

with other mutant globin.

SCD is one of the most common genetic diseases worldwide, affecting approximately 100,000 Americans, including other nationalities, such as Africans, Hispanics, Italians, Greeks, Iranians, Turks, and individuals of Arab, Caribbean, Asian Indian descent, and other ethnic groups. The incidence of the disease varies in different geographic locations. Among African Americans, the incidence of sickle cell trait is about 8%, whereas among inhabitants of West Africa, the incidence is reported to be as high as 40%. The high incidence of sickle cell trait in West Africans is believed by some to be the result of selective protection afforded trait carriers against one type of malaria.

The gene that determines the production of HbS is situated on an autosome and, when present, is always detectable and therefore dominant. Heterozygous persons who have both normal HbA and abnormal HbS are said to have **sickle cell trait**. Persons who are homozygous have predominantly HbS and have SCA. The inheritance pattern is essentially that of an autosomal recessive disorder. Therefore, when both parents have sickle cell trait, there is a 25% chance with each pregnancy of producing an offspring with SCA.

Although the defect is inherited, the sickling phenomenon is usually not apparent until later in infancy because of the presence of fetal Hgb (HbF). As long as the child has predominantly HbF, sickling does not occur because there is less HbS. Newborns with SCA are generally asymptomatic because of the protective effect of HbF (60% to 80% HbF), but this rapidly decreases during the first year, so these children are at risk for sickle cell–related complications ([Driscoll, 2007](#); [Ellison, 2012](#); [Heeney and Dover, 2009](#); [Meier and Miller, 2012](#)).

## **Pathophysiology**

The clinical features of SCA are primarily the result of (1) obstruction caused by the sickled RBCs with other cells, (2) vascular inflammation, and (3) increased RBC destruction ([Fig. 24-2](#)). The abnormal adhesion, entanglement, and enmeshing of rigid sickle-shaped cells accompanied by the inflammatory process intermittently blocks the microcirculation causing vasoocclusion ([Fig. 24-3](#)). The resultant absence of blood flow to adjacent tissues