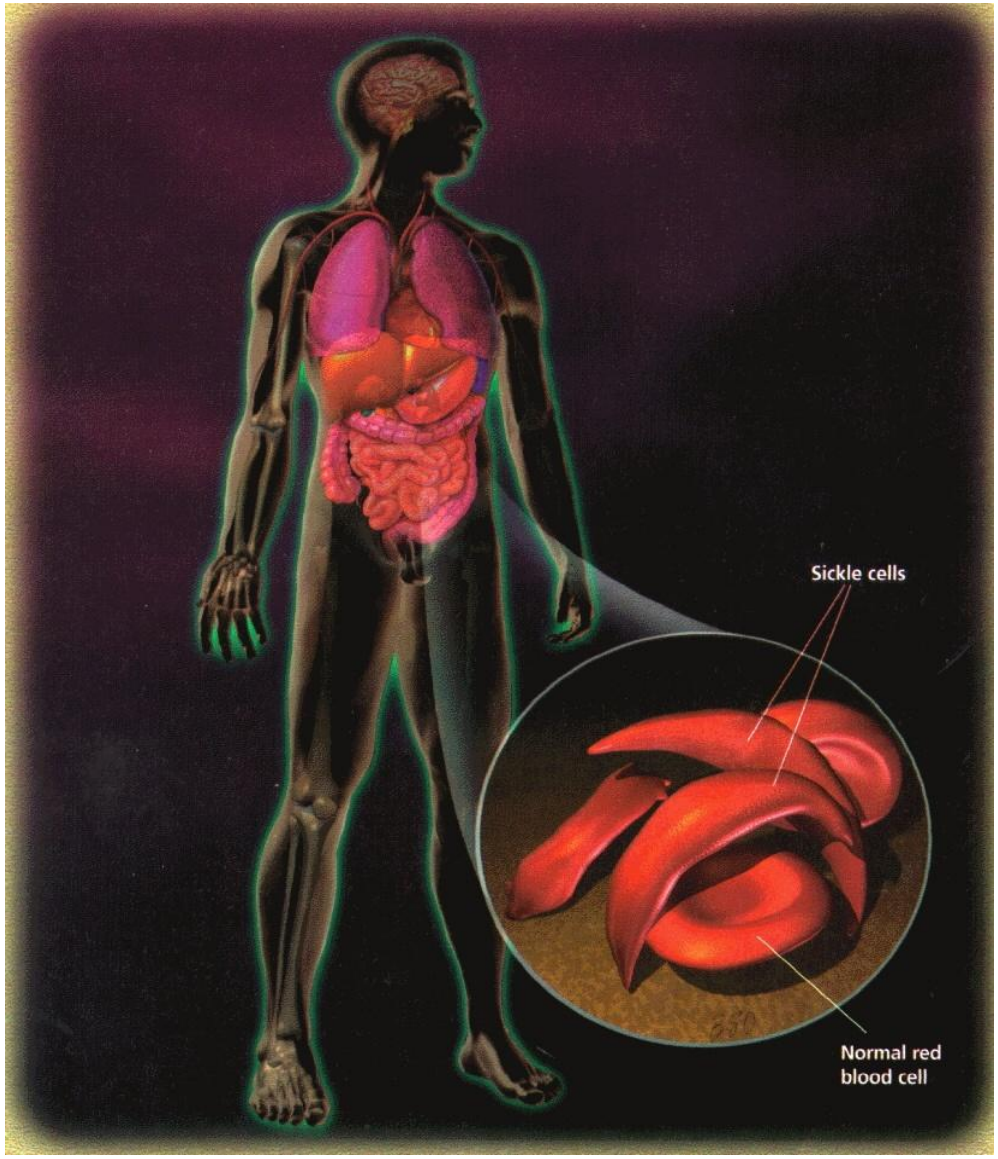
SICKLE CELL ANEMIA
PEDIATRIC PROGRESS

- Mark Heiny, M.D., Ph.D.
- Riley Pediatric Sickle Cell Program
- (317) 944-9684
- mheiny@iupui.edu

Sickle Hemoglobin – trait & disease

- 10,000 yrs ago a Hgb mutation occurred in Africa that protected against malarial infection
  - This survival advantage gradually increased the gene frequency
  - Then there were two people with Sickle trait…
- 10% of African Americans have Sickle trait
  - 1 in 500 AA babies are born with SC DISEASE
  - 100,000 total Americans have SCD (CDC est)


Sickle cells
Normal red blood cell

Milestones - Lab

- 1910 - Herrick - description of sickle cells
- 1940 - Sherman - low O2 sickling (trait)
- 1950 - Pauling - Hgb S by EP
- 1957 - Ingram - single AA mutation IDed
- 1960 - Perutz - Hgb crystal structure

Milestones - Clinical

- 1978 - Pneumovax (polysaccharide)
- 1986 - PCN prophylaxis
- 1987 - Hemophilus vaccine (HiB)
- 1990 - Bone marrow transplant (selected pts)
- 1995 - Hydroxyurea trial for adults (Hgb F)
- 1998 - STOP trial, TCD U/S for stroke prev
- 2000 - Prevnar (conjugated Pneumococcal)
- 2011 – Baby HUG study (HU at 9-18 mos)

Newborn Screening for SCD

- Done in most states since the 1980s
- Screen for disorders where early ID can lead to improved health outcomes
- Hemoglobin electrophoresis separates hemoglobin chains with charge differences (Hgbs F/A/S/C)
- Absence of normal Hgb (Hgb A) and presence of sickle Hgb (Hgb S)
- EARLY intervention (PCN) and education

Progress in SCD

- Infection - PCN, immunizations
- Fetal Hgb induction - Hydrea and others
- Stroke screening - TCD U/S
- Silent Strokes - SIT trial
- RBC transfusion - erythrocytapheresis
- Iron chelation - oral medications
- Stem cell transplant

Not useful acutely

Common Lab Values as Predictors of SCD Severity

- **HIGH INCIDENCE**
  - Hgb S/S type (~2X)
  - Hgb < 7 g/dl (2.6X)
  - Elevated Retic %
  - High baseline WBC#
  - [Dactylitis < 1 yr of age (2.6X, NEJM 2000;342: 83-89)]
- **LOW INCIDENCE**
  - Hgb S/C (incr Hgb)
  - Hgb S/ß+ thal (Hgb A)
  - Presence of alpha-thal
  - High fetal Hgb level

PAIN EPIDEMIOLOGY

(CSSCD data, Platt et al., NEJM 1991, 325:11)

- 38%: NO pain in a five yr period
- 5%: 3 to 10 painful crises per yr
  - This accounted for 33% of all pain episodes
- Starts as early as 6 to 9 mos of age
  - Probably related to decline in fetal Hgb
- Peaks in adolescence
  - Adults with more pain have highest mortality

Improving SCD Mortality

- 1970s – SCD patients ave lifespan was 14 yrs
  - Before PCN, 20% of children died from infection
- 2000 (Prevnar) – 42% decr in deaths of SCD pts < 4 yrs old
- Comparing mortality in 1983-86 vs 1999-2002,
  - Decreased 68% for 0-3 yrs, 39% for 4-9 yrs, 24% for 10-14 yrs
- Current mortality estimates <1% of children die in the first 3 yrs of life, 94% survive to 18 yrs, and live to 48 yrs female/42 yrs males

HOPE

(Hertz Nazaire, patient/artist, NY)