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## The Process of Blood Donation

### Guest Experts:

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Cross*

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*Director of the Yale Blood Bank and  
Transfusion Service*

**Yale Cancer Center Answers**

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*Welcome to Yale Cancer Center Answers with doctors Francine Foss and Lynn Wilson. Dr. Foss is a Professor of Medical Oncology and Dermatology, specializing in the treatment of lymphomas. Dr. Wilson is a Professor of Therapeutic Radiology and an expert in the use of radiation to treat lung cancers and cutaneous lymphomas. If you would like to join the conversation, you can contact the doctors directly. The address is [canceranswers@yale.edu](mailto:canceranswers@yale.edu) and the phone number is 1-888-234-4YCC. This week, Francine is joined by Paul Sullivan and Edward Snyder. Paul is the CEO of the Connecticut Chapter of the Red Cross and Ed is the Director of the Yale Blood Bank and Transfusion Service. Here is Francine Foss.*

Foss Let us start off by having you tell us a little bit about why blood donation is so important?

Sullivan At the Red Cross, we understand blood donation to be vitally important. We serve all 30 acute-care hospitals in the State of Connecticut, and we do that literally every day of the year to make sure that the doctors in our outstanding medical facilities across the state can support patients, and certainly we are very pleased to support Yale in that endeavor.

Foss Can each of you tell us a little bit about what your roles are. Starting with you Paul, what is your role at the Red Cross?

Sullivan My personal role is I support the blood program, which literally means that we are responsible locally for collecting about 150,000 donations each year in the State of Connecticut as well as then making sure that blood is safe for transfusion. So, we collect the blood, we process it, which means breaking it down into its core components, red cells, platelets, and plasma, and then we have a team of folks who both work for the hospitals in terms of what their needs are as well as just delivering it out to them. We are a support service to hospitals to make sure that they can sustain patients' lives through blood transfusion.

Foss And Ed, can you describe your role at Yale?

Snyder The Blood Bank at Yale takes care of the needs of Smilow Cancer Hospital as well as the other parts of the Yale-New Haven Hospital. Altogether, we transfuse each year about 62,000 blood products. We transfuse about 9,000 patients a year and the various components of blood that we transfuse can be broken down into about 24,000 units of red cells, 10,000 units of plasma, and 40,000 individual units of platelets. Blood is made up of variety of cell products, cellular components, red cells, which carry oxygen, platelets which help your blood clot, and plasma, which is the liquid portion that helps your blood clot as well, and those different products are used to take care of the needs of various patients, patients who have surgery, patients who have trauma, patients with various types of medical diseases and, of course, patients with cancer.

Foss Ed, you talked about units of blood, can you just let the audience know how much a unit is?

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Snyder A unit of blood is somewhere around 550 mL of blood, which is a little more than a half a quart of liquid, but that is one donation that is made into about 2 1/2 to 3 products by the Red Cross, which I will let Paul expand on in a second, so that each time someone gives a unit of blood, they are actually donating to help at least three patients with their one donation, because we know today that giving blood as it is donated really is not necessary. Sometimes, it can be harmful to the patient if the patient, for example, just needs cells called platelets or fragments of cells called platelets that help the blood clot, and do not need red blood cells and do not need the plasma. There is really no need to give that component to the patient, rather it can be separated and used to treat another patient.

Foss Can we just digress for a minute here and talk from the point of view of a patient, the process of donating blood, where do you go, how do you find out about donating blood? Where do you go and how does that blood then get transferred to where it is needed?

Sullivan At the Red Cross we are very proud of the fact that we facilitate blood donors supporting patients through their blood donation. And it is a very straightforward process. The first step obviously is we need to impress upon the public how important it is to give blood. In Connecticut, we actually find ourselves in a situation year after year where we have to bring in blood from other parts of the country. So the first thing is donor education, but once that donor understands the importance, they come in. We have blood drives every day, all over the State of Connecticut, and we ask them to go through a three-part process. We ask them to go through a mini-physical, or health history, where we understand that it is safe for the patient to receive their blood and safe for the person to donate their blood. That takes about 15 minutes and involves a hemoglobin and hematocrit check to make sure that you have sufficient red cells, make sure you are not anemic, your blood pressure, your pulse, temperature, making sure again that you are well.

The second part of the process is the actual phlebotomy and blood collection. It takes about 15 to 20 minutes and that part in some ways is the most intimidating, but quite frankly, it is also in some ways, very relaxing. We ask the person to lie down and relax. We have really outstanding phlebotomists at the Red Cross who do this every day, as their livelihood. And then we actually draw the blood from the inside of the arm. It is a place, that not accidentally, has very few nerves, and therefore, it literally is a pinprick to donate blood. I am a donor myself and have never had an issue. Finally, we ask the person to sit and join us at what we call our canteen, which is kind of the milk and cookies time. We want to make sure that you drink some liquids, water, or juice to feel hydrated and then some snacks just to make sure you feel well on your way. The whole process, start to finish, takes about an hour, sometimes a little bit less, but we always ask people to leave open about an hour of their time, and then it goes from there back to the blood center.

Foss Some people out there might be worried or wondering whether or not they are eligible to donate blood. A lot of people have questions about that. Can you go through the eligibility criteria, age, etc.?

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- Sullivan The eligibility is pretty straightforward. The quick answer is you have to be 17 years or older in Connecticut. You have to weigh at least 110 pounds and you have to be in good physical shape and feeling well. There are further requirements so if anyone has questions, they can call 1-800-RED-CROSS. They can also go to our webpage [www.redcrossblood.org](http://www.redcrossblood.org), to check the requirements, if they are taking any prescription medicines or anything else, if they have traveled someplace that may cause us to restrict their donation, but the truth is, we estimate that more than half of Connecticut's population is eligible to give blood and yet we only see about 5% of the population come out to our blood drives. The good news is that there is plenty of headroom. We have a lot of people out there who are eligible and are not donating. As I mentioned before, we actually bring blood in because we are not self-sufficient in Connecticut in terms of taking care of our own hospitals, which I think is a shame and I cannot think of any good reason why, and so we have got to get more people involved in the program.
- Snyder I think it is important to remember that people need blood every day, and during the summer and during the winter time, it can be quite difficult, as Paul just mentioned, to get donors. Patients do not take a holiday, obviously, and blood is needed every day, whether it is for trauma or surgery, or whether it is for treatment of chemotherapeutic problems that cause a drop in blood counts, but the difficulty is that it is our job to make sure there is blood on the shelf, and the Red Cross does an outstanding job of supplying our needs. The problems are, we just finished the 4th July, a lot of people are looking forward to vacations, people are packing up the cars and leaving, yet they expect that there will be a blood supply here ready to take care of patients who are here, and as they drive away, they are probably thinking, well, someone else will be there to donate, but if everybody had that idea, there would not be anybody to donate. People need to realize that although this is vacation time and time to be with friends and family and rejoice in the summer and good weather, it is also time to stop and think about those less fortunate who may need blood. As part of your vacation plans, when you are home or before you leave, you could donate a unit of blood or contact the Red Cross about donating to see if you could help someone who wants to be able to enjoy summers in the future.
- Foss Paul, can you comment on the need for blood say in the case of a disaster? We have been lucky in Connecticut not to have a huge disaster but other states have not been so lucky. What do you do, how does that actually get managed by the Red Cross?
- Sullivan Dr. Snyder said it very well that there is a regular need. Each and every day patients are counting on us and it is the blood we collect today that is available for transfusion tomorrow. And regrettably, we operate in Connecticut with what we call a shoestring budget of blood, meaning that we often operate with literally just enough blood to get us through the next day. We measure inventory in terms of days and right now, for example, we have about a day's inventory of blood. To answer your question, that means that we are not at all prepared for a disaster. If something were to happen in Connecticut today, that would require large amounts of blood, we would obviously partner with the hospitals. We would scramble to move the blood that is in the state

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around and we would address the needs that way. We have an excellent national inventory management system at the Red Cross where we communicate multiple times a day and we have a good understanding of exactly where the blood is and we would again move very quickly to make sure that we could fortify the use or the need here in Connecticut, but again, it would be a finite resource. It takes time to bring donors in to draw the blood, to test the blood, to get it ready for patients, and that is why while I have no doubt in an emergency situation we would see many, many donors come out, by definition it would not be there in time to help the people who would need it right away. So that is one of our challenges, we have a number of people who mean to do the right thing, but we need them to act on that impulse. There is an interesting statistic, we are constantly trying to understand the population in Connecticut, and one of the questions we ask in surveys is, are you a blood donor? And I do not know if it is good news or bad news, but I guess I will say it is good news, the good news is that about a quarter of the population will tell you they are blood donors. The bad news is, we only see about a quarter of that quarter, meaning many more people say they are blood donors than actually come to donate, and I actually think that is good news. I think it means that people understand how important it is to donate. Our challenge is we need to spur them into action, and again, while I do think we are well prepared in the sense of having strong communication networks and so on in terms of responding to an emergency, and certainly the Red Cross as a national organization takes great pride in supporting communities when they are in challenging situations, quite frankly, we are not there in terms of the blood supply, and that is why whoever is listening, needs to step up to the plate if they have not already, and call 1-800-RED-CROSS and donate blood.

Snyder I think it is important to realize that one of problems is that there are always requests for blood. The Red Cross is always advertising. Sometimes, it becomes more of an urgency, and I think people sometimes get a little oversaturated with requests, and I think the way to deal with this is to resolve to give blood two or three times a year. You are not being asked to give blood every 56 days, or five or six times a year, you are being asked to give once or twice, two or three times during the year. If we increased the number of people that did that, we would not have any problems with blood shortages. It is a matter of making a commitment. We are living in a global village and we need to be there for other patients, people who become patients, because you never know when something may happen and heaven forbid, you may become a patient yourself and you will expect that blood will be there.

Foss Paul, we touched a little bit on age, but can you talk about what is being done to try to attract young people, late teens, 20s age group to donate blood?

Sullivan That is a great question because our future is the young people who are just starting to donate right now. We have two goals, one is to bring more donors into the program. We have a real focus on high schools in Connecticut. Fortunately, we get great support from Connecticut high schools and we actually have a businessman, Bob Kaufman, who is very philanthropically oriented, and Bob's Discount Furniture actually launched, and it's now in the second year, High School Heroes

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Programs, which is a scholarship program where Bob and his colleagues at Bob's Discount Furniture have stepped up to the plate in terms of giving away \$100,000 each year in high school scholarships, and their goal is to impress upon high school students through the scholarship program, how important it is to be blood donors. And so we have an ongoing education effort at high schools about the importance, and then we also have business leaders stepping up and explaining the importance. Quite frankly, we try to make it fun. For example, this summer we have Music Saves Lives tours where high school students can sign up to give blood and get backstage passes to certain concerts during the year. So that is a critical audience for us because once they become donors, we hope that they will stay donors.

Foss That sounds terrific, Paul. Unfortunately, we are going to have to take a quick break now for a medical minute. Please stay tuned to learn more about blood donation from Ed Snyder and Paul Sullivan.

*Medical  
Minute*

*Breast cancer is the most common cancer in women. In Connecticut alone, approximately 3,000 women will be diagnosed with breast cancer this year, and nearly 200,000 nationwide, but there is new hope for these women. Earlier detection, noninvasive treatments, and novel therapies provide more options for patients to fight breast cancer. In 2010, more women are learning to live with this disease than ever before. Women should schedule a baseline mammogram beginning at age 40 or earlier if they have risk factors associated with the disease. With screening, early detection and a healthy lifestyle, breast cancer can be defeated. Clinical trials are currently under way at federally designated comprehensive cancer centers such as Yale Cancer Center, to make innovative new treatments available to patients. A potential breakthrough in treating chemotherapy-resistant breast cancer is now being studied at Yale combining BSI-101, a PARP inhibitor, with a chemotherapy drug, irinotecan. This has been a medical minute, brought to you as a public service by the Yale Cancer Center. More information is available at [yalecancercenter.org](http://yalecancercenter.org). You are listening to the WNPR Health Forum on the Connecticut Public Broadcasting Network.*

Foss Welcome back to Yale Cancer Center Answers. This is Dr. Francine Foss and I am joined today by my guests, Dr. Ed Snyder and Dr. Paul Sullivan, and we are here discussing the process of blood donation. We talked a little bit in the beginning of the program about the shortage of blood in Connecticut. Ed, would you talk a little bit about the different types of blood? People identify themselves as having a specific blood type. What does that mean and how does that affect who should donate?

Snyder The reason for blood types is really not well-known, but in high school everyone knows that there are blood types A, B, AB, and O. Exactly what the purpose is of those antigens or molecules on the cell, other than keeping blood banks in business, is not really known. It is known that there are various biological and physiologic, or natural, body functions that are associated with various

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of blood types, and some blood types are actually associated with certain types of diseases. For example, there may be a large amount of people that have ulcers with blood type A, and so forth and so on, although those relationships are really not very well-proven, the associations are noted as sort of an observation. It does not really matter what blood type you are, any blood type is a blood type that is needed. Of course, you cannot just give anyone any unit of blood. There are blood types which were actually discovered by Dr. Karl Landsteiner in 1901 at Rockefeller University that are the basis for blood typing as we know it today.

You have heard terms about O being the universal donor and AB being the universal recipient. There are aspects of that that are true. The purpose of the blood bank is to make sure that right unit of blood is given to the right individual. I think more to the point is what exactly is blood used for. We all can understand when someone has surgery and there is a major degree of bleeding, and there are actually three things that cause people to bleed, either you have a problem with platelets, which are one of the little bits of cells that help your blood clot, there are proteins in the blood called clotting factors, and if you have low levels of clotting factors such as hemophiliacs might have, you might be more prone to bleeding, and lastly is an intact blood vessel. And when you have surgery, the surgeon obviously needs to cut certain blood vessels and that makes you more prone to bleeding.

So, if you have a problem with, for example, low platelets and blood vessels that are being cut, the chance of your bleeding is greater, or if you are a hemophiliac who needs to have surgery, your chance of bleeding is greater, and the surgeon contacts the blood bank and we provide the components of blood that are necessary to ensure a successful surgical procedure with minimal blood loss for the patient. What may be not as familiar to some of the members of the audience would be why people with cancer need blood transfusions. Cancer affects all organs of the body, but the organ that produces the blood is the bone marrow, and the bone marrow has cells in the body that produce red blood cells and bigger cells known as megakaryocytes which break off into little pieces and those tiny little pieces are the platelets that I have been referring to, which actually are part of the megakaryocyte, which is a very, very big cell, and then there is the plasma, which is a liquid portion that contain some of the clotting factors that I was talking about such as factor VIII and factor IX, which hemophiliacs sometimes need. So when someone has cancer, if the cancer invades the bone marrow and shuts down production of all those other cells, the blood counts will fall, and depending on the type of cancer and the type of effect on the bone marrow, which is the soft part of the bone that most of you are probably familiar with for soup bones and so forth, if that gets affected, you could have a decrease in the production of red cells leading to anemia, and you need a blood transfusion to get your hematocrit, or your hemoglobin up. If it affects the megakaryocytes, your platelets will be low and you will need a platelet transfusion. And that could also affect the white cells and if it affects the white cells, that potentially could lead to infection. We do have some methods of treating patients with low white counts. We used to think you could transfuse white cells from collection of blood, but that is not as efficient a method as using some of the more advanced pharmaceuticals that are available to try to get the body to produce its own white cells. So, if someone is getting chemotherapy to treat cancer, even if their

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bone marrow is not affected, the way the chemotherapy works is to provide some blockage to the growth of cancer cells. It is not a specific treatment, and as a result many times the bone marrow may become blocked as well.

In addition to blocking the growth of the cancer, it could actually block the growth of the normal healthy bone marrow that is not affected in an individual. Those patients during the course of chemotherapy could also develop a decrease in red cells, a decrease in platelets, and a decrease in white cells and would need transfusions of platelets or transfusions of red cells or some clotting factors to help increase the levels so that once the chemotherapy has done its job, the bone marrow comes back and they would not need to be transfused anymore. There are a whole variety of reasons why people on chemotherapy need blood, and many patients are being treated now as outpatients, so they will come into the clinic, they will get blood counts done and they will find at Smilow that their platelets are low and they will need a platelet transfusion. They expect to have those platelets there for them to be transfused and get them home and back to their families in a short period of time. They really do not want to hear, I am sorry, we are all out of platelets because nobody donated. We have to work hand in hand with the Red Cross to provide products for not only patients who are bleeding, but people who have cancer and are being treated for decreases in production of the various blood cells because of chemotherapy or radiation therapy, which can do the same thing.

- Foss I would like to echo that Ed, as a treating oncologist, almost all of our patients at some point will need some blood product and also with some of our aggressive patients, we use high-dose chemotherapy and we expect that the blood counts are going to go down and we expect that we will need those transfusions. And you and I have both been in the hospital at times when we have been short on blood and family members are usually asking, "Can I go down and donate blood now?" I guess the message from Paul is that you should be donating it in advance.
- Sullivan Absolutely! We need people ahead of time for the very, very important reasons that we want to make sure blood transfusion is as safe as possible. Quite frankly, no one gets a transfusion unless they absolutely need it, and we would never take our responsibility lightly in terms of ensuring that the patient receives a unit of blood that is as pure, if you will, and as potent as is absolutely possible, and the way we do our best to preserve that is by thorough screening of the donors and thorough testing of the blood. Again, we need people ahead of time because we cannot turn it out, if you will, on a dime because we need to make sure again that it is absolutely as safe as possible for their loved ones. So again, 1-800-RED-CROSS, sign up to be a donor because we absolutely need people.
- Snyder Something else to mention, years ago during the height of the AIDS epidemic, which is still around but we feel that there are now therapies and treatments for HIV or AIDS, there was a concern many people had that by donating blood they could somehow get AIDS, and this has been shown for over 20 years now, as it was realized at the time, to be an issue that is completely fabricated and without any basis. In fact, when you come in to donate blood, the blood bag that is

used, the needle that is used, is for one-time use only. It has never been used by anyone else and there is absolutely zero possibility of anyone getting any kind of an infectious disease from donating blood. I just mention that in case anyone had a lingering concern about that issue, which is something that might prevent someone from donating. And to further modify what Paul said, even if you come in and you are donating for someone who needs blood, almost all the time that blood is not used for that individual. So, donating at any time would be appreciated and necessary. Certainly, if you want to donate blood for a specific family member, assuming that biologically this individual can receive blood from you, if you call the Red Cross and discuss it with them and also check with your doctor at the hospital, if it is possible, arrangements could be made. Most of the time, however, people donate for the general blood supply so that blood can be on the shelf for anyone who needs it.

Foss Ed, can you comment on the safety of our blood supply? People are worried about hepatitis, AIDS and other contaminants of blood. How safe is it?

Snyder The blood supply has never been safer. The risks of getting AIDS from a unit of blood is in the two or three millions. There have been maybe two or three cases of HIV from blood transfusion over the past couple of years, very small numbers, I do not have the exact numbers but they are incredibly small because of the extremely rigorous screening tests that we use. We test for HIV using several different types of tests. We test for hepatitis B, hepatitis C, we still test for syphilis, we test for Chagas disease, we test for West Nile Virus. There are a large number of viruses and illnesses that are tested for by the Red Cross in order to ensure the safest possible blood supply.

Foss Can you talk also, Ed, about the precautions that we take when we actually transfuse blood into a patient? How many times do we check to make sure that the blood is right for that patient?

Snyder Absolutely. And I think that is a very important point. People read in the newspaper about medical errors, and that is something that we at Yale and at all hospitals in the state are very, very aware of. We ensure that when a tube of blood arrives that it is properly labeled, and that the request for blood that accompanies the tubal blood has the appropriate name on it. We then make sure when someone comes to get the unit of blood that it has been prepared for the right person. When the blood gets to the floor, the nurse checks the wristband that the patient has against the unit of blood to ensure that the right patient is getting the right unit of blood, and I can't tell you how many times patients with similar-sounding names are on the same floor or sometimes in the same room, and unless we pay very strict attention to the names and to the unit numbers that are on those units of blood, things could happen that would be very unfortunate. So, we are very, very aware of that. Focusing that the right patient gets the right unit of blood is not just biological but there is also the transport of the unit up to the patient, and with a hospital that transfuses 9,000 patients a year, you can be sure that the staff is very, very aware and make sure that the right unit is given. Once the unit is started, several things can happen. You can have allergic reactions such as hives or some difficulty breathing. You can get fever or chills. Nurses understand that this could happen and

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there are nurses that are standing near the bed side or available very quickly to stop the unit of blood if there is any adverse problem that affects the patient. There are a lot of things, which we could have another whole show on, to discuss adverse events of blood transfusion, but by and large despite what you read in the papers that blood may be harmful, I think the preponderance of evidence is that blood, when used only used a patient absolutely needs to be transfused, that there are certain risks, but the medical staff are prepared and trained to know how to treat those risks.

Foss Ed, just to clarify, if a person has trouble with blood, say they have a reaction to blood once, does that mean that they can never get blood again?

Snyder That is sort of a complicated question. It depends on what the trouble was. If the trouble was that they received blood and they were ill at the time and they had chills because let's say they were infected, or the medical term for that is septic, unrelated to the blood, they might have chills, which would never happen again if they got a unit of blood and they did not have the problem with the bacteria in the blood from an infection that they might have. If someone has a few hives, it is possible that they could get some hives again but really serious reactions are evaluated and we work in conjunction, we being the blood bank, work in conjunction with the oncologists such as Dr. Foss and others to ensure that if a patient needs blood, it is given under the safest possible conditions, and the patient is closely observed. Most of the time, the number of reactions are far, far less than 1%. So, if someone needs blood, there is a certain risk, of course, as there is with anything in life, but the risk is minimized and certainly the benefit of getting a unit of blood is felt to far exceed any potential risk.

Foss Well, great! This has been a really terrific show, Ed and Paul, and we have learned a lot about blood donation. Hopefully, a lot of people listening to the show will go out and donate, and I will give you one more chance to give your 800 number.

Sullivan That is right. Please call 1-800-RED-CROSS or visit [www.redcrossblood.org](http://www.redcrossblood.org), make an appointment, we do ask people to make an appointment and we have in July, a special kicker, which is Friendly's Ice Cream is offering every donor who comes in a half gallon of ice cream. So, beyond the "feel good" feeling you get from sustaining another life, you get some free ice cream too.

*Paul Sullivan is the CEO of the Connecticut Chapter of the Red Cross and Ed Snyder is the Director of the Yale Blood Bank and Transfusion Service. If you have questions or would like to share your comments, visit [yalecancercenter.org](http://yalecancercenter.org) where you can also get the podcast and find written transcripts of past programs. You are listening to the WNPR Health Forum on the Connecticut Public Broadcasting Network.*