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To

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ERNDIM QA Scheme for Qualitative Blood Spot Acylcarnitine Analysis

Annual Report 2013

Participation

The geographical distributions of the active participants of the quality assurance scheme organized and distributed through the centre of Heidelberg in 2013 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	2
Austria	1
Belgium	6
Brazil	1
Bulgaria	1
China	3
Czech Republic	2
France	15
Germany	9
Greece	1
Lebanon	1
Luxembourg	1
Slovakia	1
Switzerland	3
The Netherlands	8
Turkey	2
United Kingdom	2
Total	59

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Samples and results

Two sets of three blood spot samples (total 6; sample number 21A, 21B, 21C, 22A, 22B, 22C) were distributed to 59 laboratories.

Eight participants did not answer to any of the two circulations. Seven laboratories returned results only for one circulation.

Table 2: Receipt of results

Circulation	In time returns	Late returns	Total
1. circulation	46	1	47
2. circulation	50	0	50

Shipment of the samples

Blood spot samples prepared on Whatman 903™ specimen collection paper were shipped on 30 September 2013 and on 27 November 2013.

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

		4	3	2	1	0
Sample 21A	Long-chain hydroxyacyl-CoA dehydrogenase (LCHAD) deficiency	44		1	1	1
Sample 21B	Multiple acyl-CoA dehydrogenase (MAD) deficiency	45		2		
Sample 21C	Glutaric aciduria type I	47				
Sample 22A	Methylmalonic acidaemia	47	3			
Sample 22B	Normal profile	41		5	3	1
Sample 22C	Very long-chain acyl-CoA dehydrogenase (VLCAD) deficiency	excluded from scoring				

Comments on performance

The analytical performance in detecting hydroxylated long-chain acylcarnitines was 99%. The diagnostic performance for **long-chain hydroxyacyl-CoA dehydrogenase (LCHAD) deficiency** (*sample 21A*) was 96%. One participant missed this diagnosis.

Sample 21B was taken from a patient suffering from mild **multiple acyl-CoA dehydrogenase (MAD) deficiency**. Relevant metabolites were only partially increased. For scoring the differential diagnosis of MAD and MCAD deficiency along with the advice for organic acid analysis in urine was assessed. With this the interpretative performance was 94%.

The overall performance (analytical and diagnostic) for **glutaric aciduria type I** (*sample 21C*) was at 100%.

For *sample 22A* (**methylmalonic acidaemia**) the analytical performance in detecting elevated amounts of propionylcarnitine(C3) was 100% whereas the interpretative performance was 94%. Three participants diagnosed either β-ketothiolase, multiple carboxylase (MCD) deficiency or holocarboxylase synthetase deficiency.

The **normal control** *sample 22B* was correctly identified by 86% of the participants. Five laboratories detected slightly increased concentrations of hexadecanoylcarnitine (C16), octadecanoylcarnitine (C18) and/or octadecenoylcarnitine (C18:1) and diagnosed CPT II deficiency or VLCAD deficiency.

Sample 22C was collected from a patient with compensated **very long-chain acyl-CoA dehydrogenase (VLCAD) deficiency**. The interpretation was complicated by the very low levels of free and total carnitine resulting in normal to marginally elevated C14:1. The overall performance would have been only 24% and was therefore excluded from scoring.

Scoring scheme

In the process of ongoing accreditation of the ERNDIM organization there is a need for harmonization of performance assessment within the qualitative schemes (see ERNDIM 'Newsletter Spring 2013' at www.erndim.org).

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 and twenty-four for the whole sample set of six samples per 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 criterium 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 participants´ cumulative scores are shown in table 4. Cumulative scores are the scores for the whole year.

This year twenty-four participants (41% of all participants) got full marks.
Please note that the highest score in 2013 was twenty points based on five valid samples.

Table 4: cumulative total scores 2013 (all registered laboratories that returned results for both circulations)

	Number of laboratories
Cumulative scores	**2013**
24	Not defined
23	Not defined
22	Not defined
21	Not defined
20	25
19	3
18	3
17	4
16	3
15	0
14	0
13	0
12	0
11	0
10	0
9	0
8	0
7	0
6	0
5	0
4	0
3	0
2	0
1	0
0	0

Your individual scores for Sample 21A – 22C:

Sample 21A
Sample 21B
Sample 21C

Sample 22A
Sample 22B
Sample 22C

Your total score 2013

Your total score for 2013 was:

Your number of returns in 2013 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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