

Newborn Screening Quality Assurance Program

PROFICIENCY TESTING

Lysosomal Storage Disorders
Quarterly Report

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INTRODUCTION

This report is the Quarterly summary of all data reported within the specified data-reporting period for the Quarter 3, 2016, proficiency testing (PT) program for Lysosomal Storage Disorders (LSD) in dried blood spots (DBS) to detect Krabbe disease, Pompe disease, and Mucopolysaccharidosis Type I (MPS-I). The attached tables provide the certification profiles for the distributed specimens, the verification of your reported data, and the summary of reported analytical and categorical results.

On July 11, 2016 a panel of five unknown DBS specimens was distributed to seven laboratories in the United States to analyze Galactocerebrosidase (GALC) for Krabbe disease, Acid Alpha-Glucosidase (GAA) for Pompe disease, and alpha-L-iduronidase (IDUA) for MPS-I in whole blood.

PARTICIPANT RESULTS

This panel of DBS specimens were prepared from human blood, including cord blood from unaffected individuals and leuko-depleted adult blood restored with lymphoblast cells derived from patients with LSD (specimens 316L1, 316L2, 316L3, 316L4, and 316L5).

We processed data from seven participants. Laboratories were asked to report quantitative results for GALC, GAA, and IDUA in $\mu\text{mol/hr/L}$ units and qualitative results as “No follow-up required (Screen Negative)” or “Follow-up required (Screen Positive)”. A “Borderline” assessment category has also been added to more accurately assess those labs that identify milder disease forms, carriers, or pseudo deficiencies. The statistical summary analysis includes summary data for all methods.

For GALC, five laboratories reported using flow injection analysis MS/MS (FIA-MS/MS) non-kit, and one used a fluorometric method. For GAA, five laboratories reported using FIA-MS/MS, non-kit; one used LC-MS/MS and one reported using digital microfluidics. For IDUA, five laboratories reported using FIA-MS/MS, non-kit; one used LC-MS/MS and one reported using digital microfluidics.

The GALC, GAA, and IDUA expected values were based on CDC assayed values by FIA-MS/MS. The frequency distribution of participants’ interpretations for categorical results is shown in Tables 1a–c. Specimen certification information is given in Table 2 and overall method statistics for GALC, GAA, and IDUA are given in Tables 3a–c.

The all-method mean cutoff for GALC was 0.5, with a range of 0.4 to 0.6 $\mu\text{mol/hr/L}$; the all-method mean cutoff for GAA was 2.5 with a range of 0.7 to 9.0 $\mu\text{mol/hr/L}$; and the all-method mean cutoff for IDUA was 1.6 with a range of 0.8 to 3.0 $\mu\text{mol/hr/L}$.

One False-negative was reported for GALC for Specimen 316L5. No False-negatives were reported for GAA or IDUA. False-positive assessments should be monitored and kept as low as possible. Specimen 316L5 was “Not Evaluated” for IDUA.

The Newborn Screening Quality Assurance Program will ship next Quarter’s PT specimens for Krabbe, Pompe, and/or and Mucopolysaccharidosis Type I disease in January 2017.

ACKNOWLEDGMENTS

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CDC/APHL

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Table 1a. Frequency of reported Clinical Assessments
 Krabbe Disease (GALC)

Specimen Number	No follow-up required (Screen Negative)	Follow-up required (Screen Positive)
316L1	6	0
316L2	6	0
316L3	6	0
316L4	6	0
316L5	1	5

Table 1b. Frequency of Reported Clinical Assessments
 Pompe Disease (GAA)

Specimen Number	No follow-up required (Screen Negative)	Follow-up required (Screen Positive)
316L1	7	0
316L2	7	0
316L3	7	0
316L4	0	7
316L5	7	0

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Table 1c. Frequency of Reported Clinical Assessments:
 Mucopolysaccharidosis Type I (IDUA)

Specimen Number	No follow-up required (Screen Negative)	Follow-up required (Screen Positive)	Borderline
316L1	0	7	0
316L2	7	0	0
316L3	7	0	0
316L4	7	0	0
316L5*	3	1	3

*Specimen 316L5 was "Not Evaluated" for IDUA.

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Table 2. Specimen Certification

Specimen Number	Expected GALC ($\mu\text{mol/hr/L}$)	KRABBE Assessment Code
316L1	3.15	1
316L2	6.44	1
316L3	6.24	1
316L4	3.18	1
316L5	0.28	2
Specimen Number	Expected GAA ($\mu\text{mol/hr/L}$)	POMPE Assessment Code
316L1	40.92	1
316L2	14.30	1
316L3	28.21	1
316L4	0.81	2
316L5	33.84	1

1 = No follow-up required (Screen Negative) 2 = Follow-up required (Screen Positive)

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Table 2. Specimen Certification, cont.

Specimen Number	Expected IDUA (μmol/hr/L)	MPS-I Assessment Code	Acceptable Assessment
316L1	0.09	2	
316L2	14.63	1	
316L3	22.14	1	
316L4	4.66	1	
316L5*	1.97	1	3

1 = No follow-up required (Screen Negative) 2 = Follow-up required (Screen Positive)
 3 = Borderline

*Specimen 316L5 was "Not Evaluated" for IDUA.

OVERALL STATISTICS

Table 3a. Screening Results for GALC – ALL Methods

Specimen	N	Mean ($\mu\text{mol/hr/L}$)	SD	%CV
316L1	6	3.57	1.0	27.7
316L2	6	7.30	2.9	39.7
316L3	6	7.32	2.7	36.5
316L4	6	3.13	0.8	25.2
316L5	6	0.28	0.2	52.9

Table 3b. Screening Results for GAA – ALL Methods

Specimen	N	Mean ($\mu\text{mol/hr/L}$)	SD	%CV
316L1	7	26.20	21.1	80.4
316L2	7	8.87	6.6	74.6
316L3	7	16.54	14.0	84.3
316L4	7	0.42	0.5	126.3
316L5	7	22.02	14.6	66.2

Table 3c. Screening Results for IDUA - ALL Methods

Specimen	N	Mean ($\mu\text{mol/hr/L}$)	SD	%CV
316L1	7	0.58	0.7	119.8
316L2	7	10.10	5.6	55.3
316L3	7	18.11	9.2	50.9
316L4	7	4.37	1.3	29.7
316L5	7	1.79	0.9	50.6

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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