



Newborn Screening ACT Sheet

[Hemoglobin FS]

Hemoglobin S/S or Hemoglobin S/Beta Zero Thalassemia (Hb S/S or HbS/β⁰ Thalassemia)

Differential Diagnosis: Homozygous Hemoglobin S; Hemoglobin S/Beta Zero (β^0) Thalassemia); Hemoglobin S/Beta Plus (β^+) Thalassemia; Hemoglobin S/Hereditary Persistence of Fetal Hemoglobin (HPFH).

Condition Description: Hemoglobin S/S and Hemoglobin S/ β^0 Thalassemia are inherited red blood cell disorders characterized by abnormal hemoglobin production. They are due to genetic changes in the beta hemoglobin gene. Although asymptomatic at birth, symptoms begin as Hb F decreases and Hb S predominates. The clinical course is highly variable, ranging from asymptomatic to life-threatening infections, strokes, acute chest syndrome, end organ damage, and pain crises. Hb S/HPFH is clinically benign.

You Should Take the Following Actions:

- Inform the family of the newborn screening result.
- Ascertain clinical status (newborns are expected to be asymptomatic).
- Evaluate the newborn (assess for splenomegaly and send CBC).
- Administer prophylactic penicillin.
- Consult with sickle cell specialist immediately with in person follow up by no later than 12 weeks of age.
- Coordinate confirmatory diagnostic testing and management as recommended by specialist.
- Provide family with basic information about Hemoglobin S/S or Hemoglobin S/Beta Zero (β^0) Thalassemia including the need for urgent evaluation if fever of $\geq 38.5^{\circ}$ C (101°F), or signs of stroke or splenic sequestration.
- Refer for genetic counseling.
- Report final diagnostic outcome to newborn screening program.

Diagnostic Evaluation: The hemoglobins are listed in order of the amount of hemoglobin present on the newborn screen (F>S). **Isoelectric focusing, high performance liquid chromatography (HPLC) or capillary zone electrophoresis** is used to confirm the newborn screening result. **Complete blood count:** the CBC, smear and reticulocyte count may be normal at birth but over the first months of life demonstrate a worsening anemia, with an increasing reticulocyte count and sickle cells on smear. **Molecular genetic testing** is required to distinguish Hb S/S, Hb S/ β ⁰ Thalassemia, and Hb S/HPFH, and to characterize the specific Thalassemia variant present.

Clinical Considerations: Newborns with Hemoglobin S/S are generally asymptomatic. Hemolytic anemia and vaso- occlusive complications can develop during infancy or in early childhood. Without appropriate treatment, complications may include life-threatening infection, splenic sequestration, pneumonia, acute chest syndrome, pain episodes, aplastic crises, dactylitis, priapism, osteonecrosis, and stroke. Comprehensive care including family education, a modified immunization schedule, prophylactic penicillin, therapeutic interventions such as hydroxyurea, prompt treatment of acute vaso-occlusive events, and screening for early signs of organ damage reduces morbidity and mortality. Most newborns with HbS/ β^0 Thalassemia have a clinical course similar to Hb S/S. Hb S/HPFH is typically benign. Solubility testing (Sickledex) should not be used to confirm the diagnosis. Iron supplements should be avoided unless iron deficiency is documented.

Referral (local, state, regional, and national):

Children's of Alabama Pediatric Hematology 1600 7th Avenue South, ACC 512 Birmingham, AL 35233 Phone: (205) 638-2390

St. Jude's Clinic at Huntsville Hospital Pediatric Hematology 910 Adams Street, Suite 310 Huntsville, AL 35801 Phone: (256) 265-5833 or 1-866-595-5449 University of South Alabama Sickle Cell Center Pediatric Hematology 1504 Springhill Avenue, Suite 5230 Mobile, AL 36604

Phone: (251) 415-5172 or (251) 405-5147

This practice resource is designed primarily as an educational resource for medical geneticists and other clinicians to help them provide quality medical services. Adherence to this practice resource is completely voluntary and does not necessarily assure a successful medical outcome. This practice resource should not be considered inclusive of all proper procedures and tests or exclusive of other procedures and tests that are reasonably directed to obtaining the same results. In determining the propriety of any specific procedure or test, the clinician should apply his or her own professional judgment to the specific clinical circumstances presented by the individual patient or specimen. Clinicians are encouraged to document the reasons for the use of a particular procedure or test, whether or not it is in conformance with this practice resource. Clinicians also are advised to take notice of the date this practice resource was adopted, and to consider other medical and scientific information that becomes available after that date. It also would be prudent to consider whether intellectual property interests may restrict the performance of certain tests and other procedures.