Molecular Imaging for Breast Cancer: State-of-the-art Trials at SCCA
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Introduction

Andrew Schorr:
Hello and thank you for joining us once again on Patient Power sponsored by the Seattle Cancer Care Alliance. I’m Andrew Schorr broadcasting live from Seattle. You know, every two weeks we connect with you with leading experts from the Seattle Cancer Care Alliance and help you understand sometimes some of the most significant and sometimes more complex cancer issues, but it shines a light on it and helps you and your family make better decisions should someone be diagnosed with cancer in your family or yourself. And I think it gives you a great deal of peace of mind because you truly hear the latest right here.

Now, as you may know this is Breast Cancer Awareness Month, and I have kind of mixed feelings about that. I am happy to raise awareness for breast cancer, and we will talk more about that, mammography along the way today. But of course if you are diagnosed with breast cancer it doesn't matter what month it is, or if you are a breast cancer survivor it doesn’t matter what month it is. You have it on your mind whether it's every day or in a recurring way. And the good news is that most people who are diagnosed with breast cancer, happily more and more it is diagnosed early, and it is curable, and people lead long, healthy lives.

Well, sometimes it's later stage, and sometimes it comes back, and when it does, we want to be able to understand what are we dealing with, where has the cancer spread, and not just how big the tumor is or where it is, but exactly what it is, and I mean, what is its biology. And if you can understand that then as we develop medicines, you can then have medicines that are individualized to that cancer site, which could be different. Maybe there are even different cancers operating in the body, we'll learn more about that, but you want to have targeted therapy. We have talked about that so much on Patient Power.

Well, we are going to talk about that tonight because at the Seattle Cancer Care Alliance they are leading the way now with state-of-the-art clinical trials in what we are calling molecular imaging for breast cancer. And this could have great impact in the treatments for women with more advanced breast cancer, metastatic breast cancer, and ultimately it could certainly affect the treatments people have or assessment of how is the treatment working in many cancers and also down the road apply to people with even earlier cancers where it hasn't spread, but what's
going on, and can you look inside the body and understand the biology of those cancer cells without having to poke a needle in it or some other kind of imaging. Fascinating. And you are going to meet physicians who are leading the way and a research coordinator who will help explain if you choose that you would like to be in one of these clinical trials that’s studying all this.

First, I would like to introduce Dr. Hannah Linden. Now, Dr. Linden is an associate professor in the department of medicine, division of oncology at the University of Washington in Seattle and the Seattle Cancer Care Alliance. So she is a medical oncologist and helps guide the care for people diagnosed with breast cancer. Dr. Linden, you know, we talked so much this month about mammography, and many places are switching from sort of analog, old film pictures of the breast, to digital mammography, but anyway, and I know sometimes if there is something suspicious, there may be a biopsy or an ultrasound exam, but what we are going to talk about tonight takes imaging to a whole new level, doesn't it?

**Molecular Imaging and Traditional Approaches**

**Dr. Linden:**
Yes. This is a little different. It's sort of instead of showing you a picture of what the cancer looks like in terms of a shape, this shows you more what the cancer is doing, and I think that's a more dynamic process, and it potentially is a more informative one probably complementary to the traditional approach.

**Andrew Schorr:**
Now, you have done a lot of research on this and have written major journal articles, and you have worked for years now with another physician, a professor of radiology and nuclear medicine, and he's got a whole bunch of titles at the University of Washington and Seattle Cancer Care Alliance, Dr. David Mankoff, who for years, and I know you have been working with him since 2002, he started in 1993 working with PET imaging, which we will learn about, positron emission tomography, if I have got it right, and applying that to how we learn about what's going on with breast cancer.

Dr. Mankoff, thank you so much for joining us. So help us understand these technologies and what they potentially could do to help Dr. Linden make decisions with her patients.

**Dr. Mankoff:**
Well, Andrew, thank you very much for having us. It's always rewarding to the imagers to be included as part of the cancer process.

I think as Dr. Linden, Hannah, mentioned earlier what's different about the type of technology that we are using is rather than structural imaging where we are looking at size and shape and density, this is often thought of as functional molecular imaging where we are looking actually at the biology and the molecular
biochemistry of the tumor. So rather than seeing where the tumor is and how big it is and what density it is, we are actually really looking at how it behaves at a very fundamental molecular and chemical level.

Andrew Schorr:
Dr. Linden, so when someone is, it's suspicious that there is early breast cancer, a woman is often told, well, we need to biopsy that, and they stick a needle in it, and then you go back in the microscope and look at the cancer cells and, or if there are cancer cells and make decisions on that. When breast cancer is more advanced, why can't you do that?

Dr. Linden:
You can, and actually you should do that. You should put a needle in at least one distant site to verify that it's really spread because this is a major piece of news you are going to give a patient if they have metastatic breast cancer, and so you do want to prove it. And a tissue biopsy to prove that the cancer has spread is the standard of care. However, it's not feasible nor very comfortable for the patient to sample multiple sites, and actually some sites are very difficult to get to because they are deep in the body. And so if there were a noninvasive way to do it, that's actually more appealing.

Andrew Schorr:
When breast cancer spreads, where does it typically spread to? Where are some of these sites, and if there are multiple ones, how many sites could somebody maybe have?

Dr. Linden:
Right. And you know, again it's always really scary to be a patient and think about it this way, but for whatever reason that probably has to do with something about where cancer cells like to settle and probably also has to do with where blood flows, the predilections in breast cancer are to bone, that's the most common site, or liver or lung, but it can go anywhere. But where we commonly look are those three sites. Late in the disease it also can go to brain.

Andrew Schorr:
Now, typically when there has been a suspicion of more advanced breast cancer, what are the imaging technologies, Dr. Mankoff, that have been done traditionally?

Dr. Mankoff:
So the traditional imaging technologies include a CAT scan or CT scan and then often a slightly different nuclear medicine radio tracer procedure called a bone scan, and that allows you to look throughout the body including effectively at the lungs, the liver, bones, and importantly other tissues such as lymph nodes that can harbor the cancer.

Andrew Schorr:
All right. Why do we need something better than that? Where does that fall short?
Dr. Mankoff:
So it falls short in two fashions. One is the bone scan is the beginning of an example of a technique that works by looking for changes in the chemistry at individual sites rather than looking for their structural changes. Part of the reason the bone scan works so well is it allows you to look at places where the bone is actively turning over at a rate that is more than you would expect for normal bone, and that's one of the ways of identifying spread to the bones.

The way PET works is take that perhaps a step beyond and works in a much more general fashion to be able to look at other aspects of pure biology and biochemistry to find tumors. So one of the areas that's very commonly used in PET right now uses the tracer called fluorodeoxyglucose or FDG, and that's a sugar that looks very much like the sugar that the body using for a fuel, and tumor cells are using that sugar and that fuel at a much higher rate than normal tissues are. So an FDG PET scan can identify sites of disease that are sometimes not seen by these other structural imaging because they are identified on the basis of their biology. So we are already using some forms of molecular imaging to help diagnose and determine the extent of breast cancer especially in more advanced patients.

Andrew Schorr:
All right. Now, I think I need to translate this a little bit for those who didn't get A in science. Okay? So let me see if I got this right. So, okay. So one type of imaging is simply taking a picture of structures and organs in the body and looking for something unusual. And then sometimes, as Dr. Linden says, you stick a needle in what looks unusual and look at the cells under a microscope and see whether or not they are cancer. And then there is various testing that can be done in the lab to see if it's cancer, what type of cancer it is, and we will talk more about different cancer biology in a minute, but that all starts with imaging, with a picture.

And then you were talking about this PET scanning. Now, the way I think of PET scanning, and tell me if I am right, is that these cells needs fuel. And you are actually giving them some kind of fuel and watching, kind of watching their metabolism. And with what you know about cancer cells, if the metabolism like when you were talking about the bone cells kind of is faster, then there is knowledge that that is likely to be cancer cells, right?

Dr. Mankoff:
Right. And what I want to point out is when we give them a fuel, we are giving them a teeny, tiny amount of fuel that’s so small the body doesn’t know it's there. So we are not actually causing the tumors to grow. And the reason we have to use radioactivity to be able to see those sites is the amount of that fuel that we give is so small that if it did not have radioactivity, we wouldn't be able to detect that. But because it's radioactive we can use the specialized equipment to find those sites of disease and take a picture of these cells on the basis of their fuel consumption or usage if you want to think about it that way.
Andrew Schorr:
Okay. So let me see if I am framing where the research is headed because I know you have been devoting your career to this and working closely now with Dr. Linden, medical oncologist, as you help this because after all we want it to help Dr. Linden and the Dr. Linden's of the world make better decisions for their patients. So is the idea now if not all breast cancer cells are alike, not just in size and shape and location but in their actual biology, then you are trying to use PET imaging and the tracer you use, what you inject in and watch in certain types to see if you can identify the exact biology of the tumor cells? Did I get it right?

Identifying and Understanding the Biology of Tumor Cells

Dr. Mankoff:
Yes, exactly. And one of the points to make there is I think many patients who have had cancer or know somebody that's had cancer have heard about a PET scan. It's fairly commonly used. But they have really probably only heard about the type of PET scan that uses the sugar fuel to look for the tumors. And what's important is the method of PET works in general and allows us to use many different tracers in different parts of the system to look at other parts of tumor biology beyond how aggressively a tumor is metabolizing, how aggressively it's using sugar.

So when we think about what the next step is we are really thinking about going beyond detection techniques and, as you said, utilizing the exact same physical processes with different chemicals to be able to look at how different cancers differ and how sometimes within the same patient they differ at different sites of the body.

Andrew Schorr:
Well, we have got so much to talk about. Dr. Linden, we are going to come back to you because Dr. Mankoff just mentioned something I had never thought about. I thought if cancer spread, it was the same kind of cancer cells everywhere, and he has kind of given us a clue that maybe that's not always true, which would mean the medicine that you might give for someone with advanced cancer that might be effective at some sites might not be effective at all. Wow. Lots to talk about for people concerned about advanced cancer as we look at these latest clinical trials at the Seattle Cancer Care Alliance and molecular imaging for breast cancer. Much more to come as we continue right after this.

Andrew Schorr:
Thanks for joining us for a live webcast. Andrew Schorr here. If you would like to give us a call and you have a question about these clinical studies at the Seattle Cancer Care Alliance looking at new ways of imaging exactly what's going on for people with more advanced breast cancer, then just call the studio during our broadcast. You can also send us an e-mail to patientpower@seattlecca.org, patientpower@seattlecca.org, and we have a whole library of programs we have done with many eminent cancer experts from the Seattle Cancer Care Alliance, and they are all right there on the web for you at SCCA, patientpower.org.
Okay. We're going to continue our discussion now with nuclear medicine expert Dr. David Mankoff from the University of Washington and the SCCA, and Dr. Hannah Linden, medical oncologist from the same. And then in a few minutes we will be meeting somebody who also helps translate all this on a daily basis for people who are considering being in the clinical trials we are discussing along the way, and that's Erin Schubert. And we will be with Erin in just a minute.

But, Dr. Linden, so you are a medical oncologist. Dr. Mankoff said just before our little break that you are looking with this imaging to see if the biology at these sites where maybe the cancer has spread, is it the same type of cancer cell. That's striking to me. I always thought it would just be if the cancer has spread, and hopefully there is a medicine you can take, and it's going to kill those cancer cells uniformly or at least knock it back. So tell us about that because it sounds like I didn't, you are understanding more about the differences that can happen at different sites. Tell us about whether it varies from site to site. That's a new one on me.

**Dr. Linden:**
Well, it can vary is the skinny. That's the quick answer, but, you know, this gets into the shades of gray that we face when we try to treat people with breast cancer, and this is why you need a good lab to test the cells and you need a thoughtful doctor to follow you because you don't want to treat somebody for the wrong problem. So we have potent, targeted therapies in breast cancer, like anti-estrogen therapies and anti-HER2/neu therapies, and you want to be able to use those appropriately for patients. Unfortunately they don't always work, and that's part of why we use chemotherapy.

So to answer your question, usually the cancer is the same at multiple sites, and usually if it responds at one site it responds at others. But there can be differences, and Dr. Mankoff's work is trying to take a look at those differences and figure out how they have meaning for patients.

**Andrew Schorr:**
Dr. Mankoff, all right. Let's talk about estrogen. So we have done a lot of breast cancer programs, and we understand that usually estrogen is the bad guy and the fuel for a lot of these breast cancer tumors, and the biology of most women I think at least post menopausal as I understand is often estrogen if I have got that right. So tell us about, at least let's start with one of the studies where I understand this tracer where you have an IV and there is this nuclear material, radioactive material, very low level that's in there, and it's looking for estrogen biology, right? Help us understand that.

**Dr. Mankoff:**
Right. So to take a half a step back from that, at the receiving end of the estrogen is something called the estrogen receptor which takes the signal from estrogens in the blood and translates that into activity in normal breast tissue, and that's how normal breast tissue is able to carry out its function, in part by responding to estrogens. In the breast cancer the estrogen uses the estrogen receptor to
promote growth in the breast tumors, and if you can interrupt that signaling, if you can get between the estrogen and the estrogen receptor and shut that process down, you can actually not only prevent tumor growth you can often kill the cancers that way. So when a patient gets biopsied, you take the biopsied material out and you perform special stains to look to see if those estrogen receptors are there.

What we are trying to do with the imaging is be able to do that same process in a complementary faction in a way that adds to the pathology to be able to make an image of that estrogen receptor. So in essence what we are trying to do with a PET scan is form an image not necessarily of the size and shape of the cancer or even its glucose metabolism, but form an image that tells us whether each site of the disease is expressing that estrogen receptor, has estrogen receptor in it.

Andrew Schorr:
Wow. Okay. So we have talked about the way it's normally done now, where it's feasible. So you have a needle biopsy, you look at the cells under a microscope, and the pathologist is able to make decisions that way. What you are talking about is noninvasively, if you will. So I know we have got a long way to go and this is in a clinical trial, but could this be where we are headed is that this imaging could be so accurate and you could be so confident that you could basically take a picture of what's going on and be confident of the biology of what you are dealing with?

Dr. Mankoff:
Yeah. I think that is an important direction. But I want to make it clear to those folks who are listening, we are not talking about having an imaging test replace the tried and true and well tested approach of taking a tissue sample and looking at it under the microscope. But what we are saying is you really can't sample the entire disease across the entirety of the body, and even if you were to try to do that the chance that you would hit each piece accurately and really have samples that represent the way the disease is behaving throughout the body is small.

So the idea of imaging is adding to that ability to noninvasively be able to look at every piece of tumor that's in any site in the body and be able to characterize it. And in this case what we want to be able to do is use the estrogen imaging to tell whether or not there is an estrogen receptor associated with each the tumor sites.

Andrew Schorr:
All right. Well, let's get down to sort of a consumer level here.

Dr. Mankoff:
Okay.

Andrew Schorr:
I want to bring into the discussion Erin Schubert. So Erin works very closely with the doctors. She is a clinical research coordinator at the Seattle Cancer Care Alliance, and as we said this is very leading edge research, and these doctors have been involved in it for years, and the Seattle Cancer Care Alliance is really one of
the leading, if not the leading center in the world working on this. So we are really, it could be a tremendous change as we look at how to take pictures and understand exactly what's going on with more advanced cancer in the years to come and maybe even earlier cancers that we will talk about along the way and other cancers beyond breast cancer, too.

So, Erin, so tell us what's involved in somebody being in let's say a clinical trial to assess the use of this sort of estrogen receptor tracer. What does it mean for a patient? What does it mean in terms of the understanding? Is there any health concerns they might have? Who qualifies for such a study? And what's involved just in their time? And then I want to get in how closely are they followed? I was in a clinical trial, and I will probably share my story about that, too, but tell us what's involved and who's a candidate for this.

Candidates for Clinical Trials at the SCCA

Erin:
Sure. Thanks for including me, Andrew. I appreciate it.

So let's take for example, as Dr. Mankoff and Dr. Linden have spoken about, we have several different studies going and again for slightly different patients who qualify, but let's take basically the one we're talking a lot about today, the estrogen imaging study, and that is a new study that we are opening. And in this case it is a study for patients who are newly diagnosed with that advanced cancer. So it's not their cancer that they were initially diagnosed with, their breast cancer, but this is when it has come back presumably and sometimes in multiple sites, not always, but it has to be a fairly recent diagnosis of that, that the cancer has come back.

We have some studies, other studies that would be applicable to patients who have had their metastatic cancer for a while or for a number of years and already been treated for it. In this one, in this case because we are really wanting to prove over time how we could use an imaging technique like this, we are trying to get patients that are sort of have not been treated for their advanced cancer yet. So that's basically the qualifications for this particular study.

And as you said, a lot of the questions I normally get from patients is sort of what does it entail for them, how much time is it going to take for them to participate. This is a nice study in a lot of ways because I think it's something that adds a lot of information potentially for the patient and for the doctors that are treating them and as you talked about trying to make decisions about what their treatment should be and what's really going to work best for them, but it really doesn't entail a lot of extra time in terms of the patient's commitment to it.

In this study what they would need to do if they decided to participate is come to, in this case we do want them to come to our institution, so come either to the Cancer Care Alliance or to the University of Washington Medical Center. We do in this case have them see either Dr. Linden or one of her colleagues. It's sort of to just get into our system and get into just for an early visit to make sure we have all of their medical history and everything accurate.
And then they come for the actual imaging scan which in this case is a PET scan that uses that estrogen tracer that Dr. Mankoff and Dr. Linden were speaking about. And they would come for that one PET scan. The PET scan itself, they are probably going to be in our institution for about three or four hours when they come for it, but it is of course an outpatient scan so they just need to come for about half a day. And then essentially they are done with the primary part of the research protocol.

Then they go back to, whether they are being treated here at the Cancer Care Alliance by one of our oncologists or if they are being treated somewhere out in the community by another medical oncologist, and we do allow that in this case. They don't have to come here for all of their treatments. So basically they are going to go back to whoever was their treating doctor and then start the treatment that has already been planned in this case. So we want patients who are already planning to getting some kind of treatment that's designed to specifically target that estrogen receptor. So there are a number of different treatments that do that, and Dr. Linden can elaborate on that further, but we basically want people that are not going to be getting chemotherapy but that are going to be getting some sort of estrogen-targeted therapy.

So they are going to go back to their physician and be treated, and we, the study actually says we are going to follow them for up to six months. What that means is that we are going to be in contact with their physician and getting information about how their treatment is going. We are going to be, we do have patients come back at a three-month interval and then at a six-month interval to just get a blood draw. We are also looking as part of this study at hormone levels in the blood, and that again is not something that necessarily is standardly done but that we are interested in looking at.

And then at the end of that six months we, you know, a lot of times driven by their normal clinical, their normal care with their doctor they would be getting some follow-ups, regular, you know, standard imaging. As Dr. Mankoff had talked about, that could be a CAT scan or a bone scan, and we really leave that up to the discretion of the doctor that's treating them. But essentially what we are trying to do is look for how they are responding to that treatment that now they have been getting for a couple of months.

**Andrew Schorr:**
All right. I have just have a couple of basic questions, and then we are going to take a break. And then we have been getting questions from Karen in Lake Arrowhead, California and Gail in Chandler, Arizona, people who are listening around the country if not around the world and are very interested in this.

Just quickly for you, Dr. Mankoff, so I don't know what a PET scanner looks like, so maybe you can tell us, and is it just that somebody has a simple IV? And you mentioned the word "radioactive," and that gets me a little twitchy. Is there any danger or harm? You know, just how safe is this?
Can Radioactive Materials Harm Patients?

Dr. Mankoff:
So the scanners are now getting to look like computers. The outside of the box looks the same, and it's what's inside the box that actually makes the difference. So a PET scanner actually looks very much like a CAT scanner or any other type of scan that the patients have had. It's actually a little bit more friendly than MRI scanners, much less confined and doesn't make as much noise. So from the standpoint of what the scanner looks like, I think most people that have been through a cancer diagnosis will have seen a scanner that looks like this.

In terms of what you do when you go there is you have to get an intravenous line. That's so that we can inject the radio tracer. And then mostly what you do is lie there. These pictures take a little bit longer than some of the other pictures. Sometimes the patients will lie on the table for up to a half an hour or an hour at a time while we are collecting the scans that come along.

It is radioactive material, and so it does carry some radiation dose to it, but in general because it is a very small amount of radioactivity, it's relatively low radiation, and in many ways the radiation that you get from this type of scan is actually lower than what you would get from a CAT scan which also involves radiation.

Andrew Schorr:
Okay. We are going to take a quick break. I hear some more SCCA messages about cancer which bring us great information as well. And when we come back we are going to continue with our questions. We have got some good ones.

If you would like to send us a question, just send us a quick e-mail to patientpower@seattlecca.org, patientpower@Seattlecca.org. Or give us a call. We would love to hear you on the show. We will be right back with more of our live webcast on molecular imaging for breast cancer and state-of-the-art trials at the Seattle Cancer Care Alliance. Stay with us.

Andrew Schorr:
Thanks for being with us this evening as we discuss really the very leading edge of imaging to try to understand what's going on with breast cancer when it has advanced or spread to other parts of the body. We have been talking about the biology of breast cancer tumors. We have talked so far about this estrogen tracer to match up with the estrogen receptors that may be at these remote cancer sites.

We have got a question in, Dr. Linden, from Gail in Chandler, Arizona, and it kind of gets at that. She says, "Are these trials working for minorities with breast cancer, and is race a factor for the trials?" And maybe implied on that is in certain minorities is it always estrogen that's at work?
Dr. Linden:
I actually think that, you know, we live in a melting pot here, and breast cancer is breast cancer. We tend to treat it individually by looking at the overall health of the patient and by looking at the specific type of breast cancer, and we see estrogen receptor positive disease in all kinds of people, including men, and we see estrogen receptor negative disease in all kinds of people. So a test is a test, and this particular trial and all our trials are open to everyone. We don't discriminate. And including again men, we try to make most of our trials open to men with breast cancer as well.

Does Breast Cancer Differ Among Races?

Andrew Schorr:
What I am getting at, though, is are there certain biologies of tumors that might be more prevalent in one race versus another? For instance I have heard this term among African-American women of the so-called triple negative?

Dr. Linden:
Yes.

Andrew Schorr:
And also meaning negative about estrogen, and so are there trials that are going to be looking at that? Will there be imaging to try to get at that as well?

Dr. Linden:
Right. Triple negative tumors are seen again in all races, so I don't think that they neglect Caucasians. We see aggressive, those are aggressive tumors, and we see them in people from many, many different racial backgrounds. Obviously this sort of imaging with and treatment of metastatic breast cancer with only endocrine therapy would be totally inappropriate for a triple negative tumor.

We do have other studies however that are targeting the more aggressive tumors, and there is a study run by one of my colleagues, Jennifer Specht here, looking at the locally advanced tumors, which are often triple negative tumors. And that does include some molecular imaging as well, which I bet Dr. Mankoff would be delighted to comment about, using both MRI and PET imaging. But the whole problem or the challenge with triple negative tumors is we don't have one molecule to target, whereas with estrogen receptor positive tumors we can be very specific and selective about the target.

Andrew Schorr:
So the way I see it, and I,

Dr. Linden:
So I think you are asking me whether or not there is a racial preference, and there is a study out of North Carolina suggesting that triple negative tumors are a little more common in African-Americans. However, another way to look at that data is to say that estrogen receptor positive tumors, especially the kind that occur late in
life in women on hormone replacement therapy, are less common in African-Americans. So I tend to try not to answer this question because I think that breast cancer doesn't have biases, and it attacks people from all different socioeconomic, racial types and even does attack, less commonly, men. So we want to be inclusive and just treat everybody and treat them based on the type of tumor they have, not based on other factors.

Andrew Schorr:
Right. Thank you for that. I am actually getting particularly at the imaging part of it though, and that is, so let me see if I have got this right. Dr. Mankoff, help me. So if we can look at the biology, however we do it, but what's really cool is we can do it noninvasively with the techniques you have been working on so we know what the biology is. And we have talked about this estrogen tracer, if you will, and we do have medicines that Dr. Linden has mentioned to try to kill those cancer cells that have that biology. And I know the drug companies and the National Cancer Institute and others, people around the world are working on other kinds of drugs for other kinds of tumors. So is the idea that we will know what it is and what it isn't, whether it is this type or that type, and then that will have better informed treatment approaches?

How Science is Helping Patients Make Informed Decisions

Dr. Mankoff:
Yeah. No, that's exactly the approach. As a matter of fact, the most important information one can get about a breast cancer when you are considering to treat the estrogen receptors is knowing that that estrogen receptor is not there. So in the kind of patients that we are looking at, they may have had the estrogen receptor in their initial cancer at the time of their diagnosis. The first inclination of the doctors is to go back and retreat, treat those cancers assuming those estrogen receptors are there again when the cancer comes back, and in fact the most important thing we can do from an imaging standpoint is identify that fraction of patients whose tumors have lost the estrogen receptors because there is virtually no chance of that treatment working.

So one of the most important things imaging can do is identify not only who is likely to respond to a particular targeted therapy, but more importantly identify who is very unlikely to respond to that targeted therapy so that they can move on to a different therapy that's likely to be effective in the cancer that they have.

Andrew Schorr:
Right. Right. And that's so important. And so let's talk about that. And actually we have a question that came in a little earlier. I just want to get to it from Karen in Lake Arrowhead, California, and she was talking about monitoring treatment. And she was saying, "Will monitoring responses guide the treatment so to speak? Will physicians stop the therapy if the response is not good?" And so I understand that PET can be used this way and maybe you can talk about with these leading edge tracers, could you not only look at what you have got, what to start, but also then when therapy starts, how is it doing?
Dr. Mankoff:
Yes. It's actually all, we are really trying to attack all parts of the process, and we are really one of the first groups in the country to use PET technology to be able to assess response to treatment. So part of the idea there is right now we are looking to see if the tumor shrinks to know whether our treatment works or not, but there is good reason to believe that the biochemical changes are going to happen long before the tumor actually starts to shrink and die off. And so we are actually using PET with a variety of tracers to be able to look at whether or not the tumor is responding.

So in the perfect world and the place we are hopefully heading towards at least in some patients is to think about this in a couple-of-steps process. Number one, let's say we want to pick an endocrine therapy, an estrogen treatment. Number one, is that target present? Is the estrogen receptor there? If the target is not present, we need to move on to a different type of treatment. Then once we have selected that particular treatment if the target is there, there is still no guarantee that that treatment is going to work. We want to use this advanced imaging to go back very early and tell if the treatment that we have chosen is working because again if it's not working, and we have more choices, which we do now for breast cancer, we want to move on to something else that's likely to be effective.

Andrew Schorr:
Wow. Well, I think it's a wonderful tool. Now, Dr. Linden, you deal with cancer patients throughout your day every day and hopefully for many years, that they can, you know, be either cured or you can have them manage the cancer chronically. When you think about these approaches and where it could go, what's your hope of how it could make a difference for those people you see?

Dr. Linden:
Well, what we know is that the patients who respond to anti-estrogen therapy actually do quite well, in part because we aren't giving them toxic treatments but also just because the biology of their tumor is very different. So what we hope is that we can use the imaging to identify the patients who are going to derive the most benefit and I think more intriguingly potentially identify the drugs that can provide more benefit, and so that we can provide less toxic therapies to people and even as we dream about what we could really do with research find a way to make the tumor become more sensitive to the less toxic treatment, the anti-estrogen treatment. So the tool is very powerful at many levels, and we are only just now beginning to look at its utility.

Andrew Schorr:
Wow. This is really cool. Erin, just before we go on, if someone says, wow, they are really on to a very leading edge of imaging that could maybe down the road help my doctor and I make decisions, is there a phone number they call or a website they go to? How does someone find out more?
Erin:  
Well, yeah. To find out about our specific studies obviously here at the Cancer Care Alliance, patients can contact, I am actually the coordinator for all of Dr. Mankoff’s imaging studies that include PET, as well as actually I work closely with Dr. Linden and Dr. Specht, as she mentioned, and other colleagues in her group. So my phone number is probably the best initial point of contact because I can provide them information about all of our studies and potentially, you know, point them in the right direction if they are interested in other types of imaging studies that maybe I am not the coordinator for but know who is. So I can give that phone number.

And I also think that a good resource is, the Fred Hutchinson Cancer Research Center website actually has, and the Seattle Cancer Care Alliance also, actually they are basically the same resource, they're linked, do have information about all the open and enrolling studies, both treatment studies and the imaging studies that have gone through this institution available, and that's if you go on to that website and look under breast cancer. Or if you know specific information about the study you are looking for it actually provides, I think, good information about what the study is, who would be candidates, etc. So that’s actually a very good resource for both.

Andrew Schorr:  
Okay. So your phone number, Erin? Let's give that twice.

Erin:  
My phone number is area code 206-288-6966.

Andrew Schorr:  
One more time.

Erin:  
206-288-6966.

Andrew Schorr:  
Okay. And then the website of course people can go to the seattlecca.org and take a look, look under breast cancer, look under clinical trials.

We are going to take a short break. When we come back, I want to ask our medical oncologist, Dr. Linden, and our radiologist, nuclear medicine specialist, Dr. Mankoff, about what this could mean in other cancers. And also we have talked about it taking a look at what's going on with advanced breast cancer, but what about earlier? So we will talk about that as we continue our live webcast on this whole new world that's under study, molecular imaging when we come back on this webcast sponsored by the Seattle Cancer Care Alliance.

Andrew Schorr:  
Welcome back to our live webcast. Now, as we mentioned, we do this every two weeks. So two weeks from tonight we are going to have a discussion that really
of interest to anybody who has been diagnosed with cancer or has that, as I like to say, in the rearview mirror, but still may even have some effects of treatment. We are going to discuss changes in intimate and sexual relationships after cancer. And with us from the Seattle Cancer Care Alliance will be Dr. Sylvie Aubin. So that's two weeks from tonight. Send us your questions. We would love to take them up during that broadcast.

But now let's go back to the final section of our webcast as we discuss molecular imaging for breast cancer and state-of-the-art trials for that at the Seattle Cancer Care Alliance. Now, I was mentioning that wouldn't it be great if this could also take a look at what's going on earlier in breast cancer or even in other cancers. So, Dr. Mankoff, what about that? So you are looking at cancer where it's spread to multiple sites, but couldn't this same technology give information for the many more people, men, as Dr. Linden said, as well as women, when the cancer is earlier?

**Dr. Mankoff:**
Yes. So it very much could, and as a matter of fact both in breast cancer and other cancers we have some of these trials going on in very early cancers. For example in breast cancer we will use this trial for women who have breast cancer that has not spread but who are treated either with hormonal therapy or chemotherapy before they go on to surgery. So we are already beginning to look at earlier stage tumors for this cancer and other cancer. We naturally tend to start with the more advanced cancers in this situation because that is a place where we are going to most likely gain the most information about imaging and where when we try to validate that the imaging works, we don't want to assume that a new technique obviously is giving us correct information. We really want to make sure that we are making intelligent decisions for patients before we put these new techniques into place. The more advanced cancers because they are more apparent make that easier to make those studies and to prove to us that we are doing this in the right way.

We actually have a program that has been based around imaging cancer biology for many years, over 20 years, that existed long before I got here directed by one of our senior scientists by the name of Dr. Kenneth Crone who directs our molecular imaging grant here that's been in place for a number of years. And that grant is really looking at these same targeted questions for a variety of cancers, not just breast cancer. So we are already doing that, and this same technology, you are absolutely right, can apply to a variety of cancers, especially those cancers where knowing something about the biology of the tumor is likely to affect treatment.

**Andrew Schorr:**
Dr. Linden, so where are we now? So I know this is, we are talking about a group of clinical studies, and so much in medicine needs, you need the data. I remember, you know, it wasn't that long ago when there was a lot of excitement about bone marrow transplant for women with advanced breast cancer, and then the studies came out, the really detailed studies and said, you know, this is not better. So I
know how important it is to do this in a step-wise fashion and understand the value of the information. So now while the studies are going on, what do you do with the information? And how might that change if the study, you know, proves to be very valid?

**Dr. Linden:**
Right. I think that you are right that we need information, but even with just the information that we have right now from clinical trials, we know that targeting the estrogen receptor is a very valid and effective approach. So there is nothing risky to the patient about trying anti-estrogen therapy for their estrogen receptor positive tumor. By participating in the imaging study, they will get a picture of what's going on throughout their body at multiple tumor sites. If the tumor is just in one spot in their spine we will look at that, but if it's in multiple bones or in multiple other areas, we can get an image of that. And so by participating in the study the patient is going to get the benefit of that with really no risk because the treatment decision is really based on a biopsy. I hope in the future we can do things where we actually determine what type of treatment we are going to do based on the imaging, but we are not there yet. We are close, though.

**Andrew Schorr:**
Right. No, it sounds like we are getting close now.

Erin Schubert, I have a question for you. So people are listening all over. So you mentioned about three hours at the Seattle Cancer Care Alliance, the University of Washington, but could somebody conceivably be an advanced breast cancer patient from some distance, come here, have the PET scan, the imaging, the tracer that's under study, and then go back to Alaska or Montana or Idaho or California, wherever they are, and be followed? So how could it work, or do you need to be a Seattle area resident?

**Erin:**
No. Actually absolutely I think we very interested in working with people within the network of community sites that oftentimes do send patients here for, you know, for a consult or a second opinion. And even if they weren't planning to do that, I think we are very interested in working with community doctors who are willing to treat their patients in this way. So, yeah. I think we have designed the trial really so that patients could come for sort of a single visit which may go over a day or two, but, you know, if patients are willing to come for a day or two at the beginning, get the visit with the oncologist just for our background information, get the PET scan, and then basically we are anticipating that we are going to have a number of patients that then would go back to their community doctor. And that doesn't necessarily have to be in Seattle. We have designed it so that that could be in Alaska or Montana or, you know, someplace else as long as they are willing to come here for that initial visit.

We do have those, at the three months and the six months we have a blood draw, but those are things that we have discussed, you know, either working out some way for patients to get that blood draw done at their outside doctor's office. And as
long as that's done in a consistent manner we are able to do that. So I think that it's set up so that it really is available to people that are interested in participating even if they are not planning to get the majority of their treatment here.

Andrew Schorr:
And Erin, what's that phone number again if they want to call you as the trial coordinator?

Erin:
So my phone number is 206-288-6966.

Andrew Schorr:
Okay. 206-288-6966. All right. We have really given people a lot of information now. I want to just go back to our doctors who are involved in this study for some final comments. So, Dr. Linden, it looks like we are on the verge of an age when you and your patients can have much more information to make informed decisions, and that's a good thing.

Dr. Linden:
Right. I think that that's, that's the idea of targeted therapy is to let people make informed decisions and let us really tailor the treatment appropriately to each patient.

Andrew Schorr:
Well, we have talked so much about personalized medicine, we have talked about targeted drug therapies, that you need to understand what you are dealing with, and now hopefully with increasing accuracy noninvasively we can get that information, and these new uses of PET scanning sound really cool for that.

Dr. Mankoff, I am going to let the final words go to you. So how would you sum this up? You have been working on this a long time. Dr. Linden and others have been working with you for many years. What are we looking at? Give me your crystal ball a little bit on how this could change cancer care.

How Research Continues to Change Cancer Care

Dr. Mankoff:
Well, Andrew, I want to start first of all by saying thank you to the patients who have participated in our trials because when we get started on our imaging we are offering experimental imaging that often may not benefit the patient, and it's really been a tremendously rewarding experience for me to see patients that are willing to come and participate in our trials in situations where many of them have already led to practices that are out the clinical practice and helping patients.

I think you hit the nail on the head. I hope we are heading towards personalized medicine, and personalized medicine depends upon having available drugs to be able to treat patients effectively, but equally importantly it depends upon identifying each person as an individual and identifying her tumor as an individual
tumor that's going to be treated in a very targeted fashion. So I see imaging as one of the tools that we are going to be able to use to drive personalized medicine. And it's been very rewarding to work in this for the last 10 to 15 years and see us evolving in that direction to the point where this simply wasn't feasible 10 or 15 years ago to the point where we are hopefully going to make this a clinical reality in the next few years and in some instances have already.

Andrew Schorr:
Wow. Well, I want to thank you, Dr. Linden, and the other colleagues, and Erin, you too at the Seattle Cancer Care Alliance and the University of Washington for your dedication to this research which will have impact not just for people who come to your institution, but people worldwide. So all the best with that.

And I would encourage people to consider being in a clinical trial. I was in a clinical trial for my leukemia, and I know it gave me great care. It worked out for me, but it's the care that most people get from my leukemia now around the world, and it felt really good to be part of it all. I will also tell you that when you are in a clinical trial they pay a lot of attention to you. You feel, you know, you have a lot of people in white coats around you, and I kind of liked that, you know, so I think you will find benefits. So I would urge you to consider it.

I also want to mention just as an aside that we at Patient Power and with our friends at the Seattle Cancer Care Alliance and the University of Washington, UW Medicine, we are having a potluck for people who participate in our Patient Power programs, and we are going to do it right near where our office is but pretty central in the Seattle area if you are around. It's on October 19th, Sunday, at the community center on Mercer Island, right in the center of the area, and we will put something up on our website, patientpower.info about that. But we would love for you to come and mingle with other empowered patients and physicians and providers like Dr. Mankoff and Dr. Linden and Erin Schubert who are very committed to people having empowering information to make decisions.

Thank you so much for joining us today. This is what we do on Patient Power, and we will have another program, remember, in two weeks from tonight, and that's going to be again on changes in intimate and sexual relationships after cancer. And we will have with us Dr. Sylvie Aubin. And we welcome your questions. Just send them to Patient Power, and send them to us at patientpower@seattlecca.org. Thanks to Dr. Mankoff and Dr. Linden at the end of their long day, Erin Schubert too, and we wish you a good night. I'm Andrew Schorr. Remember, knowledge can be the best medicine of all.

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.