

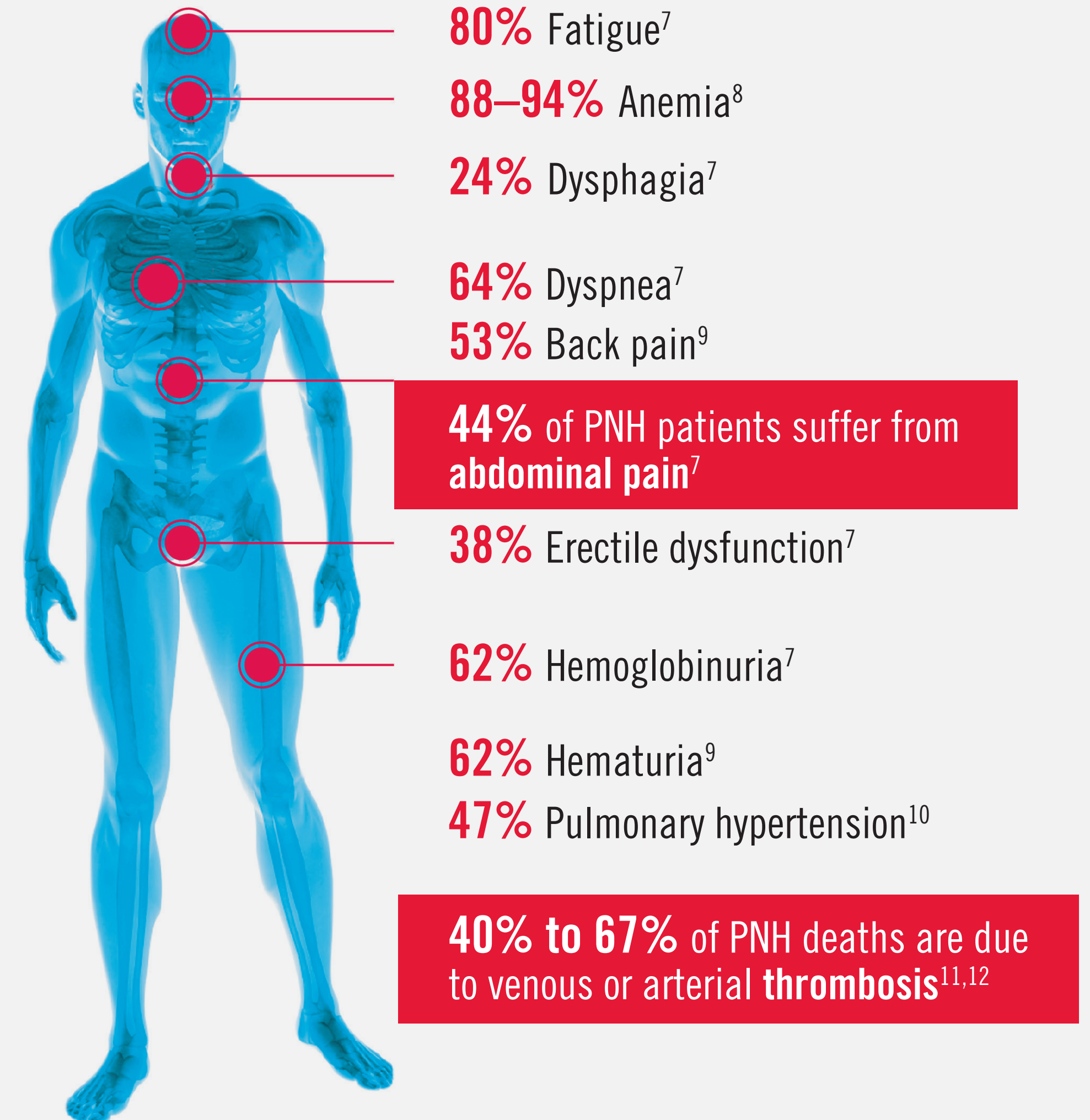




# EXPOSING THE CONNECTION BETWEEN BLOOD AND INTERNAL MEDICINE

## Paroxysmal nocturnal hemoglobinuria (PNH) is a progressive and life-threatening disease associated with morbidities and premature mortality<sup>1</sup>

- Chronic hemolysis is the underlying cause of progressive morbidities and premature mortality in patients with PNH<sup>2-4</sup>
- Delays in diagnosis of PNH have ranged from 1 to >10 years<sup>5</sup>
- Internists can help shorten time to diagnosis by identifying certain signs and symptoms of PNH<sup>6</sup>



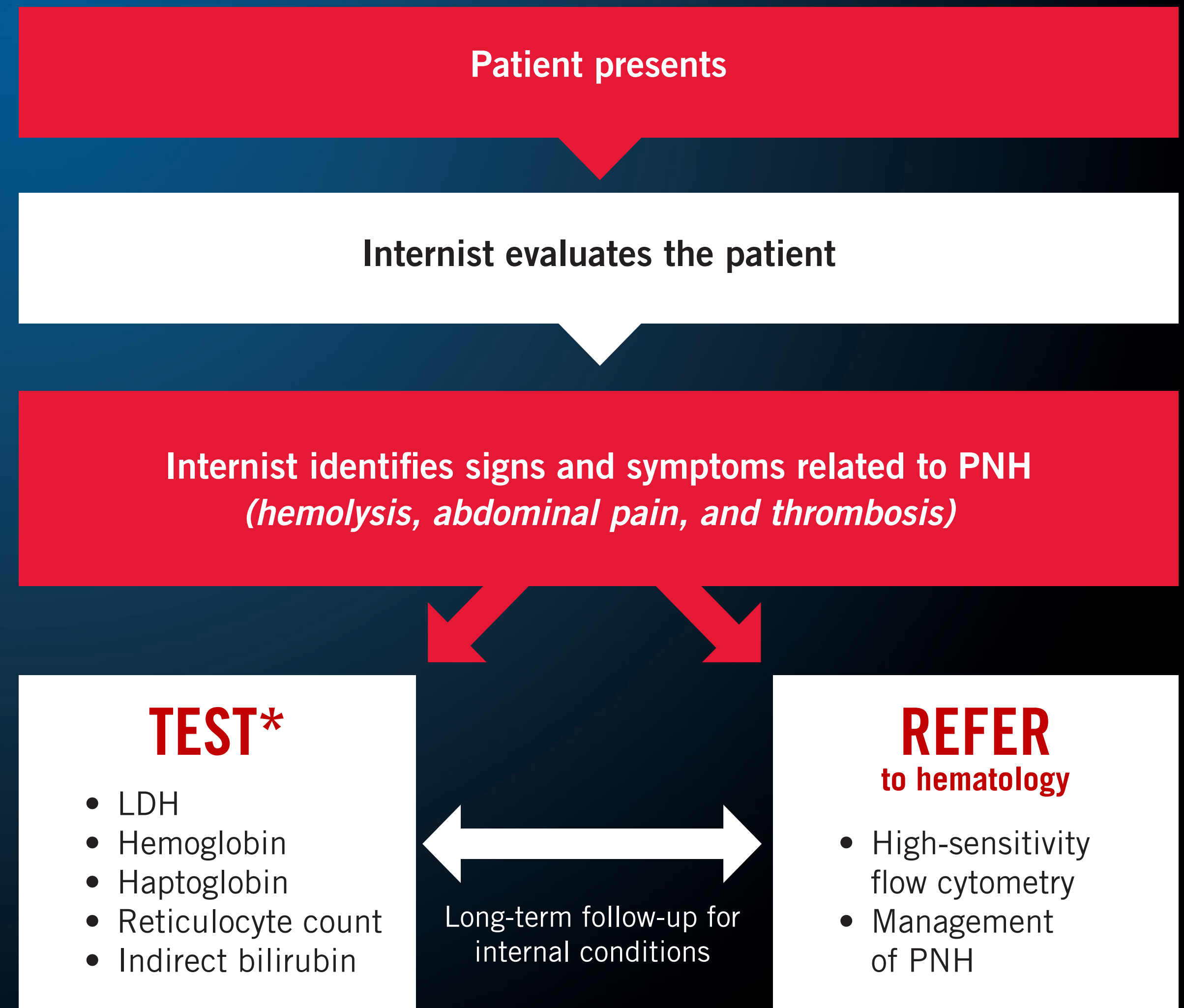
Your role as an internist in the pathway to diagnosis<sup>6</sup>

# EVALUATE TEST REFER

LDH: lactate dehydrogenase

\* Please note that there are regional variances on which healthcare professionals can order testing.

The information on this page is intended as educational information for healthcare providers. It does not replace a healthcare professional's judgment or clinical diagnosis.





# Next steps in the diagnostic process: Order additional tests\*

## Test

Order additional tests that may increase suspicion or help rule out PNH

Laboratory value	In patients with PNH <sup>14,17–19</sup>
LDH	↑ LDH 1.5 x ULN
Hemoglobin	↓
Haptoglobin	↓
Reticulocyte count	↑ Frequently elevated; may be normal or low if bone marrow is dysfunctional
Indirect bilirubin	↑

## The internist’s role in diagnosing PNH

- PNH symptoms are non-specific, and coupled with the rarity of PNH, can lead to substantial diagnostic delays<sup>1,6,20</sup>
- You, as an internist, can play a critical role in shortening the time to diagnosis, thereby improving patient prognosis and management<sup>6</sup>
- In the presence of signs and symptoms of PNH, consider ordering additional tests, and/or refer to a hematologist and follow up to manage underlying internal conditions<sup>6,17</sup>

LDH: lactate dehydrogenase; ULN: upper limit of normal.

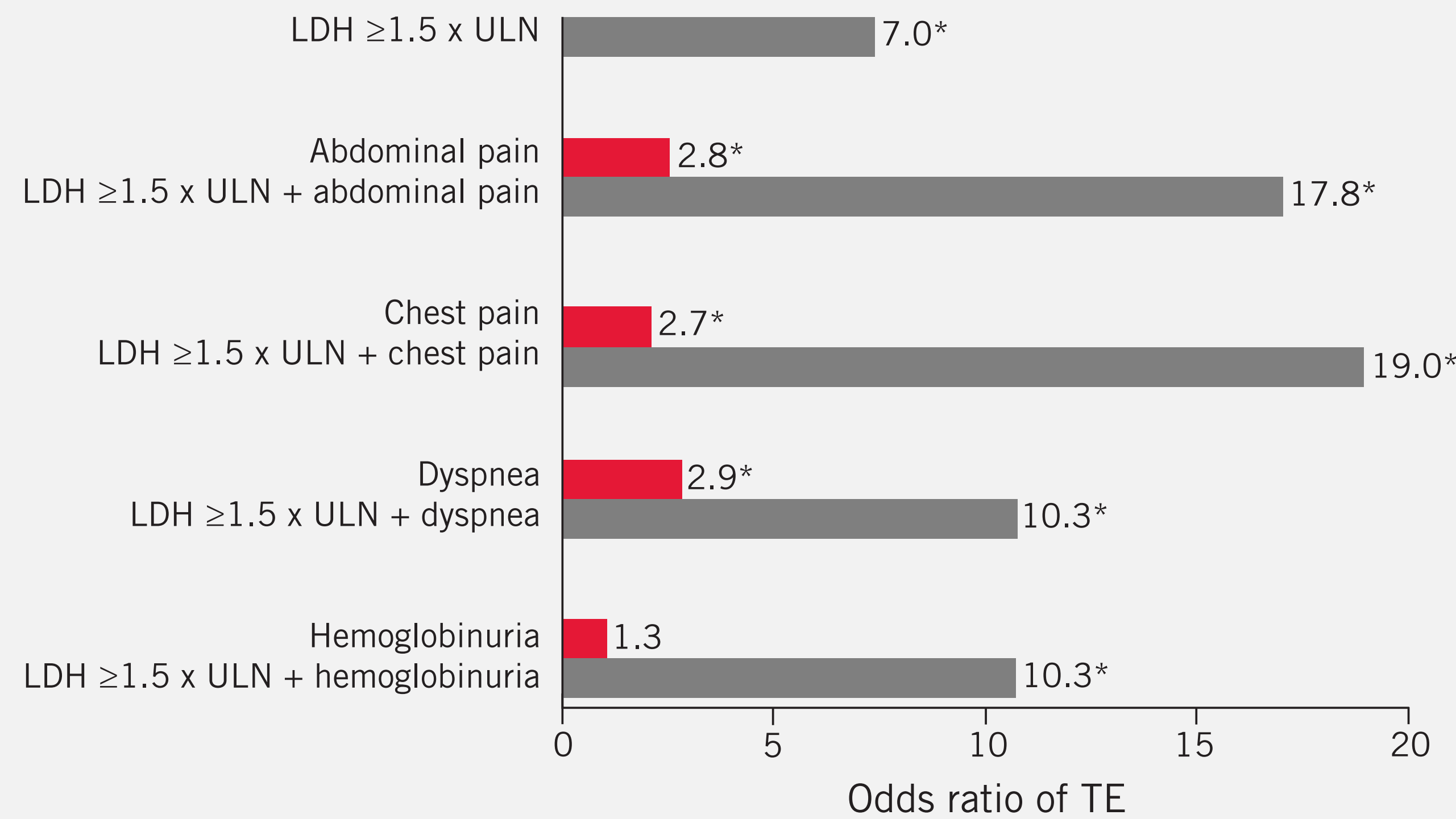
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# Patients with PNH have an increased risk of thrombosis<sup>13,14</sup>

The risk of developing a TE increases further if the patient also has LDH levels  $\geq 1.5 \times \text{ULN}$ <sup>13</sup>

## Effect of hemolysis and clinical symptoms on risk of TE<sup>15</sup>



\*  $p < 0.05$  compared with LDH  $< 1.5 \times \text{ULN}$  + no symptom.

Thrombosis is the **leading cause of death** for patients with PNH.<sup>15</sup>

TE: thrombotic event; LDH: lactate dehydrogenase; ULN: upper limit of normal.

# THANK YOU

**References:** 1. Hillmen P, et al. *N Engl J Med*. 1995;333(19):1253-1258. 2. Brodsky RA. *Hematology - Basic Principles and Practices*. 4<sup>th</sup> ed. Philadelphia, PA: Elsevier Churchill Livingstone; 2005:419-427. 3. Rother RP, et al. *JAMA*. 2005;293(13):1653-1662. 4. Hillmen P, et al. *Am J Hematol*. 2010;85(8): 553-559. 5. Dacie JV, Lewis SM. *Ser Haematol*. 1972;5(3):3-23. 6. Sahin F, et al. *Am J Blood Res*. 2015;5(1):1-9. 7. Scherezenmeier H, et al. *Haematologica*. 2014;99(5):922-929 and Supplemental Information. 8. Nishimura J, et al. *Medicine (Baltimore)*. 2004;83(3):193-207. 9. Mitchell R, et al. *SM Clin Med Oncol*. 2017;1(1):1001. 10. Hill A, et al. *Br J Haematol*. 2010;149(3):414-425. 11. Hillmen P, et al. *Br J Haematol*. 2013;162(1):62-73. 12. Sharma VR. *Clin Adv Hematol Oncol*. 2013;11 Suppl 13(9):2-8. 13. Hillmen P, et al. *Blood*. 2007;110(12):4123-4128. 14. Lee JW, et al. *Int J Hematol*. 2013;97(6): 749-757. 15. Hill A, et al. *Blood*. 2013;121(25):4985-4996. 16. Qi K, et al. *Am J Med Sci*. 2011;341(1):68-70. 17. Barcellini W, Fattizzo B. *Dis Markers*. 2015;2015:635-670. 18. Hill A, et al. *Haematologica*. 2010;95(4):567-573. 19. Brodsky RA. *Blood*. 2009;113(26):6522-6527. 20. Shammo JM, et al. 58<sup>th</sup> Annual American Society of Hematology Meeting and Exposition; December 3-6, 2015; San Diego, CA; Abstract 3264.

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