Supplemental Digital Content

Supplemental Figure 1. A shift in plasma metabolomic profiles in HF and after resynchronization therapy (CRT). A, A three way comparison of plasma metabolomic profiles of control, HF pre-CRT and HF post CRT groups by partial least squares discriminant analysis (PLS-DA). B, An integral panel of the most important metabolites in group distinction by variable importance in the projection (VIP).

Supplemental Figure 2. Transitions in metabolomic matrix in control patients, and cardiac resynchronization therapy (CRT) patients. The red color in this heat map indicates an increased metabolite level, and green indicates a decreased metabolite level. The CRT group has a distinct cluster (#1) with decreased metabolite levels and another cluster (#2 and below) with increased metabolite levels. Glutamic acid and glutamic acid (dehydrated) are shown as two separate entries.

Supplemental Table 1. Plasma Metabolite Levels Before and After CRT*

Metabolite	Control	HF pre-CRT (N=24)	HF post-CRT (N=18)	HF pre-CRT – Control *P* Value	HF post-CRT – Control *P* Value	HF pre-CRT-post-CRT *P* Value
2-HB	1.44 ± 0.35	1.14 ± 0.11	0.60 ± 0.12	.29	.010	.002
2-hydroxypyridine	0.82 ± 0.10	0.89 ± 0.07	1.23 ± 0.11	.63	.020	.009
3-AIB	0.78 ± 0.13	0.89 ± 0.08	1.25 ± 0.12	.51	.023	.01
3-HB	0.85 ± 0.09	0.93 ± 0.06	1.17 ± 0.10	.51	.052	.04
Acetate	0.71 ± 0.18	0.78 ± 0.12	1.43 ± 0.19	.76	.023	.006
Acetoacetate	0.80 ± 0.12	0.90 ± 0.10	1.23 ± 0.13	.55	.040	.04
Acetone	0.80 ± 0.23	0.96 ± 0.09	1.15 ± 0.12	.42	.14	.22
Acetylsalicylic acid	0.13 ± 0.07	1.24 ± 0.54	1.15 ± 0.45	.19	.11	.90
Alanine	0.92 ± 0.16	0.78 ± 0.10	1.32 ± 0.16	.49	.12	.006
Allo-inositol	0.51 ± 0.09	0.97 ± 0.19	1.29 ± 0.21	.13	.015	.26
Arabitol	0.53 ± 0.11	0.98 ± 0.17	1.28 ± 0.25	.11	.047	.31
Benzoate	1.49 ± 0.47	1.18 ± 0.33	0.51 ± 0.07	.61	.010	.09
Beta-alanine	0.95 ± 0.13	0.92 ± 0.07	1.13 ± 0.10	.83	.28	.08
Cholesterol	1.15 ± 0.14	0.90 ± 0.05	1.05 ± 0.07	.04	.46	.09
Citrate	1.08 ± 0.26	0.85 ± 0.07	1.15 ± 0.21	.26	.002	.15
Creatine	0.75 ± 0.07	0.91 ± 0.06	1.24 ± 0.09	.12	.001	.003
Creatinine	0.58 ± 0.10	1.13 ± 0.17	1.06 ± 0.15	.05	.002	.79
Cysteine	1.26 ± 0.19	0.83 ± 0.08	1.07 ± 0.07	.02	.27	.04
Fumarate	0.60 ± 0.12	1.01 ± 0.18	1.20 ± 0.17	.16	.021	.45
Galactinol	0.51 ± 0.12	0.46 ± 0.08	1.93 ± 0.47	.75	.038	.001
Galacturonate	0.52 ± 0.17	1.85 ± 0.48	0.18 ± 0.00	.09	.007	.004
Gluconate	0.76 ± 0.28	1.73 ± 0.43	0.21 ± 0.00	.17	.009	.003
Glucose	0.91 ± 0.08	0.98 ± 0.02	1.07 ± 0.05	.24	.099	.12
Glutamate	0.43 ± 0.08	1.54 ± 0.14	0.61 ± 0.09	<.001	.21	<.001
Glutamine	0.83 ± 0.14	0.81 ± 0.11	1.33 ± 0.15	.900	.042	.007
Glycerate	0.62 ± 0.10	1.16 ± 0.19	1.00 ± 0.12	.09	.040	.52
Glycerol	1.92 ± 0.41	0.91 ± 0.14	0.63 ± 0.09	.005	.000	.13
Glycerol-1- phosphate	1.01 ± 0.30	0.79 ± 0.07	1.27 ± 0.12	.32	.34	.001
Glycine	1.29 ± 0.22	0.82 ± 0.05	1.07 ± 0.12	.007	.36	.04
Glycolate	0.89 ± 0.07	0.93 ± 0.07	1.14 ± 0.08	.75	.052	.05
Heptadecanoate	1.80 ± 0.80	1.18 ± 0.19	0.35 ± 0.00	.30	.018	<.001
Iminodiacetate	0.94 ± 0.05	1.00 ± 0.05	1.03 ± 0.05	.47	.28	.69
Isoleucine	0.87 ± 0.09	0.90 ± 0.05	1.19 ± 0.07	.77	.015	.001
IBTP	1.10 ± 0.46	0.89 ± 0.07	1.08 ± 0.21	.50	.96	.37
Lactate	1.03 ± 0.25	0.92 ± 0.08	1.09 ± 0.10	.60	.78	.19
Leucine	0.87 ± 0.10	0.90 ± 0.05	1.19 ± 0.08	.76	.026	.004
Linoleate	1.85 ± 0.51	0.94 ± 0.08	0.63 ± 0.08	.01	.003	.009
Lysine	0.93 ± 0.07	0.97 ± 0.12	1.08 ± 0.16	.86	.52	.55
Malate	0.85 ± 0.34	1.59 ± 0.35	0.34 ± 0.00	.22	.047	.003

Malonate	0.65	±	0.05	0.94	±	0.13	1.26	±	0.25	.16	.09	.24
Mannitol	1.13	±	0.56	0.87	±	0.27	1.10	±	0.36	.64	.97	.60
Melezitose	1.47	±	0.61	1.52	±	0.50	0.10	±	0.00	.96	.004	.02
Methylamine	0.61	±	0.31	0.72	±	0.21	1.57	±	0.30	.78	.049	.02
Methylguanidine	1.22	±	0.36	0.77	±	0.23	1.17	±	0.21	.31	.90	.22
Myristate	1.66	±	0.33	1.14	±	0.09	0.48	±	0.05	.05	<.001	<.001
Nicotinate	1.41	±	0.17	1.14	±	0.12	0.60	±	0.17	.22	.005	.01
N-methylhistidine	0.47	±	0.04	0.59	±	0.04	1.80	±	0.38	.07	.018	.001
Norleucine	0.90	±	0.10	0.94	±	0.09	1.12	±	0.13	.78	.26	.26
Norvaline	1.06	±	0.12	1.01	±	0.07	0.96	±	0.12	.70	.56	.69
Oleate	1.50	±	0.30	1.18	±	0.09	0.51	±	0.08	.20	<.001	<.001
Ornithine	0.95	±	0.12	0.95	±	0.07	1.09	±	0.09	.99	.34	.12
Oxalate	0.60	±	0.11	0.78	±	0.09	1.49	±	0.27	.26	.029	.01
Palmitate	1.33	±	0.19	1.08	±	0.06	0.73	±	0.05	.10	<.001	<.001
Palmitoleate	1.81	±	0.51	1.18	±	0.17	0.35	±	0.09	.13	<.001	<.001
Phenylalanine	0.59	±	0.09	0.54	±	0.05	1.79	±	0.57	.62	.14	.02
Phosphate	0.98	±	0.11	0.95	±	0.03	1.07	±	0.04	.71	.34	.02
Proline	0.76	±	0.11	0.89	±	0.08	1.26	±	0.09	.33	.002	.004
Pyrophosphate	0.31	±	0.09	0.72	±	0.26	1.72	±	1.02	.33	.33	.30
Pyruvate	1.15	±	0.34	0.98	±	0.11	0.94	±	0.16	.56	.54	.82
Serine	1.42	±	0.15	0.93	±	0.07	0.87	±	0.08	.003	.001	.55
Serotonin	1.62	±	0.18	1.06	±	0.12	0.59	±	0.15	.02	<.001	.02
Stearate	1.15	±	0.12	1.08	±	0.04	0.82	±	0.04	.49	.005	<.001
Succinate	0.90	±	0.33	0.73	±	0.14	1.40	±	0.21	.58	<.001	.009
Sucrose	0.06	±	0.03	0.58	±	0.39	2.03	±	1.08	.40	.20	.12
Tagatose	0.46	±	0.14	1.91	±	0.67	0.14	±	0.00	.18	.003	.02
Threitol	0.48	±	0.08	1.08	±	0.14	1.17	±	0.20	.01	.025	.71
Threonine	1.40	±	0.16	0.85	±	0.08	0.98	±	0.08	.002	.017	.24
Tryptophan	0.86	±	0.23	1.63	±	0.29	0.27	±	0.00	.11	.001	<.001
Tyrosine	0.49	±	0.04	0.50	±	0.03	1.90	±	0.41	.85	.021	<.001
Urea	0.72	±	0.08	1.03	±	0.09	1.11	±	0.12	.05	.038	.58
Urate	0.47	±	0.07	1.14	±	0.13	1.11	±	0.19	.003	.023	.88
Valine	0.93	±	0.10	0.94	±	0.05	1.10	±	0.07	.92	.031	.06

Abbreviations: CRT, cardiac resynchronization therapy; IBTP, isopropyl β-1-thiogalactopyranoside; 2-HB, 2-hydroxybutyrate; 3-AIB, 3-aminoisobutyrate; 3-HB, 3-hydroxybutyrate.

* Values are mean±standard error of the mean unless indicated otherwise.

Supplemental Table 2. Plasma Metabolite Levels Before and After CRT in Responders and Non-responders*

Metabolite	Responders							Non-responders						
	pre-CRT(N=9)			post-CRT(N=7)			*P* Value	pre-CRT(N=13)			post-CRT(N=10)			*P* Value
2-HB	1.24	±	0.60	0.79	±	0.73	0.15	1.05	±	0.44	0.43	±	0.13	<.001
2-hydroxypyridine	0.75	±	0.38	1.25	±	0.51	0.02	1.01	±	0.30	1.22	±	0.44	0.19
3-AIB	0.95	±	0.40	1.24	±	0.41	0.13	0.83	±	0.41	1.27	±	0.65	0.06
3-HB	0.98	±	0.28	1.14	±	0.35	0.26	0.88	±	0.33	1.20	±	0.53	0.10
Acetate	0.78	±	0.53	1.37	±	0.72	0.05	0.78	±	0.68	1.48	±	0.96	0.05
Acetoacetate	0.94	±	0.39	1.19	±	0.51	0.23	0.86	±	0.56	1.27	±	0.64	0.12
Acetone	1.03	±	0.40	1.22	±	0.53	0.36	0.91	±	0.50	1.08	±	0.53	0.43
Acetylsalicylic acid	1.23	±	3.03	0.24	±	0.46	0.35	1.26	±	2.37	1.97	±	2.41	0.49
Alanine	0.80	±	0.45	1.33	±	0.55	0.03	0.77	±	0.58	1.30	±	0.82	0.08
Allo-inositol	1.04	±	1.13	1.53	±	1.11	0.34	0.92	±	0.74	1.07	±	0.68	0.61
Arabitol	1.02	±	0.82	1.51	±	1.46	0.35	0.94	±	0.87	1.07	±	0.64	0.70
Benzoic acid	1.07	±	0.72	0.55	±	0.35	0.05	1.27	±	2.16	0.48	±	0.29	0.26
Beta- alanine	0.86	±	0.38	1.24	±	0.58	0.10	0.96	±	0.34	1.04	±	0.27	0.55
Cholesterol	0.95	±	0.18	1.16	±	0.33	0.15	0.85	±	0.29	0.95	±	0.27	0.43
Citrate	0.90	±	0.49	1.35	±	0.58	0.08	0.76	±	0.52	1.52	±	0.82	0.01
Creatine	0.92	±	0.22	1.16	±	0.29	0.05	0.91	±	0.33	1.31	±	0.47	0.03
Creatinine	0.89	±	0.25	1.20	±	0.42	0.05	0.89	±	0.46	1.39	±	0.62	0.03
Cysteine	0.84	±	0.40	1.11	±	0.26	0.09	0.83	±	0.41	1.04	±	0.38	0.23
Fumaric acid	1.14	±	1.11	1.27	±	0.93	0.78	0.90	±	0.65	1.14	±	0.52	0.36
Galactinol	0.52	±	0.48	1.79	±	2.36	0.10	0.42	±	0.27	2.06	±	1.81	<.001
Galacturonic acid	2.21	±	2.41	0.18	±	0.00	0.02	1.54	±	2.37	0.18	±	0.00	0.09
Gluconic acid	1.87	±	2.14	0.21	±	0.00	0.03	1.61	±	2.14	0.21	±	0.00	0.05
Glucose	0.98	±	0.09	1.08	±	0.16	0.07	0.99	±	0.12	1.05	±	0.28	0.48
Glutamic acid	1.58	±	0.68	0.70	±	0.39	<.001	1.51	±	0.68	0.54	±	0.43	<.001
Glutamine	0.81	±	0.45	1.25	±	0.58	0.07	0.81	±	0.64	1.40	±	0.74	0.06
Glyceric acid	1.06	±	0.29	0.92	±	0.40	0.38	1.24	±	1.25	1.08	±	0.59	0.71
Glycerol	0.85	±	0.33	0.69	±	0.48	0.39	0.95	±	0.89	0.58	±	0.35	0.23
Glycerol -1-P	0.88	±	0.29	1.42	±	0.45	<.001	0.71	±	0.35	1.13	±	0.53	0.03
Glycine	0.75	±	0.24	0.92	±	0.36	0.22	0.88	±	0.25	1.21	±	0.62	0.10
Glycolic acid	0.88	±	0.31	1.08	±	0.35	0.18	0.98	±	0.35	1.20	±	0.36	0.15
Heptadecanoic acid	1.30	±	1.03	0.35	±	0.00	0.01	1.07	±	0.88	0.35	±	0.00	0.02
Iminodiacetic acid	0.96	±	0.14	1.02	±	0.21	0.47	1.03	±	0.28	1.03	±	0.23	0.99
Isoleucine	0.94	±	0.17	1.15	±	0.27	0.05	0.87	±	0.28	1.23	±	0.37	0.01
Isopropyl beta--thiogalactopyranoside	0.87	±	0.32	1.07	±	0.68	0.39	0.92	±	0.34	1.09	±	1.16	0.61
Lactate	0.98	±	0.42	1.21	±	0.44	0.24	0.87	±	0.42	0.98	±	0.43	0.54
Leucine	0.95	±	0.19	1.15	±	0.30	0.08	0.87	±	0.30	1.22	±	0.42	0.03
Linoleic acid	1.06	±	0.49	0.69	±	0.47	0.11	0.84	±	0.26	0.56	±	0.22	0.01
Lysine	0.97	±	0.44	1.15	±	0.65	0.47	0.96	±	0.68	1.02	±	0.76	0.85

Malic acid	1.38	±	1.60	0.34	±	0.00	0.07	1.76	±	1.89	0.34	±	0.00	0.03
Malonate	1.07	±	0.89	1.22	±	1.15	0.75	0.83	±	0.29	1.29	±	1.06	0.15
Mannitol	1.01	±	1.52	0.70	±	0.98	0.61	0.75	±	1.17	1.46	±	1.94	0.29
Melezitose	1.97	±	2.89	0.10	±	0.00	0.07	1.14	±	2.06	0.10	±	0.00	0.13
Methylamine	0.79	±	0.99	1.43	±	1.13	0.19	0.65	±	1.13	1.68	±	1.47	0.07
Methylguanidine	0.75	±	0.81	1.14	±	0.85	0.30	0.80	±	1.37	1.19	±	1.01	0.45
Myristic acid	1.05	±	0.42	0.49	±	0.21	<.001	1.21	±	0.48	0.48	±	0.26	<.001
Nicotinic acid	1.15	±	0.50	0.46	±	0.53	0.01	1.14	±	0.66	0.72	±	0.90	0.21
N-methylhistidine	0.54	±	0.14	1.37	±	1.18	0.03	0.63	±	0.22	2.18	±	1.98	0.01
Norleucine	1.07	±	0.54	1.32	±	0.76	0.41	0.84	±	0.35	0.95	±	0.28	0.41
Norvaline	1.10	±	0.36	1.16	±	0.59	0.81	0.93	±	0.36	0.78	±	0.35	0.32
Oleic acid	1.25	±	0.45	0.56	±	0.36	0.00	1.12	±	0.48	0.46	±	0.31	0.00
Ornithine	0.93	±	0.23	1.19	±	0.28	0.03	0.96	±	0.39	1.01	±	0.45	0.80
Oxalic acid	0.69	±	0.50	1.44	±	0.91	0.03	0.86	±	0.37	1.53	±	1.43	0.12
Palmitic acid	1.13	±	0.29	0.76	±	0.26	0.01	1.03	±	0.27	0.70	±	0.18	<.001
Palmitoleic acid	1.34	±	0.69	0.38	±	0.41	<.001	1.04	±	0.93	0.32	±	0.39	0.03
Phenylalanine	0.62	±	0.19	1.30	±	1.18	0.08	0.47	±	0.31	2.24	±	3.25	0.06
Phosphoric acid	0.92	±	0.20	1.08	±	0.16	0.05	0.98	±	0.13	1.06	±	0.20	0.22
Porphine	0.72	±	0.26	0.91	±	0.37	0.18	1.04	±	0.36	1.61	±	0.58	0.01
Proline	0.90	±	0.38	1.19	±	0.33	0.09	0.89	±	0.41	1.32	±	0.45	0.02
Pyrophosphate	1.07	±	1.82	1.47	±	4.13	0.77	0.42	±	0.45	1.94	±	4.91	0.28
Pyruvic acid	1.12	±	0.64	1.21	±	0.76	0.79	0.87	±	0.44	0.70	±	0.56	0.44
Serine	1.03	±	0.47	0.93	±	0.34	0.58	0.85	±	0.24	0.81	±	0.35	0.78
Serotonin	1.17	±	0.56	0.66	±	0.73	0.09	0.97	±	0.63	0.54	±	0.60	0.11
Stearic acid	1.08	±	0.20	0.85	±	0.21	0.02	1.08	±	0.17	0.79	±	0.17	0.00
Succinate	0.68	±	0.60	1.30	±	0.78	0.05	0.77	±	0.74	1.49	±	1.07	0.07
Sucrose	0.94	±	2.78	3.75	±	6.57	0.21	0.27	±	0.54	0.49	±	0.89	0.49
Tagatose	1.26	±	1.38	0.14	±	0.00	0.03	2.45	±	4.26	0.14	±	0.00	0.10
Threitol	1.08	±	0.59	1.38	±	1.16	0.46	1.08	±	0.80	0.98	±	0.56	0.74
Threonine	0.84	±	0.38	1.02	±	0.31	0.27	0.86	±	0.38	0.94	±	0.40	0.60
Tryptophan	1.59	±	1.36	0.27	±	0.00	0.01	1.67	±	1.50	0.27	±	0.00	0.01
Tyrosine	0.50	±	0.12	1.42	±	1.32	0.03	0.50	±	0.16	2.34	±	2.13	0.01
Urea	1.07	±	0.42	1.14	±	0.59	0.76	0.99	±	0.48	1.08	±	0.50	0.65
Uric acid	1.21	±	0.51	1.37	±	1.04	0.68	1.07	±	0.73	0.87	±	0.50	0.46
Valine	0.94	±	0.24	1.18	±	0.32	0.07	0.85	±	0.35	1.24	±	0.46	0.03

Abbreviations: CRT, cardiac resynchronization therapy; IBTP, isopropyl β-1-thiogalactopyranoside; 2-HB, 2-hydroxybutyrate; 3-AIB, 3-aminoisobutyrate; 3-HB, 3-hydroxybutyrate.

* Values are mean±standard error of the mean unless indicated otherwise.

Supplemental Table 3. Changes (delta) in Plasma Metabolite Levels Before and After CRT in Responders and Nonresponders*

Metabolite	Responders post-CRT- pre-CRT (N=7)			Nonresponders post-CRT- pre-CRT (N=10)			*P* Value
2-HB	-0.62	±	0.93	-0.62	±	0.39	0.98
2-hydroxypyridine	0.45	±	0.61	0.20	±	0.43	0.33
3-AIB	0.27	±	0.64	0.37	±	0.60	0.74
3-HB	0.13	±	0.49	0.24	±	0.42	0.61
Acetate	0.44	±	0.95	0.54	±	1.11	0.84
Acetoacetate	0.13	±	0.58	0.27	±	0.78	0.68
Acetone	0.14	±	0.71	0.16	±	0.43	0.94
Acetylsalicylic acid	-1.18	±	3.70	0.45	±	3.02	0.32
Alanine	0.44	±	0.78	0.46	±	0.96	0.96
Allo-inositol	0.44	±	0.73	0.10	±	0.51	0.26
Arabitol	0.46	±	0.98	0.05	±	0.57	0.28
Benzoic acid	-0.62	±	0.69	-1.00	±	2.59	0.70
Beta- alanine	0.31	±	0.66	0.08	±	0.56	0.42
Cholesterol	0.15	±	0.18	0.09	±	0.14	0.43
Citrate	0.43	±	0.67	0.61	±	0.78	0.62
Creatine	0.18	±	0.30	0.29	±	0.50	0.57
Creatinine	0.25	±	0.43	0.36	±	0.70	0.69
Cysteine	0.29	±	0.39	0.15	±	0.56	0.57
Fumaric acid	-0.04	±	1.17	0.14	±	0.30	0.64
Galactinol	1.49	±	2.52	1.63	±	1.84	0.90
Galacturonic acid	-2.40	±	2.73	-1.45	±	2.59	0.46
Gluconic acid	-2.02	±	2.38	-1.41	±	2.40	0.60
Glucose	0.08	±	0.09	0.05	±	0.23	0.78
Glutamic acid	-0.80	±	0.73	-1.06	±	0.66	0.44
Glutamine	0.30	±	0.70	0.45	±	0.94	0.71
Glyceric acid	-0.10	±	0.33	-0.35	±	1.22	0.58
Glycerol	-0.22	±	0.45	-0.50	±	0.75	0.37
Glycerol -1-P	0.38	±	0.43	0.47	±	0.41	0.67
Glycine	0.21	±	0.17	0.32	±	0.48	0.56
Glycolic acid	0.36	±	0.42	0.26	±	0.48	0.65
Heptadecanoic acid	-1.05	±	1.04	-0.76	±	0.96	0.55
Iminodiacetic acid	0.04	±	0.22	-0.06	±	0.30	0.41
Isoleucine	0.18	±	0.37	0.31	±	0.38	0.47
Isopropyl beta--thiogalactopyranoside	-0.03	±	0.25	0.25	±	1.08	0.49
Lactate	0.18	±	0.56	0.14	±	0.40	0.88
Leucine	0.18	±	0.41	0.30	±	0.41	0.55
Linoleic acid	-0.46	±	0.29	-0.33	±	0.22	0.29

Lysine	0.24	±	0.63	0.10	±	1.08	0.74
Malic acid	-1.18	±	1.79	-1.44	±	2.08	0.78
Malonate	0.03	±	1.30	0.46	±	1.04	0.44
Mannitol	-0.48	±	2.13	0.65	±	2.23	0.29
Melezitose	-2.08	±	3.29	-1.07	±	2.25	0.45
Methylamine	0.43	±	1.82	0.84	±	1.72	0.63
Methylguanidine	0.19	±	1.37	0.16	±	1.94	0.97
Myristic acid	-0.67	±	0.52	-0.87	±	0.55	0.46
Nicotinic acid	-0.70	±	0.58	-0.40	±	1.46	0.59
N-methylhistidine	0.88	±	1.20	1.54	±	1.95	0.42
Norleucine	0.47	±	0.74	0.10	±	0.47	0.21
Norvaline	0.14	±	0.65	-0.13	±	0.24	0.25
Oleic acid	-0.84	±	0.44	-0.77	±	0.42	0.72
Ornithine	0.37	±	0.32	-0.06	±	0.46	0.04**
Oxalic acid	0.76	±	0.86	0.70	±	1.37	0.91
Palmitic acid	-0.48	±	0.33	-0.39	±	0.24	0.47
Palmitoleic acid	-1.20	±	0.72	-0.91	±	0.86	0.46
Phenylalanine	0.62	±	1.27	1.69	±	3.15	0.38
Phosphoric acid	0.22	±	0.10	0.09	±	0.22	0.13
Porphine	0.10	±	0.46	0.63	±	0.47	0.03**
Proline	0.47	±	0.49	0.35	±	0.48	0.61
Pyrophosphate	0.29	±	5.23	1.47	±	5.10	0.64
Pyruvic acid	-0.02	±	0.53	-0.09	±	0.59	0.79
Serine	0.07	±	0.32	-0.08	±	0.29	0.30
Serotonin	-0.30	±	0.88	-0.48	±	1.15	0.72
Stearic acid	-0.28	±	0.35	-0.31	±	0.17	0.76
Succinate	0.42	±	0.95	0.56	±	1.24	0.80
Sucrose	2.93	±	6.55	0.16	±	1.17	0.21
Tagatose	-0.97	±	1.07	-2.25	±	4.80	0.47
Threitol	0.29	±	0.80	-0.20	±	0.54	0.14
Threonine	0.32	±	0.29	0.03	±	0.34	0.08
Tryptophan	-1.01	±	1.01	-1.45	±	1.66	0.52
Tyrosine	1.02	±	1.30	1.85	±	2.16	0.36
Urea	0.06	±	0.36	0.04	±	0.26	0.90
Uric acid	0.23	±	0.88	-0.32	±	0.43	0.10
Valine	0.22	±	0.47	0.34	±	0.49	0.60

Abbreviations: CRT, cardiac resynchronization therapy; IBTP, isopropyl β-1-thiogalactopyranoside; 2-HB, 2-hydroxybutyrate; 3-AIB, 3-aminoisobutyrate; 3-HB, 3-hydroxybutyrate.

* Values are mean±standard error of the mean unless indicated otherwise.

** *p* Value <.05.

Figure 1S

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Figure 1S

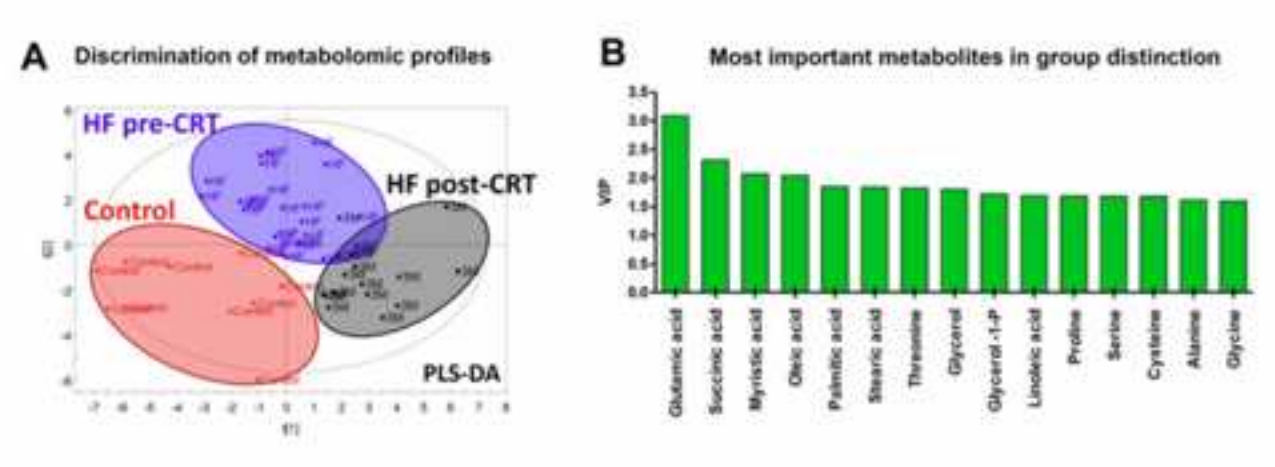

Figure 2S

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Figure 2S