reported as "zero trans fat" on the label. Their idea of what constitutes a "serving" and those of consumers are often quite different.

Many foods now being advertised that they are "trans free" and they actually are because they have not used the partial-hydrogenation process to solidify them into a spreadable texture.

Although most nutrition advice suggests limiting intake of animal fat in general, it may be that dairy fat may be less cancer-promoting than some other animal fats. This is possibly because it contains a special form of fat called **conjugated linoleic acid.** High-fat dairy food and conjugated linoleic acid intakes were found to be associated with a lower incidence of colorectal cancer in Swedish men and women. As noted earlier, often the cancer risk factors associated with colon cancer and prostate cancer in particular are very similar to those in breast cancer.

Conjugated linoleic acid is currently receiving a lot of attention as a possible anti-cancer substance but no conclusions are available yet. As always, the factors associated with the "dairy fat" piece, like the calcium intake piece and the vitamin D piece, are very hard to separate in studies with humans. But it appears that all three of these substances may contribute to decreased risk. (More on vitamin D later.)

5. Vitamin and Mineral Antioxidants

In general, generous amounts of antioxidants automatically accompany a diet rich in fruits and vegetables. That diet pattern also has been shown to have benefits in decreasing breast cancer risk. As discussed earlier, the antioxidant strength of the phytochemical pigments far exceeds that of the antioxidant vitamins and minerals. However, most vitamins and minerals have many other important roles to play in metabolism.

As discussed earlier, it appears that many dietary antioxidants work in conjunction with each other, so studies that examine the effects of a substance in isolation are less likely to

demonstrate any effect that might potentially be present. Effects observed of **vitamins C and E and selenium** are likely related in part to their antioxidant properties. A very low-fat diet may actually provide inadequate vitamin E because the major natural food source is polyunsaturated oil. (Saturated fats like fat in meat or milk are not very good sources of vitamin E.) Other minerals like zinc and copper are involved in antioxidant activity as one of many important functions.

The mineral **selenium** has several roles in the body as an antioxidant and in the function of energy metabolism and in the immune system. Inadequacy causes serious health problems. Selenium inadequacy is more common in America than vitamin C or E deficiency, so it will get a closer look here. There is a large amount of promising research into the role of assuring selenium adequacy in several types of cancer. There is also data that suggests that assuring selenium adequacy may help in the effectiveness of certain chemotherapy medications.

Some recommendations for decreasing cancer risk suggest aiming for at least 200 iu vitamin E, about 500 mg vitamin C and 60 mcg selenium daily as safe and appropriate intake levels, along with a diet rich in fruits, vegetables and whole grains. For comparison, the RDA-type recommendations for most healthy people sets the level of vitamin E at 30 iu, vitamin C at 90 mg and selenium at 60 mcg. Notice that the suggested levels here for vitamins E and C are more generous than the usual recommended amount, but the selenium level is at the usually recommended amount. This is because assuring normal adequacy of selenium is likely important in protecting against the development of several cancers, but taking more provides no additional benefit, and high doses can be unsafe.

The toxic level of selenium has been shown to be about 800 mcg/day over a long period of time, and experts have suggested an upper limit of safety to be 600 mcg/day. The selenium content of foods varies with where the food was grown, so it is hard to assess the amount in a particular person's diet. However, a supplemental amount of 50-70 mcg is safe. Even if a person lives in a "high selenium" region, that amount is unlikely to contribute significantly to toxicity problems. The amount in supplements varies from none to about 200 mcg, so check the label. Your State Extension Service Agent can tell you about the selenium level in the soil where you live.

Recently some confusion about the role of selenium in cancer risk was raised by a large study called the Selenium and Vitamin E Cancer Prevention Trial [SELECT] that involved 35,533 "healthy" men. They gave some of the men 200 mcg/day of selenium and/or 400 iu of vitamin E and after five-seven years they found no difference in the incidence of prostate cancer in the group given extra selenium compared with the men who received no extra selenium (the "placebo" treatment.)

The fact that this regimen did not have an effect on the incidence of developing cancer, however, was very likely due to the fact that none of the men in the study were ever selenium deficient. Other research studies showing benefit from providing additional selenium have involved correcting deficiency and assuring adequacy. In other words, if one's selenium intake is fine, throwing more into the mix does not provide further protection. But this study tells us nothing at all about whether **correcting selenium inadequacy** might have decreased the incidence of developing cancer.

Besides questions about the role of antioxidants in terms of decreasing risk of developing cancer, there is also the issue to comment on is the use of the antioxidants vitamins E and C in minimizing certain side-effects of chemotherapy treatment or of interfering with the effects of chemotherapy. Generally, the "benefits" have outweighed the negatives.

One other area of emerging information about vitamin E is that some forms we commonly use (like alpha-tocopherol) alone may be less protective against cancer and other cell problems than some cousins of this substance, such as gamma-tocopherol, and gamma- and delta-tocotrienols. That means new specific recommendations about various substances of the vitamin E family are likely to be appearing soon.

Cancer preventive effects of vitamin E. Curr Pharm Biotechnol. 2012 Jan;13(1):156-64. Effect of vitamins C and E on antioxidant status of breast-cancer patients undergoing chemotherapy. J Clin Pharm Ther. 2011 Jan 4.

Inadequacy of any nutrient can cause all kinds of problems, so it is always wise to assure an adequate intake of all of them.

6. INTAKE OF OTHER VITAMINS AND MINERALS

The body's defenses against cancer depend on adequacy of all the tools needed by the immune system. That is just what many vitamins and minerals are … the tools you need to run your body. Many nutrients have been shown to be important for fighting cancer in particular. For example, as described earlier, assuring adequacy of the mineral **magnesium** has been found to reduce risk of colon cancer. Several B-vitamins are looking like they are important as well.

For example, in one report, **older women with the lowest vitamin B-12 levels were at greatest risk of breast cancer.** Many people become less able to absorb vitamin B12 from food as they age. When vitamin B12 status has been most carefully assessed, it has been shown that **about 1/3 of the elderly are actually vitamin B12 deficient**. Taking **acid-blocking medications** for gastro-esophageal reflux (heartburn) can also cause this problem regardless of age**. In both situations, the form of vitamin B-12 found in vitamin pills can bypass the problem and prevent deficiency.**

Vitamin B-12 is also important for nerve health, and prevention of anemia and hearing loss. There are some genetic conditions that result in vitamin B12 deficiency for other reasons that require other methods to correct. [Please see my "Vitamin B12" paper on MeritCare's website for more information about this issue.]

Adequacy of vitamin B6 and folic acid has long been found to be important in lowering the risk of breast and/or colon cancer, especially among women who drink alcohol regularly. Interestingly, regular alcohol use or chronic antibiotic use specifically

impairs absorption of folic acid in the intestine. A collection of genetic patterns and health conditions also affect absorption or utilization of folates at the tissue level. That makes for a lot of unaccounted-for variability in trying to see large over-riding patterns about intake and breast cancer risk.

For a look at the complexity involved with trying to figure out the role of any nutritional factor in health, cancer prevention and treatments, lets look a bit closer just at the folic acid research:

- Some studies show that inadequacy of folic acid increases risk of breast cancer.

- Some suggest that high intakes might increase the rate of breast cancer.

- At the same time, others are showing that generous folic acid or folate may increase protection agains breast cancer and some other cancers. [e.g. High Intake of Folate from Food Sources Is Associated with Reduced Risk of Esophageal Cancer in an Australian Population. J Nutr. 2011 Feb;141(2): 274-283.]

- Then there are others noting that the effects of folate in foods or folic acid as a supplement or additive may affect people's risk of breast cancer differently depending on several well-recognized genetic differences in folate metabolism, and things like hormone status, age and status relative to menopause. An example of this is the well-recognized MTHFR gene most commonly seen in some people of Irish heritage … and there are quite a lot of us Irish (or part-Irish) people out there. Other ethnic groups have also been found to have similar genetic problems with folic acid.

  [This gene pattern affects one's ability to utilize certain food forms of folates, and the problem is invisible without special testing. Luckily, the answer is not to get yourself tested for possible Irish gene patterns … simply taking a standard multivitamin will solve the problem whether you have that genetic pattern or not. **The form in the multivitamin is able to bypass the whole difficulty with the food forms of folate**.]

- In nature, folic acid often works together with vitamin B12. That means that the consistent finding of poor vitamin B12 status in many people can affect the outcome of studies exploring folate intake in cancer prevention or treatment. However, in most studies, the vitamin B12 status of the people being studied is not evaluated.

- Food folates are also associated closely with consumption of certain vegetables and fruits. [That's where the word "folate" comes from … the Latin name for "foliage."] So, how can we tell whether it is the folate or the other things in the food like other nutrients, phytochemicals or even pesticides that are related to cancer risk?

- Then, we know that some **food** forms of folate are just naturally much less available to be absorbed than others by **everyone**, so it matters a lot which ones were actually

used by the people in the studies. But of course, that is generally not actually evaluated in any of these studies.

- There is also a raft of information looking at applications of folates (from foods or supplements) in various forms as adjuncts (helpers) to make chemotherapy more effective or to decrease certain bad side effects of the treatments. In some cases, it has been shown to make it possible for a patient to tolerate a higher dose of chemotherapy and to increase effectiveness of treatment. This was something my oncologist and I utilized in my own cancer treatments over ten years ago with great success. But these effects are very specific to the particular chemotherapy regimen, so there is no universal one-size-fits-all recommendation in this area. I wish there were.

Bottom line on Folic Acid / Folate and Breast Cancer: This research is much too complicated to come up with a definitive statement that addresses all these issues.

However, with the usual caveat that the information provided here is not intended to take the place of the advice of your heath care professional nor is it intended to provide personal specific nutrition guidance for any particular individual, here's my current best guess about folic acid and breast cancer (subject to change at any moment. ☺):

- **Eat lots of fruits and vegetables**, some of which will contain absorbable folates (along with a lot of good other stuff.) Interestingly, in some studies that questioned a slightly increased risk of breast cancer in postmenopausal women only, the increased risk was only related to food folate intake, but not to supplemental folates or to total folates, and no "dose-response" was observed. That means that there was no pattern apparent among the people in each group related to how much folate they took in. Hmmm … that makes it kind of hard to assume that it's the folate causing whatever effect they found. [Am J Clin Nutr. 2009 Feb;89(2):624-33. Folate and one-carbon metabolism nutrients from supplements and diet in relation to breast cancer risk.]

- **Eat plenty of whole grains that are less "processed/refined" for many reasons.** Of the processed grains you eat, folic acid has been added in a well-absorbed form since 1998, but that is not the reason for using more whole grains and less refined grains. … it's the other good stuff in the germ of the grains. Many studies show no effect on increased rates of various cancers since fortification began, but since 1998 the folic acid fortification of grain products in the US has hugely decreased birth defects and certain types of stroke. [An example of the kind of reports out there: J Clin Pharmacol. 2010 May 10. Pediatric Cancer Rates After Universal Folic Acid Flour Fortification in Ontario. "…These data may also provide some reassurance that universal flour fortification does not heighten the risk of pediatric cancer."]

- **Taking a multivitamin supplement that includes folic acid (e.g. 400 mcg, the RDA) is not scary, and it can also improve intake of absorbable vitamin B12, vitamin D and some magnesium … plus other good things. It also helps you out if you are secretly part Irish.** [Am J Clin Nutr. 2010 Apr 21. Folate and other one-

carbon metabolism-related nutrients and risk of postmenopausal breast cancer in the Cancer Prevention Study II Nutrition Cohort. "CONCLUSIONS: Our study of predominantly supplement users suggests that high intakes of folate averaged over 10 y do not increase breast cancer risk, but may be protective, particularly against ER- breast cancers."]

- **If you are being treated for cancer, ask your health care provider before using any supplements. In terms of eating lots of good nutritious FOOD, I am willing to bet that he/she will think that is a fine idea.**

Vitamin D

Vitamin D adequacy is known to reduce the risk of breast cancer, colon cancer, prostate cancer, pancreatic cancer and more recently lung cancer, cervical cancer, stomach cancer, and ovarian cancer. New research is published very regularly now associating vitamin D adequacy with lower risk of cancer in yet another body part. It is now quite reasonable (and very important) to urge people to assure adequacy and not to simply assume it. This strategy is not scary … what is scary about "assuring adequacy?" What is scary is inadequacy!

The World Health Organization estimates that 40-50% of the world's population is vitamin D deficient (based on results of many studies in which vitamin D status is actually assessed.) Traditionally, it rarely has been evaluated. Leading medical journals have described the situation as an unrecognized epidemic of deficiency in the north especially but truly an epidemic / pandemic all over the world because of variable sun exposure due to clothing, skin color, sun screen use, fear of melanoma and the lure of air conditioning. Factors like aging skin also result in significantly reduced production of vitamin D even with generous sun exposure.

Some people are covered up always because of modesty or religious beliefs, some because they live in the desert and only long robes will protect from the heat. I am just covered up as a public service. ☺ The point is … lots of people are now known to be deficient regardless of where they live because now we are beginning to actually check. Vitamin D is the number one assay requested in America at present, but most people are still not having their deficiency recognized and corrected. The consequences are severe in terms of a multitude of health problems, including cancer, heart disease, osteoporosis, diabetes, MS and a variety of autoimmune diseases, falls, frailty and depression. **Nobody needs vitamin D deficiency but lots of folks have it.**

Vitamin D has also been shown to be helpful as an adjunct to chemotherapy. In its role as an "antiproliferative" agent, vitamin D helps to control inappropriate cell growth and it makes some treatments work better. Additionally, it has been shown to be a factor in managing the side effects of discomfort, pain and weakness associated with various chemotherapy treatments.

For example, a recent study was reported of women taking an aromatase inhibitor as part of their breast cancer treatment. They were asked to rate the discomfort/pain they were experiencing. Afterward, vitamin D levels were checked and those who had described the most pain were found to be the ones who also had the lowest vitamin D levels. Low vitamin D levels were then corrected in the deficient women and when they rated their pain again they described it

as much less severe. At the time of the study, neither the women nor the researchers were aware of any particular woman's vitamin D level, her reported pain level, nor whether a vitamin D correction was made.

In most cases, assuring adequacy has been found to require an intake significantly higher than the RDA level, which was long ago set at 400 iu daily. Most recent research is showing that the maintenance (not therapeutic) intake level for many people is 1000-4000 iu/day. This is a level that is impossible to get just from food. Supplementation is required to provide that much.

Luckily, vitamin D supplements in that range (1000-4000 iu/day) are safe, inexpensive, easily available, tiny and easy to swallow. The treatment dose to correct deficiency varies but it is often 50,000 iu vitamin D per week for eight weeks. [Note that that amount is PER WEEK – NOT PER DAY.]

Many oncologists will check a person's vitamin D level at the beginning of treatment to determine whether a corrective dose of vitamin D is needed or if just a maintenance level of 2000 iu or so will keep them in the **optimal range of around 40-50 mg/dL.** The earlier level of 25 mg/dLthat was thought to be "normal" is now recognized as not being an adequateblood level to promote optimal health. Around the country, some laboratory print-outs still have the old "25" level shown as normal, so it is a good idea to ask what the actual number is and not just rely on a report of "normal."

Vitamin K

As always, **assuring adequacy of all essential nutrients supports our ability to prevent or fight cancer.** We learn more about this every day. For example, recent research found that vitamin K inadequacy increased risk of colon cancer and liver cancer, along with many other serious health problems like heart disease, osteoporosis and kidney problems. It was also found that, as has been the case with vitamin D, we very rarely check it and just assume that it is fine. **However, it has now been shown that inadequacy of vitamin K is fairly common. It is also easy, cheap and safe to fix.**

The best food sources are dark green leafy vegetables. Interestingly, no upper level of safety has ever been established for vitamin K because overdose has never been seen. I know this is a big relief to all you fans of the dark-leafy-green veggies out there. Nobody has ever overdosed on spinach!

[Only people taking a particular medication called Coumadin need to be sure to eat a consistent amount of vitamin K daily to regulate the effectiveness of the drug. **Nobody benefits from vitamin K deficiency … including people on this medication.** Vitamin K inadequacy actually makes the drug more dangerous to use. If you use this medication please see my separate handout on line about vitamin K before making any changes to your vitamin K intake. Your health care provider will want to see the new research on this before making any changes.]

At this time, many multivitamins do not even contain vitamin K --- until recently no one knew it was a problem! This omission is in the slow process of being fixed, but one can take vitamin K separately if there is a reason why those terrific leafy green vegetables are not an option.

The details about vitamin D and vitamin K (lots of „em!) are in my "Top Five Recommendations" handout and in the separate "Vitamin K" handout, which (like all the others) you can get for free by Googling "Cathy Breedon Handouts" or typing my name in the search box at www.meritcare.com. Please feel free to share any of my papers you find there with others. **Health care providers can also contact me for a special paper addressing the specific issues of vitamin K nutrition for patients using the drug Coumadin.**

7. WHAT ABOUT OTHER PHYTOCHEMICALS?

Besides all the phytochemical research with the pigment antioxidants and soy products described earlier, there is a great deal of interest in literally thousands of other plant substances in the prevention and treatment of cancer of all types. Some of these substances have anti-cancer properties, and some appear to be able to minimize side effects of chemotherapy or help it work better. **On the other hand, some are not safe to take in amounts beyond what one would get from eating the plants that contain them for dinner. And some are not safe at all** … remember poison ivy and cocaine? Actually, most of our current pharmaceutical products are derived from phytochemicals.

Most of this kind of phytochemical research is just in the discovery and initial confirmation phase, where many current well-established medications once started out. Most of these substances have not yet been studied in the large carefully controlled clinical trials needed to show that they are both effective and safe, even though they may be described as having been used somewhere in the world for some purpose for many years. Some have only been shown to be potentially useful in test tubes and labs and they have not yet been tested in animals or people. Some have turned out to help with cancer but cause some other type of serious problem. An example of the opposite problem is the use of chaparral tea, a beverage traditionally used as a relaxing agent. It is now banned because it was discovered to also be a potent cause of liver cancer. [Herbal interactions with anticancer drugs: mechanistic and clinical considerations. Curr Med Chem. 2010;17(16):1635-78]

So it is much too premature to recommend that people should seek to take in abnormally high amounts of these plant substances in an effort to prevent or treat cancer. **When we isolate and concentrate a plant chemical because it has some particular chemical activity, we move out of the world of nutrition and into the world of pharmacy**. In other words, a much better description of the use of concentrated herbal substances would be **"herbal pharmacy" and not "herbal nutrition."**

The reason that the terms "herbal nutrition" or "food supplement" are used is not because the substance is actually a nutrient or a food. It is because there is a loop-hole in the FDA's laws governing the sale of drugs. The law does not require safety testing or

even testing to show effectiveness of a product if the manufacturer simply labels it as a food or nutritional supplement. If the same substance were marketed as a pharmaceutical product or drug, such (expensive and time-consuming) testing would be required. In other words, we are essentially not at all protected from scams nor from harm when we use these products.

Although this labeling seems confusing, usually one can quickly tell the difference between what is an actual nutrition function and what is truly a pharmacy function. Just ask yourself whether the substance under discussion is being taken in a concentrated amount to cause some chemical effect on body functions, or if it is just your dinner. An example is shown on the next page.

Sorting it out: Is it a food/nutrient or is it a pharmaceutical product?

Some examples:

Food	Pharmacy
Slice of cinnamon toast	1000 mg powdered cinnamon in a capsule
Piece of licorice candy	1000 mg of the isolated plant flavonoid "isoliquiritigenin" found in licorice.
Bowl of vegetable curry flavored with the common curry spice tumeric	1000 mg isolated curcumin, a phytochemical found in the common curry spice turmeric.

There are WAY too many reports of this type to cite here, and the whole herbal pharmacy issue is outside of my area of expertise … I only know about nutrition. But interested health care professionals … or anyone at all … can find them easily on line at www.pubmed.gov (Free Public Medline from the National Library of Medicine, National Institute of Health.) Just type the words cancer and herb in the search box … or you can limit your search by specifying a particular substance … like the spice curcumin … or a particular form of cancer … like breast cancer. This is also how I keep up with the nutrition and cancer research. (Ain't technology wonderful?!)

However, it is encouraging to note that there are so many potentially helpful substances waiting to be discovered and developed in a wide variety of plant foods. And while we wait for the definitive research on concentrated plant chemicals in the battle against cancer, it is certainly reasonable to eat lots of fruits, vegetables and whole grains, and to cook with a variety of commonly used interesting spices that appear to have health benefits.

8. "Conditionally Essential" Nutrients

Conditionally essential means that usually one makes enough of a necessary substance, but sometimes we can't make enough of it. When that happens, that nutrient becomes "essential" to take in from outside the body, just like well-recognized essential vitamins and minerals. Three of these substances of interest in breast cancer are CoQ10, alpha-lipoic acid and carnitine.

Coenzyme Q (CoQ10 – also called ubiquinone) and alpha lipoic acid (also called thioctic acid) are both potent antioxidant substances that one can normally make enough of, but in certain medical conditions patients benefit from being provided with a supplemental amount. They are "conditionally essential." Both are very safe, but as supplements they can be pricey. Some applications of alpha lipoic acid (e.g. in diabetic neuropathy) showed benefit when the dosage was at least 600 mg/day.

In the cancer applications, both substances look to be helpful in helping people physically cope with side effects of chemotherapy and other treatments for cancer that can result in neuropathy and heart damage. They both have several other roles in normal metabolism, especially in energy production.

Carnitine is a tiny molecule normally made in the liver and kidney. It is important for making energy for muscles to work, and that includes the heart muscle. Carnitine also has a role as an antioxidant. Some people are normally less able to make carnitine as well as others can. Some medications and treatments also result in inadequate production of carnitine. This results in considerable fatigue and even heart damage. Some "cancer fatigue" studies have shown benefit from 4000 mg carnitine daily.

There is evidence that some people fighting cancer may benefit significantly from receiving supplemental carnitine, CoQ10 and alpha-lipoic acid with their cancer treatments. All three are very safe and they are available over the counter and also by prescription. Prescriptions are more likely to be covered by insurance. The only apparent down side is the cost. As always, be sure to discuss the use of any of these substances with your health care provider. I have a paper just on carnitine on Meritcare's website because it has many other important health applications. Additionally, all three of these supplements are discussed in more detail in my paper on nutrition for people with diabetes which is also on the website.

9. Miscellaneous

There is plenty of evidence that exercising, not smoking, maintaining a healthy weight and breast-feeding one's infants are also players on the team to decrease the risk of breast cancer. I'm going to go out on a limb here and advocate that we all try to do these things too. ☺

Also, remember to laugh a lot.

I think finding something to laugh about went a long way toward helping me cope with cancer and its treatment. In fact, as the memories of the tough times recede, it's the funny stuff that hangs around … like shaving my head with duct tape after chemotherapy, or having a contest at work to help me find the right look when picking out a wig

Here's the picture that won by a landslide: it's my husband Dan and I wearing the 1970s "Sonny and Cher" look. What do you think?

I have other great memories from my experience of having a stem-cell transplant to treat my breast cancer. While I sure don't want to go through all that again, there are terrific memories that I will always treasure from that period.

For example: The high dose chemotherapy made it extremely hard to eat anything at all. I stayed in a "medical apartment" beside the hospital for about 6 weeks. My mother moved in with me there and took care of me … sort of like 1950 all over again!

I couldn't eat much at all, so she made all kinds of things that I was able to eat at least a little of and every day took me to the hospital for an IV. We got to spend a lot of "quality time" together in spite of the whole cancer business and I think it has helped us maintain the special bond we have.

Another example: Every day my husband called me and he drove for hours every weekend to stay with me. This was all while he was working full time and had additional responsibilities at work that year. That was terrific. Also, during that time I was a puffy, red and wrinkly bald girl, so as a result of that experience I have great confidence in the idea that he did not just marry me for my looks. [Actually, it was <u>always</u> pretty unlikely that he married me for my looks, but it's still very comforting to have proof. ☺]

Don't let worries about nutrition suck the joy out of life.

At our house we have battled cancer, and we eat lots of wonderfully healthy foods and dutifully take our appropriate nutrition supplements. But my husband and I also like having a regular ten-o'clock date in the kitchen with the local news on TV and a some brownies or some other treat. And anyway … most of the time <u>my</u> brownies:

- Have lots of walnuts (baby plants!)
- Are made with olive oil (monounsaturated fat!)
- And they usually even have some of those "stealth vegetables" in there
  (like powdered spinach or kale … sounds icky but it isn't.)

That means that these brownies may actually be "health foods" … kind of like chocolate-covered peanuts. Consider the terrific nutrient density … the ratio of good-for-you stuff to calories. They just happen to taste good and to impart a certain party atmosphere to the end of the day! But even if a food has very minimal nutrition value, whatever you choose to enjoy and share with family and friends can be a "health food" … especially for mental health. **Bon appetite!**

10. Quick Summary: My Best Guesses for Breast Cancer Risk Reduction:

- Eat lots and lots of fruits, vegetables and "baby plants" and aim for most of your overall diet to be "plant-based", with less meat than Americans usually eat.

- If you do eat cured meats or grilled meats, be sure to eat lots of fruits or vegetables with them, and avoid charring the outside … or the inside, for that matter.

- Take a standard multivitamin with minerals for many reasons. I use a store brand – it does NOT have to be expensive. Take it whenever it is convenient for you; I have a bad memory (from a gigantic dose of chemotherapy that saved my life) so I know I won't remember to take things through the day. So, I just take everything in the morning and let it fight it out in there! It doesn't have to be perfect. [I have a magnet on my fridge that says: "Happiness is good health and a bad memory!" … I've got both so that makes me pretty darned happy.

- Have your vitamin D level checked. Lot's of folks are deficient and completely unaware of the problem. Take a 2000 iu vitamin D capsule to maintain a good level. If your level is deficient, your doctor can help you correct it with a temporary higher dosage.

- Check to see if your multivitamin contains vitamin K if you do not regularly eat a good amount of dark leafy greens. If you usually don't eat those dark leafy greens, either switch to a multivitamin with about 100 mcg of vitamin K, or add a separate vitamin K supplement.

- It is a good idea for your multivitamin or some combination of supplements to provide 50-60 mcg of selenium (the advisable intake.) Vitamins C and E can be taken at the advisable intake of 90 mg C and 30 iu of E, but in general they can be safely taken at 5-10 times that amount. Remember, the usual amount recommended (as RDAs or RDIs or AIs or whatever is used currently) is set at a level that is assumed to "meet the needs of most healthy people." People with cancer or any other serious condition are simply not members of that group. Their actual requirements can be far different from the needs of "healthy" people. Additionally, look for emerging research on some vitamin E products that contain some of the "cousins" of alpha-tocopherol, such as gamma-tocopherol and gamma- and delta-tocotrienols.

- Increase your ratio of omega-3 to omega-6 fats by replacing omega-6 fats (e.g. corn oil) with monounsaturated oils (olive and peanut). Eat some flax seed or use flax oil if you like it. Take at least one 1000 mg fish oil capsule daily (one that says EPA and DHA) if you do not eat fatty fish like salmon or mackerel at least twice a week. Take the fish oil even if you also east flax … there are some big differences that makes it reasonable to do both, (And, no, deep-fried breaded fish does not count … wrong kind of "fatty" fish! Darn!).

- If you do not eat much in the way of baby plants, consider both a magnesium and chromium supplement to provide the amount recommended for most folks, and be sure you are getting a good amount of dietary fiber in some form (from foods or fiber supplements.) If you do eat a good amount of baby plants fairly often, the amount of magnesium and chromium in a standard multivitamin with minerals may be enough. That is because most have about 10-25% of the recommended amount of magnesium. If you don't eat the baby plants, though, you would benefit a separate product that provides additional amounts to reach the desirable range..

- Enjoy every day, every friendship, and every meal!