

TRANSCRIPT_MITCHELL GAYNOR, MD, Environmental Oncologist

I became very interested in two things that I'm going to talk to you all about tonight. One is nutritional genomics, and that'll be the subject of my next book that'll be out next January. And the other is toxicogenomics. Toxicogenomics is the study of how various environmental toxins cause cancer and how it happens over a period of decades.

You know, one of the major things that Devra and I have both realized over the years is *what* is in our external environment—the environment out there—becomes the environment in... internal environment—it becomes what's inside you. And so, you know, we've really encouraged people: everybody has to become an environmental activist only because *your* health, and your children's health, your grandchildren's health, is completely dependent upon what's in the air that your breathing, what's in the water you're drinking, what's in the food you're eating; *and* what you can't see doesn't mean that it's not there. Because a lot of people really think if you can't see it, that it's really not there. And we know nothing could be further from the truth. And as an oncologist, I became very, very interesting, not only in treating cancer but helping people reduce the risk of ever getting cancer in the first place.

Now, we're living in a country today where one-in-three people are going to hear the words, "You have cancer." Unfortunately, when I first started about 25 years ago, the statistic was one-in-three; they predicted by 2050 that it was going to rise to one-in-two. We're almost there now, so we're ahead of schedule. So if that's not an epidemic, I don't know what is. And we've got a lot more people surviving cancer, but there are a number of types of cancers, like childhood brain tumors, again which goes along with what Devra is working on, is increasing significantly over the last 30 years. One-in-seven women will develop breast cancer. Some people have said that's due to earlier detection, which is part of it.

So, a lot of people think that if you're going to get cancer, if you're going to get Alzheimer's, if you're going to get a number of these diseases that develop in life, that it's just bad luck or bad genes. But the fact of the matter is they've looked at identical-twin studies. This was in the *New England Journal of Medicine*. Identical twins developed the same disease only 10 per cent of the time. And when you look at the most common types of cancer—like breast, colon, or prostate—identical twins only between 15 and 30 per cent of the time will they get the same disease. So a lot of it has to do with the environment. And one of the key things I'm going to talk to you about tonight is it doesn't just have to do with the genes that you're born with. Okay, you have the genes... you know, half from your mother, half from your father, but you can control gene expression throughout your entire life based on the nutrients that you're putting in your body or the toxins that you're putting in your body.

Now, this is a little bit of a technical slide, but it illustrates a point very well. So, the yellowish fat mouse you see up there is the mother of the thin dark brown normal-colored mouse right next to it. And this study was done at Duke University by Randy Jirtle. And it really illustrates the whole point I was making about what we call epigenetics. So it's not about mutation, it's not about DNA damage; it's about affecting gene expression. So that mouse is called an Agouti mouse. And it was bred so that it has a very yellow pale skin coat, it becomes obese at an early age, it becomes diabetic at an early age, and they develop a number of different tumors as they

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age. So they have a very short lifespan. When these... when this mouse was fed extra things during the pregnancy—like betaine, which comes from beets, B12, folic acid—it started giving rise to more of the normal phenotype mouse—the normal mouse that is thin, does not become diabetic, does not become cancer. *And* the fact is that's heritable, which means that mouse can continue to produce normal mice down the line. And this has been shown in so many different things both in humans and animals—like stress that a mother feels, you know, in certain animals will give rise to certain conditions down the line—that become heritable so that it's passed on.

So, women with the BRCA1 or 2 mutation, that only makes up about 10 per cent of all the breast cancer—maybe even a little bit less. But they have an 82 per cent lifetime risk of getting either breast or ovarian cancer. So this was really popularized after Angelina Jolie made the decision to have a bilateral mastectomy. Dr. King published a paper where she looked at old serum samples and looked at women before 1940—before there was a host of all these environmental toxins that we're exposed to now that women back then weren't—that the risk of breast cancer was 24 per cent if you were born before 1940, but 67 per cent if you were born after 1940. Same thing held for ovarian cancer, as well. So a lot of these environmental toxins that have been introduced since World War Two have really predisposed to a number of things. So even if you have the gene for breast cancer, not all women develop it. And I have a huge number of men and women in my practice that are BRCA1 or 2 positive, that we do a lot of preventative things that I'm going to talk to you about over the next few minutes.

So. Dr. Sheldon Feldman and Dr. Aronson—these are two doctors that have really pioneered looking at something called “ductal lavage” and breast milk, looking to see what kinds of toxins are in milk. So in mother's milk, you can find a host that are Class 1 carcinogens. And these are stored, so it's really no wonder that these get stored in fatty tissue and they stay there for decades and decades.

Toxic compounds are present in a huge number of samples of fat—whether it's from surgical patients or other patients. And they found that many of these toxins are present in very, very significant levels. So everybody has at least 80 to over 100 carcinogens that they're carrying in their body. I test people for mercury toxicity; we find it in about 30 per cent of the people we test.

So if somebody is going to develop cancer, it's very important for people to realize... let's say somebody wakes up with a cough and they go to the doctor because it's not going away after a week, he does a chest xray, finds a lung mass, they biopsy it, and finds out the person has lung cancer... you know, that lung cancer didn't start the day the person developed the cough. It very often started decades before. And so, you know, some carcinogens are activated within the body. They can damage the DNA. They can also turn on certain tumor-promoter genes, so even if they don't damage the DNA they turn on genes that will promote cancer. And it could be decades before a clinical cancer will show up. At any of these stages there are phytonutrients and certain medications that you can use to interrupt that. And one of the things that I think oncologists have really missed the boat on, so far, is the fact that everybody...

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you know, of all the 7 billion people in the world, *everybody* is walking around by the time they're 20 with cancer in their body. Now we know that from autopsy studies where people in their 20s died in car accidents or wars. They do autopsies; they'll find occult or dormant thyroid cancer, breast cancer, stomach cancer, colon cancer in almost everybody. Many people have more than one dormant cancer. So you know, we're the most rapidly evolving species on the planet. Our DNA is becoming mutated. We're exposed to environmental chemicals over the last several decades that our ancestors were never exposed to. And so the whole point about the fact that everybody has dormant cancer really changes what the philosophy is. It's not to try and eradicate every last cancer cell in the body in a given patient. It's not possible. You're not going to make one person unlike the other 7 billion on the planet. The goal for you for wellness is to keep any cancer cell in body that's dormant keep it dormant, so that it doesn't become active. And if you've had an active cancer, you want to make it to where it becomes dormant and keep it there.

So there are a number of things that you want to try and avoid. PBDEs are flame-retardants. And those are found in a lot of mattresses. You can buy PBDE-free mattresses. They put them in children's pajamas, which they definitely should not be doing. The levels of these in the human bloodstream and fatty tissue samples are doubling about every five years. In the areas where they're the highest, it's there's a correlation with breast cancer and other cancers. These type of chemicals are also neurotoxins. There's some study that it may be correlated with learning disabilities, developmental disabilities, and autism.

Phthalates are endocrine-disrupting chemicals. It means they act like weak estrogens. They're found in nail polish, the soft plastic toys that children often chew on, perfumes, skin moisturizers. You always want to make sure you're getting phthalate-free toiletries, cosmetics, things like that. And that has also been linked to cancer and reproductive impairment.

You want to avoid microwaving with wraps—like Saran wrap. It just is putting dioxin into your food. You should always use glass or ceramic things to microwave even—even Tupperware or Rubbermaid bowls are better. And avoid upholstered furniture or foam products that have been treated with flame-retardants.

Avoid dishwashing detergents with chlorine and phosphates, because when you open the dishwasher all that mist goes in. The chlorine is converted in the body to different carcinogens. You want to really be careful with cell phone and other electronic items; remember distance is your friend. You know, a lot of people are walking around talking with it right next to their ear; it's going right in through the skull to the brain. You want to avoid using cell phones with weak signals, because the weaker it gets the more it's trying to attract the original antenna, and a lot of that radiation goes into *you*. Don't keep them next to the body. Use wired rather than wireless when possible. Use your speakerphone or a hands-free device. And you don't need to keep it right next to your bed.

Other things you can do. Use baking soda to clean sinks, tubs, and toilets—rather than chlorinated chemicals. Vinegar in a pump-spray bottle is very good for cleaning mirrors,

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windows, chrome. You should always go with green toxic-free cleaning solutions for your house.

Vegetable oil with lemon juice is a great furniture polish. Those of you that are using bleach, you can continue to use it. They make a number of non-chlorine bleaches now.

Chlorine bleach is highly potentially carcinogenic. It's toxic to the lungs. Its byproducts are chloroform and other chlorinated hydrocarbons, all of which cause DNA damage. And they're also xeno-estrogens, meaning they have a weak estrogenic activity.

Hydrogen peroxide, again there are a number of bleaches made with this that are now available instead of chlorinated bleaches.

Borax is one of those. Also use non-bleached coffee filters; there's a lot of chlorinated products in all coffee filters, especially the white ones. You always want to buy the non-bleached ones. Because then you're just drinking it.

Skip synthetic air-fresheners and even, you know, all things like incense, things like that—there are number of byproducts there that are linked to a number of types of cancer.

Also, you want to use a green drycleaners where they're not using trichloroethylene. A lot of cleaners have switched over to this, but you want to just make sure. Also, the play sets that you see, you want to make sure that they don't have arsenic-related things to keep bugs out. You want to get all-natural wood from those, because the arsenic is very clearly a carcinogen, also even the resins like in your shelves in your house those can off-gas things like formaldehyde for decades.

So, one of the things... now that I've probably depressed everybody about all these things... there's a lot of, you know, very key things that people can do to protect themselves and their children against cancer from all the toxins that are here. Your first line of defence are what are called your "detoxifying enzymes." Those are found in every organ in the body—most abundant in the liver but they're also found in the lung. We discovered at (inaudible, 16:06) that a lot of people who were developing... smokers who developed lung cancer in their 40s were not able to detoxify the main carcinogen in cigarette smoke. So it's hard to know how well you toxify. You want to put a lot of things in your body that can *increase*—on an epigenetic level.... So literally, there are foods like garlic, omega-3 fatty acids, resveratrol found in the skin of red grapes, turmeric—which is what gives curry its yellow color. Those all work at the level of DNA to *increase* the body's production of detoxifying enzymes. Now why is that important? Well, you saw how the carcinogens are ubiquitous. Kathy Helzlsouer at Johns Hopkins looked at women with and without breast cancer and looked at one of the most common toxifying enzymes called "GST" or glutathione s-transferase. She found women with the lowest levels of GST had a four-fold increased chance of developing breast cancer compared with women with normal levels.

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The cruciferous vegetables—now, these are broccoli, Brussels sprouts, cauliflower, and cabbage. Both men and women: you can't consume enough of these. You should make sure you include these every day. Now, the first thing I'm going to mention is breast cancer prevention. So there's something in cruciferous vegetables called "indole-3-carbinol." Now, that can be purchased as a supplement. There's a more stable, better absorbed variety called "DIM" or di-indole methane.

And so, there's two types of estrogen metabolites in the human body: there's a 16-hydroxy-estrone and a 2-hydroxy-estrone. And so, what happens again on an epigenetic level is the indole-3-carbinol is basically able to convert the 16-hydroxy-estrone to the 2. So most American women are walking around with a predominance of 16-hydroxy-estrone. That hangs around in the body for a long time, and it's mutagenic so it promotes breast cancer. That's where most of it is. So when estrone... or, estrogen is metabolized it has to go to one of two different places: it could either go to the 16 or it could go to the 2. The indole-3-carbinol is one substance that's able to shift most of it from the 16 to the 2, which doesn't hang around long, it's converted into the body, and it's a very, very weak estrogen. For *men* it's equally important; it has been found to suppress every type of prostate cancer there is. And then there was a study out of MD Anderson two years ago that looked at people that were eating the most cruciferous vegetables: dramatic decrease in the incidence of lung cancer. So it protects against all types of cancer. The reason for the lung cancer is most likely there's another nutrient in the cruciferous vegetables called "sulforaphane." It's probably *the* most powerful elevater of detoxifying enzymes of any nutrient that we know of.

So. One of the other things that is an epidemic now that is promoting cancer is either being diabetic or being pre-diabetic—it's being over 10 per cent of your ideal body weight. And we know that people with elevated fasting serum sugar levels have a 27 per cent increase in cancer mortality amongst men; 31 per cent increase amongst women. Now why is that? Because every time you eat white sugar—you know, refined sugar—things... or anything with a high glycemic index.... Glycemic index just means how much insulin does it take to metabolize a given food. So you want to stay away from refined sugar, because those have the absolute most—things like high-fructose corn syrup-containing things. Every time your pancreas makes insulin, your liver is making something called IgF—or insulin-like growth factor—which we can measure. And that's one of the strongest tumor-promoters there is. So if you're walking around pre-diabetic, you're walking around with high IgF levels and one of the strongest tumor-promoters there is.

So the main things that I tell people if you want to reduce your risk of cancer. Inflammation. So, chronic inflammation can come from things like too much alcohol, infections, colitis, you know, arthritis. There are a number of inflammatory conditions. A lot of people are walking around with a bacterial overgrowth in their stomach called *H. pylori*, have gastritis. And it's key to measure certain indices of inflammation, which, you know, a lot of integrative practitioners are doing now. And there are a number we can measure, and we can get those levels down. There's some genetic predispositions people have also toward inflammation, but those drive cancer. Oxidative overload. That comes partly from inflammation but it also comes from a lot of food additives, pesticides, herbicides—all those create DNA damage that produce oxidative

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overload. Glycemic overload we just mentioned, and I'm going to talk a little bit more of that. But you want to avoid white sugar and white flour; go with whole grains. The best bread you can keep in the house actually are *sprouted* whole grain breads, like Ezekiel, because those contain enzymes—they help digest it. And then detoxification is critical, as we discussed.

Alpha-lipoic acid—that's a very important nutrient for people to take. A lot of people need a supplement of that for a variety of reasons. It's an antioxidant that helps reduce free radicals. It improves insulin sensitivity, so your body won't have to make as much insulin and thus not as much insulin-like growth factor. It improves glucose transport, so insulin helps glucose move into cells. And we recommend between 2[00] and 800 milligrams a day.

Then there are what we call "angiopreventative compounds." This is critically important. So, there are two types of what we call "angiogenesis"—the growth of new blood vessels around tumors. A lot of the latest cancer therapies are involved in inhibiting abnormal angiogenesis. So let's say if you cut yourself or you have surgery, and you look at those blood vessels under a microscope, it's this beautiful array—very symmetrical—of blood vessels. So you *want* some angiogenesis. It's a completely different process than when a cancer starts to take over and it takes the blood supply. This is like this dysmorphic morass of blood vessels. Everything about it is different: all the growth factors that create them. So there are a number of ways of inhibiting this abnormal angiogenesis. And that has to... that's one of the important things to do with keeping cancer cells dormant.

So, there are nutrients in soy. There are things in Milk Thistle. Quercetin in apples. Resveratrol in red grapes. Green tea is loaded with EGCG, which inhibits only the abnormal angiogenesis. Turmeric. And Saint John's Wort.

There was a paper recently published: "How Many Ways Does Curry Kill Cancer?" It's about 25 different ways. I could give you a two-hour lecture just on turmeric. And it has a host of other properties as well, including anti-ageing.

Green tea—one of the cheapest best things you can do to lower your risk of a variety of different types of cancer. The main two that have been studied are breast and prostate cancer. But even people that consume the most green tea, when they have cancer they live the longest. So critically important on a number of levels. It also inhibits angiogenesis. And it has also been found to actually help chemotherapy work better.

Whole grains. Those are important in... you know, for... they're fermented in the colon. They yield something called "short-chain fatty acids." They help improve insulin and glucose metabolisms. Also loaded with B-vitamins.

Vitamin D and breast cancer. We know... everybody should know their 25-hydroxy Vitamin D level. That's the one that's associated with a lower risk of cancer. We know that women with the lowest 25-hydroxy Vitamin D levels that's related to your intake of Vitamin D3. Now, you're not going to know how much D3 to take. If you eat a perfect diet for D3—you have salmon, you

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have cottage cheese, you have dairy—the most you're really able to get is about 250 or 350 units in a day. The least somebody needs that's living—at least around here or where I practice in New York—is about 2 to 3 *thousand* units a day. And some people are just very poor absorbers of Vitamin D3, like me. I take about 50,000 units a week just to keep my level normal. So everybody is different; you can't guess, you've got to know your D3 levels. But it lowers your risk of every type of... of almost every type of cancer, but especially breast cancer. And a study came out about two years ago showing that women with the very lowest Vitamin D3 levels when they were diagnosed with cancer had about a 90 per cent increased chance of developing metastatic disease.

There has been a lot of misinformation about soy and breast cancer. Again I could give you a two-hour lecture, but I'll give you the bottomline. Dietary soy consumption, even if you've had breast cancer, does nothing to increase your chance of the cancer coming back; and in fact, there was a big article... a big retrospective study, where they looked at a lot of studies, published in the *Journal of the American Medical Association*, looking at women that were consuming soy versus not, and found it increased disease-free survival. And the estrogens in soy are about one-thousandth as the estrogen in the human body. A study that was published in the *Journal of the National Cancer Institute* in 1998, they just looked at women that drank two glasses of soy milk a day compared to those that didn't, and they found that there was about a 25 per cent drop in serum estrone and serum estradiol levels. So estrogens that were a 1,000 times more powerful than the ones found in soy *dropped* by about 25 per cent, so the net estrogenic effect from soy is you've got a lot less estrogen in your body.

Studies have been done in people with prostate cancer, with sort of lower-grade prostate cancer, that either elected to have prostatectomy or radiation or just changed lifestyle—went vegetarian, starting doing yoga, exercising more, having green tea—and actually, in the group that was doing the lifestyle change their PSA actually decreased. In people with pre-cancer of the prostate, a very nice study was done—and this has been repeated—looking at an extract from green tea in people that had what's known as "PIN" or prostatic intraepithelial neoplasia. Almost all those men will go on to develop prostate cancer. And so, there were nine cases of prostate cancer in the ones that weren't consuming any green tea; only one at one year in the ones that were consuming the green tea. And that 30 per cent incidence per year is consistent with the literature. So green tea: critical for both men and women.

Now, there's a very old drug called "metformin." It came out in 1955. So I take metformin just preventatively. And I give metformin to a lot of my patients with cancer and that are interested in wellness that are over 50. And the reason is it originally came from the French lilac. It had been used in European folk medicine for about 300 years before. They noticed that there was 40 per cent less cancer over the ensuing decades in people taking metformin compared with those that weren't. And then there was a fascinating study published three years in the *Journal of Clinical Oncology* in breast cancer. They wanted to look at diabetic women with very large breast tumors that had to get chemotherapy to try and shrink it down to make it operable. And though, some of the women were on insulin, some were on the newer drugs—Actos, Januvia—some were on metformin. So they just wanted to see how diabetic women did with this type of

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chemotherapy. To their surprise, they found that there was a three-fold increased incidence of complete remission—meaning when they went in to do the surgery there was no cancer at all, even under the microscope—in the women that were taking metformin. We're seeing the same thing in men with prostate cancer now, even after it's already developed. It's becoming almost routine to put these people on metformin. Metformin will lower your insulin-like growth factor. It increases insulin sensitivity. But it does something even more powerful: it turns on a host of tumor-suppressor genes. So this is an example, you know, of a very old drug that's off-patent, that people can't really make any money on anymore, that very few people know about, when the scientific literature is so strong in support of using it both for cancer prevention and treatment.

Exercise—absolutely critical. There's a hormone released from your muscles after heavy exercise called "irisin." And that has been associated with anti-ageing. It has been associated with what's called "longer telomere length," which has to do with the length of your DNA strands. So exercise is one of the most important things you can do to improve insulin control, glucose control, anti-ageing, and anti-cancers. It's as important as any food.

And the precautionary principle. Devra and I have written papers on this. It came from Richard Horton, Editor-in-Chief of *Lancet*. And I just want to read this because it's so important for all the work that Environmental Health Trust is doing right now. And it has been important for all the work that I've been doing over the last 25 years. And it says, "We must act on facts in the most accurate interpretation of them using the best scientific information. That does not mean we must sit back and wait until we have 100 per cent evidence about everything." So you know, that's what, you know, a lot of the pollutants—like even, you know, with DDT, and I could name a number of other at least a dozen other things that were proven to be carcinogens but *only*.... You know, the chemical industry wanted to demand 100 per cent proof, proof that's it harmful. And you know, what the precautionary principle is saying is, "proof that it's safe where the health... where the state of health of the people is at stake, the risk can be so high and the cost of corrective action so great, that prevention is better than cure." And then, "Where there are significant risks of damage to the public health, we should be prepared to take action to diminish those risks, *even* when the scientific knowledge is not conclusive, if the balance of likely costs and benefits justifies it." You know, you'll have people tell you, "Well, you have to 100 per cent evidence." You know, if you wait for proof of harm, *most* often it's going to be too late.

And these are just some of the websites for the speakers tonight. [DrGaynor.com
GaynorWellness.com DrKathrynCollins.com EnvironmentalHealthTrust.org]

And I'd like to just close by giving you a little analogy. We all fasten our seatbelts before we drive our car—to avoid fatal auto accidents. We brush our teeth—to prevent tooth decay. I hope I've given you enough information now to see that there are number of steps we can all take to prevent ever developing cancer.

Thank you.