SUPPLEMENTAL MATERIAL

Supplemental Methods

Metabolon Platform

Sample Accessioning: Following receipt, samples were inventoried and immediately stored at -80°C. Each sample received was accessioned into the Metabolon LIMS system and was assigned by the LIMS a unique identifier that was associated with the original source identifier only. This identifier was used to track all sample handling, tasks, results, etc. The samples (and all derived aliquots) were tracked by the LIMS system. All portions of any sample were automatically assigned their own unique identifiers by the LIMS when a new task was created; the relationship of these samples was also tracked. All samples were maintained at -80°C until processed.

Sample Preparation: Samples were prepared using the automated MicroLab STAR® system from Hamilton Company. Several recovery standards were added prior to the first step in the extraction process for QC purposes. To remove protein, dissociate small molecules bound to protein or trapped in the precipitated protein matrix, and to recover chemically diverse metabolites, proteins were precipitated with methanol under vigorous shaking for 2 min (Glen Mills GenoGrinder 2000) followed by centrifugation. The resulting extract was divided into five fractions: two for analysis by two separate reverse phase (RP)/UPLC-MS/MS methods with positive ion mode electrospray ionization (ESI), one for analysis by RP/UPLC-MS/MS with negative ion mode ESI, one for analysis by HILIC/UPLC-MS/MS with negative ion mode ESI, and one sample was reserved for backup. Samples were placed briefly on a TurboVap® (Zymark) to remove the organic solvent. The sample extracts were stored overnight under nitrogen before preparation for analysis.

QA/QC: Several types of controls were analyzed in concert with the experimental samples: a pooled matrix sample generated by taking a small volume of each experimental sample (or alternatively, use of a pool of well-characterized human plasma) served as a technical replicate throughout the data set; extracted water samples served as process blanks; and a cocktail of QC standards that were carefully chosen not to interfere with the measurement of endogenous compounds were spiked into every analyzed sample, allowed instrument performance monitoring and aided chromatographic alignment. Tables 1 and 2 describe these QC samples and standards. Instrument variability was determined by calculating the median relative standard deviation (RSD) for the standards that were added to each sample prior to injection into the mass spectrometers. Overall process variability was determined by calculating the median RSD for all endogenous metabolites (i.e., non-instrument standards) present in 100% of the pooled matrix samples. Experimental samples were randomized across the platform run with QC samples spaced evenly among the injections, as outlined in Figure 1.

Table 1: Description of Metabolon QC Samples

Type	Description	Purpose
MTRX	Large pool of human plasma maintained by Metabolon that has been characterized extensively.	Assure that all aspects of the Metabolon process are operating within specifications.
CMTRX	Pool created by taking a small aliquot from every customer sample.	Assess the effect of a non-plasma matrix on the Metabolon process and distinguish biological variability from process variability.
PRCS	Aliquot of ultra-pure water	Process Blank used to assess the contribution to compound signals from the process.
SOLV	Aliquot of solvents used in extraction.	Solvent Blank used to segregate contamination sources in the extraction.

Table 2: Metabolon QC Standards

Type	Description	Purpose
RS	Recovery Standard	Assess variability and verify performance of extraction and instrumentation.
IS	Internal Standard	Assess variability and performance of instrument.

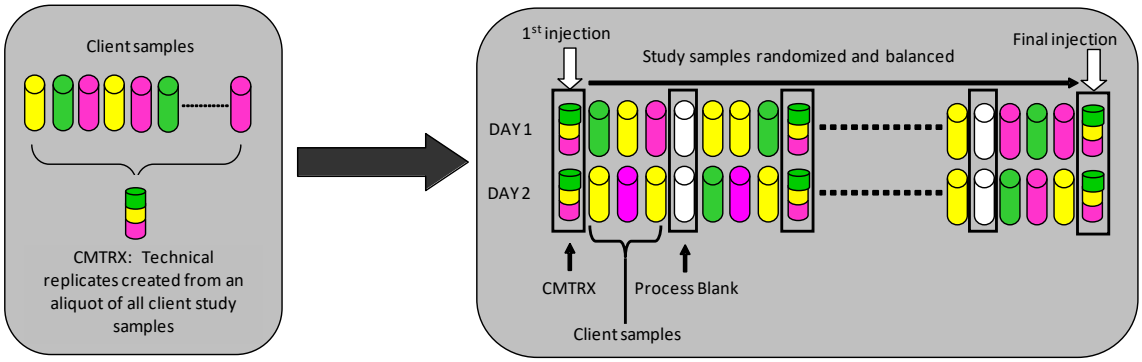


Figure 1. Preparation of client-specific technical replicates. A small aliquot of each client sample (colored cylinders) is pooled to create a CMTRX technical replicate sample (multi-colored cylinder), which is then injected periodically throughout the platform run. Variability among consistently detected biochemicals can be used to calculate an estimate of overall process and platform variability.

Ultrahigh Performance Liquid Chromatography-Tandem Mass Spectroscopy (UPLC-MS/MS): All methods utilized a Waters ACQUITY ultra-performance liquid chromatography (UPLC) and a Thermo Scientific Q-Exactive high resolution/accurate mass spectrometer interfaced with a heated electrospray ionization (HESI-II) source and Orbitrap mass analyzer operated at 35,000 mass resolution. The sample extract was dried then reconstituted in solvents compatible to each of the four methods. Each reconstitution solvent contained a series of standards at fixed concentrations to ensure injection and chromatographic consistency. One aliquot was analyzed using acidic positive ion conditions, chromatographically optimized for more hydrophilic compounds. In this method, the extract was gradient eluted from a C18 column (Waters UPLC BEH C18-2.1x100 mm, 1.7 µm) using water and methanol, containing 0.05% perfluoropentanoic acid (PFPA) and 0.1% formic acid (FA). Another aliquot was also analyzed using acidic positive ion conditions, however it was chromatographically optimized for more hydrophobic compounds. In this method, the extract was gradient eluted from the same afore mentioned C18 column using methanol, acetonitrile, water, 0.05% PFPA and 0.01% FA and was operated at an overall higher organic content. Another aliquot was analyzed using basic negative ion optimized conditions using a separate dedicated C18 column. The basic extracts were gradient eluted from the column using methanol and water, however with 6.5mM Ammonium Bicarbonate at pH 8. The fourth aliquot was analyzed via negative ionization following elution from a HILIC column (Waters UPLC BEH Amide 2.1x150 mm, 1.7 µm) using a gradient consisting of water and acetonitrile with 10mM Ammonium Formate, pH 10.8. The MS analysis alternated between MS and data-dependent MS^n scans using dynamic exclusion. The scan range varied slighted between methods but covered 70-1000 m/z. Raw data files are archived and extracted as described below.

Bioinformatics: The informatics system consisted of four major components, the Laboratory Information Management System (LIMS), the data extraction and peak-identification software, data processing tools for QC and compound identification, and a collection of information interpretation and visualization tools for use by data analysts. The hardware and software foundations for these informatics components were the LAN backbone, and a database server running Oracle 10.2.0.1 Enterprise Edition.

LIMS: The purpose of the Metabolon LIMS system was to enable fully auditable laboratory automation through a secure, easy to use, and highly specialized system. The scope of the Metabolon LIMS system encompasses sample accessioning, sample preparation and instrumental analysis and reporting and advanced data analysis. All of the subsequent software systems are grounded in the LIMS data structures. It has been modified to leverage and interface with the in-house information extraction and data visualization systems, as well as third party instrumentation and data analysis software.

Data Extraction and Compound Identification: Raw data was extracted, peak-identified and QC processed using Metabolon's hardware and software. These systems are built on a web-service platform utilizing Microsoft's .NET technologies, which run on high-performance application servers and fiber-channel storage arrays in clusters to provide active failover and load-balancing. Compounds were identified by comparison to library entries of purified standards or recurrent unknown entities. Metabolon maintains a library based on authenticated standards that contains the retention time/index (RI), mass to charge ratio (*m/z)*, and chromatographic data (including MS/MS spectral data) on all molecules present in the library. Furthermore, biochemical identifications are based on three criteria: retention index within a narrow RI window of the proposed identification, accurate mass match to the library +/- 10 ppm, and the

MS/MS forward and reverse scores between the experimental data and authentic standards. The MS/MS scores are based on a comparison of the ions present in the experimental spectrum to the ions present in the library spectrum. While there may be similarities between these molecules based on one of these factors, the use of all three data points can be utilized to distinguish and differentiate biochemicals. More than 3300 commercially available purified standard compounds have been acquired and registered into LIMS for analysis on all platforms for determination of their analytical characteristics. Additional mass spectral entries have been created for structurally unnamed biochemicals, which have been identified by virtue of their recurrent nature (both chromatographic and mass spectral). These compounds have the potential to be identified by future acquisition of a matching purified standard or by classical structural analysis.

Curation: A variety of curation procedures were carried out to ensure that a high quality data set was made available for statistical analysis and data interpretation. The QC and curation processes were designed to ensure accurate and consistent identification of true chemical entities, and to remove those representing system artifacts, mis-assignments, and background noise. Metabolon data analysts use proprietary visualization and interpretation software to confirm the consistency of peak identification among the various samples. Library matches for each compound were checked for each sample and corrected if necessary.

Metabolite Quantification and Data Normalization: Peaks were quantified using area-under-the-curve. For studies spanning multiple days, a data normalization step was performed to correct variation resulting from instrument inter-day tuning differences. Essentially, each compound was corrected in run-day blocks by registering the medians to equal one (1.00) and normalizing each data point proportionately (termed the "block correction"; Figure 2). For studies that did not require more than one day of analysis, no normalization is necessary, other than for purposes of data visualization. In certain instances, biochemical data may have been normalized to an additional factor (e.g., cell counts, total protein as determined by Bradford assay, osmolality, etc.) to account for differences in metabolite levels due to differences in the amount of material present in each sample.

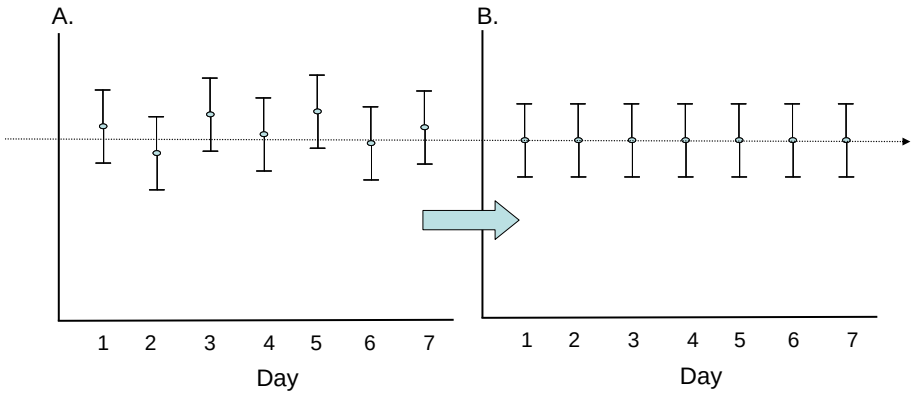


Figure 2: Visualization of data normalization steps for a multiday platform run.

Table S1. Metabolites that were significantly different among the four ACVIM groups.

	Linear model		Adjusted P values from pairwise comparisons						Mean, log2 transformed				Fold changes						Pathways				
BIOCHEMICAL	P value	FDR	A v B1	A v B2	A v C/D	B1 v B2	B1 v C/D	B2 v C/D	A	B1	B2	C/D	B1/A	B2/A	CD/A	CD/B1	CD/B2	B2/B1	SUPER_PATHW	SUB_PATHWAY	PUBCHEM	CAS	KEGG	HMDB
hydroxyasparagine	0	0	0.9158	0.5446	0	0.5446	0	0	-0.356	-0.33	-0.132	1.132	1.018	1.168	2.804	2.756	2.401	1.148	Amino Acid	Alanine and Aspartate Metabolism	97663		C03124	HMDB32332
N-acetylalanine	0	0.0001	0.0816	0.1206	0	0.8626	0.001	0.001	-0.523	-0.039	-0.087	0.973	1.398	1.353	2.819	2.017	2.084	0.968	Amino Acid	Alanine and Aspartate Metabolism	88064	97-69-8	C02847	HMDB00766
N-acetylasparagine	0	0.0001	0.0031	0.0015	0	0.6188	0.0891	0.2146	-0.696	0.126	0.264	0.664	1.768	1.946	2.567	1.452	1.32	1.101	Amino Acid	Alanine and Aspartate Metabolism	99715	4033-40-3		HMDB06028
N-carbamoylalanine	0.0052	0.024	0.0992	0.3867	0.0236	0.0236	0.4185	0.01	-0.222	0.28	-0.507	0.527	1.417	0.821	1.681	1.187	2.048	0.579	Amino Acid	Alanine and Aspartate Metabolism	426409	77340-50-2		
N,N-dimethylalanine	0.0082	0.0349	0.1143	0.7388	0.1099	0.2355	0.0051	0.1099	0.033	-0.457	-0.064	0.606	0.712	0.935	1.487	2.088	1.59	1.313	Amino Acid	Alanine and Aspartate Metabolism	5488191	2812-31-9		
creatine	0	0	0.0151	0	0	0.0073	0.0027	0.6561	-0.738	-0.145	0.601	0.723	1.509	2.53	2.754	1.825	1.089	1.677	Amino Acid	Creatine Metabolism	586	57-00-1	C00300	HMDB00064
alpha-ketoglutaramate*	0.0001	0.0009	0.1807	0.585	0.0001	0.4491	0.0047	0.0007	-0.402	4E-04	-0.253	0.905	1.321	1.109	2.473	1.872	2.231	0.839	Amino Acid	Glutamate Metabolism	48	18465-19-5		
carboxyethyl-GABA	0.0009	0.0055	0.3716	0.5805	0.008	0.7059	0.0013	0.0037	-0.048	-0.357	-0.246	0.799	0.807	0.872	1.799	2.229	2.064	1.08	Amino Acid	Glutamate Metabolism	2572	3/2/4386		HMDB02201
glutamine	0.0032	0.0157	0.2137	0.1762	0.0024	0.7746	0.0659	0.1068	0.411	0.044	-0.042	-0.666	0.775	0.73	0.474	0.611	0.649	0.942	Amino Acid	Glutamate Metabolism	5961	56-85-9	C00064	HMDB00641
N-acetylglutamate	0.0102	0.0418	0.3284	0.2489	0.0059	0.7329	0.0718	0.1285	-0.369	-0.068	0.035	0.638	1.232	1.324	2.01	1.632	1.519	1.074	Amino Acid	Glutamate Metabolism	70914	8/3/5817	C00624	HMDB01138
N-acetylglutamine	0	0.0006	0.0484	0.0383	0	0.6898	0.0205	0.0383	-0.551	-0.015	0.099	0.788	1.45	1.569	2.529	1.745	1.612	1.082	Amino Acid	Glutamate Metabolism	182230	2490-97-3	C02716	HMDB06029
2-hydroxybutyrate/2-hydroxyisobut	0	0	0.0004	0	0	0.4142	0.1358	0.4594	-0.787	0.155	0.408	0.619	1.921	2.289	2.65	1.379	1.157	1.192	Amino Acid	Glutathione Metabolism				
glycine	0.0005	0.0035	0.1499	0.0038	0.0081	0.0976	0.1499	0.7184	0.504	0.09	-0.5	-0.387	0.751	0.499	0.54	0.719	1.082	0.664	Amino Acid	Glycine, Serine and Threonine Metabolism	750	56-40-6	C00037	HMDB00123
N-acetylserine	0.0004	0.003	0.1216	0.0716	0.0002	0.6703	0.0215	0.0565	-0.486	-0.052	0.072	0.762	1.351	1.473	2.375	1.757	1.613	1.09	Amino Acid	Glycine, Serine and Threonine Metabolism	65249	97-14-3		HMDB02931
N-acetylthreonine	0	0	0.0037	0.0019	0	0.6182	0.0103	0.0385	-0.711	0.069	0.203	0.825	1.717	1.884	2.9	1.689	1.539	1.097	Amino Acid	Glycine, Serine and Threonine Metabolism	152204	17093-74-2		HMDB62557
sarcosine	0.011	0.0437	0.0208	0.9025	0.5837	0.0387	0.0144	0.5837	-0.164	0.591	-0.128	-0.369	1.688	1.025	0.867	0.514	0.846	0.607	Amino Acid	Glycine, Serine and Threonine Metabolism	1088	107-97-1	C00213	HMDB00271
4-guanidinobutanoate	0.0124	0.0478	0.0743	0.0203	0.0203	0.5246	0.5246	0.9753	-0.495	0.084	0.334	0.324	1.494	1.777	1.764	1.181	0.993	1.189	Amino Acid	Guanidino and Acetamido Metabolism	500	463-003;463-(	C01035	HMDB03464
1-methyl-5-imidazoleacetate	0.0003	0.0022	0.6647	0.9478	0.0005	0.6647	0.0024	0.001	-0.291	-0.101	-0.273	0.882	1.141	1.013	2.255	1.978	2.227	0.888	Amino Acid	Histidine Metabolism	6451814	4200-48-0		HMDB04988
1-methylhistidine	0	0	0.3465	0.2562	0	0.7211	0	0	-0.483	-0.244	-0.155	1.246	1.18	1.255	3.313	2.807	2.64	1.063	Amino Acid	Histidine Metabolism	92105	332-80-9	C01152	HMDB00001
3-methylhistidine	0	0.0002	0.2057	0.2495	0	0.8879	0.0008	0.0008	-0.459	-0.083	-0.122	0.966	1.298	1.264	2.686	2.069	2.126	0.973	Amino Acid	Histidine Metabolism	64969	368-16-1	C01152	HMDB00479
carnosine	0.0007	0.0045	0.6641	0.2386	0.0007	0.4037	0.0022	0.0332	-0.349	-0.234	0.048	0.807	1.083	1.317	2.229	2.059	1.693	1.216	Amino Acid	Histidine Metabolism	439224	305-84-0	C00386	HMDB00033
formiminoglutamate	0	0.0001	0.0259	0.0149	0	0.6106	0.0103	0.0259	-0.602	-0.014	0.128	0.837	1.503	1.658	2.711	1.804	1.635	1.103	Amino Acid	Histidine Metabolism	439233	816-90-0	C00439	HMDB00854
imidazole lactate	0.0002	0.0018	0.0077	0.0077	0.0002	0.8901	0.21	0.2397	-0.625	0.154	0.194	0.589	1.716	1.764	2.32	1.352	1.315	1.028	Amino Acid	Histidine Metabolism	793	14403-45-3	C05568	HMDB02320
N-acetyl-1-methylhistidine*	0	0	0.0342	0.0727	0	0.7835	0	0	-0.588	-0.053	-0.123	1.134	1.449	1.38	3.298	2.276	2.39	0.952	Amino Acid	Histidine Metabolism	53859791			
N-acetyl-3-methylhistidine*	0	0.0004	0.0892	0.0892	0	0.9362	0.0088	0.011	-0.502	-0.033	-0.011	0.852	1.384	1.406	2.556	1.847	1.818	1.016	Amino Acid	Histidine Metabolism	193270	37841-04-6		
2-hydroxy-3-methylvalerate	0.0003	0.0025	0.0042	0.0063	0.004	0.9372	0.7875	0.7875	-0.616	0.259	0.236	0.392	1.834	1.805	2.011	1.096	1.114	0.984	Amino Acid	Leucine, Isoleucine and Valine Metabolism	164623	488-15-3		HMDB00317
3-hydroxy-2-ethylpropionate	0	0	0.021	0.0028	0	0.3129	0.0117	0.1009	-0.646	-0.019	0.261	0.775	1.544	1.875	2.677	1.734	1.428	1.214	Amino Acid	Leucine, Isoleucine and Valine Metabolism	188979	4374-62-3		HMDB00396
3-hydroxyisobutyrate	0.002	0.0107	0.0784	0.0784	0.0014	0.8728	0.1042	0.1347	-0.503	0.058	0.106	0.612	1.476	1.525	2.166	1.468	1.42	1.034	Amino Acid	Leucine, Isoleucine and Valine Metabolism	87	2068-83-9	C06001	HMDB00336
3-methyl-2-oxobutyrate	0.0004	0.0029	0.051	0.0061	0.0024	0.3864	0.2012	0.6124	-0.564	0.04	0.333	0.492	1.52	1.862	2.079	1.368	1.117	1.225	Amino Acid	Leucine, Isoleucine and Valine Metabolism	49	3715-29-5	C00141	HMDB00019
3-methylglutaconate	0	0.0005	0.0223	0.2197	0	0.2916	0.0239	0.0037	-0.527	0.134	-0.165	0.838	1.581	1.285	2.575	1.629	2.004	0.813	Amino Acid	Leucine, Isoleucine and Valine Metabolism	1551553	5746-90-7		HMDB00522
ethylmalonate	0	0	0.1001	0.1041	0	0.9844	0.0005	0.0006	-0.527	-0.073	-0.079	1.015	1.37	1.365	2.912	2.126	2.134	0.996	Amino Acid	Leucine, Isoleucine and Valine Metabolism	11756	601-75-2		HMDB00622
isobutyrylcarnitine (C4)	0	0	0.0194	0.0057	0	0.5295	0.0008	0.0057	-0.643	-0.055	0.112	0.973	1.503	1.687	3.065	2.039	1.816	1.123	Amino Acid	Leucine, Isoleucine and Valine Metabolism	168379	25518-49-4		HMDB00736
isovalerylcarnitine (C5)	0.0002	0.0017	0.0417	0.1712	0.0001	0.545	0.0417	0.0191	-0.497	0.087	-0.089	0.772	1.499	1.328	2.41	1.608	1.815	0.886	Amino Acid	Leucine, Isoleucine and Valine Metabolism	6426851	31023-24-2		HMDB00688
N-acetylisoleucine	0	0	0.0022	0.0022	0	0.875	0.0395	0.057	-0.706	0.134	0.177	0.76	1.79	1.844	2.763	1.544	1.499	1.03	Amino Acid	Leucine, Isoleucine and Valine Metabolism	306109	3077-46-1		HMDB61684
N-acetylleucine	0.0002	0.0017	0.0235	0.066	0.0001	0.557	0.066	0.0362	-0.559	0.149	-0.021	0.717	1.634	1.453	2.422	1.483	1.667	0.889	Amino Acid	Leucine, Isoleucine and Valine Metabolism	70912	1188-21-2	C02710	HMDB11756
N-acetylvaline	0	0	0.0084	0.003	0	0.5689	0.0026	0.0084	-0.682	-0.002	0.149	0.928	1.603	1.78	3.054	1.906	1.716	1.111	Amino Acid	Leucine, Isoleucine and Valine Metabolism	66789	96-81-1		HMDB11757
tiglyl carnitine (C5)	0.0001	0.0012	0.171	0.0967	0	0.6493	0.0048	0.0173	-0.478	-0.097	0.033	0.85	1.303	1.426	2.511	1.928	1.761	1.094	Amino Acid	Leucine, Isoleucine and Valine Metabolism	22833596	64191-86-2		HMDB02366
2-aminoadipate	0.0001	0.0007	0.0049	0.001	0.001	0.5175	0.5175	0.9756	-0.649	0.165	0.392	0.402	1.757	2.057	2.071	1.179	1.007	1.171	Amino Acid	Lysine Metabolism	469	542-32-5;111(	C00956	HMDB00510
5-(galactosylhydroxy)-L-lysine	0	0.0001	0.248	0.248	0	0.939	0.0009	0.0013	-0.44	-0.119	-0.098	0.957	1.249	1.268	2.634	2.108	2.077	1.015	Amino Acid	Lysine Metabolism	123986	32448-36-5		
6-oxopiperidine-2-carboxylate	0.0003	0.0025	0.0097	0.1683	0.0003	0.1683	0.1683	0.0166	-0.534	0.255	-0.151	0.678	1.729	1.304	2.318	1.341	1.777	0.754	Amino Acid	Lysine Metabolism	3014237	34622-39-4		HMDB61705
N,N,N-trimethyl-5-aminovalerate	0.0005	0.0033	0.3693	0.0095	0.0008	0.079	0.0093	0.3483	-0.464	-0.228	0.342	0.669	1.178	1.748	2.194	1.862	1.255	1.484	Amino Acid	Lysine Metabolism	14274897			
N2-acetyl,N6-methyllysine	0.0011	0.0066	0.1059	0.6158	0.0024	0.2929	0.1059	0.0132	-0.376	0.116	-0.233	0.693	1.406	1.104	2.098	1.493	1.9	0.786	Amino Acid	Lysine Metabolism				
N6-acetyllysine	0.0015	0.0083	0.0081	0.0671	0.0026	0.4684	0.4684	0.2402	-0.56	0.265	0.05	0.495	1.771	1.527	2.077	1.173	1.361	0.862	Amino Acid	Lysine Metabolism	92832	692-04-6	C02727	HMDB00206
N6-carboxyethyllysine	0.0076	0.0333	0.2212	0.5862	0.0046	0.5123	0.0866	0.0246	-0.344	0.052	-0.188	0.678	1.316	1.115	2.032	1.543	1.822	0.847	Amino Acid	Lysine Metabolism	22283604	3/2/5746		
N6,N6-dimethyllysine	0.0015	0.0085	0.1343	0.4349	0.0009	0.4349	0.0477	0.013	-0.4	0.057	-0.174	0.746	1.373	1.17	2.213	1.612	1.892	0.852	Amino Acid	Lysine Metabolism	193344	2259-86-1	C05545	HMDB13287
N6,N6,N6-trimethyllysine	0.0011	0.0067	0.0651	0.0759	0.0006	0.933	0.0651	0.0651	-0.496	0.059	0.034	0.676	1.469	1.444	2.254	1.534	1.561	0.983	Amino Acid	Lysine Metabolism	440120	23284-33-5	C03793	HMDB01325
pipecolate	0.0021	0.0113	0.0073	0.007	0.3414	0.696	0.125	0.0887	-0.487	0.351	0.467	-0.176	1.788	1.938	1.24	0.694	0.64	1.084	Amino Acid	Lysine Metabolism	849	4043-87-2	C00408	HMDB00070
2,3-dihydroxy-5-methylthio-4-pente	0.0001	0.0009	0.3584	0.6352	0.0001	0.6415	0.0019	0.0011	-0.379	-0.075	-0.207	0.918	1.235	1.127	2.458	1.99	2.182	0.912	Amino Acid	Methionine, Cysteine, SAM and Taurine Metabolism				
alpha-ketobutyrate	0.0016	0.0091	0.0661	0.004	0.0064	0.2339	0.3226	0.7781	-0.551	0.028	0.45	0.362	1.493	2.001	1.882	1.26	0.94	1.34	Amino Acid	Methionine, Cysteine, SAM and Taurine Metabolism	58	600-18-0	C00109	HMDB00005
methionine	0.003	0.0153	0.2908	0.1146	0.0453	0.0201	0.0094	0.6098	0.163	0.481	-0.35	-0.512	1.246	0.701	0.626	0.502	0.893	0.562	Amino Acid	Methionine, Cysteine, SAM and Taurine Metabolism	6137	63-68-3	C00073	HMDB00696
S-carboxyethylcysteine	0.0002	0.0019	0.0225	0.4849	0.0002	0.1179	0.0838	0.0029	-0.467	0.204	-0.275	0.768	1.592	1.143	2.354	1.478	2.06	0.718	Amino Acid	Methionine, Cysteine, SAM and Taurine Metabolism		4033-46-9		
S-methylmethionine	0.0071	0.0314	0.638	0.0214	0.0741	0.0497	0.166	0.5392	0.347	0.218	-0.523	-0.278	0.914	0.547	0.648	0.709	1.185	0.599	Amino Acid	Methionine, Cysteine, SAM and Taurine Metabolism	458	12/7/3493	C05319	HMDB38670
N-acetylphenylalanine	0.0001	0.0006	0.0328	0.1943	0	0.4487	0.0199	0.0053	-0.513	0.085	-0.131	0.843	1.513	1.303	2.56	1.692	1.964	0.861	Amino Acid	Phenylalanine Metabolism	74839	2018-61-3	C03519	HMDB00512
5-methylthioadenosine (MTA)	0.0005	0.0035	0.1924	0.2657	0.0004	0.835	0.0198	0.0198	-0.422	-0.015	-0.077	0.771	1.326	1.271	2.287	1.725	1.8	0.958	Amino Acid	Polyamine Metabolism	439176	2457-80-9	C00170	HMDB01173
N-acetyl-isoputreanine	0.0008	0.0051	0.9244	0.7019	0.0012	0.7019	0.0013	0.0076	-0.271	-0.246	-0.086	0.841	1.018	1.137	2.161	2.124	1.901	1.117	Amino Acid	Polyamine Metabolism	131802901			
N-acetyltryptophan	0.0124	0.0478	0.2399	0.6895	0.0121	0.4463	0.1517	0.0369	-0.318	0.071	-0.201	0.625	1.309	1.084	1.922	1.468	1.773	0.828	Amino Acid	Tryptophan Metabolism	700653	1218-34-4	C03137	HMDB13713
2-oxoarginine*	0	0.0004	0.0062	0.0002	0.0002	0.2183	0.2183	0.9901	-0.685	0.088	0.475	0.472	1.709	2.236	2.23	1.305	0.997	1.308	Amino Acid	Urea cycle; Arginine and Proline Metabolism	558	10/4/3715	C03771	HMDB04225
argininate*	0.0088	0.0364	0.0505	0.0116	0.0475	0.4738	0.7376	0.6386	-0.507	0.114	0.418	0.216	1.538	1.898	1.651	1.074	0.87	1.235	Amino Acid	Urea cycle; Arginine and Proline Metabolism	160437	157-07-3		HMDB03148
dimethylarginine (ADMA + SDMA)	0.0007	0.0044	0.3902	0.1279	0.0125	0.3902	0.0026	0.0005	0.003	-0.224	-0.482	0.797	0.854	0.715	1.735	2.03	2.428	0.836	Amino Acid	Urea cycle; Arginine and Proline Metabolism	123831	102783-24-4	C03626	HMDB01539
homocitrulline	0	0.0001	0.1729	0.2746	0	0.0291	0.0031	0	-0.29	0.072	-0.576	0.977	1.285	0.82	2.407	1.873	2.934	0.638	Amino Acid	Urea cycle; Arginine and Proline Metabolism	65072	1190-49-4	C02427	HMDB00679
N-acetylcitrulline	0.0059	0.0267	0.0094	0.0807	0.0524	0.506	0.671	0.7295	-0.507	0.385	0.095	0.206	1.856	1.517	1.639	0.883	1.08	0.817	Amino Acid	Urea cycle; Arginine and Proline Metabolism	656979	33965-42-3	C15532	HMDB00856
N-acetylhomocitrulline	0	0	0.0015	0.4155	0	0.0295	0.0569	0.0002	-0.556	0.301	-0.343	0.856	1.811	1.159	2.659	1.468	2.296	0.64	Amino Acid	Urea cycle; Arginine and Proline Metabolism				
N-acetylproline	0.0027	0.0137	0.933	0.0045	0.933	0.0046	0.933	0.0079	0.231	0.208	-0.764	0.172	0.984	0.502	0.96	0.975	1.914	0.51	Amino Acid	Urea cycle; Arginine and Proline Metabolism	322640	1074-79-9		
N-delta-acetylornithine	0.0112	0.0442	0.2055	0.0814	0.0086	0.4276	0.1418	0.3853	-0.443	-0.034	0.207	0.528	1.329	1.57	1.96	1.476	1.249	1.182	Amino Acid	Urea cycle; Arginine and Proline Metabolism	9920500			

N-methylproline	0.0129	0.0488	0.243	0.0326	0.0211	0.243	0.1898	0.6858	-0.437	-0.071	0.318	0.449	1.289	1.688	1.848	1.433	1.095	1.309	Amino Acid	Urea cycle; Arginine and Proline Metabolism	557	475-11-6		
N,N,N-trimethyl-alanylproline betai	0.0006	0.0043	0.6429	0.5268	0.002	0.6429	0.0012	0.001	-0.106	-0.232	-0.367	0.857	0.917	0.835	1.95	2.127	2.335	0.911	Amino Acid	Urea cycle; Arginine and Proline Metabolism				
N2,N5-diacetylornithine	0	0.0004	0.0831	0.0093	0	0.2775	0.0093	0.0831	-0.565	-0.087	0.222	0.775	1.393	1.726	2.532	1.817	1.467	1.239	Amino Acid	Urea cycle; Arginine and Proline Metabolism	65977	39825-23-5		
proline	0.0008	0.0054	0.3172	0.0177	0.0057	0.1414	0.0491	0.5524	0.452	0.151	-0.352	-0.541	0.811	0.573	0.503	0.619	0.878	0.706	Amino Acid	Urea cycle; Arginine and Proline Metabolism	145742	147-85-3	C00148	HMDB00162
urea	0	0	0.0204	0.0479	0	0.7796	0.0005	0.0005	-0.601	0.001	-0.073	1.03	1.518	1.442	3.095	2.04	2.147	0.95	Amino Acid	Urea cycle; Arginine and Proline Metabolism	1176	57-13-6	C00086	HMDB00294
erythronate*	0	0	0.0354	0.0739	0	0.7875	0.0001	0.0001	-0.582	-0.042	-0.112	1.098	1.454	1.385	3.204	2.204	2.313	0.953	Carbohydrate	Aminosugar Metabolism	2781043	88759-55-1		HMDB00613
N-acetylglucosaminylasparagine	0.0002	0.0021	0.043	0.043	0.0003	0.8834	0.0757	0.099	-0.547	0.07	0.113	0.658	1.534	1.58	2.306	1.503	1.459	1.03	Carbohydrate	Aminosugar Metabolism	123826	2776-93-4	C04540	HMDB00489
N-acetylneuraminate	0.0014	0.008	0.1304	0.1304	0.0011	0.9773	0.0709	0.0709	-0.447	0.005	0.014	0.688	1.368	1.376	2.196	1.606	1.596	1.006	Carbohydrate	Aminosugar Metabolism	439197	131-48-6	C00270	HMDB00230
arabonate/xylonate	0	0	0.2125	0.8574	0	0.2125	0	0	-0.381	-0.061	-0.426	1.135	1.249	0.969	2.861	2.291	2.952	0.776	Carbohydrate	Pentose Metabolism				
ribonate	0	0	0.0235	0.2766	0	0.2766	0.0003	0	-0.54	0.04	-0.268	1.09	1.496	1.208	3.095	2.07	2.562	0.808	Carbohydrate	Pentose Metabolism	5460677	8/3/5336	C01685	HMDB00867
ribulonate/xylulonate/lyxonate*	0.0003	0.0023	0.0403	0.0597	0.0001	0.8967	0.0348	0.0348	-0.533	0.053	0.015	0.762	1.501	1.462	2.453	1.635	1.678	0.974	Carbohydrate	Pentose Metabolism				
2-O-methylascorbic acid	0	0.0002	0.0168	0.1788	0	0.3446	0.0167	0.0025	-0.541	0.112	-0.153	0.876	1.572	1.309	2.671	1.699	2.041	0.832	Cofactors and	Ascorbate and Aldarate Metabolism	99779	17860-87-6		
ascorbic acid 3-sulfate*	0.0009	0.0055	0.6895	0.6895	0.0011	0.9931	0.0052	0.0056	-0.302	-0.146	-0.144	0.821	1.114	1.116	2.178	1.955	1.951	1.002	Cofactors and	Ascorbate and Aldarate Metabolism	11425365			
gulonate*	0	0.0001	0.1979	0.0379	0	0.3624	0.0002	0.004	-0.523	-0.18	0.069	0.99	1.269	1.507	2.854	2.25	1.894	1.188	Cofactors and	Ascorbate and Aldarate Metabolism	152304	20246-53-1	C00257	HMDB03290
N1-Methyl-2-pyridone-5-carboxami	0	0.0001	0.6394	0.6808	0	0.5089	0	0.0004	-0.235	-0.391	-0.126	1.013	0.897	1.079	2.376	2.647	2.202	1.202	Cofactors and	Nicotinate and Nicotinamide Metabolism	69698	701-44-0	C05842	HMDB04193
nicotinamide	0.013	0.0488	0.0462	0.892	0.0462	0.0783	0.9475	0.0783	0.355	-0.357	0.26	-0.378	0.61	0.936	0.602	0.986	0.643	1.534	Cofactors and	Nicotinate and Nicotinamide Metabolism	936	98-92-0	C00153	HMDB01406
nicotinamide N-oxide	0.0018	0.0096	0.0055	0.846	0.0334	0.0135	0.5703	0.0636	0.395	-0.524	0.34	-0.309	0.529	0.963	0.614	1.161	0.638	1.819	Cofactors and	Nicotinate and Nicotinamide Metabolism	72661	1986-81-8		HMDB02730
quinolinate	0	0.0002	0.3112	0.3771	0	0.8584	0.0005	0.0005	-0.426	-0.107	-0.157	0.982	1.247	1.205	2.654	2.128	2.203	0.966	Cofactors and	Nicotinate and Nicotinamide Metabolism	1066	89-00-9	C03722	HMDB00232
pterin	0.0049	0.0231	0.1111	0.1111	0.0032	0.9734	0.1473	0.1473	-0.481	0.086	0.076	0.573	1.481	1.471	2.075	1.401	1.411	0.993	Cofactors and	Pterin Metabolism	73000	22363-60-4	C00715	HMDB00802
alpha-CEHC sulfate	0.0015	0.0083	0.0057	0.0147	0.0147	0.829	0.829	0.9818	0.574	-0.347	-0.228	-0.221	0.528	0.573	0.576	1.091	1.005	1.086	Cofactors and	Tocopherol Metabolism				
carotene diol (1)	0.0003	0.0025	0.026	0.0022	0.0049	0.3164	0.4674	0.7206	0.587	-0.085	-0.454	-0.342	0.628	0.486	0.525	0.837	1.081	0.774	Cofactors and	Vitamin A Metabolism				
pyridoxal	0.0109	0.0437	0.0191	0.0372	0.2952	0.7661	0.266	0.2952	0.451	-0.382	-0.291	0.086	0.562	0.598	0.776	1.382	1.298	1.065	Cofactors and	Vitamin B6 Metabolism	1050	65-22-5	C00250	HMDB01545
phosphate	0.0029	0.0151	0.4399	0.1188	0.0022	0.3645	0.0153	0.1188	-0.383	-0.175	0.133	0.694	1.155	1.43	2.111	1.827	1.476	1.238	Energy	Oxidative Phosphorylation	1061	7664-38-2	C00009	HMDB01429
aconitate [cis or trans]	0	0	0.006	0.0018	0	0.4842	0.0018	0.0124	-0.703	6E-04	0.185	0.92	1.629	1.851	3.079	1.891	1.664	1.137	Energy	TCA Cycle				
citrate	0	0.0005	0.0211	0.0211	0.0001	0.8663	0.0494	0.0711	-0.596	0.079	0.128	0.709	1.597	1.651	2.47	1.547	1.496	1.034	Energy	TCA Cycle	311	77-92-9	C00158	HMDB00094
carnitine	0.0004	0.0031	0.9682	0.772	0.0006	0.772	0.0006	0.0032	-0.267	-0.256	-0.122	0.883	1.007	1.106	2.219	2.203	2.007	1.098	Lipid	Carnitine Metabolism	10917	461-05-2	C00318	HMDB00062
adipoylcarnitine (C6-DC)	0.0003	0.0025	0.7965	0.9621	0.0006	0.7965	0.0017	0.0011	-0.274	-0.135	-0.261	0.885	1.101	1.009	2.232	2.027	2.212	0.916	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Dicarboxylate)	71296139			HMDB61677
(R)-3-hydroxybutyrylcarnitine	0.0001	0.0009	0.3628	0.0218	0.0004	0.1489	0.0059	0.1679	-0.456	-0.217	0.265	0.724	1.18	1.649	2.266	1.92	1.374	1.397	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Hydroxy)	53481617			HMDB13127
(S)-3-hydroxybutyrylcarnitine	0	0.0001	0.2131	0.1283	0	0.6627	0.001	0.0044	-0.474	-0.131	-0.009	0.932	1.269	1.381	2.651	2.09	1.92	1.088	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Hydroxy)				
3-hydroxyhexanoylcarnitine (1)	0.0023	0.0121	0.02	0.1737	0.0038	0.3524	0.3524	0.1424	-0.502	0.247	-0.049	0.53	1.68	1.369	2.044	1.216	1.493	0.815	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Hydroxy)				
3-hydroxypalmitoylcarnitine	0.0043	0.0206	0.0317	0.0483	0.0039	0.8687	0.3441	0.3441	-0.533	0.171	0.122	0.496	1.63	1.575	2.041	1.252	1.296	0.966	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Hydroxy)				
arachidoylcarnitine (C20)*	0	0.0005	0.0152	0.0035	0	0.454	0.0364	0.1696	-0.648	0.045	0.256	0.699	1.617	1.871	2.544	1.573	1.359	1.157	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Long Chain Saturated)				HMDB06460
lignoceroylcarnitine (C24)*	0.0002	0.0017	0.0181	0.0181	0.0001	0.7856	0.0672	0.1139	-0.605	0.086	0.164	0.677	1.614	1.704	2.433	1.507	1.428	1.056	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Long Chain Saturated)				
margaroylcarnitine (C17)*	0.0062	0.0273	0.0405	0.0104	0.0104	0.55	0.55	0.9483	-0.532	0.109	0.332	0.353	1.559	1.82	1.847	1.184	1.015	1.167	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Long Chain Saturated)		106182-29-0		HMDB06210
palmitoylcarnitine (C16)	0.001	0.0063	0.128	0.0151	0.0009	0.2866	0.0517	0.2954	-0.523	-0.063	0.284	0.612	1.376	1.75	2.196	1.596	1.255	1.272	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Long Chain Sat	461	6865-14-1	C02990	HMDB00222
stearoylcarnitine (C18)	0.0001	0.001	0.0334	0.0069	0.0001	0.366	0.0334	0.1812	-0.602	-0.004	0.254	0.693	1.514	1.811	2.453	1.621	1.355	1.196	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Long Chain Sat	6426855	18822-91-8		HMDB00848
eicosenoylcarnitine (C20:1)*	0	0.0005	0.0176	0.0176	0	0.9403	0.0262	0.0329	-0.619	0.081	0.102	0.772	1.624	1.648	2.622	1.614	1.591	1.015	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Monounsaturated)				
oleoylcarnitine (C18:1)	0.0001	0.001	0.042	0.0284	0.0002	0.636	0.042	0.1138	-0.567	0.03	0.167	0.685	1.513	1.663	2.382	1.575	1.433	1.1	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Monounsatura	6441392	38677-66-6		HMDB05065
arachidonoylcarnitine (C20:4)	0.0001	0.0006	0.0285	0.024	0	0.7398	0.0226	0.0285	-0.585	0.014	0.108	0.798	1.515	1.616	2.608	1.722	1.614	1.067	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Polyunsaturated)				
dihomo-linolenoylcarnitine (C20:3n	0.0035	0.017	0.2875	0.252	0.0018	0.7945	0.0354	0.0593	-0.391	-0.072	0.006	0.708	1.247	1.317	2.142	1.717	1.627	1.055	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Polyunsaturated)				
dihomo-linoleoylcarnitine (C20:2)*	0.0031	0.0156	0.283	0.1077	0.0019	0.4294	0.0381	0.1429	-0.424	-0.103	0.133	0.667	1.249	1.471	2.131	1.706	1.448	1.178	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Polyunsaturated)				
linolenoylcarnitine (C18:3)*	0.0117	0.0458	0.0431	0.0656	0.0198	0.8564	0.5991	0.5991	-0.495	0.19	0.135	0.398	1.607	1.547	1.857	1.156	1.201	0.963	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Polyunsaturated)				
acetylcarnitine (C2)	0	0	0.2218	0.0399	0	0.343	0.0002	0.0055	-0.514	-0.184	0.076	0.973	1.257	1.505	2.802	2.23	1.862	1.198	Lipid	Fatty Acid Metabolism (Acyl Carnitine, Short Chain)	1	5080-50-2	C02571	HMDB00201
butyrylcarnitine (C4)	0.0002	0.0021	0.2735	0.2735	0.0002	0.8522	0.0078	0.0131	-0.413	-0.095	-0.04	0.822	1.247	1.295	2.354	1.887	1.818	1.038	Lipid	Fatty Acid Metabolism (also BCAA Metabolism)	439829	25576-40-3	C02862	HMDB02013
methylmalonate (MMA)	0.0022	0.0113	0.8078	0.2056	0.0034	0.2724	0.0055	0.1132	-0.319	-0.253	0.108	0.719	1.047	1.344	2.054	1.963	1.528	1.285	Lipid	Fatty Acid Metabolism (also BCAA Metabolism)	487	516-05-2	C02170	HMDB00202
propionylcarnitine (C3)	0	0	0.016	0.0013	0	0.3049	0.0013	0.0176	-0.679	-0.055	0.218	0.919	1.542	1.862	3.028	1.964	1.626	1.208	Lipid	Fatty Acid Metabolism (also BCAA Metabolism)	107738	17298-37-2	C03017	HMDB00824
malonate	0.0004	0.003	0.0871	0.1334	0.0004	0.8455	0.0483	0.0483	-0.472	0.037	-0.02	0.722	1.424	1.368	2.288	1.607	1.673	0.961	Lipid	Fatty Acid Synthesis	867	141-82-2;265	C00383	HMDB00691
2-aminoheptanoate	0.013	0.0488	0.2141	0.0388	0.0204	0.3865	0.2141	0.6345	0.453	0.017	-0.285	-0.439	0.739	0.6	0.539	0.729	0.899	0.811	Lipid	Fatty Acid, Amino	227939	1115-90-8		
azelate (C9-DC)	0.0105	0.0424	0.3457	0.0327	0.0265	0.1953	0.1338	0.737	0.413	0.121	-0.342	-0.45	0.817	0.593	0.55	0.673	0.928	0.726	Lipid	Fatty Acid, Dicarboxylate	2266	123-99-9	C08261	HMDB00784
maleate	0	0.0003	0.1357	0.0425	0	0.492	0.0021	0.0158	-0.519	-0.114	0.079	0.889	1.324	1.513	2.654	2.005	1.754	1.143	Lipid	Fatty Acid, Dicarboxylate	444266	110-16-7	C01384	HMDB00176
2R,3R-dihydroxybutyrate	0	0.0001	0.0469	0.0644	0	0.9158	0.0008	0.0008	-0.565	-0.032	-0.06	1.002	1.447	1.418	2.962	2.047	2.088	0.98	Lipid	Fatty Acid, Dihydroxy	13120901	759-06-8		HMDB00498
2S,3R-dihydroxybutyrate	0.0002	0.002	0.0527	0.0527	0.0001	0.89	0.0288	0.0372	-0.525	0.006	0.045	0.779	1.445	1.485	2.469	1.709	1.663	1.028	Lipid	Fatty Acid, Dihydroxy	10964471	5057-93-2		HMDB02453
3,4-dihydroxybutyrate	0	0.0004	0.0026	0.3436	0.0001	0.0505	0.2114	0.0026	-0.535	0.329	-0.279	0.719	1.821	1.195	2.386	1.311	1.997	0.656	Lipid	Fatty Acid, Dihydroxy		51267-44-8		
2-hydroxynervonate*	0.0082	0.0349	0.3324	0.0949	0.0113	0.3324	0.0968	0.3324	-0.414	-0.083	0.219	0.533	1.258	1.552	1.929	1.533	1.243	1.233	Lipid	Fatty Acid, Monohydroxy	5312783			
3-hydroxystearate	0.0041	0.0196	0.1712	0.0153	0.0153	0.2874	0.2748	0.8669	-0.481	-0.007	0.349	0.403	1.389	1.778	1.846	1.329	1.038	1.281	Lipid	Fatty Acid, Monohydroxy	5282907	45261-96-9		
chiro-inositol	0.0004	0.0031	0.4298	0.2154	0.0002	0.5643	0.003	0.016	-0.402	-0.161	0.006	0.841	1.182	1.327	2.368	2.004	1.785	1.123	Lipid	Inositol Metabolism		643-12-9	C19891	HMDB34220
3-hydroxybutyrate (BHBA)	0.0001	0.0009	0.0614	0.0016	0.0009	0.1747	0.1009	0.6975	-0.59	-0.017	0.407	0.527	1.488	1.996	2.169	1.458	1.087	1.342	Lipid	Ketone Bodies	441	625-72-9	C01089	HMDB00357
acetoacetate	0	0.0006	0.0061	0.0003	0.0003	0.2616	0.2655	0.9122	-0.681	0.096	0.481	0.448	1.713	2.238	2.188	1.277	0.977	1.306	Lipid	Ketone Bodies	96	11/2/3483	C00164	HMDB00060
docosatrienoate (22:3n3)	0.004	0.0195	0.1596	0.0638	0.0044	0.4414	0.1189	0.3303	-0.467	-0.025	0.206	0.557	1.359	1.595	2.034	1.497	1.275	1.174	Lipid	Long Chain Polyunsaturated Fatty Acid (n3 and n6)	5312556	59708-86-0	C16534	HMDB02823
hexadecatrienoate (16:3n3)	0.0099	0.0408	0.7634	0.5277	0.0082	0.6416	0.0139	0.062	0.277	0.194	0.006	-0.697	0.945	0.829	0.509	0.539	0.614	0.878	Lipid	Long Chain Polyunsaturated Fatty Acid (n3 and n6)	5312428	7561-64-0		
1-palmitoyl-2-arachidonoyl-GPC (16	0.0004	0.0029	0.1453	0.0069	0.0004	0.1658	0.0244	0.3008	-0.541	-0.104	0.328	0.647	1.354	1.827	2.279	1.683	1.248	1.349	Lipid	Phosphatidylcholine (PC)	10747814	35418-58-7		HMDB07982
1-stearoyl-2-arachidonoyl-GPC (18:(	0.0012	0.0069	0.0146	0.0146	0.0018	0.8354	0.3611	0.4246	-0.58	0.15	0.212	0.503	1.659	1.731	2.119	1.277	1.224	1.043	Lipid	Phosphatidylcholine (PC)	16219824	35418-59-8		HMDB08048
1-palmitoyl-2-oleoyl-GPI (16:0/18:1	0.0008	0.0049	0.0221	0.0168	0.0006	0.7086	0.16	0.2779	-0.585	0.099	0.208	0.581	1.607	1.733	2.245	1.397	1.295	1.079	Lipid	Phosphatidylinositol (PI)				HMDB09783
1-stearoyl-2-arachidonoyl-GPI (18:0	0	0.0001	0.0001	0	0.0001	0.6339	0.7781	0.7527	-0.772	0.273	0.493	0.351	2.064	2.403	2.179	1.056	0.907	1.164	Lipid	Phosphatidylinositol (PI)		383907-33-3		HMDB09815
1-stearoyl-2-oleoyl-GPI (18:0/18:1)*	0.0004	0.0031	0.0033	0.0129	0.0007	0.7039	0.4584	0.3518	-0.628	0.255	0.145	0.513	1.845	1.709	2.206	1.196	1.291	0.927	Lipid	Phosphatidylinositol (PI)				
trimethylamine N-oxide	0	0.0003	0.1084	0.0165	0	0.2992	0.0039	0.0462	-0.549	-0.115	0.178	0.833	1.351	1.655	2.607	1.93	1.575	1.225	Lipid	Phospholipid Metabolism	1145	1184-78-7	C01104	HMDB00925
1-(1-enyl-palmitoyl)-2-arachidonoyl	0.002	0.0109	0.2298	0.0173	0.0035	0.1962	0.0532	0.4721	-0.473	-0.121	0.331	0.558	1.277	1.746	2.044	1.601	1.171	1.368	Lipid	Plasmalogen				HMDB11352

1-(1-enyl-palmitoyl)-2-linoleoyl-GP(	0.0078	0.0339	0.0235	0.0235	0.0601	0.9168	0.8727	0.8727	0.501	-0.259	-0.291	-0.152	0.59	0.578	0.636	1.078	1.102	0.978	Lipid	Plasmalogen				HMDB11211
1-(1-enyl-palmitoyl)-2-palmitoyl-GP	0.0005	0.0035	0.008	0.0145	0.0043	0.8707	0.6454	0.6454	0.587	-0.238	-0.19	-0.423	0.564	0.583	0.496	0.88	0.851	1.034	Lipid	Plasmalogen	11146967			HMDB11206
1-(1-enyl-stearoyl)-2-arachidonoyl-(	0.0004	0.0029	0.6243	0.007	0.0016	0.0256	0.0055	0.5187	-0.429	-0.301	0.402	0.645	1.093	1.78	2.106	1.926	1.183	1.628	Lipid	Plasmalogen	9547058			HMDB05779
1-(1-enyl-stearoyl)-2-oleoyl-GPE (P-	0.0051	0.0238	0.1158	0.0235	0.0056	0.4621	0.1755	0.4907	-0.505	0.014	0.274	0.494	1.433	1.717	2	1.395	1.165	1.198	Lipid	Plasmalogen		144371-68-6		HMDB11375
sphingomyelin (d18:1/18:1, d18:2/1	0.0051	0.0238	0.0031	0.1125	0.1232	0.2619	0.2494	0.8672	0.498	-0.48	-0.108	-0.055	0.508	0.657	0.682	1.343	1.038	1.294	Lipid	Sphingomyelins	6443882	108392-10-5		HMDB12101
sphingomyelin (d18:1/20:1, d18:2/2	0	0.0001	0.002	0.002	0.0002	0.7692	0.3749	0.4909	0.678	-0.195	-0.279	-0.529	0.546	0.515	0.433	0.794	0.841	0.944	Lipid	Sphingomyelins		222403-67-0		
sphingomyelin (d18:1/20:2, d18:2/2	0.0079	0.0339	0.011	0.011	0.2486	0.8256	0.293	0.2819	0.493	-0.32	-0.386	0.039	0.569	0.544	0.73	1.282	1.342	0.955	Lipid	Sphingomyelins				
sphingomyelin (d18:1/22:2, d18:2/2	0.0015	0.0085	0.0322	0.009	0.009	0.5751	0.5127	0.807	0.552	-0.109	-0.32	-0.397	0.633	0.547	0.518	0.819	0.948	0.864	Lipid	Sphingomyelins				
sphingomyelin (d18:2/24:2)*	0.0017	0.0094	0.0352	0.0103	0.0103	0.5573	0.5573	0.9734	0.54	-0.115	-0.349	-0.338	0.635	0.54	0.544	0.857	1.007	0.85	Lipid	Sphingomyelins				
stearoyl sphingomyelin (d18:1/18:0	0.0036	0.0177	0.003	0.0903	0.0903	0.2883	0.2883	0.917	0.511	-0.469	-0.115	-0.082	0.507	0.648	0.663	1.308	1.023	1.278	Lipid	Sphingomyelins	6453725	85187-10-6;8	C00550	HMDB01348
1-methylhypoxanthine	0.0001	0.0009	0.1015	0.1015	0.0118	0.9323	0.0002	0.0002	0.062	-0.391	-0.415	0.847	0.731	0.719	1.724	2.358	2.398	0.983	Nucleotide	Purine Metabolism, (Hypo)Xanthine/Inosine containin	70765	1125-39-9		HMDB13141
allantoin	0	0	0.0404	0.1099	0	0.6889	0	0	-0.572	-0.053	-0.155	1.141	1.434	1.335	3.278	2.287	2.455	0.931	Nucleotide	Purine Metabolism, (Hypo)Xanthine/Inosine containin	204	97-59-6	C02350	HMDB00462
inosine	0.0126	0.0482	0.131	0.3152	0.0846	0.0296	0.6619	0.0286	-0.177	0.296	-0.504	0.431	1.388	0.797	1.524	1.098	1.912	0.574	Nucleotide	Purine Metabolism, (Hypo)Xanthine/Inosine containin	6021	58-63-9	C00294	HMDB00195
N1-methylinosine	0.0019	0.0103	0.0878	0.0878	0.0923	0.9897	0.0035	0.0035	0.153	-0.385	-0.389	0.667	0.689	0.687	1.429	2.074	2.079	0.997	Nucleotide	Purine Metabolism, (Hypo)Xanthine/Inosine containin	65095	20245-33-4		HMDB02721
urate	0.008	0.0341	0.0194	0.2205	0.0158	0.3171	0.6254	0.2205	-0.474	0.287	-0.052	0.437	1.695	1.34	1.88	1.11	1.403	0.791	Nucleotide	Purine Metabolism, (Hypo)Xanthine/Inosine containin	1175	69-93-2;120K	C00366	HMDB00289
7-methylguanine	0.0005	0.0035	0.0535	0.1622	0.0535	0.6204	0.001	0.0042	0.116	-0.451	-0.306	0.724	0.675	0.746	1.524	2.258	2.042	1.106	Nucleotide	Purine Metabolism, Guanine containing	11361	578-76-7	C02242	HMDB00897
N2,N2-dimethylguanosine	0	0	0.1082	0.1014	0.0004	0.8234	0	0	0.006	-0.412	-0.472	1.024	0.749	0.718	2.025	2.705	2.821	0.959	Nucleotide	Purine Metabolism, Guanine containing	92919	2140-67-2		HMDB04824
5-hydroxymethylcytidine	0.0104	0.0419	0.5052	0.0545	0.0545	0.0209	0.0209	0.9665	-0.201	-0.421	0.413	0.427	0.858	1.531	1.545	1.8	1.009	1.783	Nucleotide	Pyrimidine Metabolism, Cytidine containing		19235-17-7		
5-methyl-2'-deoxycytidine	0.0046	0.0219	0.2715	0.0429	0.0098	0.2715	0.1053	0.4663	0.441	0.086	-0.281	-0.515	0.782	0.607	0.516	0.659	0.85	0.775	Nucleotide	Pyrimidine Metabolism, Cytidine containing	440055	838-07-3	C03592	HMDB02224
N4-acetylcytidine	0.0001	0.0013	0.5441	0.9035	0.0008	0.5752	0.0002	0.0011	-0.145	-0.381	-0.179	0.914	0.849	0.977	2.084	2.454	2.132	1.151	Nucleotide	Pyrimidine Metabolism, Cytidine containing	107461	3768-18-1		HMDB05923
3-ureidopropionate	0.0007	0.0045	0.76	0.239	0.0006	0.3385	0.0014	0.0321	-0.34	-0.259	0.056	0.817	1.057	1.316	2.23	2.109	1.695	1.244	Nucleotide	Pyrimidine Metabolism, Uracil containing	111	462-88-4	C02642	HMDB00026
5,6-dihydrouridine	0	0.0001	0.9153	0.7941	0	0.7941	0	0.0002	-0.313	-0.286	-0.166	1.042	1.019	1.107	2.558	2.512	2.31	1.087	Nucleotide	Pyrimidine Metabolism, Uracil containing	94312	5/4/5627		
pseudouridine	0	0	0.9467	0.9467	0	0.9467	0	0	-0.31	-0.294	-0.232	1.118	1.011	1.055	2.689	2.659	2.549	1.043	Nucleotide	Pyrimidine Metabolism, Uracil containing	15047	1445-07-4	C02067	HMDB00767
bilirubin degradation product, C17H	0.0061	0.0271	0.0085	0.1986	0.0149	0.252	0.8652	0.3069	0.507	-0.387	0.029	-0.335	0.538	0.718	0.558	1.037	0.777	1.334	Partially Chara	Partially Characterized Molecules				
gamma-glutamyl-alpha-lysine	0.0129	0.0488	0.2492	0.1855	0.0175	0.6878	0.1855	0.2599	-0.395	-0.009	0.114	0.519	1.307	1.423	1.885	1.442	1.324	1.089	Peptide	Gamma-glutamyl Amino Acid	65254			
gamma-glutamylglutamate	0.0011	0.0065	0.0495	0.0088	0.0016	0.4632	0.1628	0.4672	-0.564	0.042	0.298	0.526	1.522	1.817	2.129	1.398	1.171	1.194	Peptide	Gamma-glutamyl Amino Acid	92865	1116-22-9	C05282	HMDB11737
gamma-glutamylisoleucine*	0.0011	0.0066	0.1629	0.0838	0.0024	0.5384	0.0838	0.1629	-0.451	-0.044	0.14	0.625	1.325	1.506	2.107	1.59	1.399	1.136	Peptide	Gamma-glutamyl Amino Acid	14253342			HMDB11170
gamma-glutamylphenylalanine	0.0053	0.0241	0.5712	0.6723	0.008	0.8137	0.037	0.037	-0.298	-0.057	-0.128	0.682	1.182	1.125	1.971	1.669	1.753	0.952	Peptide	Gamma-glutamyl Amino Acid	111299	7432-24-8		HMDB00594
gamma-glutamyltyrosine	0.0103	0.0419	0.69	0.0537	0.4532	0.1087	0.3467	0.0224	0.127	0.017	-0.58	0.391	0.926	0.613	1.201	1.296	1.96	0.661	Peptide	Gamma-glutamyl Amino Acid	94340	7432-23-7		HMDB11741
N,N-dimethyl-pro-pro	0.0001	0.0008	0.9006	0.9006	0.0001	0.9006	0.0003	0.0003	-0.279	-0.2	-0.245	0.961	1.056	1.024	2.362	2.237	2.307	0.97	Peptide	Modified Peptides				
2-methoxyhydroquinone sulfate (1)	0.0048	0.0225	0.0696	0.0051	0.0807	0.2741	0.9521	0.2741	0.501	-0.126	-0.495	-0.108	0.647	0.501	0.656	1.013	1.308	0.774	Xenobiotics	Benzoate Metabolism				
4-vinylcatechol sulfate	0.0008	0.005	0.0489	0.0055	0.0055	0.3775	0.3775	0.9059	0.55	-0.065	-0.365	-0.402	0.653	0.531	0.517	0.791	0.974	0.812	Xenobiotics	Benzoate Metabolism				
4-vinylphenol sulfate	0.0003	0.0024	0.214	0.0044	0.0018	0.0855	0.0353	0.619	0.508	0.151	-0.411	-0.566	0.781	0.529	0.475	0.609	0.898	0.677	Xenobiotics	Benzoate Metabolism	6426766	2628-17-3	C05627	HMDB62775
hippurate	0.0021	0.0112	0.9024	0.9024	0.0032	0.9024	0.0032	0.0092	-0.207	-0.24	-0.137	0.785	0.977	1.05	1.989	2.035	1.894	1.075	Xenobiotics	Benzoate Metabolism	464	495-69-2	C01586	HMDB00714
S-(3-hydroxypropyl)mercapturic aci	0	0	0.0808	0.0603	0	0.7491	0.0001	0.0003	-0.558	-0.118	-0.034	1.075	1.357	1.438	3.102	2.286	2.157	1.06	Xenobiotics	Chemical	3371179	23127-40-4		
sulfate*	0	0	0.017	0.0053	0	0.5407	0	0.0005	-0.661	-0.088	0.067	1.092	1.488	1.657	3.372	2.266	2.035	1.114	Xenobiotics	Chemical	1118	14808-79-8	C00059	HMDB01448
triethanolamine	0.0123	0.0478	0.1	0.0109	0.0634	0.3007	0.6291	0.5465	-0.482	0.061	0.451	0.21	1.457	1.909	1.615	1.109	0.846	1.31	Xenobiotics	Chemical	7618	102-71-6	C06771	HMDB32538
2-aminophenol sulfate	0.003	0.0153	0.0863	0.0016	0.1489	0.1489	0.625	0.0943	0.48	-0.117	-0.606	0.031	0.661	0.471	0.732	1.108	1.555	0.713	Xenobiotics	Food Component/Plant	181670			HMDB61116
ferulic acid 4-sulfate	0.0052	0.024	0.2756	0.0093	0.0692	0.1156	0.368	0.411	0.436	0.071	-0.51	-0.245	0.776	0.519	0.624	0.804	1.202	0.669	Xenobiotics	Food Component/Plant	6305574	86321-29-1		HMDB29200
gluconate	0	0.0006	0.025	0.346	0	0.1977	0.0344	0.0021	-0.493	0.16	-0.236	0.826	1.572	1.195	2.495	1.587	2.089	0.76	Xenobiotics	Food Component/Plant	10690	527-07-1	C00257	HMDB00625
homostachydrine*	0.0056	0.0251	0.166	0.0026	0.0847	0.0847	0.5743	0.1984	-0.462	-0.027	0.589	0.144	1.352	2.072	1.523	1.126	0.735	1.533	Xenobiotics	Food Component/Plant	441447	1195-94-4	C08283	HMDB33433
mannonate*	0	0.0001	0.2345	0.2273	0	0.837	0.0003	0.0007	-0.463	-0.139	-0.083	1.003	1.252	1.302	2.761	2.206	2.122	1.04	Xenobiotics	Food Component/Plant	3246006	642-99-9		
X - 11381	0.0001	0.0009	0.0774	0.0008	0.0002	0.0774	0.0272	0.5713	-0.591	-0.112	0.443	0.614	1.394	2.047	2.305	1.653	1.126	1.469						
X - 12097	0.0011	0.0066	0.4356	0.4356	0.0031	0.1833	0.0239	0.0011	-0.198	0.01	-0.448	0.776	1.155	0.841	1.964	1.701	2.336	0.728						
X - 12100	0.0076	0.0331	0.1789	0.1789	0.0072	0.9922	0.1626	0.1626	-0.401	0.018	0.021	0.591	1.338	1.34	1.989	1.487	1.484	1.002						
X - 12101	0	0	0.0904	0.0639	0	0.7311	0.0002	0.0007	-0.548	-0.114	-0.022	1.042	1.351	1.439	3.009	2.228	2.091	1.066						
X - 12117	0.0012	0.0067	0.0368	0.0584	0.0014	0.85	0.1953	0.1953	-0.538	0.146	0.09	0.569	1.607	1.545	2.154	1.341	1.394	0.962						
X - 12127	0.0001	0.0008	0.5841	0.2304	0.0001	0.4561	0.0007	0.0113	-0.377	-0.235	0.018	0.883	1.103	1.314	2.393	2.169	1.821	1.191						
X - 12680	0.0002	0.002	0.0101	0.4344	0.0002	0.101	0.1355	0.0047	-0.487	0.259	-0.272	0.725	1.677	1.161	2.317	1.381	1.995	0.692						
X - 12689	0.0003	0.0023	0.0023	0.0089	0.0011	0.7233	0.6142	0.5077	-0.636	0.276	0.174	0.47	1.882	1.753	2.152	1.144	1.228	0.931						
X - 13684	0.0123	0.0478	0.1239	0.5606	0.0107	0.3036	0.2412	0.0515	-0.364	0.153	-0.195	0.588	1.431	1.124	1.934	1.352	1.72	0.786						
X - 13695	0.0038	0.0183	0.0196	0.0164	0.0152	0.777	0.777	0.777	0.546	-0.169	-0.272	-0.362	0.609	0.567	0.533	0.875	0.939	0.931						
X - 15461	0	0.0005	0.1038	0.0456	0	0.5896	0.0042	0.0194	-0.524	-0.082	0.07	0.864	1.358	1.509	2.615	1.926	1.733	1.111						
X - 16580	0.0084	0.0353	0.6211	0.4246	0.0075	0.6211	0.0269	0.0793	-0.309	-0.146	0.004	0.676	1.119	1.242	1.978	1.768	1.593	1.109						
X - 18345	0.0011	0.0067	0.0299	0.2727	0.0006	0.2727	0.1397	0.0283	-0.479	0.178	-0.145	0.684	1.578	1.261	2.239	1.419	1.776	0.799						
X - 22162	0	0	0.589	0.589	0	0.8635	0	0	-0.399	-0.235	-0.189	1.138	1.121	1.157	2.902	2.589	2.509	1.032						
X - 23536	0.0009	0.0057	0.6397	0.7285	0.0011	0.7285	0.006	0.0045	-0.304	-0.092	-0.206	0.82	1.158	1.07	2.18	1.882	2.037	0.924						
X - 23593	0.0085	0.0357	0.6381	0.6381	0.0071	0.9433	0.028	0.028	-0.292	-0.089	-0.111	0.696	1.151	1.134	1.984	1.723	1.749	0.985						
X - 23659	0	0.0005	0.9814	0.9814	0.0001	0.9814	0.0002	0.0002	-0.276	-0.228	-0.235	0.983	1.034	1.029	2.393	2.315	2.325	0.995						
X - 23665	0.003	0.0151	0.0478	0.0046	0.0463	0.3112	0.7459	0.4554	-0.523	0.098	0.478	0.197	1.538	2.001	1.647	1.071	0.823	1.301						
X - 23739	0	0.0003	0.0538	0.2489	0	0.4786	0.0033	0.0009	-0.505	0.028	-0.168	0.943	1.447	1.263	2.728	1.885	2.161	0.873						
X - 24408	0.0134	0.0498	0.0631	0.0931	0.022	0.8484	0.5271	0.5271	-0.475	0.172	0.113	0.412	1.565	1.503	1.849	1.181	1.23	0.96						
X - 24623	0	0	0.0002	0	0	0.2945	0.5033	0.6543	-0.801	0.204	0.551	0.424	2.006	2.552	2.336	1.165	0.915	1.272						
X - 24728	0	0	0.0392	0.04	0	0.9794	0.0006	0.0008	-0.585	-0.04	-0.033	1.017	1.459	1.466	3.035	2.08	2.07	1.005						
X - 25247	0.0003	0.0022	0.0659	0.0006	0.0082	0.0782	0.3639	0.3905	0.571	0.002	-0.571	-0.304	0.674	0.453	0.545	0.809	1.203	0.672						
X - 25419	0.0089	0.0369	0.016	0.016	0.0854	0.7266	0.6823	0.5751	-0.516	0.263	0.369	0.088	1.716	1.846	1.52	0.886	0.823	1.076						
X - 25422	0	0	0.4007	0.4684	0	0.8553	0	0	-0.453	-0.201	-0.246	1.24	1.191	1.154	3.233	2.715	2.802	0.969						

X - 25794	0.0112	0.0442	0.0447	0.0447	0.0225	0.8551	0.6471	0.6739	-0.494	0.144	0.199	0.387	1.556	1.617	1.842	1.184	1.139	1.039						
X - 25948	0	0	0.061	0.009	0	0.365	0	0.0012	-0.611	-0.148	0.088	1.069	1.378	1.623	3.203	2.324	1.974	1.177						
X - 26035	0	0	0.3293	0.0569	0	0.3124	0	0.0006	-0.496	-0.263	0.034	1.093	1.175	1.444	3.008	2.56	2.083	1.229						

Table S2. P value distributions from a bootstrap subsampling study

	Resampling size				Variation Explained		P values					
Iteration	A	B1	B2	C/D	PC1 (%)	PC2 (%)	PC1	PC2	Age	BCS	Body weight	Sex
1	10	10	10	10	15.2	8.6	0.001183	0.070508	0.06754	0.744694	0.0542404	0.392559
2	10	10	10	10	15.1	8.2	3.15E-06	0.146352	0.084529	0.098693	0.05361359	0.410112
3	10	10	10	10	12.4	9.3	0.00028	0.531539	0.223515	0.573529	0.07686274	0.969057
4	10	10	10	10	13.7	8.8	0.007622	0.21972	0.090911	0.505312	0.13676947	1
5	10	10	10	10	15.7	9	0.000325	0.24474	0.128654	0.566646	0.26767972	0.969057
6	10	10	10	10	14.5	9.1	0.003234	0.720436	0.208693	0.595038	0.10319423	0.642298
7	10	10	10	10	15.6	8.8	6.39E-05	0.033048	0.154502	0.142478	0.34166331	1
8	10	10	10	10	13.5	9.7	1.43E-05	0.681202	0.087986	0.033059	0.06187466	0.726949
9	10	10	10	10	16	8.3	6.89E-05	0.915567	0.086226	0.370308	0.47209743	0.600571
10	10	10	10	10	11.9	9.4	4.07E-05	0.884057	0.145653	0.141674	0.16059284	0.684285
11	10	10	10	10	14.5	9.6	0.006612	0.315633	0.113612	0.477426	0.08467992	1
12	10	10	10	10	14	9.5	0.000205	0.133699	0.093926	0.810124	0.10714826	1
13	10	10	10	10	12	9.4	4.06E-05	0.037046	0.184981	0.008503	0.05588512	0.783186
14	10	10	10	10	15.1	8.4	0.000394	0.061978	0.055667	0.047621	0.39344308	1
15	10	10	10	10	12.6	8.6	0.000257	0.096358	0.113514	0.227209	0.15256719	0.897606
16	10	10	10	10	12.4	8.4	0.001286	0.025318	0.101169	0.229236	0.07250139	0.726949
17	10	10	10	10	14.6	9	0.000156	0.203072	0.090936	0.128633	0.113736	1
18	10	10	10	10	15.5	9.4	0.001402	0.155934	0.10813	0.096057	0.12303757	1
19	10	10	10	10	14.5	9.4	0.000689	0.49528	0.181322	0.470677	0.38799428	0.969057
20	10	10	10	10	14.7	9.1	0.000772	0.240639	0.229444	0.907359	0.05166925	1
21	10	10	10	10	12.5	8.2	1.77E-05	0.419127	0.23555	0.282169	0.28843598	0.684285
22	10	10	10	10	13.2	7.9	1.38E-05	0.614165	0.075208	0.981894	0.0938096	0.684285
23	10	10	10	10	15.9	8.8	0.00156	0.523986	0.149735	0.255732	0.06590854	1
24	10	10	10	10	15.9	8.6	0.002623	0.141546	0.209909	0.661177	0.08030861	0.851798
25	10	10	10	10	15.1	8.6	0.000265	0.877152	0.05727	0.4875	0.0525548	0.970745
26	10	10	10	10	13	10.6	0.001401	0.582323	0.075549	0.011838	0.37898745	0.851798
27	10	10	10	10	16.1	9.9	0.000344	0.620809	0.221061	0.340364	0.14046016	1
28	10	10	10	10	14.1	9.6	0.000177	0.087658	0.111755	0.08738	0.26388862	0.627147
29	10	10	10	10	15.1	7.9	3.95E-05	0.074181	0.060841	0.063928	0.21598928	0.969057
30	10	10	10	10	14.6	9.3	0.000116	0.233741	0.054195	0.252148	0.22918415	0.715437
31	10	10	10	10	15.3	8.8	0.000138	0.029782	0.064164	0.442496	0.47058824	0.865456

32	10	10	10	10	13.5	9.7	0.000242	0.095229	0.182337	0.183773	0.30995848	0.897606
33	10	10	10	10	13.9	8.8	0.000154	0.425447	0.145248	0.221992	0.09694064	0.31176
34	10	10	10	10	13.4	11	0.000156	0.254732	0.267763	0.22301	0.31390304	0.894795
35	10	10	10	10	15.3	7.8	4.2E-05	0.879759	0.062503	0.377616	0.20689479	0.688927
36	10	10	10	10	16.5	7.7	0.001003	0.450305	0.057179	0.361604	0.7555242	0.341394
37	10	10	10	10	15.1	9.1	0.000409	0.465285	0.065419	0.330447	0.74337872	0.641891
38	10	10	10	10	12.7	9.7	0.000126	0.085036	0.112987	0.683971	0.38250436	1
39	10	10	10	10	12.6	9.4	0.001613	0.14771	0.139354	0.137491	0.08632695	0.715437
40	10	10	10	10	13.5	9.4	0.002035	0.191266	0.077283	0.340364	0.07671969	0.889491
41	10	10	10	10	16	8.8	0.000328	0.167299	0.330831	0.37295	0.08435731	1
42	10	10	10	10	15.2	9.4	0.000193	0.642325	0.109656	0.809324	0.22263356	0.528081
43	10	10	10	10	15.1	8.8	0.000254	0.434908	0.053729	0.173974	0.48959048	0.678373
44	10	10	10	10	15.6	8.4	0.000154	0.327034	0.063962	0.334678	0.44338568	1
45	10	10	10	10	13.2	9.8	0.000406	0.539191	0.213572	0.240978	0.16933386	0.715437
46	10	10	10	10	15.2	8.4	0.000254	0.805446	0.104361	0.924353	0.19599014	0.894795
47	10	10	10	10	13.6	8.7	0.000418	0.021968	0.284257	0.386108	0.05787573	1
48	10	10	10	10	15.5	8.3	0.000305	0.86906	0.11038	0.52511	0.22808267	0.402566
49	10	10	10	10	14.6	9.4	0.000394	0.256649	0.175034	0.395091	0.07936651	0.410112
50	10	10	10	10	13.8	9.5	0.000261	0.038818	0.413948	0.259724	0.1325843	0.894795
51	10	10	10	10	14.4	9.3	0.000654	0.281038	0.257104	0.511467	0.42120478	0.684285
52	10	10	10	10	14.7	9	0.00017	0.605826	0.095164	0.063903	0.1220913	0.894795
53	10	10	10	10	14.3	9.6	0.000442	0.560091	0.1234	0.962178	0.58359931	0.662157
54	10	10	10	10	13.8	9.8	0.000849	0.136716	0.206222	0.221538	0.11333071	0.889491
55	10	10	10	10	14.5	9.6	7.21E-06	0.287108	0.057829	0.008774	0.32083612	0.897606
56	10	10	10	10	14.1	9.1	1.74E-07	0.428548	0.070605	0.091221	0.1405942	0.642298
57	10	10	10	10	15.8	9.9	3.07E-05	0.45433	0.190637	0.663969	0.35966529	1
58	10	10	10	10	15.8	8.9	0.002521	0.197514	0.074013	0.056241	0.82599288	0.969057
59	10	10	10	10	14	9.5	3.06E-05	0.487298	0.099617	0.104569	0.09521663	1
60	10	10	10	10	15.5	8.4	0.000363	0.457847	0.104035	0.37862	0.24428358	1
61	10	10	10	10	15	8.8	0.000475	0.334217	0.080959	0.528141	0.36510877	0.783186
62	10	10	10	10	15.4	8.7	0.000564	0.316927	0.062043	0.492867	0.05887165	0.678373
63	10	10	10	10	17.3	7.6	9.46E-05	0.001811	0.348	0.648411	0.58771005	1
64	10	10	10	10	14.4	9.6	1.14E-05	0.073108	0.36307	0.819518	0.301322	0.538008
65	10	10	10	10	14.5	10.1	0.000117	0.078575	0.159807	0.917639	0.07796497	0.538008

66	10	10	10	10	14.5	9.4	1.71E-07	0.293448	0.081376	0.017478	0.06093505	0.897606
67	10	10	10	10	14.1	8.9	0.002456	0.902474	0.123927	0.640149	0.15885904	0.969057
68	10	10	10	10	16.3	8.4	0.000224	0.153466	0.168878	0.095337	0.07261736	0.433148
69	10	10	10	10	14.1	8.2	0.000105	0.546562	0.593803	0.12315	0.20313042	0.970745
70	10	10	10	10	15.7	9.6	0.000254	0.581101	0.073972	0.358373	0.08900392	0.688927
71	10	10	10	10	15.5	9.4	2.14E-05	0.353216	0.081706	0.980579	0.05896502	0.715437
72	10	10	10	10	14	10	8.92E-05	0.113399	0.142311	0.475564	0.215377	0.889491
73	10	10	10	10	14	10.5	0.003044	0.775273	0.620981	0.535467	0.08665017	1
74	10	10	10	10	12.9	9	0.006832	0.094136	0.25126	0.20492	0.4452356	1
75	10	10	10	10	15.2	8.8	0.00158	0.958492	0.310557	0.975152	0.08521172	0.688927
76	10	10	10	10	17.2	9.4	0.000473	0.33756	0.070077	0.408795	0.12750215	1
77	10	10	10	10	14	9.5	0.020279	0.326104	0.139802	0.09557	0.61004381	1
78	10	10	10	10	14.4	9.2	0.00048	0.422001	0.052036	0.738764	0.15729539	0.684285
79	10	10	10	10	14.2	8	0.00048	0.508843	0.327702	0.236181	0.05579793	1
80	10	10	10	10	14.4	9.1	0.000237	0.464298	0.118501	0.47211	0.172807	0.688927
81	10	10	10	10	15.3	8.7	0.000119	0.314442	0.05842	0.188548	0.07249767	0.897606
82	10	10	10	10	14.1	9.1	4.37E-06	0.981317	0.073567	0.00651	0.30216675	1
83	10	10	10	10	14.6	9.3	0.00041	0.174179	0.41236	0.251083	0.43565649	0.894795
84	10	10	10	10	15.6	9.1	5.35E-05	0.439883	0.053241	0.838255	0.0749002	0.894795
85	10	10	10	10	16.9	9.2	2.19E-06	0.087995	0.092855	0.08585	0.06939476	0.476884
86	10	10	10	10	15.2	8.7	0.00064	0.296322	0.118572	0.637462	0.46922479	1
87	10	10	10	10	13.8	9.8	0.00558	0.088212	0.165974	0.118585	0.37273213	0.897606
88	10	10	10	10	14.3	8.6	0.000148	0.319417	0.076358	0.562747	0.06396015	1
89	10	10	10	10	14.8	9.2	4.06E-05	0.244381	0.066454	0.545455	0.10862026	0.263255
90	10	10	10	10	15.3	9.7	1.64E-05	0.473905	0.06168	0.270666	0.07483052	0.970745
91	10	10	10	10	15.3	8.5	2.35E-05	0.507405	0.071624	0.089346	0.14105494	0.479046
92	10	10	10	10	13.2	9.1	3.81E-05	0.220973	0.121585	0.913344	0.18565285	0.969057
93	10	10	10	10	13.2	9.5	0.000153	0.471931	0.233728	0.574434	0.5997494	1
94	10	10	10	10	15.2	9.1	7.25E-05	0.143725	0.118875	0.408491	0.0852853	0.715437
95	10	10	10	10	14	9.6	0.000372	0.22024	0.213461	0.076022	0.05756272	1
96	10	10	10	10	14.3	9.2	4.86E-05	0.068715	0.065379	0.142319	0.36611249	0.969057
97	10	10	10	10	14.6	9.6	0.001489	0.405458	0.284746	0.237545	0.28653984	0.969057
98	10	10	10	10	16	7.8	0.002198	0.688818	0.08227	0.306553	0.05294746	0.969057
99	10	10	10	10	13.6	8.6	8.16E-05	0.987409	0.455925	0.139163	0.14350678	0.969057

100	10	10	10	10	15.1	9.5	0.003581	0.320797	0.4829	0.223621	0.06390499	0.865456
101	10	10	10	10	13.6	9.6	2.69E-05	0.664547	0.097649	0.774976	0.25580205	0.889491
102	10	10	10	10	15.9	8.5	0.000243	0.191024	0.083957	0.02569	0.22614173	0.31176
103	10	10	10	10	14.5	8.6	0.018878	0.443702	0.301467	0.448153	0.07691323	0.970745
104	10	10	10	10	13.4	8.2	1.06E-05	0.419548	0.089897	0.213152	0.07341288	0.969057
105	10	10	10	10	13.2	10.1	0.000289	0.065963	0.097564	0.630291	0.09526896	0.512969
106	10	10	10	10	16.2	8.5	6.53E-05	0.161891	0.085991	0.039021	0.16733769	0.392559
107	10	10	10	10	17.8	8.1	5.86E-05	0.070801	0.105814	0.676201	0.12424418	0.257296
108	10	10	10	10	15.1	9.2	0.000107	0.415658	0.235545	0.621019	0.15173325	0.688927
109	10	10	10	10	13.1	9.1	0.000162	0.310398	0.217101	0.713144	0.23555273	0.715437
110	10	10	10	10	15.9	9	0.004717	0.217724	0.120508	0.42088	0.19938548	0.969057
111	10	10	10	10	14.8	8.8	0.010558	0.579524	0.964871	0.44433	0.06656957	0.969057
112	10	10	10	10	14.9	9.2	0.00268	0.515505	0.141353	0.097721	0.31738884	0.715437
113	10	10	10	10	14.5	8.7	0.000312	0.496242	0.071241	0.077339	0.20759038	0.268815
114	10	10	10	10	16.8	8	7.3E-05	0.398824	0.059538	0.355868	0.16679195	1
115	10	10	10	10	15	9.1	5.82E-06	0.495541	0.054133	0.706159	0.101234	0.402566
116	10	10	10	10	13.9	9.1	0.001948	0.442849	0.12918	0.097516	0.12708777	0.969057
117	10	10	10	10	15.9	8.1	2.93E-05	0.646848	0.123174	0.338554	0.27514907	0.969057
118	10	10	10	10	14	9.1	0.001575	0.744077	0.261605	0.402183	0.47970205	0.662157
119	10	10	10	10	14.8	9.7	0.000137	0.305081	0.071689	0.0816	0.13170836	1
120	10	10	10	10	15.1	8.9	0.000892	0.520254	0.055641	0.722092	0.50134984	0.257296
121	10	10	10	10	12.1	9.4	7.7E-05	0.719244	0.132065	0.091963	0.13498011	0.970745
122	10	10	10	10	14.4	9.7	0.000733	0.485155	0.20321	0.225503	0.15632289	0.969057
123	10	10	10	10	15.9	9.5	4.33E-05	0.518932	0.050702	0.075641	0.1709285	0.433148
124	10	10	10	10	15.5	9.2	0.002367	0.109291	0.420117	0.468951	0.31566016	0.714444
125	10	10	10	10	14.8	7.6	0.001559	0.439432	0.109375	0.25135	0.13003736	0.835815
126	10	10	10	10	14.9	8.9	0.000464	0.404778	0.498675	0.975082	0.51133069	0.851798
127	10	10	10	10	14.6	10	0.002789	0.31662	0.235992	0.693804	0.11910832	0.894795
128	10	10	10	10	16.4	9.2	0.001918	0.444899	0.15178	0.45796	0.33128582	0.894795
129	10	10	10	10	13.3	8.6	7.19E-05	0.622149	0.229204	0.120184	0.34144364	1
130	10	10	10	10	14	9.4	0.000132	0.120847	0.197498	0.041169	0.39857238	0.33233
131	10	10	10	10	13.6	10	2.46E-06	0.27344	0.084509	0.065968	0.10362677	1
132	10	10	10	10	14.8	8.5	0.001209	0.164173	0.066371	0.452263	0.09354636	0.894795
133	10	10	10	10	13.6	9.5	0.006461	0.390771	0.254966	0.75516	0.05080845	1

134	10	10	10	10	15	9.2	4.31E-05	0.167471	0.345398	0.370308	0.09081927	1
135	10	10	10	10	15.7	8.9	0.000685	0.516563	0.35946	0.34924	0.10834362	0.865456
136	10	10	10	10	15.3	8.7	0.003133	0.200024	0.0989	0.331615	0.09966473	0.715437
137	10	10	10	10	14.9	9.3	0.000427	0.197227	0.259996	0.779627	0.05413502	0.851798
138	10	10	10	10	14.6	8.5	0.002906	0.132122	0.088052	0.219674	0.38322332	0.783186
139	10	10	10	10	14.5	9.6	6.08E-05	0.354171	0.209144	0.053576	0.26338875	0.760758
140	10	10	10	10	16.8	9.4	7.35E-05	0.845769	0.078527	0.020836	0.09577757	1
141	10	10	10	10	13.8	8.7	1.32E-05	0.143165	0.124442	0.573579	0.50322351	1
142	10	10	10	10	14.6	9.8	0.000178	0.648473	0.156947	0.135034	0.46998433	0.851798
143	10	10	10	10	13.7	10	0.000405	0.630027	0.18562	0.390143	0.32291028	0.889491
144	10	10	10	10	13.9	9.2	1.37E-06	0.975025	0.085953	0.110633	0.11039127	0.969057
145	10	10	10	10	15.1	9	0.000117	0.221549	0.198389	0.043178	0.2562647	0.962884
146	10	10	10	10	14.7	7.9	9.4E-05	0.250029	0.18403	0.020797	0.53453113	0.894795
147	10	10	10	10	15.5	8.7	4.21E-05	0.119231	0.077658	0.699787	0.30758495	0.894795
148	10	10	10	10	15.7	9.5	0.005257	0.374197	0.179036	0.335657	0.12949277	0.715437
149	10	10	10	10	15	9.6	0.001478	0.42683	0.497232	0.146525	0.06685971	0.783186
150	10	10	10	10	12.9	9.5	4.13E-05	0.571919	0.116864	0.457238	0.16797602	0.528081
151	10	10	10	10	14.9	9.2	1.79E-05	0.460601	0.058254	0.470759	0.17656756	0.970745
152	10	10	10	10	13.7	9	1.57E-06	0.456605	0.078993	0.299433	0.0619239	0.969057
153	10	10	10	10	12.9	9.5	6.14E-05	0.49592	0.293273	0.399742	0.12967042	0.684285
154	10	10	10	10	13.5	10.4	0.000916	0.435152	0.061308	0.47211	0.18151395	1
155	10	10	10	10	14	9.3	0.000371	0.713523	0.075484	0.610703	0.25787576	0.715437
156	10	10	10	10	14.6	7.9	3.15E-05	0.172813	0.124056	0.235502	0.36213941	0.894795
157	10	10	10	10	14.8	8	0.003226	0.980795	0.207501	0.125296	0.49221026	0.715437
158	10	10	10	10	12.2	9.5	0.000267	0.723231	0.05655	0.681378	0.88597133	0.688927
159	10	10	10	10	16.7	9.5	0.000426	0.430747	0.080287	0.571388	0.20883689	0.627147
160	10	10	10	10	14.1	9.4	0.000853	0.493464	0.059358	0.517602	0.29057636	1
161	10	10	10	10	13.5	9.6	0.00197	0.546341	0.078239	0.04449	0.06610737	0.970745
162	10	10	10	10	13.6	9.5	0.00289	0.584132	0.064365	0.666215	0.35912909	1
163	10	10	10	10	14.2	9.5	0.000909	0.037671	0.271952	0.091144	0.14107279	0.662157
164	10	10	10	10	16.3	8.2	0.000219	0.019041	0.05523	0.230186	0.11773847	0.889491
165	10	10	10	10	15.3	10.5	1.8E-05	0.381673	0.075263	0.467145	0.3145502	0.894795
166	10	10	10	10	13.2	9.7	4.2E-06	0.984944	0.109485	0.00469	0.09022141	1
167	10	10	10	10	14	9.3	4.93E-06	0.235206	0.052064	0.317581	0.31297719	0.505903

168	10	10	10	10	16.4	9.3	0.000335	0.145398	0.132363	0.010306	0.55693887	0.889491
169	10	10	10	10	14.6	9.5	6.58E-05	0.554826	0.061821	0.05972	0.06209674	0.391327
170	10	10	10	10	15.3	9.2	3.66E-05	0.536667	0.077176	0.175528	0.06406548	0.715437
171	10	10	10	10	15.2	8.8	1.41E-05	0.444034	0.081399	0.970642	0.41467559	0.894795
172	10	10	10	10	14.5	10.2	0.001262	0.189075	0.252783	0.198741	0.09562496	0.715437
173	10	10	10	10	12.8	8.1	4.76E-05	0.428104	0.335353	0.668028	0.16309763	1
174	10	10	10	10	13.7	10.7	0.001744	0.503042	0.156466	0.67134	0.06850823	0.476884
175	10	10	10	10	16.1	8.5	0.000531	0.068911	0.413662	0.651096	0.30585145	1
176	10	10	10	10	15.6	8.8	0.000375	0.218655	0.07021	0.364427	0.10402496	0.715437
177	10	10	10	10	15.6	8.7	0.00213	0.432228	0.052005	0.037878	0.14459604	0.715437

Table S3. Pearson's correlation analysis between significant metabolites and key echo variables.

	P values			FDR			Correlation coefficients		
BIOCHEMICAL	**nLVIDd**	**nLAD**	**LA/Ao**	**nLVIDd**	**nLAD**	**LA/Ao**	**nLVIDd**	**nLAD**	**LA/Ao**
hydroxyasparagine	0.034912	0.000333	0.000129	0.143833	0.00308	0.002098	0.242359	0.40087	0.425254
N,N-dimethylalanine	0.197889	0.027048	0.116845	0.302856	0.048555	0.142811	0.149342	0.253639	0.18139
N-acetylalanine	0.221365	0.009516	0.0083	0.316871	0.024272	0.020344	0.141918	0.295651	0.300724
N-acetylasparagine	0.365624	0.152091	0.253786	0.446874	0.183343	0.291937	0.105232	0.165891	0.132523
N-carbamoylalanine	0.271966	0.985715	0.95614	0.35721	0.985715	0.961604	0.127611	-0.00209	-0.00641
creatine	0.002969	0.000139	0.001394	0.052205	0.002036	0.005706	0.336369	0.423345	0.360172
alpha-ketoglutaramate*	0.281813	0.005324	0.000491	0.367401	0.017064	0.003307	0.125042	0.316639	0.390294
carboxyethyl-GABA	0.203971	0.038676	0.015363	0.306828	0.060388	0.031078	0.147361	0.237701	0.277143
glutamine	0.051926	0.005333	0.037242	0.166163	0.017064	0.060691	-0.22384	-0.31658	-0.23943
N-acetylglutamate	0.234305	0.045105	0.073372	0.319671	0.067275	0.098576	0.138061	0.230552	0.206588
N-acetylglutamine	0.417994	0.05001	0.009107	0.493738	0.072742	0.020823	0.094258	0.225645	0.29729
2-hydroxybutyrate/2-hydroxyisobutyrat	0.231709	0.012126	0.011939	0.3186	0.02907	0.025315	0.138822	0.286431	0.287032
glycine	0.370873	0.008706	0.007557	0.450163	0.022532	0.019277	-0.10409	-0.29896	-0.30416
N-acetylserine	0.483024	0.038892	0.065287	0.549395	0.060388	0.090476	0.081681	0.237444	0.21254
N-acetylthreonine	0.152862	0.001757	0.005674	0.258689	0.007587	0.016108	0.165584	0.353086	0.314407
sarcosine	0.038679	0.007617	0.029745	0.151278	0.020624	0.049859	-0.2377	-0.30387	-0.24949
4-guanidinobutanoate	0.01348	0.000188	0.000449	0.105949	0.002407	0.003307	0.282311	0.4157	0.39276
1-methyl-5-imidazoleacetate	0.159687	0.014347	0.015564	0.264185	0.032372	0.031127	0.162914	0.279859	0.276624
1-methylhistidine	0.00242	1.06E-05	6.31E-06	0.052205	0.000467	0.000278	0.342997	0.481579	0.492184
3-methylhistidine	0.109993	0.005884	0.008309	0.238135	0.017551	0.020344	0.184809	0.31313	0.300687
carnosine	0.110949	0.012553	0.010546	0.238135	0.02907	0.023796	0.184322	0.285091	0.291776
formiminoglutamate	0.303264	0.034035	0.037864	0.389594	0.056511	0.061138	0.119645	0.243504	0.238672
imidazole lactate	0.387221	0.015425	0.012933	0.466787	0.032709	0.026468	0.1006	0.27698	0.283929
N-acetyl-1-methylhistidine*	0.013803	4.97E-05	4.57E-05	0.105949	0.001248	0.001006	0.281381	0.447917	0.449811
N-acetyl-3-methylhistidine*	0.225051	0.00364	0.003809	0.316871	0.013135	0.012036	0.140803	0.32963	0.32811
2-hydroxy-3-methylvalerate	0.754811	0.572708	0.253197	0.772364	0.59834	0.291937	-0.03642	0.065722	0.132686
3-hydroxy-2-ethylpropionate	0.148748	0.015266	0.043699	0.254224	0.032709	0.068063	0.167237	0.277395	0.232039
3-hydroxyisobutyrate	0.558203	0.277571	0.622313	0.602723	0.311162	0.651947	0.068215	0.126141	0.057407
3-methyl-2-oxobutyrate	0.360137	0.164301	0.064631	0.443245	0.196714	0.090279	0.106435	0.161156	0.213048
3-methylglutaconate	0.46797	0.030896	0.021788	0.539661	0.052285	0.03913	0.084505	0.247818	0.262855
ethylmalonate	0.129447	0.000517	0.000696	0.25033	0.003793	0.003952	0.175486	0.388879	0.380546

isobutyrylcarnitine (C4)	0.03057	0.001443	0.012872	0.141586	0.006513	0.026468	0.248287	0.359122	0.284114
isovalerylcarnitine (C5)	0.05525	0.004643	0.007555	0.170596	0.016023	0.019277	0.220821	0.321381	0.304169
N-acetylisoleucine	0.261995	0.061462	0.090872	0.349326	0.08451	0.11674	0.130276	0.215565	0.195314
N-acetylleucine	0.510527	0.450697	0.438147	0.565112	0.480743	0.476011	0.076639	0.087807	0.09025
N-acetylvaline	0.131139	0.019495	0.025161	0.25033	0.038796	0.043845	0.174727	0.26748	0.256755
tiglyl carnitine (C5)	0.116455	0.003402	0.024717	0.244	0.01274	0.043502	0.181581	0.331884	0.257517
2-aminoadipate	0.205785	0.051292	0.40253	0.306933	0.073086	0.440033	0.146778	0.224427	0.097409
5-(galactosylhydroxy)-L-lysine	0.042624	0.000568	0.001268	0.15337	0.003947	0.005441	0.233204	0.386296	0.363046
6-oxopiperidine-2-carboxylate	0.12485	0.036109	0.316814	0.246895	0.057254	0.355154	0.177586	0.240834	0.116364
N,N,N-trimethyl-5-aminovalerate	0.004438	0.001044	0.00714	0.060081	0.005104	0.018757	0.32293	0.368818	0.306215
N2-acetyl,N6-methyllysine	0.087614	0.048259	0.050258	0.213507	0.071374	0.075602	0.197274	0.227349	0.225407
N6,N6,N6-trimethyllysine	0.663378	0.086233	0.250221	0.699129	0.111595	0.291937	0.050736	0.198122	0.133514
N6,N6-dimethyllysine	0.119815	0.081195	0.258388	0.246895	0.105854	0.295301	0.179956	0.20131	0.131257
N6-acetyllysine	0.30603	0.262403	0.45607	0.390299	0.297955	0.492444	0.118968	0.130166	0.086772
N6-carboxyethyllysine	0.021475	0.004927	0.003298	0.118896	0.016676	0.010952	0.263461	0.319333	0.332915
pipecolate	0.657513	0.574542	0.927073	0.697122	0.59834	0.937729	0.051678	0.065409	0.010676
2,3-dihydroxy-5-methylthio-4-pentenoa	0.139257	0.000747	0.000747	0.253017	0.004405	0.004092	0.171185	0.378544	0.37854
alpha-ketobutyrate	0.231212	0.092058	0.082853	0.3186	0.11573	0.10964	0.138969	0.194615	0.200244
methionine	0.064928	0.010215	0.017519	0.181388	0.025323	0.033883	-0.21282	-0.29298	-0.27186
S-carboxyethylcysteine	0.195963	0.02367	0.075103	0.302539	0.042948	0.100138	0.149978	0.25936	0.205382
S-methylmethionine	0.148779	0.005544	0.011932	0.254224	0.017118	0.025315	-0.16722	-0.31522	-0.28705
N-acetylphenylalanine	0.14219	0.034994	0.045225	0.253017	0.056548	0.069821	0.169944	0.242253	0.230427
5-methylthioadenosine (MTA)	0.2619	0.118116	0.067662	0.349326	0.144364	0.092314	0.130302	0.180773	0.210732
N-acetyl-isoputreanine	0.316991	0.006507	0.00383	0.398503	0.018775	0.012036	0.116321	0.309551	0.32793
N-acetyltryptophan	0.316533	0.111978	0.085372	0.398503	0.138789	0.112131	0.116431	0.183802	0.198656
2-oxoarginine*	0.016254	0.000298	0.000483	0.105949	0.00308	0.003307	0.274885	0.403739	0.390768
argininate*	0.056854	0.089002	0.206999	0.172522	0.113509	0.246162	0.21942	0.196432	0.14639
dimethylarginine (ADMA + SDMA)	0.429621	0.183738	0.059445	0.501839	0.2185	0.085059	0.091932	0.154126	0.217222
homocitrulline	0.035141	0.023034	0.061361	0.143833	0.042228	0.087093	0.242064	0.260515	0.215647
N,N,N-trimethyl-alanylproline betaine (T	0.469137	0.056075	0.040928	0.539661	0.07771	0.064895	0.084284	0.220096	0.235091
N2,N5-diacetylornithine	0.011237	0.002851	0.008323	0.102971	0.011406	0.020344	0.289359	0.337694	0.300625
N-acetylcitrulline	0.494273	0.702994	0.87052	0.55409	0.723549	0.890764	-0.0796	0.044451	0.019011
N-acetylhomocitrulline	0.132277	0.067916	0.063017	0.25033	0.090554	0.088728	0.17422	0.210542	0.214317
N-acetylproline	0.270269	0.076652	0.018252	0.35721	0.100677	0.034542	-0.12806	-0.20432	-0.27018

N-delta-acetylornithine	0.000865	0.016012	0.069114	0.030444	0.033549	0.093569	0.374319	0.275487	0.209653
N-methylproline	0.018976	0.069644	0.231979	0.115165	0.092161	0.274016	0.268591	0.209263	0.138743
proline	0.159648	0.001767	0.006469	0.264185	0.007587	0.017515	-0.16293	-0.3529	-0.30976
urea	0.01721	0.000515	0.011056	0.108176	0.003793	0.024323	0.272578	0.389002	0.289978
erythronate*	0.142322	0.002841	0.000894	0.253017	0.011406	0.004573	0.169889	0.337816	0.373374
N-acetylglucosaminylasparagine	0.392651	0.066052	0.05117	0.470113	0.089425	0.075833	0.099459	0.211951	0.224543
N-acetylneuraminate	0.039767	0.051907	0.041768	0.152151	0.073086	0.065635	0.236421	0.223852	0.234149
arabonate/xylonate	0.07999	0.011383	0.012376	0.207004	0.027826	0.025931	0.202096	0.288862	0.28564
ribonate	0.020687	0.001351	0.001197	0.118896	0.006259	0.005441	0.265022	0.361115	0.364748
ribulonate/xylulonate/lyxonate*	0.11089	0.029892	0.119663	0.238135	0.051078	0.145246	0.184352	0.249275	0.180029
2-O-methylascorbic acid	0.208607	0.029606	0.002941	0.308528	0.051078	0.010562	0.145879	0.249698	0.336688
ascorbic acid 3-sulfate*	0.100891	0.001101	0.000267	0.232394	0.005239	0.00298	0.189615	0.36724	0.406692
gulonate*	0.001996	1.01E-05	2.98E-06	0.050192	0.000467	0.000175	0.349098	0.482706	0.506847
N1-Methyl-2-pyridone-5-carboxamide	0.006218	0.000997	0.000767	0.072953	0.005104	0.004092	0.311174	0.370164	0.377773
nicotinamide	0.886829	0.211328	0.114435	0.891897	0.248032	0.140843	-0.0166	-0.14502	-0.18257
nicotinamide N-oxide	0.4916	0.863709	0.470743	0.55409	0.878687	0.502126	0.080093	-0.02002	-0.08398
quinolinate	0.015848	0.002254	0.000613	0.105949	0.009447	0.003718	0.275899	0.345254	0.384155
pterin	0.172486	0.211391	0.021045	0.275977	0.248032	0.038185	0.158125	0.145	0.264306
alpha-CEHC sulfate	0.680714	0.246267	0.48461	0.713129	0.283288	0.513803	-0.04797	-0.13462	-0.08139
carotene diol (1)	0.088557	0.09094	0.179138	0.213507	0.115146	0.214478	-0.1967	-0.19527	-0.15574
pyridoxal	0.558014	0.395883	0.733553	0.602723	0.427456	0.759444	-0.06825	-0.09879	0.039689
phosphate	0.010061	0.007183	0.053608	0.102971	0.020391	0.077975	0.293555	0.305999	0.222291
aconitate [cis or trans]	0.123472	0.000468	0.000348	0.246895	0.003746	0.003221	0.178228	0.391615	0.399681
citrate	0.556566	0.018899	0.006629	0.602723	0.038233	0.017678	0.068498	0.268757	0.308887
carnitine	0.033626	0.000583	0.003127	0.143833	0.003947	0.01079	0.244047	0.38554	0.334677
adipoylcarnitine (C6-DC)	0.104313	0.001009	0.00029	0.232394	0.005104	0.002999	0.18777	0.369811	0.404524
(R)-3-hydroxybutyrylcarnitine	0.104066	0.00774	0.010933	0.232394	0.02064	0.024323	0.187902	0.303285	0.290407
(S)-3-hydroxybutyrylcarnitine	0.029768	0.000326	0.000539	0.141586	0.00308	0.003389	0.249458	0.401369	0.387727
3-hydroxyhexanoylcarnitine (1)	0.344853	0.02888	0.004498	0.427423	0.050325	0.013649	0.109848	0.250787	0.322469
3-hydroxypalmitoylcarnitine	0.146751	0.051866	0.019992	0.254224	0.073086	0.036652	0.168052	0.223891	0.266439
arachidoylcarnitine (C20)*	0.000775	0.00037	3.2E-05	0.030444	0.003258	0.000806	0.377467	0.397994	0.457846
lignoceroylcarnitine (C24)*	0.023899	0.015375	0.004666	0.118896	0.032709	0.01392	0.258951	0.277111	0.321209
margaroylcarnitine (C17)*	0.082331	0.088182	0.103552	0.207004	0.113285	0.128346	0.200578	0.196928	0.188176
palmitoylcarnitine (C16)	0.048993	0.020082	0.005353	0.165262	0.038796	0.015445	0.226629	0.266254	0.31645

stearoylcarnitine (C18)	0.036854	0.021519	0.001982	0.147418	0.040291	0.007753	0.239905	0.263376	0.34932
eicosenoylcarnitine (C20:1)*	0.014802	0.008219	0.002346	0.105949	0.02159	0.008975	0.278623	0.301086	0.343988
oleoylcarnitine (C18:1)	0.005659	0.000223	3.21E-05	0.071137	0.002458	0.000806	0.314505	0.411289	0.45782
arachidonoylcarnitine (C20:4)	0.048226	0.000813	0.000271	0.165262	0.004519	0.00298	0.227381	0.376104	0.406287
dihomo-linolenoylcarnitine (C20:3n3 or	0.130694	0.001015	0.000909	0.25033	0.005104	0.004573	0.174926	0.36965	0.372861
dihomo-linoleoylcarnitine (C20:2)*	0.042178	0.034675	0.018129	0.15337	0.056548	0.034542	0.233694	0.242666	0.270461
linolenoylcarnitine (C18:3)*	0.16089	0.044012	0.053482	0.264185	0.067275	0.077975	0.162452	0.231705	0.222405
acetylcarnitine (C2)	0.003327	4.02E-05	9.75E-05	0.052205	0.001179	0.001906	0.33263	0.452743	0.432004
butyrylcarnitine (C4)	0.050651	0.000638	0.001054	0.165262	0.004162	0.005015	0.225033	0.382993	0.368531
methylmalonate (MMA)	0.0427	5.83E-05	0.000507	0.15337	0.001283	0.003307	0.233121	0.444197	0.389413
propionylcarnitine (C3)	0.00152	0.0002	0.005143	0.044585	0.002407	0.015086	0.357543	0.414163	0.317844
malonate	0.732932	0.020137	0.006371	0.754363	0.038796	0.017515	0.039785	0.266141	0.310307
2-aminoheptanoate	0.227598	0.016842	0.09201	0.317915	0.034873	0.117346	-0.14004	-0.27345	-0.19464
azelate (C9-DC)	0.113773	0.000751	0.000461	0.241254	0.004405	0.003307	-0.1829	-0.37839	-0.39207
maleate	0.219343	0.00334	0.000245	0.316871	0.01274	0.00298	0.142535	0.332499	0.408893
2R,3R-dihydroxybutyrate	0.223609	0.000205	0.001261	0.316871	0.002407	0.005441	0.141238	0.41349	0.363205
2S,3R-dihydroxybutyrate	0.239932	0.006075	0.00911	0.324831	0.01782	0.020823	0.13643	0.311998	0.297278
3,4-dihydroxybutyrate	0.501082	0.039115	0.100338	0.558167	0.060388	0.125244	0.078354	0.237183	0.189918
2-hydroxynervonate*	0.136674	0.049048	0.087348	0.253017	0.071937	0.113039	0.172295	0.226575	0.197436
3-hydroxystearate	0.184561	0.044751	0.051274	0.287458	0.067275	0.075833	0.153841	0.230922	0.224445
chiro-inositol	0.010586	0.003339	0.000695	0.102971	0.01274	0.003952	0.291631	0.332509	0.380603
3-hydroxybutyrate (BHBA)	0.103815	0.012483	0.03874	0.232394	0.02907	0.061983	0.188036	0.285309	0.237625
acetoacetate	0.031798	0.050527	0.375131	0.1435	0.072892	0.417025	0.246542	0.22515	0.103173
docosatrienoate (22:3n3)	0.064455	0.02028	0.018504	0.181388	0.038796	0.034645	0.213185	0.265847	0.269625
hexadecatrienoate (16:3n3)	0.053443	0.004574	0.001239	0.167964	0.016023	0.005441	-0.22244	-0.3219	-0.36373
1-palmitoyl-2-arachidonoyl-GPC (16:0/2	0.045181	0.052382	0.004392	0.159039	0.073168	0.01356	0.230472	0.223413	0.323287
1-stearoyl-2-arachidonoyl-GPC (18:0/20	0.176202	0.231356	0.016597	0.279383	0.267886	0.032821	0.156784	0.138926	0.274043
1-palmitoyl-2-oleoyl-GPI (16:0/18:1)*	0.003559	0.003657	0.00037	0.052205	0.013135	0.003252	0.330381	0.329477	0.398049
1-stearoyl-2-arachidonoyl-GPI (18:0/20:	0.102385	0.031504	0.003501	0.232394	0.052807	0.011412	0.188804	0.246954	0.330928
1-stearoyl-2-oleoyl-GPI (18:0/18:1)*	0.023565	0.015328	0.002923	0.118896	0.032709	0.010562	0.25955	0.277233	0.336884
trimethylamine N-oxide	0.483842	0.035342	0.048675	0.549395	0.056548	0.074494	0.081529	0.241806	0.226939
1-(1-enyl-palmitoyl)-2-arachidonoyl-GPI	0.163975	0.249085	0.03352	0.264767	0.284668	0.055313	0.161279	0.133832	0.244188
1-(1-enyl-palmitoyl)-2-linoleoyl-GPC (P-	0.430555	0.306304	0.60755	0.501839	0.336935	0.640292	-0.09175	-0.1189	-0.05985
1-(1-enyl-palmitoyl)-2-palmitoyl-GPC (P	0.162113	0.014394	0.025891	0.264185	0.032372	0.044675	-0.16198	-0.27973	-0.25553

1-(1-enyl-stearoyl)-2-arachidonoyl-GPE	0.058957	0.035165	0.000409	0.175332	0.056548	0.003307	0.21763	0.242034	0.395323
1-(1-enyl-stearoyl)-2-oleoyl-GPE (P-18:0	0.009167	0.00733	0.001378	0.100839	0.020477	0.005706	0.297044	0.305266	0.360527
sphingomyelin (d18:1/18:1, d18:2/18:0)	0.655909	0.978139	0.967637	0.697122	0.983728	0.967637	-0.05194	0.003196	0.004732
sphingomyelin (d18:1/20:1, d18:2/20:0)	0.079406	0.009681	0.001	0.207004	0.02434	0.004887	-0.20248	-0.29501	-0.3701
sphingomyelin (d18:1/20:2, d18:2/20:1,	0.821416	0.949901	0.886364	0.83566	0.960819	0.901735	-0.02632	0.007329	-0.01667
sphingomyelin (d18:1/22:2, d18:2/22:1,	0.08524	0.027312	0.00848	0.211299	0.048555	0.020445	-0.19874	-0.25322	-0.29993
sphingomyelin (d18:2/24:2)*	0.134687	0.063757	0.017343	0.252181	0.086986	0.033883	-0.17316	-0.21373	-0.27227
stearoyl sphingomyelin (d18:1/18:0)	0.522859	0.690564	0.643704	0.575145	0.714937	0.670367	-0.07442	-0.04641	-0.05391
1-methylhypoxanthine	0.33906	0.022577	0.011645	0.423223	0.041827	0.025303	0.111166	0.26136	0.287989
allantoin	0.050705	0.000822	0.003092	0.165262	0.004519	0.01079	0.224981	0.3758	0.335043
inosine	0.411173	0.838581	0.277651	0.488962	0.858083	0.315269	0.095639	0.023757	0.12612
N1-methylinosine	0.297596	0.028681	0.006194	0.385124	0.050325	0.017305	0.121046	0.251089	0.311307
urate	0.880864	0.304036	0.050219	0.890989	0.336543	0.075602	-0.01748	0.119456	0.225444
7-methylguanine	0.073657	0.044392	0.055887	0.202557	0.067275	0.080624	0.206388	0.231301	0.220261
N2,N2-dimethylguanosine	0.059772	0.000693	0.000162	0.175332	0.004358	0.002375	0.21695	0.380664	0.419498
5-hydroxymethylcytidine	0.096946	0.113368	0.029516	0.230573	0.13953	0.049859	0.191804	0.183105	0.249832
5-methyl-2'-deoxycytidine	0.022595	0.018407	0.002405	0.118896	0.03767	0.009005	-0.26133	-0.26984	-0.3432
N4-acetylcytidine	0.015579	0.005293	0.001721	0.105949	0.017064	0.006883	0.276585	0.316846	0.353726
3-ureidopropionate	0.140595	0.005512	0.003296	0.253017	0.017118	0.010952	0.170617	0.315424	0.332936
5,6-dihydrouridine	0.06458	0.000112	0.000477	0.181388	0.001973	0.003307	0.213087	0.428613	0.391131
pseudouridine	0.034663	9.23E-05	0.000325	0.143833	0.001804	0.003179	0.242681	0.433332	0.401467
bilirubin degradation product, C17H18N	0.219978	0.224553	0.087322	0.316871	0.261731	0.113039	-0.14234	-0.14095	-0.19745
gamma-glutamyl-alpha-lysine	0.954182	0.328206	0.092838	0.954182	0.358784	0.11755	0.006702	0.113674	0.194158
gamma-glutamylglutamate	0.014769	0.007547	0.028637	0.105949	0.020624	0.048933	0.278711	0.304206	0.251156
gamma-glutamylisoleucine*	0.724806	0.486805	0.397606	0.750388	0.516131	0.437366	0.041045	0.080979	0.098427
gamma-glutamylphenylalanine	0.630797	0.268101	0.130104	0.676953	0.302472	0.156837	0.056014	0.128636	0.17519
gamma-glutamyltyrosine	0.180871	0.428901	0.818124	0.284226	0.460284	0.842046	-0.15513	-0.09208	0.026818
N,N-dimethyl-pro-pro	0.201517	0.012447	0.019395	0.30575	0.02907	0.035932	0.148155	0.285418	0.267691
2-methoxyhydroquinone sulfate (1)	0.12251	0.14205	0.376744	0.246895	0.17242	0.417025	-0.17868	-0.17	-0.10283
4-vinylcatechol sulfate	0.143927	0.066763	0.033628	0.253312	0.089697	0.055313	-0.16922	-0.21141	-0.24404
4-vinylphenol sulfate	0.079482	0.01976	0.009057	0.207004	0.038796	0.020823	-0.20243	-0.26692	-0.29749
hippurate	0.023544	0.005828	0.024017	0.118896	0.017551	0.042697	0.259587	0.313463	0.258742
S-(3-hydroxypropyl)mercapturic acid (H	0.011701	0.000126	0.000186	0.102971	0.002015	0.002523	0.287805	0.425756	0.415941
sulfate*	0.002729	1.94E-05	1.3E-05	0.052205	0.000682	0.000456	0.339116	0.468871	0.47741

triethanolamine	0.12108	0.548029	0.250928	0.246895	0.577563	0.291937	0.179354	0.069982	0.133317
2-aminophenol sulfate	0.224079	0.29955	0.296367	0.316871	0.333676	0.334363	-0.1411	-0.12056	-0.12135
ferulic acid 4-sulfate	0.081476	0.021157	0.008866	0.207004	0.040038	0.020823	-0.20113	-0.26409	-0.29829
gluconate	0.711676	0.094655	0.094266	0.741154	0.118151	0.118506	0.043091	0.193107	0.193331
homostachydrine*	0.081726	0.339542	0.470584	0.207004	0.368885	0.502126	0.200967	0.111055	0.084011
mannonate*	0.02432	0.000452	0.000131	0.118896	0.003746	0.002098	0.258209	0.392601	0.424758

Table S4. Pearson's correlation analysis on carnitine, significant acylcarnitines and echo variables

	P values (w/ echo variables)			FDR (w/ echo variables)		
Carnitine & acylcarnitines	nLVIDd	nLAD	LA/Ao	nLVIDd	nLAD	LA/Ao
adipoylcarnitine (C6-DC)	0.1043	0.001	0.0003	0.2324	0.0049	0.0028
carnitine	0.0336	0.0006	0.0031	0.1437	0.0039	0.0107
acetylcarnitine (C2)	0.0033	0	0.0001	0.0528	0	0.0016
butyrylcarnitine (C4)	0.0507	0.0006	0.0011	0.1652	0.0039	0.0052
tiglyl carnitine (C5)	0.1165	0.0034	0.0247	0.2441	0.0127	0.0435
(S)-3-hydroxybutyrylcarnitine	0.0298	0.0003	0.0005	0.1417	0.0028	0.0031
isovalerylcarnitine (C5)	0.0552	0.0046	0.0076	0.1704	0.0159	0.0194
dihomo-linoleoylcarnitine (C20:2)*	0.0422	0.0347	0.0181	0.1534	0.0565	0.0346
dihomo-linolenoylcarnitine (C20:3n3 or 6)*	0.1307	0.001	0.0009	0.2504	0.0049	0.0045
margaroylcarnitine (C17)*	0.0823	0.0882	0.1036	0.2069	0.1133	0.1284
3-hydroxyhexanoylcarnitine (1)	0.3449	0.0289	0.0045	0.4275	0.0504	0.0137
3-hydroxypalmitoylcarnitine	0.1468	0.0519	0.02	0.2543	0.0731	0.0367
isobutyrylcarnitine (C4)	0.0306	0.0014	0.0129	0.1417	0.0063	0.0264
propionylcarnitine (C3)	0.0015	0.0002	0.0051	0.044	0.0022	0.015
palmitoylcarnitine (C16)	0.049	0.0201	0.0054	0.1652	0.0388	0.0156
(R)-3-hydroxybutyrylcarnitine	0.1041	0.0077	0.0109	0.2324	0.0205	0.0243
eicosenoylcarnitine (C20:1)*	0.0148	0.0082	0.0023	0.1063	0.0215	0.0088
arachidonoylcarnitine (C20:4)	0.0482	0.0008	0.0003	0.1652	0.0044	0.0028
stearoylcarnitine (C18)	0.0369	0.0215	0.002	0.1476	0.0403	0.0078
linolenoylcarnitine (C18:3)*	0.1609	0.044	0.0535	0.2642	0.0673	0.078
arachidoylcarnitine (C20)*	0.0008	0.0004	0	0.0317	0.0035	0
lignoceroylcarnitine (C24)*	0.0239	0.0154	0.0047	0.1188	0.0327	0.014
oleoylcarnitine (C18:1)	0.0057	0.0002	0	0.0717	0.0022	0

	r (with echo variables)		
Carnitine & acylcarnitines	nLVIDd	nLAD	LA/Ao
adipoylcarnitine (C6-DC)	0.19	0.37	0.4
carnitine	0.24	0.39	0.33
acetylcarnitine (C2)	0.33	0.45	0.43
butyrylcarnitine (C4)	0.23	0.38	0.37

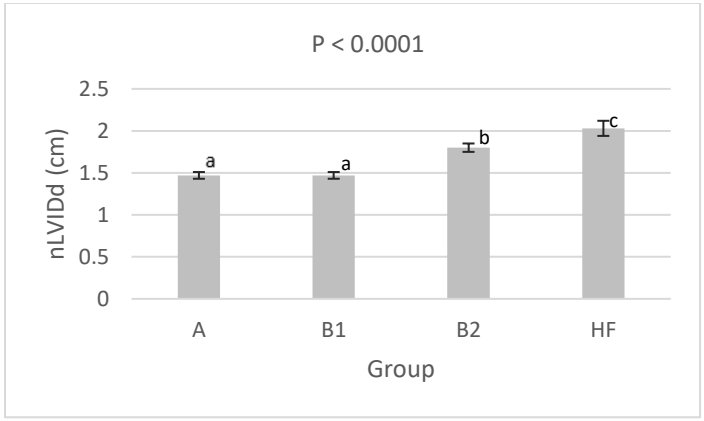
tiglyl carnitine (C5)	0.18	0.33	0.26
(S)-3-hydroxybutyrylcarnitine	0.25	0.4	0.39
isovalerylcarnitine (C5)	0.22	0.32	0.3
dihomo-linoleoylcarnitine (C20:2)*	0.23	0.24	0.27
dihomo-linolenoylcarnitine (C20:3n3 or 6)*	0.17	0.37	0.37
margaroylcarnitine (C17)*	0.2	0.2	0.19
3-hydroxyhexanoylcarnitine (1)	0.11	0.25	0.32
3-hydroxypalmitoylcarnitine	0.17	0.22	0.27
isobutyrylcarnitine (C4)	0.25	0.36	0.28
propionylcarnitine (C3)	0.36	0.41	0.32
palmitoylcarnitine (C16)	0.23	0.27	0.32
(R)-3-hydroxybutyrylcarnitine	0.19	0.3	0.29
eicosenoylcarnitine (C20:1)*	0.28	0.3	0.34
arachidonoylcarnitine (C20:4)	0.23	0.38	0.41
stearoylcarnitine (C18)	0.24	0.26	0.35
linolenoylcarnitine (C18:3)*	0.16	0.23	0.22
arachidoylcarnitine (C20)*	0.38	0.4	0.46
lignoceroylcarnitine (C24)*	0.26	0.28	0.32
oleoylcarnitine (C18:1)	0.31	0.41	0.46

Table S5. Significant KEGG Pathways

Pathways	Total	Hits	P val	FDR	Impact
Arginine Biosynthesis	14	4	0.0024	0.20	0
Synthesis and Degradation of Ketone Bodies	5	2	0.0174	0.63	0.6
Nicotinate and Nicotinamide Metabolism	15	3	0.0252	0.63	0.19
Histidine Metabolism	16	3	0.0300	0.63	0.14
Valine, Leucine and Isoleucine (BCAA) Biosynthesis	8	2	0.0448	0.74	0

Table S6. Quantitative metabolite set enrichment analysis (qMSEA)

Metabolite Sets	Total	Hits	P val	FDR
Methionine Metabolism	43	15	0.000	0.000
Pyrimidine Metabolism	59	8	0.000	0.000
Nicotinate and Nicotinamide Metabolism	37	6	0.000	0.000
Methylhistidine Metabolism	4	2	0.000	0.001
Transfer of Acetyl Groups into Mitochondria	22	3	0.000	0.001
Spermidine and Spermine Biosynthesis	18	5	0.000	0.001
Histidine Metabolism	43	12	0.000	0.003
Homocysteine Degradation	9	4	0.000	0.004
Glycine and Serine Metabolism	59	16	0.001	0.006
Arginine and Proline Metabolism	53	10	0.001	0.010
D-Arginine and D-Ornithine Metabolism	11	1	0.002	0.013
Beta-Alanine Metabolism	34	10	0.002	0.014
Aspartate Metabolism	35	10	0.003	0.016
Purine Metabolism	74	14	0.004	0.023
Ammonia Recycling	32	10	0.004	0.023
Porphyrin Metabolism	40	1	0.005	0.025
Threonine and 2-Oxobutanoate Degradation	20	2	0.006	0.025
Amino Sugar Metabolism	33	2	0.006	0.025
Warburg Effect	58	7	0.006	0.026
Betaine Metabolism	21	5	0.007	0.028
Lysine Degradation	30	4	0.012	0.045
Lactose Synthesis	20	1	0.014	0.047
Lactose Degradation	9	1	0.014	0.047
Tryptophan Metabolism	60	10	0.014	0.048
Citric Acid Cycle	32	5	0.016	0.050
Oxidation of Branched Chain Fatty Acids	26	3	0.020	0.061
Ketone Body Metabolism	13	2	0.025	0.075
Pantothenate and CoA Biosynthesis	21	4	0.028	0.079
Phenylacetate Metabolism	9	3	0.029	0.080
Butyrate Metabolism	19	3	0.03	0.08
Phosphatidylethanolamine Biosynthesis	12	3	0.038	0.098
Phenylalanine and Tyrosine Metabolism	28	6	0.042	0.106
Bile Acid Biosynthesis	65	10	0.050	0.123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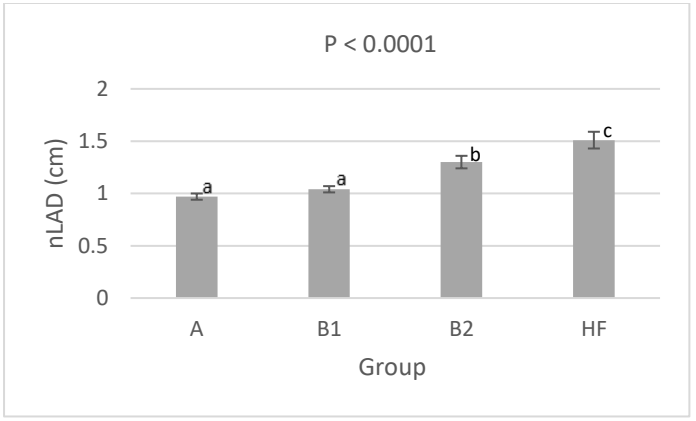
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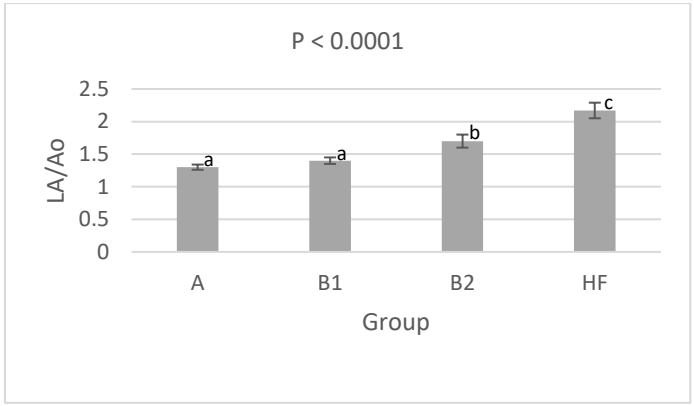
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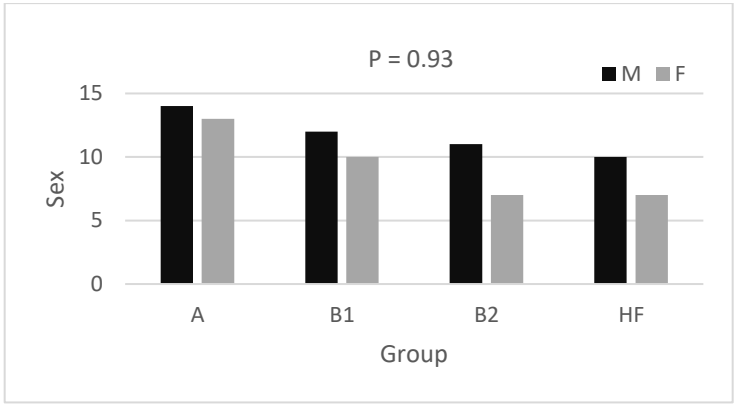
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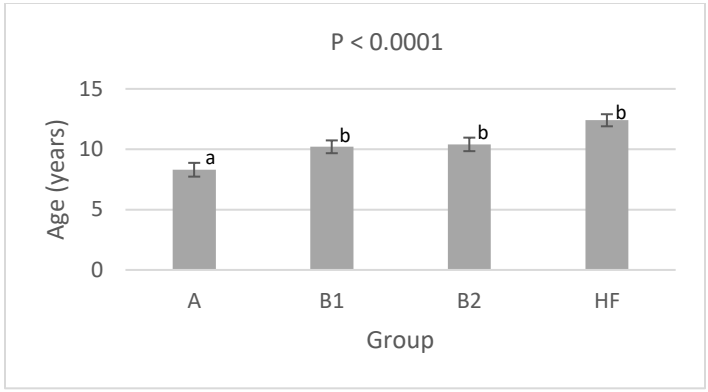
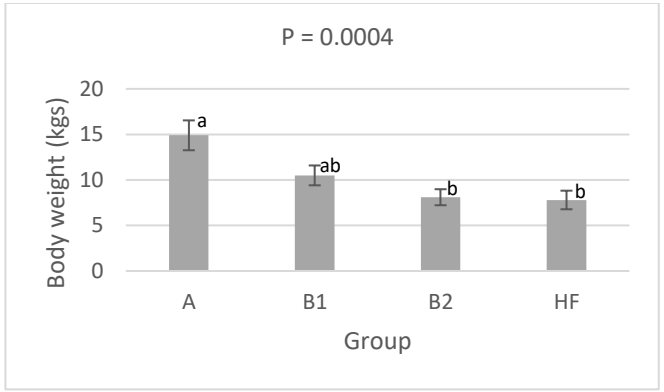
HF
Group

Figure S1. Barplots of sex, age, body weights, BCS, and key echo variables. P value from ANOVA are displayed on the top of each barplot. Different letters indicate statistical difference.





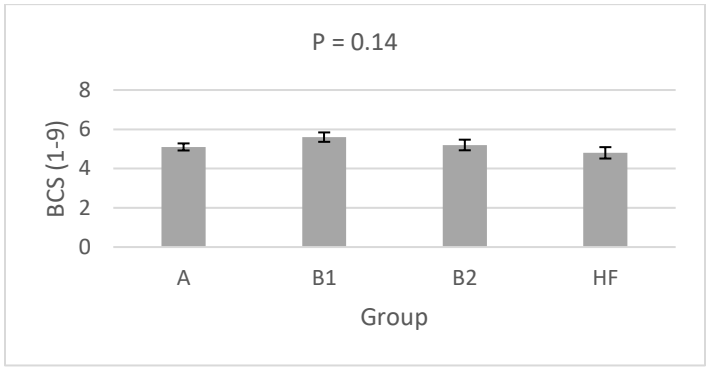


Figure S2. PLS-DA (top panel). The percentages of data variation explained by the first two components, are indicated on the x and y axes. Boxplots along component 1 (bottom panel). Tukey's test was performed to compare groups. *** P < 0.001; **** P < 0.0001.

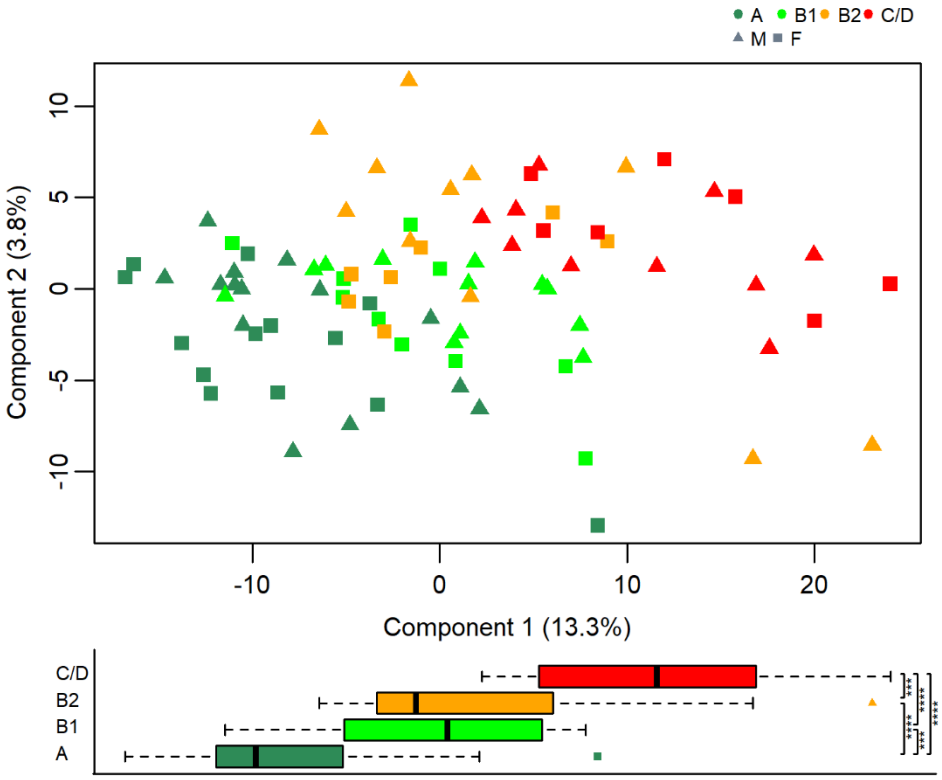


Figure S3. (A) Distribution of P values from bootstrap experiments. Only bootstrapped subsamples that showed no difference in age or body weight were analyzed. (Left) was plotted against each sample on PC1, PC1, age, body weight (BW), sex and BCS. (Right) The histogram of . The greyish dashed line denotes P = 0.05. (B) PCA analysis on cardiac medications. Only preclinical dogs in the B1 and B2 groups were included. Dogs were considered for two groups: those that were on stable cardiac medications for 2 weeks or longer (Y) and those that were not (N). Student's t-test was performed to compare the difference on PC1 or PC2 between groups.

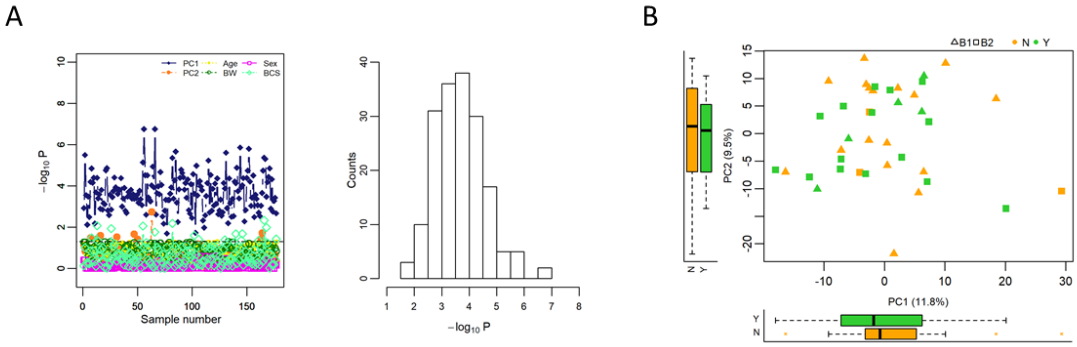


Figure S4. Heat map of 22 acylcarnitine concentrations from all samples. Hierarchical clustering was performed on the Euclidean distances between samples. The color scale corresponds to concentrations from low (deep blue) to high (maroon).

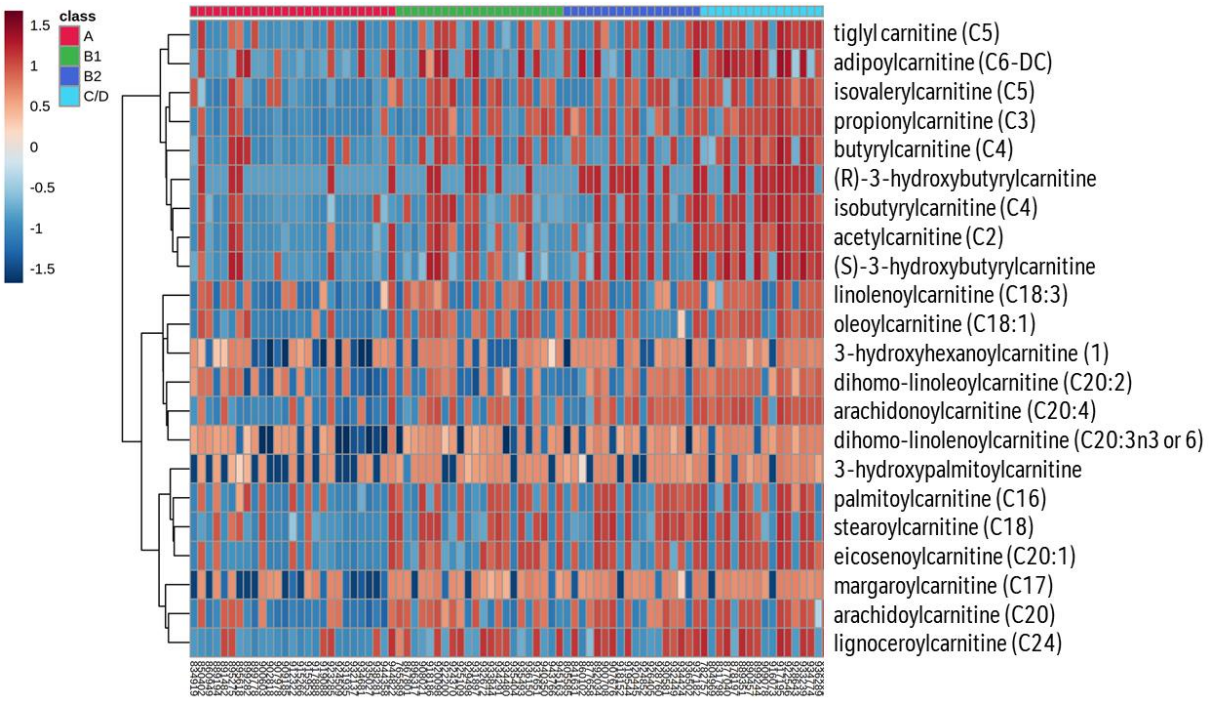


Figure S5. Pearson's correlations between aconitate and (A-G) citrate, quinolinate, urea, BHBA, TMAO, 3-MH, and carnosine, and between (H) 3-MH and urea, and (I) 4-guanidinobutanoate and 2-oxoarginine. FDR < 0.0001 in all cases.