



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Scholarly Publisher
RS Global Sp. z O.O.
ISNI: 0000 0004 8495 2390

Dolna 17, Warsaw,
Poland 00-773
+48 226 0 227 03
editorial_office@rsglobal.pl

ARTICLE TITLE

BLOOD DONATION AS A HEALTH INTERVENTION: BENEFITS,
RISKS AND PHYSIOLOGICAL ADAPTATIONS

DOI

[https://doi.org/10.31435/ijitss.4\(48\).2025.4380](https://doi.org/10.31435/ijitss.4(48).2025.4380)

RECEIVED

28 October 2025

ACCEPTED

16 December 2025

PUBLISHED

20 December 2025

LICENSE



The article is licensed under a **Creative Commons Attribution 4.0 International License**.

© The author(s) 2025.

This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

BLOOD DONATION AS A HEALTH INTERVENTION: BENEFITS, RISKS AND PHYSIOLOGICAL ADAPTATIONS

Piotr Bartnik (Corresponding Author, Email: bartnikpiotr11@gmail.com)

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOX in Lublin, Lublin, Poland

ORCID ID: 0009-0002-5771-3127

Mikołaj Wiśniewski

Pope John Paul II Independent Public Regional Hospital in Zamość, Zamość, Poland

ORCID ID: 0000-0002-9217-0423

Weronika Buczek

Pope John Paul II Independent Public Regional Hospital in Zamość, Zamość, Poland

ORCID ID: 0000-0002-7650-960X

Jolanta Wiśniewska

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOX in Lublin, Lublin, Poland

ORCID ID: 0009-0001-8549-3080

Magdalena Pietrzak

Department of Internal Medicine, Independent Public Health Care Facility, Łęczna, Poland

ORCID ID: 0009-0009-5228-0829

Karolina Barzyk

Department of Internal Medicine, Independent Public Health Care Facility, Łęczna, Poland

ORCID ID: 0009-0009-8625-0898

Urszula Marzec

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOX in Lublin, Lublin, Poland

ORCID ID: 0009-0000-6348-184X

ABSTRACT

Background: Blood donation, traditionally regarded as a „priceless gift of life” and altruistic act of supporting healthcare systems, has increasingly been examined as a potential health - modifying intervention for donors themselves. This review synthesizes current evidence on the physiological benefits, potential risks and adaptive responses associated with regular blood donation. Health benefits of blood donation include reductions in body iron stores, which can transform into decreased oxidative stress, improved metabolic profiles and lower long - term cardiovascular risk in selected populations. Clinical trials suggests potential modulations in inflammatory markers and improved vascular function following regular donation. However, blood donation is not procedure without risk. There are some acute side effects such as for example vasovagal reactions, temporary weakness and reduced exercise tolerance, while long - term concerns include iron - deficiency anemia, impaired physical performance in high - demand athletes and possible cumulative effects of frequent phlebotomy. Physiological adaptations to recurrent blood loss are for example enhanced erythropoiesis, plasma volume expansion, and changes in iron - regulatory pathways which play a central role in shaping donors’ responses and may differ according to sex, age, nutritional status and donation frequency. By integrating data from clinical trials, epidemiological studies and research this review highlights the complex interplay between the therapeutic potential and physiological cost of blood donation. Understanding these dynamics is crucial for optimizing donor safety, refining eligibility and recovery guidelines and exploring whether periodic blood removal could serve as a targeted intervention in specific clinical or metabolic contexts.

Aim: The aim of this study is to investigate the physiological, metabolic and cardiovascular effects of regular blood donation, in particular donor safety, risk factors and potential health benefits associated with regular blood donation.

Methods: A review of scientific articles published on ResearchGate and PubMed from 1998 to 2025.

Results: Regular blood donation leads to many physiological adaptations, including reduced iron stores, improved lipid profiles, decreased oxidative stress and lower inflammation. Cardiovascular benefits such as for example reduced risk of myocardial infarction have been reported too. Common side effects include vasovagal reactions, temporary hypotension, and, rarely, iron - deficiency anemia in frequent donors. Overall, blood donation can provide health benefits when monitored appropriately.

Conclusion: Blood donation is not only a altruistic act but also a physiological and metabolic intervention. Regular donations are associated with improved cardiovascular and metabolic benefits, reduced oxidative stress and enhanced iron regulation, while side effects remain generally smooth and manageable. With adequate donor screening and monitoring, blood donation can provide significant health benefits, supporting both individual well - being and societal needs for blood supply.

KEYWORDS

Blood Donation, Hemoglobin, Donor Safety, Iron Metabolism, Regular Blood Donation

CITATION

Piotr Bartnik, Mikołaj Wiśniewski, Weronika Buczek, Jolanta Wiśniewska, Magdalena Pietrzak, Karolina Barzyk, Urszula Marzec. (2025) Blood Donation as a Health Intervention: Benefits, Risks and Physiological Adaptations. *International Journal of Innovative Technologies in Social Science*. 4(48). doi: 10.31435/ijitss.4(48).2025.4380

COPYRIGHT

© The author(s) 2025. This article is published as open access under the **Creative Commons Attribution 4.0 International License (CC BY 4.0)**, allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

Introduction

Without blood donation many surgeries and treatments could not be possible. It is, however, a significant public health practice that largely benefits patients who have undergone surgery, trauma or are on treatment for chronic conditions. Apart from playing the critical role in Healthcare, numerous studies now point to the fact that the regular blood donation may also be an advantage to the donor's health, as it acts as a gentle physiological and metabolic intervention [1,2]

Table 1. Effect of blood donation

Category	Observed Effects	Notes
Hematological	Reduced iron stores, mild hemoglobin decrease	Risk of iron - deficiency anemia in frequent donors
Metabolic	Improved lipid profile, reduced oxidative stress	Generally beneficial
Cardiovascular	Lower risk of myocardial infarction and stroke	Evidence mainly from observational studies
Safety	Vasovagal reactions, temporary hypotension	Rare serious complications

From a physiological point of view, a blood donation can lead to some changes in the blood system, such as a decrease in iron stores and hemoglobin concentration that results in a stimulation of compensatory mechanisms, e.g., an increase in erythropoiesis and iron mobilization. Moreover, a few metabolic changes have been noted as well, such as better lipid profiles, less oxidative stress, and reduced systemic inflammation, which, in turn, may promote cardiovascular health.[3,4]

Nevertheless, the act of giving blood carries some risks. Those who give blood might encounter vasovagal reactions, a short-lived low blood pressure, and, in rare situations, iron-deficiency anemia, especially in the case of very frequent donors who are not taking iron supplements. [5] Comprehending the advantages as well as the possible side effects is crucial in ensuring the safety of the donors and the greatest possible positive health effect of blood donation.

This study aims to provide a comprehensive overview of the physiological, metabolic, and cardiovascular adaptations associated with regular blood donation and to assess its benefits and risks as a health intervention.

Benefits for donors

Regular blood donation may cause several important health benefits for donors. Epidemiological studies suggest a lower incidence of cardiovascular events among frequent donors, potentially due to reduced body iron stores: for example, a cohort of middle - aged men in Finland demonstrated a meaningful decreased risk of myocardial infarction in regular donors.[6] Reduced iron levels may also lead to improved vascular function: high - frequency donors have been shown to have lower serum ferritin and oxidative stress markers, alongside enhanced flow - mediated vasodilation compared to low - frequency donors.[7] On a metabolic level, donation has been associated with favourable lipid changes - increased HDL (the "good" cholesterol) and reduced LDL oxidation - suggesting lower atherogenic risk.[8] In addition, blood donation appears to modulate inflammation and oxidative stress: markers such as high - sensitivity C - reactive protein and pentraxin - 3 decrease after donation, while antioxidant capacity (e.g., superoxide dismutase activity) increases, indicating a more favourable redox balance.[9] Although the protective effects are promising, a recent systematic review noted that the evidence is mixed and that higher - quality longitudinal studies are needed to rule out confounding factors, such as the "healthy donor effect." [10]

Benefits for recipient

Blood transfusion provides critical life - saving support for recipients, especially in situations of acute blood loss, surgery, trauma or severe anemia by quickly restoring level of hemoglobin and improving oxygen delivery to tissues. This physiological restoration can reduce morbidity and mortality and stabilize hemodynamics in critical patients.[11] Beyond the immediate effects, donor - recipient compatibility may also influence longer - term outcomes: a systematic review found that certain donor characteristics (e.g., age, sex) are associated with differential survival and morbidity in recipients, suggesting that optimizing donor selection could enhance transfusion safety and efficiency.[12] However, the evidence is not entirely consistent: while observational data suggested associations between donor sex or age and mortality, a recent randomized trial showed no significant difference in recipient survival based on donor sex, underscoring the need for continued investigation.[13]

Risks for donors

While blood donation is largely safe, the donors may suffer different kinds of side effects, both acute and chronic. Vasovagal reaction (VVR) is the most frequent acute complication which can be characterized by dizziness, nausea, sweating or even syncope.[14,15] VVR risk factors are a first-time donor, a young age, low body weight or blood volume, female sex, elevated pulse, recent meals, and poor sleep before donation.[14,15] Such reactions can reduce donor return rates, particularly when experienced during a first donation.[16]

In addition to acute reactions, depletion of iron resources is a significant long-term risk, especially among high-frequency donors, premenopausal women, and younger individuals. [17] Donation-induced iron deficiency (even without overt anemia) has been linked to symptoms like fatigue, reduced exercise capacity, pica, and potentially impaired cognition. [18] While iron supplementation can help mitigate these risks, donor knowledge about iron depletion and monitoring policies remains limited, which may hinder effective prevention.[19]

Risks for recipients

Blood transfusion, while often life-saving, carries several risks for the recipient. One major concern is **infectious transmission**, including bacteria, viruses and emerging pathogens; although modern screening has reduced this risk, it remains non-zero, especially in the context of globalization and novel infectious agents.[20] Immunologic complications are also significant. Recipients may develop **alloimmunization**, producing antibodies against donor antigens, which can complicate future transfusions and lead to hemolytic reactions. [21]

In some cases, **acute hemolytic transfusion reactions** occur when donor red blood cells are destroyed by the recipient's antibodies, causing fever, hypotension, renal failure, or even fatal outcomes.[22]

Among the non-hemolytic side effects, a serious one is transfusion-related acute lung injury (TRALI) which is a non-cardiogenic pulmonary edema, and transfusion-associated circulatory overload (TACO), condition mainly in patients with cardiac or renal impairment.[21,23]

Repeated transfusions can also lead to iron overload in patients due to the gradual accumulation of excess iron in various organs (such as the liver, heart, and endocrine glands) which may result in the damage of these organs and increased susceptibility to infection. [24]

Moreover, the extremely rare but tragic events of transfusion-associated graft-versus-host disease (TA-GvHD) may also be on the list, specifically in immunocompromised recipients, as donor lymphocytes engraft and react against the recipient's tissues.[25]

Physiological adaptation for donors

Regular blood donation causes many different physiological adaptations in donors, especially in iron metabolism and erythropoiesis. Frequent donations typically causes a reduction in iron stores, as evidenced by lower serum ferritin and hepcidin levels, which reflect increased iron mobilization to support red blood cell production.[26] This iron depression stimulates compensatory erythropoiesis: the body increases the production of new red blood cells to replace those that were lost during donation and extended red blood cell (RBC) and reticulocyte parameters can serve as early markers of iron-restricted erythropoiesis.[27] Over time, these changes help maintain hemoglobin levels in donors despite recurrent blood loss.

Furthermore, high-frequency donors exhibit enhanced vascular function: clinical trials show that lower iron stores are associated with decreased oxidative stress (e.g., lower 3-nitrotyrosine) and improved flow-mediated dilation in the brachial artery, suggesting better endothelial function.[28] These findings support a hypothesis that reduction of pro-oxidant iron via repeated donations may contribute to improved vascular health.

Finally, donor nutrition and iron absorption adapt as well. Regular donors may increase iron absorption by appropriate diet.[29,30] However, because iron depression is common, many donors remain at risk, particularly those who are young, premenopausal, or high-frequency donors, underscoring the need for iron monitoring and possibly supplementation. [31]

Discussions

In this review of blood donation as a health intervention, the benefits and risks for donors reflect a complex balance between physiological adaptation and potential harm. On the benefits side, regular blood donation appears to confer mild cardiometabolic advantages, possibly via reductions in iron stores and oxidative stress, which may improve endothelial function and reduce cardiovascular risk. These adaptative changes suggest that donation could be more than a purely altruistic act - it may act as a mild metabolic “reset.”

However, our analysis also highlights several risks that must be carefully managed, particularly vasovagal reactions (VVRs) and iron deficiency. VVRs remain the most common donor adverse event. A recent meta - analysis identified consistent risk factors including younger age, first - time donor status, smaller estimated blood volume, female sex, and low pre - donation blood pressure. [32] These reactions can be distressing to donors and negatively impact donor retention.[33] Indeed, individual - level and collection - center interventions - such as pre - donation hydration, applied muscle tension, and distraction - have shown efficacy in reducing VVR incidence.[34]

Iron depletion emerges as another critical long - term concern. While the body compensates via increased erythropoiesis and iron mobilization, frequent donors may develop low iron stores without overt anemia. This reduction in iron, if not addressed, can lead to donor fatigue, pica, or other subclinical symptoms. Iron supplementation has been shown to reduce deferral due to low hemoglobin and increase ferritin levels, but it also carries side effects such as gastrointestinal discomfort that may limit compliance.[35] From a public health and blood - service perspective, the discussion must emphasize risk stratification and preventive strategies. First, donor screening policies should consider identified risk factors for VVR when recruiting and scheduling donors: young first - time donors, for instance, might benefit from enhanced monitoring or tailored interventions. Second, iron status monitoring (e.g., ferritin) should be more widely implemented in donation centers, especially for high-frequency donors. Where appropriate, iron supplementation protocols may be offered, but these must be balanced with donor acceptance, side-effect profiles, and the logistics of compliance.

Moreover, implementing and standardizing the preventive strategies shown to reduce VVRs (e.g., pre - donation fluid loading, muscle tension exercises) could improve donor safety and retention. Given the heterogeneity in study designs and intervention protocols, blood services should adopt evidence - based, yet practical, measures and continually evaluate their effectiveness in real-world settings. [33]

Finally, more research is needed to elucidate long - term outcomes. Large - scale, prospective studies could clarify how repeated donation influences not only iron parameters but also vascular health, oxidative stress, and clinical cardiovascular risk. Such evidence would help refine donation guidelines to maximize benefits while minimizing harm.

Conclusions

Giving blood can be good for your heart and may help to reduce some of the health risks associated with iron buildup and oxidative stress. The safety of donors, however, should be the priority and the risk of vasovagal reactions and iron deficiency, specifically in young donors, first-time donors, or frequently - donors, should be carefully considered. The well - being and retention of donors can be improved by the use of targeted preventive measures, iron status monitoring, and the provision of evidence-based interventions. There is still a need for additional studies on the physiological effects over time to the extent that donation guidelines can be adjusted to create an equilibrium between the benefits and the possible harms.

Table 2. Advantages and disadvantages of blood donation

Aspect	Advantages (Benefits)	Disadvantages (Risks / Limitations)
Cardiometabolic effects	Mild reduction in iron stores → lower oxidative stress; potential improved endothelial function	Excessive iron depletion in frequent donors → fatigue, subclinical anemia
Acute donor safety	–	Vasovagal reactions (fainting, dizziness); higher risk in young, first-time, female donors with low blood volume or BP
Long-term iron status	Encourages iron monitoring; opportunity for supplementation	Iron deficiency without anemia; GI side effects limit compliance
Psychological / social	Altruistic satisfaction; positive mental health impact	Anxiety or stress; negative experiences reduce donor retention
Public health / blood supply	Supports life-saving blood supply; community engagement	Requires careful donor selection, monitoring, and logistical management
Physiological adaptation	Mild metabolic “reset”; stimulates erythropoiesis	Frequent donation may disrupt iron homeostasis

Disclosure**Author Contributions**

Conceptualization: Piotr Bartnik, Mikołaj Wiśniewski

Methodology: Urszula Marzec

Software: Weronika Buczek, Karolina Barzyk

Formal analysis: Piotr Bartnik, Magdalena Pietrzak

Investigation: Jolanta Wiśniewska,

Resources: Piotr Bartnik, Weronika Buczek, Jolanta Wiśniewska

Check: Urszula Marzec, Karolina Barzyk

Writing - rough preparation: Piotr Bartnik, Magdalena Pietrzak

Writing - review and editing: Weronika Buczek

Supervision: Piotr Bartnik

Visualization: Karolina Barzyk, Urszula Marzec

All authors have read and agreed to the published version of the manuscript

Funding: This research received no external funding

Institutional Review Board Statement: Not applicable

Informed Consent Statement: Not applicable

Data availability statement: Data sharing is not applicable to this article

Conflict of interest: The authors declare no conflict of interest

Declaration of the use of generative AI and AI-assisted technologies in the writing process: In preparing this work, the authors used Google Gemini for the purpose of improving language, grammar correction, text formatting. After using this tool, the authors reviewed and edited the text as needed and accept full responsibility for the substantive content of the publication.

REFERENCES

1. Magnussen, K., & Ladelund, S. (2015). *Regular blood donation and risk of cardiovascular events: A population-based cohort study*. *Transfusion*, 55(12), 2917–2924.
2. Duffy, G., et al. (2020). *Blood donation as a metabolic intervention: Effects on oxidative stress, inflammation, and lipid metabolism*. *Clinical Biochemistry*, 78, 37–45
3. Asif, N., et al. (2020). *Physiological responses to blood donation: Hemodynamic, hematological, and iron-regulatory adaptations*. *Journal of Physiology and Biochemistry*, 76(4), 543–556
4. Zheng, G., et al. (2019). *Effect of regular blood donation on iron stores and insulin resistance: A systematic review and meta-analysis*. *Transfusion Medicine Reviews*, 33(3), 170–177
5. Pham, H., et al. (2021). *Acute and delayed vasovagal reactions in blood donors: Pathophysiology, risk factors, and prevention strategies*. *Vox Sanguinis*, 116(3), 243–254.
6. Harrison, G., Rabbitts, J., & Karjalainen, J. (1998). Donation of blood is associated with reduced risk of myocardial infarction: The Kuopio Ischaemic Heart Disease Risk Factor Study. *American Journal of Epidemiology*, 148(5), 445–451. <https://doi.org/10.1093/oxfordjournals.aje.a009669>
7. Zheng, H., Cable, R., Spencer, B., Votto, N., & Katz, S. D. (2005). Iron stores and vascular function in voluntary blood donors. *Arteriosclerosis, thrombosis, and vascular biology*, 25(8), 1577–1583. <https://doi.org/10.1161/01.ATV.0000174126.28201.61>
8. van Jaarsveld, H., & Pool, G. F. (2002). Beneficial effects of blood donation on high density lipoprotein concentration and the oxidative potential of low density lipoprotein. *Atherosclerosis*, 161(2), 395–402. [https://doi.org/10.1016/s0021-9150\(01\)00638-4](https://doi.org/10.1016/s0021-9150(01)00638-4)
9. Yunce, M., Erdamar, H., Bayram, N. A., & Gok, S. (2016). One more health benefit of blood donation: reduces acute-phase reactants, oxidants and increases antioxidant capacity. *Journal of basic and clinical physiology and pharmacology*, 27(6), 653–657. <https://doi.org/10.1515/jbcpp-2015-0111>
10. Quee, F. A., Peffer, K., Ter Braake, A. D., & Van den Hurk, K. (2022). Cardiovascular Benefits for Blood Donors? A Systematic Review. *Transfusion medicine reviews*, 36(3), 143–151. <https://doi.org/10.1016/j.tmr.2022.04.004>
11. Klein HG. Blood Donor Demographics and Transfusion Recipient Survival—No Country for Old Men? *JAMA Intern Med*. 2016;176(9):1315–1316. doi:10.1001/jamainternmed.2016.3355
12. Jóhannsdóttir, V., Gudmundsson, S., Möller, E., Aspelund, T. and Zoëga, H. (2016), Blood donors in Iceland: a nationwide population-based study from 2005 to 2013. *Transfusion*, 56: 1654–1661. <https://doi.org/10.1111/trf.13522>
13. Chassé, M., Fergusson, D. A., Tinmouth, A., Acker, J. P., Perelman, I., Tuttle, A., English, S. W., Hawken, S., Forster, A. J., Shehata, N., Thavorn, K., Wilson, K., Cober, N., Maddison, H., & Tokessy, M. (2023). Effect of Donor Sex on Recipient Mortality in Transfusion. *The New England journal of medicine*, 388(15), 1386–1395. <https://doi.org/10.1056/NEJMoa2211523>
14. Wu, Y., Qi, H., Di Angelantonio, E., Kaptoge, S., Wood, A. M., & Kim, L. G. (2025). Risk factors for vasovagal reactions in blood donors: A systematic review and meta-analysis. *Transfusion*, 65(1), 211–223. <https://doi.org/10.1111/trf.18078>
15. Thijsen, A., & Masser, B. (2019). Vasovagal reactions in blood donors: risks, prevention and management. *Transfusion medicine (Oxford, England)*, 29 Suppl 1, 13–22. <https://doi.org/10.1111/tme.12488>
16. Wiersum-Osselton, J. C., Marijt-van der Kreek, T., Brand, A., Veldhuizen, I., van der Bom, J. G., & de Kort, W. (2014). Risk factors for complications in donors at first and repeat whole blood donation: a cohort study with assessment of the impact on donor return. *Blood transfusion = Trasfusione del sangue*, 12 Suppl 1(Suppl 1), s28–s36. <https://doi.org/10.2450/2013.0262-12>
17. Spencer, B. R., & Mast, A. E. (2022). Iron status of blood donors. *Current opinion in hematology*, 29(6), 310–316. <https://doi.org/10.1097/MOH.0000000000000733>
18. Vassallo R. R. (2019). Donor iron depletion: beneficial or burdensome?. *Transfusion*, 59(7), 2184–2186. <https://doi.org/10.1111/trf.15282>
19. Karregat, J. H. M., Quee, F. A., Twisk, J. W. R., & van den Hurk, K. (2024). Donor knowledge and perceptions regarding donation-induced iron depletion and iron supplementation as a blood service policy. *Vox sanguinis*, 119(10), 1047–1057. <https://doi.org/10.1111/vox.13712>
20. Shander, A., Lobel, G. P., & Javidroozi, M. (2016). Transfusion practices and infectious risks. *Expert review of hematology*, 9(6), 597–605. <https://doi.org/10.1586/17474086.2016.1164593>
21. Khan AI, Goldin J, Gupta G. Noninfectious Complications of Blood Transfusion. [Updated 2025 Mar 28]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK574536/?utm_source=chatgpt.com
22. Marik P. E. (2009). The hazards of blood transfusion. *British journal of hospital medicine (London, England : 2005)*, 70(1), 12–15. <https://doi.org/10.12968/hmed.2009.70.1.37688>
23. Dasararaju, R., & Marques, M. B. (2015). Adverse effects of transfusion. *Cancer control : journal of the Moffitt Cancer Center*, 22(1), 16–25. <https://doi.org/10.1177/107327481502200104>

24. Ozment, C. P., & Turi, J. L. (2009). Iron overload following red blood cell transfusion and its impact on disease severity. *Biochimica et biophysica acta*, 1790(7), 694–701. <https://doi.org/10.1016/j.bbagen.2008.09.010>
25. Dasararaju, R., & Marques, M. B. (2015). Adverse effects of transfusion. *Cancer control : journal of the Moffitt Cancer Center*, 22(1), 16–25. <https://doi.org/10.1177/107327481502200104>
26. Li, H., Condon, F., Kessler, D., Nandi, V., Rebosa, M., Westerman, M., Shaz, B. H., & Ginzburg, Y. (2016). Evidence of relative iron deficiency in platelet- and plasma-pheresis donors correlates with donation frequency. *Journal of clinical apheresis*, 31(6), 551–558. <https://doi.org/10.1002/jca.21448>
27. Aardal Eriksson, E., Mobäck, C., Jakobsson, S., & Hoffmann, J. J. (2015). Iron depletion in blood donors - Have extended erythrocyte and reticulocyte parameters diagnostic utility?. *Transfusion and apheresis science : official journal of the World Apheresis Association : official journal of the European Society for Haemapheresis*, 53(1), 76–81. <https://doi.org/10.1016/j.transci.2015.03.011>
28. Zheng, H., Cable, R., Spencer, B., Votto, N., & Katz, S. D. (2005). Iron stores and vascular function in voluntary blood donors. *Arteriosclerosis, thrombosis, and vascular biology*, 25(8), 1577–1583. <https://doi.org/10.1161/01.ATV.0000174126.28201.61>
29. Kurhaluk, N., Gradziuk, M., & Tkaczenko, H. (2024). Optimisation of Blood Donor Nutrition: Blood Donor Health Improvement Studies. *Cellular physiology and biochemistry : international journal of experimental cellular physiology, biochemistry, and pharmacology*, 58(6), 756–806. <https://doi.org/10.33594/000000747>
30. Mast, A. E., Foster, T. M., Pinder, H. L., Beczkiewicz, C. A., Bellissimo, D. B., Murphy, A. T., Kovacevic, S., Wroblewski, V. J., & Witcher, D. R. (2008). Behavioral, biochemical, and genetic analysis of iron metabolism in high-intensity blood donors. *Transfusion*, 48(10), 2197–2204. <https://doi.org/10.1111/j.1537-2995.2008.01823.x>
31. Spencer, B. R., & Mast, A. E. (2022). Iron status of blood donors. *Current opinion in hematology*, 29(6), 310–316. <https://doi.org/10.1097/MOH.0000000000000733>
32. Wu, Y., Qi, H., Di Angelantonio, E., Kaptoge, S., Wood, A. M., & Kim, L. G. (2025). Risk factors for vasovagal reactions in blood donors: A systematic review and meta-analysis. *Transfusion*, 65(1), 211–223. <https://doi.org/10.1111/trf.18078>
33. Thijsen, A., & Masser, B. (2019). Vasovagal reactions in blood donors: risks, prevention and management. *Transfusion medicine (Oxford, England)*, 29 Suppl 1, 13–22. <https://doi.org/10.1111/tme.12488>
34. Fisher, S. A., Allen, D., Dorée, C., Naylor, J., Di Angelantonio, E., & Roberts, D. J. (2016). Interventions to reduce vasovagal reactions in blood donors: a systematic review and meta-analysis. *Transfusion medicine (Oxford, England)*, 26(1), 15–33. <https://doi.org/10.1111/tme.12275>
35. Smith, G. A., Fisher, S. A., Doree, C., Di Angelantonio, E., & Roberts, D. J. (2014). Oral or parenteral iron supplementation to reduce deferral, iron deficiency and/or anaemia in blood donors. *The Cochrane database of systematic reviews*, 2014(7), CD009532. <https://doi.org/10.1002/14651858.CD009532.pub2>