MSK nurse Grace Yang displays the blood stem cells that were collected through her arm. In the spring of 2024, Yang donated to a stranger who needed her cells for a stem cell transplant.

Imagine finding out that your bone marrow or blood stem cells could save the life of someone who needed it — even a complete stranger. Memorial Sloan Kettering Cancer Center (MSK) nurse Grace Yang, RN, received such a call in March 2024.

“This is definitely something I was never expecting to happen to me,” Yang says. “But because I work in the Bone Marrow Transplant [BMT] Service, I knew the impact it could have on somebody else’s life. It felt like a privilege to be able to help in a different way.” Yang works as an office practice nurse for BMT and cellular therapy specialist Heather Landau, MD.

Stem cell and bone marrow donations can offer people with blood cancer and other blood diseases the best chance for a cure. There is an urgent need for more donors between the ages of 18 and 40, especially donors of non-European and mixed ancestry. Yang, who is of Asian ancestry, was 29 when she donated.

You may wonder how to donate, whether donating bone marrow or blood stem cells is painful, and what's involved in bone marrow and stem cell transplantation procedures. Here's what you need to know.

What Are Bone Marrow and Stem Cells and How Are They Used?

First, some background: Transplanting donor stem cells that form new blood cells in a patient is a lifesaving treatment for many people with blood cancers like leukemia and lymphoma, as well as some other blood diseases. Contrary to what many people might think, the cells used in the transplant are usually collected from the donor's bloodstream. Only on rare occasions are the stem cells taken from the bone marrow.

These donor cells are needed because before receiving a transplant, patients are given chemotherapy and sometimes radiation to wipe out the cancer. These treatments also destroy the patient's blood-making cells. So they need healthy blood stem cells to be infused into their body. This transplant procedure enables patients to grow new blood cells and recover from the treatment.

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Why Is It Important To Donate Bone Marrow and Blood Stem Cells?

Every year, about 18,000 people in the United States are diagnosed with a life-threatening illness for which a stem cell transplant from a donor is the best treatment option. Unfortunately, only about 30% of those patients have a family member who is the best match. That means that about 12,000 people need to find an unrelated donor.

One way that donors are found is through NMDP, which maintains a registry for connecting unrelated volunteer donors with patients in need. Unfortunately, many people are reluctant to join this registry because they don't realize the process is easier than they think, nor do they fully appreciate the desperate need for donors.

Yang signed up for the NMDP registry through a community drive, before she even worked in the BMT field. More than a decade later, she learned she was a match with a patient. "I encourage all the people around me to sign up," she says. "They are shocked that it's so easy."

Can't People Who Need a Transplant Get a Donation From a Sibling or Another Family Member?

Even if a patient has an adult sibling who is the right age to donate, there is only a 1 in 4 chance a sibling will be a perfect match.

Siblings and other family members are often a half match, and this can be a good option for many patients. But for some patients, the best way to maximize the chances of a successful transplant is to find a fully matched donor — even one who is unrelated.

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The Bone Marrow and Stem Cell Donation Process

There are a lot of misconceptions about donating bone marrow and stem cells, especially that it is a burden or painful.

When Yang first told her parents that she had been matched to a patient in need, she found out that her father had also donated bone marrow to stranger — more than 20 years ago. At that time, the process was more complicated. Because of his past experience, her father was a bit concerned about what she might go through, but she explained that thanks to advances in technology, the donation process is much easier than it used to be.

Here is a step-by-step guide:

Joining the Donor Registry

Because studies have shown that patients receiving blood stem cells from younger donors have a better long-term survival rate, you must be between the ages of 18 and 40 to join the registry.

Joining the registry is simple. Go to www.bethematch.org to order a collection test kit that will be sent to your house. The website may also direct you to

a local registration drive in your area. Once you get the kit, all you need to do is wipe a cotton swab on the inside of your cheek, seal it in a provided container, and mail it back.

What Happens if I Match With a Patient?

You will be contacted if you are a full match or a partial match for a patient in need of a bone marrow or stem cell transplant. Congratulations! Your cells may be the best option to save that person's life.

Several additional steps will be needed to confirm that a transplant with your cells is likely to be successful. These include filling out a health questionnaire, having additional blood tests, and undergoing a physical examination.

Scheduling Your Donation

If testing confirms that you are a suitable donor, your donation will be scheduled for a time that works for you and for the patient's treatment schedule. Depending on where you live, you may need to travel to one of the specialized facilities that collects the stem cells from blood or bone marrow. If you need to travel, your expenses will be covered by NMDP.

Yang traveled to Chicago to make her donation, and the NMDP not only arranged her trip and paid for everything, but it also paid for her sister to travel with her so she didn't have to go alone.

What Happens When You Donate Blood Stem Cells — Is It Painful?

Thanks to procedures developed over the past few decades, 90% of the time the stem cells needed for the transplant are taken from the blood, not the bone marrow. This process is much easier for donors because it does not require surgery.

With stem cell donation from the blood, there is little pain. It is very similar to donating blood platelets. The main difference is that for a few days ahead of time, donors need to receive an injection of a drug called filgrastim (Neupogen®), which stimulates the bone marrow to produce extra blood-forming stem cells. Donors may experience some bone pain or a low-grade fever while taking filgrastim, but the side effects usually are not severe and go away after the donation process is complete.

Most people are able to give themselves injections of filgrastim at home, so they don't need to go to the doctor every day.

On the day of the donation, the donor is hooked up to what is called an apheresis machine. The blood is collected from one arm, sent through a machine that removes the stem cells, and then returned to the other arm. Other than the initial needle prick, it is not a painful experience.

The process takes several hours, during which donors often read or watch movies. It may be necessary for donors to return for a second day, depending on how many cells are retrieved.

For Yang, the donation took about 3 hours. "We started in the morning, and I was done before lunch," she says. "The nurses did a great job of making me feel comfortable and checked on me often throughout the process."

What Happens When You Donate Bone Marrow?

In only about 10% of cases, doctors may recommend the patient receive a bone marrow donation requiring a surgical procedure. Donors are placed under general anesthesia, while bone marrow is removed from small holes drilled into their pelvic bones.

This procedure takes an hour or two, and usually donors can go home that same day.

Recovery After Donating

If you have donated stem cells from your blood, you may feel tired for a few days, but many donors feel no effects at all the next day.

If you have donated bone marrow, you will probably have some pelvic and hip pain, as well as some bruising, for a few days after the procedure. These aches and pains can be controlled with over-the-counter pain medications like Advil and Tylenol. Most people can go back to regular activities right away, but your medical team can provide more details for specific activities.

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How Are Patients Matched to Donors?

The process by which the donor and recipient are matched is called HLA (human leukocyte antigen) typing. It's not the same as blood type. Instead, it has to do with the immune proteins that we all inherit at birth from both of our parents. The immune system uses these proteins to understand which cells belong to your body and which do not. A perfect match means that 8 out of 8 markers are the same.

Matching is not related to gender, so your donation can go to someone of any gender as long as the HLA markers align.

Yang has not yet learned anything about the patient who received her cells, but hopes to in the coming months. "I just feel so lucky that I was able to do something amazing for somebody else," she says.

It Can Be Difficult for People in Some Ethnic Groups To Find a Match

Not everyone who needs a donor is able to find one who is fully matched. A patient's best chance of finding a donor is someone within their own ethnic group. Members of certain ethnic groups, including those of Latin American, Asian, African, and Middle Eastern ancestry, have a harder time finding a match. These groups tend to be underrepresented in public registries.

For example, for people of Latin American descent, the odds of finding a matched donor in a public registry are less than 50%. For Black patients, the odds are only about 30%. It may be even harder for people of mixed ethnic backgrounds to find donors because their HLA makeup can be more complex.

This makes it especially important for people from these underrepresented ethnic groups, as well as those who have mixed ancestry, to join a public registry like NMDP.

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What Happens if Patients Can't Find a Donor Match?

For patients who are unable to find a fully matched donor, there are other options. These include:

- Using cells from a family member who is a half match (called a haploidentical transplant)
- Using cells from an unrelated donor who is only partly matched (called a mismatched transplant)
- Using stem cells from donated umbilical cord blood

These treatments can offer patients very good outcomes, but in some cases it's better to have a donor who is a perfect match.

Yang says even though she works as a BMT nurse, she still had questions throughout the donation process. "Everyone at NMDP is great about addressing any concerns you may have about the process, and they have many great resources," she says. "Any time I have the opportunity to talk to someone about this, I encourage them to get involved."

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