Pediococcus acidilactici Y01 reduces HFD-induced obesity via altering gut microbiota and metabolomic profiles and modulating adipose tissue macrophages M1/M2 polarization

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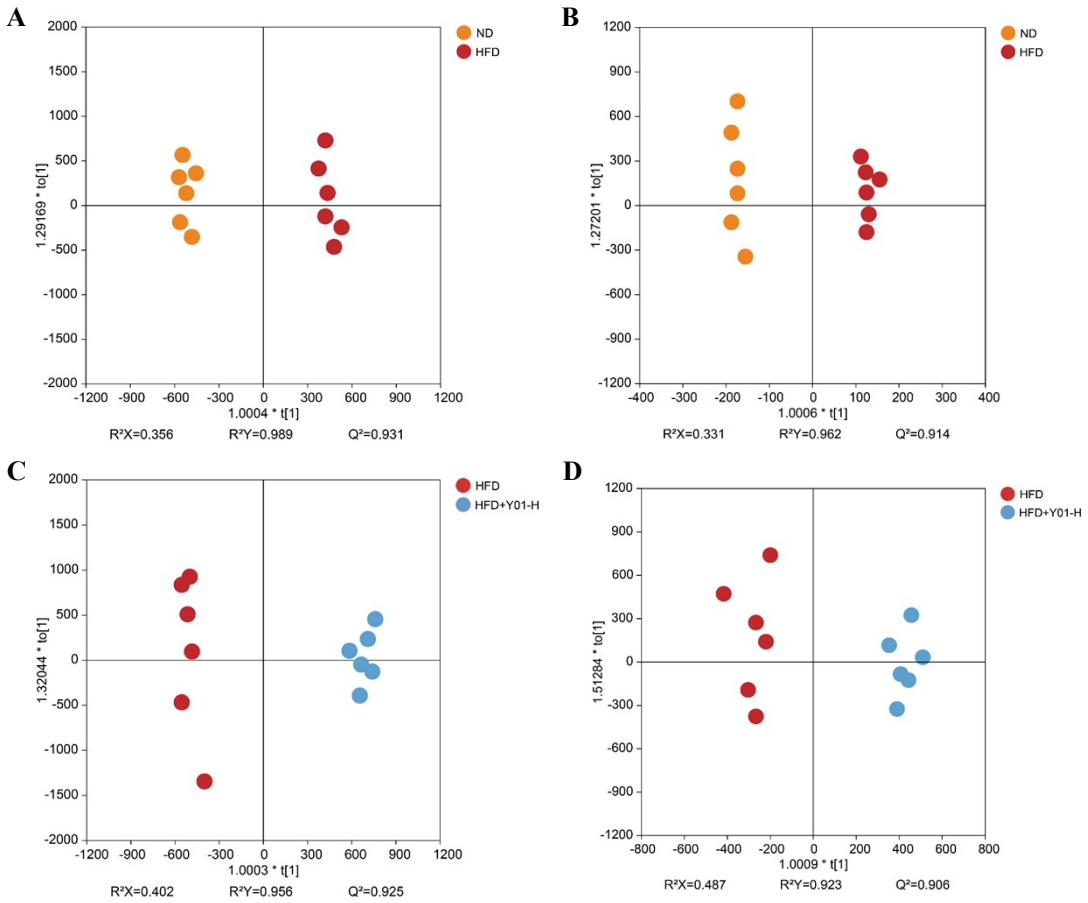

Fig S1. Effects of *P. acidilactici* Y01 on fecal metabolic profile in HFD-induced obese mice. The OPLS-DA score plots between ND and HFD groups in (A) positive ion mode and (B) negative ion mode; the OPLS-DA score plots between HFD and HFD+Y01-H groups in (C) positive ion mode and (D) negative ion mode.

Table S1. Detailed information of fecal differential metabolites between ND and HFD groups.

Metabolite	m/z	Retention time (min)	Adducts	Formula	VIP	Trend	P	HMDB_ID
Sphinganine	302.3107	8.01	M+H	$C_{18}H_{39}NO_2$	2.57	↑	**	HMDB0000269
Choline	103.1642	9.49	M-H	$C_5H_{14}NO$	2.34	↓	**	HMDB0000097
L-Tyrosine	182.0838	2.21	M+H	$C_9H_{11}NO_3$	2.12	↑	**	HMDB0000158
L-Tryptophan	205.2237	5.02	M+H	$C_{11}H_{12}N_2O_2$	1.79	↓	**	HMDB0000929
L-Threonine	118.0534	1.56	M-H	$C_4H_9NO_3$	1.20	↑	*	HMDB0000167
L-Serine	104.0421	1.49	M+H	$C_3H_7NO_3$	1.45	↑	*	HMDB0000187
PC(16:0/22:5(7Z,10Z,13Z,16Z,19Z))	830.5708	12.05	M+Na	$C_{46}H_{82}NO_8P$	1.85	↓	**	HMDB0007990
PC(18:0/20:5)	808.5804	11.02	M+H	$C_{46}H_{82}NO_8P$	1.25	↑	*	HMDB0008050
PC(18:4/20:5)	800.5263	8.53	M+H	$C_{46}H_{74}NO_8P$	1.54	↑	**	HMDB0008248
PC(20:3/22:6)	856.5911	8.78	M+H	$C_{50}H_{82}NO_8P$	1.22	↑	**	HMDB0008387
PC(20:5(5Z, 8Z, 11Z, 14Z, 17Z)/P-18:1 (11Z))	800.1915	8.94	M+Na	$C_{18}H_{32}N_6O_7$	1.87	↑	**	HMDB0008523
PC(22:6(4Z, 7Z, 10Z, 13Z, 16Z, 19Z)/20:0)	900.5956	15.31	2M+K	$C_{13}H_{20}N_4O_3$	2.04	↑	***	HMDB0008734
LysoPC(16:1)	494.3278	12.75	M+H	$C_{24}H_{48}NO_7P$	2.16	↓	**	HMDB0010383
LysoPC(18:1(11Z)/0:0)	522.3627	11.38	M+H	$C_{26}H_{52}NO_7P$	2.75	↓	**	HMDB0010385
LysoPC(20:3/0:0)	546.3693	4.27	M+H	$C_{28}H_{52}NO_7P$	3.87	↑	***	HMDB0010393
LysoPC(20:4(5Z,8Z,11Z,14Z))	544.3496	7.82	M+H	$C_{28}H_{50}NO_7P$	3.30	↑	***	HMDB0010395
PE(14:0/22:0)	792.5816	15.88	M+FA-H	$C_{41}H_{82}NO_8P$	1.95	↓	**	HMDB0008841
PE(16:0/22:6)	762.5172	10.34	M-H	$C_{43}H_{74}NO_8P$	1.67	↓	**	HMDB0008946
PE(18:3(6Z, 9Z, 12Z)/20:4(5Z, 8Z, 11Z, 14Z))	760.4919	14.32	M−H	$C_{43}H_{72}NO_8P$	1.48	↑	*	HMDB0009168
LysoPE(18:2(9Z,12Z)/0:0)	478.2989	9.24	M+H	$C_{23}H_{44}NO_7P$	2.16	↓	**	HMDB0011507
SM(d18:0/22:1(13Z))	831.6673	13.04	M+H	$C_{45}H_{91}N_2O6P$	1.47	↑	**	HMDB0012092
SM(d18:1/16:0)	702.0450	13.54	M-H	$C_{39}H_{79}N_2O_6P$	1.68	↑	*	HMDB0010169
SM(d18:1/20:0)	803.6324	10.91	M+H	$C_{43}H_{87}N_2O_6P$	1.33	↑	*	HMDB0012102
Cer(d18:1/12:0)	610.5419	12.73	M+FA-H	$C_{30}H_{59}NO_3$	1.91	↑	*	HMDB0004947
Linoleic acid	279.4742	8.37	M+H	$C_{18}H_{32}O_2$	1.48	↓	**	HMDB0000673
α-linolenic acid	279.3071	8.34	M+H	$C_{18}H_{30}O_2$	2.86	↓	***	HMDB0001388
γ-Linolenic acid	279.2686	15.51	M+H	$C_{18}H_{30}O_2$	1.87	↑	**	HMDB0003073
Arachidonic acid	303.5041	13.82	M-H	$C_{20}H_{32}O_2$	3.51	↑	***	HMDB0001043

Palmitic acid	255.4038	8.67	M-H	$C_{16}H_{32}O_2$	2.54	↑	***	HMDB0000220
Vaccenic acid	281.2533	4.36	M-H	$C_{18}H_{34}O_2$	2.11	↑	**	HMDB0003231
Urocanic acid	139.0522	1.69	M+H	$C_6H_6N_2O_2$	1.72	↑	*	HMDB0000301
Xanthosine	283.0706	3.29	M-H	$C_{10}H_{12}N_4O_6$	1.68	↑	*	HMDB0000299
Orotic acid	155.0130	1.44	M-H	$C_5H_4N_2O_4$	1.44	↑	*	HMDB0000226
Dihydroceramide	374.2986	5.72	M+FA-H	$C_{19}H_{39}NO_3$	1.74	↓	*	HMDB0006752
Creatine	132.0866	1.38	M+H	$C_4H_9N_3O_2$	1.55	↑	*	HMDB0000064
Indol	118.0691	3.93	M+H	C_8H_7N	1.71	↓	*	HMDB0000289
Indolelactic acid	206.0863	4.57	M+H	$C_{11}H_{11}NO_3$	2.24	↓	**	HMDB0000671
(±)12-HETE	319.2291	10.27	M-H	$C_{20}H_{32}O_3$	2.51	↓	**	HMDB0006111
8-HETE	319.2375	4.34	M-H	$C_{20}H_{32}O_3$	1.64	↓	*	HMDB0004679

Table S2. Detailed information of serum differential metabolites between HFD and HFD+Y01-H groups.

Metabolite	m/z	Retention time (min)	Adducts	Formula	VIP	Trend	P	HMDB_ID
Sphinganine	302.3107	8.01	M+H	$C_{18}H_{39}NO_2$	2.37	↓	***	HMDB0000269
Choline	103.1642	9.49	M-H	$C_5H_{14}NO$	2.33	↑	**	HMDB0000097
L-Tyrosine	182.0838	2.21	M+H	$C_9H_{11}NO_3$	2.21	↓	**	HMDB0000158
L-Tryptophan	205.2237	5.02	M+H	$C_{11}H_{12}N_2O_2$	1.68	↑	**	HMDB0000929
L-Threonine	118.0534	1.56	M-H	$C_4H_9NO_3$	1.34	↓	**	HMDB0000167
PC(O-16:0/2:0)	524.3761	9.97	M+H	$C_{26}H_{54}NO_7P$	1.23	↓	**	HMDB0062195
PC (20:5(5Z, 8Z, 11Z, 14Z, 17Z)/P-18:1 (11Z))	800.1915	8.94	M+Na	$C_{46}H_{80}NO_7P$	1.61	↓	**	HMDB0008523
PC(22:5(7Z.10Z.13Z.16Z. 19Z)/14:0)	780.5528	14.94	M+H	$C_{44}H_{78}NO_8P$	1.43	↓	*	HMDB0008689
PC (22:6(4Z, 7Z, 10Z, 13Z, 16Z, 19Z)/20:0)	900.5956	15.31	2M+K	$C_{50}H_{88}NO_8P$	1.78	↓	***	HMDB0008734
LysoPC(14:1(9Z)/0:0)	464.2845	10.77	M-H	$C_{22}H_{44}NO_7P$	4.46	↓	**	HMDB0010380
LysoPC(18:1(11Z)/0:0)	522.3627	11.38	M+H	$C_{26}H_{52}NO_7P$	2.88	↑	***	HMDB0010385
LysoPC(20:3/0:0)	546.3693	4.27	M+H	$C_{28}H_{52}NO_7P$	3.71	↓	***	HMDB0010393
LysoPC(20:4(5Z,8Z,11Z,14Z))	544.3496	7.82	M+H	$C_{28}H_{50}NO_7P$	3.30	↓	***	HMDB0010395
LysoPE(18:2(9Z,12Z)/0:0)	478.2989	9.24	M+H	$C_{23}H_{44}NO_7P$	2.03	↑	**	HMDB0011507
LysoPE(20:4(8Z.11Z,14Z. 17Z)/0:0)	502.2903	9.87	M+H	$C_{25}H_{44}NO_7P$	1.79	↑	*	HMDB0011518
LysoPG(18:1(9Z)/0:0)	511.3076	6.16	M+H	$C_{24}H_{47}O_9P$	1.47	↓	*	HMDB0240602
LysoPA(18:2(9Z,12Z)/0:0)	435.2511	9.36	M+H	$C_{21}H_{39}O_7P$	1.83	↓	*	HMDB0007856
SM(d18:1/16:0)	702.0450	13.54	M-H	$C_{39}H_{79}N_2O_6P$	1.70	↓	**	HMDB0010169
Cer(d18:1/12:0)	610.5419	12.73	M+FA-H	$C_{30}H_{59}NO_3$	1.91	↓	*	HMDB0004947
α-linolenic acid	279.3071	8.34	M+H	$C_{18}H_{30}O_2$	2.93	↑	***	HMDB0001388
Arachidonic acid	303.5041	13.82	M-H	$C_{20}H_{32}O_2$	4.11	↓	***	HMDB0001043
Palmitic acid	255.4038	8.67	M-H	$C_{16}H_{32}O_2$	2.21	↓	***	HMDB0000220
Hippuric acid	180.0773	12.12	M+H	$C_9H_9NO_3$	1.35	↑	*	HMDB0000714
Urocanic acid	139.0522	1.69	M+H	$C_6H_6N_2O_2$	1.69	↓	*	HMDB0000301
Orotic acid	155.0130	1.44	M-H	$C_5H_4N_2O_4$	0.37	↓	*	HMDB0000226
3-hydroxyanthranilic acid	154.0575	1.33	M+H	$C_7H_7NO_3$	2.65	↑	**	HMDB0001476
5-hydroxyindole-3-acetic acid	192.0705	5.43	M+H	$C_{10}H_9NO_3$	1.46	↑	*	HMDB0000763

Prostaglandin E2	353.2307	6.54	M+H	$C_{20}H_{32}O_5$	1.75	↓	**	HMDB0001220
Indole	118.0691	3.93	M+H	C_8H_7N	1.26	↑	**	HMDB0000738
Indolelactic acid	206.0863	4.57	M+H	$C_{11}H_{11}NO_3$	2.07	↑	**	HMDB0000671
16(R)-HETE	319.2380	9.07	M-H	$C_{20}H_{32}O_3$	2.01	↑	**	HMDB0004680