



**External Quality Assessment
Enzyme Analysis for Lysosomal Storage Diseases**



Pilots "large scale"

- 2006 (36)**
- 2007 (46)**
- 2008 (55)**
- 2009 (59), DBS (27)**



- 2010 (58)**
- 2011 (61)**



ENZYMES 2011 PROFICIENCY TESTING

EBV CELL LINES

Hurler/Scheie (MPS I) α -L-iduronidase

Krabbe Galactocerebrosidase EBV 6

Niemann Pick A/B Sphingomyelinase EBV 4+5+8

Sanfilippo B (MPS IIIB) α -N-acetylglucosaminidase

Sly (MPS VII) β -Glucuronidase

Hunter iduronate sulphatase

MPS VI, Arylsulphatase B

GM₁ (Morquio B) β -Galactosidase

Mannosidosis β -mannosidase EBV 2

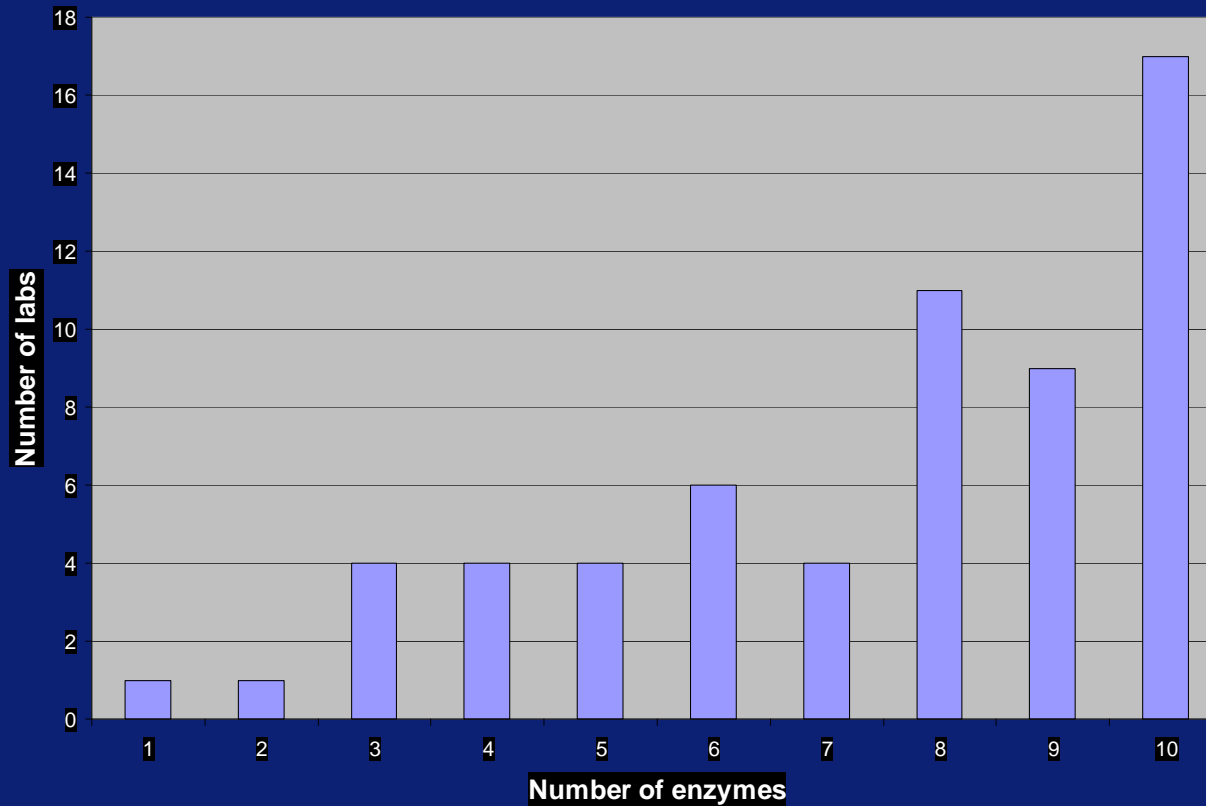
Mannosidosis α -mannosidase EBV 3

EBV nr 1 + 7 control EBV used for determination CV



RESULTS 2011

NUMBER OF ENZYMES MEASURED



Reproducibility of protein/vial 2011 duplicate samples EBV

Particip nr	CV
1	7
2	11
3	3
4	10
5	2
6	4
7	40
8	20
9	5
10	5
11	10
12	?
13	19
14	6
15	?
16	6
17	4
18	?
19	?
20	8

21	13
22	?
23	22
24	5
25	?
26	11
27	22
28	3
29	6
30	54
31	24
32	1
33	11
34	10
35	?
36	40
37	?
39	35
40	51
41	48

42	21
43	4
44	12
45	46
47	23
48	45
49	12
50	15
51	20
52	?
53	1
54	1
55	18
56	19

57	?
58	7
59	8
60	52
61	51
62	?
63	?
64	?

N=64	2010	2011
No data	7%	16%
CV<25	67%	68%
CV>25	26%	16%



Reproducibility of Arylsulfatase B 2011 duplicate samples EBV

Particip.nr	CV
1	8
2	200;d+
3	4
5	35
6	10
8	22
9	129
12	?,
13	34
16	10
17	9
18	?
20	?
21	26
24	?
25	?
26	29
27	5
29	50
30	96

31	2
32	0
36	28
38	60
39	24
40	36
42	66;1d+
43	0
44	?
46	?
47	26
48	51
49	10
50	103
51	34
52	?;1d+
53	103
55	?
56	65
23	63

57	?
58	263
61	137
62	?

D- enzyme activity patient sample > 30%
control EBV

D+ enzyme activity other EBV < 20 %
control EBV

N=44	2011
No data	25%
CV<25	27%
CV>25	48%



Reproducibility of α -Hexosaminidase 2011 duplicate samples EBV

Particip.nr	CV
1	
2	
3	104
4	15
5	2
6	24
7	11
8	24;d+
9	35
10	
11	
12	
13	
14	
15	
16	21
17	17
18	
19	
20	

21	38
22	
23	46
24	
25	55
26	33
27	179
28	
29	20
30	68
31	20
32	6
33	
34	
35	
36	183
38	6
39	10
40	
41	6

42	96
43	
44	11
45	
46	
47	37
48	171
50	89
51	21
52	
53	176
54	
55	28
56	26
57	
58	108;d+
59	
60	
61	45
62	

N=41	2011
No data	22%
CV<25	41%
CV>25	37%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of β -Galactosidase 2011 duplicate samples EBV

Particip.nr.	CV
1	76;d+
2	45;d+
3	69
4	22
5	5
6	17
7	116
8	24
9	64;d+
10	?
11	10
12	?
13	21
14	1
15	?
16	22
17	8
18	?
19	?
20	1

21	?
22	?
23	125;d+
24	21
25	53
26	31;d+
27	46
28	6
29	30
30	58
31	10;d+
32	3
33	31
34	2
35	?;d+
36	12
38	29;d+
39	14
40	12
41	30

42	48
43	2
44	60;d+
45	7
46	114
47	19
49	13
50	62
51	22
52	?;d+
53	3
54	?
55	33
56	26
57	?;d+
58	84;d+
59	17
60	82
61	9
62	?

N=61	2011
No data	20%
CV<25	43%
CV>25	37%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of β -Mannosidase 2011 duplicate samples EBV

Particip.nr	CV
1	
2	33
3	16
4	11
5	28
6	
7	
8	34
9	50
10	?
11	15
12	?
13	
14	18
15	?
16	48
17	0
18	?
19	?
20	

21	5
22	?
23	2
24	30
25	55
26	
27	11
28	11
29	199
30	59
31	3
32	11
33	
34	
35	
36	
38	26
39	56
40	3
41	3

42	37
43	17
44	81
45	5
46	32
47	21
49	28
50	96
51	13
52	?
53	6
54	?
55	28
56	21
57	
58	61
59	
60	85
61	70
62	?

N=47	2011
No data	17%
CV<25	40%
CV>25	43%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of α -Mannosidase 2011 duplicate samples EBV

Particip. Nr	CV
2	140
3	40;d+
4	30
5	20
6	10
7	90
8	9
9	37;d+
10	?
11	8
12	?
13	18
14	5;d+
15	?
16	15
17	0
18	?
19	?
20	12

21	4
22	?
23	83d+
24	d-
25	56
26	2
27	8
28	0
29	55;d+
30	49
31	104;d-
32	5
33	110;d+
34	
35	
36	
38	40
39	68;d-
40	36
41	9

42	30
43	4
44	91;d+
45	1
46	19
47	42;d+
49	29
50	127
51	17;d+
52	d-
53	10;d-
54	?
55	113
56	36;d+
57	
58	169;d+
59	
60	
61	81;d+
62	?

N=56	2011
No data	23%
CV<25	36%
CV>25	41%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of α -Iduronidase 2011 duplicate samples EBV

Particip.nr	CV
1	
2	
3	23
4	18
5	121
6	30
7	26
8	0,d+
9	
10	?
11	
12	?
13	3
14	
15	?
16	22
17	62
18	?
19	?
20	6

21	14
22	?
23	77
24	
25	
26	46
27	13
28	108
29	17
30	40
31	3
32	0
33	53
34	40
35	
36	40
38	
39	40
40	104
41	42

42	6
43	64
44	
45	
46	13
47	116
49	120
50	53
51	
52	
53	7
54	?
55	116
56	12
57	?;
58	100
59	
60	
61	77
62	?

N=49	2011
No data	24%
CV<25	31%
CV>25	45%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of β -Glucuronidase 2011 duplicate samples EBV

Partip.nr	CV
1	46
2	
3	76
4	21
5	19
6	4
7	71
8	63;d+
9	63
10	?
11	2
12	?
13	16
14	1
15	?
16	0
17	6
18	?
19	?
20	26

21	6
22	?
23	41
24	41
25	48
26	2
27	44
28	5
29	43
30	41
31	36
32	10
33	
34	
35	
36	22
38	165
39	185;d+
40	62
41	5;d+

42	22
43	9
44	88
45	
46	24; d+
47	16
49	21
50	60
51	49
52	
53	7
54	?
55	5
56	12
57	?;
58	25
59	
60	95
61	49
62	?

N=55	2011
No data	20%
CV<25	40%
CV>25	40%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of Iduronidate sulphatase 2011 duplicate samples EBV

Particip.nr	CV
1	79;d+
2	
3	44;d+
4	10;d+
5	3
6	
7	12
8	26
9	0
10	?
11	
12	?
13	
14	
15	?
16	30;d+
17	10
18	?
19	?
20	

21	6;d+
22	?
23	3;d+
24	
25	20;d+
26	9;d+
27	1;d+
28	
29	91;d+
30	99;d+
31	40;d+
32	8
33	33
34	
35	
36	8
38	
39	58
40	
41	106

42	12
43	29
44	
45	
46	
47	18;d+
48	92;d+
50	54
51	d+
52	d+
53	
54	?
55	11
56	15;d+
57	?;
58	
59	
60	
61	39
62	?

N=38	2011
No data	21%
CV<25	42%
CV>25	37%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of Galactocerebrosidase 2011 duplicate samples EBV

Particip.nr	CV
1	
2	
3	
4	
5	175;d+
6	12
7	6
8	120
9	
10	
11	0
12	
13	
14	
15	d-
16	41;d-
17	0
18	
19	
20	3

21	74
22	
23	77
24	
25	
26	
27	
28	0
29	111;d-
30	
31	91
32	0
33	27;d-
34	
35	
36	83
38	
39	
40	
41	42;d-

42	78
43	37
44	1;d-
45	
46	
47	46
48	157;d+
50	6
51	D+
52	D-
53	0
54	
55	105
56	
57	
58	74;d-
59	
60	
61	30;d-
62	

N=42	2011
No data	36%
CV<25	21%
CV>25	43%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



Reproducibility of Sphingomyelinase 2011 duplicate samples EBV

Particip.nr	CV
1	
2	19
3	53
4	
5	114
6	7
7	59
8	0
9	11
10	
11	14
12	
13	
14	
15	
16	5
17	9
18	
19	
20	

21	26
22	
23	
24	
25	
26	19
27	
28	18
29	11
30	
31	77
32	11;d-
33	
34	
35	
36	57
38	
39	12;d-
40	
41	35;d-

42	9
43	
44	7
45	
46	
47	40
49	
50	25
51	13
52	
53	9
54	
55	18
56	
57	
58	59
59	
60	
61	53
62	

N=40	2011
No data	28%
CV<25	45%
CV>25	28%

D- enzyme activity
patient sample > 30%
control EBV

D+ enzyme activity
other EBV < 20 %
control EBV



OVERALL PERFORMANCE 2011

1 Participant: 100% score (6 enzymes), CV<25%; enzyme patient<30%; enzyme control >20%

17 Out of 64 Participants: Diagnosis correct (enzyme act. <30%), control enzyme activity>20%

