

Advances in Pediatric Bone Marrow Transplant

Webcast

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Introduction

Andrew Schorr:

A cancer diagnosis at any age can be frightening, especially when a young person is involved. In this program Dr. Scott Baker from the Seattle Cancer Care Alliance will discuss the latest advances in pediatric bone marrow transplant and also immunology treatments. And we'll also meet a patient who has received not one but two transplants. Learn more about how these treatments are providing hope for many. It's all next on Patient Power.

Hello and welcome to Patient Power sponsored by the Seattle Cancer Care Alliance. I'm Andrew Schorr. Well, when we think of our children, imagine your child being diagnosed with cancer and then being told that what is needed is a what we've always called a bone marrow transplant, sometimes a stem cell transplant, but actually a therapy that was developed in Seattle, and one of the leaders in the field won a Nobel prize for it, Dr. Thomas. It started right in Seattle. Well, as you can imagine, at the Seattle Cancer Care Alliance they have a lot of expertise, and it has been such a hopeful story. It's been refined, and for some people it has truly been lifesaving. We're going to learn more about that.

Anna's Story

Andrew Schorr:

We're going to hear from an expert, Dr. Scott Baker in a minute, but I want you first to meet Anna Robinson. Anna is 26 and lives in Seattle. She graduated from one of our best colleges, Smith College back East, but between your junior and senior year, was it, Anna?

Anna:

Yes.

Andrew Schorr:

Was that when all this started?

Anna:

Yes, when I came home from my junior year of college I had large bruises on the back of my legs from rolling luggage bumping the back of my legs, and my parents

were concerned. My dad told me to go to the doctor because, he didn't tell me this until later, but the bruising reminded him of a family friend who had had AML about 10, 15 years ago, and his first symptoms were bruising, bruising on his arms.

Andrew Schorr:

And you were also having some dizziness and some tiredness?

Anna:

Yes. I was working about two blocks away from my house, and every day that walk just got longer and longer. And finally when I couldn't walk up a flight of stairs without having to put my head down because I was so dizzy, my mom and I finally went to the doctor.

Andrew Schorr:

And you go to your family doctor, and the doctor does a blood test and comes back with this diagnosis of you said it, AML, acute myelogenous leukemia. Did you have any clue has that was?

Anna:

I had a vague notion because of our family friend going through it. I remember having to wash my hands a lot going over to his house, but it was just very surreal and very, you know, this is a dream. This isn't real.

Andrew Schorr:

Or a nightmare I imagine for your parents and for yourself. There you are a college student with your life in front of you, and now you're being told that potentially your life is on the line, right?

Anna:

Yes, very much. And I sort of regressed. I was 21, starting to become an adult, and suddenly I felt like I was an eight-year-old child again.

Andrew Schorr:

And you needed a lot of people to take care of you, sure.

Anna:

Yes.

Andrew Schorr:

And so 21, diagnosed in the summer of 2006. You find out that your sister Becky, your younger sister, is a perfect match.

Anna:

Yes.

Andrew Schorr:

You move forward with two rounds of chemo and then the transplant, and we're going to understand better how that works from Dr. Baker. But unfortunately eight months or so later after recovering from the transplant, you go with your boyfriend to Utah. How were you feeling?

Anna:

Well, I now had exercise-induced asthma. Because through the stem cell transplant she had exercised-induced asthma and then suddenly I had it. So hiking I had that, but then something also felt wrong on top of that. I sort of had to put my head down to get blood to my head. I just was feeling light-headed and more so than just not being able to breathe very well.

Andrew Schorr:

And you had relapsed.

Anna:

Yes.

Andrew Schorr:

And so in the end you had a second transplant, and that was with a matched unrelated donor, and that one kind of worked. I know you needed some additional lymphocytes from that donor later, but that worked, right?

Anna:

Well, we also did a few things differently in the second transplant. After the first one I went on tacrolimus and also on steroids, and the second transplant we put me on a very short course of tacrolimus and a very short course of steroids, and I have only had very short courses of steroids after the second transplant, not prolonged ones, and that's to encourage the graft-versus-leukemia effect.

Andrew Schorr:

Right. Right. For those donor cells to fight the leukemia that you had. Well, the good news is is that while you go on and you take a pill to help you also keep things in check, and you've had some side effects of the steroids. For instance, I know not too long ago you had a hip replaced.

Anna:

Yes.

Andrew Schorr:

But today you're doing pretty well?

Anna:

I think so. I am getting my energy back and I'm able to get out and exercise, and I'm starting to look for work now.

Andrew Schorr:

And starting to feel like the adult that you wanted to be.

Anna:

Getting there, yes. I've sort of gone through my teenage years a second time, and I'm beginning my independence now.

Andrew Schorr:

And the care you've gotten over the years from the Seattle Cancer Care Alliance, I guess, has made a big difference.

Anna:

It is top notch. The doctors at the Hutch and the SCCA are absolutely amazing.

Andrew Schorr:

Well, we have one of them with us. That's Dr. Scott Baker. Dr. Baker is a pediatric oncologist. He's also the director of the cancer survivorship program at Seattle Children's Hospital, at the Fred Hutchinson Cancer Research Center and at the Seattle Cancer Care Alliance. We're going to talk about survivorship along the way, but first about transplant.

Dr. Baker, in Anna's case it's the art as well as the science, and in AML I know the transplant still when I young person like Anna is diagnosed, that's still one of the leading treatments, isn't it?

Dr. Baker:

Yes, that's correct. And so just like we can see in her situation since at the time she was diagnosed and first received chemotherapy part of the up-front treatment that she was really provided at that point then included having a bone marrow transplant from her matched sibling donor, which was what occurred with the first transplant, and that really is the standard approach we have with AML currently in this day and age.

Andrew Schorr:

Now, for some other illnesses still transplant remains so basic to treatment in helping try to save lives in children, and some other leukemias, other illnesses have drug therapies now that we're able to do that have been quite effective. And then beyond cancer I know for conditions, nonmalignant conditions like sickle cell anemia and I know there's a wide range of hereditary blood and autoimmune conditions, transplant comes into play with children there too, right?

Dr. Baker:

Yes, that's correct. So we were actually fortunate in that our overall indications for transplant have actually been decreasing over the last several years primarily because of the success of other nontransplant types of therapies that now are actually curing patients without, you know, the need for transplant for some diseases. But then on the other hand we're also expanding the use of

transplantation for other nonmalignant conditions which also can be cured by transplant, but as transplant is becoming safer and more successful and we're able to find donors for more numbers of patients the use of transplant for some of these nonmalignant indications is actually becoming more common now.

Andrew Schorr:

I want to tell the cool story of Anna and her donor. So typically, I know, you have the opportunity, Anna, if I've got this right, that somebody who receives a transplant, organ transplants too, you can write a letter.

Anna:

A year after.

Andrew Schorr:

A year after to the donor and they may or may not respond. In your case, they did respond and I understand you had a big reunion in New York and you were in a magazine story and on the *Today* show as well. That must have been cool.

Anna:

Yes. It was my 15 minutes of fame, and while I'd give it up if I could have not had cancer but I did and it was great. It was through DKMS, the donor registry that Katie, my second donor signed up through. They were the ones that put all this together. So I got to meet Katie in front of two film cameras and one still camera, but after that it was great just to be able to talk to her and find out what her experience was donating, herself.

Andrew Schorr:

And Katie is who? Where is she and what does she do?

Anna:

Well, when she donated cells she was a nursing student at the University of Missouri. Since then she's graduated. She's two years younger than I am. She's graduated and has worked as a nurse. It was great to be able to talk to her about what I'd been through because I knew she could understand the medical side of it more than most people could.

Andrew Schorr:

So you got to say to Katie, and of course with the work of the doctors at the SCCA, that whole group with Katie as the start, they saved your life.

Anna:

Yes, and there are no words to say thank you for that. Thank you just doesn't cover it.

The Role of Transplant in Children

Andrew Schorr:

Now, Dr. Baker, besides donors, young adults like Katie, now comes into the picture stem cells, immature stem cells from the umbilical cord. And I know that at Fred Hutchinson Cancer Research Center there's been pioneering work. Where are we with that coming into play and its role in transplant for children?

Dr. Baker:

Well, the use of cord blood as a stem cell source for transplant is actually continuing to really increase, you know, worldwide. So the issue is that our standard source that we've, you know, primarily relied on in the past has been stem cells or bone marrow from sibling donors, but only about one in four siblings will actually be a match to their sibling who needs a transplant, so we've been forced to look at unrelated donors as well as now the potential for cord blood.

And so currently, as I said, the use every year of cord blood is continuing to increase. In the United States currently cord blood is used more than bone marrow for transplants in pediatrics. In some other countries, such as Japan, cord blood is used as the primary donor source for the majority of transplants that they do in both adults and kids, so it's really, really becoming utilized much, much more commonly. And part of the reason is that the match of a cord blood unit doesn't have to be as exact as when we're actually using a living related or unrelated donor, and so we can get by with some, some degree of mismatch between the patient and the cord blood unit without the risks of the same kinds of complications, particularly graft-versus-host disease that we see in situations where bone marrow donors are mismatched.

Andrew Schorr:

Now, we've mentioned graft-versus-host disease, and I want you just to define that for our listeners. Let me see if I get it right. I'll take a quiz here for a second. If I've got it right, you have these donated cells from someone else's immune system or maybe even a little baby, and they're not your own and so while they may be really close your body may still recognize this as foreign and kind of fight against them and there may be some side effects related to that.

Dr. Baker:

Yes, that's really exactly right. And what happens over time if these cells do, they do certainly recognize the fact that we've put them into a body that's different than where they came from, so we use the medications early after transplant to really just suppress their ability to cause a reaction against the patient. But what happens with those cells over time, fortunately, is they develop what we call tolerance, which primarily just means that after a while, after several months they just sort of accept the fact that, you know, they're in this new body and they're going to have to get used to it and not cause any of the graft-versus-host disease

reactions. In some patients that happens relatively quickly, and other ones we have to continue the medications that suppress them for several months or sometimes even several years.

Andrew Schorr:

We're going to talk more about the details of transplant, and also we're going to get into immunology, particularly related to these nonmalignant conditions where you do transplant. We're going to go over that for people who obviously are listening and may have a child facing this. We'll also hear from Anna and of course a lot more detail from Dr. Scott Baker from the Seattle Cancer Care Alliance. It's all continuing right after this break on Patient Power. Stay with us.

The Goal of Transplant

Andrew Schorr:

Welcome back to Patient Power sponsored by the Seattle Cancer Care Alliance. Andrew Schorr here with Anna Robinson, 26 years old from Seattle, moving on with her life after receiving not one but two transplants for acute myelogenous leukemia and looking forward to getting a job and just having a full life. Also with us is Dr. Scott Baker, who is a pediatric oncologist with the Seattle Cancer Care Alliance and Seattle Children's, does research at Fred Hutchinson Cancer Research Center, and is also the director of the cancer survivorship program there.

Dr. Baker, let's just help people understand what a transplant is. What are we doing now? In Anna's case, first she received cells from when seemed like a perfect match from sister Becky, later from an unrelated donor, Katie, but what's the idea there of using those cells to try to beat the cancer?

Dr. Baker:

Well, they're twofold, actually. So one of the goals of the transplant process is that we use fairly intensive doses of chemotherapy and sometimes also total body irradiation in order to eradicate the cancer cells. But unfortunately that also typically eradicates the patient's own normal bone marrow cells as well as their immune system. So part of the original intent of the transplant was to be able to give back cells from a donor that would then replenish the patient's bone marrow, reproduce all of their blood cells and their immune system.

What we also learned, though, over time, is that those new cells that we give back to the patient also have now the ability to recognize a leukemia cell in the patient as being abnormal and actually can go and kill those cancer cells that may have even survived the intensive chemotherapy and radiation that we give before the transplant. And so there is an immunologic effect, what we call the graft-versus-leukemia effect, where the new cells are attacking any residual leukemia cells.

Andrew Schorr:

It's kind of a surveillance or a radar in a seek-and-destroy if that new immune system, healthy immune system spots the cancer cells.

Dr. Baker:

Yes, that's exactly right. And what happens before transplant is that the patient's own immune system has lost the ability to recognize those malignant or cancer cells or leukemia cells, you know, in the patient's own body and therefore allowed the leukemia to continue to grow and proliferate, but then the new immune system from the donor, which is stronger and able to recognize those cells as abnormal, can go in and kill them.

Andrew Schorr:

Now, Dr. Baker, you also do transplant in nonmalignant conditions. I mentioned sickle cell anemia, but there are other autoimmune conditions, inherited conditions. So there you don't have cancer cells, you just have inherited genetic, I guess, abnormality. So how does it work there?

Dr. Baker:

Yes, so for the majority of those kinds of diseases, the primary cell that is abnormal is a cell type that's produced in the bone marrow itself, and so that can be a red blood cell in the case of sickle cell anemia. It can be a white blood cell in the case of many of the different kinds of immune system diseases. And so what we can do in the course of bone marrow transplant then is because we are replacing abnormal bone marrow with new bone marrow many of these diseases then can be cured just by the fact that you're giving them a new bone marrow that's normal with normal cells, and whatever the underlying abnormality of those cells in the original bone marrow are gone and replaced by the new bone marrow cells.

Long and Short-Term Side Effects

Andrew Schorr:

Dr. Baker, now, we mentioned in the case of Anna, she had to have two goes at this and some additional cells infused and medicine she takes. She had a side effect from we believe some of the steroid medicine she took where she had a lot of pain in her hip and ultimately not too long ago needed a hip replacement surgery, which she's had and doing well. But let's talk about the concerns, side effects of any of this that parents and patients need to be aware of.

Dr. Baker:

Yes. So this is a big issue with our transplant survivor because the process of transplant and the medications we use are very powerful and can have both short-term as well as long-term side effects, and so that's actually a large part of what we deal with in the months and years after transplant in our survivors is just doing surveillance for those types of long-term complications and providing, you

know, education about what those kinds of effects might be as well as testing and monitoring to see if they're developing and finding out ways to be able to prevent them.

So for example the bones are very susceptible to the effects of the chemotherapy and radiation and in particular to steroid medicines which are used quite commonly after transplant in the treatment of graft-versus-host disease. And they can actually cause enough abnormalities, particularly in joints where one of the unfortunate complications is we certainly have, you know, seen many patients who have required joint replacements, either hips or knees, because of the lasting effects from the steroid treatments primarily.

Andrew Schorr:

Now, what about getting better at that? Are we getting better at limiting the side effects in children? And one of the things I wonder about is using these medicines when we have a young child who hasn't finished growing.

Dr. Baker:

Yes, so those are good questions. So where we're actually moving with the whole field of transplant is really towards utilizing what we call reduced intensity kinds of transplants, and so with these we're really using almost a tenth of the dose of radiation for example or different--different kinds of chemotherapy that don't have the same kind of intensive short-term as well as long-term side effects, and just newer medicines that are available now that are just very suppressive on the immune system such that we can actually do a transplant with these reduced-intensity conditioning regimens and--with that, and the benefit for kids is actually the prevention of long-term complications. And in adults the big benefit is that it reduces a lot of the short-term kinds of side effects and complications that especially older adults aren't able to tolerate.

Andrew Schorr:

Now, one other area I wanted to talk about for a second when we talked about young girls is trying to preserve their fertility. That's something you think about at the SCCA.

Dr. Baker:

Yes, it definitely is. And unfortunately some of the damage from a fertility standpoint can actually occur with the chemotherapy that patients get before they come to us for transplant, but whenever possible we do actually engage the infertility specialists, and we have several in town that we work with in trying to preserve fertility in both, you know, both males and females with things can be done prior to the onset of the transplant.

And actually at Seattle Children's now there is a whole group of individuals that really are focused on fertility for all of the pediatric cancer patients that are

diagnosed at Children's and they're actually involved at the diagnosis of every patient to see whether it's appropriate to potentially look at any type of fertility preservation technique for all the patients.

Andrew Schorr:

Right. That is so important to be thought of as we think of survivorship. We mentioned you're the director the survivorship program. So the understanding is for folks like Anna who come out the other side and go forward hopefully with a full life is you have a program that they can be part of so that there's the ongoing surveillance with the knowledge of what they've been through to try to monitor them and provide care or a special approach if needed, right?

Dr. Baker:

Yes, that's exactly right. So one of the things that we've learned is that a lot of the kinds of potential complications or long-term side effects that patients can experience from transplant, while they may not be able to be prevented entirely many of them can be treated. And for example we've found that transplant survivors can develop changes that can increase the risk of cardiovascular disease and diabetes. However, these are the kinds of things that can be modified with diet, exercise, medications to lower cholesterol and triglyceride levels, and so many things that we actually can do if we know that we need to be screening our survivors for these aftereffects, then there's many things we can do to actually change the course of what could potentially happen if these things are not monitored and treated. So we're finding issues like this or areas like this increasingly that we can actually have an impact on by screening and treating before the actual true disease or problem develops down the road.

Progress: How Far have We Come?

Andrew Schorr:

Dr. Baker, transplant has been developed and refined over many years now, starting in Seattle, as the sort of home base for it. In your evaluation how far have we come? And just, you know, people listen carefully to what you say as sort of a barometer of hope. How far have we come and what hope do you feel transplant offers to young patients who have these illnesses where this approach might apply?

Dr. Baker:

Well, in the early days of transplant it was really utilized as the last hope, the last-ditch effort, the last possible thing that was available to patients, and so now though things have really progressed entirely to where that's not the role of transplant anymore. The role of transplant really is its use in the context of the overall treatment for a patient, so just like Anna where it was designed to be utilized really as part of her initial treatment, not at the point where it was, where there was relapse and things to deal with. And so that's I think the biggest thing is just the evolution and success of transplant has become so significant that it no longer is this last-ditch effort.

And also we've learned so much just in the supportive care and management of our patients during the transplant process that, you know, that we can deal with many of the kinds of infections and other side effects and complications that we didn't have the ability to deal with in the past.

Andrew Schorr:

And these hereditary and autoimmune conditions where you're doing transplant now, it gives someone the hope of a cure.

Dr. Baker:

Yes, definitely. So for those kinds of diseases transplant is a cure for them. It's not a treatment. And so, you know, a great example of that is the sickle cell disease that you mentioned in that after transplant in patients with sickle cell disease that disease is gone, and they have normal, normal red blood cells, and all of the terrible complications and side effects from that disease are really cured and gone from the transplant.

And there's several other. Same way with immune deficiency diseases where, you know, you're replacing or giving a child now a normal immune system. Where they could have before died from a common cold now they can fight off infections like, you know, like normal children can.

Andrew Schorr:

Dr. Baker, I know every child's situation is difference and there are highs and lows I'm sure that you have in your work, but generally more now are you feeling upbeat?

Dr. Baker:

Yes, for the most part. The majority of patients that we transplant become long-term survivors and, as I mentioned before, the field has really evolved a lot over the last 20 years to where our success rates are much higher. Our ability to transplant more patients now with the use of cord blood and other donor sources has made it much more accessible to larger number of populations, and so, you know, it's really been an exciting time for transplants.

Andrew Schorr:

Dr. Scott Baker from the Seattle Cancer Care Alliance, thanks for what you do, and I know Anna Robinson joins me in thanking a whole bunch of people at the SCCA. I want to give the last word to Anna. Anna, there are people listening, parents maybe, young adults, children, who have been told that this might apply to them, and it is terrifying as it I'm sure has been for you. What would you say to them to help them move forward with some hope?

Anna:

I'd say that everyone is going to have a different experience going through a transplant, and it can be hell, but they're going to get through it. My advice to parents who feel like their child is sick and they can't do anything is to take control

of the small things like making sure they know what medications their child is on, even in the hospital, and making sure that those medications are given at the right time and at the right dosage level.

And then for kids, what really got me through is watching funny movies, reading comics. Just try to laugh whenever you can.

Andrew Schorr:

Anna, we wish you all the best. I know you've been through a lot, but you have a lot of people to thank, too, your sister, Becky, your parents, the doctors, Katie.

Anna:

And the nurses.

Andrew Schorr:

The nurses. Big group, and I know everyone is pulling for you to have a long and happy life. And get a great job, okay?

Anna:

Thank you.

Andrew Schorr:

Okay. Anna Robinson joining us from Seattle, all the best to you. Dr. Scott Baker, the whole team, thank you. Thank you all for being with us, joining us on this Patient Power program. Certainly when we talk about transplant in children, it is scary when you're facing it but it is very encouraging to know all the progress that's been made, and here's Anna with us who has certainly been through a full course of transplant and is looking forward to a very bright, meaningful future.

I'm Andrew Schorr. Thank you for being with us today. And, remember, knowledge can be the best medicine of all.

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