The Benefits of Curcumin for Cancer Treatment: A Special Interview with Dr. William LaValley

By Dr. Joseph Mercola

DM: Dr. Joseph Mercola

WL: Dr. William LaValley

DM: Cancer, one of the leading causes of death. Is there an herb that will work for nearly every type of cancer? This is Dr. Mercola, helping you take control of your health. We are joined today by Dr. William LaValley, who really focuses most of his clinical work on the treatment of cancer, and he's going to shed his wisdom on this area. Welcome and thank you for joining us today.

WL: Thank you, Joe. It's great to be here.

DM: We first met a number of years ago – seven or eight years ago? Somewhere around there.

WL: Yes.

DM: At a conference in your hometown, in Austin, Texas, I believe.

WL: That's right.

DM: The first and only time I've been to Austin. I was really excited to meet you. It was really not related to health. But we got together and really had a great time. I learned that we share a lot of similar philosophical approaches. But one of your main passions is the treatment of cancer.

Like me, you were trained in general medicine, but really took time off and devoted a significant amount of time to understanding the biochemical pathways, so that you could support people nutritionally. I found that fascinating. Actually, we've heard a number of close family members and friends with cancers who have come down to your practice. I'm wondering if you could describe your journey in that area, so people could know and better understand your perspective.

WL: Sure. I went to medical school beginning in 1980. In 1982, I was on an exchange program to the People's Republic of China. That was back in the old days before China was open to the West. It was a fascinating experience for me. I was there to look at traditional Chinese medicines and acupuncture. I was specifically interested at that time in the brain chemistry of acupuncture. I saw treatments and things being administered to patients in a way that did not make sense to me.

One of the important messages that I learned there was that natural products, natural molecules, from plants and animals that are already available in nature have been used by the Chinese for at least hundreds, probably thousands, of years. That deeply changed my perspective in the world of medicine. I came back to medical school, and thereafter, looked at how I could integrate the perspective of conventional pharmaceutical administration as well as natural extract, natural product ("supplements" is what we call them in the US) administration.

I've been practicing that since 1986, and realized in the mid-2000s that my knowledge base was really far behind and that I never learned the science of molecular biology, the way that molecules traffic information and signal information to each other in these molecular maps of biological activity. Because in the 1980s,

when I was in medical school in Houston at Baylor College of Medicine, there were no specific classes in the medical curriculum, the basic science curriculum, because molecular biology was still pretty much in the laboratories.

That realization in 2005 reoriented my time. I took about a 75 percent sabbatical time to learn molecular biology, specifically the molecular biology of cancer. I didn't realize at the time, naively so, how vast the subject was. It was probably a good thing because I may not have started at that time.

DM: How long did you devote to that learning journey?

WL: The best that we can calculate I think is somewhere between 9,000 and 9,500 hours – building a database, a relational database, from the *PubMed* literature about the molecular biology of cancer. One of the important lessons I learned is that the molecular biology understanding can be applied across the range of diseases and symptoms that are characterized in the scientific literature. That knowledge is applicable by going into the database of *PubMed* and the related databases, and looking at the molecular pathways that are relevant in those particular diseases.

DM: As I mentioned in the introduction, there appears to be an herb that seems to be universally useful for just about every type of cancer, which is really odd because cancer consists of a wide variety of different molecular pathologies. One wouldn't necessarily suspect that there would be one herb that would work for most of them. Maybe you can describe your discovery of that process.

WL: Sure. I went back to the literature and looked at how I can support the decision-making process and the recommendations that I'm making for treatment from the scientific literature, including literature that goes from the treatment of humans with oral products like pharmaceuticals or natural products.

This is where I learned about this molecule called curcumin, all the way down to its use in animals and then its use in test tubes or petri dish. That molecule comes from the traditional spice, from the root plant called turmeric. That turmeric contains curcumin and related curcuminoids that carry the yellow-orange pigment that is used as a dye originally in many years past, as well as it's what gives the food, curry, and wherever you use turmeric the yellow-orange color.

It turns out that scientists have... I know actually that there are some that are in the US who come from… Their families originally came from India, where this spice had been used for many health reasons. They began to look into the scientific validity of this and began testing this molecule, curcumin, against a variety of diseases in the petri dishes or the test tubes as well in animals. Now it's beginning, it's emerging, into studies in humans.

One of the amazing things about curcumin (actually, I think the word "amazing" is used too often, but I think it really does apply here) is that this molecule has some profound anti-inflammatory activity and has activity in many molecular targets. There are molecules that are in the cells, and those molecules interact with each other along certain pathways or tracks. The traffic of that interaction, the signals that are transferred in that trafficking of information in the molecules, presents many different targets or molecular-specific complexes.

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In many targets, curcumin has… Whether it's causing an increase in traffic, an increase of the activity of that molecular target, or a decrease, an inhibition, of that activity in that molecular target, again and again we see that the result is an anti-cancer result. One of the reasons that I use curcumin for patients is that it has multiple anti-cancer targets. It's a single agent that gives multi-targeted anti-cancer actions.

DM: Okay, you had mentioned that curcumin is really an extract of the plant turmeric. To get the molecular actions that you're seeking in your cancer patients, it would be nice if they could just take the whole herb. But unfortunately, while there's some curcumin in there, there's not enough to make a significant difference. Can you describe the process of how you need to take large amounts of this and what types of concentrations you had in some of the early work you did? Because there were no concentrated forms available, and you got to basically teach people how to make these extracts.

WL: That's right. The turmeric root contains about three percent curcumin concentration. One of the biggest limitations of curcumin as a therapeutic agent is that it is very poorly absorbed in the raw form. It's lipophilic. It loves oil or fat, and it dissolves in oil or fat. The absorption that a person would get by taking 100 milligrams of turmeric is three percent curcumin and only one percent of that, because curcumin in its raw form is only one percent bioavailable or one percent absorbed.

The natural product industry has developed a standard of a 95-percent concentration of curcumin. When you see natural product supplements available in the industry, we see commonly that there are capsules that have 95 percent concentration. Initially, years ago, that was what we had available for patients. Even that, taking a 95-percent concentration and taking it orally in a capsule, the dry powder in the capsule, only one percent of that could be absorbed. In order to get amounts of curcumin in the bloodstream that are reasonable to have therapeutic effect and to have therapeutic concentrations in the serum, people had to take large amounts of curcumin.

There was a study done where people were given eight grams of raw curcumin powder per day for two months without adverse effects, without harm, and still only were able to demonstrate minimal or moderate amounts of curcumin in the serum.

In searching the literature, I found that a way to change that, to dramatically increase the bioavailability, the amount of curcumin that can be absorbed, is actually a very simple process of bringing water to a boil, putting those capsules or some dry powder (I use it by the teaspoon), and boiling it for 10 to 12 minutes. That increases the amount of curcumin that was now dissolved in water from that one-percent amount up to 12 percent or so. That amount is a vast number of curcumin molecules that are now in a bioavailable or absorbable form. I had patients do that for years. In fact, I still do have patients do that in addition to taking curcumin that has been prepared in a more bioavailable format as well.

DM: Can you provide us with some examples of patients you treated who responded favorably to curcumin, and maybe a few to demonstrate the wide range of patients who might benefit from this?

WL: Sure. I've used the administration of curcumin as a cornerstone for anti-cancer protocols across a broad spectrum of diagnoses of different types of cancer. The challenge in identifying the value of any one particular molecule is that that treatment plan would have to be administered using just that molecule compared to another cohort, another group, of subjects that were using a similar trial without that molecule. My protocols generally use multiple agents. I'm using multiple natural products as well as multiple pharmaceutical prescriptions generally.

DM: And these are typically targeted for the specific individual – you don't have some shotgun protocol used for anyone with cancer.

WL: That's right. We look at the pathology reports. Sometimes we're able to get molecular profiling done or genomic profiling done. Based on the results there, that can show molecular targeting as an option. We focus on that whenever we have that data. I don't have a cohort of patients who have diagnoses of cancer and whom I have only used curcumin on.

I do have in other patients who have inflammatory disorders like arthritis. I think arthritis is a pretty good barometer [compared to other] types of inflammatory disorders that exist. It's one where we can tell they're

getting benefit from taking the product, discontinuing it for a while, taking it again, and [being] able to test the benefit from it. There are other illnesses like the diagnosis of inflammatory gout. I have seen curcumin become beneficial or therapeutic to some patients with inflammatory disease.

I want to make it very clear that nothing, no particular molecule, works for everything. Many different therapeutic molecules work for some people. The challenge is to match the therapeutic product [and for it to] be beneficial.

In my view, one of the main tractions for me about curcumin is there's a broad range of data that has been developed about the administration of curcumin for a broad range of diseases, including inflammatory disease malignancy (i.e. cancer and various types of cancer). [There's] also [neuronal 18:57], including the issues of Alzheimer's, dementia, Parkinson's, as well as models of multiple sclerosis.

There's a truly broad array of disease that curcumin has a significant potential for benefit. The challenge is: how are you going to get enough into the bloodstream to make a difference? That's where the bioavailability of the product [comes in]. There's now a range of those products on the market that allow substantial amounts of curcumin and some of the metabolites of curcumin that are therapeutic. I think people now have much better options than had been available five years ago and certainly 10 years ago.

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DM: Well, that's terrific. Can you give us an update as to the progress that's been made, because we first started discussing curcumin five or six years ago, maybe longer. I know you are concerned that the natural products industry really hadn't provided a supplement form of curcumin that had high bioavailability, which could eliminate essentially the self-processing that your patients require. What I don't think you've mentioned was that it's not as simple as boiling the water and putting curcumin in it. It volatilizes and it tends to color your entire kitchen with this deep yellow pigment, which is really difficult to get out.

WL: Oh, yeah.

DM: It's doable but [it's] a great inconvenience.

WL: That's right. I have told all the patients that I've treated, and whom I'm recommending what I call the curcumin in water to, that they'll have a side effect called "yellow kitchen syndrome." It gets a lot of giggles initially, and then they'll realize after they're doing it for a while that curcumin has a pigment coming off of the steam that is now volatilizing the molecules that are now a pigment in the kitchen. Some people have gotten that yellow pigment essentially around the kitchen as well as on their clothes. It's a big issue.

DM: It's used as a dye. I mean, it actually dyes clothing. It's a perfect coloring agent.

WL: That's right. Convenience as well as efficiency, I think, is driving some of the changes in the forms of curcumin. Because it's a fat-loving or lipophilic molecule, a lot of the preparations that have now been developed to make it more bioavailable include some sort of oil or fatty acid involved in the matrix or the preparation, so that the molecule will be more easily absorbed and more readily available for that absorption once it's taken into the GI tract.

I'm talking all of these are oral products; I'm not talking about any injectable. There's development in the pharmaceutical industry for analogs, different types of related molecules which will be on the market, that are going to be, I think, also powerful molecules in years to come. I think a lot of that is fairly far away. Right now we're looking at a lot of products that are available that have more bioavailability and more absorbability. That usually is about somewhere between seven and eight times higher absorption than the raw, unprocessed 95-percent-concentration dry powder.

One of the challenges is maintaining a therapeutic amount of curcumin in the bloodstream. I'm very interested and I now recommend for people products that give a sustained release, so that not only is the product bioavailable increases the absorbability or bioavailability through making it more absorbable by using an oil or fatty acid, but then making it so that it has a long amount of absorption rather than a rapid peak of absorption and then a decline of the amount in the bloodstream. A lot of products that do have increased bioavailability will cause a larger amount of curcumin to go into the bloodstream in a much more pulse-like fashion.

A patient will take that capsule that has the increased bioavailability, fat-soluble complex, that absorbs a higher amount of curcumin in their serum, in their bloodstream, and then that amount drops because it's not sustained-release. I'm interested in it and make recommendations for patients that get the sustained-release, high-bioavailability products.

When I'm making treatment recommendations I want to provide recommendations that include a high sustained amount of curcumin in the bloodstream. The way to do that is to provide a curcumin product that is associated with an increased bioavailability matrix. That's usually some sort of a fatty acid or oil that it is mixed up and dissolved with in some form of matrix that allows it to be released over time, so that the patients getting sustained release increase levels in their serum of the curcumin.

That sustained release permits a longer therapeutic impact rather than just a pulse of high amounts of serum curcumin that then decreases because the product is released all at once rather than sustained over time. I think therapeutically it's of greater value to have a highly bioavailable, sustained-release curcumin product for its therapeutic value.

DM: Perfect. Perhaps you can review your process for treating patients with cancer, and actually maybe even discuss how you came about shifting your clinical practice to that mode. I mean, you shared that you went to China and had this perspective that there's a radical difference.

WL: Right.

DM: But how did you shift? Because you could use that perspective to treat a lot of different illnesses, but why did you settle on cancer? This is a particularly intriguing question because cancer is a disease that is typically treated with very expensive medications. I mean, typically tens if not hundreds of thousands of dollars in many, many cases. Many times it's covered by insurance. But if not, it typically exhausts the patients' life savings in an effort to rescue them. As a result of that reality, there is a strong incentive to protect that revenue stream.

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As a result then, many of the medical boards are pushed to prosecute clinicians who use treatments for cancer that are outside of the normal paradigm or conventional standards. It's typically one of the riskier areas to treat because many physicians wind up losing their licenses. I'm wondering with that reality – land you knew that going in – why you chose to treat cancer.

WL: That's a really good question. Back in the beginning of my practice in the late 1980s and early '90s, I saw patients who had a diagnosis of cancer, and I really had very little understanding about how to provide any benefit. I looked into the natural medicine community, and there were a lot of treatment recommendations that were fairly prevalent in the natural medicine or at the time what was called holistic medicine or alternative medicine. It has now evolved to I think a more appropriate name of integrative and complementary medicine. That's how we have it in Nova Scotia.

What I realized is that a lot of the natural medicine recommendations at that time in the '90s were based on folklore or were based on a lot of clinical empirical evidence – experience and observations that really had

very small amounts of scientific evidence to say, “Here’s what we’re using to target this particular molecular activity in that cancer.” I wanted to get better therapeutic outcomes.

It turned out that in the ‘90s, there were a number of patients that… Even though I was using treatments that I did not understand the molecular basis of, a large number of these patients improved. Some of them achieved remission. I didn’t predict who it would be; I couldn’t have known. I was quite surprised to see some people who I thought would do very poorly did very well and who I thought we’re going to do very well did not do so well. At that time I learned the lesson of internally no longer making judgments or predictions, and leaving the possibility of people getting better open to them.

They got more and more improvement across the patient population, and then there were a number of physicians who became interested in the kinds of treatments that these patients were getting. I decided that I wanted to be able to provide a scientific basis for that. That’s how I got involved in going into the literature and learning molecular biology.

I think if we look back at the medical education of the US and Canada, which are fairly similar, molecular biology was not widely taught in 1980s; it started to become taught in the ‘90s. I used an arbitrary cutoff point that’s purely my own arbitrary designation: the physicians who graduated, were licensed, and were practicing prior to the turn of the century have likely significantly less exposure to learning about molecular biology than the much younger and the more recent graduates. That, I felt, put me at a disadvantage in making treatment recommendations.

In learning the molecular pathways, in learning the molecular biology of cancer pathways, and in learning that what the evidence actually shows for the effect of natural product extracts on various relevant molecular targets in various cancers, we see that there’s actually quite a large amount of evidence that supports using various molecules, natural products, and pharmaceuticals that are already approved and that have been around for a long time to affect anti-cancer activity along that pathway at that target. That’s called molecularly targeted anti-cancer treatment, and it’s widely practiced in oncology today.

What’s not widely practiced is the use of the natural products for the molecularly targeted anti-cancer activity. I provide that for my patients because the evidence base suggests and supports the use of these treatment recommendations. I tell patients very clearly (and it is absolutely true) that these treatment protocols are not a cure for their cancer. I wish they were, but they’re intended to slow the progression of the cancer and to provide multi-targeted, multi-agent (multiple therapeutic agents), anti-cancer protocols that are in addition to and not instead of what they have already chosen to take with their conventional oncology team.

When I saw that more physicians were interested in this information they needed to know, [they say], “Show me the evidence.” If we’re all agreeing to do evidenced-based care (I think it’s pretty clear that there’s a broad consensus of medical practice in the US and Canada that we’re all agreeing to provide evidence-based care), it gets to the question of what constitutes sufficient evidence. That’s where I think a lot of the issues or the debate occurs.

Some folks, some physicians, say, “The only evidence that I’m going to accept for treatment recommendation is the evidence that comes along with the approval of a particular pharmaceutical agent and the usage that is on the package insert or the label for that particular product. We see that. It’s called the on-label indication or on-label usage for that particular pharmaceutical. We see that when those drugs are approved…

There’s a lot of evidence now that drugs that are approved currently for pharmaceutical anti-cancer activity have a particular type of cancer that it is approved for usage in. What has happened is that oncology physicians have also used those same approved molecules for a cancer that it was approved for use on the

label. They all frequently use that same pharmaceutical drug for treatment of a different cancer, for a treatment that has not been approved for on the label.

I think it was in 2012 [when] there was a very interesting article that came out about how approximately 30 percent of conventional oncology treatments are for treating cancers with drugs that use the drugs in a manner that is not what they were approved for, for an indication or usage that is not on the label. That's called an off-label usage. Thirty percent of these chemotherapy drugs were used in a non-approved way or off-label usage. That's a perfectly legitimate, perfectly legal, usage of a drug.

Once a drug is approved in the US and Canada, a physician is able to prescribe and administer a drug in a manner other than what it was originally approved for, and that's off-label usage. It constitutes about 10 percent of the pharmaceutical prescriptions in primary care, and in oncology, 30 percent. This is a very broad usage that occurs. By definition, there's not then that controlled trial that provides the evidence that supports the use of a new approved usage for that drug by the FDA or by Health Canada.

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The way that I provide these natural product recommendations or the off-label pharmaceutical prescriptions for patients in an anti-cancer manner is to do so based on information that shows where these particular molecules affect these relevant targets in cancer cells, which I think is the lowest grade or lowest type of data, or in cancer cells in animals that's a more relevant data. Frequently it's in mice, rats, and rodents. Also for usage of these molecules in humans and, in particular, if it's an oral administration. That's a very high criteria of evidence, and I use that spectrum of evidence to support the recommendations.

Today I did a quick search on the *PubMed* database and looked at how many articles or references *PubMed* does show for "curcumin" and "anti-cancer," and over 500 articles or 500 references came up. When I did the same search for "curcumin in cancer," it was over 2,300. That doesn't constitute a specific recommendation that curcumin can be useful. When you go down into that literature and learn about the molecular pathways, that evidence now starts to be sufficient to say, "What's the benefit-risk?" I tell the patients that we're using these products with the intention of an anti-cancer activity. We're trying to have multiple anti-cancer activities on multiple molecular pathways and on multiple molecular targets.

One of the visualizations that I use for patients to understand this is a street map. If you're looking from above onto a street map and if it was on a computer in 3D that would show you a traffic on a street map in a big city, there are some areas, some roads, that are really large and that have lots of traffic, other roads that branch off that have less traffic, and some roads that have very little traffic. I'm looking at where the data show that these are high-traffic signaling pathways, and where you can use molecules to alter that traffic from a pro-cancer set of pathways or a pro-cancer effect to interfere with that pro-cancer activity and drive anti-cancer traffic.

People start to understand that there are multiple pathways and that when you use molecules like curcumin, curcumin has a very broad range of anti-cancer targets. I show some of the literature that supports all that information. They look at "What's my risk?" versus "What's my potential benefit?" That's how we decide to administer that in the case of curcumin. We go through the same thing with other items.

DM: How about if you can provide some general recommendations for people with cancer, sort of the shotgun ones that work for all? Like we've said, curcumin is probably beneficial to add to the regimen of just about any type of cancer because it works on universal pathways. It seems to lower that. Now, from my perspective, improving your diet would be a useful thing.

WL: Absolutely.

DM: If a person has insulin or leptin resistance, you could actually measure your fasting insulin and leptin levels to determine that. But most likely you'll have clinical signs, which would mean you're overweight, have high blood pressure, high cholesterol, or diabetes. If any of these metabolic syndromes or if any of these clinical conditions are occurring, most likely insulin and leptin resistance are a factor. Because there are patients with cancer who do not have insulin resistance, so that's a different ball game.

WL: Right.

DM: But my guess is most do. Since you treat cancer patients a lot, is that your experience? [Do] most have insulin resistance?

WL: Right.

DM: In the early stages.

WL: Absolutely. Metabolic syndrome is frequently associated with it in a broad range of patients as well.

DM: I just wanted you to confirm that. So, if they have this insulin and leptin resistance, it would seem, from my perspective (if I was counseling someone), that they should go on a ketogenic diet, a nutritional ketogenic diet, to resolve that. That would be in combination with some intermittent fasting to really kickstart the system to resolve that insulin and leptin resistance and get the body fat percentage down.

Once that's resolved, then you can finetune it based on the person's needs. It's not something that they need to be on forever, but at least [until they] resolve that resistance, because that seems to be one of the most profoundly driving factors in most patients. That's my view, and I'm just wondering if you can comment on that.

WL: Yes, I agree with you that a ketogenic diet is really appropriate in many cases, probably the significant majority of cases. One of the ways that I demonstrate that to patients (because, as you know, a ketogenic diet is for most people a pretty significant alteration in the way that they're eating) is I ask them to obtain a positron emission tomography (PET) scan. That PET scan is a type of imagery that uses a decoy sugar or a sugar analog like glucose. You can think of it as a first cousin to regular glucose that is administered as a contrast agent via IV, orally, or it could be both. Where that sugar concentrates is where we're going to see an increased density of light in that imagery.

It turns out that it's been known for probably 80 years or longer that solid tumors and some of the blood cancers, in particular solid tumors, are sugar-loving, sugar-avid. Another term is that they are addicted to sugar. I use that PET scan to demonstrate to patients that here is objective proof that the tumors that you have in your body, in these locations, are sugar-avid. They're taking up sugar at a rate much higher than the other regular healthy cells.

I want to drive home that message, so that they are motivated to alter their diet to have a low, low carb intake, causing their body to generate additional nutrient supply molecules called ketones, which is the basis of the word "ketogenic" in a ketogenic diet. What that means is that we're trying to provide an anti-cancer antagonistic pressure on the cancer cells by reducing the amount of sugar that's readily available for uptake and absorption in nutrient usage in the cancer cells, by reducing the easily available sugar in the diet and compensating for the nutrient reduction and sugar by increasing healthy fats and oils. A ketogenic diet is…

DM: Yeah, that's an important point, because many people are kind of attracted to Paleo [diet] because they think that's nutritional ketosis. Although that can do it, it doesn't do it as well, and it does it in a way that might be counterproductive because it's relatively high in protein.

WL: Right.

DM: You have to be really careful because many of these amino acids – like, I think, glutamine and leucine – can actually stimulate carbohydrate production and then, secondarily, insulin production. Also if you can comment on this… Well, before we go into that, when you said "really eliminate the carbs," that's really all starchy carbs. It's pretty much limited on the green, leafy vegetables, because you can't overeat those.

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WL: Right.

DM: But with respect to the protein, from your perspective, because you've looked at and studied these biochemical pathways, do you feel that in addition to the extra protein being used to stimulate carbohydrate production, it's also a factor to stimulate the mammalian target of rapamycin (mTOR) pathways, which are useful for building muscles but when you're treating cancers, are not necessarily good? Because mTOR is a pathway that increases cellular proliferation.

WL: Right. There's a lot of work in the cancer research on how to manage or how to modulate the mTOR complex, the mTOR target. One of the products that's out there, which has been approved as a pharmaceutical for usage for decades, is the pharmaceutical drug Metformin. That has an anti-cancer activity and inhibiting mTOR. It turns out curcumin has a similar effect.

DM: On the mTOR pathway?

WL: Yeah, on the mTOR, on the upstream to PI3K/Akt/mTOR.

DM: I did not know that.

WL: The value that I've extracted from this database, looking at the pathways independent of the way that most of us get from our continuing medical education (which is targeting particular pathways based on what pharmaceutical is supporting that continuing medical education or what natural product or supplement is supporting that continuing medical education)… What I'm looking at is: how do we get a broad range of these molecules in place so we get multiple target activity in the… Sorry, I got sidetracked.

Going back to the ketogenic diet, importantly in that (I call it a low, low-carb diet) is you're absolutely right. You're not going to eliminate all carbohydrates. You're not going to eliminate all sugars. There are sugars and carbohydrates in vegetables. Technically, there's sugar in animal products – meats do have some form of sugar. Even if you could have a zero-sugar diet, which I think is almost impossible, your body is still going to generate sugar through the process of gluconeogenesis, new sugar-making from the liver.

We're not trying to have a no-sugar diet; what we're trying to do is to have a minimal amount of blood sugar, to use the dietary options to drive the development and distribution of the ketones throughout the body from the food supply, and to maintain a moderate amount of ketones in the blood that thereby affects the cancer cells in an adverse and in an antagonistic way, because they have less availability of their desired nutrient fuel, sugar.

Managing that dietary recommendation can be challenging for people because they want to know, "Well, how much fat should I eat? How much good, clean, healthy oils or good, clean, healthy animal products should I eat?" What I tell them is, "Monitor your ketones by using the urine ketone sticks." In fact, I prefer my patients to be on the Multistix, which they can use to test their urine two or three times a day. Just put a bottle of Multistix in the bathroom, and check two or three times a day how much ketone level is showing in the urine.

If you're having a moderate amount of ketones, you're maintaining a good ketogenic diet. Even a small amount of ketone is a good ketogenic diet. That gives people a much better marker rather than trying to count the amount of fat calories, protein calories, or carb calories, or maintaining the appropriate ratios to continue ketosis.

DM: There's still maybe some value to count your protein calories, because it's really easy to overeat protein. In my experience, most people are eating 200, 300, to 400 percent more protein than they need.

WL: Sure, absolutely.

DM: At least to look at that. And there are some really good, free apps that you can get online, an application for your smartphone or your tablet, which is MyFitnessPal, one of the best.

WL: Yes.

DM: They've got databases of just about every food known to man. You can enter it in there, and it will tell you how many grams of protein and carbohydrates. It's a little bit of a challenge to do it initially, but once you've got it done after a few days, it's pretty much repetitive. You can figure it out pretty easily.

The formula I recommend is from Dr. Rosedale. That's one gram per kilogram of lean body mass, which is about half a gram per pound of lean body mass. Most people, especially people with cancer, they're going to run 20, 30, 40 percent body fat. If they weigh 300 pounds, they may be 150-pound lean body mass.

WL: Right.

DM: That's only 70… Even though they're 300 pounds, they only need 70 grams of protein. Have a big piece of steak, and you're over the top at one meal.

WL: Sure. Absolutely.

DM: I just think that's, you know. I don't treat cancer. That's why I'm really excited to hear your feedback because (and I think anyone actually at this point) you're in the trenches, you're seeing this, and you're seeing results with this approach, which I find very reaffirming. Because certainly from a theoretical perspective, it makes sense, but you had the opportunity to try it out on the field.

WL: One of the biggest challenges, I think, that patients who are diagnosed with cancer have is that there still exists within a lot of the conventional oncology community what I think is denial that sugar or glucose from the diet can be fueling the growth and spread or proliferation of their cancer cells, the cancer in their body. I've had patients come to me saying that their oncologist have said to them, "It doesn't matter what you eat. Go ahead," or "You're losing weight. Increase your calories."

DM: No! [They say,] "Let's give you some Ensure."

WL: Yeah.

DM: High-fructose corn syrup and terrible omega-6 fat, you know. It's a prescription to accelerate cancer growth. I mean, that is so classic.

WL: It is.

DM: That product should be banned from the marketplace. It has killed so many people. All the so-called experts are just clueless on this.

WL: It is. It's pouring lighter fluid or gasoline on fire.

DM: Yes!

WL: I tell them to avoid that. I give them the understanding about why and how it is, and that's where the PET scan is very helpful for demonstrating to them that their cancer is sugar-avid, that it's addicted to sugar. Interestingly, what happens is that cancer cells that are sugar-addicted or sugar-avid usually bring in the glucose at a rate up to 10 times higher than healthy cells.

Rather than using that sugar for creating energy for the cells… It does that a little bit, a small amount of energy. But it uses those bit and pieces of sugar that it breaks down to create that small amount of energy. Rather than feeding it to the powerhouse of the cells called mitochondria, which creates a large amount of energy, they use those bits and pieces of sugars for building blocks of other molecules that the cancer cells need to make in order to grow and spread. It's using those sugars as building blocks.

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That, unfortunately, has not been widely understood by many patients. I think that it has been understood by a larger number of oncologists recently, and there is a recommendation coming out to minimize or at least lower the sugar.

As you know, the recommendations from Dr. Seyfried is to have a ketogenic diet, treating cancer as a metabolic disease. The way that I approach it is yes, it's a metabolic disease. The other constituent is in the microscopic environment around the cancer cells in a manner to not only antagonize the cancer cells but reduce the support that the cancer cells have in the microscopic environment right around them. That's really important because a lot of the current therapies do not have targeted microenvironment treatment.

With the anti-inflammatory value of curcumin… Curcumin has anti-cancer activity not only in the cancer cells but outside in the immune system cells that can either be anti-cancer or there are some immune cells unfortunately that become what I described as kidnapped, co-opted, or programmed by the cancer to support the cancer and to suppress the anti-cancer immune system. Curcumin can have anti-cancer activity on cells that are outside of the cancer cells that are otherwise supporting the cancer cells. It's a very versatile molecule.

DM: Terrific. Now, as we're recording this interview, there's been a real-milestone-in-technology announcement. About 10 years ago, the cost to sequence the human genome was probably about 50 to 70 million dollars. But as we're recording this, that price… There was a company that had launched a product that actually sold… They had it by 10 million dollars for each of the machine. But it would essentially sequence the entire human genome for under a thousand dollars, which is a major milestone.

Interestingly, if you graph that out, the slope… I'm sure many people have heard of this: the Moore's Law, that things accelerate every two years, 18 months, or even every year. But this is accelerating 200 to 300 percent faster than Moore's Law. This drop in the [cost], you know, the technology implications on genetic sequencing. You've been doing this for a while, so I'm wondering if you noticed that, if it's affected your ability to get more information at a lower cost, because many of these tests are not covered by insurance.

WL: Yes. It has profound effect when we can get the data. Generally, when I'm making a treatment protocol, developing a protocol of recommendations for particular patients, cancer pathology results, those pathology results are generally prescribing the cell types, so the specific diagnosis of the cancer. Rarely are those results including information about the molecular pathways that are overactive or underactive in those particular cancer cells. I'm having to, like the other physicians who are developing treatment recommendations (including the oncologist), make best guesses about how to treat that cancer.

You can look at the current chemotherapy protocols for particular cells in particular diagnoses of particular types of cancer cells. There are a range of these chemotherapy profiles, chemotherapy protocols, that can

be administered without doing the testing to evaluate whether that particular chemotherapy kills those cancer cells. In other words, is that group of cancer cells sensitive to that type of chemotherapy or not? We're making our best guess.

There are now available laboratory evaluations of living cancer cells. When they take out a surgical specimen, bits of it can be sent to laboratories that will test the sensitivity of those cancer cells to various chemotherapy agents and to other agents, including other pharmaceuticals and, more importantly, some of the natural health supplements.

In addition to that, what you were talking about is the genomic testing, as well as I'll speak about some molecular profiling that is done on the specimens after they have been taken to the pathology lab, after they have been stained and put onto slides, where the genetic activity that is characteristic of those particular cells is evaluated, or what is also called proteomics or the protein expressions of the various molecular targets is also evaluated.

Whenever we can get that data (it is becoming increasingly more available through laboratories in the US and now in Canada), those results will tell me in particular that, for instance, as you mentioned, the target mTOR was hyperactivated, or that inhibiting mTOR or inhibiting other molecular targets is an anti-cancer intervention in that person's cancer. Another person could have the same diagnosis with the same cell type and run through the same type of genomic testing or proteomic testing, and not have that molecular target be obvious in the results. Targeting that particular target would not be appropriate or valuable in that case.

Wherever we can get better data about chemosensivity or sensitivity to other anti-cancer agents, as well as, very importantly, the genomic testing and the proteomic testing, we want to do that. It's not just generally covered by the insurance companies at this point. I think that it will become much more so. That's because when you have a more targeted result, you can see where you can focus the treatment. I think that that will make treatments not only more effective, but ultimately more cost-effective as well.

When I make these treatment protocols, we're, in general, making best guesses about what is generally available or generally expressed in that type of cancer. And then if we're fortunate enough to have some of these very specific results for those particular patients, then we can really focus on treatment and then they can get better therapeutic result, because we're not having to cover other targets that are not so relevant.

DM: Terrific. Well, we're kind of running out of time at this point. What I wanted to conclude with is information if people want to contact you to consult for any health challenges that they have, including cancers. What I neglected to mention in the introduction is that I believe you are dual-licensed. You are licensed to practice medicine in the US and in Canada.

WL: That's correct.

DM: You spent a significant amount of time up in Canada, which is why you referenced the Canadian system quite a bit in the interview. Maybe you can provide your contact information, so people who want to know more and consult with you would know how to connect.

WL: Sure. There are two ways that I help people in that regard. My medical clinic is a small clinic in Nova Scotia. It's where I have a medical office. I see patients there. People from the US come up either through Chicago or through Newark. It's a quick access through the city of Halifax. My office is in Chester in Nova Scotia. It's where I see patients. My phone number there is 902-275-4555.

When I'm in Austin, in the US, it's where I'm doing the research for these protocols. I also do consultations for other physicians, where those physicians have patients who have a particular diagnosis. For instance, a patient with pancreatic cancer, and the physician wants to implement one of the protocols that I provide. I will do a consultation with that physician's patient and then make recommendations to that physician for

implementation. In that way, patients are able to get it locally without having to travel to Nova Scotia. I don't have a clinic for treating patients in Austin because it would just be too much to have two clinics in such a far location currently.

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DM: Not too many legal battles or challenges with the medical boards?

WL: Well, there's always a requirement for all of us to maintain clinical evidence-based treatment. I find the biggest issue is with other physicians – not with patients – who are not yet educated about the evidence base. They make rash recommendations, attacks, or ridicule. That's just the way that that is. I think there's much more openness to the recognition that there's a vast amount of data out there showing that there's value for targeting multiple pathways, whether it's in cancer, autoimmune disease, or neurodegenerative disease.

DM: I couldn't agree more. I want to thank you for all that you do. You've given your contact information. Oh, one last question: you were in the process of, the last time we spoke, compiling some training materials for professionals that incorporate this molecular database that you created. Is that available yet, that resource?

WL: Yeah, we're developing that now. We have to make sure that we… When I have a large number of articles and I'm looking at them, I have to make sure that we're maintaining copyright. I have to… My database, when I go in, I look at the articles. I can't upload that as a single database. We have to essentially prune and clear the database, so that it just shows the copyright-appropriate abstracts of those articles and shows the links for those articles.

I am available to talk with other physicians, as well as the patients of those physicians sometimes come, take the protocols, and then bring them to their physicians. It's a challenge right now because there's so much information that's not readily known by so many physicians that they become afraid. I think one of the biggest issues certainly in US and Canada is that when a physician wants to administer one of these natural products or several of them, as well as some of the off-label pharmaceuticals for their anti-cancer usage, they are afraid of recriminations or disciplinary actions.

That's, I think, very unfortunate, because the evidence base does exist for it, and it's consistent with the way that other types of conventional medicine or practice using off-label pharmaceuticals as well. I think that the most important movement that needs to occur is for the patients to recognize their own value in the decision-making process and demand that they have access to these therapeutic choices because they're available, they're supported in the evidence base, and they have the right to ask for them rather than to just accept whatever the physician is otherwise offering in the conventional realm.

DM: Okay.

[END]