

Dispelling Potential Fears Associated with Stem Cell Donation

AN EVIDENCE-BASED COMMENTARY

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ABSTRACT

An increasing number of patients require life-saving stem cell transplants, often from unrelated donors. In order to facilitate this process, bone marrow and stem cell registries have been established to genetically catalog potential donors and can be used to find matches for patients in need. Given the wide genetic variability in populations and significant ethnic disparities in donor registries worldwide, there are substantial gaps in the availability of compatible unrelated stem cell donors. Limited understanding of the procedures involved in stem cell donation, along with potential misconceptions of associated risks, may discourage prospective donors. Many people are unaware that there are two established methods for stem cell donation from adult donors, either through bone marrow harvest or—more commonly—through peripheral blood stem cell harvest. This evidence-based commentary explores these two procedures, deconstructs misconstrued fears associated with stem cell donation, and subsequently encourages readers to consider registering as stem cell donors.

may be explained by 2017 data revealing that only 1% of Canadians are currently registered as stem cell donors.⁶ Additionally, although patients are more likely to find matches within their own ethnic group, there is a lack of ethnic diversity in donor registries, with non-caucasians comprising only 31% of the OneMatch Registry, as of January 2017.⁷ As a result, the probability of finding a suitable donor varies greatly depending on patient ethnicity, from 75% for Caucasian patients to 27% for African-American patients.⁷ The resulting discrepancy highlights the need for more ethnically diverse donors.⁷

COMMON FEARS ASSOCIATED WITH STEM CELL DONATION

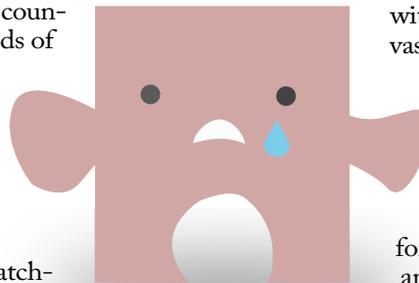
Literature reports that fear and lack of understanding of stem cell donation represent barriers for donor registration.^{8,9} Individuals informed about the donation process are more likely to participate as stem cell donors; thematic syntheses of qualitative investigations on donor motivations reveal that fear of invasive procedures is a primary concern in their decision.¹⁰ According to psychosocial assessments of prospective bone marrow donors, the possibility of postoperative paralysis or death during the operation induces substantial anxiety.¹¹ This is evident from statements such as, “I thought of an operation on the spine, that I could not walk anymore,” or “I thought that you might have died through it. I didn’t know that you could make more bone marrow.” These fears are perpetuated by the popular misconception that the bone marrow is the sole source of stem cells for transplantation; in reality, stem cells can be collected from the periphery with the more common and less invasive method of PBSC-T.¹²

Nonetheless, the idea of PBSC-T elicits its own fears. The drug granulocyte colony-stimulating factor (G-CSF) is instrumental in PBSC donation, for which blood is filtered through an apheresis machine to extract stem cells. Before the two to six hour donation procedure, G-CSF is

INTRODUCTION

For patients with a range of conditions - including blood cancers, autoimmune disorders, and metabolic diseases - hematopoietic stem cell transplants may be an integral component of their treatment.¹ Medical literature has extensively detailed the benefits of these procedures, namely their potential to significantly increase patient survival and long-term quality of life.² Unfortunately, the requirement of genetic compatibility between donor and recipient and the reality of related donors found by fewer than 30% of patients leave the remaining 70% of patients to search for a compatible unrelated donor in a national registry.³ These donors will altruistically provide stem cells through one of two methods: bone marrow transplantation (BMT) or peripheral blood stem cell transplantation (PBSC-T). In Canada, the OneMatch Stem Cell and Bone Marrow registry collaborates with 75 registries in 53 other countries to facilitate hundreds of annual matches.⁴

Despite these efforts, nearly half of the Canadian patients in need of stem cell transplants are still unable to find a matching donor.⁵ This disconnect between supply and demand



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administered to greatly increase the count of hematopoietic stem cells in the bloodstream.¹³ Prospective PBSC donors are reportedly wary of side effects associated with G-CSF drug administration.^{14,15} Furthermore, an online survey exploring public awareness of stem cell donation found that approximately 31% of the 1,471 participants against joining a stem cell registry worried that the PBSC donation process would be painful.¹⁶

“Evidence indicates a low overall risk for bone marrow donors, suggesting that many reported fears may be exaggerated.”

ADDRESSING FEARS ASSOCIATED WITH STEM CELL DONATION

Evidence indicates a low overall risk for bone marrow donors, suggesting that many reported fears may be exaggerated. Bone marrow donation involves the extraction of stem cells from the hip bone, rather than the spine.¹⁷ Moreover, bone marrow donation is a day surgery performed under general anaesthetic, with most donors discharged from the hospital within 24 hours.^{17,18} An investigation into the major adverse events associated with bone marrow donation revealed only one death and zero cases of paralysis in a large sample of 27,770 donors.¹⁹ Although pain at the anatomical site of donation is self-reported by 82% of donors, this symptom is amenable to anti-inflammatory drug therapy, with a median recovery time of three weeks.^{17,18} This evidence suggests that the risks associated with bone marrow donation are overall low.

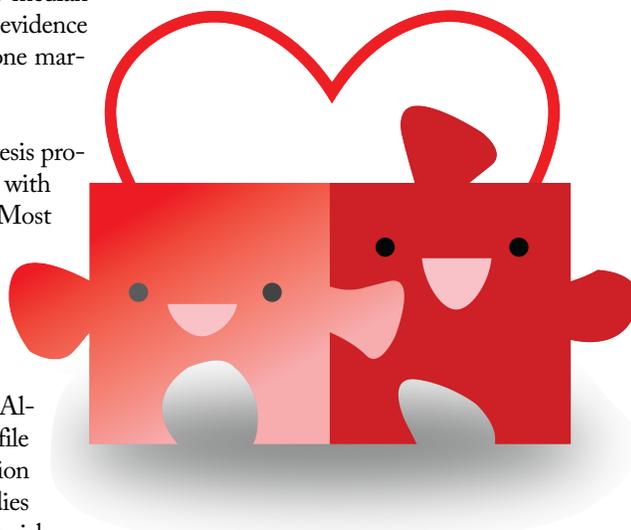
Furthermore, PBSC-T employs an apheresis procedure that is well-documented to be safe with a very low risk of serious adverse effects.²⁰ Most recipients experience short-term side effects from G-CSF injections, such as bone pain, nausea, and fatigue.^{18,21,22} However, the median recovery time for PBSC donors is one week, with 94% of donors fully recovering after 30 days.¹⁸ Although the long-term (>10 years) risk profile of G-CSF treatment and PBSC donation remains to be elucidated, prospective studies suggest that G-CSF does not increase the risk for leukemia or other hematopoietic malignancies

relative to unexposed controls.^{23,24}

STEM CELL DONATION MATTERS

Regardless of the method for stem cell donation, recipient prognosis significantly improves, whereas life expectancies for individuals unable to receive stem cell therapies deteriorates.²⁵ Among a sample of adult patients with previous blood cancer who became cancer-free two years after transplantation, after transplantation, the probability of five-year survival was 89%. Additionally, for the patients who remained disease-free, rate of survival 20 years after transplantation was estimated at 80.4%.²⁶

The long-term health benefits of stem cell transplants, compared to those of the non-transplant alternative, are substantial, but they are unfortunately unattainable for many patients. Given that the number of Canadian patients in need of unrelated donors is only increasing, we hope that our review, with its examination of the low overall risks associated with stem cell donation and the promising outcomes for recipients, dispels potential fears associated with the procedure and inspires individuals to register as stem cell donors. In fact, the number of patients in need of unrelated donors is only increasing in Canada.²⁷ We hope that our review outlining the low overall risks associated with stem cell donation and the promising outcomes for recipients of stem cell therapies dispels potential fears associated with donation procedures and inspires individuals to register as stem cell donors.



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