LEUKEMIA & LYMPHOMA SOCIETY®

THE BLOODLINE WITH LLS

A PODCAST FOR PATIENTS AND CAREGIVERS

Episode: 'Hope for Rare Cancers: Blastic Plasmacytoid Dendritic Cell Neoplasm (BPDCN)'

Description:

Join us as we speak to Dr. Eunice Wang, the Chief of Leukemia Service and Professor of Oncology at Roswell Park Comprehensive Cancer Center in Buffalo, NY. In this episode, Dr. Wang delves into the rare blood cancer, blastic plasmacytoid dendritic cell neoplasm (BPDCN). Usually identified by characteristic deep purple lesions, oncologists continue to raise awareness of this rare diagnosis, as swift referral and treatment usually leads to better outcomes. After being universally identified as BPDCN by World Health Organization (WHO) in 2018, clinical trials and CAR T-cell therapies have brought new hope to BPDCN patients.

Transcript:

Elissa: Welcome to the *Bloodline* with LLS. I'm Elissa.

Edith: I'm Edith.

Lizette: And I'm Lizette. Thank you so much for joining us on this episode.

Elissa: Today, we will be speaking to Dr. Eunice Wang, the Chief of Leukemia Service and Professor of Oncology at Roswell Park Comprehensive Cancer Center in Buffalo, New York.

She directs the Roswell Park Hematological Procurement Shared Resource and is the physician leader for the Roswell Park Chemotherapy and Infusion Center. She also serves as an Associate Professor in the Department of Medicine at University of Buffalo in New York.

Dr. Wang maintains an active clinical practice treating acute leukemias, myeloid malignancies, and other hematological disorders.

Dr. Wang's clinical research focuses on the development of early-stage clinical trials for acute leukemias and myeloid malignancies. Her translational research interests involve the development of novel biological therapies targeting the bone marrow microenvironment for acute myeloid leukemia.

Welcome Dr. Wang!

Eunice Wang, MD: Hello, nice to be here. Thank you so much for the opportunity.

Elissa: Thank you. So, let's get started with learning a little bit about you. How did you start in the field of medicine and studying hematologic malignancies?

Dr. Wang: Well, that's a great question. So, when I was in high school, my dream was to become a scientist in the laboratory, and I did a lot of studying. I think one summer I studied rattle snakes and I looked at bacteria and so forth. So, I was determined when I went to college that I was going to be a laboratory rat.

But during my freshman year, there was a friend in my dormitory that was somebody that my roommates and I used to hang out with. And the n about halfway through freshmen year, he developed some back pain and went to the student health center, and he was diagnosed with an acute leukemia. Subsequently, he left college and underwent treatment for chemotherapy, and suffice it to say that he never came back to school.

So, after that experience, that summer following my freshman year, instead of going and seeking out a basic science lab, I went to the Dana Farber Cancer Institute and asked whether I could spend my summer internship research project there at the cancer institute, specifically studying leukemia.

And that's how I determined at the end of my undergraduate years that rather than doing basic science, I wanted to do something more translational. And that really was the impetus for me to turn from the lab to a career in clinical medicine.

Elissa: Wow! So, it all kind of started with a classmate getting diagnosed with acute leukemia.

Dr. Wang: Yes, at a very early formative stage of my life, and I remember meeting with my lab mentor towards the end of my undergraduate and saying I was planning to apply to graduate school, and him saying to me, "Well that's great, Eunice, but if you become a physician, you can do research and patient care, whereas if you go into the laboratory, you're not going to have that direct impact." And I think that distinction for me was really what convinced me to apply for medical school.

Lizette: Wow! Well, we are thankful that you did go through the process, as you're doing great research and great patient care for our blood cancer patients.

Today's episode is on blastic plasmacytoid dendritic cell neoplasm, or BPDCN. Can you tell us what this is? Many of our listeners probably don't know or have not heard of BPDCN.

Dr. Wang: So BPDCN, blastic plasmacytoid dendritic cell neoplasm is a highly aggressive, historically difficult to diagnose hematologic malignancies and it's extremely rare. So, in the past we though that this cancer really constituted less than 1% of acute leukemias, and it is typically very aggressive, so we do classify it in the category of an acute leukemia. We don't know how common it is, but it is extremely rare.

There's estimates that there's only about 1,000 to 1,400 cases annually in the United States and Europe, typically diagnosed in older individuals, in their 60s and 70s, and three times more common in men than in women, but it can occur even in childhood.

So, there was a local case here in upstate New York of a young child who had BPDCN treated at one of our outlying centers. Very, very rare and, as you know, a difficult to remember name, but something that we dealt with over the years. It's had a lot of

different names and NK cell lymphoma, blastic NK cell leukemia lymphoma. This is just the latest iteration but extremely uncommon to see this in the overall population.

Elissa: What brought about the change to this new name, the BPDCN?

Dr. Wang: So, I think it was based on just increasing science and awareness that the cell of origin for this cancer was not an NK cell or a natural killer cell. Natural killer cells express the surface antigen CD56. And because this cancer expressed that, I think in the past the feeling was that this arose from natural killer cells. What this actually arises from is dendritic cells interacts and preps and activates effector T cells, so it's actually a different cell of origin. There's different types of dendritic cells and one of the subclassifications is a blastic plasmacytoid. So, I think the name change just came from our increasing awareness and discovery that the cell of origin was different than the one that we previously thought of based on some immunohistochemical staining.

Elissa: Now for our listeners who don't know what is a dendritic cell?

Dr. Wang: A dendritic cell is a cell that is part of your immune system. And what it does is it interacts with things in the environment and your immune system, so it is interacting with antigens, proteins, foreign substances. And what it does is, when it interacts with these foreign substances, it takes part of those substances, processes it, and presents it in a fashion where the T cells, which are sort of the effector cells that recognize and destroy these things can recognize and create reactions to it.

So, for example, dendritic cells are very important for what we know of as responses to the COVID vaccine. So, when you get immunized against COVID, you're being immunized against a certain spike protein, but your body doesn't inherently recognize the spike protein, so it needs to be broken down and presented to your T cells in such a way that they can make an immune response.

Now because these dendritic cells are such like a frontline player in your immune response, dendritic cells are very common in the skin. Your skin is the number one largest organ in your body because it covers such a great surface area. We don't think about it as an organ, but it is. And the skin contains high numbers of dendritic cells as the first line of defense to sort of recognize and process immune antigens.

And for that reason, when you have a cancer of the dendritic cells, as in BPDCN, 80% of BPDCN's actually will present as skin lesions and often times will be recognized and biopsied by dermatologists as opposed to hematologists/oncologists, which I think is also a change from the way that other hematologic cancers come to recognition in the community.

Edith: That's very interesting. BPDCN is such a rare blood cancer. What is the prognosis?

Dr. Wang: So BPDCN is, as I mentioned, classified along with the acute leukemias. And the reason that is in part classified in that way is because it can be very clinically aggressive. Patients present with what looks like just a few lesions on their scalp or on their face or on their skin, their chest or back. And, initially, some of these lesions look very indolent, however, over time they can spread rapidly. So, you can have patients have one lesion and then within a few weeks have three or four, five, ten, fifteen. And without treatment, the overall survival and progression of these lesions is very rapid. So, without treatment most patients only live a matter of weeks to a few months. Even with treatment, their survival can be just a year.

And so, it is incredibly important when treating this disease that it be recognized and referred to the appropriate specialist as soon as possible and treatment be started to control the disease, and in many patients potentially be referred for a bone marrow transplant as the curative option.

Elissa: Wow! Now you talked about the lesions that can be all over the body, and that seems to distinguish it, right, from other cancers because of those very distinct

lesions? Is there anything else, any other signs and symptoms that may come up that may either distinguish them or add to that diagnosis?

Dr. Wang: So, as I mentioned, about 80-90% of patients will have some type of skin lesions, about 40-50% may also have bone marrow involvement and abnormalities in your blood cell count consistent with what we would be more typically seen in acute leukemic syndrome.

Generally, when these lesions are identified, it is incredibly important to biopsy them. They often times are like these dark bruise-like things. They look kind of purplish. They can just be flat lesions, or they can be large tumor masses or scattered purple-reddish things on the body. The most important thing is to biopsy the lesions and to distinguish it from other blood cancers. So, one thing to do is to do special staining looking for markers or proteins on the cancer cells, and there's a really easy mnemonic to remember what are the CD markers on BPDCN, and that's that BPDCN cells express CD1,2,3, CD4, and CD 5,6. So we often will say CD1,2,3,4,5,6, and they express another marker TCL1.

Now many dermatologists may not do all of those stainings, or there's other things that can be confused with BPDCN. So, it is important that if this is identified and there is difficulty in making that diagnosis, that these slides or that these patients be referred to academic medical centers so they can truly make this diagnosis for this disorder. It's important to start relatively soon and, as I mentioned, for those patients that are eligible, bone marrow transplantation may be in their future as the option that offers the best long-term cure. Given the short survival, difficulties in diagnoses and delays in diagnoses can really lead to very aggressive disease progression.

We now have treatment options for patients that is relatively nontoxic. In the past we used to give aggressive systemic chemotherapy similar to what we give for acute myeloid or acute lymphocytic leukemia. But, recently, in 2018, we had the approval of a specialized antibody toxin combination called tagraxofusp. This antibody treatment

is given over 3-5 days and is very well tolerated in the majority of patients with a response rate of about 90%.

So, again, that particular antibody targets that CD123 expression on the cancer cell. So, again, just providing that link between recognition of the disease, doing the diagnostic testing, and then having those diagnostic testings directly leading to an effective therapy for this cancer.

Elissa: Now that seems like a lot just having to make sure they get the correct diagnosis very early on, especially if it's going first to a dermatologist or a GP. Is there training going on with dermatologists or GPs to be able to recognize this and do a biopsy?

Dr. Wang: Well, I think there's growing recognition. And I think this is spurred by the fact that we actually have an effective therapy. Prior to the approval of tagraxofusp in December 2018, there were no approved therapies for the treatment of BPDCN.

And, as you know, it also had a number of other different names. So, this is something that most people in the community were not aware of and they would potentially treat with lymphoma chemotherapy or leukemia therapy. I think nowadays there's growing recognition and the BPDCN is now listed as a diagnosis in the National Comprehensive Cancer Network guidelines for acute leukemia. There are now guidelines being published on recognition and treatment. And most encouragingly, there's a number of other different agents that are now being tried for patients with BPDCN. So now, not only if you have it recognized can you get upfront treatment, but if you fail upfront treatment, we actually have clinical trials with newer antibodies targeting CD123. We're using some of the chemotherapy that we use for acute myeloid leukemia, the venetoclax/azacitidine in patients, and there are clinical trials.

I'm getting inquiries from clinical trials from patients with BPDCN from around the world now-

Lizette: Wow!

Dr. Wang: - recognizing this cancer type and the fact that here in the United States not only do we have standard options, but we now have experimental options. I think in the past there was little recognition because, honestly, there wasn't much we would do differently. But nowadays I think there's growing enthusiasm and knowledge, just even this podcast. I don't know that we're ever had a podcast in The Leukemia & Lymphoma Society about BPDCN before. And I think the fact that you're doing this – is just evidence about how much prominence this rare disease is getting in the current era.

Elissa: That's amazing that it's really only back to 2018 where it was really truly recognized as what it is and had finally some kind of treatment. So, you mentioned earlier about dermatologists may not check for all of the markers. Are they encouraged if they see any kind of sign of BPDCN to send it over to an academic center, for kind of deeper pathology?

Dr. Wang: Yes. I mean, I think that there's a lot of increasing recognition, there's education that's specifically targeting I believe the dermatologist as well as the pathologist in terms of recognizing this entity. And, as I said, even if it's not BPDCN, it could be something similar, like we often will see sometimes this confused with what's called granulocytic sarcoma or the presence of acute myeloid leukemia cells in the skin. So, either way it does need to be diagnosed and managed.

I also want to mention that sometimes BPDCN doesn't occur alone. In a certain percentage of cases, the BPDCN can coexist or be associated with another hematologic malignancy such as myelodysplastic syndromes (MDS) or chronic myelomonocytic leukemia (CMML). That occurs in about 10 or 20% of cases. So, if there's any concern that a lesion could be BPDCN, I think, at that point, obtaining a complete blood cell count and referring that person to a hematologist should occur. In fact, I think that patients that have abnormal blood counts in the setting of a skin lesion, regardless of

whether they have the skin node things, may be referred earlier to a hematologist because there's some recognition that maybe the peripheral blood count isn't normal, but just to know that it sometimes is with the hem malignancy, sometimes it's on its own, sometimes patients even present with lymphadenopathy and about 30 or 40% of cases will have large lymph nodes, and they can be confused with lymphoma.

So, a very heterogeneous diagnosis presentation and many different ways it can clinically manifest.

Lizette: Yeah, definitely. Now does it evolve from other blood cancers like an MDS, myelodysplastic syndromes, or CMML, chronic myelomonocytic leukemia. Does it evolve from that, or can they both exist together?

Dr. Wang: So, they can both exist together in about 10-20% of cases, and that's actually a fascinating question. We know that the cell of origin for a lot of hematologic malignancies is the hematopoietic stem cell that becomes malignant or leukemic in the bone marrow microenvironment. And it's likely that, that same hematopoietic stem cell that goes awry when we have BPDCN could also go awry in many different ways.

So, I think that my hypothesis is that that stem cell sometimes becomes dysplastic and maybe there are additional genetic abnormalities that occur that lead to abnormalities in the cell that would have been a dendritic cell; that cell escapes from the bone marrow, migrates into the skin and starts growing in the skin , which is the natural area that these dendritic cells live, and then spread, and then manifest as that way. So, we think that it might be a common lesion or abnormality in that hematopoietic stem cell.

We often will look in the bone marrow patients that have BPDCN, and even if we don't see BPDCN cells in the bone marrow, I've had patients who've had genetic abnormalities such as TET-2, P53 mutations that mimic what we see in patients with myelodysplastic syndrome and CMML. So, we do think that they're related, they're both blood cancers. But, again, myelodysplastic syndrome or CMML tends to be a more

indolent in many cases disease. BPDCN, by the time it escapes from the bone marrow and starts spreading into the skin, should be treated more aggressively.

Elissa: Now you mentioned earlier a bit about the current treatments for BPDCN, and I'm so glad that you mentioned clinical trials. Prior to this podcast, I spoke to our clinical trial support center that goes and looks for trials around the country for specific patients, so they will match a patient to a trial. And they do look for trials with BPDCN for patients. And so that's really exciting, that there's more treatments potentially on the horizon.

One thing I wanted to ask about was the stem cell transplant because that's something that may not be known since there really is right now just the one current treatment. Could you talk about a stem cell transplant for patients and who might qualify?

Dr. Wang: Sure. So, as we know, we standard chemotherapy when in the old days we used to give lymphoma or acute leukemia chemotherapy, we could get the disease to go away very rapidly. So, I had a patient whose disease vanished. I started him on acute myeloid leukemia therapy, and his BPDCN sort of disappeared from his skin and his lymph nodes over a course of three, four, five weeks. We repeated everything and he was in a complete remission, so that was all great and good. But, literally, within two to three months the lesions came back, and we were unable to get it back under control.

So, we know that even the most intensive chemotherapy that we give for hem malignancies, which is what we give for acute myeloid or lymphoid leukemia, doesn't cure the disease. What we need to do is use targeted therapies, so more is not necessarily better. Smarter is better. So, the antibody drug conjugate targets the CD123, which is expressed on the overwhelming majority of the BPDCN cells and brings with it a diphtheria toxin, which destroys the cells.

Once we're able to selectively destroy the majority of those cells, we still have the problem of that leukemic or BPDCN hematopoietic stem cell in the bone marrow. And

that is why, even though we're able to clear out the lymph nodes, clear out the skin, and clear out the bulk disease, we still have to target that stem cell. Otherwise, as I just demonstrated in that case presentation, the disease will come roaring back.

So many of our patients who are fit enough to undergo stem cell transplantation, that's what we recommend because replacing those cells in the bone marrow represents the best chance for long-term cure of the disease and prevention, again, of the disease recurring because you're going in there, you're eradicating, you're replacing the bone marrow stem cells. So, for all of our patients that we're able to get some modicum of disease control, who can go to a stem cell transplant, I would recommend that.

In patients who are not fit enough to get that, I would continue the tagraxofusp until it stops working, and then I would actively investigate clinical trials. I have somebody in my clinic coming tomorrow who failed upfront tagraxofusp, failed a clinical trial, and then responded to the third-line treatment with those venetoclax/azacitidine combination.

So, there is still hope, there's a lot of options, there's a lot of efficacy that we're seeing. But I think most of us would still recommend that stem cell transplant.

Elissa: Is there a different survival rate then for patients that got the stem cell transplant? Are we looking at the potential for longer life?

Dr. Wang: Yeah. In patients who have achieved a remission and can go for stem cell transplantation, I have patients who are alive, three, four, five years later, even after a haploidentical or a reduced intensity transplant. So, there is potential that you can get long-term disease control and potential cure in that setting.

And all therapies with BPDCN, conventional chemo, maybe about a year. With BPDCN, we do have a number of patients surviving two years or longer, so we do have long-term survivors with BPDCN treated with tagraxofusp, but for again, the majority of

patients we would recommend a transplant at this time if it's possible for them to get it.

Elissa: I'm curious, something we didn't discuss earlier, we've compared BPDCN a lot to other acute leukemias. Are there the genetic mutations like there are in diseases like AML?

Dr. Wang: Yes, so a lot of times we see what we call complex cytogenetics. And a lot of times, as we mentioned previously, we see a lot of the same gene mutations that we would see in other hem malignancies. We see FLT-3 mutations, we see P53 mutations, we see most commonly TET-2 mutations, which are found more commonly in acute myeloid leukemia and myelodysplastic syndromes. So, we do think that there's a fair amount of overlap in those diseases.

Whether we can translate some of our treatments for acute myeloid leukemia that we have a number of under investigation into BPDCN, is actually an area of active investigation. And there's been anecdotal data and now a clinical trial looking at the venetoclax and azacitidine, similar to what we give for AML in patients with relapsed/refractory BPDCN. So, I do think that there is overlap but it is important to distinguish between the two.

One area of difference is that the BPDCN cells express high levels of that CD123 protein. So when we try using some of the tagraxofusp in patients with acute myeloid leukemia, we don't see nearly the high response rates. In patients who had BPDCN we saw response rates of about 90-100% with that antibody treatment because it is targeting CD123, and those cells are so sensitive to it because they have such high-level expression. Although AML cells also express CD123, they don't express it nearly, so we don't get 90% response rates. So, in a way, the therapies do differ between the two, but they are interrelated.

Lizette: Wow, there's so much going on that I didn't realize. I know that the last time that we did any type of patient education for BPDCN, that was when the first

clinical trial was starting. And it was exciting that there was a clinical trial starting for this indication. Now there's more and more, and I'm so glad that the treatment is working for a lot of our BPDCN patients.

We have heard from a lot of patients where they have been able to move to transplant, and their quality of life has improved. Are there any kind of side effects with a lot of these treatments? Not just transplant.

Dr. Wang: So, I think among patients upfront who are able to receive tagraxofusp, it's been generally well tolerated. There's nausea, fatigue. Perhaps the most common adverse event of special interest in patients getting tagraxofusp is this syndrome called a capillary leak syndrome. And that basically is because the toxin that the antibody is bound to is actually a bacterial toxin, it's a diphtheria toxin. And what happens is, when you put that toxin in people's body, they develop a syndrome where the toxin can affect your blood vessels and make the blood vessels very leaky. And so, the protein and stuff in your blood vessels leaks out into your tissues, and that way patients can get this capillary leak syndrome really is evidenced by like weight gain and they get swelling in their legs. Their albumin level or their protein level in their system can drop. Their blood pressure can drop.

One of the things that we check before we give patients treatment with tagraxofusp is we check their underlying baseline albumin or protein levels. In patients whose protein levels are very low, we don't give the drug to because we don't want to have a higher incidence of that capillary leak syndrome. It really only occurs in about 20% of patients, and as soon as it's recognized and managed it can be something that really is much more commonly seen when we first start therapy.

There are a number of newer therapies targeting CD123 for BPDCN patients, and those include CAR T cells, as well as bispecific antibodies that bind CD123 and CD3 on T cells. So, for patients who are being treated with those CD123 CAR or bis, we're seeing cytokine release which is essentially activation of the patient's immune system.

The side effects of venetoclax/azacitidine on clinical trial to date have largely been similar to the side effects that we see with patients with AML treated with those agents. So I think that there are a growing number of options. Who would have thought CAR T cells for BPDCN? You know, it's a lot of new acronyms that we didn't have a few years ago.

Elissa: That's really neat that CAR T cells can be used now for something so rare like BPDCN.

Dr. Wang: I just wanted to emphasize one other thing in terms of the diagnosis. Many people when they present with their skin lesions or present with maybe a single large dark purplish or reddish like, almost like tumor growth on their arm, will have potential dermatologists say, "Well, we could just excise that and take it out" Or they might see somebody in the community that says, "God, that looks like a solid tumor. Let's cut that out and radiate that."

Because this is not a solid tumor mass, this is a systemic hematologic malignancy originating, again, as we mentioned, from that bone marrow stem cell, these strategies where we tried to locally control the disease with radiation or excision, are generally not successful. So, we've seen patients here where they had the initial lesion taken out and then they recur with five new lesions, or they'll have it excised or radiated, and then within a short amount of time it'll regrow.

So, I do want to emphasize that it's important to get that biopsy and to recognize that this is a systemic disease and not a local disease. We really only recommend those types of treatments for patients that are not able to get systemic therapy or more like in a palliative setting, if the tumor gets so large that it becomes bulky. But, in general, systemic therapies work much, much better and have more durable responses than just a local measure like that.

Lizette: And I'm so glad that you said that because I think that that's one of my biggest concerns with BPDCN because people don't know what it is until they're

diagnosed, right? So, you don't know what you don't know. And it's really hard, when you see something on your skin, not think to yourself, "Let me go to a dermatologist, and that person will be able to treat me." To lo and behold get a blood cancer diagnosis, nonetheless. So, I think it's one of my biggest concerns as to how to bring awareness to these types of diseases.

Dr. Wang: Yeah. I mean, I think even in the best-case scenario, because it is so rare and we're saying only about like worldwide maybe a thousand cases a year. Even those of us in academic medical centers, until recently, would rarely see this diagnosis. And this is even me, my entire practice is seeing patients with the aggressive leukemias and myeloid malignancies.

So, I think that this is something that, as we get increasing awareness and we get more comfortable with, and we get the education for, we're going to see it a little bit more. I think that there's been some reports that it's starting to pop up, but the incidence of it used to be so low, and I think with increasing recognition, I think that's great. And I think that that's what leads to questions about what is the true incidence of this disease? Have we just been mis-diagnosing all these years or discarding it?

So, I'm actually very excited to hear that people are talking about it, they're treating it, their referring it. They may still have only seen one or two cases in their lifetime, but now they know what to do with it.

Edith: So, Doctor Wang, on our patient podcast home page, we have a quote that says, "After diagnosis comes hope." What would you say to BPDCN patients and their families to give them hope for the future?

Dr. Wang: This is a rare malignancy but, as I say to a lot of patients after diagnosis, "We got this. We got something for this. We can treat it, we can recognize it, we know the biology and we can help you. So, I need you to bear with us. We have effective therapies that have up to 90% response rate in the upfront setting. We have options like transplant that can cure you. We have clinical trials. So don't lose hope.

Come to the specialists, and we will do our best to give you as many years and as much time as you deserve."

Elissa: Well, thank you so much, Dr. Wang, for joining us today. It's just so exciting to hear about a disease that was really only fully recognized just a few years ago, and just having, the single treatment available now, but then having so many on the horizon and in clinical trials, and with CAR T therapy and stem cell transplant as options. It's just so exciting and I hope that our BPDCN listeners and their families are really finding hope with everything that you've mentioned today.

So, thank you so much, we really appreciate you joining us.

Dr. Wang: It was my pleasure, and if there's anything I can do to address questions or concerns, I'm happy to be a resource.

Elissa: And thank you to everyone listening today. *The Bloodline with LLS* is one part of the mission of the Leukemia and Lymphoma Society to improve the quality of lives of patients and their families.

To help us continue to provide the engaging content for all people affected by cancer, we would like to ask you to complete a brief survey that can be found in the show notes or at TheBloodline.org. This is your opportunity to provide feedback and suggested topics that will help so many people. We would also like to know about you and how we can serve you better.

The survey is completely anonymous and no identifying information will be taken.

We hope this podcast helped you today. Stay tuned for more information on the resources that LLS has for you or your loved ones who have been affected by cancer.

Have you or a loved one been affected by a blood cancer? LLS has many resources available to you: financial support, peer-to-peer connection, nutritional support and more.

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We encourage patients and caregivers to contact out information specialists at 1-800-955-4572 or go to LLS.org/PatientSupport. You can also find information about BPDCN at LLS.org/Leukemia.

If you would like to get in contact with Dr. Wang, she can be reached by email at eunice.wang@roswellpark.org.

All of these links will be found in the show notes or at TheBloodline.org.

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