

Supplementary materials

Supplementary Table S1 Sequences of primers for RT-qPCR.

Gene Name	Primer Sequence
TNF- α	F: 5'-CCAGACCCTCACACTCAGATC-3'
	R: 5'-CACTTGGTGGTTTGCTACGAC-3'
IL-6	F: 5'-TACCACTTCACAAGTCGGAGGC-3'
	R: 5'-CTGCAAGTGCATCATCGTTGTTC-3'
IL-1 β	F: 5'-TTGAAGAAGAGCCCATCCTC-3'
	R: 5'-CAGCTCATATGGGTCCGAC-3'
TLR4	F: 5'- AGGTTGGCACTCTCACTTCC -3'
	R: 5'- GGAATGTCATCAGGGACTTTGC -3'
MyD88	F: 5'- CCGCCTATCGCTGTTCTTGA-3'
	R: 5'- GCCAGGCATCCAACAAACTG-3'
NF- κ B	F: 5'- ACAACTATGAGATGAACTCCGGG -3'
	R: 5'- GATAGCAGTGGGCTGTCTCC -3'

Supplementary Table S2 Details of 35 metabolites enriched following UDG intervention

Metabolite	KEGG Pathway Description	HFD (mean ± SD)	UDG (mean ± SD)	UDG vs HFD		
				P_value	VIP	FC
1-Methylnicotinamide	Nicotinate and nicotinamide metabolism; Bile secretion	3.77±0.1	3.07±0.56	0.0125	2.5112	0.8138
1,4-Dihydro-1-Methyl-4-Oxo-3-Pyridinecarboxamide	Nicotinate and nicotinamide metabolism	4.7±0.08	4.43±0.1	0.0005	1.7117	0.9426
N1-Methyl-4-Pyridone-3-Carboxamide	Nicotinate and nicotinamide metabolism	5.08±0.07	4.79±0.09	0.0001	1.8072	0.9431
Niacinamide	Nicotinate and nicotinamide metabolism; Vitamin digestion and absorption	4.75±0.04	4.56±0.08	0.0005	1.4497	0.9586
Propionic Acid	Nicotinate and nicotinamide metabolism; Protein digestion and absorption; Propanoate metabolism	5.19±0.12	4.92±0.21	0.0232	1.4293	0.9485
Succinic Acid	Nicotinate and nicotinamide metabolism; Propanoate metabolism; Phenylalanine metabolism; Citrate cycle (TCA cycle); Glucagon signaling pathway	6.19±0.13	5.89±0.23	0.0197	1.5316	0.9516
Nicotinic Acid	Nicotinate and nicotinamide metabolism	4.14±0.54	3.2±0.42	0.0072	2.9788	0.7732
Maleic Acid	Nicotinate and nicotinamide metabolism; Tyrosine metabolism; Citrate cycle (TCA cycle)	5.79±0.18	5.45±0.31	0.0444	1.583	0.9416
L-Isoleucine	Central carbon metabolism in cancer; Valine, leucine and isoleucine biosynthesis; Valine, leucine and isoleucine degradation; Protein digestion and absorption; Aminoacyl-tRNA biosynthesis; Mineral absorption	6.85±0.03	6.73±0.09	0.0108	1.0358	0.9826
L-Tyrosine	Central carbon metabolism in cancer; Protein digestion and absorption; Tyrosine metabolism; Phenylalanine metabolism; Aminoacyl-tRNA biosynthesis	5.95±0.03	5.82±0.07	0.0013	1.1334	0.9783
L-Tryptophan	Central carbon metabolism in cancer; Protein digestion and absorption; Aminoacyl-tRNA biosynthesis;	6.44±0.04	6.33±0.07	0.0059	1.0518	0.9825

	Mineral absorption					
	Central carbon metabolism in cancer;					
Malic Acid	Renal cell carcinoma; Glucagon signaling pathway	6.31±0.12	6.09±0.21	0.0491	1.2235	0.9647
	Valine, leucine and isoleucine					
Ketoleucine	biosynthesis; Valine, leucine and isoleucine degradation	6.42±0.04	6.21±0.1	0.0007	1.4959	0.9673
	Valine, leucine and isoleucine					
3-Methyl-2-Oxovaleric Acid	biosynthesis; Valine, leucine and isoleucine degradation	6.33±0.04	6.17±0.12	0.0103	1.2324	0.9735
	Valine, leucine and isoleucine					
Citraconic Acid	biosynthesis	4.28±0.06	4.15±0.08	0.0089	1.0885	0.9692
	Primary bile acid biosynthesis; Bile secretion					
Chenodeoxycholic Acid		4.29±0.52	5.05±0.16	0.0066	2.7458	1.1769
	Primary bile acid biosynthesis; Bile secretion					
Cholic Acid		3.53±0.71	4.61±0.27	0.0063	3.2698	1.303
	Primary bile acid biosynthesis					
3A,7A-Dihydroxy-5B-Cholestan-26-Al		4.44±0.13	4.63±0.12	0.0271	1.2324	1.0423
	Primary bile acid biosynthesis					
3A,7A,12A-Trihydroxy-5B-Cholestan-26-Al		4.88±0.08	5.04±0.08	0.0056	1.2429	1.0336
	Primary bile acid biosynthesis					
3Beta,7Alpha-Dihydroxy-5-Cholestenoate		5.19±0.17	5±0.12	0.0483	1.2086	0.9628
	Pyrimidine metabolism					
Urea		3.99±0.05	3.85±0.06	0.0021	1.1556	0.9654
	Pyrimidine metabolism					
5'-Thymidylic Acid		4.46±0.13	4.27±0.14	0.0396	1.1894	0.9581
	Apoptosis					
Sphingosine		5.21±0.1	5.05±0.08	0.0173	1.14	0.9704
	Phenylalanine metabolism					
2-Hydroxycinnamic Acid		5.17±0.03	5.06±0.05	0.0008	1.0634	0.9789
	Bile secretion					
Dehydroisoandrosterone 3-Glucuronide		4.15±0.09	3.97±0.08	0.0047	1.3372	0.9554
	Glycerophospholipid metabolism					
L-2-Aminoethyl Seryl Phosphate		5.35±0.04	5.1±0.07	0.00002	1.7102	0.9527
	Valine, leucine and isoleucine degradation; Propanoate metabolism; Pyrimidine metabolism					
Methylmalonic Acid		6.18±0.13	5.86±0.24	0.0199	1.5632	0.9492
	Tyrosine metabolism					
3-Amino-3-(4-Hydroxyphenyl)Propanoate		6.02±0.03	5.91±0.05	0.0018	1.0404	0.9819
	Tyrosine metabolism					
Normetanephine		4.9±0.02	4.79±0.07	0.0045	1.0043	0.9782
	Choline metabolism in cancer; Glycerophospholipid metabolism					
Lysopc(20:5(5Z,8Z,11Z,14Z,17Z)/0:0)		6.8±0.06	6.94±0.11	0.0254	1.0513	1.0203
	Choline metabolism in cancer; Glycerophospholipid metabolism					
Gpcho(20:4/18:0)		7.45±0.06	7.26±0.19	0.0352	1.192	0.9738

Lysopc(20:4(8Z,11Z,14Z,17Z)/0:0)	Choline metabolism in cancer; Glycerophospholipid metabolism	4.43±0.04	4.3±0.09	0.0094	1.1085	0.97
Lysopc(P-18:0/0:0)	Choline metabolism in cancer; Glycerophospholipid metabolism	4.35±0.11	4.56±0.2	0.0469	1.2258	1.0492
Bile Acid	Vitamin digestion and absorption	5.98±0.18	6.2±0.14	0.0435	1.2756	1.0361
Pantothenic Acid	Vitamin digestion and absorption	6.02±0.09	5.85±0.15	0.0387	1.1283	0.9713

Table note: UDG(mean ± SD): expression levels of metabolites in UDG(mean ± SD); HFD(mean ± SD): expression levels of metabolites in HFD(mean ± SD); P.value: statistical p-value; VIP: variable importance in the projection from orthogonal partial least squares discriminant analysis (OPLS-DA); FC: fold change value of the metabolite in groups;. HFD: High-fat diet group; UDG: UDG intervention group