

## **Supporting information**

### **Multiple Univariate Data Analysis Reveals the Inulin Effects on the High-fat-diet Induced Metabolic Alterations in Rat Myocardium and Testicles in the Pre-obesity State**

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Figure legends:

**Figure S1.** Schematic illustrations for animal experiments.

**Figure S2.** Changes of (A) body weight, (B) average daily energy intake, (C) body-weight-gain per unit of energy intakes (mg/kcal) for rats fed with normal diet (ND), control diet (CD), inulin-containing control diet (ICD), high-fat diet (HFD) and inulin-containing HFD (IHFD). Dotted lines indicated the diet-switch time. Each value is mean  $\pm$  S.D. <sup>a</sup> CD vs. HFD  $p<0.05$ ; <sup>b</sup> HFD vs. IHFD  $p<0.05$ ; <sup>c</sup> CD vs. IHFD  $p<0.05$ .

**Figure S3.** Heart model evaluation based upon pairwise comparison of **(A)** CD vs. HFD, **(B)** HFD vs. IHFD, and **(C)** CD vs. IHFD. From left to right are PCA scores plots, PLS-DA scores plots, random permutation tests, and OPLS-DA scores plots.

**Figure S4.** Testicle model evaluation based upon pairwise comparison of **(A)** CD vs. HFD, **(B)** HFD vs. IHFD, and **(C)** CD vs. IHFD. From left to right are PCA scores plots, PLS-DA scores plots, random permutation tests, and OPLS-DA scores plots.

**Figure S5.** OPLS-DA loading plots showing the discrimination between heart hydrophilic extracts of **(A)** CD vs. HFD, **(B)** HFD vs. IHFD, and **(C)** CD vs. IHFD. (Forced implementation) <sup>a</sup>Magnification factors of the regions  $\delta$  5.1-9.8 relative to  $\delta$  0.5-4.8.

**Figure S6.** OPLS-DA loading plots showing the discrimination between testicle hydrophilic extracts of **(A)** CD vs. HFD, **(B)** HFD vs. IHFD, and **(C)** CD vs. IHFD. (Forced implementation) <sup>a</sup>Magnification factors of the regions  $\delta$  5.1-9.8 relative to  $\delta$  0.5-4.8.

**Figure S7.** Results from the Student's *t*-test (if criteria met) or Kruskal-Wallis test of metabolites in myocardium from rats to validate the results from the multiple univariate data analysis. Vertical axis: peak area per mg tissue. <sup>a</sup> CD vs. HFD,  $p<0.05$ ; <sup>b</sup> CD vs. IHFD,  $p<0.05$ ; <sup>c</sup> HFD vs. IHFD,  $p<0.05$ . Keys: Tau, taurine; Lac, lactate; Glu, glutamate; GPC, glycerophosphocholine; AMP, adenosine monophosphate; Lys, lysine; 3-HB, 3-hydroxybutyrate; HTau, hypotaurine; HpX, hypoxanthine; NAD<sup>+</sup>, nicotinamide adenine dinucleotide; SI, *scyllo*-inositol.

**Figure S8.** Results from the Student's *t*-test (if criteria met) or Kruskal-Wallis test of metabolites in testicle tissues from rats to validate the results from the multiple univariate data analysis. Vertical axis: peak area per mg tissue. <sup>a</sup> CD vs. HFD,  $p<0.05$ ; <sup>b</sup> CD vs. IHFD,  $p<0.05$ ; <sup>c</sup> HFD vs. IHFD,  $p<0.05$ . Keys: Glu, glutamate; Ala, alanine; Thr, threonine; HpX, hypoxanthine; 3-HB, 3-hydroxybutyrate; Xan, xanthine; Succ, succinate; His, histidine; SI, *scyllo*-inositol.

**Table S1.** Formula for control (CD) and high-fat diet (HFD)

	CD		HFD	
Ingredient	g	<i>kcal</i>	g	<i>kcal</i>
Casein, 80 Mesh	200	800	200	800
L-Cystine	3	12	3	12
Com Starch	315	1260	72.8	291
Maltodextrin 10	35	140	100	400
Sucrose	350	1400	172.8	691
Cellulose, BW200	50	0	50	0
Soybean Oil	25	225	25	225
Lard	20	180	177.5	1598
Mineral Mix S10026	10	0	10	0
Dicalcium Phosphate	13	0	13	0
Calcium Carbonate	5.5	0	5.5	0
Potassium Citrate, 1 H <sub>2</sub> O	16.5	0	16.5	0
Vitamin Mix V10001	10	40	10	40
Choline Bitartrate	2	0	2	0
Total	1055	4057	858.1	4057

**Table S2.** Results from the Student's *t*-test (if criteria met) or Kruskal-Wallis test for some metabolites in myocardium tissues from rats fed with control diet (CD), high-fat diet (HFD) and inulin-containing high-fat diet (IHFD)

Metabolites	Signal area per mg tissue <sup>a</sup>			<i>p</i> -values from Student's <i>t</i> -test <sup>b</sup>		
	CD	HFD	IHFD	CD vs.HFD	HFD vs. IHFD	CD vs.IHFD
Glutamate	5.82±0.72	5.19±0.41	5.17±0.67	1.90×10 <sup>-2</sup>	-	2.84×10 <sup>-2</sup>
Lysine	0.88±0.08	0.97±0.11	1.01±0.14	3.24×10 <sup>-2</sup>	-	1.13×10 <sup>-2</sup>
Taurine	32.02±3.12	31.54±3.32	29.35±2.58	-	-	2.82×10 <sup>-2</sup>
Hypotaurine	0.45±0.07	0.32±0.05	0.28±0.05	5.36×10 <sup>-5</sup>	3.97×10 <sup>-2</sup>	3.45×10 <sup>-7</sup>
3-Hydroxybutyrate	0.58±0.10	0.72±0.14	0.69±0.20	1.17×10 <sup>-2</sup>	-	-
Lactate	20.81±2.56	24.22±1.82	22.74±2.06	1.51×10 <sup>-3</sup>	-	-
<i>scyllo</i> -Inositol	0.04±0.00	0.04±0.00	0.14±0.03	-	9.93×10 <sup>-8</sup>	2.15×10 <sup>-7</sup>
GPC	2.60±0.26	2.28±0.16	2.55±0.34	1.75×10 <sup>-3</sup>	1.77×10 <sup>-2</sup>	-
AMP	1.82±0.64	1.28±0.52	1.26±0.43	4.02×10 <sup>-2</sup>	-	1.76×10 <sup>-2</sup>
Hypoxanthine	0.33±0.05	0.40±0.07	0.37±0.06	6.29×10 <sup>-3</sup>	-	4.10×10 <sup>-2</sup>
Inosine	3.39±0.47	3.80±0.38	3.83±0.63	3.17×10 <sup>-2</sup>	-	-
Guanosine	0.09±0.02	0.09±0.01	0.10±0.01	-	4.99×10 <sup>-2</sup>	-
NAD <sup>+</sup>	0.09±0.03	0.06±0.01	0.06±0.02	5.14×10 <sup>-4</sup>	-	3.68×10 <sup>-3</sup>

<sup>a</sup> NMR signal integrals of a metabolite are linearly correlated to its concentration. Values here are expressed as peak-area per mg tissue (mean ± SD). <sup>b</sup> only those with p<0.05 were tabulated here.

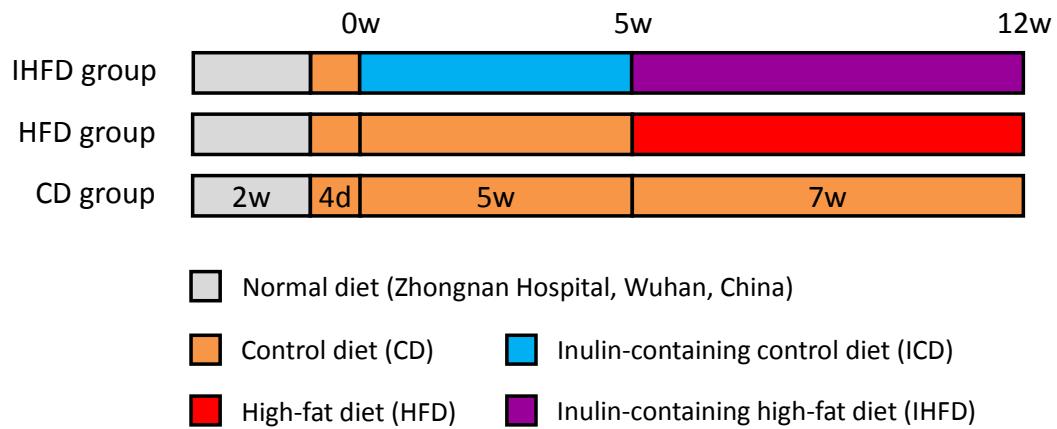
GPC, glycerophosphocholine; AMP, adenosine monophosphate; NAD<sup>+</sup>, nicotinamide adenine dinucleotide.

**Table S3.** Results from the Student's *t*-test (if criteria met) or Kruskal-Wallis test for some metabolites in testicle tissues from rats fed with control diet (CD), high-fat diet (HFD) and inulin-containing high-fat diet (IHFD)

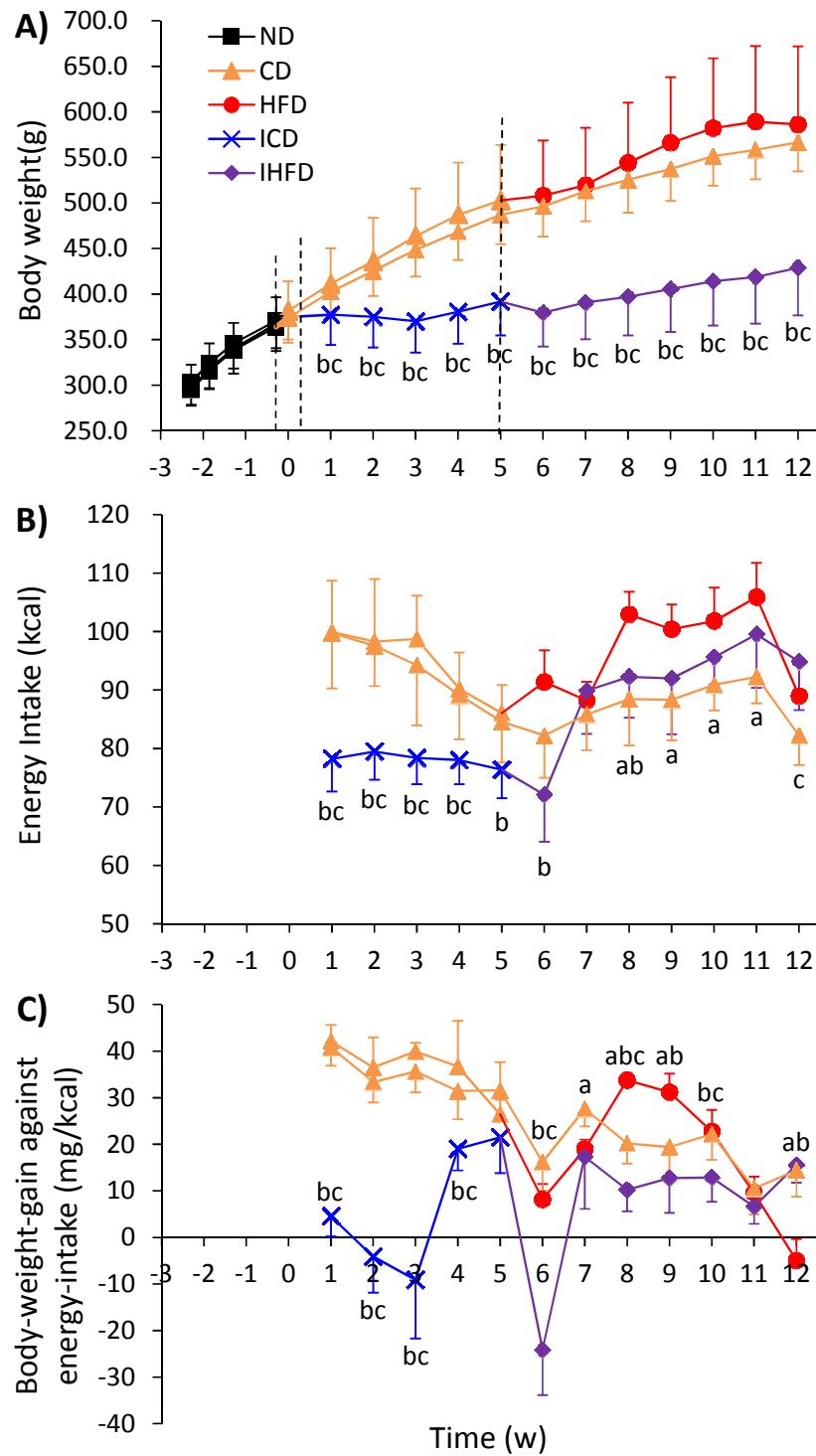
Metabolites	Signal area per mg tissue <sup>a</sup>			<i>p</i> -values from Student's <i>t</i> -test <sup>b</sup>		
	CD	HFD	IHFD	CD vs. HFD	HFD vs. IHFD	CD vs. IHFD
Alanine	18.67±1.06	16.78±1.60	14.96±2.14	5.73×10 <sup>-3</sup>	3.91×10 <sup>-2</sup>	7.19×10 <sup>-5</sup>
Glutamate	54.15±3.35	50.02±3.19	50.82±2.60	1.12×10 <sup>-2</sup>	-	1.61×10 <sup>-2</sup>
Threonine	11.67±0.56	11.38±0.79	12.89±0.97	-	7.88×10 <sup>-4</sup>	2.23×10 <sup>-3</sup>
Histidine	1.50±0.06	1.50±0.16	1.61±0.15	-	-	3.79×10 <sup>-2</sup>
3-Hydroxybutyrate	4.23±0.43	5.05±0.72	4.49±0.80	6.49×10 <sup>-3</sup>	-	-
Succinate	1.99±0.14	2.23±0.22	2.03±0.24	8.61×10 <sup>-3</sup>	-	-
Acetate	2.90±0.23	2.98±0.28	3.26±0.26	-	2.74×10 <sup>-2</sup>	3.28×10 <sup>-3</sup>
<i>scyllo</i> -Inositol	0.39±0.02	0.36±0.03	1.08±0.13	-	2.69×10 <sup>-10</sup>	1.21×10 <sup>-9</sup>
Betaine	23.65±1.66	22.08±1.25	23.36±1.08	2.81×10 <sup>-2</sup>	1.78×10 <sup>-2</sup>	-
Urea	2.00±0.17	1.69±0.13	2.30±0.43	1.94×10 <sup>-4</sup>	3.87×10 <sup>-4</sup>	4.49×10 <sup>-2</sup>
Uracil	1.92±0.10	1.95±0.19	2.06±0.20	-	-	4.91×10 <sup>-2</sup>
Xanthine	2.93±0.10	3.13±0.27	3.12±0.23	-	-	1.91×10 <sup>-2</sup>
Hypoxanthine	5.46±0.53	6.01±0.55	6.41±0.84	3.44×10 <sup>-2</sup>	-	5.39×10 <sup>-3</sup>
Inosine	12.51±1.43	10.78±1.25	11.21±1.64	9.94×10 <sup>-3</sup>	-	-

<sup>a</sup> NMR signal areas of a metabolite are linearly correlated to its concentration. Values here are expressed as peak-area per mg tissue (mean ± SD). <sup>b</sup> only those with *p*<0.05 were tabulated here.

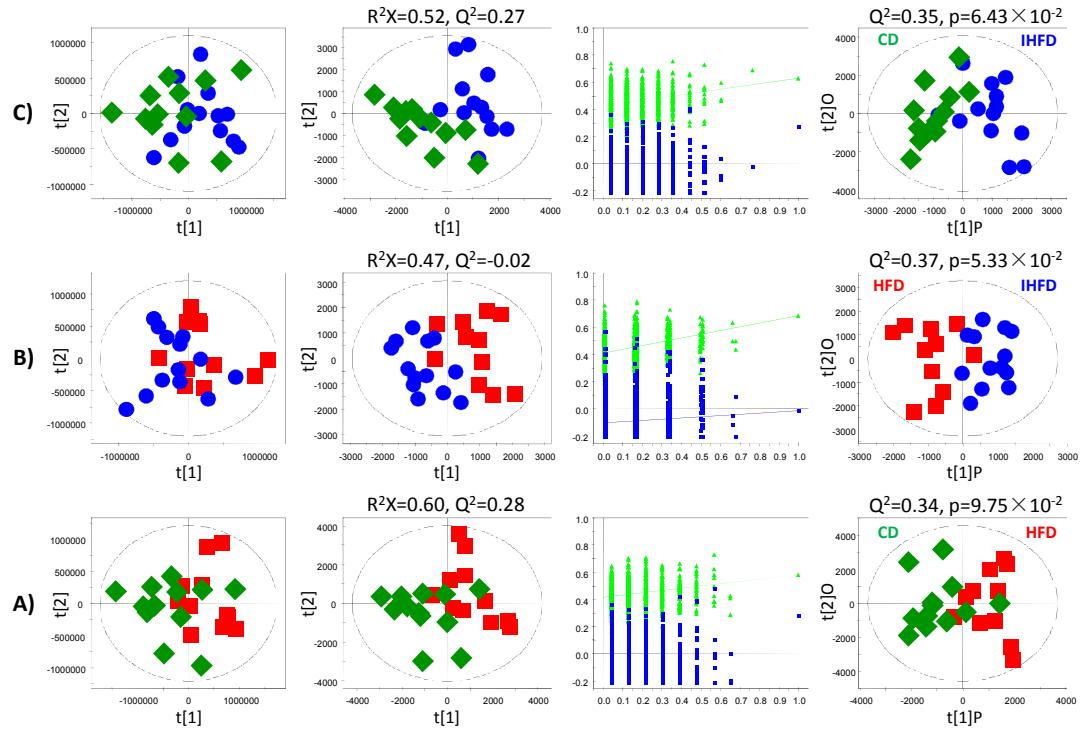
**Figure S1.**



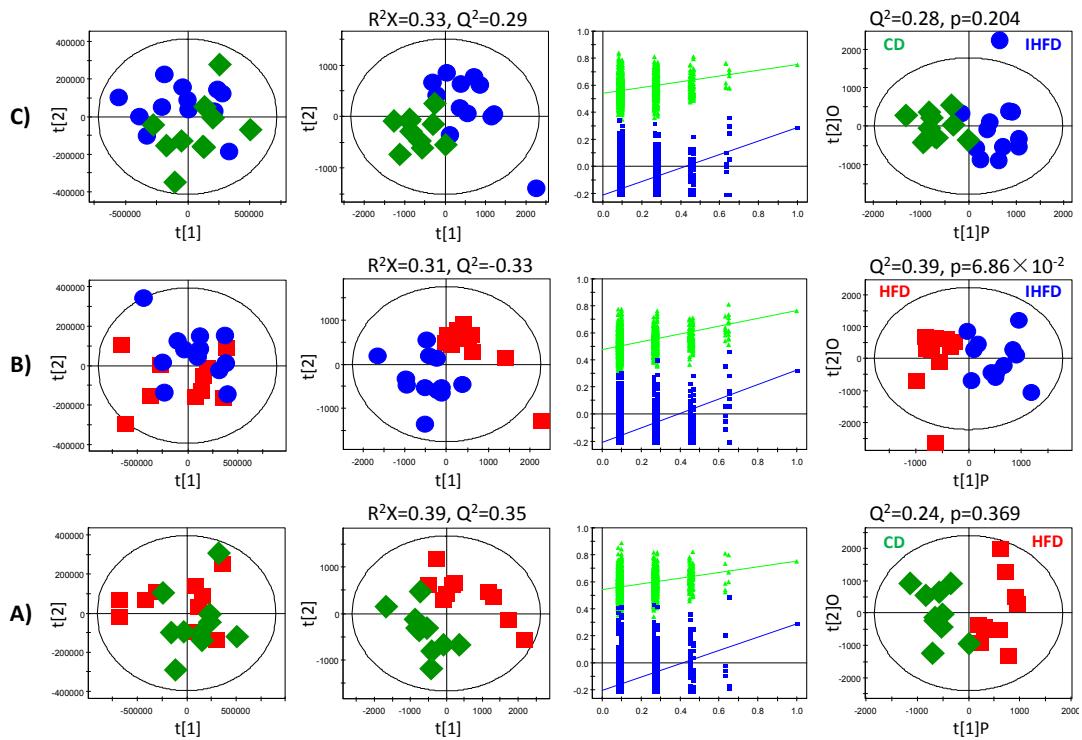
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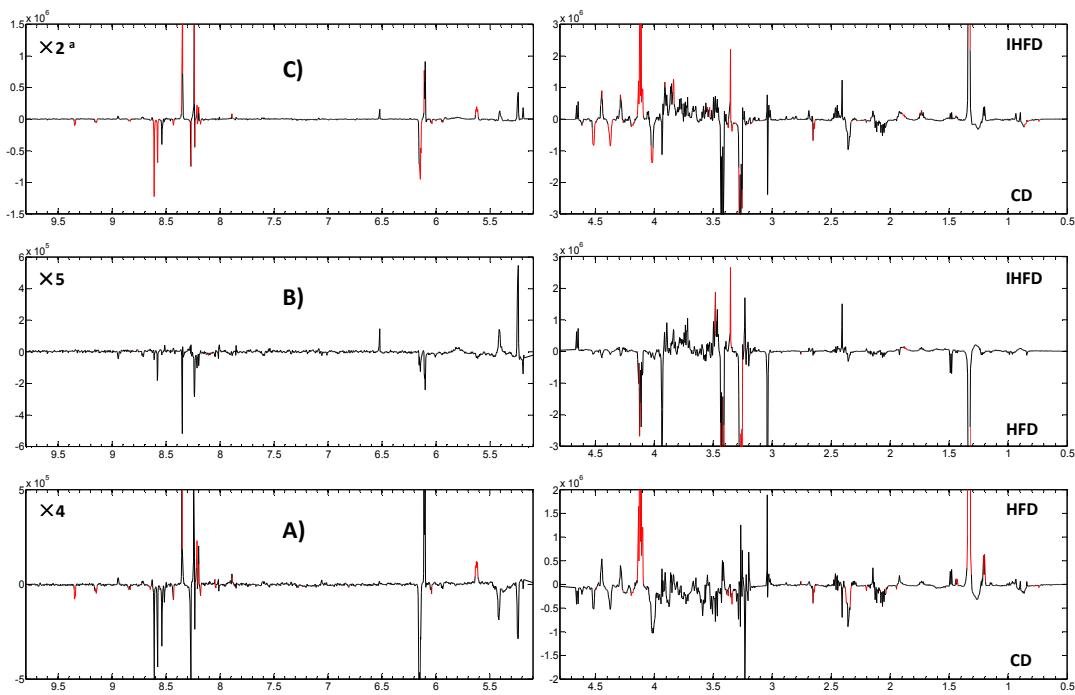
**Figure S3.**



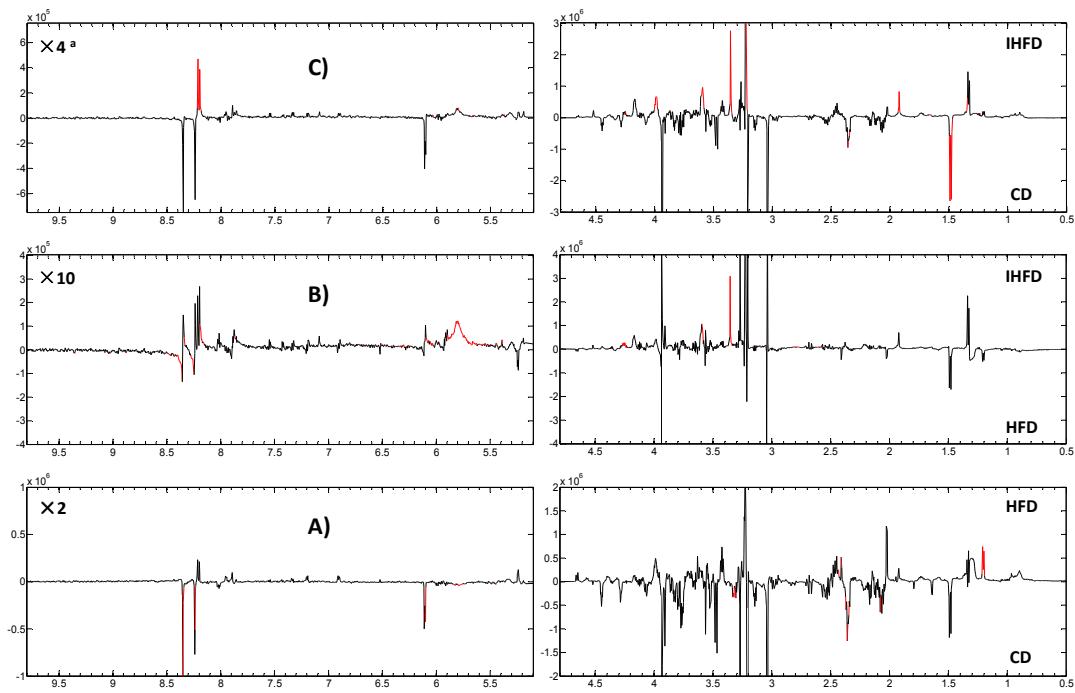
**Figure S4.**



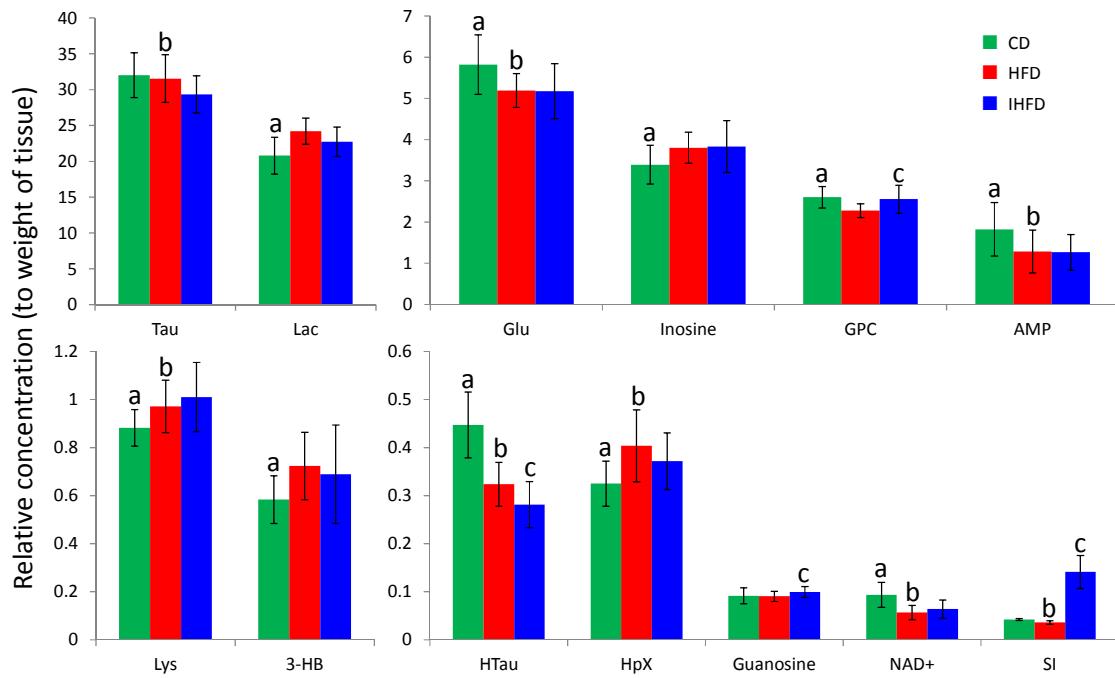
**Figure S5.**



**Figure S6.**



**Figure S7.**



**Figure S8.**

