

Role of Transplant

What Is Autologous Stem Cell Transplant (or Bone Marrow Transplant)?

The medical term for autologous stem cell transplant (ASCT) is “high-dose therapy (HDT) with stem cell rescue.” In myeloma, the use of HDT was introduced in the 1990s. In the 2000s, the FDA approved novel treatment options for myeloma that led to improved outcomes in ASCT-eligible patients.

More recently, the use of newer therapies throughout the disease course has significantly improved outcomes, including the efficacy of ASCT. The goal in myeloma care is to keep as many treatment options open as possible. By doing so, patients can choose therapies that offer the best chance for a deep and lasting remission.



You can learn more about how response is assessed by reading the [IMF Patient Handbook \(/node/1502\)](#).

Why Should a Myeloma Patient Consider an Autologous Stem Cell Transplant?

ASCT is one of the treatment options to consider for patients with myeloma. You should discuss and compare the benefits and risks of all options available to you with the doctor treating your myeloma.

ASCT can help patients respond better to treatment and stay in remission longer. Remission length is called **progression-free survival (PFS)**, which is the time a patient lives with myeloma without it getting worse. While ASCT may improve PFS, **overall survival (OS)**—the time from diagnosis or start of treatment until death from any cause—is similar with or without transplant. As myeloma treatments get better, overall survival continues to increase.

Even if you are a good candidate for a treatment like ASCT, many factors m

[Privacy settings](#) and the final decision is yours. That’s why seeking an opinion—

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

WITHDRAW CONSENT

Myeloma specialists at large “high-volume” treatment centers or academic institutions care for hundreds of myeloma patients, conduct clinical trials with novel myeloma therapies, and develop the expertise needed to help guide the optimal treatment strategy for your unique case of myeloma.

If an in-person consultation with a myeloma expert cannot be arranged, you or your doctor can schedule a consultation as a video or telephone call. This is a common practice, and the [IMF InfoLine \(/node/993\)](#) can help you identify one or more such specialists. Your goal is to gain a clear understanding of your options so that you can proceed with confidence.

How to Make Your Decision About Undergoing an ASCT

How should a myeloma patient be assessed for an ASCT?

Eligibility criteria for ASCT varies among institutions. In 2014, the IMF's International Myeloma Working Group (IMWG) published a consensus statement. This statement said that the arbitrary age of 65 is no longer sufficient to define whether a patient is eligible or ineligible for ASCT.

Physiological age is a more important factor than chronological age.

Other considerations to evaluate appropriate treatment include:

- General fitness

- Concurrent illnesses

- Kidney function

- Heart and lungs function

- Liver function

In the U.S., there is no upper age limit set in the Medicare National Coverage Determination for ASCT in myeloma, and the Centers for Medicare & Medicaid Services (CMS) have now removed the upper age limit on coverage. As a re

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

Speak with your healthcare team.

Most myeloma patients can consider ASCT after finishing their initial treatment. But decisions regarding ASCT should be made based on a risk-benefit assessment. You and your doctor must consider all the relevant myeloma-related factors, including the following:

- Confirm your diagnosis of myeloma and if your disease is active and if it requires treatment.

- Discuss your response to prior treatments, as well as your current range of treatment options and their potential risks and benefits.

- Myeloma patients who have no minimal residual disease (MRD) after frontline therapy, have improved OS whether they have undergone ASCT or not.

- Your test results, such as beta-2 microglobulin (β 2-microglobulin, β 2M, or β 2M), serum albumin, and any chromosomal abnormalities that might indicate that you have high-risk multiple myeloma (HRMM), disease that is more likely to relapse quickly after treatment.

To learn about tests used to monitor and assess myeloma, read the [IMF's publication Understanding Your Test Results \(/node/1630\)](#).

Patient-related factors to discuss with your doctor include your personal, professional, and financial situations.

Understanding the Benefits and Risks of ASCT

As with any form of myeloma treatment, autologous stem cell transplants have benefits and drawbacks. The goal is for you to discover the treatment that offers you the most benefits with the least personal risks, and to do so, you must understand the potential side effects of every option.

Pros

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

looking or waiting for a suitable donor to provide the graft. Because the graft comes from the same body, the risk of Graft-Versus-Host Disease (GVHD) is minimal, and the immune suppression protocol is much less intensive.

Improved response rates: ASCT treatment boasts a higher response rate than donor grafting and similar treatments, increasing the chances of remission, better long-term outcomes, and an enhanced quality of life.

Remission advantages: While there is no outright cure for multiple myeloma, ASCT treatment does provide many people with an improved chance of survival compared to chemotherapy. It has also been shown to deliver measurable residual disease (MRD) negativity, an important indicator of remission. Even those who don't achieve remission show strong rates of low or no progression of their cancer.

Cons



Autologous stem cell transplants have their pros and cons. Less desirable side effects can include:

Illness: ASCT carries many of the same side effects as other cancer treatments, including nausea, vomiting, mouth sores, and hair loss.

Infection susceptibility: An attack on your immune system requires a counterattack. Since ASCT can affect your immune system, you may be at greater risk for infections and other diseases in the time following your treatment.

Secondary malignancy: The high-dose chemotherapy ASCT supplies to the body can have its own consequences. Even if it treats the myeloma, it can also lay the foundation for other types of cancer to develop. Because of this, clinician monitoring is crucial to treatment success.

Relapse: Following ASCT-facilitated remission, patients will still need regular visits with their care team, as the treatment can cause unintended side effects even years after the procedure.

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

later, if the disease relapses.

How is chemotherapy used as part of the ASCT process?

Chemotherapy is the use of drugs to kill cancer cells. HDT is more effective at eradicating myeloma cells from the bone marrow than standard-dose chemotherapy. But any treatment that reaches the bone marrow to kill myeloma cells is also capable of damaging normal stem cells.

If your doctor recommends ASCT, then your initial therapy should be with drugs that don't damage your normal stem cells prior to harvesting. For example, therapy with Revlimid® (lenalidomide) for more than 4 cycles may impair stem cell collection.

How should a myeloma patient prepare for undergoing an ASCT?

You should feel comfortable and reassured before you begin your ASCT process. You can do a lot to get ready for your ASCT. The [IMF has a library of publications \(/node/1076\)](#) about the therapies used for the treatment of myeloma at every stage of the disease. All are free-of-charge and can be downloaded or requested in printed form.



Ask your doctor any questions you may have. Some transplant centers may pair you up with a fellow patient who has been through the ASCT process and can share their experience with you. If possible, bring a friend or family member to your doctor appointments. They can take notes, and ask your doctor to provide an "after-visit summary."

Share what you learn with your loved ones. This way, they will know what to expect and how they can best help in the weeks and months ahead.

Your transplant center and team

Ask your doctor whether you will receive treatment on an inpatient or outpatient basis. Visit the transplant center and see the rooms where the ASCT process recuperation will take place. If the transplant center location is far from you.

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

meeting them helps you know who does what and what support is available. ASCT is complex, so your team should have experience and expertise.

Support resources

Having a support network is very important. ASCT can place overwhelming stresses on patients and their loved ones before, during, and after the procedure. We urge you to take advantage of the support resources offered through your hospital, the [IMF InfoLine \(/node/993\)](/node/993) and [support groups \(/node/1010\)](/node/1010), and through other patient-centric organizations. Ask your doctor about the benefits of psychological counseling or psychiatric consultation.

Understand the Process of ASCT in Myeloma

What are the steps in the process of autologous stem cell transplant in myeloma?

The following are the steps in the process of ASCT in myeloma:



1. Induction therapy is given to prepare the patient for ASCT.
2. Stem cells are mobilized from the bone marrow into the bloodstream.
3. Stem cells are collected from the bloodstream, frozen, and stored in a laboratory.
4. The patient is treated with high-dose chemotherapy to kill remaining cancer cells.
5. Stem cells are thawed and infused back into the patient through a vein.
6. Stem cells travel to the bone marrow and begin producing new blood cells.

Induction therapy

Induction therapy is the initial treatment given to a patient in preparation for an ASCT. Depth of response after induction therapy is generally thought to influence the depth of response after ASCT. However, even lesser degrees of response to induction therapy may be sufficient for effective stem cell collection.

After each treatment cycle, ask your doctor how you are responding and whether ASCT is still recommended.

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

FDA-approved induction therapies

The triplet combinations below are listed in alphabetical order.

Kyprolis® (carfilzomib), Revlimid® (lenalidomide), and dexamethasone [KRd]

Velcade® (bortezomib), Revlimid, and dexamethasone [VRd]

The quadruplet combinations below are listed in alphabetical order.

Darzalex Faspro® (daratumumab + hyaluronidase-fihj) plus KRd [DKRd]

Darzalex Faspro plus VRd [DVRd]

Sarclisa® (isatuximab-irfc) plus KRd [Isa-KRd]

Sarclisa plus VRd [Isa-VRd]

NCCN-listed induction therapies

The National Comprehensive Cancer Network (NCCN) Guidelines for

Myeloma include the following induction therapies:



Revlimid and dexamethasone [Rd],

Velcade, cyclophosphamide, and dexamethasone [VCd or CyBorD],

Velcade, Adriamycin® (doxorubicin), and dexamethasone [PAd],

Ninlaro® (ixazomib), Revlimid, and dexamethasone [IRd].

The NCCN Guidelines include the following induction therapies as “useful in certain circumstances:”

Velcade and dexamethasone [Vd],

Velcade, thalidomide, and dexamethasone [VTd],

Darzalex plus VTd [DVTd],

VTd, cisplatin, doxorubicin, cyclophosphamide, and etoposide [VTd-PACE].

Stem cell collection before HDT

Your stem cells will be collected using a process called apheresis. A machine takes stem cells from your blood and returns the rest to you. Apheresis is done as an outpatient procedure for 1 to 5 days, about 3 to 4 hours each day.

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

daily harvesting of stem cells until a sufficient quantity is collected.

2. You will receive CSF plus chemotherapy. The most commonly used drug to enhance the release of stem cells from the bone marrow into the bloodstream is cyclophosphamide. Yet, other drugs can be used instead. Ask your doctor about potential side effects.
3. You will receive CSF plus a mobilizing agent, a drug to trigger the release of stem cells into the bloodstream. This is particularly helpful for patients who have difficulty generating enough stem cells for harvesting. In 2008, the FDA approved Mozobil® (plerixafor) for stem cell mobilization in combination with a growth factor. In 2023, the FDA approved Aphexda® (motixafortide) to mobilize hematopoietic stem cells for ASCT in combination with filgrastim.

Next, the collected stem cells are taken to a laboratory, where they are frozen in liquid nitrogen and stored at a temperature of -80°C (-112°F). Excellent function of stem cells is retained for at least 10 years.

 **Note:** Scientific evidence indicates that “purging” myeloma cells from the harvested stem cells is not effective in ASCT for myeloma.

High-dose therapy

When you are ready to proceed with ASCT, your doctor will first use HDT to reduce your level of monoclonal protein (myeloma protein, M-protein) by at least 50%. HDT destroys myeloma cells in the bone marrow where they grow. It is more effective at eradicating myeloma cells from the bone marrow than standard-dose chemotherapy. However, any treatment that reaches the bone marrow to kill myeloma cells also damages your normal stem cells. The most common type of HDT used in myeloma is melphalan, administered at dose of 200 milligrams per square meter (mg/m^2) of body surface area (size of patient).

Medications are given to prevent or lessen the anticipated side effects of HDT.

Melphalan's Role in the Transplant Process

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

reintroduce uninfected stem cells from elsewhere in the patient's body to restore function.

This proven medication [has been used to treat myeloma \(/node/1104/\)](/node/1104/) since the 1960s. More recent advancements have also made it available as an oral medication as part of a quadruplet treatment, though this is mostly used outside of the U.S.

What are common side effects of HDT?

nausea
vomiting
diarrhea
mouth sores
skin rashes
hair loss
fever or chills

Infection

How Are Patients Monitored During and After ASCT?

Patients are monitored very closely during and after the administration of HDT, including daily measurement of weight, blood pressure, heart rate, and temperature.

Stem cell rescue

Approximately 36 to 48 hours after HDT, the levels of melphalan in your body are very low and do not harm the reinfused stem cells. Your frozen stem cells are thawed and infused back into your bloodstream over a period of 1 to 4 hours. The chemical used to keep stem cells fresh has a garlic smell – you may even experience the taste of garlic.

Engraftment

Engraftment is the process by which the reinfused stem cells migrate from bloodstream to your bone marrow, where they begin to produce new blood c

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

recover. You may receive transfusions if necessary.

Some transplant centers may require you to remain in the hospital on an inpatient basis after the reinfusion, and some centers have facilities nearby where you may stay while being monitored daily at the hospital on an out patient basis. The length of stay varies patient-to-patient but is usually around 2 to 3 weeks. If you live near the transplant center, you may be able to sleep at home and come to the hospital for daily monitoring on an outpatient basis.

When you are discharged, your recovery will continue at home for about 2 to 4 months. Often, the most difficult time is waiting for the reinfused stem cells to engraft, for blood counts to return to safe levels, and for side effects to resolve. On some days you may feel better, and on other days you may feel too weak to do much more than sleep.



Frequent visits to the hospital may be required to monitor your progress. It is important to take things one day at a time. As your bone marrow produces new blood cells, symptoms resolve, the risk of serious infections is reduced, and transfusions may no longer be needed.

Depth of response

HDT with stem cell rescue delivers further improvement in the level of response achieved by induction therapy. More than half the time, partial response (PR) will be improved to either very good partial response (VGPR) or complete response (CR). The ultimate goal of HDT with stem cell rescue is to eliminate all residual myeloma cells that have not been killed during induction therapy.

The Role of Tandem ASCT

ASCT can be performed once (a "single" autologous transplant) or twice ("double" or "tandem" autologous transplants). Tandem ASCTs are usually done with an interval of 3 to 6 months between the two transplants.

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

ASCT appears to be beneficial for some patients, and this is one of the reasons that enough stem cells for two ASCTs may be collected in advance of the first transplant.

What Are the Possible Side Effects of an Autologous Stem Cell Transplant?

Side effects are a possibility with every type of medical treatment or procedure. Each patient reacts differently at each step of the ASCT process.

No two patients share exactly the same side-effect profile. Following HDT with stem cell rescue, common potential side effects include the following:



nausea,
mouth sores,
hair loss,
infection,
fatigue,
diarrhea, and
skin rash.

The appropriate management of side effects is one of the reasons why it is so important to have your ASCT at a transplant center where the doctors, nurses, and allied healthcare professionals have performed the ASCT procedure many times on many myeloma patients. Such a team is more likely to have the expertise to care for each individual patient's needs.

Until engraftment of the infused stem cells takes place, patients are very susceptible to developing infections. Certain infections can cause serious complications or be potentially life-threatening. Even a minor infection like the common cold can lead to complications because the body's immune system is weakened by the effects of HDT. To protect the patient and prevent infection following supportive care measures may be required:

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

fungi.

If infection or fever occurs, the patient may be given an intravenous (IV) infusion of antibiotics into the vein.

Is a Stem Cell Transplant Worth It for Multiple Myeloma?

Ultimately, the choice to use ACST with melphalan in the treatment of multiple myeloma is a personal one — no one except the patient and their care team can decide whether the risks are worth the potential benefits. However, it is notable that this treatment may pose additional risks for those with renal insufficiency (RI), though studies have shown that lowering the dose (<https://pmc.ncbi.nlm.nih.gov/articles/PMC11384638/>) of melphalan can mitigate these challenges.

How to Resume Your Life After Undergoing an ASCT



Data from the Health Resources and Services Administration (HRSA) demonstrate that 99.1% of myeloma patients in the U.S. are alive at 100 days following ASCT.

After your ASCT, you will need to rely upon your medical team as well as on the support of a care partner. It is not uncommon for patients to experience a loss of the sense of independence, while at the same time experiencing feelings of isolation, depression, and helplessness. Patients and their care partners may consider seeking assistance from a trained counseling professional. There may also be benefits to participating in patient support groups either in-person or virtually.

On average, it takes 3 to 6 months to recover from an ASCT. By this time, your bone marrow will be producing healthy blood cells and your immune system will once again be able to fight infection. Your hair will grow back.

What's Next?

Stem cell transplants are just one of many options you have to address multiple myeloma. If you're ready to learn more about other options available to you, review

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

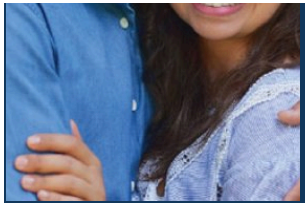


Related Content

Melphalan (Alkeran) (/treatment/multiple-myeloma-medications/melphalan-alkeran)

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.



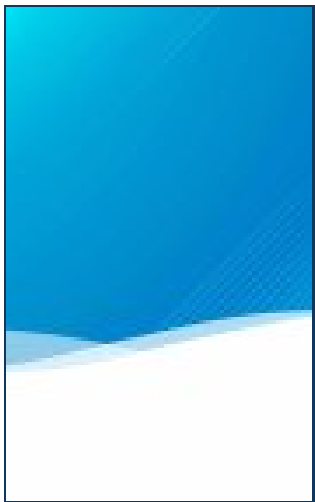
Print

destination=/autologous-stem-cell-transplant)

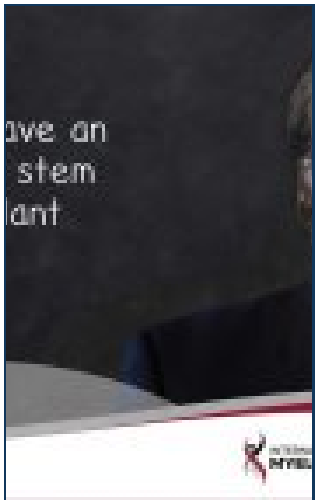


Digital

destination=/checkout)



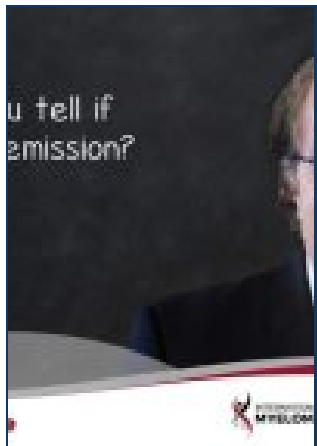
What is the role of ASCT in the frontline setting for African-American patients? (/videos/role-asct-frontline-setting-...



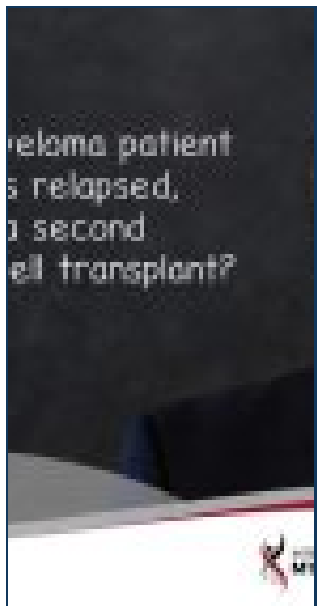
Should I have an autologous stem cell transplant (ASCT)? (/videos/should-i-have-autologous-stem-cell-transplant-asct)

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.



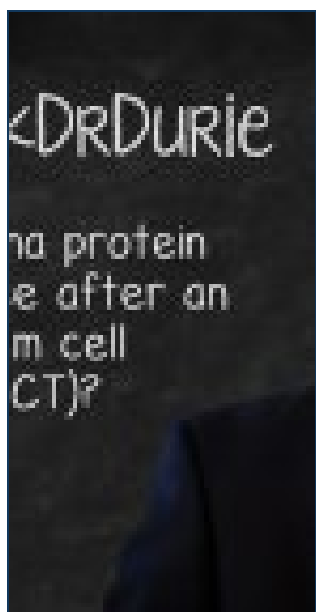
How Do You Tell If You're in Remission? (/videos/how-do-you-tell-if-youre-remission)



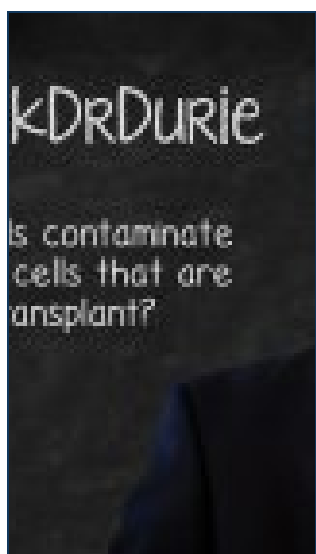
Does a multiple myeloma patient whose disease has relapsed, need to undergo a 2nd ASCT? (/videos/does-...

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.



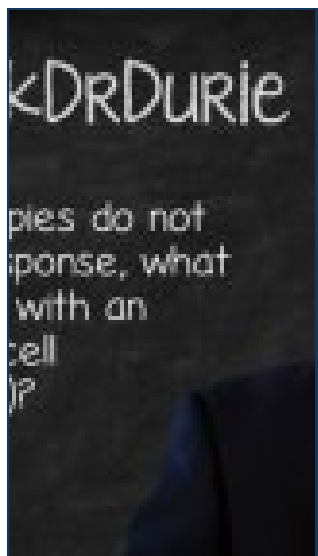
Can my myeloma protein slightly increase after an autologous stem cell transplant (ASCT)? (/videos/can-my-...



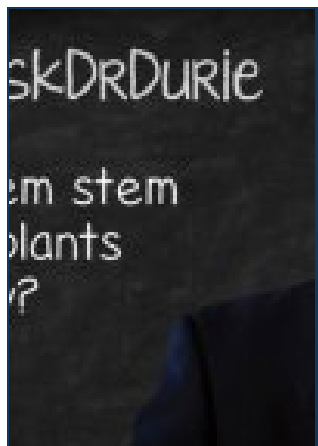
Can myeloma cells contaminate a patient's stem cells that are harvested for transplant? (/videos/can-myeloma-cells-...

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.



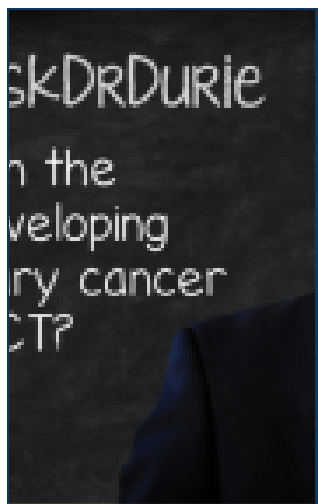
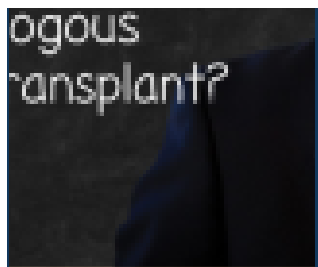
If frontline therapies do not produce a full response, will ASCT do so? (/videos/if-frontline-therapies-do-not-produce-full-respons...)



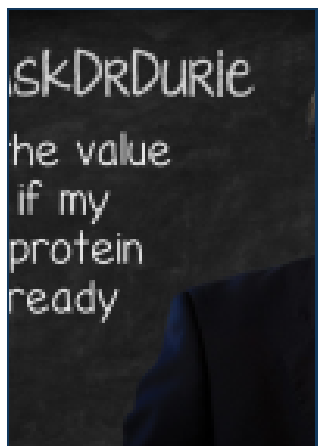
Are tandem stem cell transplants necessary? (/videos/are-tandem-stem-cell-transplants-necessary)

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.



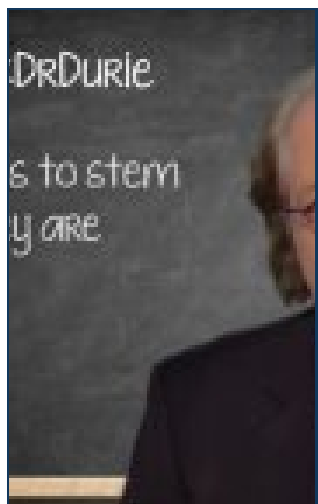
Is it worth the risk of developing a secondary cancer after ASCT? (</videos/it-worth-risk-developing-secondary-cancer-after-...>)



What is the value of ASCT if my myeloma protein level is already zero? (</videos/value-asct-if-my-myeloma-protein-level...>)

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.



#AskDrDurie: What happens to stem cells once they are harvested?

(/videos/askdrdurie-happens-stem-cells-once-...



The International Myeloma Foundation medical and editorial content team

Comprised of leading medical researchers, hematologists, oncologists, oncology-certified nurses, medical editors, and medical jour our team has extensive knowledg

We use cookies on our website to support technical features that enhance your user experience.

We also use analytics & advertising services.

physicians and healthcare professionals.

Last Medical Content Review: February 25, 2026



GIVE WHERE MOST NEEDED

\$25

\$50

\$100

\$150

\$250

OTHER

LEARN MORE

