

Blood donation and anemia

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A 31-year-old woman presents to your family practice with concerns about light-headedness during exercise and cravings for ice. Her history does not suggest cardiac or respiratory illness. She does not describe heavy menses and is not pregnant. She denies any other bleeding or surgery. She has no gastrointestinal symptoms and takes no prescribed or over-the-counter medications. She eats meat regularly, drinks minimal alcohol, and is a non-smoker. She has been exercising 5 days a week for years and is frustrated by her recent limitations. Findings of a physical examination are completely normal. Her laboratory test results show a hemoglobin level of 101 g/L and a serum ferritin level of less than 5 µg/L, with normal mean corpuscular volume. Upon further questioning, she indicates that she donates blood every 2 months; however, she did not donate this month because she felt unwell.

Is there a problem?

Voluntary blood donation is a common and necessary practice in Canada. Each year, 950 000 units of whole blood are collected in Canada outside Quebec^{1,2} and most get used within the year for blood transfusions across the country.

Donating blood is an altruistic act for which most donors cannot expect any health benefit in return. Possible reductions in cardiac disease, noted in early retrospective analyses of blood donors, have not been demonstrated in subsequent larger prospective studies.³ In this volunteer setting, it is essential to recognize and reduce possible harms of blood donation without deterring potential or current donors, who are critical to the blood supply. Iron deficiency anemia (IDA) is one of these potential harms.

What is the extent of the problem?

Iron deficiency anemia is common, particularly in women, for whom pregnancy and menstruation are the dominant causes.⁴ The overall prevalence of anemia in the Canadian Health Measures Survey of 2009 to 2011 was 3% in women aged 20 to 49 years, with a 9% rate of iron deficiency (ID).⁵ Blood donation in this already vulnerable population can cause or contribute to ID and IDA, with recurrent donation increasing the risk.^{1,6} In Canada, 8% to 10% of repeat donors are asked to defer donation owing to a hemoglobin level of less than 125 g/L,¹ which is 3 times the baseline rate of anemia in the population. The recent RISE (REDS-II Donor Iron Status Evaluation) study⁶ showed even more concerning results: among 2425 men and women in the United

States accepted for blood donation, 66% of the frequent women donors and 49% of the frequent men donors were iron deficient. Many such patients will not see physicians and will continue to try to donate every 56 days (the minimum recovery period suggested by Canadian Blood Services). Even for those who do see physicians, if they do not ask about blood donation, physicians might overlook this important cause of ID and IDA, and might also initiate inappropriate investigations looking for other underlying causes.

Iron deficiency alone, without IDA, can contribute to symptoms. Low ferritin levels have been associated with fatigue, exercise intolerance, restless legs, reduced cognitive function, and pica, particularly for ice (pagophagia).^{7,8} Iron replacement in these patients has been shown to reduce symptoms in many studies.^{3,9-12}

Canadian Blood Services has begun to study ferritin levels in blood donors, in addition to the current point-of-care hemoglobin testing, to determine the extent of ID in donors and update recommendations accordingly.¹

What can family physicians do?

Ask about blood donation. Patients with symptoms suggestive of anemia, especially fatigue, restless legs, exercise-associated symptoms, and pagophagia, should be asked about blood donation. It is also a quick topic to add to annual health examinations or screening review visits, which might help to prevent ID and IDA.

Discuss reducing the frequency of blood donation in iron deficient or anemic patients, and in those at risk. With 90% of blood donation coming from repeat donors, it is critical to encourage patients to continue blood donation, but on an individualized basis. Women of childbearing age with ID or IDA should reduce donations to twice a year, once iron and hemoglobin levels have returned to normal.^{1,13} Donations might require further reduction if there is poor recovery of iron stores.

Provide iron supplementation. Even if physician assessment is encouraged owing to donation deferral, only 50% of these patients are prescribed iron supplements.¹ With an estimated 2000 to 4000 mg of iron required to replace that lost in a unit of blood, iron-containing multivitamins and dietary heme iron are inadequate to replenish iron levels in donors with ID or IDA.³

If a patient is a frequent blood donor (more than twice a year for women or more than 3 times a year for men⁵), it is reasonable to ask about symptoms of ID and check hemoglobin and ferritin levels.

Table 1. Iron supplementation needed to replace 1 whole blood donation

IRON PREPARATION	TABLET, MG	ELEMENTAL IRON, %	ELEMENTAL IRON CONTENT PER TABLET, MG	NO. OF TABLETS FOR A 2000-MG TOTAL DOSE	NO. OF TABLETS FOR A 4000-MG TOTAL DOSE
Ferrous sulfate	300	20	60	33	66
Ferrous gluconate	300	12	35	57	114
Ferrous fumarate	300	33	99	20	40
Polysaccharide-iron complex	150	100	150	14	28

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In non-anemic patients with normal ferritin levels, discuss dietary iron and consider supplementation after donation. Results of HEIRS (Hemoglobin and Iron Recovery Study)¹⁴ demonstrated a median recovery time for hemoglobin stores of 32 days after blood donation in those given 1 tablet of ferrous gluconate a day for 24 weeks after donation versus 128 to 168 days in those not given supplementation.

In patients with ID or IDA, full-dose replacement of iron should be prescribed (Table 1),¹ followed by daily or lower-dose supplementation after donation. As taking iron supplements can cause side effects such as nausea, diarrhea, constipation, and tooth staining, supplementation on alternate days or 3 times per week can also be considered, although it has not been specifically studied in this setting.¹⁵

Conclusion

Iron deficiency anemia is common in blood donors, especially in female donors of childbearing age. By prevalence, blood donation is equivalent to gastric ulcers or carcinoma as a cause of IDA.⁴ Family physicians can reduce harm by asking about blood donation, considering iron supplementation, and reducing donation frequency in patients with signs or symptoms of ID or IDA. They can also consider deferring other investigations for IDA in frequent blood donors unless symptoms strongly suggest alternative causes or if patients' symptoms do not respond to iron therapy. By taking these steps, physicians protect Canada's future blood supply; even if people donate less often, keeping them healthy improves the chances that they will continue to donate for life. 🌱

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Competing interests

None declared

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