UniversitätsKlinikum Heidelberg

University Children´s Hospital
Metabolic Laboratory
Im Neuenheimer Feld 430 | 69120 Heidelberg

To

University Children's Hospital
Angelika-Lautenschläger-Klinik

Department of General Pediatrics
(General Pediatrics, Neurology, Metabolism, Gastroenterology, Nephrology)
Prof. Dr. med. G.F. Hoffmann
Chairman
Center for Metabolic Diseases Heidelberg

Metabolic Laboratory

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ERNDIM QA Scheme for Qualitative Blood Spot Acylcarnitine Analysis

Annual Report 2012

Participation

The geographical distributions of the active participants of the quality assurance scheme organized and distributed through the centre of Heidelberg in 2012 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	5
Brazil	1
Bulgaria	1
China	2
Czech Republic	2
France	16
Germany	6
Greece	1
Lebanon	1
Luxembourg	1
Slovakia	1
Switzerland	3
The Netherlands	8
Turkey	3
United Kingdom	2
Total	56

Im Neuenheimer Feld 430
69120 Heidelberg
Stoffwechsellabor:
Fon +49 (0)6221 56 8276
8423
Fax +49 (0)6221 56 5565

Newbornscreening
Fon +49 (0)6221 56 8278

stoffwechsellabor@uni-hd.de
www.stoffwechsel.uni-hd.de

Samples and results

Two sets of three blood spot samples (total 6; sample number 19A, 19B, 19C, 20A, 20B, 20C) were distributed to 56 laboratories.

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

Table 2: Receipt of results

Circulation	In time returns	Late returns	Total
1. circulation	42	2	44
2. circulation	47	0	47

Shipment of the samples

Blood spot samples prepared on Whatman 903™ specimen collection paper were shipped on 13th September 2012 and on 07th December 2012.

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

		-2	-1	0	1	2
Sample 19A	Long-chain hydroxyacyl-CoA dehydrogenase (LCHAD) deficiency	1	1		1	41
Sample 19B	Methylmalonic acidaemia				1	43
Sample 19C	Normal profile	5				39
Sample 20A	Glutaric aciduria type I	1				46
Sample 20B	3-Methylcrotonyl-CoA carboxylase (3-MCC) deficiency		2		5	40
Sample 20C	Medium-chain acyl-CoA dehydrogenase (MCAD) deficiency					47

Comments on performance

The analytical and diagnostic performance in identifying **methylmalonic acidaemia (#19B) medium-chain acyl-CoA dehydrogenase deficiency (#20C)** was nearly at 100%.

Sample **#19A** was taken from a patient with **long-chain hydroxyacyl-CoA dehydrogenase deficiency** and showed increased amounts of long-chain hydroxyacylcarnitines (C16OH, C18:1OH and C18OH). The analytical and diagnostic performance for this sample was at 93%. One laboratory suggested VLCAD deficiency. Two participants missed this diagnosis.

The **normal control** sample **#19C** was correctly identified by 86% of the participants. Four laboratories detected slightly increased concentrations of hexadecanoylcarnitine (C16), octadecanoylcarnitine (C18) and octadecenoylcarnitine (C18:1) and diagnosed CPT II deficiency or VLCAD deficiency.

Increased concentration of C5DC-carnitine in sample **(#20A)** was clearly detected by all except one of laboratory. The diagnostic performance for **glutaric aciduria type I** was at 98%. One participant reported a normal acylcarnitine profile.

Sample **#20B** originated from a patient suffering from **3-methylcrotonyl-CoA carboxylase deficiency**. In this dried blood sample elevated amounts of C5OH-carnitine were detectable. Several diseases are associated with increased C5OH and cause a broad differential diagnosis. Beside 3-MCCD deficiencies of HMG-CoA lyase, 3-methylglutaconyl CoA hydratase, 3-oxothiolase, 2-methyl-3-hydroxybutyryl CoA dehydrogenase, biotinidase, or holocarboxylase synthetase have to be considered. Overall 96% of the participants focused on these diagnoses. 3-MCC deficiency was suggested by 85%, in part by including secondary analytical findings such as normal C3-, C5DC- and C5:1-carnitine. Three laboratories diagnosed isovaleric acidaemia or carnitine uptake deficiency.

Scoring scheme

Individual returns for each sample were scored on the scale

2	Correct/satisfactory
1	Helpful but incomplete
0	Unhelpful / failing to return a result
-1	Slightly misleading
-2	Misleading

The ERNDIM organisation provides a single “Certificate” to cover participation and performance in all its schemes.
For the “Qualitative Acylcarnitine Scheme” we adopted the criteria to define “Participation” and “Satisfactory Performance” from the well-established system of the “Qualitative Organic Acid Scheme”.
“Participation” will be defined as requiring all two returns during a year and “Satisfactory Performance” as obtaining a score of 7 or more out of maximum score 12.
We are aware that these criteria are somewhat arbitrary but we are convinced that they will represent the different contexts in which the participants are working.

The participants´ cumulative scores are shown in table 5. Cumulative scores are the scores for the whole year.

This year twenty-nine participants (52% of all participants) got full marks!

Table 5: cumulative total scores 2012 (all registered laboratories that returned results for both circulations)

	Number of laboratories		
Cumulative scores	**2012**	**2011**	**2010**
12	29	Not defined	17
11	6	Not defined	2
10	0	Not defined	4
9	1	Not defined	0
8	3	20	11
7	0	11	4
6	7	8	1
5	1	0	0
4	1	1	1
3	1	0	1
2	0	9	1
1	1	0	0
0	0	7	8

Your individual scores for #Sample 19A – 20C:

Sample #19A
Sample #19B
Sample #19C

Sample #20A
Sample #20B
Sample #20C

Your total score 2012

Your total score for 2012 was:

Your number of returns in 2012 was:

stoffwechsellabor@uni-hd.de
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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,

Dr. C. D. Langhans

Laboratory of Metabolic Diseases

Prof. Dr. G. F. Hoffmann

Director
Department of General Paediatrics