Newborn Screening Quality Assurance Program

QUALITY CONTROL MIDYEAR REPORT

Volume 20, No. 1 June 2009

INTRODUCTION

The Newborn Screening Quality Assurance Program (NSQAP), Centers for Disease Control and Prevention (CDC), distributed dried-blood-spot (DBS) quality control (QC) materials for thyroxine (T4), thyroid-stimulating hormone (TSH), 17 α-hydroxyprogesterone (17-OHP), total galactose (Gal), phenylalanine (Phe), leucine (Leu), methionine (Met), tyrosine (Tyr), valine (Val), citrulline (Cit), immunoreactive trypsinogen (IRT), and fourteen acylcarnitines (C0 high, C2, C3, C3DC, C4, C5, C5DC, C5OH, C6, C8, C10, C14, C16, C18) to laboratories operating newborn screening programs and to manufacturers of screening test products. Included with each semiannual shipment of QC specimens were instructions on how to report data using the new paperless Quality Control Data Collection (QCDC) process. A choice of either a PDF or Excel file is downloaded from the Newborn Screening website and used to send by email an electronic submission of participant QC results.

This midyear report contains a summary of the QC data submitted during the first half of 2009 by state, contract, and private laboratories in the United States; international participants; and manufacturers of screening test products.

QUALITY CONTROL MATERIALS

The QC specimen lots were provided as 6-month supplies of DBSs on filter paper. DBS QC lots were prepared from whole blood of 50% or 55% hematocrit. The QC materials were enriched with predetermined quantities of the selected analytes and dispensed in 100 µL aliquots on Whatman Inc. (Fairfield, NJ) Grade 903 filter paper.

A QC shipment for T4, TSH, or 17-OHP consisted of blood-spot materials from three lots per analyte, with each lot containing a different concentration of analyte. A QC shipment for IRT, Gal, Phe, Leu, Met, Tyr, Val, Cit, and the acylcarnitines consisted of blood-spot cards from four different lots.

The QC materials were supplied for use as external controls in quantities sufficient to maintain continuity and transcend changes in production lots of routinely used method- or kit-control materials. The external QC materials were intended to supplement the participants' method- or kit-control materials at periodic intervals and to allow participants to monitor the long-term stability of their assays. The QC materials should not be used as routine daily QCs.

PARTICIPANTS' RESULTS

For this midyear report, we compiled the data that each participant reported from five analytic runs of specimens from each QC lot and calculated mean values and standard deviations from these data. Data values outside the 99% confidence interval for each QC lot were not included in the computations. We did not include methods with 10 or less values for each lot of the series. We could not include qualitative data, data submitted as inequalities or ranges, data submitted in unidentified units, or data from more than five analytic runs per specimen lot per participant. Some participants submitted results in units other than those requested on the data-report forms. To ensure that all results are appropriately entered in the CDC database, participants should convert their results to the requested units before entering them on the data-report forms.

---- QC DATA ----
see pages 3-34

CDC/APHL

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

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The reported QC data are summarized in tables on pages 3-34, which show the analyte by series of QC lots, the number of measurements (N), the mean values, and the standard deviations (SD) by kit or analytic method. In addition, we used a weighted linear regression analysis to examine the comparability by method of reported (aggregated) versus enriched concentrations. Results of the linear regression analyses are summarized in the tables on pages 3-34.

DISCUSSION

The enriched values of the QC specimen lots, shown in the tables for each lot, do not take into account the endogenous levels of the analytes; however, analytic results indicate that endogenous concentrations are negligible for all analytes except Phe, Leu, Met, Tyr, Val, Cit, and the acylcarnitines. For Phe, Leu, Met, Tyr, Val, Cit, and the acylcarnitines, the nonenriched base pools were distributed as the first QC specimen lot in each series so that participants could measure the endogenous Phe, Leu, Met, Tyr, Val, Cit, or acylcarnitine concentration of the series. QC lots 825-828 were enriched with Gal, Phe, Leu, Met, Tyr, Val, and Cit. QC lots 865-868 were enriched with acylcarnitines. All other QC lots were enriched with one analyte per lot. Gal lots 825-828 were enriched with equimolar quantities of simple galactose and galactose-1-phosphate.

The tables, which summarize reported QC results (pages 3-34), provide data for method-related differences in analytic recoveries and method bias. Because we prepared each QC lot series from a single batch of hematocrit-adjusted, nonenriched blood, the endogenous concentration was the same for all specimens in a lot series. We calculated the within-laboratory SD component of the total SD and used the reported QC data from multiple analytic runs for regression analyses. We calculated the Y-intercept and slope listed in each table using all analyte concentrations within a lot series (e.g., lots 811, 812, and 813). Because only three or four concentrations of QC materials are available for each analyte, a bias error in any one pool can markedly influence the slope and intercept. The Y-intercept provides one measure of the endogenous concentration level for an analyte. For Phe, Leu, Met, Tyr, Val, Cit, and the acylcarnitines, participants measured the endogenous concentration levels by analyzing the nonenriched QC lots. When endogenous levels were compared for the amino acids and the acylcarnitines, we found them to be similar for all methods per analyte. Ideally, the slope should be 1.0, and most slopes were close to this value, ranging from 0.8 to 1.2 but some were a bit farther away. For example, for one T4 method, the slope was 1.6; for one Leu method, the slope was 0.68; and for one C2 method, the slope was 0.62. The C3DC and C5DC methods show the greatest variation in slopes among all analytes. For C3DC and C5DC, note that for both kit and non-kit users, the calculation of concentrations for the QC lots may vary with type of internal standard. Data are not sorted by internal standard type. Slope deviations may be related to analytic ranges for calibration curves. Because the endogenous concentration was the same for all QC lots within a series, it should not affect the slope of the regression line among methods. Generally, slope values substantially different from 1.0 indicate that a method has an analytic bias.

Each year, with the extensive cooperation of Whatman Inc. and Ahlstrom Corp., we routinely monitor the absorption characteristics of approved filter papers. Participants may refer to page 10 of the 2008 Newborn Screening Quality Assurance Program summary report* for a chart of the serum absorbancies of six Grade 226 filter paper lots and to page 11 for charts of the serum absorbancies of 24 Grade 903 filter paper lots that CDC monitored. The following Whatman Grade 903 filter paper lots were used in the production of QC specimen lots distributed during the first 6 months of 2009: W051 (Lots 751-753, 791-794, 801-803, 811-813) and W071 (Lots 825-828, 865-868).

ACKNOWLEDGEMENT

We would like to thank Hussain R. Usman, MBBS, MSc, DrPH, Public Health Informatics Fellow, Public Health Informatics Fellowship Program, for his valuable contribution and assistance in the improvement and enhancement of NSQAP's data management and reporting system. Dr. Usman's modifications to our present SAS Quality Control Regression program and expertise in database customization has given us a streamlined mechanism for generating final reports.

* Bell CJ, editor. Newborn Screening Quality Assurance Program: 2008 Annual Summary Report. Atlanta: Centers for Disease Control and Prevention, 2009;26:1B81.

http://www.cdc.gov/labstandards/nsqap.htm

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services or the association of Public Health Laboratories.

2009 Quality Control Data
Summaries of Statistical Analyses

THYROXINE (μg T4/dL serum)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 801 – Enriched 2 μg/dL serum						
MP Biomedicals RIA	20	1.7	0.2	0.5	-0.4	1.0
Neo-Genesis Accuwell	39	1.6	0.4	0.7	-0.9	1.2
Delfia	78	1.7	0.2	0.3	-0.2	0.9
AutoDelfia	284	1.9	0.3	0.5	-0.1	1.0
TecnoSuma UMELISA	10	4.0	0.9	0.9	0.8	1.6
Interscientific NeoMAP Multiplex	10	1.2	0.3	0.3	-0.8	1.0
Other	10	2.7	0.4	0.4	0.3	1.1
Lot 802 – Enriched 7 μg/dL serum						
MP Biomedicals RIA	20	6.0	0.8	1.1	-0.4	1.0
Neo-Genesis Accuwell	39	7.2	1.0	1.1	-0.9	1.2
Delfia	77	6.5	0.6	0.8	-0.2	0.9
AutoDelfia	287	6.7	0.6	0.8	-0.1	1.0
TecnoSuma UMELISA	10	12.0	0.9	0.9	0.8	1.6
Interscientific NeoMAP Multiplex	10	6.9	1.1	1.1	-0.8	1.0
Other	10	8.0	0.8	0.8	0.3	1.1
Lot 803 – Enriched 11 μg/dL serum						
MP Biomedicals RIA	20	10.5	0.9	1.8	-0.4	1.0
Neo-Genesis Accuwell	40	12.5	1.8	2.7	-0.9	1.2
Delfia	78	10.2	1.0	1.1	-0.2	0.9
AutoDelfia	286	10.5	0.9	1.1	-0.1	1.0
TecnoSuma UMELISA	10	18.4	1.5	1.5	0.8	1.6
Interscientific NeoMAP Multiplex	10	10.6	1.8	1.8	-0.8	1.0
Other	10	12.8	1.1	1.1	0.3	1.1

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

THYROID-STIMULATING HORMONE (μIU TSH/mL serum)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 811 – Enriched 25 μIU/mL serum						
Siemens Healthcare Diagnostics	40	27.5	3.9	4.6	-2.7	1.2
Neo-Genesis Accuwell	50	26.9	2.8	4.6	-2.6	1.2
MP Biomedicals IRMA	20	30.1	3.5	3.8	4.8	1.0
MP Biomedicals (ICN) ELISA	10	21.4	2.0	2.0	-2.6	0.9
Delfia	466	25.5	2.7	3.6	-1.2	1.0
AutoDelfia	789	24.7	2.3	2.9	-1.8	1.0
Ani Labsystems	69	26.7	3.0	4.2	-1.6	1.1
Bio-Rad Quantase	80	30.8	3.0	5.9	3.8	1.0
TecnoSuma UMELISA	10	22.9	2.1	2.1	-4.8	1.0
Bioclone ELISA	50	26.8	3.9	8.9	-6.2	1.3
DiaSorin	90	25.5	3.4	5.5	1.1	1.0
In House	50	26.5	2.6	5.8	3.2	0.9
Other	40	27.4	2.4	8.5	2.6	1.0
Lot 812 – Enriched 40 μIU/mL serum						
Siemens Healthcare Diagnostics	40	42.4	5.2	7.0	-2.7	1.2
Neo-Genesis Accuwell	50	43.3	5.5	9.9	-2.6	1.2
MP Biomedicals IRMA	20	41.8	4.6	6.4	4.8	1.0
MP Biomedicals (ICN) ELISA	10	28.2	2.8	2.8	-2.6	0.9
Delfia	470	37.2	3.5	4.6	-1.2	1.0
AutoDelfia	786	36.8	3.0	3.8	-1.8	1.0
Ani Labsystems	68	37.6	3.9	5.5	-1.6	1.1
Bio-Rad Quantase	80	43.9	4.1	6.5	3.8	1.0
TecnoSuma UMELISA	10	34.4	5.2	5.2	-4.8	1.0
Bioclone ELISA	50	43.8	4.1	14.3	-6.2	1.3
DiaSorin	89	39.2	4.7	5.7	1.1	1.0
In House	50	39.5	3.0	7.7	3.2	0.9
Other	40	39.8	4.7	11.0	2.6	1.0

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

THYROID-STIMULATING HORMONE (μIU TSH/mL serum)
- continued -

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 813 – Enriched 80 μIU/mL serum						
Siemens Healthcare Diagnostics	40	91.0	7.6	11.6	-2.7	1.2
Neo-Genesis Accuwell	50	90.5	8.9	16.2	-2.6	1.2
MP Biomedicals IRMA	20	82.3	7.3	7.9	4.8	1.0
MP Biomedicals (ICN) ELISA	10	67.0	5.4	5.4	-2.6	0.9
Delfia	476	80.0	8.0	9.7	-1.2	1.0
AutoDelfia	784	79.5	6.5	8.8	-1.8	1.0
Ani Labsystems	69	83.4	7.6	9.8	-1.6	1.1
Bio-Rad Quantase	77	87.4	10.9	15.2	3.8	1.0
TecnoSuma UMELISA	10	79.0	10.1	10.1	-4.8	1.0
Bioclone ELISA	50	96.7	11.2	32.4	-6.2	1.3
DiaSorin	87	78.3	7.9	9.7	1.1	1.0
In House	47	76.8	7.7	9.6	3.2	0.9
Other	40	79.5	9.0	21.2	2.6	1.0

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

17 α-HYDROXYPROGESTERONE (ng 17-OHP/mL serum)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 751 – Enriched 25 ng/mL serum						
MP Biomedicals RIA	39	27.1	2.9	3.0	6.2	0.8
Neo-Genesis Accuwell	50	29.4	4.1	5.4	7.0	1.0
Delfia	89	24.8	2.8	3.9	0.0	1.0
Delfia Neonatal 17-OHP (A024)	39	23.5	4.5	5.9	0.8	1.0
AutoDelfia	456	27.5	3.0	3.8	0.0	1.1
AutoDelfia Neonatal 17-OHP (B024)	139	23.8	2.2	4.0	1.0	0.9
Bio-Rad Quantase	80	27.9	3.4	6.7	5.0	0.9
TecnoSuma UMELISA	10	40.4	2.6	2.6	-2.1	1.7
LC-MS/MS	20	36.2	6.0	6.0	14.9	1.0
In House	10	24.2	3.4	3.4	1.5	0.9
Other	20	28.4	3.5	3.5	4.3	1.0
Lot 752 – Enriched 50 ng/mL serum						
MP Biomedicals RIA	39	48.9	3.0	5.0	6.2	0.8
Neo-Genesis Accuwell	50	59.9	6.6	12.1	7.0	1.0
Delfia	90	49.8	4.6	6.9	0.0	1.0
Delfia Neonatal 17-OHP (A024)	39	50.6	9.9	14.7	0.8	1.0
AutoDelfia	453	53.9	5.3	7.6	0.0	1.1
AutoDelfia Neonatal 17-OHP (B024)	137	46.2	4.2	7.3	1.0	0.9
Bio-Rad Quantase	80	45.6	6.3	12.2	5.0	0.9
TecnoSuma UMELISA	10	86.0	13.4	13.4	-2.1	1.7
LC-MS/MS	20	68.0	9.7	10.3	14.9	1.0
In House	10	47.7	5.6	5.6	1.5	0.9
Other	20	57.9	8.6	9.2	4.3	1.0
Lot 753 – Enriched 100 ng/mL serum						
MP Biomedicals RIA	39	90.8	9.1	11.8	6.2	0.8
Neo-Genesis Accuwell	50	104.9	11.0	18.5	7.0	1.0
Delfia	96	99.3	15.3	18.0	0.0	1.0
Delfia Neonatal 17-OHP (A024)	40	96.0	12.3	28.6	0.8	1.0
AutoDelfia	454	109.0	10.2	14.9	0.0	1.1
AutoDelfia Neonatal 17-OHP (B024)	139	91.8	8.6	17.0	1.0	0.9
Bio-Rad Quantase	80	91.4	14.4	25.0	5.0	0.9
TecnoSuma UMELISA	10	171.1	29.3	29.3	-2.1	1.7
LC-MS/MS	20	110.6	9.3	28.7	14.9	1.0
In House	10	93.1	15.5	15.5	1.5	0.9
Other	20	106.2	16.4	16.4	4.3	1.0

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

IMMUNOREACTIVE TRYPSINOGEN (ng IRT/mL whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 791 – Assayed 16.1 ng/mL blood						
MP Biomedicals (ICN) ELISA	10	21.6	4.4	4.4	15.2	0.4
Delfia	165	16.1	2.1	2.9	-1.7	1.1
AutoDelfia	459	16.6	1.6	2.0	-0.6	1.1
Bio-Rad Quantase	40	13.0	1.6	2.2	-2.4	0.8
Bioclone ELISA	20	14.6	1.7	1.8	-3.8	0.9
Other	10	20.3	2.1	2.1	4.2	0.9
Lot 792 – Assayed 38.8 ng/mL blood						
MP Biomedicals (ICN) ELISA	10	32.4	3.5	3.5	15.2	0.4
Delfia	169	41.0	5.2	7.5	-1.7	1.1
AutoDelfia	448	43.1	3.9	4.9	-0.6	1.1
Bio-Rad Quantase	38	26.4	3.1	3.2	-2.4	0.8
Bioclone ELISA	19	27.5	2.9	3.8	-3.8	0.9
Other	10	37.3	2.5	2.5	4.2	0.9
Lot 793 – Assayed 69.2 ng/mL blood						
MP Biomedicals (ICN) ELISA	10	46.6	6.6	6.6	15.2	0.4
Delfia	168	77.3	8.7	11.4	-1.7	1.1
AutoDelfia	449	79.9	6.6	8.1	-0.6	1.1
Bio-Rad Quantase	39	49.2	7.6	10.9	-2.4	0.8
Bioclone ELISA	20	52.6	3.2	4.1	-3.8	0.9
Other	10	62.3	7.5	7.5	4.2	0.9
Lot 794 – Assayed 133.7 ng/mL blood						
MP Biomedicals (ICN) ELISA	10	73.4	11.7	11.7	15.2	0.4
Delfia	167	147.3	16.8	21.4	-1.7	1.1
AutoDelfia	444	149.7	11.6	13.6	-0.6	1.1
Bio-Rad Quantase	40	104.1	12.7	15.6	-2.4	0.8
Bioclone ELISA	20	115.6	14.1	34.5	-3.8	0.9
Other	10	122.5	16.6	16.6	4.2	0.9

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

TOTAL GALACTOSE (mg Gal/dL whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 825 – Enriched 5 mg/dL whole blood						
Fluorometric Manual	123	4.9	0.7	1.5	0.0	1.0
Fluorometric Cont Flow, Kit	10	5.4	0.7	0.7	1.0	0.9
Colorimetric	38	6.6	0.7	1.0	0.4	1.2
PerkinElmer Neonatal Kit	40	5.9	0.6	0.9	1.9	0.9
Neo-Genesis Accuwell	39	5.9	0.4	0.4	0.2	1.0
Bio-Rad Quantase	108	6.3	1.1	1.9	-1.5	1.4
MP Biomedicals Enzyme Assay	30	10.7	1.0	2.7	4.3	1.5
Interscientific Enzyme	48	5.3	0.5	0.5	-0.4	1.0
Astoria-Pacific	126	7.0	0.9	2.3	1.7	1.1
R&D Diagnostics Greece	40	4.2	0.7	0.9	-1.1	1.0
Other	40	4.9	0.5	1.0	0.2	1.1
Lot 826 – Enriched 10 mg/dL whole blood						
Fluorometric Manual	122	10.0	1.0	1.6	0.0	1.0
Fluorometric Cont Flow, Kit	10	10.7	1.2	1.2	1.0	0.9
Colorimetric	39	12.2	2.0	2.8	0.4	1.2
PerkinElmer Neonatal Kit	40	10.9	1.2	1.3	1.9	0.9
Neo-Genesis Accuwell	40	9.6	0.9	1.6	0.2	1.0
Bio-Rad Quantase	107	12.4	2.5	3.5	-1.5	1.4
MP Biomedicals Enzyme Assay	30	18.9	1.9	4.1	4.3	1.5
Interscientific Enzyme	50	8.8	0.8	1.6	-0.4	1.0
Astoria-Pacific	128	12.1	1.6	2.8	1.7	1.1
R&D Diagnostics Greece	40	8.5	0.8	2.0	-1.1	1.0
Other	40	10.1	0.8	2.2	0.2	1.1

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

TOTAL GALACTOSE (mg Gal/dL whole blood)
- continued -

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 827 – Enriched 15 mg/dL whole blood						
Fluorometric Manual	126	15.4	1.4	2.3	0.0	1.0
Fluorometric Cont Flow, Kit	10	14.7	1.4	1.4	1.0	0.9
Colorimetric	40	18.8	2.5	4.0	0.4	1.2
PerkinElmer Neonatal Kit	39	15.2	1.3	1.6	1.9	0.9
Neo-Genesis Accuwell	40	16.0	1.3	1.6	0.2	1.0
Bio-Rad Quantase	109	19.4	2.9	4.8	-1.5	1.4
MP Biomedicals Enzyme Assay	30	29.9	2.5	4.6	4.3	1.5
Interscientific Enzyme	50	13.8	1.3	2.8	-0.4	1.0
Astoria-Pacific	128	18.0	2.0	3.4	1.7	1.1
R&D Diagnostics Greece	39	13.1	1.2	3.6	-1.1	1.0
Other	40	17.9	1.0	6.2	0.2	1.1
Lot 828 – Enriched 30 mg/dL whole blood						
Fluorometric Manual	123	30.0	2.9	3.8	0.0	1.0
Fluorometric Cont Flow, Kit	10	20.2	0.0	0.0	1.0	0.9
Colorimetric	39	36.7	6.2	9.7	0.4	1.2
PerkinElmer Neonatal Kit	40	27.9	2.6	2.8	1.9	0.9
Neo-Genesis Accuwell	40	31.2	2.4	4.0	0.2	1.0
Bio-Rad Quantase	107	41.9	7.7	11.4	-1.5	1.4
MP Biomedicals Enzyme Assay	29	48.8	2.2	5.2	4.3	1.5
Interscientific Enzyme	49	29.4	2.6	2.6	-0.4	1.0
Astoria-Pacific	128	33.6	3.6	7.0	1.7	1.1
R&D Diagnostics Greece	40	28.3	2.4	5.2	-1.1	1.0
Other	40	31.2	1.5	6.3	0.2	1.1

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

PHENYLALANINE (μmol Phe/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 825 – Enriched 5 μmol/L whole blood						
Bacterial Inhibition Assays	30	71.91	9.72	14.10	65.43	1.24
Fluorometric Manual	60	108.70	14.51	33.48	103.84	0.96
Fluorometric Cont Flow, In house	10	125.00	5.27	5.27	100.87	1.36
Fluorometric Cont Flow, Kit	20	129.24	21.09	74.70	133.73	1.12
Colorimetric	89	111.46	15.10	22.09	101.16	1.19
PerkinElmer Neonatal Kit	216	90.64	9.73	11.73	82.50	0.90
Neo-Genesis Accuwell	10	93.93	13.17	13.17	90.10	1.04
Ani Labsystems	88	104.26	11.64	18.35	99.55	1.06
Bio-Rad Quantase	40	120.47	29.72	30.52	98.75	1.30
MP Biomedicals Enzyme Assay	20	57.12	14.12	25.19	38.95	1.02
Interscientific Enzyme	49	90.48	14.10	15.18	83.39	0.79
HPLC	30	89.03	11.11	15.02	82.80	0.90
Derivatized - MS/MS Non-kit	671	81.24	6.51	12.86	78.02	0.84
Non-derivatized - MS/MS Non-kit	166	97.80	8.73	16.79	95.07	0.99
Derivatized - MS/MS PE NeoGram MS2 Kit	236	89.35	7.23	11.04	87.54	0.91
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	92.51	9.72	13.44	91.10	0.94
Non-derivatized - MS/MS PE NeoBase Kit	69	84.22	5.17	8.29	79.81	0.87
Derivatized - MS/MS Chromsystems Kit	48	87.93	5.72	7.07	87.10	0.92
TecnoSuma UMTEST	18	128.44	18.95	27.76	74.17	1.23
Other	10	75.87	9.49	9.49	74.50	0.72

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

PHENYLALANINE (μmol Phe/L whole blood)
- continued -

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 826 – Enriched 181.80 μmol/L whole blood						
Bacterial Inhibition Assays	28	271.59	40.03	105.88	65.43	1.24
Fluorometric Manual	60	278.54	24.00	44.65	103.84	0.96
Fluorometric Cont Flow, In house	10	309.00	20.25	20.25	100.87	1.36
Fluorometric Cont Flow, Kit	20	334.72	27.41	110.77	133.73	1.12
Colorimetric	89	300.04	21.72	47.50	101.16	1.19
PerkinElmer Neonatal Kit	214	237.92	19.80	28.16	82.50	0.90
Neo-Genesis Accuwell	10	272.70	22.67	22.67	90.10	1.04
Ani Labsystems	88	285.98	21.28	55.44	99.55	1.06
Bio-Rad Quantase	40	297.63	57.77	59.46	98.75	1.30
MP Biomedicals Enzyme Assay	20	197.78	37.90	37.90	38.95	1.02
Interscientific Enzyme	50	217.63	27.02	29.26	83.39	0.79
HPLC	30	241.53	16.79	36.05	82.80	0.90
Derivatized - MS/MS Non-kit	671	225.69	17.25	35.06	78.02	0.84
Non-derivatized - MS/MS Non-kit	167	269.58	19.05	38.41	95.07	0.99
Derivatized - MS/MS PE NeoGram MS2 Kit	236	247.62	18.90	27.87	87.54	0.91
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	260.62	25.16	30.03	91.10	0.94
Non-derivatized - MS/MS PE NeoBase Kit	67	232.80	13.60	19.65	79.81	0.87
Derivatized - MS/MS Chromsystems Kit	50	252.83	22.20	29.53	87.10	0.92
TecnoSuma UMTEST	20	286.27	57.66	104.51	74.17	1.23
Other	10	196.40	6.91	6.91	74.50	0.72

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

PHENYLALANINE (μmol Phe/L whole blood)
- continued -

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 827 – Enriched 424.20 μmol/L whole blood						
Bacterial Inhibition Assays	30	610.98	87.18	327.49	65.43	1.24
Fluorometric Manual	49	497.50	45.64	45.64	103.84	0.96
Fluorometric Cont Flow, In house	10	692.00	49.17	49.17	100.87	1.36
Fluorometric Cont Flow, Kit	20	622.72	68.71	229.78	133.73	1.12
Colorimetric	89	609.39	42.41	85.84	101.16	1.19
PerkinElmer Neonatal Kit	212	455.77	35.37	53.22	82.50	0.90
Neo-Genesis Accuwell	10	530.55	31.31	31.31	90.10	1.04
Ani Labsystems	89	552.45	35.75	97.85	99.55	1.06
Bio-Rad Quantase	38	663.86	50.31	57.35	98.75	1.30
MP Biomedicals Enzyme Assay	20	472.62	64.53	64.53	38.95	1.02
Interscientific Enzyme	50	417.36	49.48	53.34	83.39	0.79
HPLC	30	460.19	24.78	50.52	82.80	0.90
Derivatized - MS/MS Non-kit	666	435.33	32.80	65.19	78.02	0.84
Non-derivatized - MS/MS Non-kit	166	519.40	36.31	70.49	95.07	0.99
Derivatized - MS/MS PE NeoGram MS2 Kit	237	477.52	36.06	52.86	87.54	0.91
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	491.85	38.62	66.57	91.10	0.94
Non-derivatized - MS/MS PE NeoBase Kit	67	445.94	27.22	39.75	79.81	0.87
Derivatized - MS/MS Chromsystems Kit	49	481.82	35.44	44.86	87.10	0.92
TecnoSuma UMTEST	19	477.73	42.93	87.52	74.17	1.23
Other	10	391.17	33.78	33.78	74.50	0.72

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

PHENYLALANINE (μmol Phe/L whole blood)
- continued -

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 828 – Enriched 666.60 μmol/L whole blood						
Bacterial Inhibition Assays	30	886.28	100.24	397.67	65.43	1.24
Fluorometric Manual	60	754.23	64.34	74.63	103.84	0.96
Fluorometric Cont Flow, In house	10	1012.0	53.50	53.50	100.87	1.36
Fluorometric Cont Flow, Kit	20	867.54	87.18	264.12	133.73	1.12
Colorimetric	90	893.04	66.52	142.63	101.16	1.19
PerkinElmer Neonatal Kit	213	687.26	48.39	79.94	82.50	0.90
Neo-Genesis Accuwell	10	781.69	30.61	30.61	90.10	1.04
Ani Labsystems	89	810.33	51.08	149.84	99.55	1.06
Bio-Rad Quantase	39	964.52	87.68	98.61	98.75	1.30
MP Biomedicals Enzyme Assay	20	722.65	82.27	82.31	38.95	1.02
Interscientific Enzyme	49	612.30	58.86	77.75	83.39	0.79
HPLC	29	690.74	37.23	38.08	82.80	0.90
Derivatized - MS/MS Non-kit	666	638.42	46.47	95.98	78.02	0.84
Non-derivatized - MS/MS Non-kit	166	754.80	51.01	108.33	95.07	0.99
Derivatized - MS/MS PE NeoGram MS2 Kit	236	690.90	49.71	75.99	87.54	0.91
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	720.70	62.53	95.87	91.10	0.94
Non-derivatized - MS/MS PE NeoBase Kit	68	662.02	44.36	69.41	79.81	0.87
Derivatized - MS/MS Chromsystems Kit	49	702.42	43.55	61.83	87.10	0.92
TecnoSuma UMTEST	20	967.43	161.22	255.38	74.17	1.23
Other	10	546.02	37.42	37.42	74.50	0.72

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

LEUCINE (μmol Leu/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 825 – Nonenriched 0 μmol/L whole blood						
Bacterial Inhibition Assays	20	191.51	27.25	49.39	150.81	1.08
Colorimetric	10	330.60	22.05	22.05	342.98	0.68
PerkinElmer Neonatal Kit	30	178.17	14.30	22.77	168.17	0.95
Bio-Rad Quantase	10	212.40	16.23	16.23	193.09	0.87
Interscientific Enzyme	30	184.62	49.77	72.84	181.58	0.93
Derivatized - MS/MS Non-kit	695	176.40	15.07	32.61	174.64	0.83
Non-derivatized - MS/MS Non-kit	84	219.66	16.47	42.93	218.47	0.90
Derivatized - MS/MS PE NeoGram MS2 Kit	238	167.91	15.51	20.26	166.84	0.84
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	177.82	17.85	17.85	187.93	0.74
Non-derivatized - MS/MS PE NeoBase Kit	59	209.33	13.04	22.00	204.70	0.85
Derivatized - MS/MS Chromsystems Kit	20	179.85	18.94	27.10	177.70	0.85
Lot 826 – Enriched 228.90 μmol/L whole blood						
Bacterial Inhibition Assays	20	368.91	46.62	47.68	150.81	1.08
Colorimetric	10	503.10	16.08	16.08	342.98	0.68
PerkinElmer Neonatal Kit	30	378.24	31.63	41.71	168.17	0.95
Bio-Rad Quantase	10	363.09	37.52	37.52	193.09	0.87
Interscientific Enzyme	30	368.48	48.29	48.29	181.58	0.93
Derivatized - MS/MS Non-kit	696	365.81	31.61	62.41	174.64	0.83
Non-derivatized - MS/MS Non-kit	87	423.94	24.25	73.67	218.47	0.90
Derivatized - MS/MS PE NeoGram MS2 Kit	235	358.63	30.59	36.59	166.84	0.84
Non-derivatized - MS/MS PE NeoGram MS2 Kit	38	369.01	40.47	40.47	187.93	0.74
Non-derivatized - MS/MS PE NeoBase Kit	60	399.13	26.48	36.16	204.70	0.85
Derivatized - MS/MS Chromsystems Kit	20	371.83	49.14	50.94	177.70	0.85

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

LEUCINE (μmol Leu/L whole blood)
- continued -

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 827 – Enriched 534.10 μmol/L whole blood						
Bacterial Inhibition Assays	20	674.06	56.83	56.83	150.81	1.08
Colorimetric	10	732.60	18.55	18.55	342.98	0.68
PerkinElmer Neonatal Kit	30	662.77	51.88	76.58	168.17	0.95
Bio-Rad Quantase	10	662.43	51.43	51.43	193.09	0.87
Interscientific Enzyme	30	717.09	40.55	56.37	181.58	0.93
Derivatized - MS/MS Non-kit	695	613.43	50.31	100.80	174.64	0.83
Non-derivatized - MS/MS Non-kit	87	695.13	48.49	122.42	218.47	0.90
Derivatized - MS/MS PE NeoGram MS2 Kit	233	614.16	46.13	54.56	166.84	0.84
Non-derivatized - MS/MS PE NeoGram MS2 Kit	38	591.99	53.22	53.22	187.93	0.74
Non-derivatized - MS/MS PE NeoBase Kit	60	643.47	41.20	51.02	204.70	0.85
Derivatized - MS/MS Chromsystems Kit	20	623.66	88.53	88.84	177.70	0.85
Lot 828 – Enriched 839.30 μmol/L whole blood						
Bacterial Inhibition Assays	20	1099.5	97.21	125.58	150.81	1.08
Colorimetric	10	897.30	46.28	46.28	342.98	0.68
PerkinElmer Neonatal Kit	30	975.59	61.09	79.92	168.17	0.95
Bio-Rad Quantase	10	927.62	73.17	73.17	193.09	0.87
Interscientific Enzyme	30	938.53	84.45	99.74	181.58	0.93
Derivatized - MS/MS Non-kit	702	877.15	70.10	138.03	174.64	0.83
Non-derivatized - MS/MS Non-kit	87	974.08	66.16	202.63	218.47	0.90
Derivatized - MS/MS PE NeoGram MS2 Kit	235	873.69	68.54	92.08	166.84	0.84
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	805.17	80.29	83.89	187.93	0.74
Non-derivatized - MS/MS PE NeoBase Kit	60	924.13	55.77	76.93	204.70	0.85
Derivatized - MS/MS Chromsystems Kit	20	892.59	113.00	114.39	177.70	0.85

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

TYROSINE (μmol Tyr/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 825 – Nonenriched 0 μmol/L whole blood						
Fluorometric Manual	10	126.60	13.24	13.24	98.55	1.31
PerkinElmer Neonatal Kit	29	62.02	5.34	5.72	57.29	1.05
HPLC	20	70.77	10.46	16.42	65.63	1.08
Derivatized - MS/MS Non-kit	698	60.13	6.03	10.87	56.39	1.04
Non-derivatized - MS/MS Non-kit	138	71.92	8.68	16.31	68.01	1.18
Derivatized - MS/MS PE NeoGram MS2 Kit	236	61.32	5.26	8.38	54.68	1.06
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	63.86	11.69	14.84	61.72	1.08
Non-derivatized - MS/MS PE NeoBase Kit	66	63.76	7.42	9.28	58.51	1.06
Derivatized - MS/MS Chromsystems Kit	19	62.63	4.01	4.01	55.93	1.01
Lot 826 – Enriched 276.00 μmol/L whole blood						
Fluorometric Manual	10	433.50	40.41	40.41	98.55	1.31
PerkinElmer Neonatal Kit	30	341.19	34.87	40.06	57.29	1.05
HPLC	20	352.97	18.21	45.21	65.63	1.08
Derivatized - MS/MS Non-kit	704	339.01	28.90	59.65	56.39	1.04
Non-derivatized - MS/MS Non-kit	139	385.27	32.76	77.55	68.01	1.18
Derivatized - MS/MS PE NeoGram MS2 Kit	235	339.05	29.12	40.14	54.68	1.06
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	354.27	39.66	64.65	61.72	1.08
Non-derivatized - MS/MS PE NeoBase Kit	68	346.25	22.25	29.76	58.51	1.06
Derivatized - MS/MS Chromsystems Kit	20	327.44	29.59	32.55	55.93	1.01

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

TYROSINE (μmol Tyr/L whole blood)
- continued -

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 827 – Enriched 496.80 μmol/L whole blood						
Fluorometric Manual	10	720.70	76.30	76.30	98.55	1.31
PerkinElmer Neonatal Kit	28	575.77	51.19	55.50	57.29	1.05
HPLC	20	607.46	41.67	69.02	65.63	1.08
Derivatized - MS/MS Non-kit	702	567.45	47.66	93.65	56.39	1.04
Non-derivatized - MS/MS Non-kit	139	657.17	68.06	130.08	68.01	1.18
Derivatized - MS/MS PE NeoGram MS2 Kit	236	577.24	45.97	63.23	54.68	1.06
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	601.02	76.28	119.44	61.72	1.08
Non-derivatized - MS/MS PE NeoBase Kit	70	581.04	36.99	61.46	58.51	1.06
Derivatized - MS/MS Chromsystems Kit	20	552.14	57.86	57.86	55.93	1.01
Lot 828 – Enriched 772.80 μmol/L whole blood						
Fluorometric Manual	10	1141.2	108.41	108.41	98.55	1.31
PerkinElmer Neonatal Kit	29	871.93	73.03	73.03	57.29	1.05
HPLC	20	901.11	51.50	74.04	65.63	1.08
Derivatized - MS/MS Non-kit	706	861.44	69.14	139.40	56.39	1.04
Non-derivatized - MS/MS Non-kit	140	979.42	88.64	203.84	68.01	1.18
Derivatized - MS/MS PE NeoGram MS2 Kit	236	879.23	78.18	105.61	54.68	1.06
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	895.13	101.53	153.01	61.72	1.08
Non-derivatized - MS/MS PE NeoBase Kit	68	883.75	64.40	81.36	58.51	1.06
Derivatized - MS/MS Chromsystems Kit	20	841.65	66.60	70.65	55.93	1.01

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

METHIONINE (μmol Met/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 825 – Nonenriched 0 μmol/L whole blood						
PerkinElmer Neonatal Kit	30	27.18	3.88	3.88	20.21	0.96
Derivatized - MS/MS Non-kit	665	25.50	4.02	5.92	21.32	0.81
Non-derivatized - MS/MS Non-kit	86	23.67	4.12	8.86	14.35	0.91
Derivatized - MS/MS PE NeoGram MS2 Kit	220	26.87	3.50	5.94	24.86	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	38	18.49	5.05	5.09	15.71	0.68
Non-derivatized - MS/MS PE NeoBase Kit	50	22.05	2.30	5.67	13.99	0.79
Derivatized - MS/MS Chromsystems Kit	39	23.89	2.35	2.95	19.79	0.83
Lot 826 – Enriched 67.10 μmol/L whole blood						
PerkinElmer Neonatal Kit	29	80.14	10.87	10.87	20.21	0.96
Derivatized - MS/MS Non-kit	679	72.93	8.54	13.85	21.32	0.81
Non-derivatized - MS/MS Non-kit	87	66.20	7.30	19.58	14.35	0.91
Derivatized - MS/MS PE NeoGram MS2 Kit	221	80.22	6.81	9.23	24.86	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	51.96	9.49	10.89	15.71	0.68
Non-derivatized - MS/MS PE NeoBase Kit	50	59.91	4.10	10.16	13.99	0.79
Derivatized - MS/MS Chromsystems Kit	39	72.00	8.62	8.87	19.79	0.83
Lot 827 – Enriched 201.30 μmol/L whole blood						
PerkinElmer Neonatal Kit	30	206.15	26.42	31.54	20.21	0.96
Derivatized - MS/MS Non-kit	665	182.18	17.19	29.37	21.32	0.81
Non-derivatized - MS/MS Non-kit	89	193.75	20.44	52.82	14.35	0.91
Derivatized - MS/MS PE NeoGram MS2 Kit	225	201.23	16.39	20.09	24.86	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	162.16	27.22	30.76	15.71	0.68
Non-derivatized - MS/MS PE NeoBase Kit	49	169.95	14.70	26.20	13.99	0.79
Derivatized - MS/MS Chromsystems Kit	39	183.75	15.92	17.43	19.79	0.83
Lot 828 – Enriched 402.60 μmol/L whole blood						
PerkinElmer Neonatal Kit	29	410.22	38.15	39.48	20.21	0.96
Derivatized - MS/MS Non-kit	664	351.46	31.37	56.58	21.32	0.81
Non-derivatized - MS/MS Non-kit	89	382.80	36.81	104.10	14.35	0.91
Derivatized - MS/MS PE NeoGram MS2 Kit	223	375.38	29.56	37.72	24.86	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	285.56	39.83	62.72	15.71	0.68
Non-derivatized - MS/MS PE NeoBase Kit	50	336.85	19.61	39.53	13.99	0.79
Derivatized - MS/MS Chromsystems Kit	40	354.86	30.42	41.46	19.79	0.83

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

VALINE (μmol Val/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 825 – Nonenriched 0 μmol/L whole blood						
PerkinElmer Neonatal Kit	29	180.51	13.05	21.18	175.81	0.79
Derivatized - MS/MS Non-kit	612	173.82	18.50	34.78	167.04	0.73
Non-derivatized - MS/MS Non-kit	90	154.21	14.74	33.08	148.43	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	207	161.61	20.15	29.09	157.67	0.70
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	156.08	13.27	20.54	153.95	0.69
Non-derivatized - MS/MS PE NeoBase Kit	60	166.97	11.96	32.88	160.19	0.74
Derivatized - MS/MS Chromsystems Kit	20	136.05	8.60	17.81	129.91	0.58
Lot 826 – Enriched 256.50 μmol/L whole blood						
PerkinElmer Neonatal Kit	30	375.60	34.80	54.33	175.81	0.79
Derivatized - MS/MS Non-kit	622	346.93	35.40	59.19	167.04	0.73
Non-derivatized - MS/MS Non-kit	90	324.03	24.34	66.82	148.43	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	210	328.70	37.67	56.24	157.67	0.70
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	328.17	38.58	55.99	153.95	0.69
Non-derivatized - MS/MS PE NeoBase Kit	60	342.96	30.12	66.06	160.19	0.74
Derivatized - MS/MS Chromsystems Kit	20	271.15	18.93	43.97	129.91	0.58
Lot 827 – Enriched 598.50 μmol/L whole blood						
PerkinElmer Neonatal Kit	30	646.81	55.29	80.12	175.81	0.79
Derivatized - MS/MS Non-kit	621	596.02	56.70	91.33	167.04	0.73
Non-derivatized - MS/MS Non-kit	89	580.23	48.22	119.81	148.43	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	210	580.79	61.90	100.89	157.67	0.70
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	571.93	57.01	82.31	153.95	0.69
Non-derivatized - MS/MS PE NeoBase Kit	60	596.52	42.13	110.85	160.19	0.74
Derivatized - MS/MS Chromsystems Kit	20	470.31	34.11	67.56	129.91	0.58
Lot 828 – Enriched 940.50 μmol/L whole blood						
PerkinElmer Neonatal Kit	29	927.13	97.13	107.34	175.81	0.79
Derivatized - MS/MS Non-kit	624	855.28	78.58	138.08	167.04	0.73
Non-derivatized - MS/MS Non-kit	90	825.77	66.21	188.63	148.43	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	206	812.92	101.93	140.51	157.67	0.70
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	807.16	54.17	125.22	153.95	0.69
Non-derivatized - MS/MS PE NeoBase Kit	60	859.78	61.09	168.52	160.19	0.74
Derivatized - MS/MS Chromsystems Kit	20	675.60	34.58	92.19	129.91	0.58

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

CITRULLINE (μmol Cit/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 825 – Nonenriched 0 μmol/L whole blood						
PerkinElmer Neonatal Kit	28	31.78	2.82	3.11	31.89	0.93
Derivatized - MS/MS Non-kit	658	23.54	3.14	5.85	21.34	0.70
Non-derivatized - MS/MS Non-kit	87	31.31	5.44	7.11	29.88	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	235	29.10	1.99	3.15	28.96	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	28.58	4.61	5.69	30.67	0.88
Non-derivatized - MS/MS PE NeoBase Kit	60	27.60	2.34	3.67	27.71	0.81
Derivatized - MS/MS Chromsystems Kit	30	26.76	2.29	7.12	26.23	0.75
Lot 826 – Enriched 57.10 μmol/L whole blood						
PerkinElmer Neonatal Kit	30	81.69	4.22	11.13	31.89	0.93
Derivatized - MS/MS Non-kit	651	59.47	6.99	14.12	21.34	0.70
Non-derivatized - MS/MS Non-kit	89	81.21	11.92	21.15	29.88	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	237	77.92	5.10	7.48	28.96	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	80.24	14.90	16.82	30.67	0.88
Non-derivatized - MS/MS PE NeoBase Kit	60	73.45	5.54	8.53	27.71	0.81
Derivatized - MS/MS Chromsystems Kit	30	69.09	7.78	20.25	26.23	0.75
Lot 827 – Enriched 171.30 μmol/L whole blood						
PerkinElmer Neonatal Kit	30	196.43	11.18	20.54	31.89	0.93
Derivatized - MS/MS Non-kit	655	140.83	14.96	33.85	21.34	0.70
Non-derivatized - MS/MS Non-kit	88	179.86	22.78	35.87	29.88	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	235	179.60	10.79	17.58	28.96	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	185.84	25.95	25.95	30.67	0.88
Non-derivatized - MS/MS PE NeoBase Kit	60	166.24	10.81	19.22	27.71	0.81
Derivatized - MS/MS Chromsystems Kit	30	154.70	17.70	38.80	26.23	0.75
Lot 828 – Enriched 342.60 μmol/L whole blood						
PerkinElmer Neonatal Kit	30	347.69	26.37	32.02	31.89	0.93
Derivatized - MS/MS Non-kit	653	263.24	27.54	58.96	21.34	0.70
Non-derivatized - MS/MS Non-kit	88	337.95	49.35	70.06	29.88	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	235	327.46	19.43	30.52	28.96	0.87
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	328.63	41.33	50.72	30.67	0.88
Non-derivatized - MS/MS PE NeoBase Kit	59	303.25	15.84	29.23	27.71	0.81
Derivatized - MS/MS Chromsystems Kit	30	285.03	25.91	68.02	26.23	0.75

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

FREE CARNITINE (μmol C0/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	771	38.22	3.85	7.89	38.43	1.04
Non-derivatized MS/MS Non-kit	118	39.41	4.56	8.71	38.96	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	265	47.61	4.16	6.99	47.68	1.39
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	35.97	3.08	10.31	36.57	0.96
Non-derivatized-MS/MS PE NeoBase Kit	60	39.05	3.62	5.61	39.22	0.99
Derivatized-MS/MS Chromsystems Kit	30	43.71	3.64	4.40	44.04	1.05
Lot 866 – Enriched 25 μmol/L whole blood						
Derivatized - MS/MS Non-kit	768	65.39	5.96	12.97	38.43	1.04
Non-derivatized MS/MS Non-kit	120	66.51	7.44	14.23	38.96	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	266	82.85	7.34	12.61	47.68	1.39
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	61.34	6.06	17.00	36.57	0.96
Non-derivatized-MS/MS PE NeoBase Kit	60	64.28	6.07	8.11	39.22	0.99
Derivatized-MS/MS Chromsystems Kit	29	71.14	5.65	5.89	44.04	1.05
Lot 867 – Enriched 50 μmol/L whole blood						
Derivatized - MS/MS Non-kit	766	89.41	8.94	17.48	38.43	1.04
Non-derivatized MS/MS Non-kit	119	89.97	10.34	18.88	38.96	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	267	116.09	10.49	18.12	47.68	1.39
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	84.37	6.10	24.49	36.57	0.96
Non-derivatized-MS/MS PE NeoBase Kit	60	88.47	7.19	11.92	39.22	0.99
Derivatized-MS/MS Chromsystems Kit	30	96.33	7.07	8.95	44.04	1.05
Lot 868 – Enriched 75 μmol/L whole blood						
Derivatized - MS/MS Non-kit	768	117.08	11.23	23.37	38.43	1.04
Non-derivatized MS/MS Non-kit	120	121.12	14.22	27.94	38.96	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	264	151.99	13.73	24.36	47.68	1.39
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	107.93	9.97	31.88	36.57	0.96
Non-derivatized-MS/MS PE NeoBase Kit	50	113.40	9.87	14.90	39.22	0.99
Derivatized-MS/MS Chromsystems Kit	29	123.17	7.76	14.14	44.04	1.05

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

ACETYLCARNITINE (μmol C2/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	811	16.71	2.17	5.56	16.97	0.99
Non-derivatized MS/MS Non-kit	106	14.22	1.31	1.89	14.65	1.13
Derivatized - MS/MS PE NeoGram MS2 Kit	271	16.98	1.67	3.31	17.19	0.62
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	14.60	1.08	2.15	15.00	1.21
Non-derivatized-MS/MS PE NeoBase Kit	48	11.17	0.91	1.66	11.68	0.86
Derivatized-MS/MS Chromsystems Kit	20	16.00	1.19	1.59	15.67	0.99
Lot 866 – Enriched 10 μmol/L whole blood						
Derivatized - MS/MS Non-kit	811	27.47	3.48	7.32	16.97	0.99
Non-derivatized MS/MS Non-kit	108	26.52	2.28	3.08	14.65	1.13
Derivatized - MS/MS PE NeoGram MS2 Kit	270	23.89	1.81	3.49	17.19	0.62
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	27.92	2.36	4.36	15.00	1.21
Non-derivatized-MS/MS PE NeoBase Kit	49	20.91	1.46	2.97	11.68	0.86
Derivatized-MS/MS Chromsystems Kit	19	25.37	2.00	2.14	15.67	0.99
Lot 867 – Enriched 20 μmol/L whole blood						
Derivatized - MS/MS Non-kit	811	36.38	4.33	9.02	16.97	0.99
Non-derivatized MS/MS Non-kit	107	37.36	3.09	4.67	14.65	1.13
Derivatized - MS/MS PE NeoGram MS2 Kit	269	29.34	1.95	3.46	17.19	0.62
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	38.92	3.75	5.68	15.00	1.21
Non-derivatized-MS/MS PE NeoBase Kit	48	29.00	1.89	4.29	11.68	0.86
Derivatized-MS/MS Chromsystems Kit	20	34.72	3.24	3.24	15.67	0.99
Lot 868 – Enriched 30 μmol/L whole blood						
Derivatized - MS/MS Non-kit	809	46.77	5.15	11.57	16.97	0.99
Non-derivatized MS/MS Non-kit	106	48.26	4.19	5.37	14.65	1.13
Derivatized - MS/MS PE NeoGram MS2 Kit	271	35.92	2.53	3.96	17.19	0.62
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	51.43	3.44	6.60	15.00	1.21
Non-derivatized-MS/MS PE NeoBase Kit	39	36.94	2.83	3.94	11.68	0.86
Derivatized-MS/MS Chromsystems Kit	19	45.76	3.05	3.61	15.67	0.99

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

PROPIONYLCARNITINE (μmol C3/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	796	1.67	0.24	0.43	1.75	1.02
Non-derivatized MS/MS Non-kit	113	1.74	0.22	0.54	1.74	1.15
Derivatized - MS/MS PE NeoGram MS2 Kit	274	1.33	0.10	0.15	1.38	0.88
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	1.55	0.33	0.45	1.74	1.12
Non-derivatized-MS/MS PE NeoBase Kit	58	1.33	0.10	0.23	1.43	0.86
Derivatized-MS/MS Chromsystems Kit	20	1.68	0.29	0.38	1.91	0.95
Lot 866 – Enriched 3 μmol/L whole blood						
Derivatized - MS/MS Non-kit	789	4.93	0.58	1.10	1.75	1.02
Non-derivatized MS/MS Non-kit	110	5.26	0.53	0.75	1.74	1.15
Derivatized - MS/MS PE NeoGram MS2 Kit	276	4.10	0.29	0.38	1.38	0.88
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	5.39	0.60	1.10	1.74	1.12
Non-derivatized-MS/MS PE NeoBase Kit	60	4.07	0.28	0.63	1.43	0.86
Derivatized-MS/MS Chromsystems Kit	20	5.00	0.90	1.17	1.91	0.95
Lot 867 – Enriched 7.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	790	9.36	1.08	1.92	1.75	1.02
Non-derivatized MS/MS Non-kit	110	10.25	1.01	1.32	1.74	1.15
Derivatized - MS/MS PE NeoGram MS2 Kit	274	7.99	0.48	0.72	1.38	0.88
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	10.10	1.01	2.01	1.74	1.12
Non-derivatized-MS/MS PE NeoBase Kit	60	7.99	0.45	1.24	1.43	0.86
Derivatized-MS/MS Chromsystems Kit	20	9.17	1.19	1.64	1.91	0.95
Lot 868 – Enriched 12 μmol/L whole blood						
Derivatized - MS/MS Non-kit	785	14.02	1.58	3.18	1.75	1.02
Non-derivatized MS/MS Non-kit	110	15.63	1.69	2.26	1.74	1.15
Derivatized - MS/MS PE NeoGram MS2 Kit	275	11.96	0.79	1.16	1.38	0.88
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	15.20	1.77	3.89	1.74	1.12
Non-derivatized-MS/MS PE NeoBase Kit	49	11.59	0.90	1.45	1.43	0.86
Derivatized-MS/MS Chromsystems Kit	20	13.17	1.58	1.72	1.91	0.95

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

MALONYLCARNITINE (μmol C3DC/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Assayed 0.06 μmol/L whole blood						
Derivatized - MS/MS Non-kit	582	0.06	0.03	0.04	-0.03	1.22
Non-derivatized MS/MS Non-kit	40	0.24	0.03	0.17	0.18	0.66
Derivatized - MS/MS PE NeoGram MS2 Kit	234	0.08	0.02	0.03	-0.15	3.12
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	0.45	0.10	0.18	0.28	2.70
Non-derivatized-MS/MS PE NeoBase Kit	40	0.26	0.04	0.21	0.19	1.06
Derivatized-MS/MS Chromsystems Kit	20	0.06	0.01	0.03	-0.13	2.44
Lot 866 – Assayed 0.30 μmol/L whole blood						
Derivatized - MS/MS Non-kit	584	0.34	0.07	0.14	-0.03	1.22
Non-derivatized MS/MS Non-kit	40	0.38	0.07	0.26	0.18	0.66
Derivatized - MS/MS PE NeoGram MS2 Kit	239	0.77	0.08	0.18	-0.15	3.12
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	1.11	0.13	0.44	0.28	2.70
Non-derivatized-MS/MS PE NeoBase Kit	40	0.50	0.07	0.33	0.19	1.06
Derivatized-MS/MS Chromsystems Kit	20	0.58	0.06	0.17	-0.13	2.44
Lot 867 – Assayed 0.71 μmol/L whole blood						
Derivatized - MS/MS Non-kit	582	0.81	0.14	0.30	-0.03	1.22
Non-derivatized MS/MS Non-kit	40	0.64	0.08	0.39	0.18	0.66
Derivatized - MS/MS PE NeoGram MS2 Kit	240	1.99	0.19	0.49	-0.15	3.12
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	2.17	0.28	0.85	0.28	2.70
Non-derivatized-MS/MS PE NeoBase Kit	40	0.92	0.15	0.59	0.19	1.06
Derivatized-MS/MS Chromsystems Kit	20	1.52	0.16	0.48	-0.13	2.44
Lot 867 – Assayed 1.25 μmol/L whole blood						
Derivatized - MS/MS Non-kit	583	1.52	0.26	0.56	-0.03	1.22
Non-derivatized MS/MS Non-kit	40	1.02	0.10	0.61	0.18	0.66
Derivatized - MS/MS PE NeoGram MS2 Kit	240	3.78	0.40	0.88	-0.15	3.12
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	3.68	0.39	1.50	0.28	2.70
Non-derivatized-MS/MS PE NeoBase Kit	40	1.52	0.14	0.90	0.19	1.06
Derivatized-MS/MS Chromsystems Kit	20	2.96	0.32	0.97	-0.13	2.44

Note that for both kit and non-kit users, the calculation of concentrations for the quality control lots varied with type of internal standard. Data are not sorted by internal standard type. In a survey, participants reported using d6-C5DC, d3-C8, d3-C3, or d3-C16.

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

BUTYRYLCARNITINE (μmol C4/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	785	0.28	0.07	0.10	0.27	0.90
Non-derivatized MS/MS Non-kit	114	0.28	0.08	0.16	0.26	0.85
Derivatized - MS/MS PE NeoGram MS2 Kit	264	0.25	0.06	0.07	0.23	0.74
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	0.37	0.16	0.21	0.41	0.80
Non-derivatized-MS/MS PE NeoBase Kit	59	0.24	0.03	0.05	0.24	0.82
Derivatized-MS/MS Chromsystems Kit	20	0.20	0.01	0.05	0.14	0.73
Lot 866 – Enriched 1 μmol/L whole blood						
Derivatized - MS/MS Non-kit	786	1.23	0.17	0.23	0.27	0.90
Non-derivatized MS/MS Non-kit	118	1.13	0.12	0.30	0.26	0.85
Derivatized - MS/MS PE NeoGram MS2 Kit	265	1.02	0.18	0.19	0.23	0.74
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	1.23	0.29	0.32	0.41	0.80
Non-derivatized-MS/MS PE NeoBase Kit	60	1.11	0.09	0.17	0.24	0.82
Derivatized-MS/MS Chromsystems Kit	19	0.91	0.05	0.13	0.14	0.73
Lot 867 – Enriched 2.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	789	2.43	0.30	0.44	0.27	0.90
Non-derivatized MS/MS Non-kit	117	2.29	0.22	0.67	0.26	0.85
Derivatized - MS/MS PE NeoGram MS2 Kit	264	1.97	0.26	0.32	0.23	0.74
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	2.44	0.45	0.50	0.41	0.80
Non-derivatized-MS/MS PE NeoBase Kit	60	2.22	0.14	0.41	0.24	0.82
Derivatized-MS/MS Chromsystems Kit	20	1.82	0.16	0.29	0.14	0.73
Lot 868 – Enriched 5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	787	4.84	0.54	0.84	0.27	0.90
Non-derivatized MS/MS Non-kit	115	4.56	0.41	1.38	0.26	0.85
Derivatized - MS/MS PE NeoGram MS2 Kit	265	3.98	0.59	0.64	0.23	0.74
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	4.38	0.87	0.93	0.41	0.80
Non-derivatized-MS/MS PE NeoBase Kit	49	4.40	0.30	0.54	0.24	0.82
Derivatized-MS/MS Chromsystems Kit	19	3.89	0.29	0.57	0.14	0.73

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

ISOVALERYLCARNITINE (μmol C5/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	802	0.16	0.04	0.07	0.17	0.96
Non-derivatized MS/MS Non-kit	118	0.15	0.03	0.06	0.14	0.97
Derivatized - MS/MS PE NeoGram MS2 Kit	272	0.14	0.04	0.05	0.15	0.83
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	0.20	0.08	0.11	0.21	0.80
Non-derivatized-MS/MS PE NeoBase Kit	59	0.13	0.02	0.02	0.14	0.83
Derivatized-MS/MS Chromsystems Kit	20	0.15	0.01	0.01	0.15	0.97
Lot 866 – Enriched 0.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	803	0.67	0.10	0.16	0.17	0.96
Non-derivatized MS/MS Non-kit	118	0.63	0.07	0.21	0.14	0.97
Derivatized - MS/MS PE NeoGram MS2 Kit	275	0.58	0.09	0.11	0.15	0.83
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	0.63	0.18	0.23	0.21	0.80
Non-derivatized-MS/MS PE NeoBase Kit	60	0.57	0.06	0.09	0.14	0.83
Derivatized-MS/MS Chromsystems Kit	19	0.64	0.05	0.05	0.15	0.97
Lot 867 – Enriched 1.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	804	1.60	0.20	0.30	0.17	0.96
Non-derivatized MS/MS Non-kit	114	1.58	0.15	0.48	0.14	0.97
Derivatized - MS/MS PE NeoGram MS2 Kit	274	1.37	0.18	0.21	0.15	0.83
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	1.40	0.32	0.39	0.21	0.80
Non-derivatized-MS/MS PE NeoBase Kit	59	1.40	0.10	0.22	0.14	0.83
Derivatized-MS/MS Chromsystems Kit	19	1.57	0.12	0.12	0.15	0.97
Lot 868 – Enriched 3 μmol/L whole blood						
Derivatized - MS/MS Non-kit	813	3.05	0.35	0.56	0.17	0.96
Non-derivatized MS/MS Non-kit	117	3.05	0.36	1.03	0.14	0.97
Derivatized - MS/MS PE NeoGram MS2 Kit	275	2.66	0.37	0.41	0.15	0.83
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	2.60	0.52	0.73	0.21	0.80
Non-derivatized-MS/MS PE NeoBase Kit	50	2.63	0.26	0.40	0.14	0.83
Derivatized-MS/MS Chromsystems Kit	19	3.06	0.23	0.24	0.15	0.97

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

GLUTARYLCARNITINE (μmol C5DC/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 - Assayed 0.06 μmol/L whole blood						
Derivatized - MS/MS Non-kit	803	0.05	0.02	0.03	-0.03	1.36
Non-derivatized MS/MS Non-kit	88	0.07	0.03	0.06	-0.06	2.18
Derivatized - MS/MS PE NeoGram MS2 Kit	269	0.07	0.01	0.02	-0.11	3.16
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	0.15	0.04	0.11	-0.12	5.19
Non-derivatized-MS/MS PE NeoBase Kit	50	0.12	0.03	0.05	-0.01	2.69
Derivatized-MS/MS Chromsystems Kit	20	0.08	0.01	0.03	-0.17	4.11
Lot 866 – Assayed 0.23 μmol/L whole blood						
Derivatized - MS/MS Non-kit	814	0.29	0.06	0.11	-0.03	1.36
Non-derivatized MS/MS Non-kit	90	0.44	0.07	0.29	-0.06	2.18
Derivatized - MS/MS PE NeoGram MS2 Kit	272	0.61	0.05	0.07	-0.11	3.16
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	1.12	0.18	0.59	-0.12	5.19
Non-derivatized-MS/MS PE NeoBase Kit	50	0.63	0.07	0.13	-0.01	2.69
Derivatized-MS/MS Chromsystems Kit	20	0.77	0.09	0.29	-0.17	4.11
Lot 867 – Assayed 0.39 μmol/L whole blood						
Derivatized - MS/MS Non-kit	804	0.51	0.08	0.18	-0.03	1.36
Non-derivatized MS/MS Non-kit	90	0.80	0.09	0.49	-0.06	2.18
Derivatized - MS/MS PE NeoGram MS2 Kit	275	1.13	0.07	0.13	-0.11	3.16
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	1.90	0.34	1.12	-0.12	5.19
Non-derivatized-MS/MS PE NeoBase Kit	50	1.10	0.09	0.19	-0.01	2.69
Derivatized-MS/MS Chromsystems Kit	20	1.43	0.16	0.48	-0.17	4.11
Lot 868 – Assayed 0.72 μmol/L whole blood						
Derivatized - MS/MS Non-kit	811	0.95	0.15	0.35	-0.03	1.36
Non-derivatized MS/MS Non-kit	90	1.51	0.18	0.91	-0.06	2.18
Derivatized - MS/MS PE NeoGram MS2 Kit	272	2.16	0.16	0.26	-0.11	3.16
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	3.60	0.50	2.29	-0.12	5.19
Non-derivatized-MS/MS PE NeoBase Kit	39	1.90	0.14	0.21	-0.01	2.69
Derivatized-MS/MS Chromsystems Kit	20	2.79	0.37	0.91	-0.17	4.11

Note that for both kit and non-kit users, the calculation of concentrations for the quality control lots varied with type of internal standard. Data are not sorted by internal standard type. In a survey, participants reported using d3-C5, d9-C5, d3-C8, or d6-C5DC as an internal standard for C5DC.

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

3-HYDROXYISOVALERYLCARNITINE (μmol C5OH/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	730	0.47	0.08	0.14	0.48	0.76
Non-derivatized MS/MS Non-kit	86	0.73	0.07	0.55	0.69	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	276	0.44	0.08	0.13	0.44	0.67
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	0.58	0.18	0.27	0.57	0.56
Non-derivatized-MS/MS PE NeoBase Kit	20	0.43	0.03	0.04	0.43	0.41
Derivatized-MS/MS Chromsystems Kit	18	0.36	0.02	0.05	0.35	0.56
Lot 866 – Enriched 1 μmol/L whole blood						
Derivatized - MS/MS Non-kit	732	1.25	0.18	0.32	0.48	0.76
Non-derivatized MS/MS Non-kit	84	1.51	0.16	1.09	0.69	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	276	1.12	0.16	0.30	0.44	0.67
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	1.12	0.26	0.27	0.57	0.56
Non-derivatized-MS/MS PE NeoBase Kit	20	0.85	0.08	0.11	0.43	0.41
Derivatized-MS/MS Chromsystems Kit	17	0.91	0.06	0.10	0.35	0.56
Lot 867 – Enriched 2 μmol/L whole blood						
Derivatized - MS/MS Non-kit	731	1.98	0.28	0.52	0.48	0.76
Non-derivatized MS/MS Non-kit	88	2.48	0.22	1.71	0.69	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	274	1.77	0.24	0.46	0.44	0.67
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	1.69	0.31	0.36	0.57	0.56
Non-derivatized-MS/MS PE NeoBase Kit	20	1.24	0.10	0.10	0.43	0.41
Derivatized-MS/MS Chromsystems Kit	18	1.47	0.13	0.19	0.35	0.56
Lot 868 – Enriched 3 μmol/L whole blood						
Derivatized - MS/MS Non-kit	726	2.77	0.37	0.67	0.48	0.76
Non-derivatized MS/MS Non-kit	88	3.37	0.25	2.12	0.69	0.89
Derivatized - MS/MS PE NeoGram MS2 Kit	277	2.47	0.37	0.66	0.44	0.67
Non-derivatized - MS/MS PE NeoGram MS2 Kit	40	2.26	0.51	0.56	0.57	0.56
Non-derivatized-MS/MS PE NeoBase Kit	20	1.68	0.13	0.20	0.43	0.41
Derivatized-MS/MS Chromsystems Kit	17	2.05	0.18	0.20	0.35	0.56

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

HEXANOYLCARNITINE (μmol C6/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	804	0.07	0.03	0.04	0.07	0.84
Non-derivatized MS/MS Non-kit	114	0.06	0.02	0.06	0.05	0.95
Derivatized - MS/MS PE NeoGram MS2 Kit	271	0.05	0.02	0.03	0.08	0.57
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	0.05	0.03	0.07	0.09	0.88
Non-derivatized-MS/MS PE NeoBase Kit	57	0.04	0.01	0.01	0.06	0.69
Derivatized-MS/MS Chromsystems Kit	18	0.05	0.01	0.01	0.06	0.74
Lot 866 – Enriched 0.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	816	0.50	0.08	0.12	0.07	0.84
Non-derivatized MS/MS Non-kit	113	0.54	0.06	0.30	0.05	0.95
Derivatized - MS/MS PE NeoGram MS2 Kit	274	0.40	0.07	0.08	0.08	0.57
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	0.54	0.08	0.11	0.09	0.88
Non-derivatized-MS/MS PE NeoBase Kit	60	0.43	0.04	0.10	0.06	0.69
Derivatized-MS/MS Chromsystems Kit	17	0.45	0.02	0.04	0.06	0.74
Lot 867 – Enriched 1.0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	808	0.89	0.12	0.19	0.07	0.84
Non-derivatized MS/MS Non-kit	109	0.96	0.10	0.56	0.05	0.95
Derivatized - MS/MS PE NeoGram MS2 Kit	275	0.67	0.10	0.11	0.08	0.57
Non-derivatized - MS/MS PE NeoGram MS2 Kit	47	1.00	0.18	0.21	0.09	0.88
Non-derivatized-MS/MS PE NeoBase Kit	60	0.76	0.05	0.19	0.06	0.69
Derivatized-MS/MS Chromsystems Kit	18	0.79	0.06	0.07	0.06	0.74
Lot 868 – Enriched 2.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	816	2.18	0.28	0.45	0.07	0.84
Non-derivatized MS/MS Non-kit	111	2.45	0.22	1.51	0.05	0.95
Derivatized - MS/MS PE NeoGram MS2 Kit	279	1.50	0.25	0.29	0.08	0.57
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	2.26	0.41	0.52	0.09	0.88
Non-derivatized-MS/MS PE NeoBase Kit	50	1.78	0.16	0.46	0.06	0.69
Derivatized-MS/MS Chromsystems Kit	18	1.92	0.18	0.20	0.06	0.74

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

OCTANOYLCARNITINE (μmol C8/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	834	0.11	0.03	0.04	0.11	1.02
Non-derivatized MS/MS Non-kit	136	0.11	0.02	0.06	0.10	1.05
Derivatized - MS/MS PE NeoGram MS2 Kit	272	0.09	0.03	0.04	0.08	0.86
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	0.14	0.05	0.07	0.12	0.96
Non-derivatized-MS/MS PE NeoBase Kit	59	0.08	0.02	0.02	0.08	0.93
Derivatized-MS/MS Chromsystems Kit	18	0.07	0.01	0.01	0.05	0.79
Lot 866 – Enriched 0.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	848	0.65	0.18	0.22	0.11	1.02
Non-derivatized MS/MS Non-kit	134	0.65	0.07	0.16	0.10	1.05
Derivatized - MS/MS PE NeoGram MS2 Kit	275	0.53	0.09	0.09	0.08	0.86
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	0.60	0.13	0.14	0.12	0.96
Non-derivatized-MS/MS PE NeoBase Kit	60	0.57	0.05	0.08	0.08	0.93
Derivatized-MS/MS Chromsystems Kit	17	0.46	0.04	0.09	0.05	0.79
Lot 867 – Enriched 1.0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	849	1.08	0.16	0.24	0.11	1.02
Non-derivatized MS/MS Non-kit	132	1.09	0.12	0.27	0.10	1.05
Derivatized - MS/MS PE NeoGram MS2 Kit	277	0.90	0.14	0.15	0.08	0.86
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	1.05	0.18	0.21	0.12	0.96
Non-derivatized-MS/MS PE NeoBase Kit	59	0.97	0.07	0.13	0.08	0.93
Derivatized-MS/MS Chromsystems Kit	18	0.79	0.08	0.18	0.05	0.79
Lot 868 – Enriched 2.5 mmol/L whole blood						
Derivatized - MS/MS Non-kit	831	2.68	0.30	0.50	0.11	1.02
Non-derivatized MS/MS Non-kit	131	2.73	0.29	0.72	0.10	1.05
Derivatized - MS/MS PE NeoGram MS2 Kit	276	2.23	0.33	0.36	0.08	0.86
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	2.54	0.46	0.59	0.12	0.96
Non-derivatized-MS/MS PE NeoBase Kit	49	2.41	0.23	0.30	0.08	0.93
Derivatized-MS/MS Chromsystems Kit	17	2.03	0.16	0.35	0.05	0.79

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

DECANOYLCARNITINE (μmol C10/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	801	0.14	0.03	0.05	0.15	1.19
Non-derivatized MS/MS Non-kit	124	0.14	0.03	0.11	0.15	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	273	0.09	0.02	0.03	0.09	0.77
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	0.16	0.05	0.07	0.15	1.01
Non-derivatized-MS/MS PE NeoBase Kit	58	0.11	0.01	0.05	0.12	0.91
Derivatized-MS/MS Chromsystems Kit	20	0.09	0.01	0.01	0.08	0.82
Lot 866 – Enriched 0.25 μmol/L whole blood						
Derivatized - MS/MS Non-kit	819	0.45	0.09	0.13	0.15	1.19
Non-derivatized MS/MS Non-kit	126	0.43	0.07	0.18	0.15	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	273	0.29	0.05	0.06	0.09	0.77
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	0.39	0.08	0.10	0.15	1.01
Non-derivatized-MS/MS PE NeoBase Kit	58	0.34	0.03	0.05	0.12	0.91
Derivatized-MS/MS Chromsystems Kit	19	0.29	0.03	0.04	0.08	0.82
Lot 867 – Enriched 0.75 μmol/L whole blood						
Derivatized - MS/MS Non-kit	809	1.03	0.15	0.23	0.15	1.19
Non-derivatized MS/MS Non-kit	126	0.94	0.14	0.35	0.15	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	274	0.68	0.10	0.12	0.09	0.77
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	0.92	0.15	0.16	0.15	1.01
Non-derivatized-MS/MS PE NeoBase Kit	58	0.81	0.05	0.11	0.12	0.91
Derivatized-MS/MS Chromsystems Kit	19	0.69	0.06	0.11	0.08	0.82
Lot 868 – Enriched 1.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	804	1.93	0.24	0.43	0.15	1.19
Non-derivatized MS/MS Non-kit	125	1.75	0.23	0.65	0.15	1.07
Derivatized - MS/MS PE NeoGram MS2 Kit	276	1.25	0.18	0.21	0.09	0.77
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	1.65	0.26	0.29	0.15	1.01
Non-derivatized-MS/MS PE NeoBase Kit	47	1.48	0.13	0.19	0.12	0.91
Derivatized-MS/MS Chromsystems Kit	19	1.31	0.11	0.13	0.08	0.82

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

MYRISTOYLCARNITINE (μmol C14/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	777	0.12	0.03	0.05	0.13	0.97
Non-derivatized MS/MS Non-kit	118	0.10	0.03	0.05	0.09	0.98
Derivatized - MS/MS PE NeoGram MS2 Kit	271	0.09	0.03	0.03	0.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	0.10	0.03	0.08	0.11	0.67
Non-derivatized-MS/MS PE NeoBase Kit	58	0.07	0.01	0.02	0.08	0.86
Derivatized-MS/MS Chromsystems Kit	30	0.10	0.02	0.04	0.12	0.91
Lot 866 – Enriched 0.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	790	0.62	0.10	0.16	0.13	0.97
Non-derivatized MS/MS Non-kit	116	0.58	0.07	0.19	0.09	0.98
Derivatized - MS/MS PE NeoGram MS2 Kit	271	0.50	0.07	0.08	0.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	0.44	0.11	0.14	0.11	0.67
Non-derivatized-MS/MS PE NeoBase Kit	59	0.50	0.04	0.07	0.08	0.86
Derivatized-MS/MS Chromsystems Kit	30	0.60	0.11	0.29	0.12	0.91
Lot 867 – Enriched 1.5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	786	1.59	0.23	0.36	0.13	0.97
Non-derivatized MS/MS Non-kit	118	1.53	0.16	0.49	0.09	0.98
Derivatized - MS/MS PE NeoGram MS2 Kit	274	1.29	0.16	0.17	0.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	1.14	0.16	0.26	0.11	0.67
Non-derivatized-MS/MS PE NeoBase Kit	58	1.38	0.10	0.20	0.08	0.86
Derivatized-MS/MS Chromsystems Kit	30	1.50	0.21	0.64	0.12	0.91
Lot 868 – Enriched 3.0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	781	3.02	0.38	0.62	0.13	0.97
Non-derivatized MS/MS Non-kit	117	3.03	0.37	0.99	0.09	0.98
Derivatized - MS/MS PE NeoGram MS2 Kit	277	2.51	0.30	0.35	0.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	2.12	0.26	0.50	0.11	0.67
Non-derivatized-MS/MS PE NeoBase Kit	50	2.64	0.22	0.41	0.08	0.86
Derivatized-MS/MS Chromsystems Kit	30	2.85	0.50	1.21	0.12	0.91

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

PALMITOYLCARNITINE (μmol C16/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	793	1.14	0.16	0.25	1.12	0.84
Non-derivatized MS/MS Non-kit	115	1.16	0.17	0.33	1.10	0.86
Derivatized - MS/MS PE NeoGram MS2 Kit	275	1.12	0.17	0.19	1.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	1.12	0.21	0.22	1.07	0.84
Non-derivatized-MS/MS PE NeoBase Kit	58	1.11	0.10	0.17	1.09	0.86
Derivatized-MS/MS Chromsystems Kit	29	1.09	0.18	0.33	1.15	0.79
Lot 866 – Enriched 4 μmol/L whole blood						
Derivatized - MS/MS Non-kit	797	4.44	0.49	0.78	1.12	0.84
Non-derivatized MS/MS Non-kit	112	4.48	0.51	1.10	1.10	0.86
Derivatized - MS/MS PE NeoGram MS2 Kit	274	4.28	0.52	0.54	1.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	49	4.49	0.44	0.63	1.07	0.84
Non-derivatized-MS/MS PE NeoBase Kit	59	4.43	0.36	0.45	1.09	0.86
Derivatized-MS/MS Chromsystems Kit	30	4.38	1.00	1.60	1.15	0.79
Lot 867 – Enriched 8 μmol/L whole blood						
Derivatized - MS/MS Non-kit	799	7.87	0.82	1.40	1.12	0.84
Non-derivatized MS/MS Non-kit	113	7.95	0.87	2.05	1.10	0.86
Derivatized - MS/MS PE NeoGram MS2 Kit	274	7.57	0.80	0.89	1.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	50	7.52	0.87	1.35	1.07	0.84
Non-derivatized-MS/MS PE NeoBase Kit	59	8.06	0.61	0.87	1.09	0.86
Derivatized-MS/MS Chromsystems Kit	30	7.45	1.21	2.26	1.15	0.79
Lot 868 – Enriched 12 μmol/L whole blood						
Derivatized - MS/MS Non-kit	798	11.21	1.17	1.94	1.12	0.84
Non-derivatized MS/MS Non-kit	111	11.50	1.22	2.88	1.10	0.86
Derivatized - MS/MS PE NeoGram MS2 Kit	275	10.78	1.22	1.33	1.09	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	48	11.30	1.11	1.19	1.07	0.84
Non-derivatized-MS/MS PE NeoBase Kit	49	11.28	0.89	1.16	1.09	0.86
Derivatized-MS/MS Chromsystems Kit	30	10.59	1.77	3.11	1.15	0.79

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

2009 Quality Control Data
Summaries of Statistical Analyses

STEAROYLCARNITINE (μmol C18/L whole blood)

METHOD	N	Mean	Average Within Lab SD	Total SD	Y-Intercept*	Slope
Lot 865 – Nonenriched 0 μmol/L whole blood						
Derivatized - MS/MS Non-kit	752	0.92	0.14	0.26	0.92	0.81
Non-derivatized MS/MS Non-kit	97	0.78	0.11	0.24	0.76	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	268	0.88	0.12	0.12	0.86	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	0.97	0.15	0.25	0.93	0.85
Non-derivatized-MS/MS PE NeoBase Kit	50	0.90	0.07	0.10	0.91	0.83
Derivatized-MS/MS Chromsystems Kit	20	0.67	0.04	0.21	0.67	0.58
Lot 866 – Enriched 1 μmol/L whole blood						
Derivatized - MS/MS Non-kit	753	1.71	0.23	0.44	0.92	0.81
Non-derivatized MS/MS Non-kit	98	1.47	0.19	0.48	0.76	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	265	1.67	0.18	0.20	0.86	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	38	1.78	0.20	0.30	0.93	0.85
Non-derivatized-MS/MS PE NeoBase Kit	48	1.74	0.12	0.14	0.91	0.83
Derivatized-MS/MS Chromsystems Kit	20	1.26	0.16	0.44	0.67	0.58
Lot 867 – Enriched 2 μmol/L whole blood						
Derivatized - MS/MS Non-kit	767	2.55	0.35	0.72	0.92	0.81
Non-derivatized MS/MS Non-kit	97	2.17	0.25	0.65	0.76	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	263	2.46	0.25	0.28	0.86	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	38	2.56	0.40	0.60	0.93	0.85
Non-derivatized-MS/MS PE NeoBase Kit	50	2.59	0.19	0.23	0.91	0.83
Derivatized-MS/MS Chromsystems Kit	20	1.84	0.15	0.55	0.67	0.58
Lot 868 – Enriched 5 μmol/L whole blood						
Derivatized - MS/MS Non-kit	751	4.96	0.63	1.31	0.92	0.81
Non-derivatized MS/MS Non-kit	97	4.37	0.51	1.38	0.76	0.72
Derivatized - MS/MS PE NeoGram MS2 Kit	263	4.90	0.52	0.56	0.86	0.81
Non-derivatized - MS/MS PE NeoGram MS2 Kit	39	5.19	0.82	1.37	0.93	0.85
Non-derivatized-MS/MS PE NeoBase Kit	39	5.07	0.38	0.42	0.91	0.83
Derivatized-MS/MS Chromsystems Kit	19	3.60	0.23	0.93	0.67	0.58

*Estimated by performing a weighted linear regression analysis of mean reported concentrations versus enriched concentrations and extrapolating the regression to the Y-axis.

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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