

Supporting Information

Effects of different ratios of carbohydrate–fat in enteral nutrition on metabolic pattern and organ damage in burned rats

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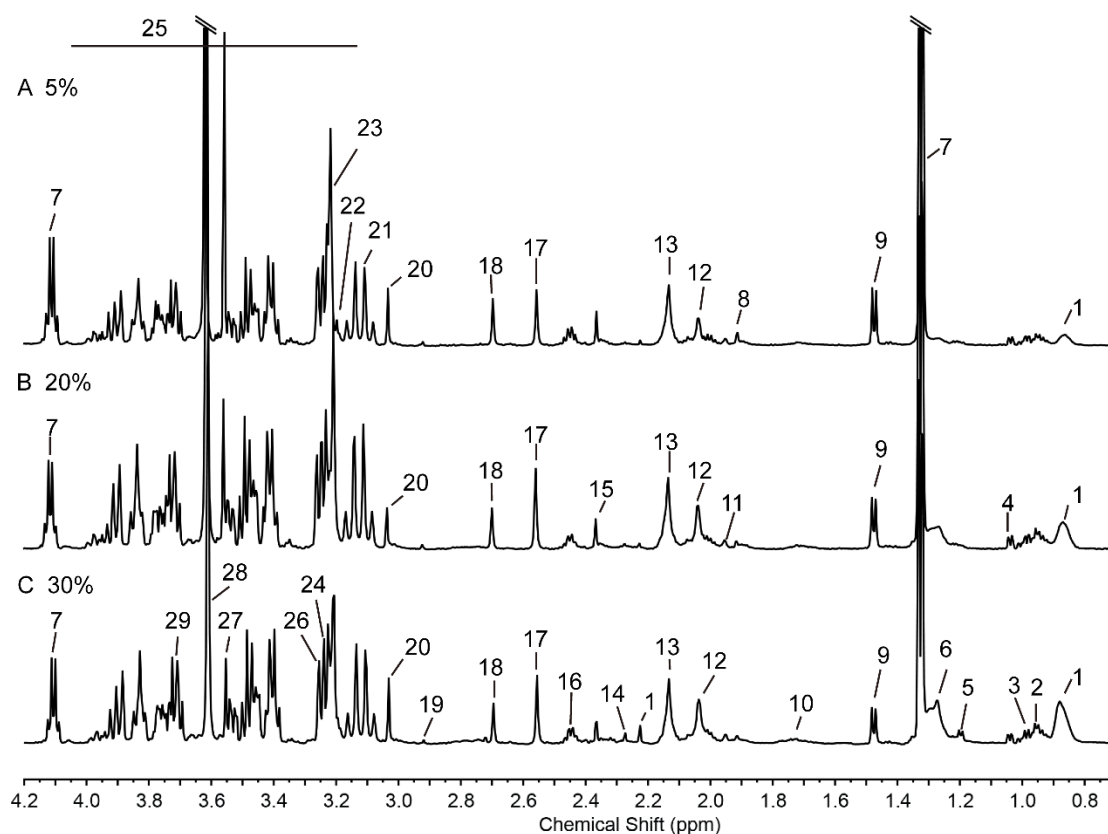


Figure S1. Representative 600 MHz ^1H NMR spectra of plasma (A. 5%, B. 20% and C. 30% group). The ^1H -NMR signals identified were: 1. Lipid, 2. Isoleucine, 3. Leucine, 4. Valine, 5. Isobutyrate, 6. 3-hydroxybutyrate, 7. Lactate, 8. Lysine, 9. Alanine, 10. Arginine, 11. Acetate, 12. N-acetylated glycoproteins (NAG), 13. O-acetylated glycoproteins (OAG), 14. Acetoacetate, 15. Pyruvate, 16. Glutamine, 17. Succinate, 18. Dimethylamine, 19. Dimethylglycine, 20. Creatinine, 21. Phenylalanine, 22. Choline, 23. Trimethylamine N-oxide (TMAO), 24. Phosphocholine, 25. α -glucose, 26. Betaine, 27. Glycine, 28. Oxalic acid, and 29. Glycerol.

Table S1. Nutritional supplement formula.

Control group			Burn + 5% fat group		Burn + 10% fat group		Burn + 20% fat group		Burn + 30% fat group	
Name	Weight	Energy	Weight	Energy	Weight	Energy	Weight	Energy	Weight	Energy
Peptisorb	100 g	402 Kcal	100 g	402 Kcal	100 g	402 Kcal	100 g	402 Kcal	100 g	402 Kcal
Glucose	-	-	155.8 g	623.1 Kcal	104.7 g	562.8 Kcal	100.5 g	442.2 Kcal	-	-
Amino acid	28.14 g	112.56 Kcal	43.28 g	180.9 Kcal	43.28 g	180.9 Kcal	43.28 g	180.9 Kcal	28.14 g	112.56 Kcal
Medium long chain	115.64 ML	168.84 Kcal	-	-	41.3 ML	60.3 Kcal	123.9 ML	180.9 Kcal	115.64 ML	168.84 Kcal
Fatty acid emulsion										
Total	272.34 g	683.4 Kcal	299.08 g	1206 Kcal	301.42 g	1266.3 Kcal	398.28 g	1206 Kcal	272.34 g	683.4 Kcal

Table S2. Assay values of REE in each group of rats from 1–14 days after burn injury.

		PBD0	PBD1	PBD2	PBD3	PBD4	PBD5	PBD6	PBD7	PBD8	PBD9	PBD10	PBD11	PBD12	PBD13	PBD14
REE (Kcal/kg/d)	C	251.5±11.2	245.9±11.7	246.4±12.8	249.8±9.9	244.4±9.9	249.8±10	253.7±13	251.3±11.5	244.8±9.9	248.4±12.6	251.7±12.8	252.8±12.1	252.9±11.9	249.1±14.5	251.4±12.6
	5 %	256.8±14	246.9±11.8	250.3±5	234.6±17.2	238.5±12.9	247.1±11.2	256.7±5.2	255.4±14.3	263.4±12.9	261.5±12.1	262±6.2	259.3±14.6	263.6±7.3	268.4±10.4	267.8±12.6
	10%	259.1±16	242.7±9.9	240.9±20.7	223.5±18.7	230.1±13.5	238.1±12.6	244±14.1	243.2±10.2	244.6±11.2	242±12.4	248.3±10	245.5±11.7	243.3±8.8	249.7±11.6	255.5±12.3
	20%	253.6±11.5	230.8±18.5	225.1±15.2	211.9±11.4	225±16.7	234.6±11.1	241.2±12.7	250.1±15.6	250.7±10.7	269.6±11.4	269.9±12	273.2±11.1	273±17.5	273±13	276.8±10.2
	30%	259.4±10.1	222.2±10.8	214±12.6	197.3±11.5	218.4±12.4	227.3±11.6	255.2±11.2	269.7±14.8	280.3±12	278.9±13.8	276.8±12.8	281.6±11.8	277.6±13.4	279.3±12.5	289±10.4

Table S3. The actual amount of energy supplied to each group of rats from 1–14 days after burn injury.

		PBD0	PBD1	PBD2	PBD3	PBD4	PBD5	PBD6	PBD7	PBD8	PBD9	PBD10	PBD11	PBD12	PBD13	PBD14
Energy supply (Kcal/kg/d)	C	251.7±11.8	245.4±11.4	246.3±12.7	249.3±9.5	244.2±9.2	249.3±9.4	253.7±13.6	251.5±11.4	244.1±9.2	248.2±12.2	251.4±12.5	252.5±12.6	252.1±11.2	248.4±14.7	251.5±11.3
	5 %	193.1±10.5	185.7±8.81	187.1±3.3	175.4±123	178.1±9.5	185.2±8.5	192.2±4.2	191.2±10.2	263.7±12.9	261.4±12.3	262.1±6.8	259.1±14.4	263.2±7.1	268.3±10.2	267.9±12.1
	10%	194.2±12.6	182.2±7.1	180.1±15.7	167.3±14.7	172.3±10.7	178.4±9.2	183.8±10.2	182.3±7.7	244.8±11.9	242.8±12.4	248.5±10.8	245.5±11.7	243.5±8.2	249.5±11.4	255.2±12.9
	20%	190.5±8.4	172.7±13.5	168.1±11.0	158.2±8.2	168.1±12.2	175.7±8.2	180.1±9.2	187.2±11.3	250.4±10.8	269.2±11.8	269.3±12.8	273.2±11.1	273.6±17.8	273.1±12.4	276.4±10.3
	30%	193.9±7.7	166. 5±8.6	160.2±9.2	147.8±8.1	163.2±9.5	170.3±8.6	191.7±8.1	202.6±11.8	280.4±12.7	278.1±12.9	276.4±12.1	281.2±11.4	277.5±13.3	279.1±12.6	289±10.6

Table S4. ¹H-NMR characteristic signals of the identified metabolites in serum.

ID	Metabolites	¹ H Shift(δ)
1	Lipid	0.891(t) 1.210(m) 1.221(m) 1.232(m) 1.590(m) 2.018(m) 2.238(m) 2.742(m) 2.749(m) 2.761(m)
2	Isoleucine	0.943(t) 1.000(d) 1.008(d) 1.284(m) 1.459(m) 1.961(m)
3	Leucine	0.955(d) 0.965(d) 0.975(d) 1.691(m) 1.707(m) 3.685(dd) 3.753(d)
4	Valine	0.988(d) 1.020(d) 1.040(d) 1.052(d) 2.285(m) 3.570(d) 3.617(d)
5	Isobutyrate	1.361(d)
6	3-hydroxybutyrate	1.200(d) 2.293(m) 2.380(m) 4.131(m)
7	Lactate	1.341(d) 4.108(q)
8	Lysine	1.434(m) 1.689(m) 1.719(m) 1.886(m) 1.897(m) 3.031(t) 3.767(t)
9	Alanine	1.480(d) 1.492(m) 3.783(q)
10	Arginine	1.681(m) 1.730(m) 1.926(m) 3.257(t) 3.774(m)
11	Acetate	1.914(s)
12	N-acetylated glycoproteins (NAG)	2.04 (s)
13	O-acetylated glycoproteins (OAG)	2.14 (s)
14	Acetoacetate	2.273(s) 3.441(s)
15	Pyruvate	2.318(s) 2.372(s)
16	Glutamine	2.14(m) 2.46(m) 3.77(t)
17	Succinate	2.395(s)
18	Dimethylamine	2.71(s)
19	Dimethylglycine	2.930(s) 3.723(s)
20	Creatinine	3.938(s) 3.051(s) 4.066(s)
21	Phenylalanine	3.119(dd) 3.260(dd) 3.962(dd) 3.991(dd)
22	Choline	3.208(s) 3.657(m) 4.072(m)
23	Trimethylamine N-oxide (TMAO)	3.21(s)
24	Phosphocholine	3.218(s) 3.585(m) 4.142(m)
25	α-glucose	3.429(t) 3.542(dd) 3.708(t) 3.732(dd) 3.822(dd) 3.840(dd)
26	Betaine	3.271(s) 3.915(s)
27	Glycine	3.558(s)
28	Oxalic acid	3.621(s)
29	Glycerol	3.552(dd) 3.649(dd) 3.795(m)
30	Triglycerides	4.072(m)

Type of ¹H Shift(δ): s, single; d, doublet; t, triplet; m, multiple; q, quartet; dd, doublet of doublets.

Table S5. Identified metabolites from different groups with S-plot, VIP and P-value.

Metabolites	VIP	<i>P</i> -value*
Lipid	4.10675	< 0.0001
Isoleucine	1.65065	0.0386
Leucine	1.6876	0.0045
3-hydroxybutyrate	2.95366	< 0.0001
Lactate	9.21987	0.0047
Alanine	6.30719	0.0008
Pyruvate	4.26619	0.0012
Dimethylamine	2.25777	< 0.0001
Betaine	2.99439	0.0001
Glycine	8.23387	< 0.0001
Oxalic acid	2.28375	0.0392
Glutamine	2.23501	0.0441

* One-way ANOVA for comparisons between multiple groups

Table S6. The associated metabolic pathways of the differential metabolites in Table S5.

Pathway Name	Hits/Total	<i>p</i> -value	FDR	−log(p)	Impact
Alanine, aspartate and glutamate metabolism	3/28	0.00113	0.034	2.95	0.11378
Glyoxylate and dicarboxylate metabolism	3/32	0.00169	0.034	2.77	0.10582
Glycine, serine and threonine metabolism	3/34	0.00201	0.034	2.70	0.31772
Pyruvate metabolism	2/22	0.01231	0.172	1.91	0.20684
Glycolysis / Gluconeogenesis	2/26	0.01702	0.204	1.77	0.10044