Hamilton Health Sciences
PATIENT EDUCATION

Thinking about donating stem cells or bone marrow?

Information for potential donors

From the Bone Marrow Transplant Team at Hamilton Health Sciences, 2015.

Thinking about donating stem cells?

Reading this booklet can help you learn about donating stem cells:

- from your blood by “Peripheral blood stem cell donation”
- from your bone marrow by “Bone marrow donation”

Please consider this information before making the decision whether or not to undergo one or both of these procedures.

You will not directly benefit from donating stem cells. Only the person who receives your donation will benefit.

There is a possibility of side effects or complications with all medical procedures. The members of the Bone Marrow Transplant Team will discuss the specific risks associated with donating stem cells from your blood or bone marrow and you can refer to this book as often as needed.

We hope that this information does not scare or alarm you.
We simply want to you to have enough information to make an informed decision – one that is right for you.

If you have questions or concerns at any time, please talk with a member of the Bone Marrow Transplant Team.

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Questions about donating stem cells

What are stem cells?

Stem cells are immature cells from which all blood cells develop. For example, stem cells can develop into:

- red blood cells, which carry oxygen to every part of your body
- white blood cells, which help fight infection
- platelets, which help your blood form clots to stop bleeding

A blood or bone marrow transplant replaces a person's stem cells lost during cancer treatment with healthy stem cells from a donor. If the transplant is successful, the donor's stem cells settle into the recipient's bone marrow. Here they divide and grow into normal, healthy blood cells. This is the best possible treatment for a patient with a serious blood disease or cancer, such as leukemia.

How are stem cells collected?

Most stem cells are found in the soft, spongy marrow inside bones. A smaller number are found in the bloodstream. These are called **peripheral blood stem cells**.

Stem cells can be collected in these ways:

- by **apheresis**, a procedure that removes peripheral blood stem cells from the donor's blood through intravenous lines
- by **bone marrow donation**, a surgical procedure that removes bone marrow from the donor's hip bones

As a potential donor, you need to learn about both procedures. Our Transplant Team will usually request one of the two procedures. However, you do have a choice of which procedure you would like to use.

If apheresis does not collect enough stem cells, a bone marrow donation may be needed.

Will I be accepted as a donor?

You must be in good health to be a donor. Before you can be accepted as a donor, you will be asked questions about your medical history and have a physical examination and blood tests. This includes testing for infectious diseases.

Blood tests help the health care team:

- decide whether you are healthy enough to undergo donation
- know whether it is safe to give your stem cells to the recipient

These tests are needed to protect your health and that of the recipient. You can ask for the results of your tests, if you wish.

Can I change my mind?

Donating stem cells is voluntary. Before you agree to donate your stem cells, think carefully about all the information in this booklet. You need to be **absolutely certain** of your decision to donate.

If you change your mind after the recipient's own stem cells are destroyed with chemotherapy or radiation, he or she will die.

Donating peripheral blood stem cells

Peripheral blood stem cells are collected in a procedure called **apheresis**. Pregnant women are not allowed to have this procedure.

Before the procedure, you will be given shots (injections) of **growth factor**. Growth factor stimulates the bone marrow to make more stem cells and release them into the blood.

Growth factor is also called:

- G-CSF (granulocyte colony stimulating factor)
- filgrastim (the brand name is Neupogen®)

What happens before donation?

The first step in donating peripheral blood stem cells is to move more stem cells from your bone marrow into your bloodstream with injections of growth factor.

You will have an injection of growth factor each day, for 4 or 5 days before the collection. A nurse at the hospital will give you your first injection. The nurse may teach you or a family member how to give the other shots. Blood tests will show when there are enough peripheral stem cells for you to start collection.

Health Canada has approved the use of filgrastim (Neupogen®) for the collection of stem cells from patients who will receive a transplant of their own stem cells (autologous transplants).

You should be aware that filgrastim has not yet been approved for the collection of stem cells from healthy donors who are making a donation for recipients (allogeneic transplants).

Filgrastim is used in this special circumstance because it has been shown to be effective in increasing the number of peripheral stem cells.

Risk associated with growth factor (filgrastim)

You may notice some pain, swelling or redness at the site where the shots are given.

The following side effects are possible when taking filgrastim:

- aching pain in your bones
- headaches
- muscle aches
- tiredness (fatigue)
- nausea and vomiting
- trouble sleeping
- irritability
- hot flashes

Most side effects can be managed with medications and usually go away within 2 or 3 days of the last injection. You can take acetaminophen (Tylenol®) to relieve pain.

Growth factor will cause your white blood cell count to be very high. This does not cause any symptoms. Your white blood cell count should return to normal within a few weeks of your last injection.

Growth factor will make your spleen become larger. While taking filgrastim, do not do strenuous activities or contact sports, which could injure your spleen. There is a small risk (1 in 10,000) of pain and bleeding from the spleen. This is a potentially serious side effect. See your doctor if you develop pain on your left side, just below your ribs.

Rare side effects of filgrastim include allergy symptoms such as:

- fast heart beat
- dizziness
- shortness of breath
- itching or rash

Growth factor injections quickly cause an increase in liver enzymes (proteins) in the blood. If you are tested for hepatitis (an infection of the liver) at this time, the test may be a “false positive”. This means that the results show you have hepatitis surface antigen (also a protein), when you do not. You may need other tests to confirm the results.

People with sickle cell anemia may have a severe reaction to filgrastim. Sickle cell anemia is an inherited disorder of the red blood cells. You will be tested for this. If you have sickle cell anemia you will not be allowed to donate peripheral blood stem cells. You may be asked to consider bone marrow donation instead.

Growth factor stimulates the growth of normal blood cells. However, in some patients with cancer or other blood disorders, it has stimulated the growth of abnormal white blood cells (leukemic cells). No long-term risks have been found so far with healthy people who have received growth factor. More research is needed before we know whether growth factor affects a person's risk of developing cancer.

What happens during donation?

Peripheral blood stem cells are collected from the blood in a procedure called apheresis. There are usually 2 days of collection to make sure enough stem cells are collected. Each procedure takes 6 to 8 hours.

The apheresis nurse will put in 3 intravenous (IV) lines. Your blood flows through one intravenous, usually in a vein in your arm, into a machine called a cell separator that removes the stem cells. For some people, a special intravenous called a central line is put in a larger vein of the neck, chest or groin. The remaining blood flows back to your body through a second intravenous. A third IV is used to give you calcium to prevent side effects during the procedure.

Risks associated with apheresis

The apheresis procedure may cause the following side effects:

- lower calcium in the blood, due to the fluid used to keep the blood from clotting
- numbness or tingling in the fingers, toes and lips
- bleeding, bruising or redness at the sites where the intravenous needles go in
- fainting
- irregular heartbeat
- high or low blood pressure
- in rare cases, nausea and vomiting

If you are taking aspirin (ASA) or ibuprofen (Advil®, Motrin®), there can be a risk of bleeding during the apheresis procedure. Before undergoing apheresis, you must tell the doctor if you are taking these medications, or have taken them within 5 days of the procedure.

If you have apheresis several days in a row, your platelet count could become low (called thrombocytopenia), which can increase your risk of bleeding. Your platelet count will be measured before each apheresis procedure. If your platelet count becomes too low, apheresis may have to be delayed or you may be asked to consider donating bone marrow instead.

If you have a central line, a rare complication called pneumothorax is possible. This happens when air becomes trapped between your lungs and chest wall.

Apheresis is also used to collect **Mononuclear cells**, which are cells in the blood that are part of the immune system. These cells can be also given to patients with cancer or other serious blood disorders. Growth factor is not given before the procedure. Patients who donate Mononuclear cells have the same risks from the apheresis procedure.

What are the risks for female donors?

Risks related to pregnancy

The process of donating peripheral blood stem cells, including growth factor injections, can harm a developing baby (embryo or fetus). You should not take filgrastim if you are pregnant.

All female donors who have the potential to become pregnant will be given a pregnancy test before being accepted as a donor. If you are pregnant, you will not be allowed to donate.

You must use a reliable form of birth control, as recommended by your doctor, while taking filgrastim and for 48 hours after your last shot.

Tell your doctor immediately if birth control fails or is interrupted, or there is any chance of pregnancy.

Risks related to breastfeeding

Growth factor can pass into breastmilk and could harm a breastfeeding baby. You should not take filgrastim if you are breastfeeding.

Donating bone marrow

Stem cells can be collected directly from your bone marrow. The bone marrow is removed from your pelvic bone (hipbone) in a surgical procedure. This method may be chosen for donation, or needed as an alternative when peripheral stem cell donation does not collect enough stem cells. Pregnant women are not allowed to have this procedure.

What happens before bone marrow donation?

You will meet with the Anesthesiologist, the doctor who will look after you in the operating room. The Anesthesiologist will ask you questions about your health, examine you and answer any questions you may have.

You will have an intravenous (IV) put into a vein in your arm.

What happens during bone marrow donation?

The Anesthesiologist will give you a general anesthetic. This is a medication, given through your IV, so that you will be asleep and not feel any pain during the bone marrow donation. The Anesthesiologist will closely monitor you during the procedure.

While you are lying on your stomach, the surgeon will make a small cut (incision) in the skin on your lower back. He or she will use a needle and syringe to draw out a small amount of bone marrow from the pelvic bone. This process is repeated until enough bone marrow (usually about a litre) is collected. You may have several small incisions, which do not require stitches. The operation takes 1 to 2 hours. You will go home the same day.

What happens after bone marrow donation?

Recovery time is different for each person. It may take a few days to several weeks. During this time, you will feel more tired than usual. The areas where bone marrow was collected may be bruised and feel tender or sore. Your back may feel stiff or sore, especially when lifting, climbing stairs or bending over. The muscles in your back and legs may feel sore or tired.

You should have a check up with your family doctor about 2 weeks after your donation to make sure you are recovering well. Your body will naturally replace the donated bone marrow in about 4 to 6 weeks.

What are the risks with bone marrow donation?

Risks related to general anesthesia

The following side effects are possible with a general anesthetic:

- a sore throat from the tube used to help you breath during the operation
- nausea and vomiting

Uncommon side effects of general anesthesia include fever, allergic reaction and difficulty passing urine.

Risks related to surgery

There are some risks associated with all types of surgery. The risks related to surgery for bone marrow donation are considered to be very low, but may include:

- infection (swelling and redness at the incisions or the intravenous site, fever)
- injury to the bone, nerves or muscles at the collection site, which may require physiotherapy or additional medical treatment or surgery

The chance of having a major complication is estimated to be 1 to 3 in 1000 (0.1 to 0.3%). The chance of having a less serious complication is estimated to be 6 to 12 in 100 (6 to 12%).

Notes and questions

The doctor and other members of the Bone Marrow Transplant Team will talk with you about stem cell donation procedures and related risks. Please feel free to ask questions and talk about your concerns.

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