

# Newborn Screening Quality Assurance Program

## PROFICIENCY TESTING

## Second Tier LC-MS/MS CAH Quarterly Report

Volume 5, No. 4

November 2015

### INTRODUCTION

This report is the quarterly summary of all data reported within the specified data-reporting period for Quarter 4, 2015. The attached tables provide the certification profiles for the distributed specimens, the verification of your reported data, the statistical analysis of the quantitative data, and the frequency distribution summaries for expected interpretations. We distribute this proficiency testing (PT) report to all participants, and program colleagues by request.

On October 5, 2015, a panel of five unknown dried blood spot (DBS) specimens prepared with different enrichments of five biomarkers for congenital adrenal hyperplasia (CAH) was distributed to six domestic laboratories and thirteen international laboratories. DBS specimens were prepared at 50% hematocrit.

### PARTICIPANT RESULTS

We processed data from 19 participants. Laboratories were asked to report concentrations of 17-hydroxyprogesterone (17-OHP), 4-androstenedione (4AD), cortisol, 11-deoxycortisol and 21-deoxycortisol results in ng/mL serum. For the statistical summary analysis, we did not include data that were outside the 99% confidence interval.

Nineteen laboratories reported results using tandem mass spectrometry (LC-MS/MS). Twelve of these labs also reported enzyme immunoassay (EIA) results. The expected analyte concentration values were based on CDC expected values. Overall statistics from EIA (Table 1) and LC-MS/MS (Table 2) methods were combined so as to not identify an individual laboratory.

The frequency distribution of participants' interpretations for screening results is shown in Table 3; your laboratory's

interpretations are shown on the Specimen Certification page.

Most programs use a clinical ratio to determine if samples are normal or abnormal. NSQAP uses the formula: clinical ratio =  $([17\text{-OHP}] + [4\text{-AD}]) / [\text{CORT}]$ . Samples with a calculated ratio less than the clinical ratio are considered "normal"; those samples with a calculated ratio greater than the clinical ratio are evaluated as "abnormal." Observations on participant reported LC-MS/MS cutoff values are shown in Table 4.

Expected interpretations (qualitative assessments) may differ by participant because of specific assessment practices. When the reported clinical assessment differs from our expected clinical assessment, the grading algorithm is used to evaluate test performance. An explanation of the grading algorithm can be found on the NSQAP data reporting web site or in the annual summary report. Overall, participants reported ten false-positive and no false-negative results.

All data are presented in units of ng/mL serum. Data reported in nM whole blood units were multiplied by the following factors for conversion to serum concentration: 0.66 (17-OHP), 0.57 (4-AD), 0.72 (cortisol), and 0.69 (11- and 21-deoxycortisol). In order to expedite the issuance of this report, data that are not submitted in the requested units (ng/mL serum) will not be accepted. Please contact us for guidance on conversion factors.

NSQAP will ship the next Second Tier Congenital Adrenal Hyperplasia PT specimens in January 2016. If you have any comments or questions about CAH LC-MS/MS quality assurance issues, contact Dr. Joanne V. Mei at 770-488-7945, by fax at 770-488-7459, or by e-mail at [jvm0@cdc.gov](mailto:jvm0@cdc.gov). ❖

CDC/APHL

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Table 1. Overall Statistics for 17-Hydroxyprogesterone by EIA.

**OVERALL STATISTICS - 17-HYDROXYPROGESTERONE (ng/mL Serum)  
 EIA SCREENING RESULTS**

Specimen	N	Mean	SD	%CV
415A1	12	9.23	2.80	30.34
415A2	12	9.71	3.55	36.54
415A3	12	10.33	3.08	29.84
415A4	12	74.30	17.18	23.12
415A5	12	88.85	21.62	24.33

Table 2. Overall Statistics for 17-Hydroxyprogesterone, 4-Androstenedione, Cortisol, 11-Deoxycortisol and 21-Deoxycortisol by LC-MS/MS.

**2a. OVERALL STATISTICS - 17-HYDROXYPROGESTERONE (ng/mL Serum)  
 LC-MS/MS SCREENING RESULTS**

Specimen	N	Mean	SD	%CV
415A1	16	10.80	2.53	23.38
415A2	16	11.05	2.50	22.64
415A3	16	10.90	3.47	31.82
415A4	19	80.55	18.64	23.14
415A5	19	91.28	18.93	20.74

**2b. OVERALL STATISTICS - 4-ANDROSTENEDIONE (ng/mL Serum)  
 LC-MS/MS SCREENING RESULTS**

Specimen	N	Mean	SD	%CV
415A1	16	19.07	6.87	36.02
415A2	16	19.88	5.68	28.56
415A3	16	21.17	5.07	23.95
415A4	19	23.73	7.32	30.84
415A5	19	41.65	11.79	28.30

**2c. OVERALL STATISTICS - CORTISOL (ng/mL Serum)  
LC-MS/MS SCREENING RESULTS**

<b>Specimen</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>%CV</b>
<b>415A1</b>	16	42.09	13.01	30.91
<b>415A2</b>	16	41.18	9.75	23.68
<b>415A3</b>	16	41.25	11.08	26.86
<b>415A4</b>	19	117.54	28.11	23.92
<b>415A5</b>	19	20.47	6.26	30.59

**2d. OVERALL STATISTICS - 11-DEOXYCORTISOL (ng/mL Serum)  
LC-MS/MS SCREENING RESULTS**

<b>Specimen</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>%CV</b>
<b>415A1</b>	11	6.91	6.57	95.14
<b>415A2</b>	10	5.08	1.87	36.81
<b>415A3</b>	11	8.78	10.95	124.72
<b>415A4</b>	12	4.68	2.05	43.71
<b>415A5</b>	12	12.49	4.23	33.86

**2e. OVERALL STATISTICS - 21-DEOXYCORTISOL (ng/mL Serum)  
LC-MS/MS SCREENING RESULTS**

<b>Specimen</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>%CV</b>
<b>415A1</b>	7	0.54	0.78	143.70
<b>415A2</b>	7	0.54	0.83	153.08
<b>415A3</b>	9	0.96	1.06	110.66
<b>415A4</b>	11	0.59	0.83	141.15
<b>415A5</b>	12	10.38	3.14	30.21

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Table 3. Frequency Distribution of Participant's Final Interpretations\*

Specimen	Within Normal Limits (WNL)	Outside Normal Limits (ONL)	Not Evaluated
415A1	17	2	0
415A2	17	2	0
415A3	17	2	0
415A4	15	4	0
415A5	0	19	0

\*LC-MS/MS METHOD

Table 4. Frequency of LC-MS/MS Clinical Ratio Cutoff Values

	All Laboratories	Domestic	International
MEAN	1.9	1.7	2.0
MODE	2.5	1.0	2.5
MIN	0.1	1.0	0.1
MAX	6.6	2.5	6.6

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**.

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