

Sickle Cell Trait

A plain-English guide for you and your family

WHAT IS HAPPENING

Normally, hemoglobin inside your red blood cells carries oxygen smoothly from your lungs to every part of your body, keeping cells round and flexible as they flow through tiny blood vessels. When someone has sickle cell trait, they inherited one gene for sickle hemoglobin from one parent and one normal gene from the other parent. The body makes enough normal hemoglobin that red blood cells stay round and work well under everyday conditions. Only in extreme situations—like severe dehydration, very high altitudes, or intense exercise without enough water—might some cells briefly change shape, but this rarely causes problems. Most people with sickle cell trait live completely normal, healthy lives and never have symptoms.

What you might feel

- Usually no symptoms
- Blood in urine (hematuria)
- Inability to concentrate urine (hyposthenuria)
- Muscle pain or weakness during extreme exercise
- Dark urine after intense exercise
- Urinary tract infections
- Sudden collapse during high-intensity training
- Splenic tissue death from blocked blood flow (infarction) at high altitude

Call the doctor right away if...

- Severe muscle pain, weakness, or dark cola-colored urine after intense exercise—indicates exertional sickling with rhabdomyolysis and risk for acute kidney injury or death
- Sudden collapse or loss of consciousness during high-intensity training—suggests life-threatening exertional sickling with possible cardiac arrest from high potassium (hyperkalemia)

- Left upper abdominal pain with left shoulder pain at high altitude—indicates splenic tissue death from blocked blood flow (infarction) requiring descent and emergency evaluation
- Persistent or worsening proteinuria with rising creatinine—suggests progressive chronic kidney disease requiring ACE inhibitor or ARB and nephrology referral

What the care team will do

- Recognize that sickle cell trait is a carrier state, not a disease requiring routine treatment.
- Screen for trait status before pregnancy or genetic counseling for family planning.
- Educate on rare situations that can trigger sickling: extreme dehydration, high altitude, severe low oxygen (hypoxia), and extreme exertion.
- Monitor urine and hydration status during strenuous physical training or competitive sports.
- Assess for blood in the urine (hematuria) (blood in urine) and counsel that it may occur without serious underlying disease.
- Provide reassurance that life expectancy and general health are normal with sickle cell trait.
- Document trait status clearly in the medical record for anesthesia and surgical teams.
- Counsel against high-altitude activities (above 10,000 feet) without acclimatization or supplemental oxygen.

Medicines you may be given — and why

lisinopril or enalapril

ACE inhibitors block an enzyme that makes angiotensin II, a hormone that tightens blood vessels in the kidney. By lowering angiotensin II, these drugs relax the vessels leaving the kidney filter (efferent arterioles), reducing pressure inside the glomerulus (kidney filter) and decreasing protein leak into urine.

losartan or valsartan

ARBs block the receptor where angiotensin II binds to cause blood vessel constriction. They work similarly to ACE inhibitors by reducing pressure in the kidney filter and decreasing protein loss. ARBs are used when patients cannot tolerate ACE inhibitors due to cough.

Normal saline (0.9% sodium chloride) IV fluids

Normal saline is a sterile saltwater solution given through a vein to rapidly expand blood volume and increase urine flow. In exertional sickling with rhabdomyolysis, high urine output

(above 200 mL per hour) prevents myoglobin (muscle protein) from settling in kidney tubules and causing acute tubular tissue death (necrosis) (kidney damage from blocked tubules).

Hydration counseling (non-drug behavioral intervention)

Teaching individuals with sickle cell trait to drink fluids before, during, and after exercise prevents dehydration that concentrates blood and increases sickling risk. Adequate hydration maintains blood volume, keeps oxygen delivery normal, and reduces the chance that red blood cells will sickle in small vessels during physical activity or illness.

Genetic counseling (non-drug intervention)

Genetic counselors explain inheritance patterns and help individuals understand their 25% risk of having a child with sickle cell disease if both parents carry sickle cell trait. Counseling includes discussion of prenatal testing options like chorionic villus sampling (testing placental tissue at 10-12 weeks) or amniocentesis (testing amniotic fluid at 15-20 weeks) to diagnose hemoglobin disorders before birth.

Altitude avoidance counseling (non-drug preventive strategy)

People with sickle cell trait should avoid rapid ascent to altitudes above 8,000 feet where low oxygen pressure can trigger red blood cell sickling in the spleen, causing splenic tissue death from blocked blood flow (infarction) (tissue death from blocked blood flow). Gradual acclimatization over several days allows the body to adjust to lower oxygen levels and reduces sickling risk.

Where this information comes from

- American Society of Hematology (ASH) 2020 guidelines on sickle cell disease and trait screening recommendations
- American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin No. 78 (reaffirmed 2023): Hemoglobinopathies in Pregnancy
- American College of Medical Genetics and Genomics (ACMG) 2021 standards for hemoglobinopathy carrier screening and genetic counseling
- National Athletic Trainers' Association (NATA) 2012 consensus statement on sickle cell trait and the athlete

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