Advances in the Treatment of the Brain Tumor
Webcast
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Raymond Sawaya, M.D.

Dr. Zwelling:
Welcome to Patient Power, the every-two-week series with many replays, and the upcoming schedule is on www.mdanderson.org back slash Patient Power. This is part of M. D. Anderson's commitment, whether you are an Anderson patient now or ever become one, for you and your family to know about the latest about cancer from a credible source.

Andrew Schorr is on vacation. My name a Dr. Leonard Zwelling. I'm a member of the faculty of M. D. Anderson. The subject tonight is brain tumors. We're going to be speaking with Dr. Ray Sawaya, who is chairman of neurosurgery a little bit later.

But first we want to talk to one of our patients. Tracy Schoettelkotte is a patient from M. D. Anderson who is a Vermont native and a graduate of the University of Texas Law School in 2002, after which she got married and got pregnant. She was at a law firm in Houston in September of 2002, and then her life changed dramatically. And I'm going to let Tracy tell you a little bit of what happened next.

Tracy:
Thank you very much for allowing me to come and share my story with you. Like you said, I had graduated from law school in May of 2002, and then my husband, Chris, and I, we were married in August of 2002. And we went on a beautiful honeymoon and came back, and I had started working only to find out very quickly that I had become pregnant. And that was with our plans but not quite so quickly. But lo and behold that had happened. And I was working and I was there about, I don't know, a week or two, and I started noticing that I was getting headaches. But I attributed all of that to being a pregnant lady and working now as a lawyer and feeling a little bit of stress there.

And I remember calling my sister, who is a few years younger than I am, who was also pregnant during that same period of time. And I called her and I said, I'm having these horrible headaches. And she looked up online and she said, That's normal. That's normal. That's what happens. You can't drink your coffee. You can't have the stuff you're used to. That's normal. So we all went forward with it that it was normal.

Dr. Zwelling:
When did you decide things maybe weren't normal?

Tracy:
Well, Christmas day. We had gone up to Vermont actually to say good-bye to my grandma. She was sick and we knew she was sick, so we all went up and said good-bye to her in Vermont. And she passed away on the 23rd of December. And we had all from then gone down to my mom and dad's in Roanoke, Virginia. And I was having horrible headaches. I could not talk really because the pain was so harsh. I couldn't stand up for any prolonged period of time. And we had had an early Christmas dinner. My brother-in-law had to get back to Atlanta that day, so we had an early Christmas dinner. And I was helping clean up after that, doing some dishes and all of a sudden I just couldn't stand up any more. So I was kind of down on my hands and knees in the kitchen at my mom and dad's house, and I just felt that something was wrong.

And so my husband, Chris, and my dad took me to the hospital. And my dad had worked at the hospital, so we got in right away and started doing testing. And I was there an hour, hour and a half, did all sorts of tests, nothing came up. Didn't seem like anything was wrong. They lastly decided that we were going to do a quick scan, CAT scan. And I can remember my husband being in the scanning room where he was watching all the pictures. He tells this story greatly, where he is looking at this big red blog in my brain.

They call us out, we're done, and I was sitting in the waiting area, or I was actually on a bed, I think, and in came an OB-GYN. And she was telling me that I had a brain tumor the size of a baseball, and they weren't really sure what to do, but they were going to make calls to their oncologist. It was Christmas day, so they were making all sorts of calls at that point. So we were there a couple hours, and the oncologist there, or the neuro-oncologist maybe he was, came in and said that he recommended that we get surgery right away, maybe the next day or two more days down the road in Richmond at the hospital there. And he thought that I had three months.

Dr. Zwelling:
To cut to the chase, of course, how did you make it to M. D. Anderson?

Tracy:
To cut to the chase, between my husband and my father, they said there's no way you're going to have surgery here at this hospital or at any other place here in Virginia. My husband had made contacts earlier. The best man in our wedding, actually, was a patient here at M. D. Anderson and he's still kicking and screaming around now. So he had made some calls there and he just started on the phone that night, and by the next day we had a plane coming back home and I had a meeting scheduled on the 27th with Dr. Sawaya.

Dr. Zwelling:
What did Dr. Sawaya say to you when he met with you on the 27th?

Tracy:
The thing that I remember Dr. Sawaya saying to me is we're not going to do anything yet but go forward and we'll see what happens. We're not looking at three months down the road so.

Dr. Zwelling:
What exactly happened? You saw Dr. Sawaya two days after you were seen in Virginia, and I believe you were operated on a couple days later.

Tracy:
We had originally scheduled for I think around the 4th or the 5th of January, and then I kind of took a bad turn. I had some more trouble with my ability to speak and communicate, so I went back in again and we did another scan I think, and we just decided or Dr. Sawaya decided that we were going to do surgery earlier. And we did surgery New Year's Eve. And he got to miss out on any party with his wife that night and he saved me.

Dr. Zwelling:
Before we bring Dr. Sawaya in, tell us a little bit about the difference of what your experience was between the hospital in Virginia and the hospital here in Houston, M. D. Anderson.

Tracy:
One was positive and one was not.

Dr. Zwelling:
Tell us about that.

Tracy:
The attitude from day one was we'll get this fixed--

Dr. Zwelling:
At M. D. Anderson.

Tracy:
At M. D. Anderson. Absolutely. Absolutely. And it is today. It hasn't changed. And it can be from anyone who greets you at the front door to the surgeon to the assistants that are working there. They just all are warm and supportive like none other.

Dr. Zwelling:
We like to hear that, of course. I'm going to bring Dr. Sawaya on in a little bit to talk about brain tumors, but I think the first thing we'd like to ask Dr. Sawaya is

specifics about Tracy's case. How did this--how did you approach this? And is this a typical or atypical presentation for brain tumor?

Dr. Sawaya:
It is a typical presentation, but some of the specifics that I think are important to mention here, one, it was a large tumor that was near the speech center. So that presented a specific challenge that I will talk about in a moment. The other challenge was she was pregnant, and the risks with anesthesia, the risk of inducing labor--of course, that would be premature labor in a cancer hospital. That was not something that obviously we wanted. So to make a long story short, we decided to do the operation with Tracy awake during the main part of the operation.

Dr. Zwelling:
And that's something that's fairly unique for brain surgery. You couldn't do this with abdominal or chest surgery, could you?

Dr. Sawaya:
That's correct. And the advantage of doing it awake were twofold here. One, we would give Tracy much less anesthetic, so the effect on the baby would be very limited. But the other crucial advantage is that we can monitor her speech abilities, her language abilities while we are removing this large tumor that is very near her speech center. And, in fact, we did that. And you have heard from her earlier that she was having some speech difficulty because obviously there was pressure on that area.

As far as her presenting in the way she described, it is very common to present with headaches, and that's usually when tumors are large in size. And those headaches are not transient. They are not temporary headaches. These are headaches--we all get headaches, and that doesn't mean we have a brain tumor. The headache has to be a persistent headache. It may get better, it may get worse, but it persists over a period of time. And you heard that that's the way Tracy presented with her symptoms.

Very briefly, other ways to present with a brain tumor would be to have a seizure. This is actually a common way to present with a brain tumor, a seizure, meaning a convulsion. That's where usually there's jerking movements of the muscles of one side or the other. And ultimately one can have what is called a grand mal seizure, meaning where the patient actually passes out, they may bite their tongue, they may lose control of their bladder. But that's the most extreme, and that's the most dramatic form. Most seizures are really not grand mal. Most seizures are more minor.

So seizures, headaches, and some neurological impairment are the three usual form of presentation with a brain tumor.

Dr. Zwelling:
How common are these brain tumors? We should distinguish between primary brain tumors and secondary brain tumors. Why don't we talk about that real briefly and then we'll focus on the primary.

Dr. Sawaya:
Yes. Indeed, so any cancer can travel through the blood into the brain. However, there are certain cancers that tend to do that more commonly and those are lung cancer, breast cancer and skin cancer in the form of melanoma. So those are the three leading causes. So patients with these three types of cancers tend to have almost routine assessment of the brain during their evaluation and treatments to make sure that these cancers have not spread to the brain.

Dr. Zwelling:
But these were not what Tracy was faced with?

Dr. Sawaya:
No. So Tracy had a primary brain tumor. Primary brain tumors tend to be less common than metastatic or what we call secondary brain tumors. Primary brain tumors can be benign or can be malignant. Tracy's tumor was a highly malignant form of brain tumor called glioblastoma. And the treatment of these tumors vary depending on the location, on the type of tumors and on a number of other factors, as a matter of fact, that we can review.

Dr. Zwelling:
We're going to get to the treatment of brain tumors and also the specifics of Tracy's treatment which we've only partially covered.

If the audience has any questions please call 877-711-5611. Or send us an email at patientpower@mdanderson.org. And we'll be right back in a few seconds. Thank you.

We're back with Tracy Schoettelkotte and Dr. Ray Sawaya, chairman of the department of neurosurgery at M. D. Anderson Cancer Center in Houston, Texas. We have a caller from Florida, caller Linda from Florida. Can we hear Linda's call, please?

Caller:
Hello.

Dr. Zwelling:
Hello, Linda?

Caller:
Yes.

Dr. Zwelling:
This is Dr. Zwelling, you want to ask your question? We can hear you.

Caller:
Yes, I do. I have spent the last two years there at your facility at M. D. Anderson in Houston, and my younger brother passed away with a glioblastoma. And I'm also a nurse practitioner, and I was very much involved in his care and questions and treatment. And one of the frustrations that I experienced with his care there was not being able to find out if he had--my understanding was there is an enzyme in the brain that if it is not active the Temodar works more effectively than if it is active. And in order to find out if the enzyme was active it had to be sent in to NIH or something, and the time that evolved during that period would not be productive for his treatment.

And my question is has anything changed in the last year and a half that would provide patients with that information to know if Temodar was going to be the primary drug that would be beneficial to treatment.

Dr. Zwelling:
Okay. Thank you very much, Linda. Dr. Sawaya?

Dr. Sawaya:
Yes. So the enzyme is called MGMT for short, and it's easier to remember this way. The MGMT a year and a half ago was just coming in focus, so the testing for it was not widely available. Now that it is recognized to be an important test it is readily available and it is available at M. D. Anderson.

Having said that patients even who do not have an active MGMT enzyme can still benefit from the Temodar, but they may not benefit as much as patients in whom the enzyme is not active. So the treatment will still go on, but it's important to know the information about the enzyme. You're absolutely right.

Dr. Zwelling:
And in general that's something that we're trying to develop in all kinds of cancers. See if we can identify something about the cancer that would lead us down one pathway or another when it comes to treatment. So that's a very good question. Thank you Linda.

I want to go back to talk a little bit about brain tumors in general, and then we're going to get back to some of the other therapy that Tracy was involved in. How common are primary brain tumors, Dr. Sawaya?

Dr. Sawaya:
So primary brain tumors are not very common tumors, and I'm saying this in comparison with cancer in general. There are approximately 40,000 new primary brain tumors in the United States per year, and a little over half of these tumors are malignant and a little less are benign.

Dr. Zwelling:
And benign tumors, I assume, we can treat with surgery alone most of the time.

Dr. Sawaya:
Most of the time if they progress, if they cause symptoms, if they enlarge. Some benign tumors we actually watch, because they produce small risk. However, any tumor that shows evidence of growth is a tumor that is a potential risk, because it's going to press on critical brain. So a benign tumor that is growing or causing symptoms, they are removed, and therefore that's an operation. And most of the time--although there are now some forms of radiation that can be used for small benign tumors, called radiosurgery or Gamma Knife radiosurgery.

But without going there, I think a benign tumor that is growing if it is completely removed, that usually results in a cure, meaning the likelihood of this tumor coming back would be very, very small. The malignant tumors obviously present a much different challenge.

Dr. Zwelling:
One of the things that people have talked a lot about, particularly in recent years, is the risk factors for cancers in general and specifically the risk factors for brain tumors. One of the things we hear a lot about is cell phones and power lines and diets. What really is known about the association between things in the environment and the onset of brain tumors?

Dr. Sawaya:
So, unfortunately, with today's science and knowledge we do not know what causes the majority of primary brain tumors. Cell phone have been studied. There have been numerous high quality, large-volume studies that have come up with no evidence of a relationship between cell phone use and the occurrence of primary brain tumors. So I believe that we have put that issue to rest, although a lot of people keep bringing it up.

Dr. Zwelling:
Oh, yeah. We hear it a lot.

Dr. Sawaya:
So in general speaking, we do not know what causes these tumors. Why a young, healthy person like Tracy develop a tumor like this, we don't know. Unlike smoking and lung cancer or ultraviolet radiation and melanoma skin cancers where we know there is a strong relationship, we do not have such knowledge for brain tumors.

Dr. Zwelling:
Let's return to Tracy specifically and talk a little bit about what is done beyond the surgery. Tracy, can you tell us what was done after your surgery?

Tracy:
After my surgery, they gave me about a month to recover from that, and I started at the end of January, beginning of February with radiation. And I went through six weeks of radiation and finished that the first week in March.

Dr. Zwelling:
You had some sort of special radiation, though, because of your condition, did you not?

Tracy:
I did. They had this big, huge plate of metal--and I don't even pretend to know what it was--but they had developed this plate that would sit just under my chin and kind of cover me from--make a difference between where the radiation was going in my brain and where it would go to Jeffrey.

Dr. Zwelling:
To help protect your child.

Tracy:
To protect Jeffrey, that's exactly right. And so we did that. They created this monster machine and put it in front of my face, and we got zapped quite a few times. Or at least I did. Beautifully. It was wonderful. But Jeffrey didn't, and that was just an unbelievably wonderful thing that happened.

Dr. Zwelling:
Tell us about that. Your son was born--

Tracy:
He was born in May 2003, and he is a very healthy young little boy now.

Dr. Zwelling:
And how did your pregnancy go? Did it go pretty normally for a first pregnancy?

Tracy:
It went very well. We did induce labor a little early, so he was I guess now five weeks early. And he was born very healthy. He did stay in an NICU for about six or seven days but came home, and he's doing very, very well right now.

Dr. Zwelling:
Before we go on I want to remind people who are listening that they can give us direct calls at 877-711-5611. Please call if you have a question for Dr. Sawaya or for Tracy.

What happened after the baby was born? You were not finished with your therapy at that point, were you? You've had surgery now. You had special radiotherapy. What was next?

Tracy:
After I had Jeffrey--we did a C-section with Jeffrey, so they gave me about another month after that, and I started doing my chemotherapy. And I guess I went through four rounds.

Dr. Zwelling:
You got procarbazine, vincristine and CCNU, I believe, is what I think you told me.

Tracy:
That's right. That was my trio.

Dr. Zwelling:
Were there any side effects from that?

Tracy:
I lost some hair. I gained some weight. One of the things when I was pregnant with Jeffrey is they put me on steroids so that we could make sure that he was going to be as big and healthy as he could be.

Dr. Zwelling:
And fully developed, yeah.

Tracy:
So I had gained some weight. Lost a lot of hair. Got very tired. I did not really get very sick in terms of, you know, having to monitor, and, you know, I wasn't throwing up or anything like that. But I was very, very tired. And I had to definitely make sure that I spent some time and was okay to rest and do those types of things.

Dr. Zwelling:
Did you recover your energy after the chemotherapy stopped?

Tracy:
It's taken a while, honestly. I'm now coming up on three years of--is that about right, Dr. Sawaya? So I'm doing very well right now.

Dr. Zwelling:
Still disease free. That's the most important.

Tracy:
Indeed. Very happy to tell everyone that.

Dr. Zwelling:
But tell me a little bit about--you did return to work at some point, did you not?

Tracy:
I returned to work as soon as I could. I did not want to let this brain tumor, this brain cancer get in the middle of my life, my dreams. I had always wanted to practice law, and I had started school, the school of law later on in life than most. And I was 30 years old, and I wasn't going to let anything get in my way at that point in time.

Dr. Zwelling:
How long did you continue to work at that point?

Tracy:
I started right after Jeffrey was born. I took my six, eight weeks, whatever it was then and then started back to work then. And right now I've taken a year off, leave of absence, and doing some work at the Mind Clinic.

Dr. Zwelling:
Tell us about the Mind Clinic, because I thought it was a fascinating part of what M. D. Anderson has to offer.

Tracy:
Yeah. I will be in my fifth year December 25th, Christmas day. And one of the things that has occurred is my memory, my ability to remember things or get access to the things that I need to remember has changed a little bit, and part of that is because of where my tumor was and the cognitive abilities that are stored there. Part of it is probably a little bit because of whatever, the radiation or the chemotherapy. Whatever it was, we now see some impact.

And so what we're trying to do at the Mind Clinic is to develop a way for me to easily access the things that I need to access that aren't where they used to be. It's kind of like I used to be able to go from A to B to get to a letter or a word, and now I have to kind of go around a whole big mountain to get to it sometimes.

Dr. Zwelling?
And this is something that they actually can train you to do?

Tracy:
They're working on it.

Dr. Zwelling:
Could you find that you've used some of the techniques that you were given?

Tracy:
Absolutely. And a lot of the things that we're doing is making sure that I'm keeping a written gallery, kind of, of things that I need to do and things that I am doing and then sitting down--one of my other problems is reading and the attention span that I can put forth on that.

Dr. Zwelling:
Do you tire?

Tracy:
Yes. And I can usually do it for a couple minutes, and then I feel like I have to do something else. So I've lost some of the skills that I used to have in reading and writing and filtering that information through, which obviously is and was very important in practice of law. So we're going forth and trying to figure out what we need to do there in order to get me back up to speed.

Dr. Zwelling:
Let me remind people who are listening to us that they can call us in with questions at 877-711-5611. Or send us an email at patientpower@mdanderson.org. I'm Len Zwelling from M. D. Anderson with Dr. Ray Sawaya and Tracy. And we'll talk a little bit more about Tracy's therapy when we come back. Thanks.

This is Len Zwelling back with Patient Power and Tracy and Dr. Ray Sawaya. And I see Linda has called us back with another question. Can we have that question, please? Linda, are you there?

Caller:
Yes. My question related to the fact that while my brother was in treatment in your facility he had significant platelet problems and his bone marrow would not reproduce the platelets he needed in order to continue his Temodar treatments and ended up on significant doses of Accutane and steroids and continued to deteriorate and passed away. And being a nurse practitioner, I continued to do research for several years concerning this and ran across a program in Alabama where they were doing a scorpion extraction of the scorpion poison and injecting that directly into the glial cells and were having some significant positive results as a result of doing that.

And my question is has M. D. Anderson done anything collaboratively with this or have they--do you have an opinion at this point after a year or two if there's any value in that process?

Dr. Zwelling:
Dr. Sawaya?

Dr. Sawaya:
Yes. As a matter of fact, we have a very strong collaborative effort with the neuro-oncology and neurosurgery group at the University of Alabama on a program. It does not use a scorpion poison. It uses a adenovirus. We call it the oncolytic virus or the Delta 24. And this is a very important new approach that we are about to start at M. D. Anderson. This is a project that has taken four years, along with the team at the University of Alabama, to finally get the FDA approved to use that virus to inject directly into brain tumors. And we anticipate that this protocol, which is ready to be used, will be available and approved by the fall.

Dr. Zwelling:
Is there something unique about brain tumors that sort of begs for an approach that's more direct when it comes to drugs? We hear about the blood-brain barrier as possibly being something that will interfere with conventional chemotherapy. Can you talk a little bit about that?

Dr. Sawaya:
Yes. This is a very, very important point. Indeed, there is a blood-brain barrier that we all have in our brain which is intended to keep toxic molecules, toxic substances, drugs from getting into the brain and damaging the brain. So the blood-brain barrier is keeping many of these molecules, which unfortunately includes a number of drugs that could potentially be used against brain tumors.

Now, some of newer drugs like you heard earlier the Temodar, or temozolomide, is one that does cross the blood-brain barrier and is effective, but there are other drugs that are unable to. So that's why you see that there are tendencies in some patients to have the drug or the molecule or the whatever is being tested to be injected directly into the brain tumor.

The down side of that, obviously, is that those are invasive methods where you have to use a needle, you have to transgress into the brain as opposed to taking a pill orally, which would be the ideal.

Dr. Zwelling:
Let's talk a little bit about--I would like to cover two things before we finish. One is how specifically were the drugs selected for Tracy? How did you pick the drugs you picked? And we also don't want to miss the issue of clinical trials of all forms. Are there new forms of surgery? Are there new forms of radiation? And are there new forms of chemotherapy and other forms of therapy? So let's start with Tracy's particular drugs. How did we pick the drugs we picked for Tracy?

Dr. Sawaya:
So Tracy, as you recall, he tumor was discovered in 2002. It was a time when Temodar was not yet fully established and widely used. Back then--and those studies have initially come out of University of California in San Francisco and were used widely at M. D. Anderson, used a combination of drugs, three different drugs. And the reason those drugs were used is because they of course have demonstrated some activities against these types of brain tumors, and they do cross the blood-brain barrier. However, using three drugs obviously increases the toxicity of these drugs such as decrease in platelet count and anemia and things like that.

So now we have moved into a single drug, Temodar, which has shown definite effectiveness against a particular type of tumor that Tracy had, which the glioblastoma.

Dr. Zwelling:
And she was also given, after the conventional chemotherapy, she was given Accutane, which is usually thought of as a medicine for acne.

Dr. Sawaya:
Yes. So Accutane, the story behind Accutane actually came out of M. D. Anderson. Our neuro-oncologists at M. D. Anderson were studying that drug in the laboratory in dishes on cells that were growing in the laboratory. Accutane is a drug that helps differentiate cells, meaning it helps make cells become mature. So if you have an aggressive tumor it might make it behave better. And that's where the idea came from, and trials were attempted at M. D. Anderson. And surprisingly we saw responses in patients who had failed other forms of chemotherapy. And that has established Accutane as a commonly used drug. It has low toxicity. It may dry the skin, but in terms of bone marrow toxicity that is very, very low.

Dr. Zwelling:
How long do patients usually take it for?

Dr. Sawaya:
They take it for a prolonged period of time, in years.

Dr. Zwelling:
Once again let me remind people who are listening to us that the call in number is 877-711-5611. If you have a question for Dr. Sawaya or Tracy, please call us. Or if you would like to email us, patientpoweratmdanderson.org.

Let's talk a little bit about what's new and what's on the cutting edge, because certainly people expect M. D. Anderson to be doing the newest and the most interesting sorts of ways to develop new therapies for cancer. What's new in the surgical world, particularly at M. D. Anderson? And we're going to give a little bit of a hint at what's coming up in August with the brain suite.

Dr. Sawaya:
Yes. So technology plays a major role in neurosurgery in general and in brain tumors in particular. I've already described to you the situation that Tracy faced with a large tumor in a very critical part of the brain, and the ability to remove such a tumor cannot be taken for granted, because for a long time these tumors were considered inoperable. And in fact as you heard Tracy was not given a very positive prognosis when she was first diagnosed. So the technology which uses the ability to image the tumor and to show us exactly where we need to go in relation to the surrounding brain is a critical part of the advance that we experience right now.

And so we have now operating rooms that have many computers, that have many guiding equipment that all are aimed to help the surgeon see better where to go, where to find the tumor and where to avoid the surrounding critical brain.

Dr, Zwelling:
Just like surgery radiotherapy is a local form of therapy. Is there something new in radiotherapy for brain tumors?

Dr. Sawaya:
Yes. Actually, the radiotherapy mirrored the advances in surgery. Why? Because it is again based on images. So the radiation is a beam, is an x-ray beam that penetrates tissues. Like a chest x-ray, for instance. Well, if you don't guide that beam precisely to the tumor, then you're going to have that x-ray or that radiation penetrate healthy brain. Now, there will always be some x-ray going through healthy brain, and that's okay. That does not cause any harm. It's the majority of the x-ray beam that needs to be focused on the tumor, and this is the form of radiation called either stereotactic radiation or conformal, meaning it conforms to the shape of the tumor.

And that really is a tremendous advance that has gradually taken shape and place over the last, say, ten years, but mostly in the last two to three years. A technique called IMRT is precisely doing that, is conforming the radiation to the shape of the tumor.

Dr. Zwelling:
Has the new proton therapy been used for brain tumors at all?

Dr. Sawaya:
Yes. So, again, a brand-new proton radiation facility just opened at M. D. Anderson about a year ago. And proton radiation has a particular advantage of being able to be focused on the tumor even more than standard forms of radiation. That's why there's so much interest in proton radiation therapy now. And the closer a tumor is to a critical structure in the body, such as a spinal cord or the brain stem, the more beneficial it is to use the proton facility.

Dr. Zwelling:
The last part of it, of course, is chemotherapy. And people think of clinical trials when they think of chemotherapy. Are there specific new chemotherapies or other clinical trials, maybe even gene therapy, for brain tumors?

Dr. Sawaya:
So, really, this is a very, very rich field, and we feel fortunate that it is so because these tumors are formidable. We are of course proud of Tracy and how well Tracy has done, but sadly, I would say, that many patients--I would almost say the majority of the patients will not do as well as Tracy did, so we cannot lose sight of that. So it's exciting to know that there are many, many avenues, in fact, many more than I can cover in this program, but nevertheless, let me hit on some of them.

Dr. Zwelling:
Please.

Dr. Sawaya:
I mentioned earlier this gene therapy project, which I think is very promising and will be tested at M. D. Anderson as well as the University of Alabama starting, hopefully, this fall. There is a vaccine trial which we have conducted at M. D. Anderson, the results of which are extremely encouraging. The vaccine, one would think that you would take an injection before you have a tumor to prevent a tumor, like before you have an infection. Well, that's not really the principle. A vaccine against cancer is to--even though the patient has the cancer if you could teach the immune system of that patient to recognize that cancer and therefore to begin to fight against it, that is a vaccine.

And so we have used a specific marker that exists on these glioblastoma cells, and we are vaccinating patients with this type of tumor that have that marker on their tumors, and it is amazing to see the response of the immune system in these patients, and we're seeing definite prolongation in survival of these patients who have gotten the vaccine.

Dr. Zwelling:
And there are immune cells in the brain, are there not?

Dr. Sawaya:
Yes, there are immune cells but, unfortunately, these tumors tend to suppress the immune system. That's part of why they are so vicious, so difficult to treat. And so we're trying to trick those tumors by boosting the immune cells that go to the brain and hopefully kill those tumor cells.

Dr. Zwelling:
And what about conventional chemotherapy? Are there new drugs that seem to be specific for brain tumors?

Dr. Sawaya:
Yes. Temodar is--again is a drug that just came out, and yet it has significant effectiveness.

Dr. Zwelling:
And that's an oral agent, isn't it?

Dr. Sawaya:
It is an oral agent with low toxicity that is well tolerated by patients. But there are others. And we are also able to take those drugs that are unable to traverse, to go through the blood-brain barrier. We are modifying them in the laboratory to make them go in the brain.

Dr. Zwelling:
We'll be back in a little bit. This is Dr. Len Zwelling from M. D. Anderson. Please remember to call us at 877-711-5611. Or send us an email at patientpower@mdanderson.org. We'll be right back. Thank you.

Hi. This is Dr. Len Zwelling from M. D. Anderson. We're here with Dr. Ray Sawaya and Tracy Schoettelkotte. And we're going to talk a little bit about some of the doctors that Tracy saw besides Dr. Sawaya. She didn't just see one doctor. She might if she were in the community. Tracy, tell us a little bit about who else you saw.

Tracy:
I saw several doctors, actually. My oncologist, who I still see regularly today, Dr. Morris Groves. I remember sitting down with him prior to my surgery very briefly. And then I also prior to my surgery sat down with the neuroradiologist, Dr. Maor, who was just incredible. And he is now retired, but we're missing him there. But those are the two that come off the top of my mind. I know I was also speaking with other people within M. D. Anderson that were not necessarily surgeons or other specialists in the brain surgery and treatment but in the emotional impact of brain cancer and those types of things. And the therapy and the important support of family and the family support that they have at M. D. Anderson and the abilities and programs that are established for your family members as well.

Dr. Zwelling:
Great. Dr. Sawaya, we'd like to hear a little bit about how M. D. Anderson has this multidisciplinary approach. We hear about it all the time with all the tumors, and let's just talk about the specifics of multidisciplinary care for brain tumors.

Dr. Sawaya:
This is really a very, very crucial point, because there's really no one specialist that can handle all the complexity of a disease like glioblastoma. So the ideal setup is that that brings all the specialties or subspecialties that are involved in the evaluation, management, care and eventually outcome of the treatment of these tumors. And this is very complex because there are many, many physicians and specialists behind the scenes that perhaps, frequently, the patients don't even meet.

Let me emphasize, for instance, the important role of the neuropathologist. Now, an experienced neuropathologist knows how to read the slides that come out of the tumor. When the tumor is taken and it's sliced, it has to be evaluated. And an expert neuropathologist can make the right diagnosis. Making an error in calling a tumor can lead to a number of problems past that point. So clearly, accurate diagnosis is a critical part and an experienced neuropathologist is an essential member of the team.

An experienced neuroradiologist that is going to help the surgeon and the radiation therapist see where the tumor is in relation to critical brain and later on will help the neuro-oncologist tell whether this tumor is trying to grow back, whether what we are seeing on the scan is scar from the radiation or from the surgery or from the drugs. Those can be very, very difficult to evaluate. And the need to have an expert neuroradiologist that is experienced is essential.

Now beyond this, obviously, you've already heard the surgeon, the radiation therapist or oncologist and the neuro-oncologist, these are key members of the team, each of them bringing their expertise, their experience to deliver the best treatment possible.

Dr. Zwelling:
One thing we did not cover, and we should because it's an important part of brain oncology, is children with cancer. That is not the same disease, is it? It's something different when it comes to children with cancer.

Dr. Sawaya:
Yes. There are a number of differences. Actually, most children's tumors respond better to treatment than adult tumors. That is a good thing. The limitations in children's are probably on two levels. One is the radiation therapy on a young brain can lead to significant problems in terms of growth, maturation, development of the brain. So there are very, very special cares that are delivered. And in fact in children younger than five years of age the radiation is avoided all together. So there are those specific situations that we have to pay attention to.

The other aspect related to the novel drugs. There are now new drugs that are being tested in adults that may be promising, but we have limitation in testing

them in children because, again, of the young age of the child and not knowing whether these drugs will cause some permanent toxicity for a body that is growing and a brain that is growing. So there are those limitations. Otherwise the same principles apply, the surgery, the radiation, the chemotherapy, the expert assessment of the tissue, the radiology, all these are similar to treatment in adults.

Dr. Zwelling:
And a big issue with children after brain surgery and if they do get radiation, I guess, is learning disorders that can follow.

Dr. Sawaya:
Yes. Indeed, definitely the effect on intelligence. But, again, I will emphasize that a child has a greater capacity than an adult brain to recover. So the role of rehabilitation both cognitive, related to the brain function, or physical rehabilitation can lead to remarkable improvements in children.

Dr. Zwelling:
Tracy, I just thought we might ask you a question that's a little bit off the subject. But what do you do for fun now that you can have fun? Because the surgery and the radiotherapy and the chemotherapy certainly weren't fun.

Tracy:
Well, I'm playing golf again and hitting a little better than I was maybe four years ago.

Dr. Zwelling:
Is that a side effect of the surgery?

Tracy:
I think so. Definitely. Don't ask my husband, though.

Dr. Zwelling:
Okay.

Tracy:
Doing that. We're traveling still. We are taking Jeffrey here and there, baseball games, soccer games, football games, all those types of things that a family would do.

Dr. Zwelling:
Great. Yes, Dr. Sawaya?

Dr. Sawaya:
Support group. We should not forget about the need to seek help when necessary, when required. The need to network. One needs to meet with other patients who may have gone through this process before you, to learn from them, to help you, to guide you, as well as social workers who specialize in that.

Dr. Zwelling:
Our next broadcast will be on August 7th with Dr. Jeffrey Weinberg discussing The BrainSUITE: Image Guided Cancer Neurosurgery. I'd like to thank Tracy Schoettelkotte and Dr. Ray Sawaya for coming on the show today and talking about brain tumors.

You can rehear this broadcast on mdanderson.org/patientpower shortly. If there are any other call-ins or emails please go ahead and send them in. We'll try to answer those questions. Thank you very much. This is Dr. Leonard Zwelling from M. D. Anderson.