Cancer Biomarkers - Individualizing Cancer Care
Webcast
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Ron Swenson

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Introduction

Andrew Schorr: Hello and thank you once again for joining us on Patient Power sponsored by the Seattle Cancer Care Alliance. Broadcasting live from Seattle I'm Andrew Schorr in this worldwide broadcast where you hear cancer information every two weeks that is quite unique and connects you with a leading expert and also inspiring patients. Today we're going to talk about a topic that maybe you have never thought about. You may know something about it and you didn't realize it. The topic a cancer biomarkers, what are they, and how does it really show promise in our fight to cure a cancer, should you be diagnosed with it, with a very targeted therapy and understand while you're being given that therapy, how are you doing. What are the unique qualities of your cancer cells? How do you measure them? How do you kill them? How do you go on hopefully to be cured or make that cancer chronic and lead a long and full life? That's what we're going to discuss with a leading expert from the Seattle Cancer Care Alliance and the University of Washington in just a minute.

But first I want you to meet a patient. That's 56-year-old Ron Swenson. Ron was a civilian working with the Navy for 30 years right next to Bainbridge Island, Washington, where he lives. And he started to have pain, pain particularly in his neck, and that went on for a while but finally on his birthday, his 53rd birthday, wasn't it Ron, it turned that that pain in your neck was not just some sore neck but it was actually a spread of prostate cancer. Did I get it right?

Ron’s Diagnosis of Prostate Cancer

Ron: Yeah. Yeah. I screwed you up on your ages, but I was actually 54 when I was diagnosed, but, yes, that is right. I was diagnosed with that.

Andrew Schorr: Well, it was a lousy birthday present, for sure.

Ron: Yeah. It was a tough one to tell my folks while they were giving me a birthday party.
Andrew Schorr:
Oh, my. So it's terrifying. Now, that's the bad news. The good news is here we are in 2008, three years, almost three full years later, and you're doing very well even though your prostate cancer is said to be advanced. Is that right?

Ron:
Yeah, I feel great. If the doctors didn't tell me I was sick I probably would hardly know it.

Andrew Schorr:
Now, you've gotten great care at the Seattle Cancer Care Alliance, and that's consisted of hormonal therapy because usually these prostate cancers are fueled by testosterone, and so typically there are drugs like Lupron that are designed to shut down the testosterone and stop that cancer growth. You had radiation, I know. And now you're in a clinical trial with a targeted therapy aimed at what's deemed to be some unique qualities of your cancer cells. So you're kind of in the new age of medicine, aren't you?

Ron:
Yeah. I've been on dasatinib since last July.

Andrew Schorr:
Right. And I should mention that dasatinib, this drug he's mentioning, the trade name is Sprycel, is a drug that's approved in a leukemia, CML leukemia, and it's a very, new modern medicine, and it's being used experimentally in a clinical trial because of certain qualities in the prostate cancer that Ron has.

Now, let's meet his doctor, Dr. Evan Yu, who is a medical oncologist for the Seattle Cancer Care Alliance to understand what are we talking about when we say cancer biomarkers.

Dr. Yu, welcome to Patient Power. Help define this term for us.

What is a Cancer Biomarker?

Dr. Yu:
Thank you very much. Well, a cancer biomarker is really something that biologically correlates and goes along with a disease, so there are a lot of different types of biomarkers and there are a lot of ways that biomarkers can be used. But the whole idea is this is something that can be in the blood, that's found in the tissue or even in a form of imaging, like a PET scan or something, that you can quantify the activity of the cancer. And the idea to use biomarkers is that when you're treating somebody with cancer you can see, it should correlate with it. If it goes up it means the cancer might be getting worse, unfortunately, or if it goes down it means things are getting better.
Additionally, biomarkers can be used to hopefully select therapies. Because everyone is not the same, some patients might do better with some therapies than others. So really what my research is focused on is looking at finding new biomarkers in cancer.

Andrew Schorr:
Okay. Now, I have a vivid example that sticks in my mind. I had, five, seven years ago, quite a long time ago, I was the host of a program where there were a thousand women in the auditorium in Minneapolis, and it was about new targeted therapies for breast cancer. And we had all these women sitting in rows, and we said, Look around the room, look to the woman to the right, look to the woman to the left, the woman in front of you, the woman behind you, all these women have been diagnosed with breast cancer, and the odds are that the woman next to you does not have the same biology of breast cancer cells as you do. And this was of course timed with the introduction of a new targeted therapy for one of those biologies, Herceptin, where there was a test measuring HER-2/neu. So I write that HER-2/neu, a protein, was an example of a biomarker, and you could see does this particular woman have this in her breast cancer and if so then hopefully, and it's been great news since then, that we have a targeted therapy aimed at that biology.

Dr. Yu:
Absolutely. I think HER-2/neu is an example of what we call a predictive biomarker, and that means it's something that can help predict who will or won't respond to a specific therapy. And if you have a breast tumor that produces a lot of HER-2/neu, which is a protein, those patients will do much better with a new drug called Herceptin. Now, it's been around for a few years, but it's a biologic therapy. It's targeted directly to HER-2/neu and it goes right there so it's not like standard chemotherapy. So that's a perfect example of what we call a predictive biomarker, selecting what drugs to use to treat that individual's cancer.

What Does a PSA Test Mean for Cancer?

Andrew Schorr:
All right. Now let's talk about maybe a less than perfect biomarker. So Ron is someone with prostate cancer where you measure the PSA, the prostate specific antigen. And I've had that test and so many men my age have had it, and there's always been controversy among doctors, well, what does the number mean, and maybe what does the number mean even after you've been treated for prostate cancer. So is the PSA test a biomarker? And if it's not perfect, how would you rate it? And if it isn't perfect, how come?

Dr. Yu:
Well, PSA is a biomarker, but the issue is it depends on what stage of the disease you use it at. People use it to help screen for cancer, and it's okay there to help detect the cancer. It's not perfect, but it's okay, meaning some people might have
a low PSA and have cancer and other people might have a high PSA and have might not have cancer, so there it kind of falls apart a little bit. It's not a perfect biomarker.

In advanced stages of prostate cancer it's not real good. As the cancer eventually, as you mentioned, it responds to testosterone or hormonal environments, eventually the cancers can become what we call hormone refractory, and in those settings the PSA is not very reliable as well. So when I said that biomarkers should correlate with disease getting better or worse, sometimes the PSA doesn't correlate so well, so you have to take the whole big picture.

Andrew Schorr:
Where are we with biomarkers now? I know that's your home base in research, Dr. Yu at the Seattle Cancer Care Alliance. Where are we now, across the world, in Seattle and at major cancer centers around the country in developing useful biomarkers in the clinic to help people know, A, do they have cancer, B, how much cancer they have and maybe, C, which drugs would be appropriate and are those drugs as they're used being effective.

Dr. Yu:
Well, I think that's a great question. I think we're still in its infancy of developing and discovering biomarkers. And the reason is in the last five or ten years we've really started to gain a better understanding of cancer biology, and I think that our knowledge is only going to keep growing. And as it continues to agree and we understand the biology better we'll be able to find more biomarkers. But at this point in time biomarkers are still pretty researchy. I mean there are some biomarkers, and as you point out HER-2/neu is a perfect one, but at the end of the day we still treat patients in a similar fashion. We know that not everyone is going to respond well to a specific therapy or not to a specific and some will, the question is who will and who won't. And that's why we need to continue to look for new biomarkers because right now with the exception of a few examples, like HER-2/neu that you brought up, we don't have that many biomarkers yet.

Andrew Schorr:
You know, I've been in some FDA approval hearings and there have been some, I would think, some exciting drugs. I mean I've been at FDA hearings where there have been people who are alive today where they were failing other therapies, but there was no specific test to understand what was the unique thing going on. And I can recall one case where the drug was not approved because the data across all the whole population of people with that disease wasn't that exciting. It seems like we really need to understand these biomarkers to understand are there, if you will, niche drugs that may not work for everybody but for a certain subset, a certain biology, could be a home run. Wouldn't you agree?

Dr. Yu:
Oh, that's so important. That's exactly my point and why I'm so passionate about this research, is there are so many drugs that unfortunately didn't get FDA approved. And it's not that they don't work. They work, but for a subset of
patients. Now, the problem is we just haven't been able to identify that subset of patients. And when you treat across a big population of people not everyone is going to respond. So if we can get smart enough to figure out those biomarkers and to understand the biology of how the drug works and of the cancer itself and pick out the patients that will respond to a specific drug, we can empower those research studies and actually show that, hey, these patients, if you just study this group of patients, you're going to find that most of them respond to a treatment, rather than maybe 20 percent here or 40 percent there. And that will really, really change the face of medicine and help us in drug development. And we'll have a whole flurry of new drugs if we can put more effort and emphasis on finding new biomarkers because they will help develop new drugs and help get new drugs FDA approved. Not only FDA approved but also FDA approved faster because we'll reach our end point and find out sooner whether the drug is hitting the target or not, and that's very important.

**Andrew Schorr:**
Wow. This is so exciting. So I think this has been a wonderful introduction to help all of us who don't have the science understanding that you do, Dr. Yu, get an clue as to how this can make a big difference. And certainly cancer is typically a disease as we age, and we got a big baby boomer population getting older, and so this could be the beginning of personalized therapy to help control or cure your cancer.

Give us a call. We're talking about cancer biomarkers and what it means for you. Or send us an e-mail, patientpower@seattlecca.org. We'll be back with much more.

**Andrew Schorr:**
Welcome back to our live webcast. You're listening on the air, perhaps, on the radio, across the country. Thank you for joining us. I'm Andrew Schorr. This is what I do all the time on Patient Power. You can look at our website, patientpower.info. I'm also on healthradio.net. And we're doing this program with our dear friends at the Seattle Cancer Care Alliance, which includes the University of Washington, the Children's Hospital in Seattle and also the Fred Hutchinson Cancer Research Center, all known around the world for being leaders in cancer care.

With us is Dr. Evan Yu, who is a medical oncologist and known as a specialist in prostate cancer but also in this new world of cancer biomarkers, which shows promise in helping us understand the specific cancer type we might develop, have targeted therapies for that so that you can cure it or make it such low level that you can just live chronically with cancer. And also we have with us Ron Swenson, who worked with the Navy for 30 years, and then found out his neck pain turned out to be prostate cancer that had spread. But he's doing well with new targeted therapy too.
Dr. Yu, this whole idea of biomarkers has been controversial a bit because we were talking about PSA. Why has PSA as a biomarker been controversial? And I know I went to the HMO doctor years ago and I said, Should I have PSA, and he wasn't so sure, and I know it's been debated. And there are other tests as well. Why isn't it a slam dunk, everybody says biomarker, good idea?

Dr. Yu:
Well, I think it comes down to the fact that PSA is not a perfect biomarker because remember I said in the beginning of the show I said biomarker actually has to be tied in biologically to the disease. Biomarker has to improve when the disease improves, get worse when the disease gets worse. And that's the problem with PSA is that it isn't always tied in. Now, what is PSA? PSA is just a protein, and it's a protein that happens to not only be produced by prostate cancer but by normal prostate. So even normal prostate produces PSA, so when that's elevated it doesn't have to be cancer. So again it's not perfectly tied in with prostate cancer, and that's the main problem with PSA.

Andrew Schorr:
Okay. Now, one test that's used some in ovarian cancer is something called CA-125 or in other areas like colorectal cancer they use a CEA test. Do you know much about these? Are they good examples, bad examples?

Dr. Yu:
Absolutely. Those are also blood tests, and they are also biomarkers, but unfortunately they're even worse than PSA. PSA at least is something you can kind of follow during treatment, and it often makes sense at the early stage of disease when you're treating somebody with hormonal therapies because hormones, testosterone namely, and PSA tie in very closely together. But CA-125 and CEA and CA-125 is for ovarian, and CEA is generally for colon cancer, those are not uniformly elevated in everyone, whereas PSA usually is elevated in prostate cancer. So they're only biomarkers that can be used for some patients that produce CEA and CA-125.

Now, in patients that do produce it they can be used to follow the disease, and hopefully after you've had surgery or whatever treatment those markers, CEA and CA-125, go away, and if it comes back up that's a concerning sign, and then you have to go look to see, oh, is it really back. But that being said and done, these are not as uniformly expressed as PSA is in prostate cancer, so unfortunately they're probably not even as good as PSA is.

Andrew Schorr:
Now, let's go back to PSA for a minute, being a guy, and we've got Ron Swenson with us.

Ron, I think if I'm right that when you were first diagnosed with advanced prostate cancer your PSA was like 2300? Is that right? Did I read that right?
Ron:
Yeah. My first test with Dr. Yu was 2340.

Andrew Schorr:
Oh, my goodness. Now, what's it now?

Ron:
Well, I’ll tell you what the path has been. Actually on Lupron it got down to .23.

Andrew Schorr:
From 2300, wow.

Ron:
Yeah. And then it slowly rose until last July I got to a 5, and since then it's up to just over 20.

Andrew Schorr:
All right. But, Doctor, you're not measuring how well you're controlling Ron's cancer just by that, are you? Because you're saying it's an imperfect test.

Dr. Yu:
Right. I think that's an excellent point. Early on I believe the PSA was a more reliable measure. We actually have data that when you are diagnosed with advanced cancer, like Ron was, that if the PSA drops very low that's actually a good sign. Those patients will do better and live longer, and we know that. So earlier on in response to hormonal therapies like Lupron, like you mentioned, testosterone-lowering therapies, PSA is a more reliable measure, and how low the PSA drops gives us some important prognostic information as to how well our patients will do.

Now, what ends up changing is the cancer changes. The cancer gets smart. It starts developing more genetic alterations, and as it changes it becomes what's more called hormone refractory disease, so it's reliant less upon testosterone. And so when we do use different therapies other than hormonal therapies especially on these new molecular targeted agents, they don't directly affect the PSA pathway because they don't directly affect the hormonal pathways that produce PSA. So PSA becomes less reliable. Ron is a perfect example where his PSA now is I’d say less than perfect. His actually scans when you measure the tumor in the liver have actually shrunk in response to the therapy that he's received on this research study with dasatinib, but yet his PSA initially went down and slowed down, but now it's gone up a little bit. But if I see with scans that the tumor is shrinking I have to believe that's a good sign.

Candidates for Individualized Therapies

Andrew Schorr:
So we have to look at cancer in a whole new way. It used to be, growing up and everything, and of course a lot of people still now, someone's diagnosed with
cancer they say, well, how big is the tumor and where is it and if you have surgery, did they cut it out, or maybe if you had chemotherapy, did it shrink. But really we're getting down to the molecular level, aren't we, and seeing it individually? And also are there individual therapies that are appropriate for that patient on day one and maybe even other individualized therapies later on, right?

Dr. Yu:
Absolutely. I think really individualized cancer therapy is the way we need to go, is understanding the differences, what we call heterogeneity, between one person patient's cancer and another patient's cancer, just like you initially said with the analogy of the breast cancer patients, how the breast cancer cells are different from one woman to the next woman. It's the same thing in prostate cancer and in most cancers. It's just not the same. You can't group everyone together and say, okay, this is the stage of your disease, this is the treatment we're going to give you. That's what we're doing more or less now. But with biomarkers, if we develop new biomarkers some day I'd hope that we could identify different pathways or molecular defects that have gone wrong that have created those cancers, and then we could specifically tailor therapy, and that's really where we need to go.

Andrew Schorr:
Now, if our listeners want to call in please do so.

Dr. Yu, so I've got this image. I've got this great Patient Power production team. Some of us are men who are in their 50s and 60s, we're very young and handsome of course, but if we were sitting in your waiting room and had been diagnosed with prostate cancer just like that example I gave of the women diagnosed with breast cancer, are you saying that I could look to my left and look to my right with my friends and the biology of our individual prostate cancers might well be different?

Dr. Yu:
Absolutely. And I think with prostate cancer probably even more so than with breast cancer. So this whole concept of heterogeneity exists and is a very, very dominant phenomenon. And that's why when you look at cancer therapies across the board, you know, hormonal therapies work great for prostate cancer. The vast majority of men, over 90 percent, will respond initially to that. But a lot of cancer therapies unfortunately the numbers are a lot smaller as to what percentage will respond, and it's because we don't understand yet the heterogeneity. And that's what we're moving toward, that we're getting better at with biomarkers is understanding that, who will and who won't respond.

Current Developments and Breakthroughs in Prostate Cancer

Andrew Schorr:
So you're talking about all this research going on. Will there be breakthroughs that we're hearing about or will this be, don't hold your breath, it's going to be a long, long time?
Dr. Yu:
No, absolutely the field is moving every single day. I can give you a perfect example. From our institution not my personal research but a couple of my colleagues and collaborators, and this is a unique biomarker. It's an imaging biomarker. Women that have breast cancer, hormonal therapies often work for them, but eventually they will require chemotherapy. And so my colleagues Dr. David Mankoff, who is a nuclear medicine imager, and Dr. Hannah Linden, who is a breast cancer oncologist, a specialist in that field, they developed and found a new imaging modality or PET scan imaging with something called FES, or fluoroestradiol, this basically detects the estrogen receptor, which is the hormonal receptor for breast cancer.

And what they found is that patients that uptake this in their tumor, meaning that they have a lot of estrogen receptor, are ones that are much more apt to be responsive to hormone therapies. And if you don't uptake it then you don't respond as well to hormonal therapies. And this is really moving towards individualized cancer care. So with this sort of modality you might say, Well, your tumor isn't the type that's going to respond well to hormonal therapy, we're going to move sooner to chemotherapy. And that's again the whole concept of personalized or individualized cancer care.

So there are advancements constantly, and this is an advancement that came out of the University of Washington Fred Hutchinson Cancer Research Center. The paper probably was just published a year, year and a half ago. And so constantly there's those sorts of things, and we're doing the same types of study in prostate cancer. So I anticipate the field will continue to move forward and we'll develop new biomarkers.

Andrew Schorr:
That is so cool. I know Dr. Mankoff, too.

Dr. Yu:
Great guy.

Andrew Schorr:
Congratulations to that team. I want to mention what this means to people and that is that and you gave the example, and we'll talk about more after our next break here, is that you don't want to undergo chemotherapy, let's say, that won't work, but it used to be that that's what happened. They'd say, well, let's see if it works. But now we're getting these ways of saying, Is this likely to work for you or What is likely to work for you, and give you the treatment that has the highest likelihood of success.

We invite your calls or an e-mail to patientpower@seattlecca.org. We'll be right back with much more of our live program on cancer biomarkers on Patient Power brought to you by the Seattle Cancer Care Alliance. We'll be right back.
Andrew Schorr:
So if you're listening tonight and you say, Boy, I wish Harry heard this or Sally, they can because the replays are posted on the Seattle Cancer Care Alliance website, that's one place, SCCA patientpower.org, and a whole library of programs we've done previously with really many world-renowned cancer experts. They're also on my website which is patientpower.info. And we're so honored that Microsoft now has a new health search engine, health.live.com, and you can search on many topics, and then Patient Power programs like this one tonight show up right there.

You are welcome, since we're live to give us a call. Or send us an e-mail. I'm going to fire some e-mail questions to Dr. Yu in a second. Here's the e-mail address. Patientpower@seattlecca.org.

So we're talking about really a pretty simple idea but maybe a term you're not familiar with, and that is biomarkers in cancer. And as I've been learning, so this is the idea, is there a unique sign, quality of your cancer cells so we can measure how many of them there are, are they changing? Is there a therapy that we can aim at because of that quality that we can target your cancer cells with? And we were talking about Herceptin in breast cancer as an example, and there are others we can talk about in lung cancer and some others and certainly in leukemia that I've been diagnosed with and was diagnosed 12 years ago now. We said 11, but now it's 12 years. I'm happy to be a survivor.

For instance some people have a biological status of their leukemia, chronic lymphocytic leukemia, which is called p53. Well, now there is at least one therapy that targets people with that. So do you have that p53 or not? Might that therapy if you do then be successful? So that's all the analysis that's going on, and hopefully that will proliferate as we have an understanding of more cancers to get you the quality therapy, the targeted therapy that can make a huge difference in saving your life and maybe curing that cancer, which is what the hope is.

Let's go back to Dr. Evan Yu from the Seattle Cancer Care Alliance. Dr. Yu, so we got some e-mails questions. Here's one from George in Seattle, and he says, "Do all cancer types have detectable biomarkers? If no, which do not?"

Dr. Yu:
Well, I think the answer to that is that at this point in time they do not, but I think we just haven't discovered them yet. I think all cancers have unique properties that we will be able to measure in the future. Whether that's through a simple blood test or a urine test or through imaging with a PET imaging scan, I think we can detect it eventually. We just need to continue to put effort and research funding towards this topic.

Now, at the current time, however, most cancers don't have biomarkers because we just haven't found them yet. You heard that CEA for colon cancer and CA-125 for ovarian cancer and PSA for prostate cancer and maybe CA 19–9 for pancreatic cancer, but there aren't a lot of blood biomarkers other than that for most cancers. And as far as imaging goes, there really are no imaging biomarkers other than the
new novel ones I talked about for breast cancer. So most cancers don't have good, well established biomarkers at this point in time, but I hope that in the future we will.

Challenges in Biomarker Research

Andrew Schorr:
Give us an idea of what you're doing in lab, you know, the elementary school level, if you will, Evan. What are you and your colleagues doing to try to figure this out? How hard is it? We heard over the last few years about the human genome project and sort of cracking the code. How do you crack the code related to biomarkers so that we start hearing the news or hearing on Patient Power, oh, we've got a biomarker for this, we've got a biomarker for that. What are the challenges?

Dr. Yu:
Well, I think the challenges are really being able to study these issues because these are not issues that you can replicate in the laboratory. We do a lot of laboratory studies with cells, with mice, etc., but that can't really replicate what's really happening in human beings. So to really establish a biomarker we have to do it in humans. Certainly we can start off with studies in cells in mice, but we have to do good clinical trials that are focused on biomarkers. And I think most people when they hear about clinical trials they're thinking about a treatment study. Like I'm going to get a new drug, drug A, drug B, whatever, I'm going to get a new drug. And we need to also change our thinking a little bit to think about along with drug A in the study we need to attach a biomarker study so we understand how drug A is working. And so that is something that we have to dedicate effort to, that industry, biotech and pharmaceuticals have to put effort into as well to better understand how their drugs work. So I think that's where we really need to go.

So that's the kind of work we're doing is we are looking at the broad spectrum, imaging biomarkers, blood biomarkers, urine biomarkers, tissue biomarkers. Even when we can get tissue from patients from their cancers, we're looking at the specific properties in their tissue and correlating it with how well they do and how well they respond to specific therapies.

Andrew Schorr:
Right. Now, I want to go back to that for a second because I know this test came out a year or a couple years ago in breast cancer, maybe you're familiar with it, I think it's called the Oncotype DX, and the idea was would certain women benefit from certain chemotherapy or was it not needed. Was that an example of sort of a panel of, I guess it would be biomarkers, I'm not that sophisticated in how to describe it, to say what do we know about this woman's cancer cells, and then what would be worth doing?

Dr. Yu:
That's absolutely a perfect example because the point of Oncotype DX is to take women who have localized breast cancer and predict the likelihood as to whether
their breast cancer will come back or not. And it also assesses whether they'll benefit from adding chemotherapy to reduce that risk or not. And that's a perfect example of a biomarker. And that's why I say that although we don't have a lot of biomarkers there are a lot of biomarker studies ongoing and that we're starting to develop these things. I just personally believe we need even more of these types of studies because this is really how we can help people is we can help people select the right therapies for that individual person not just for a population.

Andrew Schorr:
Right. So using that Oncotype DX example in breast cancer, folks, I want you to understand there are some women then who avoid going through certain chemotherapies and I went through chemotherapy, and it's not a walk in the park for sure, because it was judged that they were at low likelihood that their cancer would recur, where other women who benefited because it said it's a higher likelihood and you should go through this therapy. I'm glad that you give me an A for picking that example and I'm very encouraged by it.

So we got an e-mail, Dr. Yu, from Lorraine in California who says then, "How will biomarkers impact the future of medicine and cancer treatment?" So I mentioned that example in breast cancer. Sounds like the impact could be potentially huge. Am I right?

Impact of Biomarkers for the Future of Medicine

Dr. Yu:
Huge impact. And the way I would see it is, A, biomarkers can give an individual more information as to how aggressive his or her cancer is. So it's it gives you information right there. B, a biomarker can help you select which therapy you should go on. Does my cancer have unique properties that would make it conducive to getting this treatment versus that treatment. C, biomarkers can help you understand is your cancer really responding well to this treatment or not. And that's something that's oftentimes confusing. We look at scans, CT scans, bone scans, blood tests, but there's a lot of confusion as to whether a cancer is getting better or getting worse. It's simple if the cancer is getting smaller, but there are a lot of cancers that go to bone, let's say. You can't measure tumor in a bone, and so that's a problem right there. But with a new biomarker, maybe you can.

And the other thing is that biomarkers can help you understand if a new drug is working early or not. Rather than waiting for years and years and years to find out does this drug help people live longer and live better, if you have a biomarker that correlates with that long-term outcome, then you can get more drugs to market sooner and you can help people faster. So there's a lot of ways biomarkers can change the future of oncology.

Andrew Schorr:
Right. And your mention of assessing whether a drug therapy is working brings to mind a program I did with somebody you know in Seattle, Chappie Conrad. He's an expert in sarcoma and is an orthopedic surgeon as well, an oncologic orthopedic
surgeon. And so that's been a benefit right there where, as I understand it, and as you mentioned with Dr. Mankoff earlier, but an example in sarcoma, where you can measure how the uptake of certain medicines are happening with someone with sarcoma cancer cells and say, Whoa, they're sucking them up, they're killing the cancer cells, look at that biologic activity or not and then make judgments on how long to stick with the therapy because of it. And I know that can make a real difference for patients.

**Dr. Yu:**
Oh, yeah. I think those sorts of studies are fantastic, and we're doing those sorts of studies too with prostate cancer with novel imaging. We're identifying things the tumor is avid for, and we're injecting it as a radio tracer for PET imagings to measure tumor activity. And the advantage to that is if you have cancer in three or four spots in your body they may not all behave the same. One spot may respond to treatment and another spot may not. But if you can real time image the activity of the tumor and then give a treatment and see the change there, that is really, really exciting, and that can help you determine how quickly and whether your drugs that you're giving are working or not. And so that's a lot of the work that we're doing, that myself and Dr. Mankoff are doing in prostate cancer. I know Dr. Conrad has been involved also, as you speak, with nuclear imaging in sarcomas. I mentioned the example of breast cancer. That's why I think imaging is actually a great potential biomarker, and so again it's very exciting.

**Andrew Schorr:**
It is. It's really cool. And just to help people understand, so they know about x-rays and CT scans, things like that. With PET scan your actually looking at the biologic activity. You're imaging biologic activity so you're looking at those cancer cells and how they're reacting biologically to certain substances, right?

**Dr. Yu:**
That's absolutely right. So when you do a CT scan or CAT scan or MRI those are just giving you an anatomic picture. When you do a bone scan and things light up on a bone scan that's just telling you whether there's turnover in bone or not. And arthritis, trauma, broken bone, all those things can cause turnover in bone. And cancer causes turnover in bone, but again keep in mind that turnover in bone just tells you what's going on in the bone. It doesn't tell you whether those cancer cells are active or not.

PET imaging can tell you whether those cancer cells are active or not. And how PET standardly works is they inject a radioactive nucleotide that is glucose added. It's something called FDG, which is like glucose. So cancer cells generally grow fast, and if they grow fast they should uptake more glucose, and that's how PET imaging standardly works. Now, what we're doing here with our nuclear medicine group that's very, very top notch is that we're not just doing glucose PET imaging we're looking at all different types of novel imaging modalities. We're looking at tumors that are lipid avid, so looking at lipid metabolism, like in prostate cancer. I mentioned the example in breast cancer. That's imaging the estrogen receptor. We hope to image the androgen receptor, which is where testosterone binds in
prostate cancer. So, again, with PET you can also mix it up. You can look for specific molecular defects and image that activity in the cancer.

**Andrew Schorr:**
Folks, you are listening to really the leading edge of cancer research, but this is going to proliferate around the country. And, Dr. Yu, I know that we have healthcare providers listening to this program too who are very excited about what you're talking about. And I know I am knowing that so many millions of people as we age will be affected by cancer. Wouldn't it be great if we could have targeted therapies and know exactly how we're doing to cure your cancer or knock it back so you can lead a long and full life.

We're going to take another break, and when we come back we're going to have one last segment when we can take your call. Don't be shy. Send us an e-mail. I've got a few more to pose to Dr. Yu right now. Patientpower@seattlecca.org. You're listening to our live broadcast, Patient Power sponsored by the Seattle Cancer Care Alliance. We'll be right back.

**Andrew Schorr:**
Welcome back to our live broadcast as we're discussing maybe something you didn't know much about but it will make a big difference for you if you or a loved one is diagnosed with cancer, cancer biomarkers. How can we look at what are the unique qualities of your cancer. Do you have cancer, like do a blood test or urine test, imaging we were just talking about. If you do, how do we target it. If we do target it, how is that therapy doing?

Now, one of the things I wanted to ask Dr. Evan Yu from the Seattle Cancer Care Alliance about is, Dr. Yu, you mentioned about these wily cancer cells and how they mutate. So is one question, is one biomarker enough to follow one person's cancer if that cancer may change over time? Or do you need like an array of biomarkers just to track one person's cancer as those wily cancer cells change clothes, disguises and don't die?

**Dr. Yu:**
Yeah. I think as we move forward an array would be ideal. Certainly there may be a common theme that all these cancer cells have that is so dominant that one biomarker may tell the whole story. But my guess is, and a lot of the ways that we're moving, is to look at an entire panel, is to be able to detect a cancer, take a look at a cancer cell or even to pull something out of the blood and look at an entire genetic panel of looking at the genome and saying these genes are up regulated, those genes are down regulated, identifying molecular signatures and saying based on this pattern we should be doing this or we should be doing that. And that in itself is more than one biomarker. It's perhaps looking at the entire genome together and taking an overall big picture look.

**Andrew Schorr:**
Okay. I feel like I'm going to science class. I grasp most of it. And Howard from Minnesota just wrote in. He's been listening. And, you know, we're watching the
price of gas so we think a lot about what do things cost. So Howard wrote in and he said, "Doctor, you mentioned biomarkers having a huge impact in the future. My question is does this mean this type of individualized care will be more costly?"

**Will Biomarkers Increase the Cost of Care?**

**Dr. Yu:**
Not necessarily. I actually think it is possible it could be more cost effective. And the reason is nowadays when we treat patients with cancer we establish that new treatment based on large studies so look at a large number of patients, and we show that there's overall statistically speaking the median survival or cure rates or whatever are improved with one treatment versus another. Okay? Now, again, this brings us back to the point of heterogeneity. Not every single patient got benefit from that treatment. Some of those patients didn't need that treatment, and that treatment did nothing for them.

So if we're looking at all these new drugs that cost thousands and thousands of dollars, because these new molecular targeting agents are expensive, and the reason they're expensive is because it costs a lot of money to develop them. But if we can pick out that maybe it's not a thousand patients in this study that need this drug but maybe it's really a hundred patients, we're not going to over treat a lot of people. So it could turn out that if we have good biomarkers that we're actually maximizing our benefit by treating those patients who really, really need the drug and not over treating patients who don't need it. And that can be cost effective.

**Andrew Schorr:**
All right. Now I'm going to put my two cents in. I know that drug development, sometimes for smaller biotech companies like little racehorses that have a good idea and great science, they require hundreds of millions of dollars to try to get a drug on the market and run the gauntlet with the FDA. And I've been there at some of those hearings and we talked about how they're trying to show benefit to often a broader population when really if they could only figure out the specific subset they could say, well, maybe it's not a home run for all patients but it is for this sub group. If they could spend less on the development, have a way to target it, maybe the drug would cost less. And as you say also we've had this shotgun approach in cancer where we often use expensive drugs across broad populations when if we could know who it would work for we'd just spend the money on the treatment for them.

So I'm encouraged. I have this vision of the future. I sure hope we can get there sooner rather than later. How can we as patients and as citizens help, Dr. Yu? How can we help you. You mention clinical trials, tissue samples, etc. How can we help?

**Dr. Yu:**
Yeah. I think just being amenable to going on a clinical trial, and again not just a clinical trial where you're getting a treatment but even volunteering to do extra imaging studies if there are imaging clinical trials, to give extra tissue or blood so
that we can store these and study these biologic features of your cancer. Sometimes, we have studies now that we're actually asking for extra biopsies of your tumor or biopsies of the bone. These things are all voluntary of course, but the reason we're asking for this is that we hope to be able to identify specific features of the cancer and identify new biomarkers so that we can help you and the future patients that have cancer. So that will help a lot.

I think the other thing that will help is for an entire movement for the nation and FDA to state for every drug that we develop, every new drug that's in development, we have to dedicate a portion of the funding to not just getting this drug out on the market and testing it in patients but to understanding how the drug works and looking for developing biomarkers simultaneously with the development of the drug.

And that's not just something that industry needs to step up and do, but we need to help them as academicians in the research areas and work with industry and the FDA. And of course the FDA is influenced by the people, and we need people to say, hey, we need to understand how our drugs are working. We don't need to just get a whole bunch of new drugs out there and throw them at everyone under the sun. We need to actually understand how they work so we can pick the patients who really will benefit a lot.

Andrew Schorr:
That's so eloquent, Dr. Yu. Now I want to bring your patient, Ron Swenson, back to it.

So Ron, here you are living with advanced cancer, prostate cancer, and you're in a clinical trial where a drug that was developed for a type of leukemia, CML, dasatinib or Sprycel, seems to be having effect for the biology of your prostate cancer. That's kind of cool, isn't it?

Ron:
Well, it worked out good for me because I would have willingly gone on probably any clinical trial but the fact that this drug had kind of proven itself in another area and in an area where bone was affected, that was the perfect situation for me.

Andrew Schorr:
Right. And I would hope you'd agree. I was in a clinical trial. You're in a clinical trial. It's something people should consider, wouldn't you say?

Ron:
Oh, yeah. And I was interested in hearing what Dr. Yu was saying because that certainly, you know, as a cancer patient, I mean, I would offer up pretty much any part of me that would maybe help out.
**Andrew Schorr:**
Wow. Ron Swenson, I wish you all the best. I've had the pleasure of meeting and interviewing some other gentlemen who were like 20 year advanced prostate cancer survivors, and I'm glad you're feeling great. Ron, thank you for joining us today. We really appreciate it.

**Ron:**
Yeah. Thank you.

**Andrew Schorr:**
And you're an inspiration to a lot of people.

Dr. Evan Yu, medical oncologist and scientist at the Seattle Cancer Care Alliance and the University of Washington Fred Hutchinson Cancer Research Center, I want to congratulate you on your work so far, Evan, and I appreciate you being back on Patient Power. We'll have to get an update one of these days, and I wish you the greatest success with what you're doing and your colleagues both at the University of Washington and around the world.

**Dr. Yu:**
Thank you very much. It's a pleasure to be on.

**Andrew Schorr:**
This is so neat. It gives me a great deal of hope hearing this. And again I want you if you are diagnosed with cancer, first to consider being part of a clinical trial. Have that be part of the discussion. And also find out if there are new kinds of testing, new examples of biomarkers, now you know what they are, that would apply to you to see what are the unique properties of your cancer and how can you have targeted therapy, how can you measure how the therapy is doing. We mentioned that Oncotype DX example in breast cancer.

So this is what we do on Patient Power. And I want to mention that we have a program coming up with the Seattle Cancer Care Alliance on May 21st where my friend Dr. Ben Greer is going to be with us. He's an expert in the treatment of gynecologic cancer, so we're talking about ovarian cancer. We'll be talking about that. So tell your friends about our programs with the Seattle Cancer Care Alliance and Patient Power. Remember, the replays are posted at SCCA patientpower.org, patientpower.info and then on the new Microsoft health search engine, health.live.com.

Thank you so much for being with us and I think we can all take a lot of encouragement from this. Remember, knowledge can be the best medicine of all. Broadcasting live from Seattle, I'm Andrew Schorr. Have a good night.

*Please remember the opinions expressed on Patient Power are not necessarily the views of Seattle Cancer Care Alliance, its medical staff or Patient Power. Our discussions are not a substitute for seeking medical advice or care from your own doctor. That's how you'll get care that's most appropriate for you.*