Electronic Supplementary Material (ESI) for Food & Function.
This journal is © The Royal Society of Chemistry 2024

Supplementary Material

Stilbenes-enriched peanut sprouts alleviated physical fatigue via regulating interactions of nutrients-microbiota-metabolites revealed by multi-omics analysis

Tong Zhu[a,b], Qi Pan[b], Kunpeng Xiao[b], Changzhou Zuo[b], Qiang Liu[c], Dandan Zhou[d], Kang Tu[b,*]

[a] *College of Food Science and Technology/Yunnan Key Laboratory of Precision Nutrition and Personalized Food Manufacturing, Yunnan Agricultural University, Kunming 650201, P. R. China*

[b] *College of Food Science and Technology, Nanjing Agricultural University, Nanjing 210095, P. R. China*

[c] *College of Food Science and Engineering/Collaborative Innovation Center for Modern Grain Circulation and Safety, Key Laboratory of Grains and Oils Quality Control and Processing, Nanjing University of Finance and Economics, Nanjing 210023, P. R. China*

[d] *College of Light Industry and Food Engineering, Nanjing Forestry University, Nanjing 210037, P. R. China*

***Corresponding author:**

Email: kangtu@njau.edu.cn

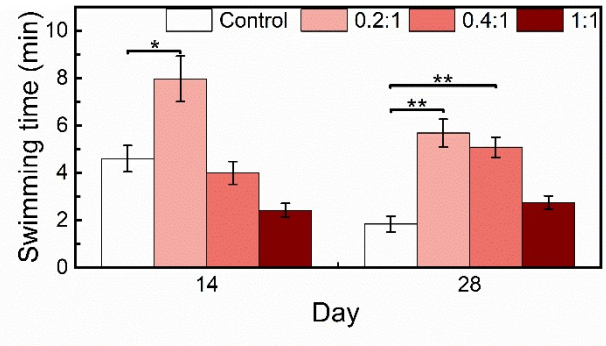

Fig. S1. Effect of diets with different adding ratios (0.2 : 1, 0.4 : 1, 1 : 1 w/w) of peanut sprouts (germinated under UV-C radiation) on the endurance time of weight-loaded swimming. Each group included six mice which were attached with a tin wire (10 % of body weight) for the test. Results were expressed as mean ± SE in the bar graphs. Statistical analysis was performed by Tukey's post hoc test (*: $P<0.05$, **: $P<0.01$).

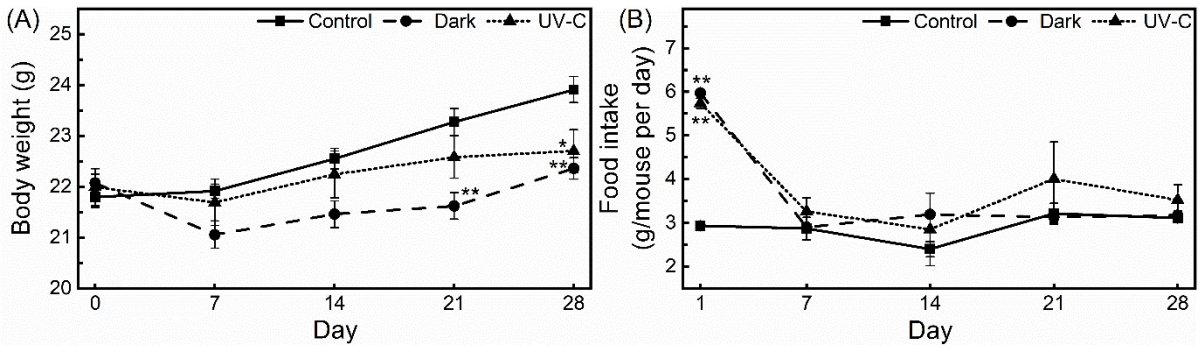

Fig. S2. Effect of peanut sprouts supplementation on body weight (A) and food intake (B) of mice. Data were expressed as mean ± SE. Statistical analysis was performed by Tukey's post hoc test (*: $P<0.05$, **: $P<0.01$ compared with the control).

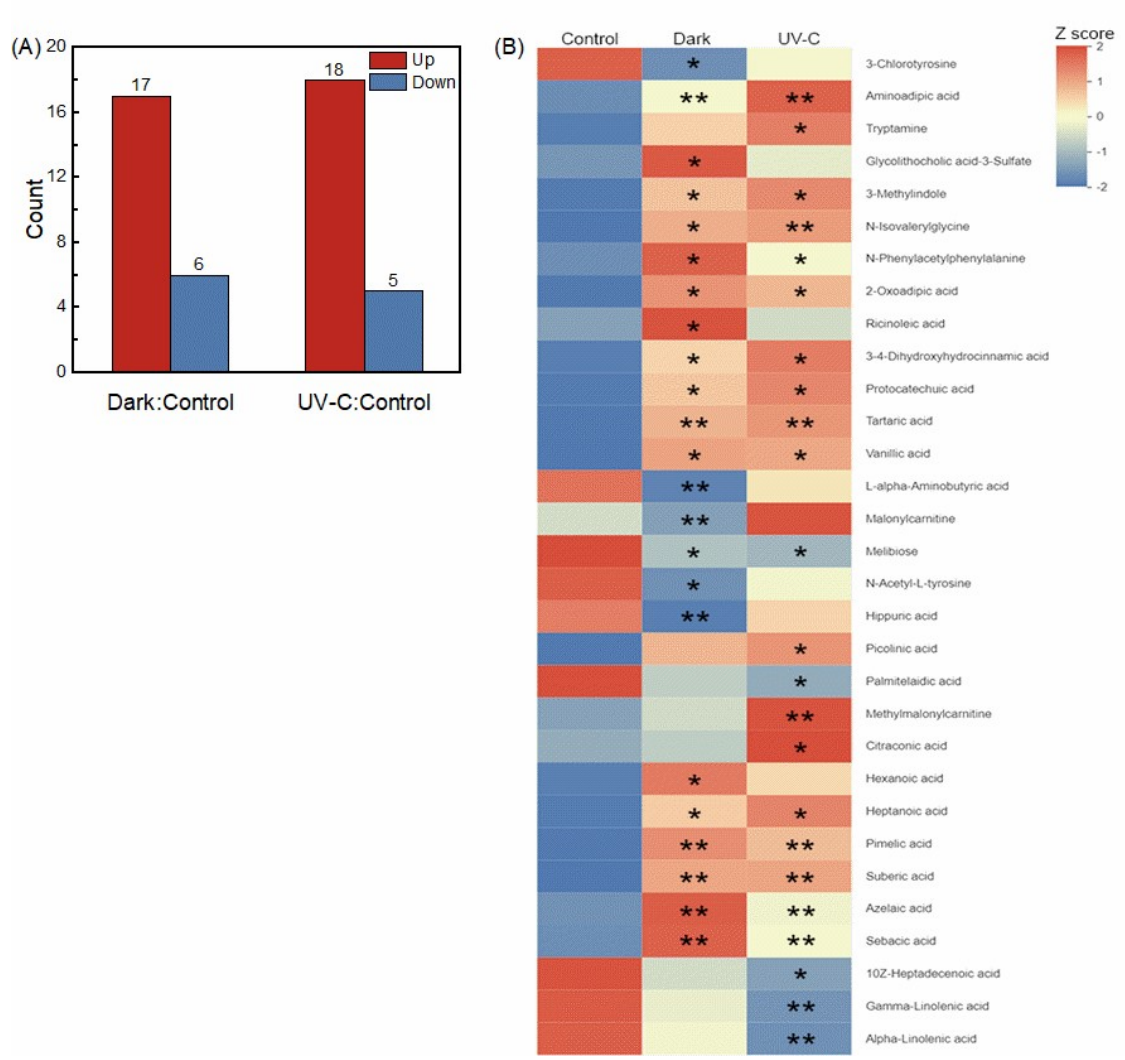

Fig. S3. Numbers of significantly altered gut metabolites by peanut sprouts supplementation (A). Heatmap of significantly altered gut metabolites by peanut sprouts supplementation (B). The changes of gut metabolites were represented by normalized Z-score for visualization. Statistical significance was analyzed by Kruskal-Wallis test with Benjamini-Hochberg correction (*: P<0.05, **: P<0.01 compared with the control).

Table S1. The nutritional composition of normal diet

Ingredient	Content (%)	Ingredient	Content (%)
Crude protein	19.32	Leucine	1.78
Crude fat	4.90	Isoleucine	0.93
Crude fiber	2.10	Valine	1.06
Crude ash	5.60	Calcium	1.36
Moisture	8.50	Magnesium	0.23
Lysine	1.34	Phosphorus	0.83
Cystine	0.25	Sodium	0.30
Methionine	0.51	Potassium	0.56
Arginine	1.15	Iron	0.02
Histidine	0.46	Manganese	0.02
Tryptophan	0.20	Zinc	0.01
Phenylalanine	0.88	Copper	1.6×10^{-3}
Tyrosine	0.64	Iodine	1.83×10^{-4}
Threonine	0.89	Selenium	4×10^{-5}

Nutrient contents were expressed as the percentage of w/w, which were achieved the national standard of P. R. China for laboratory mouse feed (GB 14924.3-2010).

Table S2. Major macronutrients and bioactive compounds in peanut sprouts powder

Composition	Content	
	Dark	UV-C
Ash	2.23 ± 0.06 g/100g	2.32 ± 0.02 g/100g
Fat	31.20 ± 0.66 g/100g	35.80 ± 0.40 g/100g**
Dietary fiber	15.10 ± 2.46 g/100g	12.93 ± 1.90 g/100g
Protein	23.30 ± 0.20 g/100g	23.67 ± 0.15 g/100g
Carbohydrate	22.37 ± 2.46 g/100g	20.17 ± 1.66 g/100g
Total phenolics	4.28 ± 0.71 mg GAE/g	4.51 ± 0.84 mg GAE/g
Total flavonoids	2.91 ± 0.60 mg rutin/g	4.75 ± 0.71 mg rutin/g**
trans-Resveratrol	2.04 ± 0.15 μg/g	52.31 ± 3.21 μg/g**
trans-Piceid	1.98 ± 0.44 μg/g	2.06 ± 0.52 μg/g
trans-Piceatannol	1.87 ± 0.24 μg/g	2.94 ± 0.71 μg/g

Dark: peanut sprouts cultivated in dark; UV-C: peanut sprouts cultivated under UV-C radiation.

The data were expressed as mean ± SD with the value from three independent experiments (n=50 for each replicate).

** represents significant difference at $P<0.01$ by an unpaired, two-tailed t-test.

Table S3. Changes of relative organ weight of mice by peanut sprouts supplementation

Relative weight (%)	Control	Dark	UV-C
Heart	0.68 ± 0.06	0.78 ± 0.03	0.70 ± 0.03
Lung	0.61 ± 0.02	0.63 ± 0.01	0.68 ± 0.05
Liver	4.35 ± 0.08	4.99 ± 0.13**	4.66 ± 0.09
Spleen	0.34 ± 0.02	0.31 ± 0.03	0.31 ± 0.03
Kidney	1.69 ± 0.02	1.79 ± 0.02	1.76 ± 0.04

ND: the normal diet group; Dark: the normal diet with peanut sprouts (cultivated in dark) supplementation group; UV-C: the normal diet with peanut sprouts (cultivated under UV-C radiation) supplementation group.
The data are expressed as mean ± SE (n=10).
** represents significant level at $P<0.01$ compared with the ND group by ANOVA and Tukey's multiple comparisons test.

Table S4. Changes of gut metabolome in each groups analyzed by targeted UHPLC-MS/MS

NO.	Component	HMDB ID[a]	Content (μmol/g stool)		
			Control	Dark	UV-C
Amino acids					
1	1-Methylhistidine	HMDB0000001	0.0431 ± 0.0124	0.0368 ± 0.0094	0.0327 ± 0.0064
2	2-3-Diaminopropionic acid	HMDB0002006	0.0365 ± 0.0147	0.0538 ± 0.0158	0.0693 ± 0.0187
3	2-Hydroxy-2-methylbutyric acid	HMDB0001987	0.0634 ± 0.0267	0.0949 ± 0.0459	0.0694 ± 0.0202
4	3-Chlorotyrosine	HMDB0001885	0.6850 ± 0.1270	0.3430 ± 0.0882	0.4950 ± 0.1010
5	4-Hydroxyproline	HMDB0000725	0.0182 ± 0.0036	0.0249 ± 0.0048	0.0122 ± 0.0028
6	5-Aminolevulinic acid	HMDB0001149	1.1000 ± 0.2980	0.9890 ± 0.3440	0.8720 ± 0.1680
7	Acetylglycine	HMDB0000532	0.9510 ± 0.2310	0.6770 ± 0.1780	0.6140 ± 0.1220
8	Aminoadipic acid	HMDB0000510	1.4300 ± 0.2730	5.1500 ± 1.0700	9.2900 ± 1.5600
9	Beta-Alanine	HMDB0000056	0.2010 ± 0.0198	0.1630 ± 0.0199	0.1960 ± 0.0532
10	Betaine	HMDB0000043	0.7910 ± 0.2620	0.5370 ± 0.1970	0.7050 ± 0.1860
11	Bicine	HMDB0011727	0.7780 ± 0.0464	0.8520 ± 0.0780	0.9110 ± 0.0330
12	Glutamyalanine	HMDB0003764	0.6970 ± 0.2060	0.5760 ± 0.2210	0.9670 ± 0.4120
13	Glycine	HMDB0000123	18.9000 ± 3.6000	15.7000 ± 3.4600	15.9000 ± 2.4900
14	Glycyl-L-leucine	HMDB0028929	0.4200 ± 0.1130	0.2060 ± 0.0533	0.4750 ± 0.1900
15	Glycylproline	HMDB0000721	0.3150 ± 0.0626	0.2720 ± 0.0595	0.2270 ± 0.0188
16	Guanidoacetic acid	HMDB0000128	0.0523 ± 0.0094	0.0466 ± 0.0122	0.0416 ± 0.0084
17	L-alpha-Aminobutyric acid	HMDB0000452	0.9030 ± 0.1110	0.4100 ± 0.0573	0.7200 ± 0.2520
18	L-Arginine	HMDB0000517	84.4000 ± 33.4000	58.2000 ± 40.8000	56.4000 ± 20.4000
19	L-Asparagine	HMDB0000168	0.6890 ± 0.3310	0.2580 ± 0.1830	0.8380 ± 0.3690
20	L-Aspartic acid	HMDB0000191	3.3400 ± 1.1600	2.3100 ± 0.8750	3.2800 ± 0.9250
21	L-Cysteic acid	HMDB0002757	1.8700 ± 0.3340	2.4900 ± 0.2310	2.7400 ± 0.4240
22	L-Glutamic acid	HMDB0000148	0.0020 ± 0.0003	0.0016 ± 0.0003	0.0014 ± 0.0002
23	L-Glutamine	HMDB0000641	2.9500 ± 0.8950	2.0100 ± 0.9000	2.1500 ± 0.5080
24	L-Histidine	HMDB0000177	1.8400 ± 0.6120	1.6200 ± 0.7590	1.6600 ± 0.5150
25	L-Homoarginine	HMDB0000670	0.3690 ± 0.0480	0.5280 ± 0.0678	0.5290 ± 0.0634
26	L-Homocitrulline	HMDB0000679	0.1160 ± 0.0143	0.1000 ± 0.0119	0.1200 ± 0.0223
27	L-Homoserine	HMDB0000719	0.1070 ± 0.0237	0.1180 ± 0.0214	0.1220 ± 0.0125
28	L-Isoleucine	HMDB0000172	10.6000 ± 1.2700	9.4800 ± 2.1200	10.8000 ± 1.8900
29	L-Kynurenine	HMDB0000684	0.0322 ± 0.0073	0.0208 ± 0.0095	0.0301 ± 0.0100

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
30	L-Leucine	HMDB0000687	16.4000 ± 1.4800	12.6000 ± 2.6900	16.2000 ± 2.0900
31	L-Lysine	HMDB0000182	15.9000 ± 2.7100	13.7000 ± 3.1600	16.2000 ± 2.7100
32	L-Methionine	HMDB0000696	3.3200 ± 0.6650	2.6400 ± 0.5280	2.6100 ± 0.3430
33	L-Norleucine	HMDB0001645	1.8800 ± 0.1900	1.5400 ± 0.4080	1.9800 ± 0.3030
34	L-Phenylalanine	HMDB0000159	20.9000 ± 3.8300	17.5000 ± 4.1700	23.4000 ± 3.2200
35	L-Pipecolic acid	HMDB0000716	0.0797 ± 0.0132	0.1100 ± 0.0262	0.1150 ± 0.0323
36	L-Proline	HMDB0000162	12.3000 ± 1.7100	9.0200 ± 1.6800	9.5700 ± 1.1000
37	L-Serine	HMDB0000187	14.9000 ± 4.1100	11.3000 ± 4.1500	14.1000 ± 2.6700
38	L-Threonine	HMDB0000167	10.6000 ± 1.5400	9.8700 ± 2.0600	10.1000 ± 1.3000
39	L-Tryptophan	HMDB0000929	0.6460 ± 0.1380	0.4600 ± 0.1510	0.5240 ± 0.1020
40	L-Tyrosine	HMDB0000158	1.5400 ± 0.2090	1.3200 ± 0.2350	1.6000 ± 0.1900
41	L-Valine	HMDB0000883	10.4000 ± 1.9700	9.4200 ± 2.0700	11.2000 ± 1.4300
42	N-Acetylhistidine	HMDB0032055	0.0165 ± 0.0030	0.0158 ± 0.0031	0.0170 ± 0.0032
43	N-Acetyl-L-alanine	HMDB0000766	0.5160 ± 0.2120	0.1810 ± 0.0564	0.2530 ± 0.0822
44	N-Acetyl-L-aspartic acid	HMDB0000812	0.1640 ± 0.0327	0.1350 ± 0.0491	0.1500 ± 0.0474
45	N-Acetyl-L-tyrosine	HMDB0000866	0.1830 ± 0.0441	0.0870 ± 0.0257	0.1280 ± 0.0276
46	N-Acetylserine	HMDB0002931	0.8980 ± 0.1130	0.6150 ± 0.1620	0.5610 ± 0.1070
47	N-Acetylserotonin	HMDB0001238	0.0008 ± 0.0003	0.0011 ± 0.0003	0.0007 ± 0.0003
48	N-Acetyltryptophan	HMDB0013713	0.0381 ± 0.0087	0.0184 ± 0.0063	0.0225 ± 0.0051
49	N-Formyl-L-methionine	HMDB0001015	2.0500 ± 0.2110	1.9400 ± 0.1550	1.8800 ± 0.0600
50	N-Isovalerylglycine	HMDB0000927	1.3100 ± 0.1910	2.3400 ± 0.2110	2.4100 ± 0.1420
51	N-Methyl-D-aspartic acid	HMDB0002393	0.0381 ± 0.0095	0.0502 ± 0.0243	0.0318 ± 0.0043
52	Norvaline	HMDB0013716	71.4000 ± 10.4000	69.1000 ±	82.9000 ± 15.2000
53	N-Phenylacetylphenylalanine	HMDB0002372	0.0192 ± 0.0018	0.0386 ± 0.0107	0.0280 ± 0.0037
54	Phosphoserine	HMDB0000272	19.2000 ± 1.0800	19.7000 ± 0.9160	19.7000 ± 1.2500
55	Sarcosine	HMDB0000271	0.5630 ± 0.2550	0.4740 ± 0.0778	0.6150 ± 0.2170
56	Ureidosuccinic acid	HMDB0000828	0.7300 ± 0.2330	0.5430 ± 0.2360	0.7070 ± 0.1870
Benzenoids					
57	3-Hydroxyanthranilic acid	HMDB0001476	1.3500 ± 0.3420	1.3100 ± 0.1440	0.9690 ± 0.1800

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
58	3-Hydroxyphenylacetic acid	HMDB0000440	0.2010 ± 0.0548	0.2300 ± 0.0348	0.1650 ± 0.0313
59	4-Hydroxybenzoic acid	HMDB0000500	0.0260 ± 0.0051	0.0254 ± 0.0034	0.0153 ± 0.0033
60	4-Hydroxyhippuric acid	HMDB0013678	0.0079 ± 0.0024	0.0064 ± 0.0012	0.0077 ± 0.0009
61	Benzoic acid	HMDB0001870	0.1240 ± 0.0115	0.1160 ± 0.0180	0.1450 ± 0.0160
62	Hippuric acid	HMDB0000714	0.0014 ± 0.0002	0.0008 ± 0.0001	0.0012 ± 0.0002
63	Homovanillic acid	HMDB0000118	0.0050 ± 0.0014	0.0033 ± 0.0008	0.0014 ± 0.0007
64	Mandelic acid	HMDB0000703	0.2060 ± 0.0575	0.2210 ± 0.0257	0.1710 ± 0.0292
65	3-Hydroxyhippuric acid	HMDB0006116	0.0096 ± 0.0025	0.0101 ± 0.0014	0.0096 ± 0.0007
66	Ortho-Hydroxyphenylacetic acid	HMDB0000669	0.0615 ± 0.0161	0.0690 ± 0.0105	0.0537 ± 0.0097
67	Phenyllactic acid	HMDB0000779	0.0928 ± 0.0337	0.0751 ± 0.0415	0.0649 ± 0.0299
68	Phenylpyruvic acid	HMDB0000205	0.2770 ± 0.0609	0.2470 ± 0.1000	0.2690 ± 0.0928
69	p-Hydroxyphenylacetic acid	HMDB0000020	0.6850 ± 0.1770	0.5900 ± 0.0749	0.4400 ± 0.0892
70	Protocatechuic acid	HMDB0001856	0.0369 ± 0.0041	0.0501 ± 0.0040	0.0537 ± 0.0032
71	Salicyluric acid	HMDB0000840	0.0060 ± 0.0009	0.0050 ± 0.0009	0.0046 ± 0.0009
72	Vanillic acid	HMDB0000484	0.0211 ± 0.0040	0.0437 ± 0.0081	0.0433 ± 0.0068
Bile acids					
73	12-Dehydrocholic acid	HMDBID NA17	1.1000 ± 0.2740	1.6000 ± 0.8080	0.6830 ± 0.3930
74	12-Ketolithocholic acid	HMDB0000328	1.6700 ± 0.1280	2.5200 ± 0.5470	2.2900 ± 0.3630
75	2,4-Dimethyladipic acid	HMDB0059727	0.0053 ± 0.0009	0.0064 ± 0.0007	0.0077 ± 0.0009
76	3-Dehydrocholic acid	HMDB0000502	0.8700 ± 0.1880	0.8610 ± 0.2830	0.9170 ± 0.2740
77	6-7-Diketolithocholic acid	HMDBID NA14	0.0262 ± 0.0044	0.0265 ± 0.0100	0.0243 ± 0.0058
78	6-Ketolithocholic acid	HMDBID NA19	1.9600 ± 0.2840	2.8100 ± 0.6190	2.6000 ± 0.4090
79	7-Dehydrocholic acid	HMDB0000391	0.4540 ± 0.1520	0.5480 ± 0.2780	0.2130 ± 0.1110
80	7-Ketolithocholic acid	HMDB0000467	1.1400 ± 0.0934	1.4000 ± 0.3150	1.3800 ± 0.2430
81	Alloisolithocholic Acid	HMDBID NA18	1.6300 ± 0.2980	1.6000 ± 0.3660	1.5200 ± 0.4270
82	Alpha-Muricholic acid	HMDB0000506	2.1800 ± 0.2890	2.0100 ± 0.2950	2.2700 ± 0.5140
83	Apocholic acid	HMDBID NA01	0.9690 ± 0.0347	1.2700 ± 0.2530	1.2700 ± 0.2160
84	Beta-Hyodeoxycholic acid	HMDB0000664	0.3290 ± 0.0605	0.2780 ± 0.0772	0.2570 ± 0.0676
85	Beta-Muricholic acid	HMDB0000415	2.8900 ± 0.5420	2.3500 ± 0.7210	2.1300 ± 0.6310

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
86	Cholic acid	HMDB0000619	0.9700 ± 0.3940	1.0100 ± 0.4750	0.4900 ± 0.2090
87	Deoxycholic acid	HMDB0000626	0.3230 ± 0.0423	0.2710 ± 0.0773	0.2800 ± 0.0795
88	Deoxycholic acid 3-sulfate	HMDB0002504	0.6270 ± 0.1560	0.4180 ± 0.2130	0.3680 ± 0.1260
89	D-Ribose-5-phosphate	HMDB0001548	0.1730 ± 0.0283	0.1640 ± 0.0441	0.1560 ± 0.0241
90	Glycochenodeoxycholic acid	HMDB0000637	0.0121 ± 0.0025	0.0148 ± 0.0017	0.0138 ± 0.0038
91	Glycochenodeoxycholic acid-3-sulfate	HMDB0002497	0.0019 ± 0.0001	0.0018 ± 0.0002	0.0019 ± 0.0002
92	Glycocholic acid	HMDB0000138	0.0095 ± 0.0059	0.0040 ± 0.0016	0.0031 ± 0.0013
93	Glycodeoxycholic acid	HMDB0000631	0.0152 ± 0.0034	0.0153 ± 0.0019	0.0175 ± 0.0057
94	Glycodeoxycholic acid-3-sulfate	HMDBID NA26	0.0013 ± 0.0001	0.0010 ± 0.0001	0.0010 ± 0.0001
95	Glycohyocholic acid	HMDB0240607	0.0089 ± 0.0047	0.0045 ± 0.0015	0.0033 ± 0.0011
96	Glycohyodeoxycholic acid	HMDB0304944	0.0021 ± 0.0005	0.0012 ± 0.0002	0.0010 ± 0.0003
97	Glycolithocholic acid-3-sulfate	HMDB0002639	0.0005 ± 2.10E-05	0.0007 ± 0.0001	0.0006 ± 3.65E-05
98	Glycoursodeoxycholic acid	HMDB0000708	0.0019 ± 0.0003	0.0012 ± 0.0001	0.0013 ± 0.0003
99	Hyocholic acid	HMDB0000760	1.2000 ± 0.4450	1.3300 ± 0.6380	0.6450 ± 0.3050
100	Hyodeoxycholic acid	HMDB0000733	0.3220 ± 0.0504	0.2790 ± 0.0797	0.2660 ± 0.0711
101	Isodeoxycholic acid	HMDB0002536	3.1600 ± 0.6260	4.5500 ± 0.9810	3.8900 ± 0.9480
102	Isolithocholic acid	HMDB0000717	0.1120 ± 0.0237	0.0631 ± 0.0103	0.0658 ± 0.0175
103	Lithocholic acid	HMDB0000761	0.7550 ± 0.1670	0.6620 ± 0.1630	0.6950 ± 0.2160
104	Nordeoxycholic acid	HMDB0304947	0.0031 ± 0.0009	0.0015 ± 0.0006	0.0014 ± 0.0004
105	Omega-muricholic acid	HMDB0000364	1.0000 ± 0.1170	1.0200 ± 0.1600	0.9810 ± 0.1930
106	Tauro-alpha-muricholic acid	HMDB0258742	0.1510 ± 0.0724	0.0480 ± 0.0064	0.0659 ± 0.0130
107	Taurochenodeoxycholic acid	HMDB0000951	0.0344 ± 0.0094	0.0335 ± 0.0056	0.0355 ± 0.0123
108	Taurocholic acid	HMDB0000036	0.1410 ± 0.0788	0.0724 ± 0.0136	0.0805 ± 0.0169
109	Taurodeoxycholic acid	HMDB0000896	0.0374 ± 0.0105	0.0370 ± 0.0056	0.0411 ± 0.0147
110	Taurohyocholic acid	HMDB0011637	0.1360 ± 0.0646	0.0646 ± 0.0095	0.0699 ± 0.0169
111	Taurohyodeoxycholic acid	HMDBID NA08	0.0067 ± 0.0014	0.0044 ± 0.0007	0.0044 ± 0.0009
112	Taurolithocholic acid	HMDB0000722	0.0017 ± 0.0003	0.0015 ± 0.0003	0.0020 ± 0.0006
113	Tauroursodeoxycholic acid	HMDB0000874	0.0112 ± 0.0025	0.0079 ± 0.0019	0.0096 ± 0.0021
114	Ursodeoxycholic acid	HMDB0000946	0.3000 ± 0.0629	0.2310 ± 0.0658	0.2320 ± 0.0635

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
Carbohydrates					
115	Beta-D-Fucose	HMDB0003081	4.0400 ± 0.5320	4.1400 ± 0.4630	3.2200 ± 0.5120
116	D-Fructose	HMDB0000660	0.7410 ± 0.1570	1.1100 ± 0.3690	1.0500 ± 0.3570
117	D-Ribulose	HMDB0000621	4.5000 ± 0.3540	4.4300 ± 0.4250	4.5300 ± 0.8680
118	D-Xylose	HMDB0000098	48.1000 ± 5.9600	38.3000 ± 5.1600	35.5000 ± 5.4600
119	D-Xylulose	HMDB0001644	1.5400 ± 0.4120	1.4600 ± 0.2340	0.9090 ± 0.1570
120	Erythronic acid	HMDB0000613	0.0112 ± 0.0023	0.0097 ± 0.0019	0.0124 ± 0.0020
121	Fructose-6-phosphate	HMDB0000124	0.0090 ± 0.0030	0.0351 ± 0.0321	0.0155 ± 0.0130
122	Glucaric acid	HMDB0000663	0.0104 ± 0.0021	0.0130 ± 0.0037	0.0082 ± 0.0017
123	Glucose-6-phosphate	HMDB0001401	0.0088 ± 0.0023	0.0400 ± 0.0371	0.0181 ± 0.0142
124	Glyceraldehyde	HMDB0001051	0.0345 ± 0.0061	0.0269 ± 0.0024	0.0248 ± 0.0041
125	Glyceric acid	HMDB0000139	0.0199 ± 0.0050	0.0159 ± 0.0044	0.0168 ± 0.0026
126	Maltotriose	HMDB0001262	0.3710 ± 0.0825	0.4950 ± 0.2170	0.7050 ± 0.3120
127	Melibiose	HMDB0000048	0.0805 ± 0.0181	0.0385 ± 0.0088	0.0360 ± 0.0064
128	N-Acetyl-D-glucosamine	HMDB0000215	37.2000 ± 4.0000	36.5000 ± 6.3500	43.7000 ± 8.3900
129	N-Acetylneuraminic acid	HMDB0000230	6.4200 ± 1.0300	5.3900 ± 1.3900	3.6500 ± 0.5720
130	Rhamnose	HMDB0000849	4.2100 ± 0.6960	4.5100 ± 0.6680	3.9700 ± 0.5980
Carnitines					
131	2-Methylbutyroylcarnitine	HMDB0000378	0.0010 ± 0.0005	0.0008 ± 0.0007	0.0008 ± 0.0006
132	3-Hydroxylisovalerylcarnitine	HMDB0061189	0.0036 ± 0.0011	0.0038 ± 0.0012	0.0037 ± 0.0007
133	Adipoylcarnitine	HMDB0061677	0.0046 ± 0.0025	0.0024 ± 0.0013	0.0030 ± 0.0013
134	Butyrylcarnitine	HMDB0002013	0.0047 ± 0.0015	0.0026 ± 0.0015	0.0028 ± 0.0014
135	Carnitine	HMDB0000062	0.1130 ± 0.0576	0.0504 ± 0.0216	0.0759 ± 0.0516
136	Glutarylcarnitine	HMDB0013130	0.0160 ± 0.0085	0.0076 ± 0.0028	0.0137 ± 0.0078
137	Hexanylcarnitine	HMDB0000705	0.0001 ± 1.00E-07	0.0001 ± 3.33E-05	0.0001 ± 3.33E-05
138	Linoleylcarnitine	HMDB0006469	0.0199 ± 0.0067	0.0323 ± 0.0196	0.0288 ± 0.0133
139	Malonylcarnitine	HMDB0002095	0.0317 ± 0.0033	0.0167 ± 0.0023	0.0721 ± 0.0383
140	Methylmalonylcarnitine	HMDB0013133	0.0136 ± 0.0037	0.0217 ± 0.0027	0.0459 ± 0.0067
141	Myristoylcarnitine	HMDB0005066	0.0153 ± 0.0063	0.0103 ± 0.0058	0.0105 ± 0.0052

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
142	Oleylcarnitine	HMDB0005065	0.2580 ± 0.0575	0.2690 ± 0.0893	0.3730 ± 0.1570
143	Palmitoylcarnitine	HMDB0000222	0.2080 ± 0.0487	0.2060 ± 0.0636	0.2480 ± 0.0923
Fatty acids					
144	10Z-Heptadecenoic acid	HMDB0060038	2.4300 ± 0.3280	1.7000 ± 0.1930	1.4300 ± 0.1380
145	12-Tridecenoic acid	HMDBID NA11	0.0060 ± 0.0020	0.0096 ± 0.0013	0.0066 ± 0.0011
146	2-Hydroxy-3-methylbutyric acid	HMDB0000407	0.0092 ± 0.0018	0.0147 ± 0.0039	0.0098 ± 0.0017
147	2-Hydroxycaproic acid	HMDB0001624	0.0540 ± 0.0220	0.0459 ± 0.0107	0.0282 ± 0.0088
148	2-Methyl-4-pentenoic acid	HMDB0031158	0.1580 ± 0.0465	0.1060 ± 0.0297	0.1620 ± 0.0461
149	2-Methylhexanoic acid	HMDB0031594	0.0018 ± 0.0004	0.0019 ± 0.0005	0.0016 ± 0.0005
150	2-Methylvaleric acid	HMDB0031580	0.0023 ± 0.0009	0.0029 ± 0.0012	0.0024 ± 0.0011
151	3-Hydroxyisovaleric acid	HMDB0000754	0.0045 ± 0.0007	0.0066 ± 0.0009	0.0047 ± 0.0006
152	3-Methylpentanoic acid	HMDB0033774	0.0013 ± 0.0001	0.0012 ± 0.0001	0.0011 ± 0.0002
153	5-Dodecenoic acid	HMDB0000529	0.0159 ± 0.0100	0.0102 ± 0.0032	0.0087 ± 0.0017
154	Acetic acid	HMDB0000042	0.1490 ± 0.0120	0.2610 ± 0.0811	0.1980 ± 0.0370
155	Adipic acid	HMDB0000448	0.0105 ± 0.0013	0.0122 ± 0.0014	0.0140 ± 0.0017
156	Alpha-Linolenic acid	HMDB0001388	3.9200 ± 1.1500	2.2200 ± 0.3460	0.9200 ± 0.1250
157	Aminocaproic acid	HMDB0001901	2.0800 ± 0.4610	2.6400 ± 1.1800	1.9600 ± 0.4030
158	Azelaic acid	HMDB0000784	0.0767 ± 0.0195	0.3310 ± 0.0626	0.1820 ± 0.0271
159	But-2-enoic acid	HMDB0010720	0.0051 ± 0.0016	0.0070 ± 0.0028	0.0124 ± 0.0034
160	Butyric acid	HMDB0000039	0.3350 ± 0.0563	0.2780 ± 0.0677	0.2790 ± 0.0861
161	Hexanoic acid	HMDB0000535	0.0341 ± 0.0029	0.0472 ± 0.0041	0.0431 ± 0.0036
162	Citraconic acid	HMDB0000634	0.0075 ± 0.0009	0.0109 ± 0.0042	0.0303 ± 0.0108
163	Dodecanoic acid	HMDB0000638	0.1540 ± 0.0449	0.2170 ± 0.0510	0.1330 ± 0.0127
164	Ethylmethylacetic acid	HMDB0002176	0.3010 ± 0.0654	0.2830 ± 0.0733	0.2920 ± 0.0824
165	Gamma-Linolenic acid	HMDB0003073	2.9200 ± 0.8620	1.5300 ± 0.1560	0.6570 ± 0.0879
166	Heptanoic acid	HMDB0000666	0.0109 ± 0.0010	0.0148 ± 0.0008	0.0160 ± 0.0017
167	Isobutyric acid	HMDB0001873	0.0791 ± 0.0276	0.1110 ± 0.0349	0.0800 ± 0.0248
168	Isovaleric acid	HMDB0000718	0.2450 ± 0.0271	0.2130 ± 0.0282	0.2030 ± 0.0271
169	Linoelaidic acid	HMDB0006270	19.2000 ± 3.1600	18.0000 ± 1.2100	12.0000 ± 2.7800

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
170	Methylglutaric acid	HMDB0000752	0.0059 ± 0.0010	0.0073 ± 0.0009	0.0087 ± 0.0012
171	Methylsuccinic acid	HMDB0001844	0.0431 ± 0.0057	0.0418 ± 0.0068	0.0645 ± 0.0025
172	Myristelaidic acid	HMDB0062248	0.1660 ± 0.1130	0.0492 ± 0.0154	0.0576 ± 0.0012
173	Myristic acid	HMDB0000806	2.1900 ± 0.4350	2.0600 ± 0.2670	1.6900 ± 0.2370
174	Myristoleic acid	HMDB0002000	0.1510 ± 0.0788	0.0478 ± 0.0160	0.0537 ± 0.0124
175	Octanoic acid	HMDB0000482	0.0826 ± 0.0104	0.1240 ± 0.0323	0.1330 ± 0.0277
176	Palmitelaidic acid	HMDB0012328	7.8600 ± 2.2200	3.5300 ± 0.8660	2.7200 ± 0.6370
177	Palmitoleic acid	HMDB0003229	7.4400 ± 2.5800	3.3900 ± 0.8220	2.7400 ± 0.6670
178	Pentadecanoic acid	HMDB0000826	42.2000 ± 12.3000	30.0000 ± 5.3000	44.2000 ± 7.6900
179	Pimelic acid	HMDB0000857	0.0050 ± 0.0009	0.0126 ± 0.0019	0.0114 ± 0.0016
180	Propanoic acid	HMDB0000237	0.6470 ± 0.2190	0.6180 ± 0.1370	0.4090 ± 0.0808
181	Ricinoleic acid	HMDB0034297	0.6600 ± 0.1240	1.1400 ± 0.0823	0.7840 ± 0.2480
182	Sebacic acid	HMDB0000792	0.0274 ± 0.0054	0.1770 ± 0.0421	0.0971 ± 0.0136
183	Suberic acid	HMDB0000893	0.0293 ± 0.0074	0.0895 ± 0.0129	0.0896 ± 0.0097
184	Tridecanoic acid	HMDB0000910	0.1710 ± 0.0414	0.1890 ± 0.0267	0.1610 ± 0.0214
185	Undecanoic acid	HMDB0000947	0.0193 ± 0.0063	0.0114 ± 0.0022	0.0108 ± 0.0014
186	Valeric acid	HMDB0000892	0.2560 ± 0.0221	0.2230 ± 0.0313	0.2180 ± 0.0323
Indoles					
187	3-Indolepropionic acid	HMDB0002302	0.0038 ± 0.0006	0.0033 ± 0.0004	0.0032 ± 0.0006
188	Indole-3-aldehyde	HMDB0029737	0.0048 ± 0.0016	0.0045 ± 0.0018	0.0066 ± 0.0033
189	Indole-3-carboxylic acid	HMDB0003320	0.0148 ± 0.0027	0.0142 ± 0.0025	0.0151 ± 0.0039
190	Indoleacrylic acid	HMDB0000734	0.1020 ± 0.0365	0.0625 ± 0.0187	0.0925 ± 0.0412
191	3-Methylindole	HMDB0000466	1.8000 ± 0.1740	2.4800 ± 0.2280	2.6400 ± 0.1860
192	Tryptamine	HMDB0000303	0.6620 ± 0.0695	0.8710 ± 0.0889	0.9510 ± 0.0531
Lipid					
193	Valerylcarnitine	HMDB0013128	0.0011 ± 0.0005	0.0009 ± 0.0008	0.0009 ± 0.0006
Nucleosides					
194	Adenosine monophosphate	HMDB0000045	0.0094 ± 0.0038	0.0208 ± 0.0137	0.0179 ± 0.0091
195	S-Adenosylhomocysteine	HMDB0000939	0.0102 ± 0.0012	0.0078 ± 0.0011	0.0118 ± 0.0025

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
Organic acids					
196	15-HETE	HMDB0003876	0.5220 ± 0.1620	1.1000 ± 0.4180	0.5450 ± 0.1020
197	2-2-Dimethylsuccinic acid	HMDB0002074	0.0109 ± 0.0016	0.0141 ± 0.0017	0.0164 ± 0.0020
198	2-Hydroxybutyric acid	HMDB0000008	0.0035 ± 0.0009	0.0042 ± 0.0013	0.0079 ± 0.0021
199	3-Hydroxybutyric acid	HMDB0000357	0.0042 ± 0.0013	0.0057 ± 0.0027	0.0096 ± 0.0026
200	3-Methyl-2-oxovaleric acid	HMDB0000491	1.1800 ± 0.2070	1.0600 ± 0.3370	1.3300 ± 0.4550
201	5-Hydroxyindole-3-acetic acid	HMDB0000763	0.0125 ± 0.0027	0.0186 ± 0.0053	0.0140 ± 0.0047
202	Acetoacetic acid	HMDB0000060	1.2200 ± 0.1410	0.9450 ± 0.2110	1.3200 ± 0.3110
203	Alpha-Hydroxyisobutyric acid	HMDB0000729	0.0061 ± 0.0027	0.0064 ± 0.0031	0.0116 ± 0.0035
204	Alpha-Ketoisovaleric acid	HMDB0000019	2.4000 ± 0.6740	4.1100 ± 0.5680	3.4600 ± 0.8870
205	Citric acid	HMDB0000094	0.0325 ± 0.0102	0.0265 ± 0.0100	0.0204 ± 0.0071
206	D-2-Hydroxyglutaric acid	HMDB0000606	0.1080 ± 0.0249	0.2070 ± 0.1240	0.3510 ± 0.1600
207	Fumaric acid	HMDB0000134	3.1600 ± 0.8230	3.1300 ± 0.7800	1.9700 ± 0.4270
208	Galactonic acid	HMDB0000565	0.0130 ± 0.0026	0.0098 ± 0.0030	0.0057 ± 0.0019
209	Glutaric acid	HMDB0000661	0.0219 ± 0.0018	0.0199 ± 0.0028	0.0315 ± 0.0118
210	Glycolic acid	HMDB0000115	0.2370 ± 0.0428	0.3480 ± 0.0808	0.4870 ± 0.0980
211	Hydroxypropionic acid	HMDB0000700	0.7280 ± 0.0973	1.0200 ± 0.3160	0.7840 ± 0.1730
212	Isocitric acid	HMDB0000193	0.0130 ± 0.0028	0.0076 ± 0.0010	0.0153 ± 0.0027
213	Itaconic acid	HMDB0002092	0.0058 ± 0.0025	0.0047 ± 0.0025	0.0036 ± 0.0005
214	Ketoleucine	HMDB0000695	0.9850 ± 0.1720	0.9430 ± 0.2870	1.1500 ± 0.3940
215	L-Dopa	HMDB0000181	0.2440 ± 0.0649	0.2530 ± 0.0195	0.2360 ± 0.0341
216	L-Malic acid	HMDB0000156	2.2900 ± 0.9740	2.1400 ± 0.6380	1.1200 ± 0.3530
217	Maleic acid	HMDB0000176	1.6800 ± 0.5480	1.8500 ± 0.5740	0.9990 ± 0.2600
218	Malonic acid	HMDB0000691	0.0163 ± 0.0012	0.0165 ± 0.0017	0.0146 ± 0.0021
219	Methylmalonic acid	HMDB0000202	0.4150 ± 0.0844	0.3640 ± 0.0836	0.3540 ± 0.0630
220	Oxalic acid	HMDB0002329	1.2400 ± 0.2940	0.8140 ± 0.0934	0.7660 ± 0.1220
0221	2-Oxoadipic acid	HMDB0000225	0.0021 ± 0.0002	0.0042 ± 0.0008	0.0040 ± 0.0009
222	Oxoglutaric acid	HMDB0000208	2.1200 ± 0.4710	3.0100 ± 1.1100	3.9500 ± 1.4500
223	Quinic acid	HMDB0003072	0.0883 ± 0.0306	0.0900 ± 0.0238	0.0633 ± 0.0149

Table S4 (continued)

NO.	Component	HMDB ID[a]	Content (μmol/g)		
			Control	Dark	UV-C
224	Quinolinic acid	HMDB0000232	0.8050 ± 0.1380	0.9220 ± 0.2560	1.2300 ± 0.2550
225	Shikimic acid	HMDB0003070	0.1740 ± 0.0581	0.1290 ± 0.0444	0.3440 ± 0.1740
226	Succinic acid	HMDB0000254	0.3960 ± 0.0637	0.3750 ± 0.0829	0.3630 ± 0.0661
227	Vanillymandelic acid	HMDB0000291	0.7160 ± 0.0925	0.7030 ± 0.0936	0.8090 ± 0.1140
228	Tartaric acid	HMDB0000956	0.0015 ± 0.0002	0.0116 ± 0.0012	0.0128 ± 0.0017
Peptidomimetics					
229	Anserine	HMDB0000194	0.0502 ± 0.0077	0.0469 ± 0.0083	0.0398 ± 0.0083
230	Carnosine	HMDB0000033	0.0127 ± 0.0022	0.0104 ± 0.0016	0.0098 ± 0.0015
Phenylpropanoic acids					
231	2-Hydroxycinnamic acid	HMDB0002641	0.0290 ± 0.0059	0.0286 ± 0.0078	0.0357 ± 0.0097
232	2-Phenylpropionate	HMDB0011743	0.3040 ± 0.0560	0.3200 ± 0.0628	0.3280 ± 0.0629
233	3-3-Hydroxyphenyl-3-hydroxypropanoic	HMDB0002643	0.0027 ± 0.0004	0.0038 ± 0.0003	0.0041 ± 0.0005
234	Hydrocinnamic acid	HMDB0000764	0.5350 ± 0.0933	0.5530 ± 0.1130	0.6060 ± 0.1210
235	Cinnamic acid	HMDB0000567	0.7770 ± 0.4760	1.1500 ± 0.8460	0.6260 ± 0.2700
236	3-4-Dihydroxyhydrocinnamic acid	HMDB0000423	0.0083 ± 0.0023	0.0212 ± 0.0033	0.0264 ± 0.0069
237	Coumarinic acid	HMDB0041592	0.0372 ± 0.0064	0.0439 ± 0.0134	0.0509 ± 0.0116
Pyridines					
238	3-Pyridylacetic acid	HMDB0001538	0.0029 ± 0.0005	0.0023 ± 0.0003	0.0019 ± 0.0002
239	Nicotinic acid	HMDB0001488	1.0200 ± 0.1330	1.1400 ± 0.2260	1.4700 ± 0.2940
240	Picolinic acid	HMDB0002243	5.0600 ± 0.6980	7.2800 ± 1.0300	7.5700 ± 0.6580

The data were expressed as mean ± SE and the value was an average of recordings from fecal samples of six mice.

a: Metabolites were annotated by the ID of the Human Metabolome Database (HMDB).