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To

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Amended report issued: Heidelberg, September 25th , 2018
Changes: C5DC replaced by C5OH on page 3 for Sample 2016.02 – Analytical details
Please discard the original report dated 01 March 2017

ERNDIM QA Scheme for Qualitative Blood Spot Acylcarnitine Analysis

Annual Report 2016

Participation

The geographical distributions of the active participants of the quality assurance scheme organized and distributed through the centre of Heidelberg in 2015 are shown in Table 1. London and Heidelberg participate in each other´s scheme and the two centers work closely together under the auspices of the ERNDIM Scientific Advisory Committee.

Country	Number of laboratories
Argentina	3
Austria	1
Belgium	6
Brazil	1
Bulgaria	1
China	2
Croatia	1
Czech Republic	2
France	16
Germany	8
Greece	1
Hong Kong	1
Lebanon	1
Luxembourg	1
Morocco	1
Slovakia	1
Switzerland	3
The Netherlands	5
Turkey	1
United Kingdom	2
Total	58

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Samples and results

Two sets of three blood spot samples (total 6; sample number 2016.01, 2016.02, 2016.03, 2016.04, 2016.05 and 2016.06) were distributed to **58 laboratories**.

Five laboratories returned results only for one circulation.

Table 2: Receipt of results

Circulation	In time returns	Late returns	Total
1. circulation	56	2	58
2. circulation	52	1	52

Shipment of the samples

Blood spot samples prepared on Whatman 903™ specimen collection paper were shipped on 21 September 2016 and on 24 November 2016.

Table 3: Distribution of scores for individual samples (laboratories making returns)

		4	3	2	1	0
Sample 2016.01	Propionic acidaemia	56	2			
Sample 2016.02	3-methylglutaconic aciduria type I	52	4		1	1
Sample 2016.03	Isovaleric acidaemia	58				
Sample 2016.04	medium-chain acyl-CoA dehydrogenase (MCAD) deficiency	53				
Sample 2016.05	Glutaric aciduria type I	53				
Sample 2016.06	Normal profile	51	2			

Comments on performance

Sample 2016.01:

Patient details: 6-month-old boy with dehydration and seizure after vomiting for 24 hours

Known diagnosis: propionic acidaemia

Analytical details Elevated C3 and ratio C3/C2.
The median of all reported values for C3 was 17.95 µmol/L with an upper reference limit of 3.0 µmol/l (median)

Analytical Performance: 100%

Diagnostic Performance:	97%.
Overall impression:	Good analytical and diagnostic performance.

Sample 2016.02:

Patient details:	4-year-old boy with developmental delay
Known diagnosis:	3-methylglutaconic aciduria type I
Analytical details	Elevated C5OH and ratio C5OH/C2. The median of all reported values for C5OH was 1.97 µmol/L with an upper reference limit of 0.547 µmol/l (median)
Analytical Performance:	98% for reporting elevated C5OH.
Diagnostic Performance:	97% with 3-methylglutaconic aciduria as main diagnosis or differential diagnosis, or advice for determination of organic acids in urine.

Sample 2016.03:

Patient details:	5-year-old boy presented with ketoacidosis after minor febrile illness
Known diagnosis:	isovaleric acidaemia
Analytical details	Elevated C5 and ratio C5/C2. The median of all reported values for C5 was 6.1 µmol/L with an upper reference limit of 0.42 µmol/l (median)
Analytical Performance:	100%
Diagnostic Performance:	100%.
Overall impression:	Very good analytical and diagnostic performance.

Sample 2016.04:

Patient details:	3-year-old girl presented with hypoglycaemic seizure
Known diagnosis:	medium-chain acyl-CoA dehydrogenase (MCAD) deficiency
Analytical details	Clearly elevated C6 , C8 , C10 , C10:1 and ratio C8/C12. The median of all reported values for C6 was 0.36 µmol/L with an upper reference limit of 0.2 µmol/l (median)

	The median of all reported values for C8 was 2.18 µmol/L with an upper reference limit of 0.22 µmol/l (median) The median of all reported values for C10:1 was 0.549 µmol/L with an upper reference limit of 0.175 µmol/l (median)
Analytical Performance:	98% for C8, 88% for C6 and 87% for C10:1.
Diagnostic Performance:	100%.
Overall impression:	Very good analytical and diagnostic performance.

Sample 2016.05:

Patient details:	13-month-old boy. Presented with hypotonia after febrile illness
Known diagnosis:	glutaric aciduria type I
Analytical details	Elevated C5DC with ratios C5DC/C8 and C5DC/C16
Analytical Performance:	100% for C5DC The median of all reported values for C5DC was 0.94 µmol/L with an upper reference limit of 0.2 µmol/l (median)
Diagnostic Performance:	100%
Overall impression:	Very good analytical and diagnostic performance.

Sample 2016.06:

Patient details:	25-year-old female with muscular weakness
Known diagnosis:	normal profile
Analytical details	no abnormalities
Analytical Performance:	71%. Five participants reported elevated amounts of C4DC
Diagnostic Performance:	96%

Scoring scheme

In 2013 we changed the scoring system from the former scale (-2, -1, 0, +1, +2) to the four-point system (+1, +2, + 3, +4) which is used also in the DPT schemes. In this system a maximum of two points is given each for analytical results and interpretation, with the latter including suggestions for further testing/actions.

The total score achievable for a single circulation of three samples is twelve. The maximal achievable score, full points for the year is twenty-four for the whole sample set of six samples in the year.

To obtain satisfactory performance a score of 16 or more should be achieved on two returns. Laboratories that participate only in one circulation are treated as non-submitters.

Another criteria for satisfactory performance will be the absence of any "critical error" which is defined as an error resulting from seriously misleading analytical findings and /or interpretations with serious clinical consequences for the patient.

The final scoring and all proposed critical errors will need to be ratified by the Scientific Advisory Board (SAB).

Further information on the concept of 'critical error' can be found in the ERNDIM Newsletters at www.erndim.org.

The participants´ cumulative scores are shown in table 4. Cumulative scores are the scores for the whole year.

This year forty-six participants got full marks. This is 86.8% of all participants that returned results for both circulations, and 79.3% of all registered participants.

Table 4: cumulative total scores 2016 (all registered laboratories that returned results for both circulations)

	Percent of participants			
Cumulative scores	**2016**	**2015**	**2014**	**2013** (maximal achievable score was 20)
24	86.8	70.5	89.2	Not defined
23	13.2	9.8	-	Not defined
22	-	7.8	4.3	Not defined
21	-	2	4.3	Not defined
20	-	5.9	2.2	71.7
19	-	2	-	6.5
18	-	-	-	6.5
17	-	-	-	8.7
16	-	2	-	6.5
15	-	-	-	-
14	-	-	-	-
13	-	-	-	-
12	-	-	-	-
11	-	-	-	-
10	-	-	-	-
9	-	-	-	-
8	-	-	-	-
7	-	-	-	-
6	-	-	-	-
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-
0	-	-	-	-
Number of all participants	58	58	62	60
Number of Nonresponders	5	3	16	14

Your individual scores for Sample 2016.01 – 2016.06:

Sample 2016.01

Sample 2016.02

Sample 2016.03

Sample 2016.04

Sample 2016.05

Sample 2016.06

Your total score 2016

Your total score for 2016 was:

Your number of returns in 2016 was:

General comments

We would like to point out here that we are not able to accept returns sent in after the report for the corresponding circulation has been mailed because this would not be compatible with the overall intention of the scheme. We are conscious of the fact that posted results could get lost on a variety of ways. Therefore it would be a good advice to send in results on more than one route (e.g. FAX and email, regular mail and FAX or email).

Appeal for contributing samples:

To keep the acylcarnitine scheme running we would like to encourage all participants to support us with samples. We need blood spots or whole blood. The shipping costs will be covered by us.

Please contact us under claus-dieter.langhans@med-uni-heidelberg.de for the details.

Yours sincerely,

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