

## Additional file 2: Additional Metabolic Information

**Table 1** Urine Organic acids

Status	Patient	Gender	Age	Upper reference value <sup>†</sup>	EMA	GA	2-MBGly	HGly	iVGly	iBGly	2-HGA	c4DC8	DC6	DC8	DC10
-	-	M + F	-	1: Birth-M12	10.97	4.80	2.00	1.20	10.00	3.50	-	15.80	56.23	38.40	119.31
-	-	M + F	-	2: <Y5	24.69	8.91	2.00	1.20	10.00	3.50	-	6.17	60.34	19.20	2.74
-	-	M + F	-	3: >Y5; <Y15	13.71	6.17	2.00	1.20	10.00	3.50	-	3.40	9.60	17.14	3.43
-	-	M + F	-	4: >Y15	6.86	5.49	2.00	2.00	10.00	3.80	-	0.00	61.71	5.49	-
-	-	M + F	-	5: Birth-M4	-	-	-	-	-	-	67.00	-	-	-	-
-	-	M + F	-	6: M4-Y2	-	-	-	-	-	-	49.00	-	-	-	-
-	-	M + F	-	7: Y2-Y10	-	-	-	-	-	-	35.00	-	-	-	-
-	-	M + F	-	8: >Y10	-	-	-	-	-	-	16.00	-	-	-	-
Untr	P1	M	M1 D14	1 + 5	36.61	36.93	1.24	29.92	0.96	-	117.53	8.32	93.16	63.19	38.71
Untr	P2	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Untr	P3	M	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Untr	P4	F	Y41 M9	4 + 8	26.62	2.37	0.47	1.18	1.34	-	50.80	1.35	21.61	1.29	-
Untr	P5	F	Y36 M6	4 + 8	154.35	675.58	30.02	43.05	151.77	30.52	312.03	47.77	400.34	-	3.03
Untr	P6	M	D3	1 + 5	200.27	1370.1	7.05	40.40	444.85	27.19	1611.9	51.59	677.00	21.06	7.69
Untr	P7	F	Y23 M5	4 + 8	0.16	86.49	0.36	10.63	4.76	16.93	54.31	21.29	126.97	1.58	1.42
Untr	P8	F	D6	1 + 5	-	2412.2	4.33	2.25	157.98	5.52	342.16	9.82	232.80	27.53	1.09
Untr	P9	M	M4	1 + 6	129.77	29.39	-	22.98	-	2.98	75.26	-	189.01	56.18	-
Untr	P10	F	Y7 M10	3 + 7	25.72	215.96	1.13	44.83	8.61	10.37	95.29	79.77	393.00	77.39	42.13
Untr	P11	M	Y2 M6	2 + 7	51.55	21.57	-	-	4.84	3.95	31.65	1.28	55.89	11.82	1.09
Untr	P12	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Untr	P13	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Untr	P14	F	Y26 M4	4 + 8	5.10	23.08	-	6.41	0.41	1.13	102.89	111.87	483.98	59.28	23.35

**Table 1 (cont.)**

Status	Patient	Gender	Age	Upper reference value <sup>†</sup>	EMA	GA	2-MBGly	HGly	iVGly	iBGly	2-HGA	c4DC8	DC6	DC8	DC10
Tr	P1	M	Y11 M5	3 + 8	13.16	1.40	-	-	0.64	0.67	28.46	0.57	1.38	5.18	-
Tr	P2	F	Y29 M9	4 + 8	14.80	1.56	-	7.36	0.81	2.90	26.06	0.38	7.07	3.02	-
Tr	P3	M	Y25 M8	4 + 8	21.28	1.49	-	-	0.52	0.64	20.96	-	2.93	1.06	-
Tr	P4	F	Y45 M1	4 + 8	5.69	1.80	-	-	0.15	0.08	63.07	-	4.01	1.36	-
Tr	P5	F	Y40 M2	4 + 8	19.59	1.29	-	-	0.03	-	13.26	-	2.53	1.33	0.95
Tr	P6	M	D11	1 + 5	32.69	2915.5	-	-	62.67	2.10	1165.9	-	-	6.59	-
Tr	P7	F	Y22 M1	4 + 8	-	93.25	0.36	11.62	1.92	13.95	118.33	159.17	614.30	86.04	17.10
Tr	P8	F	D22	1 + 5	1053.4	2739.6	15.03	185.63	904.67	105.58	1441.2	21.48	615.20	128.52	342.49
Tr	P9	M	Y18 M9	4 + 8	40.01	8.91	0.25	33.57	2.60	7.10	58.26	17.10	87.39	24.09	7.35
Tr	P10	F	Y9	3 + 7	13.07	9.99	0.20	-	-	0.14	14.27	-	3.97	3.65	-
Tr	P11	M	Y8 M7	3 + 7	13.15	4.52	0.37	3.40	0.74	1.81	67.05	11.02	15.94	10.01	1.6939
Tr	P12	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Tr	P13	F	Y41 M2	4 + 8	11.27	0.94	-	4.63	0.32	1.29	5.81	0.89	3.28	2.64	-
Tr	P14	F	Y26 M8	4 + 8	7.13	0.87	-	0.85	0.21	0.37	13.39	3.28	3.30	3.64	2.21

<sup>†</sup> Applied reference range is dependent on age. In-house reference ranges were used.

Values are given in mmol/mol creatinine. Abbreviations: 2-HGA: 2-hydroxyglutaric acid; 2-MBGly: 2-methylbutyrylglycine; c4DC8: *cis*-4-decenedioic acid; D and number: age in days; DC6: adipic acid; DC8: suberic acid; DC10: sebacic acid; EMA: ethylmalonic acid; F: female; GA: glutaric acid; HGly: *N*-hexanoylglycine; iBGly: *N*-isobutyrylglycine; iVGly: *N*-isovalerylglycine; M: male; M and number: age in months; n.d: not determined; Tr; treated; Untr: untreated; Y and number: age in years.

**Table 2** Urine Acylcarnitines

Status	Patient	Gender	Age	Upper reference value† [1]	C0	C4	C5	C5DC	C6	C8	C10
-	-	M + F	-	1: Newborn	4.89	0.84	0.38	0.63	0.23	0.2	0.1
-	-	M + F	-	2: Y1-Y5	13.93	0.19	0.25	0.04	0.13	0.15	0.08
-	-	M + F	-	3: Y6-Y17	4.74	0.77	0.29	0.46	0.11	0.15	0.09
-	-	M + F	-	4: ≥Y18	3.77	0.62	0.24	0.51	0.09	0.14	0.07
Untr	P1	M	Y1 M9	2	456.78	14.15	4.12	2.85	0.22	0.60	0.22
Untr	P2	F	Y1 M5	2	7.71	0.44	0.43	1.95	0.18	0.27	0.34
Untr	P3	M	D42	1	100.68	8.19	3.78	8.47	0.47	1.30	0.64
Untr	P4	F	Y41 M9	4	24.94	5.75	1.57	3.06	0.06	0.21	0.09
Untr	P5	F	Y36 M7	4	5.73	0.73	0.54	5.61	0.19	0.18	0.13
Untr	P6	M	D3	1	26.80	38.67	61.07	17.32	1.24	1.32	0.98
Untr	P7	F	Y3 M2	2	8.54	1.69	0.89	6.72	0.35	0.71	0.67
Untr	P8	F	9D	1	5.71	52.03	29.15	7.89	0.23	0.39	0.26
Untr	P9	M	Y1 M9	2	6.85	5.82	2.58	2.79	2.28	0.00	0.37
Untr	P10	F	Y7 M11	3	31.79	1.44	0.26	1.95	0.16	0.57	0.21
Untr	P11	M	Y2 M8	2	6.61	7.20	0.66	1.93	0.16	0.24	0.18
Untr	P12	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Untr	P13	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Untr	P14	F	Y26 M4	4	0.94	0.65	0.09	2.02	0.04	0.11	0.08
Tr	P1	M	Y11 M5	3	1.11	2.44	0.23	1.49	0.07	0.07	0.04
Tr	P2	F	Y29 M9	4	21.01	5.01	0.50	2.74	0.10	0.59	0.13
Tr	P3	M	Y25 M8	4	46.34	6.30	2.14	2.49	0.14	0.55	0.08
Tr	P4	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Tr	P5	F	Y40 M2	4	1.06	0.22	0.05	2.33	0.04	0.09	0.05
Tr	P6	M	D11	1	1202.20	623.42	2193.77	15.02	13.48	18.63	12.68
Tr	P7	F	Y13 M4	3	46.21	4.69	0.85	4.60	0.11	0.37	0.14

**Table 2 (cont.)**

Status	Patient	Gender	Age	Upper reference value <sup>†</sup> [1]	C0	C4	C5	C5DC	C6	C8	C10
Tr	P8	F	D22	1	8.91	24.15	15.22	4.24	1.79	1.63	0.27
Tr	P9	M	Y18 M9	4	8.09	9.34	0.51	2.10	0.06	0.25	0.05
Tr	P10	F	Y9	3	21.42	4.29	0.70	1.12	0.06	0.23	0.08
Tr	P11	M	Y8 M7	3	436.34	37.05	10.89	7.04	0.25	3.86	0.24
Tr	P12	F	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d
Tr	P13	F	Y41 M2	4	6.66	2.75	0.18	1.75	0.05	0.10	0.06
Tr	P14	F	Y26 M8	4	147.42	7.64	2.56	3.74	0.13	0.69	0.08

<sup>†</sup> Applied reference range is dependent on age.

Values are given in mmol/mol creatinine. Abbreviations: C0: free carnitine; C4: butyryl-/isobutyrylcarnitine; C5: isovalerylcarnitine; C5DC: glutarylcarnitine; C6: hexanoylcarnitine; C8: octanoylcarnitine; C10: decanoylcarnitine; D and number: age in days; F: female; M: male; M and number: age in months; n.d: not determined; Tr: treated; Untr: untreated; Y and number: age in years.

**Table 3** Urine Amino acids

Status	Patient	Gender	Age	Reference range <sup>†</sup>	Sarcosine	4-OH-Pro	Pro
-	-	M	-	1	0-8.5	20-320	21-213
-	-	F	-	2	0-8.5	20-320	21-213
-	-	M	-	3	0-8.5	0-143	0-130
-	-	F	-	4	0-1.4	0-13	0-13
-	-	M	-	5	0-1.4	0-13	0-13
-	-	M	-	6	0-1.4	0-13	0-9
-	-	F	-	7	0-1	0-13	0-9
-	-	M	-	8	-	0-6	64-236
-	-	M	-	9	-	0-5	43-173
Untr	P1	M	Y1 M9	5	7.94	3.83	12.43
Untr	P2	F	Y1 M5	4	25.86	7.06	32.48
Untr	P3	M	D42	3	92.71	240.39	94.27
Untr	P4	F	Y41 M9	7	9.84	2.31	4.29
Untr	P5	F	Y36 M7	7	60.09	106.42	41.70
Untr	P6	M	D3	1	67.25	1004.76	1149.35
Untr	P7	F	Y3 M2	7	10.98	7.86	14.64
Untr	P8	F	D9	2	106.99	1407.46	1674.14
Untr	P9	M	Y1 M9	5	5.14	34.65	132.79
Untr	P10	F	Y7 M11	7	2.63	1.68	4.00
Untr	P11	M	Y2 M8	6	6.83	2.03	6.89
Untr	P12	F	n.d	n.d	n.d	n.d	n.d
Untr	P13	F	n.d	n.d	n.d	n.d	n.d
Untr	P14	F	Y26 M4	7	2.90	0.27	1.32

**Table 3 (cont.)**

Status	Patient	Gender	Age	Reference range <sup>†</sup>	Sarcosine	4-OH-Pro	Pro
Tr	P1	M	Y11 M5	8	0.70	0.75	24.64
Tr	P2	F	Y29 M9	7	1.16	0.29	5.75
Tr	P3	M	Y25 M8	9	2.58	0.87	32.60
Tr	P4	F	n.d	n.d	n.d	n.d	n.d
Tr	P5	F	Y40 M2	7	0.35	0.23	9.20
Tr	P6	M	D11	1	93.18	510.92	4118.11
Tr	P7	F	Y13 M4	7	0.57	0.67	1.53
Tr	P8	F	D22	2	37.5	873.2	1505.58
Tr	P9	M	Y18 M9	9	3.15	0.31	10.89
Tr	P10	F	Y9	7	0.16	0.54	11.19
Tr	P11	M	Y8 M7	8	1.26	2.17	14.24
Tr	P12	F	n.d	n.d	n.d	n.d	n.d
Tr	P13	F	Y41 M2	7	0.14	0.21	4.03
Tr	P14	F	Y26 M8	7	0.12	0.13	9.30

<sup>†</sup> Applied reference range is dependent on age and gender. In-house reference ranges were used.

Values are given in mmol/mol creatinine. Abbreviations: 4-OH-Pro: 4-hydroxyproline; D and number: age in days; F: female; M: male; M and number: age in months; n.d: not determined; Pro: proline; Tr: treated; Untr: untreated; Y and number: age in years.

## References:

- [1] Mueller P, Schulze A, Schindler I, Ethofer T, Buehrdel P, Ceglarek U. Validation of an ESI-MS/MS screening method for acylcarnitine profiling in urine specimens of neonates, children, adolescents and adults. *Clin Chim Acta*. 2003;327:47–57.