

Figure S1 HPLC chromatograms of GF for analyzing (A) mannitol; (B) vitamin A; (C) vitamin E; (D) vitamin C; (E) vitamin B1, B2 and B3; (F) vitamin B6; (G) vitamin D; (H) canthaxanthin and astaxanthin; (I) lutein and zeaxanthin, and (J) lycopene. Standard curve of (K) glucose, (L) rutin, (M) oleoic acid, (N) gallic acid, (O) matrine and (P) β-sitosterol using for analyzing their content of GF.

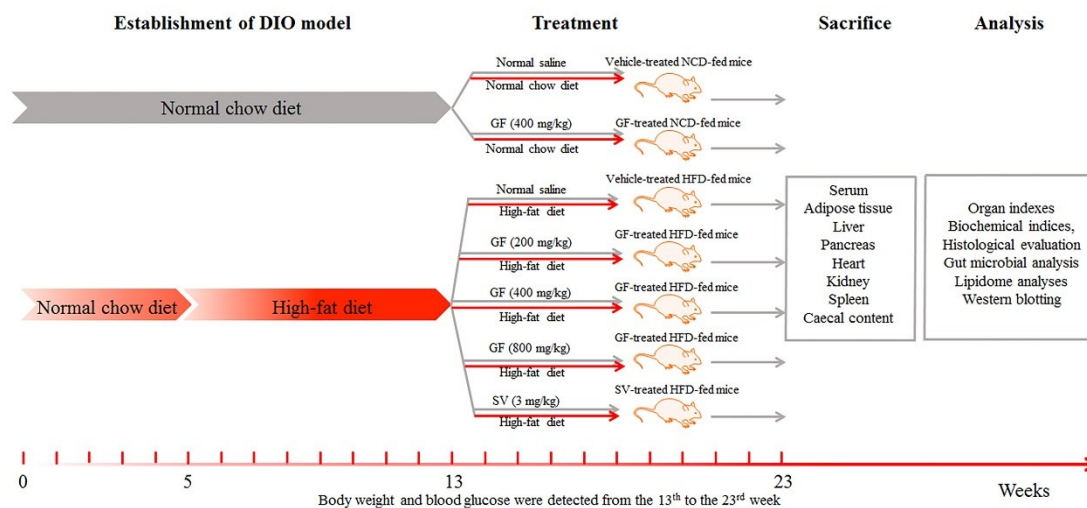


Figure S2 The process of establishing the DIO model and administering the drugs.

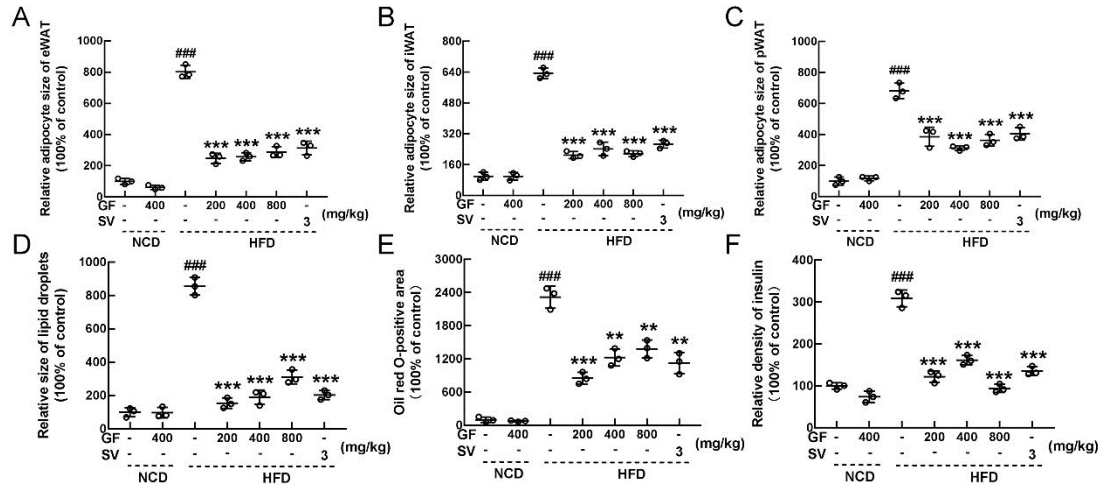


Figure S3 Adipocyte size in (A) eWAT, (B) iWAT and (C) pWAT according to representative H&E-staining results in Fig. 1H-J. (D) The relative size of lipid droplets and (E) quantification of the oil red O-positive area in the liver, according to representative H&E staining results in Fig. 2I and oil red O staining in Fig. 2J. (F) The relative levels of insulin in the pancreas, according to immunohistochemistry results in Fig. 3Q. Data were analyzed using a one-way ANOVA and are expressed as the means \pm S.E.M. (n = 3). ### $p < 0.001$ versus vehicle-treated NCD-fed mice; ** $p < 0.01$ and *** $p < 0.001$ versus vehicle-treated HFD-fed mice.

Table S1 Primary antibodies used for immunohistochemistry and western blotting.

Name	Item number	Molecular Weight (kDa)	Dilution rate
Insulin ^a	ab181547	12	1/20000
TLR4 ^a	ab217274	90	1/300
MyD88 ^b	bs-1047R	34	1/2000
TRAF6 ^a	ab33915	58	1/2000
p-IKK(α + β) ^a	ab194528	85	1/2000
t-IKK(α + β) ^a	ab55341	85	1/2000
p-I κ B α ^a	ab133462	35	1/2000
t-I κ B α ^a	ab32518	36	1/2000
p-NF- κ B ^a	ab76302	65	1/2000
t-NF- κ B ^a	ab32536	65	1/2000
IL-6 ^a	ab214429	23	1/1000
TNF- α ^c	3707S	20	1/1000
NLRP3 ^a	ab263899	118	1/1000
caspase 1 ^a	ab74279	45	1/2000
IL-1 β ^b	bs-0812R	17	1/2000
PP2A ^a	ab32104	35	1/5000
p-PKC ^a	ab75837	77	1/5000
t-PKC ^a	ab32376	77	1/2000
GAPDH ^a	ab181602	36	1/500

^a Antibodies were purchased from Abcam (Shanghai, China). ^b Antibody were purchased from Bioss (Beijing, China). ^c Antibodies were purchased from Cell Signaling Technology, Inc. (Shanghai, China).

Table S2 The effects of GF on body weights, plasma glucose, food and water intakes, and organ indices.

	week	NCD	NCD +400 mg/kg GF	HFD	HFD+200 mg/kg GF	HFD+400 mg/kg GF	HFD+800 mg/kg GF	HFD+3 mg/kg SV
Body weights (g)	0	24.23±0.24	24.68±0.23	32.69±0.57###	32.35±0.52	33.69±0.54	33.81±0.41	33.66±0.76
	2	25.06±0.32	24.26±0.39	32.87±0.54###	31.69±0.30	31.78±0.39	31.69±0.47	33.88±0.79
	4	25.89±0.26	23.90±0.51##	38.22±0.78###	31.62±0.56***	32.44±0.62***	32.30±0.47***	35.26±0.92*
	6	26.36±0.32	24.37±0.31##	44.36±0.89###	33.09±0.67***	34.31±0.60***	34.79±0.64***	39.44±0.84**
	8	27.15±0.35	24.53±0.46###	47.69±0.76###	35.90±0.93***	38.03±0.58***	37.45±0.78***	43.10±0.94**
	10	27.59±0.29	25.73±0.73#	49.66±0.58###	38.99±0.94***	41.48±0.62***	40.55±0.88***	46.29±0.89**
Plasma glucose (mmol/L)	0	7.7±0.5	7.4±0.3	11.8±0.4###	11.6±0.3	11.3±0.2	11.9±0.3	11.5±0.3
	2	10.1±0.3	10.2±0.5	12.1±0.6##	10.7±0.3	10.7±0.5	10.6±0.4	13.1±0.3
	4	9.5±0.3	9.6±0.7	14.4±0.4###	11.1±0.4***	10.2±0.5***	10.4±0.3***	13.0±0.3**
	6	9.2±0.2	8.5±0.4	14.0±0.4###	9.4±0.4***	10.2±0.4***	9.9±0.4***	10.6±0.3***
	8	8.1±0.3	8.9±0.8	12.2±0.2###	10.7±0.2***	11.2±0.4*	11.1±0.3**	12.8±0.4
	10	9.1±0.3	9.8±0.5	13.3±0.3###	9.7±0.4***	10.6±0.4***	10.1±0.5***	12.0±0.3*
Intakes (g/10g)	Food	0.83±0.03	0.79±0.09	0.84±0.08	0.78±0.06	0.94±0.13	0.77±0.02	0.78±0.10
	Water	2.45±0.21	2.10±0.67	1.95±0.23	2.36±0.32	2.53±0.64	2.13±0.48	1.99±0.13
Organ indices (%)	Spleen	0.238±0.006	0.243±0.009	0.178±0.004###	0.194±0.004*	0.195±0.005*	0.188±0.010	0.172±0.005
	Kidney	1.226±0.018	1.219±0.045	0.743±0.017###	0.871±0.0319***	0.891±0.0319***	0.849±0.0339**	0.809±0.0239*
	Heart	0.573±0.018	0.552±0.015	0.401±0.014###	0.494±0.041*	0.420±0.019	0.405±0.012	0.408±0.010

Data were analyzed using a one-way ANOVA and are expressed as the means ± S.E.M. (n = 6). # $p < 0.05$, ## $p < 0.01$ and ### $p < 0.001$ versus vehicle-treated NCD-fed mice; * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$ versus vehicle-treated HFD-fed mice.

Table S3 Basic information of the 11 significantly upregulated or downregulated metabolites by GF among experimental groups.

Class	Mean of vehicle-treated NCD mice	Mean of vehicle-treated HFD mice	Mean of GF (800 mg/kg)-treated HFD mice	vehicle-treated			GF (800 mg/kg)-treated		
				HFD mice versus vehicle-treated			HFD mice versus vehicle-treated		
				NCD mice			HFD mice		
				P value	log2 (fc)	VIP	P value	log2 (fc)	VIP
Upregulated metabolites by GF (Number: 2)									
LPC (19:0)	0.150	0.067	0.105	0.000	-1.156	1.440	0.023	0.641	1.707
TG (16:0_16:0_17:0)	0.109	0.003	0.094	0.000	-5.326	1.448	0.019	5.107	1.729
Downregulated metabolites by GF (Number: 9)									
Cer (d18:0_20:0+O)	4.504	10.082	6.240	0.001	1.163	1.416	0.003	-0.692	1.864
PC (35:0)	0.014	0.019	0.011	0.022	0.448	1.273	0.028	-0.762	1.683
PC (18:0_20:4)	0.102	0.513	0.386	0.000	2.325	1.435	0.035	-0.408	1.650
PS (39:4)	0.823	4.150	2.463	0.001	2.334	1.426	0.017	-0.753	1.744
PS (18:0_22:6)	0.003	2.385	1.314	0.001	9.776	1.417	0.029	-0.860	1.678
SM (d40:7)	0.003	0.115	0.003	0.000	5.396	1.446	0.000	-5.396	1.945
D5TG (16:0_18:2_18:0)	1.071	1.294	1.070	0.037	0.272	1.220	0.024	-0.274	1.705
TG (18:1_20:2_22:4)	0.003	0.100	0.023	0.002	5.198	1.400	0.035	-2.118	1.649
ZyE (20:2)	0.003	46.082	12.487	0.000	14.048	1.453	0.007	-1.884	1.823

log2 (fc): log2 (fold change); VIP: variable importance for the projection of orthogonal partial least squares discriminant analysis (OPLS-DA).