How common is sickle cell trait?
In the United States, sickle cell trait is most common in those of African, Middle Eastern and Mediterranean descent because of its protective effect against malaria. Sickle cell trait occurs in about 8% of the African-American population and between 0.01-0.05% of non-black Americans.

How does sickle cell trait affect athletes?
While kids with sickle cell trait generally suffer far less morbidity than those with sickle cell anemia, exercise can induce sickling in those with trait especially if the exercise is strenuous or occurs at altitude. There are 4 major factors that contribute to sickling during exercise: hypoxemia, hyperthermia, metabolic acidosis and dehydration of the red blood cells. Once sickled, red blood cells can occlude small vessels causing tissue ischemia. This can lead to problems such as splenic infarct, exertional rhabdomyolysis and sickle collapse. Rarely, sudden death may occur from severe rhabdomyolysis-induced renal failure, electrolyte disturbance and cardiac arrhythmia.

Most common symptoms of sickling
• Shortness of breath
• Fatigue
• Muscle pain or weakness (most commonly legs, buttocks and low back)
• The feeling that the athlete simply can’t go any further

How should sickling in the athlete be treated?
• Stop activity
• Give oxygen
• Check vital signs
• Cool the athlete, if necessary

If improvement is not noted immediately or athlete is unresponsive:
• Call 911
• Start CPR including using an AED if available
• Get the athlete to the hospital as quickly as possible

How prevalent are these complications?
It is hard to know for sure as there is limited data. Sickle cell trait has been shown to increase the risk of exercise-related death about 30-fold in military recruits, and been linked to at least 15 deaths in college football players as well as a handful of junior and high school athletes. Other complications such as exertional rhabdomyolysis and sickle collapse may be confused with muscle cramping or heat illness and therefore are even harder to estimate.

Can sickling complications be prevented?
It is important that athletes know the symptoms and take precautions to minimize complications. However, not all athletes are aware that they have this condition. All states now test for sickle cell disease during the newborn screen and physicians should obtain these records and discuss them with the athlete at their pre-participation physical examination. If records are unavailable and status is unknown, testing should be considered at that time. Some groups, including the American Society of Hematology, believe that universal screening is unwarranted because of a lack of scientific evidence that it will save lives and a fear that testing may unfairly stigmatize those with the disease. Instead, they prefer the implementation of precautionary measures that can be utilized for all athletes regardless of sickle cell status. Precautions include: participation in off-season conditioning programs; gradually increasing training load; allowing athletes to set their own pace; and stopping activity at the onset of symptoms.

How are complications most likely to occur?
The harder and faster athletes run, the more problems they can have. Sickling tends to increase with longer distances or with successive bursts of activity without an adequate rest period such as during repeated sprints or sustained weightlifting. Symptoms have more commonly been reported during practices than games, especially during the first few days of pre-season conditioning in the summer when the heat and humidity are high and athletes are deconditioned. Participation in sports at high altitude also significantly increases the risk of sickling.
Sickle cell trait

What is sickle cell trait?
Sickle cell trait is an inherited, genetic problem resulting in abnormal production of a substance called hemoglobin. Hemoglobin helps red blood cells carry oxygen around the body. In sickle cell trait, abnormal hemoglobin causes some of the red blood cells to change their shape (from round to crescent or sickle shape) and makes it more difficult for them to move around the body and deliver oxygen. It is related to, but not as serious as, sickle cell anemia.

How common is it?
In the United States, sickle cell trait most often affects those of African, Middle Eastern and Mediterranean ancestry. It affects about 1 out of every 12 African-Americans and around 1 in 10,000 non-black Americans.

How can you tell if an athlete has sickle cell trait?
Most of the time, you can’t, at least not by looking at them. In fact some athletes themselves are unaware that they have the condition. While sickle cell trait can cause symptoms with exercise under certain circumstances, there are many athletes at all levels of sports that have this problem and are able to compete successfully. However, it is important for athletes to be aware of their sickle cell status to help prevent complications. All babies in this country are now tested for sickle cell disease so parents and athletes should check with their doctor if they are unsure. If these records are unavailable there are other blood tests that can be done to make the diagnosis.

What kind of problems can athletes with sickle cell trait have?
Exercise, especially if it is intense or performed at high altitude, can cause red blood cells to change their shape (called sickling). When this happens, the red blood cells can get clogged in small blood vessels throughout the body and can’t deliver oxygen to the tissues of the body very well. Sickling can damage an organ called the spleen, and lead to muscle breakdown which can cause the athlete to feel weak and collapse. In extreme circumstances, the byproducts of this muscle breakdown can produce kidney failure and heart rhythm problems which cause the athlete to die suddenly.

When are these problems most likely to occur?
• During bouts of repeated activity such as weightlifting or running sprints
• When adequate rest isn’t given between activities
• At high altitude

What are the most common symptoms of sickling?
• Shortness of breath
• Fatigue
• Muscle pain or weakness (most commonly legs, buttocks and low back)
• The feeling that the athlete simply can’t go any further

How should sickling in the athlete be treated?
• Stop activity  • Give oxygen
• Check vital signs  • Cool the athlete, if necessary
If improvement is not noted immediately or athlete is unresponsive:
• Call 911
• Start CPR including using an AED if available
• Get the athlete to the hospital as quickly as possible

What precautions can be taken to prevent sickling in the athlete?
• Take part in preseason strength and conditioning programs to maintain fitness
• Gradually increase exercise when starting to train
• Allow periods of rest between repetitive exercises
• Let athletes set their own pace during workouts
• Avoid performance tests such as mile runs and serial sprints
• Do not workout when feeling ill
• Do not exercise during periods of extreme heat and humidity
• Stay hydrated
• Be cautious when working out at high altitude and have oxygen available
• STOP activity if symptoms develop
• Teach coaches about the signs of sickling and encourage them to have athletes report symptoms immediately

Sports Shorts is provided by the Home and School Committee of the Ohio Chapter, American Academy of Pediatrics

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This information is available on the Ohio AAP website www.ohioaap.org