

Supplemental Table 1. Liver metabolites with diet-induced changes that occurred only in *Gpat1*<sup>-/-</sup> (KO) mice (Q <0.1).

Super pathway	Subpathway	Metabolite	Wildtype			KO			
			Ratio (Saff/Con)*	P value	Q value	Ratio (Saff/Con)*	P value	Q value	
Amino acid metabolism	Alanine, aspartate metabolism	beta-alanine	1.06	0.6072	0.5513	1.40	0.0216	0.0933	
	Glutamate metabolism	glutamine	0.77	0.0360	0.1119	0.58	0.0004	0.0039	
	Taurine metabolism	taurine	1.38	0.0405	0.1201	1.64	0.0100	0.0575	
	Glutathione metabolism	glutathione (GSSG)	0.92	0.3843	0.4550	0.76	0.0110	0.0581	
	Valine, leucine and isoleucine metabolism		N-acetylleucine	0.87	0.1902	0.3188	0.61	0.0014	0.0121
			N-tigloylglycine	1.12	0.4195	0.4708	1.46	0.0128	0.0624
Lipid metabolism	Glycerolipid metabolism	Glycerophosphorylcholine	0.66	0.4515	0.4875	0.38	0.0136	0.0627	

\* Safflower oil diet/ control diet

Supplemental Table 2. Plasma metabolites with diet-induced changes that occurred only in *Gpat1*<sup>-/-</sup> (KO) mice (Q <0.1).

Super pathway	Subpathway	Metabolites	Wildtype			KO		
			Ratio (Saff/ Con)*	P value	Q value	Ratio (Saff/Con)*	P value	Q value
Amino acid metabolism	Cysteine, methionine, SAM, taurine metabolism	cysteine	0.86	0.2803	0.2285	0.54	5.0E-05	1.0E-04
	Glycine, serine, threonine metabolism	serine	0.97	0.8641	0.4606	0.59	2.0E-04	3.0E-04
		threonine	0.99	0.9085	0.4711	0.57	3.0E-05	1.0E-04
	Guanidino and acetamido metabolism	1-methylguanidine	0.84	0.1076	0.1279	0.67	0.0050	0.0042
	Histidine metabolism	histidine	0.85	0.1580	0.1577	0.42	2.0E-04	3.0E-04
		imidazole lactate	1.01	0.8065	0.4501	1.92	0.0029	0.0028
	Lysine metabolism	lysine	0.91	0.1545	0.1562	0.42	0.0220	0.0136
	Phenylalanine & tyrosine metabolism	thyroxine	0.78	0.0747	0.1030	0.63	0.0496	0.0267
		3-(4-hydroxyphenyl)lactate	0.90	0.6088	0.3820	0.55	0.0633	0.0328
	Tryptophan metabolism	3-indoxyl sulfate	0.61	0.1306	0.1217	0.57	0.0493	0.0267
	Urea cycle; arginine-, proline-, metabolism	urea	0.75	0.0797	0.1065	0.53	0.0038	0.0035
		trans-4-hydroxyproline	0.87	0.3187	0.2438	0.47	1.0E-05	4.0E-05
		citrulline	0.93	0.6491	0.3967	0.59	8.0E-04	0.0010
	Valine, leucine, isoleucine metabolism	isoleucine	0.89	0.2561	0.2169	0.50	3.0E-05	1.0E-04
		3-methyl-2-oxobutyrate	0.89	0.4894	0.3313	0.77	0.0539	0.0286
		3-methyl-2-oxovalerate	0.85	0.5218	0.3457	0.68	0.0743	0.0362
		leucine	0.97	0.7861	0.4419	0.45	2.0E-06	1.0E-05
		N-tigloylglycine	1.19	0.8157	0.4504	0.32	0.0017	0.0018

Carbohydrate metabolism	Mannose metabolism	mannose	1.04	0.7563	0.4310	0.66	0.0036	0.0034
	Glycolysis, gluconeogenesis, pyruvate metabolism	glucose	0.90	0.3074	0.2406	0.76	0.0036	0.0034
		lactate	0.73	0.4058	0.2872	0.33	4.0E-05	1.0E-04
	Nucleotide sugars, pentose metabolism	ribitol (adonitol)	1.39	0.14444	0.1514	0.57	0.0143	0.0096
		gluconate	0.96	0.8311	0.4567	0.69	0.0355	0.0200
Cofactors and vitamins	Ascorbate, aldarate metabolism	threonate	0.89	0.2496	0.2149	0.54	0.0051	0.0042
		glucarate (saccharate)	1.05	0.6497	0.3967	0.52	0.0046	0.0040
Energy production	Oxidative phosphorylation	phosphate	0.86	0.0807	0.1065	0.70	5.0E-04	7.0E-04
Lipid metabolism	Glycerolipid metabolism	glycerophosphorylcholine	1.85	0.0806	0.1065	2.14	0.0133	0.0091
		choline	0.76	0.1161	0.1329	0.56	0.0014	0.0016
		glycerol 3-phosphate	1.18	0.3716	0.2691	0.77	0.0724	0.0359
Nucleotide metabolism	Purine metabolism, (hypo)xanthine/inosine containing	hypoxanthine	0.94	0.8525	0.4606	1.57	0.0670	0.0340
	Purine metabolism, urate metabolism	allantoin	0.83	0.1735	0.1668	0.65	0.0072	0.0056
Peptide metabolism	$\gamma$ -Glutamyl	$\gamma$ -glutamylglutamine	0.95	0.9762	0.4935	0.65	0.0748	0.0362
Xenobiotics	Chemical	glycolate (hydroxyacetate)	0.90	0.3517	0.2620	0.62	5.0E-04	7.0E-04
	Sugar, sugar substitute, starch	erythritol	1.09	0.9674	0.4906	0.60	0.0091	0.0068

\* Safflower oil diet/ control diet