Sickle Cell Disease and Other Hemoglobinopathies: Newborn Screening and Beyond

Satellite Conference and Live Webcast
Friday, March 24, 2017
1:00 – 3:00 p.m. Central Time

Produced by the Alabama Department of Public Health
Distance Learning and Telehealth Division

Faculty

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Disclosures

- **Medical Consultant and Speaker Bureau for Novartis Pharmaceuticals, Inc.**
- **Grant funding from the Children's Oncology Group**
- **Grant funding from the Alabama Department of Public Health**

Disclosures

- **Clinical trial agreement with Selexys Pharmaceuticals Corporation with Quintiles providing clinical research organization services**
- **I will discuss off label use and investigational uses**

Purpose of NBS

- **To ensure early identification and follow up of infants affected with certain genetic, metabolic, hormonal, or functional conditions**
- **These infants may appear healthy at birth but have a medical condition that when untreated may lead to**
  - **Severe intellectual disability**
  - **Developmental disabilities**

Purpose of NBS

  - **Premature death**
- **60,000 babies are screened each year**

Why Do We Screen?

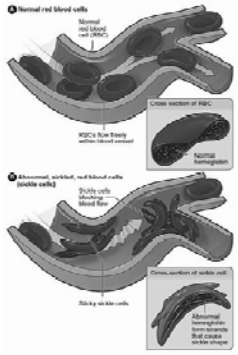
- Public Health Laws of Alabama state that each infant ≤ 28 days of age, will be tested for inheritable diseases and conditions as designated by the state board of health

Why Do We Screen?

- The state board of health shall put law into effect to provide for the care and treatment of those newborn infants whose tests are determined positive

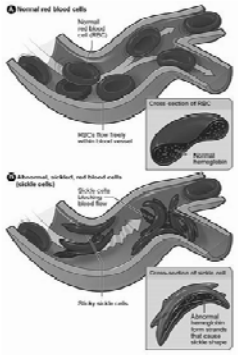
Sickle Cell Disease

- SCD is a genetic blood disorder that affects the hemoglobin protein inside of red blood cells that carries oxygen throughout the body.
- Normal red blood cells are flexible and flow freely within a blood vessel. They last an average of 120 days in the bloodstream.



Sickle Cell Disease

- Sickle cells are rigid and tend to stick to the blood vessel which blocks blood flow to areas of the body. They last an average of 19 days in the bloodstream.
- This abnormality can result in chronic anemia, serious infections, severe painful episodes, strokes, damage to body organs, and early death.



Types of SCD

- HbSS - People who have this form of SCD inherit two sickle cell genes (“S”), one from each parent. This is commonly called *sickle cell anemia and is usually the most severe form of the disease.*
- HbSC - People who have this form of SCD inherit a sickle cell gene (“S”) from one parent and from the other parent a gene for an abnormal hemoglobin called “C”. Hemoglobin is a protein that allows red blood cells to carry oxygen to all parts of the body. This is usually a milder form of SCD.

Types of SCD

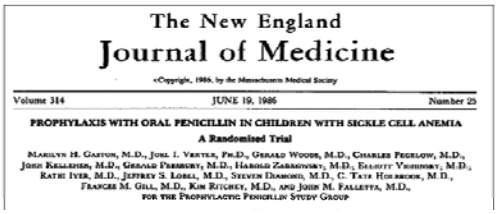
- HbS beta thalassemia - People who have this form of SCD inherit one sickle cell gene (“S”) from one parent and one gene for beta thalassemia, another type of anemia, from the other parent. There are two types of beta thalassemia: zero “0” and plus “+”. Those with HbS beta 0-thalassemia usually have a severe form of SCD. People with HbS beta +-thalassemia tend to have a milder form of SCD.

Types of SCD

- HbSD, HbSE, and HbSO - These are a few rare types of SCD. People who have these forms of SCD inherit one sickle cell gene ("S") and one gene from an abnormal type of hemoglobin ("D", "E", or "O"). Hemoglobin is a protein that allows red blood cells to carry oxygen to all parts of the body. The severity of these rarer types of SCD varies.
- HbS HPFH - Usually do not have sickle related problems

NBS for Sickle Cell Disease

- NBS is one of Alabama's most important and effective public health programs
- Screening for sickle cell disease (SCD) began in 1988
- In the 1970s, the average lifespan was 14 years
- The Cooperative Study of SCD initiated by the National Institutes of Health in 1978, found that the major cause of death was sepsis due to *Streptococcus pneumoniae*



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PROPHYLAXIS WITH ORAL PENICILLIN IN CHILDREN WITH SICKLE CELL ANEMIA
A Randomized Trial

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FOR THE PROPHYLACTIC PENICILLIN STUDY GROUP

- 84% reduction is sepsis and death due to penicillin prophylaxis and a 90% probability of surviving into adulthood
- This was the greatest impetus for widespread implementation of NBS for SCD
- Immunizations also play an important role

The SUSTAIN Study Overview

- In this yearlong trial involving patients with sickle cell disease, crizanlizumab, an antibody to P-selectin, was associated with a 45% lower rate of pain crises than placebo and a longer time to their onset
- Adverse events included arthralgia, diarrhea, and pruritus

The NEW ENGLAND JOURNAL of MEDICINE

Conclusions

- In patients with sickle cell disease, crizanlizumab therapy resulted in a significantly lower rate of sickle cell-related pain crises than placebo and was associated with a low incidence of adverse events