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Sickle cell trait and health concerns in Army soldiers

At a Glance

- Researchers found that sickle cell trait does not raise the risk of death in active-duty U.S. Army soldiers.
- Soldiers with sickle cell trait did have a higher risk of a severe breakdown of skeletal muscle caused by strenuous physical activity.
- This risk, however, was also increased among older soldiers, those who smoked, were obese, or who had recently used certain medications.

Red blood cells contain hemoglobin, a protein that carries oxygen throughout the body. People with sickle cell anemia have inherited 2 abnormal hemoglobin genes that can cause their red blood cells to become rigid and sickle shaped. When these stiff and sticky cells clump together, they can impede blood flow in small blood vessels and lead to severe pain.

People who've inherited just 1 sickle cell gene and 1 normal hemoglobin gene are said to have sickle cell trait. Those with sickle cell trait usually have no signs of disease and live a normal life. While

The Army takes precautions to reduce heat- or exercise-induced illness among all soldiers. These include environmental monitoring, acclimation, adjusting

less than 2% of U.S. residents overall have sickle cell trait, it's more common in black Americans, affecting an estimated 7.3%.

training intensities and schedules, and providing water, snacks, and electrolyte beverages. *United States Army, Sgt. Brandon Hubbard*

Some previous reports suggested that people with sickle cell trait may have an increased risk for exertional rhabdomyolysis, a severe breakdown of skeletal muscle caused by extreme physical exertion. The muscle damage can lead to kidney problems and, in some cases, death. Those who are extremely physically active, such as athletes and military personnel, are more prone to exertional rhabdomyolysis.

A team led by Dr. Lianne M. Kurina at Stanford University School of Medicine set out to assess whether soldiers with sickle cell trait have an increased risk for exertional rhabdomyolysis and death. The study was supported in part by NIH's National Heart, Lung, and Blood Institute (NHLBI). Results appeared on August 4, 2016, in the *New England Journal of Medicine.*

The team surveyed health records from active-duty soldiers in the U.S. Army who served between 2011 and 2014 and had been tested for sickle cell trait. As the trait is most common among people with African ancestry, the scientists analyzed data from soldiers who reported their race as "black or African American." All personal identifying information from the research data was removed. The analysis included a total of almost 48,000 soldiers, more than 3,500 with sickle cell trait.

There were 96 deaths from all causes and 391 cases of exertional rhabdomyolysis during the time period studied. The scientists found no difference in the risk of death in soldiers with sickle cell trait compared to those without the trait.

Soldiers with sickle cell trait had a 54% higher risk of exertional rhabdomyolysis than soldiers without the trait. Besides sickle cell trait, other factors that were associated with an increased risk were tobacco use, obesity, and a recent prescription for an antipsychotic or statin medication. The researchers also found that the overall risk of exertional rhabdomyolysis increased with age; soldiers age 36 or older had a 57% greater risk than soldiers ages 17 to 23. In general, male soldiers had about twice the risk as female soldiers.

"The most important thing to come out of this study is the really reassuring news that under conditions of universal precautions against dehydration and overheating, we don't see an elevation in the risk of mortality in people with sickle cell trait," Kurina says.

—by Carol Torgan, Ph.D.

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- Study Points to Potential Treatment for Sickle Cell Disease
- When Blood Cells Bend: Understanding Sickle Cell Disease
- Sickle Cell Disease
- Rhabdomyolysis

References: Sickle Cell Trait, Rhabdomyolysis, and Mortality among U.S. Army Soldiers. Nelson DA, Deuster PA, Carter R 3rd, Hill OT, Wolcott VL, Kurina LM. *N Engl J Med.* 2016 Aug 4;375(5):435-42. doi: 10.1056/NEJMoa1516257. PMID: 27518662.

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