

CENTER FOR MIND-BODY MEDICINE

COMPREHENSIVE CANCER CARE 2001

CONCURRENT: Nutritional Support for Cancer Patients: A Basic Program

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PROCEEDINGS:

DR. EVANS: Welcome. It was quite moving for me this morning to hear both Michael and Dean talk about both the environment and some of the nutritional aspects that we're going to be talking about today because that was a nice global introduction that I no longer have to give. And what we're going to do now is be able to build on that foundation and actually talk about a lot of specifics so that we can then use those general principles of environment, toxicity, diet, and nutrition, and really come out with some firm fundamental suggestions based on literature about how nutrition can impact cancer. And before I start I just want to acknowledge the work of friends and colleagues Jeffrey Bland and Michael Culp (?), whose lectures and inspiration actually got me going to further my knowledge in this field. And it's important in scholarship to acknowledge people because, as we all know, plagiarism is when you take too much from one particular source but they call it scholarship when you take from multiple sources. So as you listen I want you to keep in mind these words of Groucho Marx, which are to be open-minded but not so open-minded that your brains fall out. (Laughter)

DR. EVANS: It's important that you hear what I have to say but keep your critical, scientific thinking caps on as well as your more personal filters to see what might feel right or what doesn't feel right for you. And while you're keeping those words in mind I'm going to keep these words in mind, which is to finish speaking before you guys finish listening. So to me this is what nutrition and cancer are all about. I'm going to order a broiled skinless chicken breast, but I want you to bring me a lasagna and garlic bread by mistake. (Laughter) DR. EVANS: Well, I wear two hats. I've got my scientific hat but then I've got my Center for Mind-Body Medicine hat. So I'm acutely aware of the power of emotion as it relates to our food choices and I'm powerfully aware of the negative impact about guilt about those food choices. So this has to all be done in balance. This is education and this is information and everybody should implement it at the pace that feels right for them because feeling guilty about not making the right food choices or constantly not feeling good about eating something healthy can by far overpower whatever positive impact you might get from eating that healthy food. So that's a very important overview that I don't want you to forget or that I don't want to neglect. Eat to live, not live to eat. This is my first slide because this is an article that I think really by its title summarizes my perception on how we have to look at nutrition and cancer, which is there's got to be some sort of physical impact on what we put into our bodies three times a day. If we put nutrients and food into our body that are clean, wholesome, and whole that's going to have a different impact than if we ingest and put into our body foods that are loaded with chemicals and toxins or that are difficult for us to digest and that we have to then detoxify and expend a lot of cellular energy and enzymatic processes to clear through our body. So if you're talking about a general overall philosophy to nutrition and health it's too eat to live, not live to eat, eat in a way that helps us live as opposed to hinders us. Yes, we can eat a lousy diet and still live but it's not helping us live. Proper food choices are an opportunity for diet to help and have a positive impact and the way diet can have a positive impact is certainly to put certain good foods in and, of course, to avoid certain bad foods. And now we know that there are real links to dietary choices and cancer. This is the first time that we now in the medical profession are talking about nutritionally-related cancers. And what are those nutritionally-related cancers? Stomach, colon, rectum, pancreas, breast, uterus, ovary, prostate, and liver. And you can see, as you heard from our talk this morning, a lot of that is related to fats, fried foods, or being overweight. So let's start with what I like to say is a positive image or a positive story and that's colon cancer. "Colorectal cancer is largely preventable," Journal of the National Cancer Institute out of Harvard, and they are not talking about colonoscopy. More than 25 percent drop in the incidence of colon cancer occurred from 1986 through '94, and once again the National Cancer Institute here out of the University of Illinois, "Prevention of colorectal cancer is clearly occurring here in the United States." Once

again, nothing to do with colonoscopy. What it has to do with is the identification of modifiable factors, increasing physical activity, avoiding obesity, folic acid supplements, not smoking, reducing alcohol, et cetera. And the estimate, again out of Harvard, National Cancer Institute, 70 percent of colon cancer can be preventable just by those changes in lifestyle. And Dean Ornish went on and on about oh, if this was a drug everybody would know about it. But if you look at that 70- percent prevention and then you throw in colonoscopy for the 30 percent colon cancer really can be a preventable disease. Just for repetition about the Western nutritionally-linked cancers, postmenopausal breast, prostate, pancreatic, ovarian, and endometrium and again, as I pointed out on that other slide, associated with increased intake of fat, mostly animal fat. What we know in laboratory animals is you decrease the fat intake you decrease the cancer incidence and what I think the next step is, which I think is very empowering information, is that if you add fiber, fruits, and vegetables to that low-fat diet you can actually increase the amount of fat to 25 percent of calories from fat and you still get the same cancer protection. So there's something good about fiber, fruits, and vegetables and when you leave here you will certainly know all about that up, down, and sideways. So first we're going to talk about dietary fat. As I said, the threshold is somewhere between 20 and 25 percent before we start seeing increased incidence of cancer and the type of fat is critical. You may have heard good fat, bad fat. It is so very true and we're going to talk about that. The omega-3 oils, whether it's fish oil, flax oil, walnut oil, and olive oil, have all been shown to be cancer-protective so those are the good oils. Oils that are high in omega-6, vegetable oil, those are the bad oils. What's good about olive oil? It contains squalene and that's showed to be cancer-protective. This is out of the journal Carcinogenesis, which is a very prestigious cancer journal. So the take-home is use olive oil as much as you can as your major dietary oil. Now, reduction of obesity can be a confounding variable when we assess dietary interventions. What's the purpose of that bullet? The purpose of that bullet is for those of you that are going to review the literature you're going to see that when people clean up their diet they get less cancer. Well, the truth is they also lose weight and it's hard to distinguish whether it's the loss of weight or the nutritional intervention that actually is responsible for the positive effect. We also know that leaner people get less cancer in general. Now, again, Dean talked about this and we're going to expand a little bit. About the only way to really extend life expectancy in rats was to calorically restrict them. This is from 1939. Now what if you took those rats, and this is about 40 years later, and you let them eat as much as they wanted to? They'd live 100 days. If you exercised those rats you could extend their life span by 40 percent to 140 days. But if you fasted them every other day -- and that's putting it kindly; you could say if you starved them every other day -- it didn't matter if they exercised or didn't. They lived 180 days. Now, that's nice. That's in rats. How does that manifest in people? What are some of the advantages of caloric restriction? Basically the evolutionary principle is that in times of food plenty in the animal kingdom that's the signal that animals will start to reproduce, whereas in times of leaner caloric availability their metabolism is shifted towards survival. Reproduction is increased hormone synthesis, increased estrogen, et cetera. And what happens with caloric restriction when they need to live longer is they make less insulin, decreased insulin levels. This is humans as well and that's why this slide's up here. You heard Dean talk about sugar being bad because it raises your insulin levels in terms of heart disease. He didn't take the next step about increased insulin levels and cancer, and we're going to be doing that a little bit later, very exciting. Less inflammation with calorie restriction, increased metabolic efficiency, both very important. Decreased free radical production, you're going to hear about this term "free radicals." Antioxidants get rid of free radicals. Free radicals produce oxidated stress, so an antioxidant gets rid of that oxidated stress. Decreased mitosis, mitosis is cell division, and increased apoptosis. Apoptosis is programmed or appropriate cell death. So you want cells to die appropriately. You don't want them not to die and to keep going inappropriately. And then increased DNA repair, which means you're able to repair damages to DNA because it's damaged DNA that ultimately causes a cell to become cancerous. So lots of advantages to appropriate body weight. Now, what Dean didn't really talk about is when you eat too much you have your calories that come in and you either burn them out or you store them. Well, when you take excess calories in it's got to be converted into fat, and it's a reduction reaction. And that's important because when you take too much food in, and it doesn't matter whether it's carbohydrate, protein, or fat, if you take more in than you're going to use then you have to make fat and in order to do that you have to use something called NADPH. The problem is that NADPH is essentially the body's ultimate antioxidant. So you use up your antioxidant reserve by making fat when you could be using your antioxidant reserve to repair DNA damage that you get from background radiation, toxins, problems with your food, et cetera. So if you eat too much you're losing your body's natural ability to repair itself. And so you can make antioxidants or glutathione, which is important for detoxification, and that's why when you take in less calories there's less oxidative damage, you need less antioxidant, and the antioxidants can be put to better use, very important because we eat on average twice as many calories as we need. We eat refined foods, processed foods, simple sugars, too much saturated fat, too much omega-6, and too much trans fat, not enough omega-3, which are the good essential fatty acids, not enough fiber, not enough fruit and vegetables, and we use caffeine, nicotine, and alcohol. Now, we're not eating enough of the right stuff and we're eating too much of the

wrong stuff. It's important to look at nutritional basics here, and the first is the RDA. What is the RDA? The RDA is the amount required to avoid a dietary deficiency disease like scurvy. Are there any health professionals here that have treated a case of scurvy or a case of rickets? It just doesn't happen. So essentially the RDA is really a small, small, small amount of the nutrients that we need, what you might say is the nutritional equivalent of the minimum wage. And it's clearly not optimal. We all know that but it's important that it's a first step because look at this. The USDA says that after looking at 21,000 people not a single one out of 21,000 got 100 percent of the RDA for the 10 essential nutrients. So even though we know it's such an incredibly low level we're still not getting what we need. The National Health and Nutrition Survey, less than 10 percent of Americans consumed 5 servings of fruit and vegetables, 40 percent no fruit or fruit juice, 50 percent no vegetables, 70 percent didn't get vitamin C, and 80 percent didn't take anything that had carotenoids, pretty unbelievable. How do you like this one? The number one vegetable in the United States is French fries and that's 25 percent of all vegetables. Number two, iceberg lettuce and a close third is ketchup. I made this slide and I was going to say this is the standard American diet, and I couldn't fit the words "standard American diet" up there so I had to abbreviate it and look at that, the SAD diet, and it is. And look how that diet has changed just from 1909 to 1972. A hundred percent more of our protein comes from animal sources than vegetables sources. We're getting 31 percent more sugar, we've dropped almost 60 percent of our carbohydrates compared to sugar, and we've lost 50 percent of our fiber. And that's not good because we're not even getting our fiber from our number one source of fiber, which is flour, because we're taking our flour, we're processing it and making it white flour, and you see that it then loses 95 percent of its fiber. That's clearly not good if you're talking about colon. I mean, there's just so much about fiber. It reduces estrogen levels. It increases your bowel transit time so you have regular bowel movements because, as you know, if you think about what's in stool, it's stuff that you don't want to have sticking around in your body. You certainly don't want it hanging out against the walls of your intestine any longer than it has to. These are things your body wants to get rid of. Fiber helps you eliminate more rapidly. You're losing fiber, protein, essential fatty acids, and all of these vitamins and minerals. In nutritional circles when we talk about Wonder Bread we always say it's a wonder they call it bread. So now the USDA says okay, let's do the five-a-day program, have five 100-gram servings of fruit or vegetables a day. That's great except 100 grams is only a 2-inch-square portion, which is really almost nothing. But even with that small amount, just like with that RDA survey that showed not one person out of 21,000 got it, only 23 percent of rural Americans get five servings. And the reason that's important is because in rural America it's easier access to fruits and vegetables so that's why that's particularly disturbing. We want our fruits and vegetables. Why do we need five a day? I think ten a day might be more appropriate because that's where you're getting vitamins, minerals, the antioxidants, fiber, and complex carbohydrates. All of these compounds have anti-cancer properties. Twinkies have no anti-cancer properties. So that's why we want to get our fruits and vegetables and this is why we want our fruits and vegetables to be organic because they are free of pesticides. And we all heard about the term "endocrine disruptors" quite eloquently this morning but you know what? It's not the fringe, politically active, environmental groups that use the term "endocrine disruptors." It's the Environmental Protection Agency that labels them as "endocrine disruptors." Also, when food's organic it has more of the micronutrients, the vitamins and minerals, that we expect there to be. We want our meat and chicken to be organic when possible because when it's organic they're not given hormones or antibiotics. Chickens are fed estrogen in their feed because in our society we even want our chickens to have big breasts so that's why they're given estrogen. And it's important to eat free-range whenever possible because that means that they're roaming free and they get to eat when they're hungry. That's important. Number one, you don't want them to be stressed by being kept cooped up, and I'm going to put my mind-body hat on right now, because stress hormones are bad. They do bad things for your endocrine system, raise your blood pressure, et cetera, so we all get enough stress hormones in our daily life. We're all stressed enough. Who needs to start eating the stress hormones or animals in our food? So free-range is better. In terms of beef organic is better than regular but grass-fed is the best. Grass-fed gives the appropriate ratio of good fats to bad fats and I can't say that about regular organic beef, which still is very high in the omega-6s, particularly the bad omega-6s, whereas the grass-fed gives you the omega-3s. Same thing is true for dairy. If you're going to have dairy you want it to be organic so you don't get hormones and antibiotics. And this just a study which looked at the ratio between wild animals and domesticated cows and looking at how much of those calories come from fat and lean and you can see ten times as much fat in these domesticated. So free-range, grass-fed, less fat, and the fat that's there is the good fat. So now let's move on to sugar. You give people 100 grams of sugar and you see that their white blood cells, their neutrophils, the neutrophils that actually eat our bacteria or invaders or bad things, 37 percent decrease an hour after the glucose, two hours later, 43 percent decrease, and five hours later there's still an almost 20 percent decrease in function. So when you have sugar your immune system loses its effectiveness and that impaired efficiency lasts as long as five hours. So that's why sugar's bad for the immune system. What about cancer cells specifically and sugar? Well, cancer cells because of their unique metabolic needs need sugar for energy and you saw Dean's PET scans

about what healthy arteries would do and you could label things. Well, the same is true with cancer and sugar. I mean, you can label sugar with the radionucleotide, inject it into people with cancer, do a PET scan, and boom, it lights up beautifully where the tumor is. So the tumors are eating sugar and we know that we can prove it by doing these PET scans and they light up right where the tumor is. Now, why is that important? It's important because, number one, it'll clearly give us a reason to eat less sugar. But what this technology can do, it's sprinkling in the medical literature now, but if you do these scans and you can see where there's increased sugar uptake maybe that can help us with early diagnosis. Maybe it can help us with cancer staging. Instead of waiting for a tumor to be clinically obvious or big enough to be seen on a CAT scan maybe we can find areas after someone's diagnosed with what we consider to be a local disease we do one of these tests and we find that there are other areas in the body that have increased glucose utilization and maybe that's a red flag that says hey, look here or watch here for tumor. And what about using these scans to evaluate treatment effectiveness? So instead of making people go through 6, 8, 10, or 12 cycles of chemotherapy before we re-scan them or evaluate the effectiveness of the disease why not potentially look a little bit earlier and see what's happening with the sugar uptake? Because if you haven't decreased the sugar uptake maybe the treatment isn't all that effective and you can move on to something that might be more effective a little bit sooner. You heard about insulin and how foods like simple sugars go into your bloodstream very, very quickly, increase your insulin levels. Well, this is why that's bad when it comes to cancer. As I said before, you eat your sugar you get more insulin. The more sugar that you eat the more insulin you have. If you're heavy and you don't exercise you have higher insulin levels and higher what we call insulin growth factor levels. The new thought in the literature is that these high insulin levels and these high insulin growth factor levels may in some way be causative for certain cancers, particularly breast, colon, prostate, endometrium, and pancreas. There's all new data. Why? Well, one other study just to throw in there which is, again, National Cancer Institute, May of 2001, looking at the fact that higher insulin levels are associated with more cancers. So this looked at men and prostate cancer risk and serum levels of insulin. This was out of Harvard. The study was done in China but all the analysis was done in Harvard and what they found was if people had a higher baseline insulin level they had an increased risk of prostate cancer. And that was a 2-1/2 times increased risk of prostate cancer; however, if you also were obese or heavy, and what they call that is the waist- to-hip ratio, so it means your waist is very much bigger than your hips. If you had the highest waist-to-hip ratio and the highest insulin level, 8.55 times the prostate cancer risk. That's huge. And now I'll tell you why we postulate that is. And there are other cancers, there are studies about breast cancer, women having higher levels of insulin and breast cancer not doing as well, because what insulin and insulin growth factor 1 do is it inhibits apoptosis. Remember, apoptosis is programmed, appropriate cell death. So it inhibits apoptosis. It stimulates cell proliferation and that means it wants to get sugar. There's sugar in your cells. It wants to build up everything, stimulates the synthesis of sex steroids, estrogen, so you make more estrogen, clearly nothing you want if you're worried about an estrogen-dependent tumor, and it decreases something called SHBG, and SHBG actually binds estrogen so it keeps it from stimulating your cells. So that's another reason. In addition to having you make more estrogen it decreases the protein that binds it. So you really get a double whopper or a double load of estrogen by those two mechanisms when you're talking about insulin and insulin growth factor. So sugar is bad because you have a decrease in the effectiveness of the immune system lasting at least five hours. We know and I've shown you that tumors actually use sugar at a higher rate. That's been documented on the scan. And then you have increased insulin and IGF levels, and we went through the inhibition of apoptosis and stimulating the cell proliferation that that does. So therefore the really difficult conclusion to draw is to eat less sugar. What do we think mediates or increases cancer expression? And you're going to see very common themes, no fruit and vegetable consumption, no fiber, maldigestion, and malabsorption. If you don't eat your nutrients you're not going to get them but if you eat them and you don't absorb them because of problems in your gut that's not good, either. Impaired detoxification, why is that important? Because you all heard this morning how we're all exposed to toxins and it just so happened that whoever made us made us with detoxification systems, made us with the ability to get rid of toxins but you don't want to overwhelm our ability to detoxify and we'll talk about that. Adrenal dysfunction, primarily related to stress or diabetes or ----- anemia, meaning too much insulin. There are people that have too much insulin and don't have diabetes, primarily people that have elevated LDLs, elevated cholesterol, a little heavy, especially around the waist, borderline high blood pressure or hypertension. Those people have elevated insulin levels and we know why that's not good. But if you have a diet high in fruits and vegetables, you eat regularly, you're a proper body weight, and you get some sleep and exercise that helps your immune system to function. So let's go back to some of the toxins. These toxins or carcinogens damage our DNA and, as I said before, our bodies are designed to remove these toxins, and there's a phase one and a phase two detoxification system, just two different pathways so we said let's call one phase one and one phase two. And all of these pathways are made up of enzymes and the effectiveness of these enzymes are under genetic control. So what that means is we are born with different levels of effectiveness or efficiency of these detoxification pathways and so one of the major schools of thought about why certain families

have more cancer when you can't find a cancer gene is that the efficiency of these detoxification systems is clustered because of the genetic influence in families and that's the reason. So just to expand a little bit on what we heard this morning of where we're getting all of these environmental toxins, and *Living Downstream* really is the book to read. We get our toxins from pesticides, from solvents. These volatile organic compounds whenever you get new carpet, you have to watch out for those. Cooking can be bad, the tricyclic aromatic hydrocarbons, plastics, heavy metals, and nutritionally we get toxins with what we eat sometimes. Anything that can stay on the shelf and be edible after a year, I mean, what does that tell you? Preserved as an additive. You heard how we're all toxic, essentially. We all have toxins. Well, again, this is not from a politically active group that says this. This is the Environmental Protection Agency that says this. Now, since we all have toxins we need to get rid of them but if we don't get rid of them what do they do? They oxidize our DNA. This goes back to the initial part of my talk about nutrients being rich in antioxidants. This is another reason you want antioxidants, to get rid of the carcinogens that are left by these detoxifications if the detoxification systems can't get everything. And what do you know? Vegetables, fruits, soy, and green tea are excellent sources of antioxidants and that decreases the amount of oxidized DNA in our bodies. And that's why we believe they're beneficial in terms of preventing cancer. Some of this is so obvious but the literature is recent and what we're trying to do here is give you literature support through the intuitive or obvious things that we all know. So not only are we all toxic but we're also all eating contaminated food. Again, the source of this is not from some fringe group but this is comment on our society that the FDA has a Division of Contaminants Chemistry. So correlated pesticide residues were found in 100 percent of raisins, spinach, and beef, 93 percent of processed cheese, hot dogs, bologna, chicken, turkey, and ice cream, 87 percent of lamb chops, 81 percent of cheddar cheese, et cetera. So we're all toxic and all of our food is toxic as well. That's why you want to eat organic. We talked about things that have a shelf life for a year. This is strawberry flavoring. The 12 most contaminated foods at this point are Chilean grapes, strawberries, cherries, peaches, apples, apricots, spinach, bell peppers, celery, green beans, cucumbers, and Mexican cantaloupe. Another reason to eat organic. If you think our pesticide rules and regulations are lax they're even laxer elsewhere in other countries. So if you're going to be eating these foods clearly organic is best, and if it's not going to be organic, make sure that you wash them. You need to really wash each grape individually. Each fruit or vegetable needs to be washed. And this is here in the United States: Over 2.5 million tons of pesticides are used yearly with only 0.1 percent actually reaching the target pests. I said United States. I meant worldwide, 0.1 percent. Now, everybody knows how horrible pesticides are, but when you look at this ratio here it's unbelievable to me how we're still continuing to do this. Pesticides stay in the soil for over 30 years, the half-life of DDT and the US Geological Survey talks about how pesticides collect in our groundwater. So the powers that be know about this stuff, which is why things may or may not change and why we have to be proactive in how we eat and the food choices that we make. Well, what can we do? Well, when we cook we can avoid char and char produces heterocyclic amines. So unfortunately what makes that grilled steak taste so good isn't really good for us because these heterocyclic amines attack DNA in the intestine, breast, prostate, pancreas, and liver. And that's why when you eat too much of that stuff you get cancer at those sites, again recent data. And how do you decrease heterocyclic amines? By eliminating char, by marinating, and, if you can, microwaving meat briefly before cooking. I don't even do that but that will help. And here's the good news, that antioxidants, whether through diet or supplements, reduce the damage to DNA from heterocyclic amines. So if you're going to have your barbecued steak make sure you have lots of brightly colored vegetables with it and make sure you have fruit for desert. Now we'll go through very briefly some specifics about different cancers. Does an apple a day keep breast cancer away? That's really the question. And in *JAMA* in 2001 they said no; however, in 1997 the World Cancer Research Fund convened an expert panel and they said oh, yes, there's a probable association between fruit and vegetable consumption and less breast cancer. More recently in Europe they looked at 14 case control studies and 3 cohort studies and said yeah, you can decrease breast cancer by as much as 25 percent by high vegetable consumption. What about fish? Here are three studies that show you that fish from unpolluted waters gives you decreased cancer risk. I just want to spend a minute talking about fish. This is because of omega-3 essential fatty acids primarily in cold water fish like salmon, mackerel, tuna, sardines. Now, how do fish get these omega-3 fatty acids? By what they eat. So when fish are swimming in unpolluted waters they'll eat unpolluted plankton and it's that plankton that the fish put and translate into these omega-3 fatty acids or these good fatty acids. When you have farm-raised salmon they're not fed plankton, they're fed grains, and so they don't have the good omega-3 content that the natural fish do. Not only that, I was very disturbed to hear that the largest maker of commercial fish food for these farm fisheries it just came out or they just admitted that there were pesticide residues in the food that they were feeding the farm-raised fish. So I when I have the ability to find out don't eat farm-raised salmon. And you also have the whole stress hormone thing as well. So when you buy your fish ask if it's farm-raised or open-water. I think it's very, very important. And also vegetables and fruits, here's just a bunch of studies, again, less risk of breast cancer. Here we talk about meat. You want to eat organic when you can and if you don't stay away

from meat all these studies here from 1990, '95, '98, you're increasing your risk by 75 percent, 2.44 times, and well-done meat is more harmful. We talked about those reasons why. It's also true for ovarian cancer. You increase your risk by 60 percent, 30 percent. These are a lot of good studies, the International Journal of Cancer, Journal of the National Cancer Institute, 19 different cancers, and here recent data out of The Lancet. Now we're moving into more mainstream medical journals that are very prestigious, so The Lancet, very prestigious mainstream medical journal. Two to three times increased risk of prostate cancer if you didn't eat fish. And here we go. Now they're talking about omega-3 fatty acids in The Lancet. What are omega-3 fatty acids? Do people have a good understanding or do you want me to go through the basics? It's an essential fatty acid, as is omega-6. We call it essential because we can't manufacture them, we have to ingest them, and they do everything and they're very important with cell membranes. And that's important because that's how cells communicate and talk to each other. That's some of the signals that tell cells to stop dividing when they come in contact with each other. So cell-to-cell communication is very, very important as are chemicals called prostaglandins, which can be very inflammatory, raise blood pressure, et cetera, and some of them aren't very good. You get your omega-3s. We talked about cold water fish. You also get omega-3s in grass-fed beef. You heard me mention that before, not organic beef. If you're going to eat organic beef that's better than regular because you don't have the hormones and the antibiotics and the pesticides, but you still have those bad fats. Grass-fed you get the good fats. For people who don't eat fish flax seed gives you omega-3s. That's the number one source that I recommend for omega-3s. And there are good omega-6s? Not all omega-6s are bad. The omega-6s in beef, the omega-6s in dairy or eggs, yes, those are bad, but the good omega-6s are in nuts, seeds, and grains. So you want to have nuts, seeds, and grains in your diet. So in general omega-6s come from linoleic acid and they produce inflammatory prostaglandins. They give you heart disease and cancer. We believe that one of the things that can initiate or promote a cell to become cancerous is if it's in an environment of inflammation, increased cell turnover, increased cell growth. The inflammatory response is a good one if you're talking about an injury, an acute injury, and then you can heal it. But if you're talking about an injury that you can't heal, like a little nick in a blood vessel or a clot in a blood vessel in the heart that inflammatory response attracts cholesterol and that's how plaque builds up, and it also isn't good for cancer because that inflammatory response can initiate tumor growth. It increases the rate of tumor growth. It can promote metastases and enhance the growth of precancerous cells but, as I said, there are the omega-6s as well from nuts and seeds, and that's protective. So the omega-3s in general are noninflammatory but the majority of omega-6s are inflammatory. So the omega-3s inhibit precancerous cells from dividing. They inhibit tumors from being initiated. It decreases the rate of tumor growth, less metastases, and can improve cachexia, which is advanced weight loss in advanced cancer. And what a surprise but the Western diet, that SAD diet, is deficient in the amount and proper proportion of essential fatty acids. So imagine doing the brochure for this workshop at the NIH, The Essentiality of and Recommended Dietary Intake for Omega-6 and Omega-3 Fatty Acids. And the recommendation is 4 to 6 grams of omega-6 a day and 2 to 3 grams of omega-3. What you'll notice is it is roughly a 2-to-1 ratio, twice as much omega-6 as omega-3. What do most of us get? Anywhere between 10 and 20 times omega-6 to omega-3. What else could these good omega-3s and good omega-6s do? They inhibit the cellular signals that cause cancer cells to proliferate. They help with the cell membranes. And this is critical: It increases the production of 2-hydroxy-estrone. What is that? Well, if you look at breast cancer the hypothesis that's been in conventional oncology for a long time is that breast cancer is somehow related to overall exposure to estrogen, which is why we have the risk factors about childbearing and when you first got your period and when you get menopause, et cetera, that you were exposed to too much estrogen. Well, the flip side, which is, I think, the most interesting side is that what might be more important or as important is how women metabolize or digest their estrogen. How do they get it out of their system? And there are different ways to do that and it's somewhat complex, but to simplify it I'm going to just say that there are two pathways. There are really more. There are three but there are basically two pathways that you can get rid of your own estrogen. One is to form a 2-hydroxy or a 2-estrogen and the other is a 16. The 2 is anti-cancer and the 16 is actually pro-cancer. So this, as I said, might be as important if not more important in deciding who gets breast cancer because it's how you digest. If you digest or degrade or metabolize your estrogen into a cancer-causing form it's not a good thing. And we use this clinically, both with our cancer patients and in helping them to decide if they are a good candidate for hormone replacement therapy because if you are a woman that metabolizes your estrogen into this pro-cancerous form you certainly don't want to take estrogen replacement therapy. Now, the Mediterranean diet, we talked a little bit about that this morning earlier but if we went to the Mediterranean diet, and this is not the Asian diet but just the Mediterranean diet, which is a little easier to follow, 25 percent decrease in colon cancer, 15 percent less breast cancer, 10 percent less prostate, endometrial, and pancreatic cancer. There are more essential fatty acids of the good type in the Mediterranean diet. Now just two studies out of many about essential fatty acids that are not based on dietary surveys because dietary surveys are subject to recall bias. People may not remember what they've eaten or, if it's done in a prospective way, they may not fill out the survey correctly. But if you actually biopsy breast tissue and

look for the amount of omega-3, the good fatty acids, or the omega-6s, the particular bad ones, then it doesn't matter what people tell you they ate because we have an actual bioassay of what's going on, those breast cells' environment they're bathed in. So if you have more omega-3 to omega-6, lower rates of cancer, all right? That should come as no surprise. Here's another study that says they tried to repeat that data and they looked at 123 breast cancer biopsies and 59 benign biopsies from a homogenous area in France. If you had a lot of omega-3, if you had a lot of the good stuff, a third less likely to be malignant. And it's important, a third less likely. This is because these are little things. This is not a magic bullet. We're not talking about one particular intervention that will cure cancer but what we're talking about is a lot of little things and a lot of little things can have a big effect. Another little thing to think about which can have a big effect are cruciferous vegetables, cabbage, kale, broccoli, Brussels sprouts, and cauliflower, because when you look at a lot of studies, look at this, 94 studies, 67 percent of them or actually a little bit more showed a decreased risk for every single kind of cancer that they're analyzing. So cruciferous vegetables are good and here's why: Because we're back to our detoxification systems. Remember, we have phase one and phase two. This is how our body gets rid of toxins. Well, cruciferous vegetables like broccoli, cabbage, kale, and cauliflower promote phase two detoxification. Now, we think the active compound there for this phase two is something called calcium D-glucarate and isothiocyanates. I just want to describe the way the detoxification systems work. You have your toxin. It then goes through phase one and then it gets what's called an intermediate. And then from the intermediate it goes through phase two and then you pee it out. So it's toxin through phase one to intermediate, intermediate through phase two to peeing it out. And this is just a little study that says when you take rats, and you know they're going to get breast cancer because you've given them a chemical that 100 percent of them develop breast cancer, if you feed them broccoli sprout extract there's an 80-percent decrease in cancer. All right? And we believe that it's the calcium D-glucarate and the isothiocyanates which rev up this phase two system. And if you remember, the phase two takes that intermediate and then you pee it out, very important. However, there's also something called indole-3-carbinol that's important. And what does indole-3-carbinol do? Indole-3-carbinol increases phase one. So you have your toxin, phase one to intermediate to phase two and out. Now, what's important is that this is phase one and a lot of people know about indole-3-carbinol and they're taking indole-3-carbinol supplements. What's the beauty here is the metaphor that the food is best. The food is better than the supplement because in the food you enhance your phase one and your phase two. If you're just taking indole-3-carbinol all you're doing is enhancing your phase one. Now, why would that be a problem? It's a problem because the way these detoxification systems work, which is toxin, phase one, intermediate, phase two, pee it out, that intermediate is oftentimes more toxic than the original toxin. So if you rev up your phase one by taking too much indole-3-carbinol you're from toxin to intermediate. So you're on a four-lane superhighway, everyone's going at 80 miles an hour, and then you get to your phase two system but it's a two-lane highway. So those intermediates can't be cleared and they build up. Superoxide dismutase is the most common reactive intermediate, highly toxic. So this is where there's the magic in nature and one of the potential pitfalls of trying to supplement without having adequate information. What also is exciting about indole-3-carbinol is now we're talking about, again, the good estrogen metabolic pathway. So not only do the omega-3 essential fatty acids help you or shift into the good estrogen formation, but so does indole-3-carbinol. So you get more of the 2, more of the good one, and less of the 16, less of the bad one. And look at this: National Cancer Institute data. Now, this is just the history. I just want to spend a minute or two on this good estrogen/bad estrogen. This started back in 1975, when we thought that the 2-hydroxy was protective. Then we found, again Journal of the National Cancer Institute, that 16 was bad in mice. Then we found in '95 that the 2 was good in mice. And now we find that the 2 is anti-proliferative and induces apoptosis or that good programmed cell death. Now we see in women that there's less of the 2, less of the good, and now we have a prospective study looking essentially over 20 years. And basically if you had more of the 2 you had less breast cancer, not no breast cancer. This is not about absolutes, but this is about tweaking the system. And this ratio, whether you're metabolizing to 2 or 16, you can change that by diet. You can change that by cruciferous vegetables or indole-3-carbinol supplementation. Soy does that, legumes do that, the good omega-3s do that and, again, this is me speaking, but really almost every woman should have her estrogen metabolism analyzed because it gives you information in terms of, as we see here, breast cancer risk and helping in decisions about hormone replacement therapy. And then once you know what the ratio is you can then design an intervention, whether it be purely nutritional or taking some supplementation, and then we can measure the effectiveness of it. And you could also measure whether your detoxification systems, your phase one and phase two, are in proper balance or out of balance. So you take a baseline measurement of your detoxification system and you find out are phase one and phase two both the same number of lanes on the highway and then you design your supplementation based on that as well. Knowing that indole-3-carbinol does phase one, you want to make sure that your phase two is up for the task. Soy, good or bad? The basics on soy, it's a very, very complete food and the belief in anti-cancer properties comes from the observation that areas where there's high soy consumption over an entire lifetime less breast, prostate, and colon

cancer than were in the West, all right? You saw Dean Ornish's slide on that. And that's true whether people change countries or not. You heard about now in Japan young boys now having high cholesterol and heart disease. It's also true with cancer. What is a phyto-estrogen? It's a compound that comes from a plant. It is very similar in structure to human estrogen and it fools the body into believing it's estrogen. And if you look at the real science on how does it stimulates and behave like a stimulatory sometimes it can be inhibitory, but in terms of the level for this discussion it is something that the body believes or confuses to be estrogen. But when it thinks it's estrogen, even if it is stimulated by this phyto-estrogen, by this plant product, it's always stimulated to a lesser degree than regular estrogen. It's always stimulated at either 100 or 1,000 times less than regular estrogen. And so the belief is that this phyto-estrogen molecule is like a car fitting into a parking spot that has a sign that says, "Reserved for Estrogen," so that when the estrogen car drives around there's no parking spots, no place for it to fit. But when this phyto-estrogen pulls into the parking spot it stimulates the cell 100 to 1,000 times less so just finding that it's stimulatory doesn't concern me because I know it's 100 to 1,000 times less. Have you noticed that I'm repeating myself? The most common type are flavonoids and isoflavones are one type of flavonoid. It has to do with yellow pigmentation and this ----- but all you need to know is that when you hear the term "isoflavone" it's a phyto-estrogen, a type of phyto-estrogen. The most popular or significant flavonoid phyto-estrogen is an isoflavone, so that's in soy. And they're called genistein and daidzein and that's the purpose of these past bullets was just to let you know when you see genistein and daidzein think soy primarily. Oh, what do you know? They're 100 to 1,000 times weaker than estrogen and they bind to estrogen receptors to protect them from the more potent stimulation from our own estrogen or xeno-estrogens. And what are xeno-estrogens? "Xeno" means foreign. Xeno-estrogens are compounds that we ingest that our body converts into estrogen-like molecules and they park at that estrogen parking spot just like the phyto-estrogens from plants but instead of being less potent they're more potent, up to 1,000 times more potent. So if you've got the phytoestrogens that are 1,000 times less potent filling up the parking spot, then those pesticides, those xeno-estrogens that we're all eating, won't have a chance to stimulate your breast tissue 1,000 times more potently than your own estrogen. Does everybody follow that? We know through laboratory data that genistein and daidzein are antioxidants. We all know why that's good, right? We also know that it inhibits human estrogen synthesis and it causes that programmed or appropriate cell death. So there are lots of good things that genistein and daidzein do. And look at all the different types of cancer cells that are inhibited by genistein. So there are lots of anti- cancer properties in these compounds. It inhibits angiogenesis, which is the production of new blood vessels; therefore, theoretically that's a mechanism that would inhibit the growth of solid tumors because solid tumors in order to grow need more blood vessels. That's the whole mechanism of the anti-angiogenesis intervention and there was a wonderful talk on that. I suggest you all get the tape. Genistein promotes adhesion of prostate cancer cells. And why do you want your cancer cells to stick together? You want them to stick together so they don't break off, travel in the circulation, and grow somewhere else and give you a metastatic focus of disease. So soy does that. And here we are with the 2-hydroxyestrogen again. Soy helps you make more of the 2. And who knows but it was postulated in cancer research that this along with indole-3-carbinol may reduce breast cancer risk. Again, this is in women that don't have breast cancer. So cultures that have high soy consumption have less cancer. When you decrease your soy consumption your cancer incidence goes back up. Soy isoflavones in the laboratory are antioxidants. They're anti-angiogenesis and anti-adhesion. And it increases the metabolism of estrogen so that you form the good one, not the pro-cancer one. However, with the good there's always the concern that some people can't digest soy because soy has trypsin inhibitors and that gives gas and bloating. You can overcome that by eating soy as part of a balanced meal or with Beano or other things. There are phytates which decrease absorption of some minerals. Once again not significant if it's part of a balanced diet. There are less phytates in the fermented soy products like miso and tempeh. And if you eat a lot of soy you can actually inhibit thyroid hormone synthesis. So 200 milligrams a day is a lot. You probably can't even get that nutritionally without taking a supplement, but that's something to always keep in mind if you're eating a lot of soy. Does it cause breast cancer? No, they couldn't make it any bigger. There's not one study that shows an increased rate of breast cancer associated with soy consumption but concern about soy in women with breast cancer, this is real. This is real. It's real because it's a question mark. We have great data on women that eat soy throughout their lifetime. That's protective. There's no discussion about that. We have good animal data. Soy is great if you're a rat with cancer and if you're a cancer cell in a test tube we pretty much know what's going to happen, and we're going to talk about that and it's pretty interesting but there's no information on women who start eating soy late in life and we don't have a lot of information on women with breast cancer who then start eating soy so it's just a question mark. But in addition to the question mark there is some troubling data which is that a few studies showing that soy can stimulate normal breast tissue. Now, this in and of itself and these studies don't bother me because I know that soy stimulates breast tissue but I know it does it 100 to 1,000 times less than circulating estrogen. But this is important in women that are in menopause because they have very little circulating estrogen. So if you are not in menopause, you've got a lot of circulating estrogen. Soy then can

only be helpful because it's going to be stimulating less than your own circulating estrogen. But if you're in menopause and you've got no circulating estrogen or very little circulating estrogen this is a theoretical reason for concern because even though it's 100 to 1,000 times less than estrogen if you don't have any estrogen it's still going to stimulate it more than if you didn't. And in this study breast cancer cells introduced into mice grew faster if they were given a lot of genistein. And there are also studies that go the other way, but it's not like it's 100 percent the other way. And the real area of concern is soy and tamoxifen because they both bind to this estrogen receptor alpha with the same affinity and genistein can actually knock tamoxifen off the cells. So theoretically it may be decreasing the effectiveness; however, if you take a lot of genistein it can increase the effectiveness of tamoxifen. So it's just a question mark. It's just we don't know. So what I recommend is it's better to get your soy isoflavones from food as opposed to a supplement. The fermented products are better for those with digestive issues. And for a breast cancer prevention diet 50 to 100 milligrams daily of soy isoflavones and 50 milligrams a day in postmenopausal women and women with breast cancer. Now, this also has to be individualized, always, but these are just some general guidelines because the literature just isn't out there in terms of safety. We just don't have all the answers yet because the studies are being done. And this is just a slide so that you see that a half a cup of tofu is 35 milligrams of soy isoflavones. So if you're just getting one half a cup of tofu a day, which is a lot for probably most of you, it's only 35 milligrams. But you don't want to go crazy and have soy milk. Now there's a lot of fortified soy milk, which is 75 milligrams of soy isoflavones from one cup. I mean, that's where we're getting into areas I wouldn't say that are dangerous. I would just say we don't know. It's a question mark. So just realize that it's really a pharmacologic intervention without a lot of data. Soy nuts, 60 milligrams. You can get this isoflavone content from any nutritional textbook. So what can we say? Eat more vegetables. Calcium D-glucarate, indole-3-carbinol, we talked about that. Eat more fish and, if you're not going to eat more fish, fish oil capsules. Eat less meat. Now, with the essential fatty acids I also need to mention that you can figure out whether your diet is appropriate based on doing testing for your essential fatty acid composition. We can now find out whether you've got too many of the pro-inflammatory essential fatty acids or not enough. Eat less sugar. We talked about the reasons for that. Add soy to your diet in a way that reflects the literature. Try to eat organic. Avoid environmental toxins. Don't eat from that contaminated list. Try to achieve ideal body weight. It decreases your oxidant load and also lowers your insulin levels. And then think about having your essential fatty acid composition tested. Think about getting your 2-hydroxy- and 16-hydroxy-estrogen levels tested. Think about finding out what your baseline insulin level is. Remember those men that were diagnosed with prostate cancer, those with higher insulin levels, eight times the incidence of prostate cancer. And think about getting your insulin and your IGF levels tested. Things that I really didn't have time to talk about, exercise is very important. A lot of literature on the benefits of exercise, both in prevention as well as decreasing recurrence. Drinking green tea, not smoking, eating as much mushrooms as you can, and then, of course, I have to end it all with what I think is critically important as I put on my mind-body medicine hat, which is try to decrease the stress in your life, learn relaxation techniques, and solve the difficult issues in your significant relationships, very easy to do, which is why it's only one bullet. And I just want to talk about this very, very briefly, which is, again, The Lancet, as I said, very prestigious medical journal where the editor, Richard Horton, talks about the topic, and we're all here today talking about the topic, which is very sick people needing to make timely treatment decisions in the absence of medical certainty and the dilemma that physicians face on advising them. So what is that principle? And he said you must act on facts and on the most accurate interpretation of them using the best scientific information. That does not mean that we must sit back until we have 100 percent evidence about everything. When the state of the health of the people is at stake we should be prepared to take action to diminish those risks even when the scientific knowledge is not conclusive. So though I can't tell you with certainty that eating in the way we just spoke about, cleaning up your diet, will absolutely eliminate the possibility that you'll get cancer you've seen a lot of the evidence to suspect that it's certainly going to help you in a lot of ways and it's not too soon to start changing your diet and making these changes. It doesn't make sense to wait until there's absolute certainty, especially for those that don't have time. And you remember Dean's slide from Dr. Burkett (?), this is Albert Einstein's version of the same, and Einstein flipped it, just didn't use just one sentence that said wow, but what about the converse. Not everything that counts can be counted and not everything that can be counted counts. So there's a lot at work here and it's what you eat, and we talked about in the first slide about all the emotional factors that got into what we eat and how sometimes that can be even more powerful. And it's about reducing stress, solving issues in significant relationships, and by making incremental improvements in all of these different areas. That's the way to go. It's not just one magic bullet. Thank you all very much.

QUESTION: ----- is that, you know, why shouldn't I use the supplement if I'm changing my diet and eating well? And in your opinion do you feel that ----- on people that don't have access and who can't afford ----- all the time even if these needs ----- absolute optimal diet ----- we're still getting enough in the foods that ----- ?

DR. EVANS: There are a bunch of questions in there. The answer to the last part is I don't so people need to supplement for sure if they're not going to be eating organic because the data says you're not going to be getting what you need. Nutrition as a cancer preventive is different than nutrition as a therapy or treatment. So if we're talking about treatment then there's a legitimate reason to supplement.

QUESTION: -----? DR. EVANS: I know the question. The question is for people that want to have this testing done, either the essential fatty acids, the detoxification pathway, the good estrogen/bad estrogen, if you went to a conventional doctor could they do it, would they do it, would they even know about the tests? The answer is the more intellectually expanded physicians will know about it. It's difficult to find good laboratories that do this because it's usually not done through standard conventional laboratories. The laboratory that I use and recommend, and I respect their dedication to good science and intellectual integrity, is Great Smokies in Asheville, North Carolina. So anybody that wants any information about this testing, you can go to www.gsdl.com and they will help you find a practitioner in your area that knows about these tests.

QUESTION: ----- ?

DR. EVANS: I don't make specific recommendations. I talk to people and I have an assessment of where they are with estrogen metabolism. So if they are really not metabolizing their estrogens in a positive way I know that soy will help that. So that may push me to have them take a little bit of soy. If they are metabolizing their estrogen fine then they don't really need soy because they could get antioxidants. In other words when you think about what soy does you can get the benefits of soy through other nutritional interventions. We talked about that. So every single benefit of soy you can get through other ways. QUESTION: Is there any data about hypothyroidism in breast cancer -----?

DR. EVANS: The question is is there any data on hypothyroidism in breast cancer. None that I'm aware of.

QUESTION: -----?

DR. EVANS: I think that for sweeteners, what I find the ideal sweetener to be is an herb called stevia followed by raw honey or maple syrup. Thank, you all.

(Applause) (Whereupon, the PROCEEDINGS were adjourned.) * * * * *