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Stem cell transplant

Definition

A stem cell transplant is the infusion of healthy stem cells into your body. A stem cell transplant may be necessary if your bone marrow stops working and doesn't produce enough healthy stem cells. A stem cell transplant can help your body make enough healthy white blood cells, red blood cells or platelets, and reduce your risk of life-threatening infections, anemia and bleeding.

Although the procedure to replenish your body's supply of healthy blood-forming cells is generally called a stem cell transplant, it's also known as a bone marrow transplant or an umbilical cord blood transplant, depending on the source of the stem cells. Stem cell transplants can use cells from your own body (autologous stem cell transplant) or they can utilize stem cells from donors (allogenic stem cell transplant).

Why it's done

Stem cell transplants are used to treat people whose stem cells have been damaged by disease or treatment of a disease. Stem cell transplants can benefit people with a variety of both cancerous (malignant) and noncancerous (nonmalignant) diseases. A stem cell transplant may help your body:

- **Replace dysfunctional bone marrow.** For instance, in aplastic anemia, a noncancerous condition, your bone marrow doesn't make enough new blood cells. A stem cell transplant procedure destroys the dysfunctional marrow, and healthy stem cells are infused. If all goes well, the new stem cells migrate to the marrow and begin working normally.
- **Destroy unhealthy bone marrow that may contain cancer cells.** In the case of cancer, such as leukemia, a stem cell transplant procedure may help rid the bone marrow of cancer cells. When healthy stem cells are transplanted, normal cell production can resume. In addition, immune factors in the transplanted cells may help destroy any cancer cells that remain in your bone marrow.

Risks

A stem cell transplant poses many risks of complications, some potentially fatal. Although some people experience few problems with a transplant, others must endure frequent tests and repeated hospitalizations.

Complications that can arise with a stem cell transplant include:

- Graft-versus-host disease
- Stem cell (graft) failure
- Organ damage
- Blood vessel damage
- Cataracts
- Secondary cancers
- Death

Your doctor can explain your risk of complications from stem cell transplant. Together you can weigh the risks and benefits to decide whether stem cell transplant is right for you.

Graft-versus-host disease: A potential risk when stem cells come from donors

If you're undergoing a transplant that will use stem cells from a donor (allogeneic stem cell transplant), you may be at risk of graft-versus-host disease. This condition occurs when a donor's transplanted stem cells attack your body. Graft-versus-host disease can be mild or severe. It can occur soon after your transplant or months to years later.

Graft-versus-host disease can cause skin rashes, abdominal pain, diarrhea, nausea and vomiting. Over time it can cause other complications and chronic illnesses. Your doctor will monitor you closely for signs and symptoms of graft-versus-host disease.

How you prepare

Pre-transplant tests and procedures

Once donor stem cells become available, you undergo many tests and procedures to assess your health and the status of your condition, and to ensure that you're physically prepared for the transplant.

In addition, an intravenous (IV) catheter is typically surgically implanted, usually in your chest near your neck. This is often called a central line, and it usually remains in place for the duration of your treatment. It's through the central line that the transplanted stem cells will be infused. The central line is also used to collect blood samples, give chemotherapy, provide blood transfusions and even supply nutrition when necessary.

The conditioning process

After you complete your pre-transplant tests and procedures, you begin a process known as conditioning. During conditioning, you undergo chemotherapy and possibly radiation in order to:

- Destroy cancer cells
- Suppress your immune system so that your body doesn't reject the transplanted stem cells

The type of conditioning process you undergo depends on a number of factors, including your disease, overall health and the type of transplant planned — whether you get stem cells donated from someone else (allogenic transplant) or whether the stem cells come from your own body (autologous transplant).

Conditioning generally occurs in the week leading up to your stem cell transplant. In some cases, you receive high doses of chemotherapy and total body irradiation (TBI). On the other hand, you may receive only high doses of chemotherapy and no radiation at all. The type of conditioning you undergo depends on your unique circumstances.

The conditioning process may be done in the hospital or on an outpatient basis. It can cause numerous side effects and complications because your bone marrow and stem cells are destroyed in anticipation of the transplant, and even if your conditioning process is outpatient, you may need hospitalization for side effects.

Side effects of the conditioning process can include:

- Nausea and vomiting
- Diarrhea
- Hair loss
- Mouth sores or ulcers
- Infections, such as pneumonia
- Bleeding
- Infertility or sterility
- Premature menopause
- Anemia
- Fatigue
- Cataracts
- Organ failure, such as heart, liver or lung failure
- Secondary cancers

You may be able to take medications or other measures to reduce such side effects.

'Mini' stem cell transplants

A less intense conditioning process is available through what's known as a mini stem cell transplant. It's also called a reduced-intensity conditioning transplant or a nonmyeloablative transplant.

Reduced-intensity conditioning doesn't try to kill all of the cancer cells that may be in your body. Instead, it relies on the donor's immune system cells to fight your cancer cells.

A less intense conditioning regimen may seem attractive because it may pose fewer life-threatening complications. But this kind of transplant isn't appropriate for all situations. Mini stem cell transplants are typically used only for people who can't endure the harsher conditioning regimen, such as people in poorer health, and for people whose disease isn't rapidly progressing. In some cases, they may not be as successful as full transplants.

What you can expect



A bag of stem cells ready for transplant.

During your stem cell transplant

Stem cell transplants are typically performed in specialized medical centers. These centers generally have transplant units, with a team of specialists caring for you. This team often includes doctors, transplant nurses and coordinators, mental health professionals, occupational therapists, and dietitians.

Stem cell transplantation involves infusing, or injecting, donor stem cells through your central line. This usually takes one to five hours. The transplanted stem cells make their way to your bone marrow cavities, where they begin creating new bone marrow and stem cells. It can take several weeks, though, for your blood counts to begin recovering.

If you receive bone marrow or blood stem cells that have been thawed, you may notice an odor in your room for a day or two after the transplant. This is caused by the substance used to preserve the cells.

Just before the transplant, you may receive medications to reduce the side effects the preservative can cause. These side effects include:

- Nausea
- Fever
- Chills
- Hives

Not everyone experiences side effects from the preservative, and for some people those side effects are minimal.

After your stem cell transplant

After your stem cell transplant, you may stay in the hospital until your blood counts recover or you may return home but remain under close medical care. Some people who have inpatient transplants are able to leave the hospital within three to five weeks, but others may face much longer hospitalizations. Some transplant facilities require transplant recipients to

remain nearby for 100 days to allow close monitoring.

In the days and weeks after your stem cell transplant, you may have many of the same kinds of tests and procedures to monitor your condition that you had before the transplant. You may also need supplemental nutrition to compensate for nausea and diarrhea.

To combat various complications, you may need to take numerous medications. You may also need periodic transfusions of red blood cells and platelets until your bone marrow begins producing enough of those cells on its own.

Results

It usually takes about a full year for your blood cells and immune system to recover to normal levels after a stem cell transplant. In general, recovery from a stem cell transplant that uses your own harvested stem cells is quicker than one that uses donor stem cells.

A stem cell transplant can cure some diseases and put others into remission. Most people who have a stem cell transplant expect the procedure to extend their life, and it often does.

Some people sail through stem cell transplantation with few side effects and complications. Others experience numerous problems, both short and long term. The severity of side effects and the success of the transplant vary from person to person.

Most people who have a stem cell transplant and don't have a relapse of their disease go on to enjoy a good quality of life. Many are able to return to work or school and resume their normal activities.

[By Mayo Clinic Staff](#)

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