

Advisory Committee on Heritable Disorders in Newborns and Children



Carrier Screening for Sickle Cell Disease
Friday, January 22, 2010

Lanetta B. Jordan, M.D., M.P.H., M.S.P.H.
Chief Medical Officer
Sickle Cell Disease Association of America, Inc.

June 2007 “Sickle Cell Trait and The Athlete” Consensus Statement Released by National Athletes Trainer’s Association (NATA)

June 2009 NCAA recommends member institutions test student athletes

December 2009 - SCDA, CDC, HRSA, NIH, host Scientific and Public Health Implications of Sickle Cell Trait

June 2008 – SCDA responds to NATA - Not supportive of the NATA Consensus Statement

June 2009 – current - SCDA National and Member Organizations receive increased calls and request for screening recommendations

October 2009 AAP News J. Hord and S. Rice Commentary on NCAA recommendation

Scientific & Public Health Implications of Sickle Cell Trait

December 17, 2009

PARTNERS

Sickle Cell Disease Association of America, Inc.
Centers for Disease Control and Prevention
Health Resources and Services Administration
National Heart, Lung and Blood Institute - NIH

Meeting Focus:

Epidemiological Research with emphasis on
Services, Policy and Cost Effectiveness of
Sickle Cell Carrier Screening.

PRESENTATION OUTLINE

- State of the Evidence for Health Outcomes Associated with Sickle Cell Trait
- Screening, Follow-up and Health Education for Sickle Cell Trait
- Ethics, Stigma and Discrimination
- Sickle Cell Disease Association of America Recommendations

Hemoglobinopathy Heterozygous Variants

Carrier Status

Hb AS

Hb AC

Hb AD

Complications Associated with Sickle Cell Trait

(Amoateng-Adjepong 2009)

300 million people worldwide and 3 million USA Carriers

Exclusively associated

- rare but often fatal renal medullary cancer

Cumulative evidence convincing for associations

- hematuria
- renal papillary necrosis
- hyposthenuria
- splenic infarction
- exertional rhabdomyolysis
- exercise related sudden death

Probably associated

- complicated hyphema
- venous thromboembolic events
- fetal loss
- neonatal deaths
- preeclampsia

Possibly associated

- acute chest syndrome
- asymptomatic bacteriuria
- anemia in pregnancy

State of the Evidence for Health Outcomes Associated with Sickle Cell Trait

Assessment of Significant Relative Risk

Retrospective Analysis (1977 – 1981)

Non-traumatic deaths

2 million military recruits

AA Recruits with HbS (N=13 deaths)	RR 30
------------------------------------	-------

AA and other Recruits without HbS (N=5 deaths)	RR 3
--	------

AA = African American
RR = Relative Risk

Reference – J. Kark

State of the Evidence for Health Outcomes Associated with Sickle Cell Trait

Assessment of Significant Relative Risk?

Intervention Trial (1982 – 1991)

Endpoint = Prevent Exercise Related Death

1.8 million basic training recruits

Intervention = Strict protocol to prevent exercise health illness/injury

Outcome = Not one of the 13 predicted deaths occurred

State of the Evidence for Health Outcomes Associated with Sickle Cell Trait

Assessment of Significant Relative Risk

Intervention Trial (1982 – 1991)

Conclusions

- 1) Prevention of exercise related death did not require identification of sickle cell trait, as prevention, diagnosis, and treatment of exercise heat related illness/injury are unrelated to hemoglobin type;
- 2) Exertional heat illness is a preventable factor contributing to sudden exercise related death in persons with sickle cell trait.

State of the Evidence for Health Outcomes Associated with Sickle Cell Trait

Assessment of Significant Relative Risk

Evolving Military Policy (1960 – current)

Conclusions

- 1) Evidence supports sickle cell trait as an increased risk for exertional health illness or injury, likely with contribution from still unidentified genetic polymorphisms;
- 2) Sickle cell trait does not exclude military personnel from duty in the Army; Air Force, Navy and Marines screen for certain military occupations;
- 3) Preventive measures can reduce exertional health illness or injury

Screening, Follow-up, Health Education

Reporting Process US Newborn Screening Programs

- Clinically significant results reported to physician
- Carrier/trait reporting findings:
 - 48 states report to Primary Care Physicians
(exceptions, FL, GA, LA, NJ)
 - 27 report to birthing hospital
 - 17 report directly to families
 - 12 use SC CBO organization
 - 6 notify hematologists

Screening, Follow-up, Health Education

- 2006 Universal Hemoglobinopathy Screening of Newborns (90% of all newborns screened since 1993)
Screening for Disease

Screening to identify confirmed cases to initiate medical care, vaccination against *S. pneumoniae*, *H. influenzae* type b, *Meningococcus* type c infections, educate parents on health maintenance and health risks;

Carrier Screening - screening in asymptomatic individuals for genetic pre-disposition for disease/condition (no longer benign)

- Carrier Status
 - State variability in carrier status recording of test results and parental notification;
- Lack of agreed upon clinical evidence defining health risks associated with carrier status, cost / benefit challenge?

Carrier/Trait Re-Screening, Follow-up, Health Education

COST

- 400,000 collegiate athletes
- 8 million high school athletes

Sickledex test is inappropriate screening test

Hemoglobinopathy electrophoresis

College	\$20,000,000
High school	\$400,000,000

Such costs will likely result in re-screening of targeted groups

Carrier/Trait Re-Screening, Follow-up, Health Education

- Referral process
Experienced professional resources are available. Genetic and Family Planning Counseling
- Consent (informed and voluntary participation) is obtained.
- Potential benefits and risks of carrier testing are communicated before and after the test.
- Privacy is protected.
- Stigmatization of the carrier by the community is minimized.
- Long-term follow up mechanism
- Record maintenance and access

Carrier Screening Ethics, Discrimination and Stigmatization

- Beneficence
 - Moral obligation to act for the benefit of others?
- Non-maleficence
 - Unintentional discrimination/bias
 - Potential for racialization and stigmatization
 - Workforce discrimination
 - Health insurance discrimination
- Privacy (HIPAA)
 - Informed Consent
 - Voluntary
 - Respect for individual's right
- Justice
 - All individuals are treated equally and fairly

Carrier Screening Ethics, Discrimination and Stigmatization

Inaccurate Pamphlets Hit

Sickle Cell Disease 'Ghetto Hustle' Cited

By HENRY W. PIERCE
Post-Gazette Staff Writer

The current concern over sickle cell disease may undermine efforts to combat the condition, the vice chairman of the National Association for Sickle Cell Disease warned here yesterday.

Dr. Charles F. Whitten told a University of Pittsburgh audience that:

► Sickle cell fund-raising has turned into a "ghetto hustle" in many places. He told of a woman who had placed money in a can labeled "sickle cell fund," only to find that the solicitor and his

their children, but they do not have any symptoms of their own."

Genetic Information Non-Discrimination Act of 2008 (GINA)

To prohibit discrimination on the basis of genetic information with respect to health insurance and NOTE: May 21, 2008 - [H.R. 493] employment.

Although genes are facially neutral markers, many genetic conditions and disorders are associated with particular racial and ethnic groups and gender. Because some genetic traits are most prevalent in particular groups, members of a particular group may be stigmatized or discriminated against as a result of that genetic information. This form of discrimination was evident in the 1970s, which saw the advent of programs to screen and identify carriers of sickle cell anemia, a disease which afflicts African-Americans. Once again, State legislatures began to enact discriminatory laws in the area, and in the early 1970s began mandating genetic screening of all African Americans for sickle cell anemia, leading to discrimination and unnecessary fear. To alleviate some of this stigma, Congress in 1972 passed the National Sickle Cell Anemia Control Act, which withholds Federal funding from States unless sickle cell testing is voluntary.

GINA

It is expected that federal regulations will clarify what tests are and are not protected before GINA is fully in force.

Examples of protected tests are:

Tests for BRCA1/BRCA2 (breast cancer) or HNPCC (colon cancer) mutations

Carrier screening for disorders, such as cystic fibrosis, sickle cell anemia, spinal muscular atrophy, and the fragile X syndrome

GINA does not apply to members of the United States Military, to veterans obtaining health care through the Veteran's Administration, or to the Indian Health Service.

GINA does not include protection from genetic discrimination in life insurance, disability insurance, or long-term-care insurance

Sickle Cell Disease Association of America, Inc.

Carrier Screening Recommendations

1. Screening for a sickle cell hemoglobinopathy should be part of established universal newborn screening legislation.
2. Genetic information should be protected by HIPAA privacy laws
3. Hemoglobin testing should be done using Hemoglobin High Pressure Liquid Chromatography (HPLC)
4. Referral process where experienced and culturally competent professional resources are available to carriers.
5. Consent (informed and voluntary participation) should be obtained.
6. Potential benefits and risks of carrier testing should be communicated.
7. Stigmatization of the carrier by the community is minimized.
8. Universal precautions implemented to prevent exercise related illness/injury; thus sickle cell carrier status need not be identified.
9. Continuing professional education and awareness in all disciplines (medicine, sports, education, public health)
10. Appropriate carrier research agenda that complements sickle cell disease research

Thank you.

Questions?