Ever wonder why we prick potential donors’ fingers before whole blood donation? It’s to check levels of hemoglobin, the protein in blood that transports oxygen from the lungs to the cells in the body. If a potential donor’s hemoglobin is below a certain level, they cannot give blood. Hemoglobin contains iron, and low hemoglobin levels (called anemia) is often linked with low iron levels (called iron deficiency). So, why is iron important? Iron is an essential mineral; it is necessary for our body to function well, but we must get the iron we need from our diet. The body cannot make iron, but it does store it. If you don’t get enough iron in your diet or suffer blood loss, iron stores can become depleted. Initially, hemoglobin levels will be maintained, but over time, they decrease in people with iron deficiency. The adverse health effects of iron deficiency alone, without anemia, are not completely understood, but may include low energy levels. If iron reserves are depleted further, hemoglobin levels will also drop, and the individual will develop iron deficiency anemia. This can affect health, causing tiredness and other symptoms.

Iron stores can be precarious, particularly in women of child-bearing age. Although Canadian Blood Services screens every donor’s hemoglobin levels, we do not routinely check their iron stores. There is a worry that whole blood donors who donate frequently may run the risk of developing iron deficiency. This potential risk may not be recognized by either donors or their doctors. In this study, the researchers investigated hemoglobin levels and iron stores to determine the incidence of iron deficiency in donors. They also looked into the attitudes of donors towards managing and maintaining their iron levels.

**What did the researchers do?**
Researchers invited whole blood donors in the Ottawa area to participate. The researchers recruited:
- 550 donors whose hemoglobin levels were high enough to donate (greater than 125 g/L)
- 50 donors whose hemoglobin levels were too low to donate (lower than 125 g/L).

The donors’ ferritin levels, which estimate the body’s iron reserves, were measured. Unlike hemoglobin, ferritin is not measured before blood donation. The donors were interviewed about blood donation and their health. About 2 weeks later, they received a letter with their ferritin levels. Donors who had low ferritin levels (below 25 µg/L) were advised to see their doctor for follow-up. About 2 months later, the donors were sent an email questionnaire asking if they had seen their doctor and whether they’d started taking iron supplements.

**What did the researchers find?**
Donors were between 17 and 70 years of age. Some had donated before and some were first-time donors. The majority had a physician and attended regular check-ups. Most were unaware of any possible negative health impacts of blood donation and had not discussed donation with their doctors.

**Ferritin test results:**
- More than a third of first-time female donors and about two thirds of repeat female donors had low or absent iron stores.
- Iron stores were rarely low in first-time male donors, but were low in more than a third of repeat donors.
Almost all donors deferred for low hemoglobin levels were female, and close to 90% had low or absent iron stores. Hemoglobin levels and ferritin levels did correlate somewhat; donors who failed or just passed the hemoglobin test (“low pass”) had lower ferritin levels than donors with a “high pass” (130 g/L or greater).

**Post-test survey results:**
- 295 donors had low ferritin levels; 164 of these participated in the follow-up survey.
- 98 donors with low ferritin levels had seen a doctor: 50% had started taking iron supplements, 10% had started a multivitamin with iron and 21% had been told to stop donating.
- A further 17 donors with low ferritin levels had an appointment scheduled to see their doctor.
- 49 donors had no plans to see a physician and were not likely to start iron supplements.

**How can you use this research?**
Blood donors selflessly provide the gift of life, and Canadian Blood Services owes it to them to minimize any ill-effects on their health. In Canada, a dedicated group of repeat donors provide close to 90% of the donations we receive. We are incredibly grateful for such generous donors, who return time and again to give. This study showed that a significant proportion of our whole blood donors are iron deficient and that iron deficiency relates strongly to sex and frequency of donation. Many donors with low iron stores did not go to see their doctor as advised. Those that did see their doctors did not necessarily start on iron supplements.

This study showed that the hemoglobin screening limit of 125 g/L is borderline for female donors and should not be lowered. In the past, if a donor did not pass the hemoglobin screen, they would sometimes be tested again. This study showed that a failure on the first hemoglobin screen followed by a pass on the second screen is most likely an indication of borderline hemoglobin levels in an iron-deficient donor. The practice of repeat hemoglobin screening has been limited to protect these donors. Education about iron levels in blood donors needs to be directed not only toward donors but also toward their doctors. We’ve added more information about iron and iron deficiency to the information sheet for donors. We’ve improved the information sheet we give to donors with low hemoglobin levels to take to their doctor. Canadian Blood Services is currently investigating the feasibility of routinely measuring ferritin levels in vulnerable donor groups to better protect these donors and of increasing the minimum time between donations in younger female donors.

**About the research team:** Mindy Goldman is a Canadian Blood Services medical director and an adjunct professor in the department of pathology and laboratory medicine at the University of Ottawa. Samra Uzicanin is a research study coordinator in Canadian Blood Services, epidemiology and surveillance, Ottawa. Vito Scalia is the associate director of the Canadian Blood Services national testing laboratory, Ottawa. Sheila F. O’Brien is the associate director, epidemiology and surveillance, at Canadian Blood Services and adjunct faculty in the department of epidemiology and community medicine at the University of Ottawa.

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**Want to know more?** Contact Dr. Mindy Goldman at mindy.goldman@blood.ca.