

Carlecast 9 Blood and Transfusions

Dr. David Graham: It's Carlecast number nine: Blood and transfusions. You can feel safe.

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And welcome to this ninth Carlecast. I am Doctor David Graham, your host from the Carle Clinic in Urbana, Illinois. Remember that the Carlecast is the medical podcast where we give you doctors, talking with doctors, about topics interesting to you.

Today, something really interesting to talk about. Blood and transfusions are a very, very scary idea, and in many cases, rightly so; particularly when you look back in the past. There is no doubt that there are some very scary diseases that you can get from blood or other bodily fluids, and before we had the knowledge, the ability to test for many of these diseases, there are, admittedly, people who got things they probably would not have gotten had they not needed transfusions. Are we any better now? Is the whole notion of transfusion, getting blood products when you need them, a reasonable idea now? Is it safe? Is it something you should be willing to do when you need it?

Now many of us, in our lives, are going to have some sort of medical problem that's going to need surgery. Many of us will also be in some sort of accident, trauma, break something, cut something that needs medical attention. Many of these things bleed. Bleeding happens with surgery. Sometimes, in trauma or in surgery things are severe enough that a transfusion is going to help you heal; is in fact, sometimes even going to save your life. Do you feel safe getting that transfusion?

To answer those kinds of questions today, we've got someone great to talk to. Dr. Bruce Wellman is a board-certified pathologist with extra certifications in transfusion medicine. He works in pathology at Carle Clinic. He is the head of the Champaign County blood bank, and he's a pretty darn good financial mind as well, and puts that to use for Carle in ways that are very, very important to us.

Dr. Wellman and I had a chance to talk about these exact questions, and I thought it would be good for you to listen to; so if, heaven forbid, the time would come that you would need to think about the idea of a transfusion, you can think back and remember the things we talked about today and hopefully feel a lot more comfortable about the situation. So anyway, let me

give you this conversation with Dr. Bruce Wellman.

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Dr. David Graham: We're here today with Dr. Bruce Wellman. Dr. Wellman is one of our board-certified pathologists, and also carries a board certification in transfusion medicine; exactly the kind of person we want to be talking about with issues like this. Thank you, Dr. Wellman for having your time with us today.

A lot of people, when they're hearing that they may need to go to surgery or something bad happens, may hear that there's a possibility they could end up with a blood transfusion. I know for many patients that I talk to, that immediately becomes a very concerning thing. With concerns about infections, with concerns about the ways blood used to be collected and donated, what can we tell people now to make them feel more comfortable about the notion that they might end up needing a transfusion?

Dr. Bruce Wellman: Well, thanks for the opportunity, Dave. I'd just like to give a little background to blood transfusion and blood products in the United States today. Most of the blood that is transfused in the United States today from volunteer donors comes from the about 14 million donations that occur nationally every year. From those, about 21 million transfusions are given; that's our best estimate. About four to five million patients receive that blood. The volunteer blood supply in the United States is extremely safe; it's tightly regulated and carefully monitored. I think the biggest issue that we have today in the United States about blood supply is more on the availability side, as 30 to 40 percent of the locations around the country, at least in the last month to two months have been working on about a less than a two day supply.

The risk of not having blood available may be in the future a bigger risk, but from the standpoint of blood safety, there have been layers of procedures and testing put in place over the last decade in our blood supply that uses our available knowledge on probability of risk factors as well as our new technology related to testing. The volunteer blood donor is screened at the first level by a series of questions related to their health, their past medical history, and specifically related to any identified or potential risks of having been exposed or having a probability of having a transmissible agent - that is, a virus or some other agent. So the screening process starts with a detailed questioning.

Dr. David Graham: These questions - having donated in the past - they don't exactly beat around the bush. They're pretty direct at what you ask.

Dr. Bruce Wellman: No, the questions are very specific, and often make some folks uncomfortable, but they're very specific about their travel, their past medical history, and risk factors for transmissible diseases, mainly drug use and sexual habits.

So, after the donor identification screening, we move on to testing and currently the tests in the blood products, in addition to typing the blood as an ABO type and an Rh type, we would test for a number of viruses. In fact, we're testing currently today for at least five separate viruses in the blood supply, and a screening test for syphilis. The prevalence or the likelihood of finding a positive test has dropped remarkably over the last 10 to 15 years. Once the unit is tested not just by the regular laboratory methods, there are four tests that are done by a very specific RNA or DNA test called Nucleic Acid testing (NAT). These tests have significantly improved the safety of the blood supply from a viral standpoint.

Dr. David Graham: Now, we test directly for the viruses, but don't you also test indirectly for some effects that those viruses may have?

Dr. Bruce Wellman: We test for antibodies, which would be an indicator of past infection. So antibodies are tested for from the standpoint of Hepatitis B, Hepatitis C and HIV all receive additional tests for antibodies in addition to specific viral testing.

Dr. David Graham: Now one of the things that I recognize has probably been making a good bit of difference - I reach back to my old poor student days when I'd been known to donate a unit or two for 20-25 bucks. That's just not done anymore, is it?

Dr. Bruce Wellman: No, there are no paid donors in the volunteer donor blood supply in the United States today. The paid donors that are currently part of the blood system contribute plasma through plasma centers, which then goes through extensive pooling and viral inactivation process to make that product safe.

Dr. David Graham: If someone is thinking, "I'm getting blood from what may or may not be a less than desirable person who just wants to make some money by giving blood and whatever happens to the patient who gets it - no big deal," that really doesn't apply anymore.

Dr. Bruce Wellman: No, that is not the case.

Dr. David Graham: Which has got to make a huge difference in what's going on.

Dr. Bruce Wellman: Right. Now the third layer of safety in addition to the donor screening safety and donor screening questions and the testing that is done in the blood center is done in the hospital itself. The units are retested to confirm their ABO type and Rh type in the receiving facility. Then the process involves obtaining a sample from the patient and testing that in a laboratory to confirm the ABO type and detect any cross-match incompatibilities, and then before a product is released - I'm talking mainly about red cells - platelets and plasma we test for ABO type and match those.

That whole process is very carefully monitored we're pretty sensitive about making sure that the identification of the patient is verified; that the sample is correctly labeled; that the samples in the laboratory are all tracked through bar-coding or other types of double checks and ultimately, when a unit is released, it's released and we have a process on the floor to verify that the correct unit goes to the correct patient.

Dr. David Graham: That helps with the risks of just simply problems of one person not matching another one as well as they ought to.

Dr. Bruce Wellman: That's correct.

Dr. David Graham: I know for a lot of people getting transfusions, it becomes very much there's no choice in the matter. Either through surgery or whatever else; you need the blood and you need to get it done now, and there's not a lot of planning time that's available. Are there things that can be considered if you know that something's coming down the road in a month or two? Say you know you're going to get a knee replaced, or a hip replaced. Are there ways, for example, to donate your own blood for transfusion?

Dr. Bruce Wellman: Well, autologous blood has really been promoted since the mid '80s when the human immunodeficiency virus concern first became recognized. Autologous blood is available for subsets of donors who have adequate hemoglobin and adequate time to donate before the surgery. What we find with autologous donors however, is that by simply donating blood one to two to three to four weeks ahead of surgery, the donor becomes a little more anemic, and we're storing blood, and they

often receive blood back after the surgery and the actual benefit from a cost standpoint and from a safety standpoint is fairly minimal. However, if patients want to have autologous blood, the system does allow that to happen and makes it available. It can be very important subset of patients who have unusual blood types where the availability of their red cell type is limited, or other sorts of situations for maybe other blood components. So, autologous blood is an alternative.

I think another potential mechanism that can be considered in certain patients is the use of erythropoietin. Erythropoietin will stimulate red cell production, but it takes a little while to do this, so it has to be timed with the surgery so that if autologous blood were taken with EPO, your hemoglobin would have time to regenerate so you do have additional red cells. Or some folks are even using erythropoietin in the absence of autologous blood and raising pre-operative hematocrits to some level and then, with anticipated blood loss following surgery, no additional intervention is needed.

Dr. David Graham: Which makes things sound interesting, but not everybody could use that can they?

Dr. Bruce Wellman: No, I think in order to qualify, you need to be of a certain fitness, certain age range where your bone marrow has the likelihood where it is going to respond to erythropoietin and at least free of certain chronic diseases like renal failure or chronic infections that might prevent your bone marrow from responding.

Dr. David Graham: But for the right patient, that may be an option which could save them some hassles?

Dr. Bruce Wellman: It might save them whatever are the minimal risks that remain for receiving of blood from another person; it would reduce that risk.

Dr. David Graham: Which is exactly what I was going to ask next. We are talking really very minimal risks at this point?

Dr. Bruce Wellman: Yes, today there's from an infection standpoint, the risks of a blood transfusion for most viruses is very minimal. The actual risk of a viral infection from HIV right now is probably less than one per every two million recipients. Hepatitis C is in the same range, about one to two million. Hepatitis B, surprisingly enough, still is a concern. That risk at least is estimated about one in 30,000. But most of the other infections

from viruses are very low from that standpoint.

The real risks of transfusion today are things that don't get a lot of press. One is just the system error where a patient would receive the unit that wasn't intended for them, or a mis-transfusion. The actual risk of that hurting someone is probably close to one in 40,000. Actual likelihood of death, we don't like to talk about that, is probably close to - very low - less than one in two million, which is a very high standard to meet.

Other significant issues in blood transfusion are related to bacterially contaminated units. Recently, across the nation, blood centers have been testing platelets for bacterial contamination, which was the leading source, and we've lowered that incidence significantly. So, from the standpoint of the bacterial infection, I think the risk is probably from a fatality, it's probably close to one in 30,000 from one in 40,000. We haven't seen that here at our organization except for once in the 20 years that I've been here.

So, there are risks, like receiving any drug or having any therapy that have to be balanced against the advantages or the value of having a procedure. Life's not risk-free and transfusion is not risk-free, but we've taken a lot of steps to make it safer.

Dr. David Graham: So we'll boil it down into the question that I get asked a lot, that I admit is a mean question to throw out here. Your doctor tells you need a transfusion. Any concerns about getting it?

Dr. Bruce Wellman: Well, I think the discussion ought to have an explanation of why you're getting it, and the advantages of receiving it, and if those seem reasonable and are explained by the physician or the provider, I don't think you should hesitate to get a needed blood transfusion.

Dr. David Graham: Well, Dr. Wellman, thank you very much for your time this afternoon, this is certainly very enlightening, and hopefully can help go a long way towards alleviating fears of people who, in the right circumstances, do need these transfusions.

Dr. Bruce Wellman: Thank you.

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Dr. David Graham: Well, I hope you enjoyed that as much as I did. I tell you, I really cannot thank these physicians we have talking with us for

these shows enough. They take time out of a busy day, often times at the end of the day when they would much rather be home with their families, to talk with me and in that sense, talk with you about these topics and help educate all of us. I've said this before; I'll say it until we're done doing these show; every time I talk with one of these doctors I learn so much more. I use it in my practice, you can use it in your lives. It's good for all of us.

I hope, after listening to Dr. Wellman and the new things that are going on with testing about blood and safety of blood that if the time would ever come that you would need a transfusion you, in fact, could feel more comfortable about saying, "I understand you say I need this, let's go ahead." Believe me, none of us doctors ever take the notion of giving a transfusion cavalierly. We won't often transfuse just because of a number on a piece of paper. We'll transfuse for symptoms or if we really need to help things or prevent problems from happening. So please, understand that we give this as much thought as we hope you do when it comes down to the question of transfusions.

So, my usual question: what else is going on in medicine? A lot of times, I try and gear this around the topic that we've been talking about. Not too many things going on in the notion of blood, but something going on that is at least indirectly related to blood, and those are the kind of things that help blood pump blood around, and that is to say, the heart.

You know, heart disease is a huge problem as we get older. There's always got to be some problem, and the heart tends to be one of the main ones. When people have heart attacks, when there is damage to the tissue and the muscle of the heart, that's a huge problem. These days, we try and work around it surgically, we try and use medicines to help what functioning muscle there is in the heart work more efficiently, but we're still left with dead heart tissue.

Does that have to be what we accept? You know, if you look at other tissues in the body, and a great example of this is the liver. If you cut a piece of the liver out, it grows back. What's the difference between what happens in the liver and what happens in the heart? This is where some really interesting research is going on at the University Of Pennsylvania School Of Medicine. Particularly, a Dr. Woo - I had to pause for a second there, just because it sounded almost a little humorous. It's actually Dr. Joseph Woo. Dr. Joseph Woo is the director of robotic cardiac surgery at the University of Pennsylvania. He started wondering, what, in fact, makes the difference from when you cut a piece of the liver out, so that it grows back, and when a piece of the heart gets damaged - why doesn't it grow back?

Well, the big difference is that there's no, for lack of a better phrase, "jump start" to make the heart muscle tissue start growing back like it should. So Dr. Woo started looking at this question and the first part of the question always boils down to, "Well, what are the signals that keep us from re-growing damaged tissue?" He found that there's a cell cycle regulator - a protein called cyclin A2. It actually controls two major parts of the cell cycle, and can stimulate those cell cycle functions – transitions – to happen. And the amazing thing about cyclin A2 is that it's the only cyclin in the body that's totally silenced after birth in mice, in rats and in humans.

Now here's the interesting thing: Dr. Woo said, "What if, in fact, I could start causing cyclin A2 to be expressed?" How he did that was a mechanism called gene transfer, and he first did it in cells to show that he could do it, and then started doing it in mice and in rats. The interesting thing - he found, in fact, that heart muscle function improved when gene expression of cyclin A2 was achieved.

So obviously, the next question: are we ready to just start introducing genes into the muscles of humans with heart disease? No, we're not. Messing with gene expression - introducing gene expression by gene transfer is nowhere near ready to happen. There are a lot of problems with it, there's a lot of technology and techniques that need to be worked around; need to be figured out. We are going to get there, and when we get there, here's something very cool: we may no longer have to say, "Well, we'll figure out how to make the heart work better just because we're working around functions to make damaged heart not be as important." We'll get rid of the whole damaged heart thing and help the body naturally replace it with normal-functioning heart.

What I really enjoy about what's happening these days in medicine is that we are working to understand how things work. And when we understand how things work, or how things stop working, we're taking that knowledge, and then developing ideas for treatments, for therapies to make all of our lives better.

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Well, that brings us to the end of this ninth Carlecast. I hope you enjoyed listening to it as I enjoyed putting it together for you. Once again, I have to thank Dr. Bruce Wellman - lots of great information. I hope it helped alleviate some of your concerns and fears should you ever need a transfusion in the future or you know someone who may need a

transfusion sooner than that.

Of course, if you want to not just listen to this, but have a written copy available to keep on a file on hand, we have transcribed copies available for download from our website. Our website is of course, www.carlecast.com. We hope you keep subscribing to this show for all future episodes. Next is our tenth episode - God, hard to believe I'm already getting ready to have ten of these done. I've got some really different, fun, unusual topics that I'm going to be talking with people about.

There are a lot of things going on in genetics, as it applies to medicine, as we are trying to identify people who may be at a higher risk of certain diseases. How do we figure out who to test? What kind of tests can we do? What may be the implications of a positive or negative test? Another topic that might be interesting, particularly given some of the stories in the news that happen every so often - what do we do to make sure that the doctors that work at a hospital, or at a clinic have the skills they say they have, have, in fact, done the training they say they've done? In other words, how do we credential a physician? Those are just two of the topics that will be coming up in future shows.

For today, as always, I have to give thanks to Derek Miller. His music from "The Pen Machine Sessions" provides our introduction, our exit, and our bumper music. It fits in with the whole notion very well. He's kind enough to provide this music without any sort of copyright cost, and I can't thank him enough for that.

As always, please go to our web page - carlecast.com. Click on the email link there, if there are any questions, if there are any show suggestions, if there are any comments, we would love to hear them. I'd love to read them.

I have to put the caveat in here - there's no way I can answer individual case medical questions. Certain laws about practicing in states where I'm not licensed prevent me from doing that. On the other hand, if you want to ask me to find an expert in a certain topic to talk with you about, I'd love to do that. If there are things you think we might be able to do better in this podcast, I'd love to hear that as well.

So, until this tenth show comes, I am Dr. David Graham, your host from Carle Clinic in Urbana, Illinois, asking you to stay healthy.

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