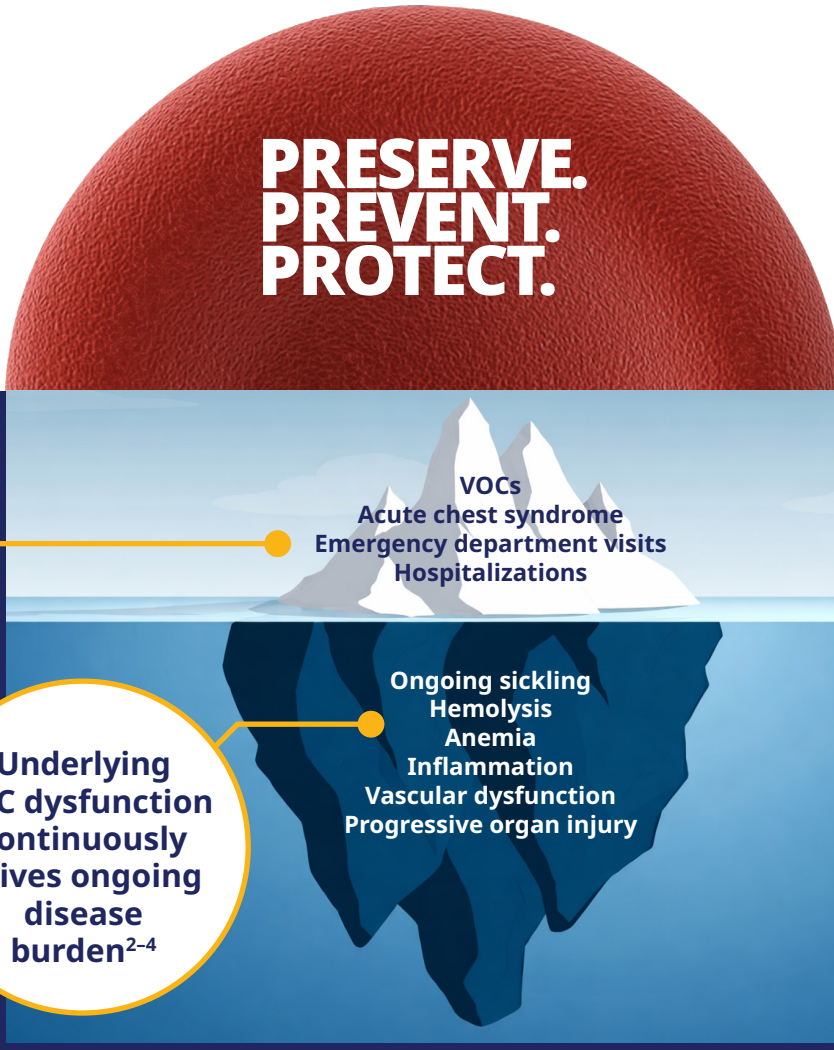
KNOW THEIR NUMBERS

Tracking Important Markers in Patients with Sickle Cell Disease



SCD crises are episodic.

The disease is continuous.

[a]VOCs are not always clinically apparent; some patients manage VOCs silently.

Visible, acute complications[1,a]

Underlying RBC dysfunction continuously drives ongoing disease burden[2–4]

Understanding RBC Health in SCD

SCD is a chronic hemolytic anemia characterized by ongoing RBC damage and destruction. RBC health reflects oxygen delivery, resistance to hemolysis, RBC survival, and function over time.[2–4]

SCD affects multiple dimensions of RBC health[2–4]

RBC dysfunction	May contribute to	Select biomarkers
• HbS polymerization and sickling	• VOCs, ischemic injury	• HbF[5,b]
• Hemolysis	• Sterile inflammation, vasculopathy, pulmonary hypertension, CKD	• LDH, indirect bilirubin, reticulocytes[6]
• Shortened RBC survival	• Increased RBC turnover, chronic anemia	• Reticulocytes[7]
• Anemia	• Fatigue, tissue hypoxia, organ damage	• Hemoglobin[8]

[b]HbF is not a direct biomarker of sickling but is an important modifier of HbS polymerization and RBC sickling.[9]

No single biomarker captures a complete picture of RBC health.

Longitudinal monitoring of biomarkers may provide a fuller view.

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Know Their Numbers: Select RBC Health Biomarkers in SCD[a]

Biomarker trends may help identify declining RBC health before changes are clinically apparent.[10,11]

Select biomarker Adult reference range[12–17]	Typical finding in SCD[2,3,12,b]	Why trends matter
Hemoglobin 11.5–15.5 g/dL[c] or 13–17 g/dL[d]	Often reduced; varies by genotype HbSS: 6–9 g/dL HbSβ0-thalassemia: 7–9 g/dL HbSβ+-thalassemia: 9–12 g/dL HbSC: 9–14 g/dL	▼ **Declining levels** may indicate worsening anemia and impaired oxygen delivery and warrant evaluation of contributing factors (eg, kidney or bone marrow dysfunction)[4,18,e]
Reticulocyte count 0.5%–2.5%	Often elevated (~5%–30%)	▲ **Increasing levels** may signal increased RBC turnover, compensatory marrow activity, and hemolytic stress[2,3,10]
Bilirubin (indirect) 0.2–1.3 mg/dL	Often elevated	▲ **Increasing levels** may reflect ongoing RBC destruction and increased hemolytic burden[3,10]
LDH 135–225 U/L (males) 135–214 U/L (females)	Often elevated	▲ **Rising levels** are a marker of cell breakdown and may reflect increased hemolysis, other cellular injury, and ongoing vascular damage.[3,10]
HbF[f] ≤1.0%	Varies by genotype	▼ **Persistently low or declining levels** may indicate reduced anti-sickling protection, associated with increased risk of VOCs and decreased RBC survival[7,9,17]

[a]Additional biomarkers and clinical measures may provide complementary insight into disease activity, oxygenation, inflammation, and organ function. [b]Values vary by genotype, age, disease severity, treatment status, transfusion history, and individual baseline; values represent typical steady-state findings and should not be interpreted as treatment targets. [c]For females or those taking estrogen. [d]For males or those taking testosterone. [e]Changes in Hb should be interpreted in the context of the patient's baseline, as sudden and gradual changes may reflect different clinical situations. [f]HbF is not a direct biomarker of sickling but is an important modifier of HbS polymerization and RBC sickling.

Helping Patients Understand Their Numbers

Key discussion points to consider:

- Reinforce that SCD activity continues between crises
- Relate lab trends to patients' symptoms such as fatigue and pain
- Emphasize routine monitoring and follow-up, even when patients feel well
- Connect trends to long-term goals, including organ health and complication prevention

Know Their Numbers. Follow The Trends.

Use Them to Guide Proactive Care and Protect Long-Term Health.

Scan code to learn more about red blood cell health.

By scanning, we may collect aggregate data for analytics, but not any personal information.

Abbreviations

CKD, chronic kidney disease; Hb, hemoglobin; HbF, fetal hemoglobin; HbS, hemoglobin S; LDH, lactate dehydrogenase; RBC, red blood cell; SCD, sickle cell disease; VOC, vaso-occlusive crisis.

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