

# Newborn Screening Quality Assurance Program

## PROFICIENCY TESTING

## Sickle Cell Disease and Other Hemoglobinopathies

Volume 26, No. 2

Panel 2

June 2016

### INTRODUCTION

On May 2, 2016 we distributed five dried blood spot (DBS) specimens to all active participants for the Panel 2 Sickle Cell Disease and Hemoglobinopathies Proficiency Testing (PT) event. A total of 76 panels were sent by overnight mail to 48 domestic laboratories and 28 foreign laboratories. This PT report is a compilation of data reports received from 72 laboratories by the designated deadline date.

We requested that participants assay all survey specimens by the analytical schemes they routinely use and report for each specimen the presumptive phenotype, the presumptive clinical assessment, and any other clinical classifications that they deem consistent with their analytic results and program operations.

In this panel, specimens were prepared from purchased umbilical cord blood (specimens 216H2-5) and from pooled, donor blood from babies diagnosed with sickle cell disease (Specimen 216H1). The FS donor bloods ranged in age from one month to two years and specimens were stored at either -80°C or 2 to 8°C. We tested the individual specimens by IEF, HPLC, and molecular methods to assure that each specimen had the correct FS phenotype/

genotype before the specimens were pooled and DBS prepared. All DBS in the PT panel were stored with desiccant at -20°C until shipment.

### PARTICIPANTS' RESULTS

The certification report, listing hemoglobins (Hb) by phenotype and their presumptive clinical assessments, appears on page 2. The frequency distribution of reported presumptive phenotypes (Table 1a) and clinical assessments (Table 1b) appears on page 3. Table 2 shows the number of specimens reported per method by testing tier and number of phenotype and assessment errors (page 4). The testing tier corresponds to the level of confirmatory testing. The individual data verification for each laboratory follows the acknowledgment page.

Donor blood was used to create specimen 216H1 with a phenotype of FS. In order to have the needed volume to create enough DBS for all participants, we pooled whole blood from twenty-six donors. The age of the blood and storage conditions for each specimen varied, causing some laboratories to report presence of unknown variants or hemoglobin E. We accepted a variety of clinical assessments to reflect the limitations this specimen presented to participants.

The next shipment of materials for the Sickle Cell and Hemoglobinopathies PT program will be on October 3, 2016.

### MEETINGS AND TRAINING

CDC Web based Sickle Cell Resources – New Booklet: Download and share CDC's newest resource for teachers and caregivers on sickle cell disease (SCD): Tips for Supporting Students with Sickle Cell Disease. At: [http://www.cdc.gov/ncbddd/sicklecell/documents/tipsheet\\_supporting\\_students\\_with\\_scd.pdf](http://www.cdc.gov/ncbddd/sicklecell/documents/tipsheet_supporting_students_with_scd.pdf)

The 2015 guidance document by the CDC-supported, APHL Hemoglobinopathy Laboratory Workgroup, "Hemoglobinopathies: Current Practices for Screening, Confirmation and Follow-up" can be downloaded at [http://www.aphl.org/AboutAPHL/publications/Documents/NBS\\_HemoglobinopathyTesting\\_122015.pdf](http://www.aphl.org/AboutAPHL/publications/Documents/NBS_HemoglobinopathyTesting_122015.pdf)

SCDAA 44th Annual Convention Sept 27 – Oct 1 Baltimore MD - <http://www.sicklecelldisease.org/index.cfm?page=annual-convention>

### ACKNOWLEDGMENTS

The specimens for this program were prepared from umbilical cord blood samples supplied by Cleveland Cord

CDC/APHL

This program is cosponsored by the Centers for Disease Control and Prevention (CDC) and the Association of Public Health Laboratories (APHL).

Direct inquiries to:  
Centers for Disease Control and Prevention (CDC)  
4770 Buford Highway, NE, MS/F19  
Atlanta, GA 30341-3724

Phone: 770-488-7897  
FAX: 770-488-4255  
E-mail: [iwilliams1@cdc.gov](mailto:iwilliams1@cdc.gov)

Editor: Joanne V. Mei  
Irene Williams



Blood Center, Cleveland, Ohio; CORD:USE Cord Blood Bank, Orlando, FL; Carolinas Cord Blood Bank, Raleigh, NC), and Life Line Stem Cell, New Haven, IN. Patient specimens were provided by Children's Hospital Oakland Research Institute (CHORI).

**Newborn Screening Quality Assurance Program  
Sickle Cell Disease and Other Hemoglobinopathies**

***Specimen and Lab Certification***

Year: 2016 Panel: 2

**Presumptive Clinical Phenotypes**

	<b>Specimen 216H1</b>	<b>Specimen 216H2</b>	<b>Specimen 216H3</b>	<b>Specimen 216H4</b>	<b>Specimen 216H5</b>
<b>Expected Presumptive Phenotype</b>	FS	FA	FA	FA	FAS
<b>Accepted Presumptive Phenotypes</b>	FS, FSU				

**Presumptive Clinical Assessments**

	<b>Specimen 216H1</b>	<b>Specimen1 216H2</b>	<b>Specimen 216H3</b>	<b>Specimen 216H4</b>	<b>Specimen 216H5</b>
<b>Expected Presumptive Clinical Assessment</b>	04	01	01	01	02
<b>Accepted Presumptive Clinical Assessments</b>					

**NORMAL HEMOGLOBIN PATTERN**

- 01 Normal - no abnormal Hb found
- 02 Hemoglobin S carrier
- 03 Hemoglobin C carrier
- 08 Hemoglobin D carrier
- 09 Hemoglobin E carrier

**SICKLE CELL DISEASES**

- 04 Hemoglobin SS disease (Sickle cell anemia)
- 05 Hemoglobin SC disease
- 06 Hemoglobin SD disease
- 12 Hemoglobin SE disease

**OTHER REPORTABLE FINDINGS**

- 16 Alpha thalassemia (Bart's Hb)
- 18 Hemoglobin E, E disease
- 19 Fast or aging bands (clinically insignificant)
- 20 Assessment not listed
- 21 Unsatisfactory sample
- 22 Unidentified variant carrier

# Newborn Screening Quality Assurance Program Hemoglobinopathies Proficiency Testing Program

Panel 2 - JUNE 2016

Table 1a. Frequency distribution of participant reported presumptive clinical phenotype

Specimen ID	Participant Reported Presumptive Clinical Phenotype	Frequency	#Correctly Classified	#Mis-Classified	#Data Not Reported
216H1	FS	44	44	0	2
	FSS	1	1	0	
	SS	1	1	0	
	FSV	7	7	0	
	FSU	3	3	0	
	FSE	6	6	0	
	FAS	5	0	5	
	FSA	6	6	0	
SAFV	1	0	1		
216H2	FA	74	74	0	2
216H3	FA	74	74	0	2
216H4	FA	73	73	0	2
	FAS IND	1	0	1	
216H5	FAS	71	71	0	2
	AS	1	1	0	
	FS	1	0	1	
	FA	1	0	1	

Table 1b. Frequency distribution of participant reported presumptive clinical assessments

Specimen ID	Participant Reported Presumptive Clinical Assessment	Frequency	#Correctly Classified	#Mis-Classified	#Data Not Reported
216H1	04 - Hemoglobin SS Disease	52	52	0	2
	12 - Hemoglobin SE Disease	5	5	0	
	20 - Assessment not listed	5	3	2	
	22 - Unidentified Variant Carrier	1	1	0	
	02 - Hemoglobin S Carrier	11	0	11	
216H2	01 - Normal	74	74	0	2
216H3	01 - Normal	74	74	0	2
216H4	01 - Normal	73	73	0	2
	02 - Hemoglobin S Carrier	1	0	1	
216H5	02 - Hemoglobin S Carrier	72	72	0	2
	04 - Hemoglobin SS Disease	1	0	1	
	01 - Normal	1	0	1	

LIST OF PRESUMPTIVE CLINICAL ASSESSMENT CODES		
01 Normal - No abnormal HGB found		<b>NORMAL</b>
02 Hemoglobin S carrier 03 Hemoglobin C carrier 08 Hemoglobin D carrier 09 Hemoglobin E carrier		HEMOGLOBIN VARIANT CARRIERS
04 Hemoglobin SS disease (Sickle cell anemia) 05 Hemoglobin SC disease 06 Hemoglobin SD disease 12 Hemoglobin SE disease		SICKLE CELL DISEASES
16 Alpha thalassemia (Bart's Hb) 18 Hemoglobin E, E disease 19 Fast or aging bands (clinically insignificant) 20 Assessment not listed 21 Unsatisfactory sample. 22 Unidentified variant carrier		OTHER REPORTABLE FINDINGS

Table 2. Number of samples reported per method by testing level

Testing Level	Method Code	Method	# Samples	# Phenotype Errors**	# Assessment Errors
1	04	Isoelectric focusing	139	5	8
	10	Bio-Rad Screening HPLC	191	2	3
	12	Other*	10	0	0
	14	Primus Ulta <sup>2</sup> HPLC	30	2	5
2	01	Electrophoresis- Cellulose Acetate	5	0	0
	04	Isoelectric focusing	68	5	7
	10	Bio-Rad Screening HPLC	39	0	0
	11	Extended Gradient HPLC	7	0	0
	12	Other*	12	0	1
	13	PCR Amplification of DNA	2	0	0
3	14	Primus Ulta <sup>2</sup> HPLC	14	0	0
	02	Electrophoresis- Citrate Agar	7	0	0
	04	Isoelectric focusing	1	0	0
4	13	PCR Amplification of DNA	1	0	0
	10	Bio-Rad Screening HPLC	2	0	0

\*Methods are designated as "Other" when less than 3 participants report results for a given method. Currently, those methods include:

IEC-HPLC  
MS/MS

Capillars - ALERE  
Sebia capillars Neonat Haemoglobin

This **NEWBORN SCREENING QUALITY ASSURANCE PROGRAM** report is an internal publication distributed to program participants and selected program colleagues. The laboratory quality assurance program is a project cosponsored by the **Centers for Disease Control and Prevention (CDC)** and the **Association of Public Health Laboratories**.

**CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)**  
**ATLANTA, GA 30341**

**Director**

Thomas R. Frieden, M.D., M.P.H.

**Director**

**National Center for Environmental Health**

Patrick Breyse, Ph.D.

**Director**

**Division of Laboratory Sciences**

James L. Pirkle, M.D., Ph.D.

**Chief**

**Newborn Screening and Molecular Biology Branch**

Carla Cuthbert, Ph.D.



**Contributors:** Carter Asef  
Paul Dantonio  
Victor R. De Jesus, Ph.D.  
Sharon Flores  
Elizabeth M. Hall  
Christopher Haynes, Ph.D.  
Jessica Hendricks  
Kameron Khaksarfard  
Francis Lee, Ph.D.  
Lixia Li, Ph.D.  
Timothy Lim, Ph.D.  
Daniel Mandel, Ph.D.  
Joanne Mei, Ph.D.  
Gyliann Peña  
Kelsey Sheard  
Robert Vogt, Ph.D.  
Irene Williams  
Golriz Yazdanpanah  
Hui Zhou, Ph.D.  
Sherri Zobel

**Production:** Sarah Brown  
Kimberly Coulter  
Chinh Nguyen  
LoNeka Shockley

**ASSOCIATION OF PUBLIC HEALTH LABORATORIES**  
**SILVER SPRING, MD 20910**



**President**

Judith C. Lovchik, Ph.D., D(ABMM)

**Chairman, Newborn Screening and Genetics in Public Health Committee**

Susan M. Tanksley, Ph.D.

**Chairman, Newborn Screening Quality Assurance Quality Control Subcommittee**

Patricia R. Hunt, B.A. and Joseph Orsini, Ph.D.

**INQUIRIES TO:**

*Irene Williams, Editor • Centers for Disease Control and Prevention (CDC)*  
*Newborn Screening Quality Assurance Program • Mailstop F-24*  
*4770 Buford Highway, N.E. • Atlanta, GA 30341-3724*  
*Phone (770) 488-4582 • FAX (770) 488-4255 • E-mail: IWilliams1@cdc.gov*