

Supplemental Table 1. List of unlabeled and labelled standards used in targeted metabolomic analysis

Analyte	Source	Catalog number	Corresponding Internal Standard	Source	Catalog number
L-Tryptophan	Sigma	93659	L-Tryptophan (13C11)	Cambridge Isotopes Laboratory	CLM-4290
Kynurenine	Sigma	K8625	L-Kynurenine Sulfate (Ring-d4, 3,3-D2)	Cambridge Isotopes Laboratory	DLM-7842
Serotonin	Sigma	14927	Serotonin-d4	Chem Cruz	Sc-473411
Kynurenic Acid	MP Bio.	102124	Kynurenic Acid-d5	Chem Cruz	Sc-470916
Anthranilic Acid	Fluka	10680	Anthranilic Acid 13C6	Isotec	709530
Xanthurenic Acid	MP Bio.	103297	Xanthurenic Acid-d4	Chem Cruz	Sc-474023
5-hydroxymethyl-2-furaldehyde	Sigma	H40807	D-Leucine-d10	CDN Isotopes	D-5607
N-acetyl-L-aspartic acid	Sigma	920	D-Leucine-d10	CDN Isotopes	D-5607
DL-Histidine	Sigma	H-7875	D-Leucine-d10	CDN Isotopes	D-5607
DL-Proline	Sigma	P-0255	D-Leucine-d10	CDN Isotopes	D-5607
Glycine	Sigma	G-8898	D-Leucine-d10	CDN Isotopes	D-5607
Pyridoxal	Acros Organics	102710010	D-Leucine-d10	CDN Isotopes	D-5607
2,6-diaminopimelic Acid	Sigma	D1377	D-Leucine-d10	CDN Isotopes	D-5607
DL-Isoleucine	Sigma	I-2627	D-Leucine-d10	CDN Isotopes	D-5607
DL-Leucine	Sigma	L-7875	D-Leucine-d10	CDN Isotopes	D-5607
D-(-)-Citramalic Acid	Sigma	6711	D-Leucine-d10	CDN Isotopes	D-5607
4-Aminobutyric Acid (GABA)	Acros Organics	103280250	D-Leucine-d10	CDN Isotopes	D-5607
Tauroursodeoxycholate (TUDCA)	Sigma	T0266	D-Leucine-d10	CDN Isotopes	D-5607
D-(+)-Glucosamine	Sigma	G4875	D-Glucosamine (¹³ C ₆)	Cambridge Isotopes Laboratory	CLM-9883
D-Mannosamine	Sigma	M4670	D-Glucosamine (¹³ C ₆)	Cambridge Isotopes Laboratory	CLM-9883
Erythritol	Sigma	E7500	D-Glucosamine (¹³ C ₆)	Cambridge Isotopes Laboratory	CLM-9883
6-deoxy-D-glucose	Sigma	D9761	D-Glucose (¹³ C ₆)	Cambridge Isotopes Laboratory	CLM-1396
DL-Fucose	Sigma	F2252	D-Glucose (¹³ C ₆)	Cambridge Isotopes Laboratory	CLM-1396
L-Glutamine	Sigma	56-85-9	Glutamine-d5	CDN Isotopes	D-2532
Valine	Sigma	516-06-3	Valine 18O	In house	NA
Methyl Beta-D-Galactoside or (2-methyl-B-D-Galactopyranoside)	Sigma-Aldrich	M0285	D-Leucine-d10	CDN Isotopes	D-5607
L-Tyrosine	Sigma	T-3379	Tyrosine 13C6	Cambridge Isotopes Laboratory	CLM-1542
Aspartate	Sigma	A-9256	Aspartate-d3	CDN Isotopes	D-1953

2-hydroxyisobutyric acid	Alfa Aesar	A13146	D-Leucine-d10	CDN Isotopes	D-5607
Uridine	Sigma	U3750	D-Leucine-d10	CDN Isotopes	D-5607
D-Glucuronic Acid	Sigma-Aldrich	G5269	D-Leucine-d10	CDN Isotopes	D-5607
D-Glucuronolactone	Sigma-Aldrich	05566	D-Leucine-d11	CDN Isotopes	D-5608
D-Galacturonic Acid	Sigma-Aldrich	48280-5G-F	D-Leucine-d12	CDN Isotopes	D-5609
Indoxyl Sulfate	Aldrich	I3875	Indoxyl Sulfate 13C6	Cambridge Isotopes Laboratory	CLM-9565

Supplemental Table 2. Confirmatory Study - Untargeted Metabolomics - Significantly Different Metabolites between Diabetes and Healthy Control Groups

Metabolite name	p-value
6-DEOXY-HEXOSE	1.13E-13
ALDO/KETO-HEXOSE	6.58E-10
5-Hydroxymethyl-2-furaldehyde	7.95E-10
ERYTHRITOL	8.13E-10
GLUCOSAMINE/MANNOSAMINE	4.61E-08
(neg) DISACCHARIDE 6C/6C/2-alpha-D-glucosyl-D-glucose	4.77E-07
2'-DEOXYURIDINE 5'-MONO-PHOS-PHATE	6.09E-07
(neg) GLUCOSE/FRUCTOSE_215.0327-0.74	8.91E-07
(neg) PHOSPHOCHOLINE	1.42E-06
(neg) HEXANESULFONIC ACID-Sulfate	1.44E-06
(neg) L-GLUTAMINE	3.11E-06
(neg) GLYCOLATE	3.12E-06
(neg) ADENOSINE 5'-MONOPHOSPHATE	3.44E-06
N-ACETYL-L-ASPARTIC ACID	4.48E-06
(neg) THREONINE/HOMOSERINE	4.54E-06
(neg) N-ACETYL-L-ASPARTIC ACID	4.64E-06
(neg) L-HISTIDINE	6.47E-06
(neg) 2-deoxy-D-galactose fructose/glucose	7.17E-06
N-ACETYLPUTRESCINE	1.60E-05
(neg) ERYTHRITOL	1.70E-05
NEPSILON,NEPSILON,NEPSILON-TRIMETHYLLYSINE	2.08E-05
UROCANATE	3.98E-05
5-METHYLCYTOSINE HYDROCHLORIDE	3.99E-05
(neg) ASPARTATE	6.57E-05
(neg) CREATININE	7.38E-05
(neg) DEOXYCYTIDINE	7.76E-05
(neg) INDOXYL SULFATE	7.88E-05
(neg) URATE_167.0210-1.85	9.38E-05
Tauroursodeoxycholic acid T-UDCA	9.85E-05
CREATININE	9.99E-05
(neg) GLUTARATE	0.00010709
ALLANTOIN	0.000115
(neg) ALLANTOIN	0.00017023
L-KYNURENINE	0.00018569
METHYL BETA-D-GALACTOSIDE	0.00019682
GLYCINE	0.00020014
(neg) L-TYROSINE	0.00020806

2-HydroxyphenylalanineL-TYROSINE	0.00022792
4-AMINOBUTANOATE /GABA	0.00024169
PYRIDOXAL	0.00026661
5-OXO-L-PROLINE/Pyroglutamic Acid	0.00027876
(neg) 2-AMINOETHYL DIHYDROGEN PHOSPHATE	0.00031486
(neg) ASPARAGINE	0.00031983
(neg) Tauroursodeoxycholic acid T-UDCA	0.00036907
(neg) URIDINE-5-MONOPHOSPHATE	0.0003707
4-IMIDAZOLEACETIC ACID	0.00039685
URATE	0.00059221
(neg) Taurolithocholic acid T-LCA	0.0006755
(neg) L-VALINE	0.00067635
(neg) Tauroursodeoxycholic acid T-UDCA	0.00092215
(neg) 3,4-Dihydroxybenzenesulfonic Acid	0.00093052
(neg) 4-COUMARATE	0.0010773
(neg) L-SERINE	0.0010816
(neg) CARNOSINE	0.0010885
(neg) 4-ACETAMIDOBUTANOATE	0.0011758
N-METHYL-D-ASPARTIC ACIDO	0.0013826
(neg) L-ARGININE	0.001436
(neg) Pantothenic Acid	0.0015016
(neg) PYRIDOXAL	0.0015261
(neg) Sulfoacetaldehyde	0.001613
METHYL INDOLE-3-ACETATE	0.0016734
Anthranilate	0.0017494
URIDINE-5-MONOPHOSPHATE	0.0019238
Pantothenic Acid	0.0019429
L-PROLINE	0.0021372
Tauroursodeoxycholic acid T-UDCA	0.0022201
CREATINE	0.0026385
(neg) CITRULLINE	0.0029156
(neg) GUANIDINOACETATE	0.0029504
NPAI-METHYL-L-HISTIDINE	0.003062
(neg) CREATINE	0.0030734
6C-SUGAR ALCOHOL	0.0034755
(neg) 4-ACETAMIDOBUTANOATE	0.0038584
Tryptophan	0.0040011
(neg) Fumaric Acid	0.0040507
(neg) SARCOSINE/BETA-ALANINE	0.0041425
(neg) L-ANSERINE	0.0042579

URIDINE	0.0045011
4-HYDROXYBENZOATE	0.0046243
(neg) 4-Hydroxybenzenesulfonic Acid	0.0054808
N-Acetyl-Arginine	0.0055593
(neg) GLYCERIC ACID	0.0056502
(neg) URIDINE	0.0057179
(neg) 3-4-HYDROXYPHENYLACTATE	0.0058334
(neg) GUANOSINE 5'-MONOPHOSPHATE	0.0058858
DEOXYCARNITINEBUTYROBETAINE	0.0059937
5-HYDROXY-L-TRYPTOPHAN	0.0070909
N-Methylnicotinamide	0.0071178
5,6-DIHYDROURACIL	0.0073754
(neg) 5-AMINOLEVULINIC ACID	0.0075105
GUANIDINOACETATE	0.0077348
RIBOFLAVIN	0.0079086
L-Isoleucine	0.0086383
L-CYSTEINE	0.009698
2-hydroxyglutarate	0.010262
(neg) 3,4-DIHYDROXY-L-PHENYLALANINE	0.010799
LL-2,6-DIAMINOHEPTANEDIOATE	0.010994
Tauroursodeoxycholic acid T-UDCA	0.011036
PHOSPHOCHOLINE	0.011265
(neg) 2,4-Dinitrophenol herbicide	0.011598
(neg) ALPHA-HYDROXYISOBUTYRIC ACID	0.012338
6-Quinolincarboxylic Acid	0.012754
(neg) Tryptophan	0.013134
(neg) Tauroursodeoxycholic acid T-UDCA	0.013503
(neg) ADENOSINE	0.013604
CitrateNH3	0.014096
(neg) 3-HYDROXYPHENYLACETATE	0.01509

(neg) = negative ion mode

Supplemental Table 3. AUROC Results

Preliminary Study	Area Under the Curve (AUC)	Confirmatory Study	Area Under the Curve (AUC)
(neg) N-ACETYL-L-ASPARTIC ACID	1	6-DEOXY-HEXOSE	1
6-DEOXY-HEXOSE	0.993055556	ERYTHRITOL	0.995555556
N-ACETYL-L-ASPARTIC ACID	0.979166667	ALDO/KETO-HEXOSE	0.991111111
Anthranilate	0.972222222	5-Hydroxymethyl-2-furaldehyde	0.991111111
(neg) Threonic acid	0.9375	GLUCOSAMINE/MANNOSAMINE	0.973333333
N-ACETYL-HEXOSAMINE	0.930555556	(neg) N-ACETYL-L-ASPARTIC ACID	0.964444444
(neg) L-HISTIDINE	0.930555556	(neg) HEXANESULFONIC ACID-Sulfate	0.964444444
(neg) 5-AMINOLEVULINIC ACID	0.930555556	N-ACETYL-L-ASPARTIC ACID	0.96
ALDO/KETO-HEXOSE	0.923611111	2'-DEOXYURIDINE 5'-MONO-PHOS-PHATE	0.96
(neg) CREATININE	0.923611111	(neg) L-GLUTAMINE	0.946666667
(neg) ALPHA-HYDROXYISOBUTYRIC ACID	0.916666667	(neg) DISACCHARIDE 6C/6C/2-alpha-D-glucosyl-D-glucose_	0.946666667
5-Hydroxymethyl-2-furaldehyde	0.909722222	(neg) GLUCOSE/FRUCTOSE	0.942222222
N-ACETYL-L-ASPARTIC ACID	0.909722222	(neg) L-HISTIDINE	0.928888889
(neg) D-GLUCURONIC ACID	0.909722222	(neg) 2-deoxy-D-galactose fructose/glucose	0.928888889
(neg) 2-deoxy-D-galactose fructose/glucose	0.909722222	(neg) PHOSPHOCHOLINE	0.924444444
GLUCOSAMINE/MANNOSAMINE	0.902777778	(neg) ASPARTATE	0.92
(neg) CITRAMALATE	0.902777778	(neg) GLYCOLATE	0.92
(neg) Monobutyl phthalate	0.902777778	N-ACETYLPUTRESCINE	0.915555556
(neg) LL-2,6-DIAMINOHEPTANEDIOATE	0.902777778	NEPSILON,NEPSILON,NEPSILON-TRIMETHYLLYSINE	0.911111111
CREATININE	0.895833333	(neg) THREONINE/HOMOSERINE	0.911111111
(neg) L-GLUTAMINE	0.895833333	(neg) ERYTHRITOL	0.911111111
(neg)C6H12O6-HEXOSE/KETOSE/INOSITOL	0.895833333	5-METHYLCYTOSINE HYDROCHLORIDE	0.906666667
(neg)Proline	0.895833333	(neg) L-TYROSINE	0.906666667
L-PROLINE	0.888888889	2-HydroxyphenylalanineL-TYROSINE	0.902222222
METHYL BETA-D-GALACTOSIDE	0.888888889	UROCANATE	0.902222222
(neg)3-HYDROXYPHENYLACETATE	0.888888889	(neg) L-SERINE	0.897777778
(neg)GLUCOSE/FRUCTOSE	0.881944444	(neg) DEOXYCYTIDINE	0.897777778
L-TYROSINE	0.875	(neg) URATE	0.893333333
LL-2,6-DIAMINOHEPTANEDIOATE	0.875	(neg) GLUTARATE	0.893333333
2-AMINOPHENOL	0.875	(neg) N-ACETYL-L-ASPARTIC ACID	0.893333333
L-KYNURENINE	0.875	(neg) CREATININE	0.888888889
5-hydroxyindoleacetic acid	0.875	Tauroursodeoxycholic acid T-UDCA	0.884444444
(neg)3-METHYL-2-OXOVALERIC ACID	0.875	(neg) INDOXYL SULFATE	0.884444444
L-HISTIDINE	0.868055556	L-KYNURENINE	0.88
(neg)4-ACETAMIDOBUTANOATE	0.868055556	METHYL BETA-D-GALACTOSIDE	0.88

GLUTARATE	0.861111111	(neg) ALLANTOIN	0.88
Tryptophan	0.854166667	CREATININE	0.875555556
(neg)3-tert-Butyladipic acid	0.854166667	(neg) ADENOSINE 5'-MONOPHOSPHATE	0.875555556
(neg)L-KYNURENINE_207.0774-6.4	0.854166667	(neg) CARNOSINE	0.871111111
L-VALINE	0.847222222	(neg) ASPARAGINE	0.871111111
Tryptophan-NH3	0.847222222	(neg) Tauroursodeoxycholic acid T-UDCA	0.871111111
L-ASPARAGINE	0.847222222	ALDO/KETO-HEXOSE	0.871111111
N-ACETYLGLYCINE	0.847222222	ALLANTOIN	0.866666667
(neg)DISACCHARIDE 6C/6C/2-alpha-D-glucosyl-D-glucose	0.847222222	URATE	0.862222222
(neg)N-FORMYLGLYCINE	0.847222222	PYRIDOXAL	0.862222222
(neg)N-ACETYL-L-LEUCINE	0.847222222	(neg) 2-AMINOETHYL DIHYDROGEN PHOSPHATE	0.862222222
L-LYSINE	0.840277778	4-IMIDAZOLEACETIC ACID	0.857777778
N-ACETYL-L-LEUCINE	0.840277778	GLYCINE	0.857777778
ETHYLMALONIC ACID	0.840277778	6C-SUGAR ALCOHOL	0.857777778
(neg)L-TYROSINE	0.840277778	URIDINE-5-MONOPHOSPHATE	0.857777778
(neg)ASPARTATE	0.840277778	(neg) URIDINE-5-MONOPHOSPHATE	0.857777778
BUTYROBETAINE	0.833333333	(neg) GUANIDINOACETATE	0.853333333
(neg)3-SULFINO-L-ALANINE	0.833333333	5-OXO-L-PROLINE/Pyroglutamic Acid	0.848888889
(neg)L-VALINE	0.833333333	4-AMINOBUTANOATE/GABA	0.848888889
GLYCINE	0.826388889	(neg) L-VALINE	0.848888889
Methionine Sulfoxide	0.819444444	(neg) Taurolithocholic acid T-LCA	0.848888889
PYRIDOXAL	0.819444444	METHYL INDOLE-3-ACETATE	0.844444444
3-HYDROXYKYNURENINE	0.819444444	4-HYDROXYBENZOATE	0.844444444
(neg)Tryptophan	0.819444444	Anthranilate	0.84
(neg)URATE	0.819444444	(neg) 3,4-Dihydroxybenzenesulfonic Acid	0.84
(neg)LysoPE 181	0.819444444	CREATINE	0.835555556
(neg)Tauroursodeoxycholic acid	0.819444444	RIBOFLAVIN	0.835555556
Allopurinol	0.8125	(neg) L-ARGININE	0.835555556
(neg)INDOXYL SULFATE	0.8125	(neg) LL-2,6-DIAMINOHEPTANEDIOATE	0.835555556
METHYL INDOLE-3-ACETATE	0.805555556	(neg) Tauroursodeoxycholic acid T-UDCA	0.835555556
(neg)N-ACETYL-D-MANNOSAMINE	0.805555556	(neg) 4-ACETAMIDOBUTANOATE	0.835555556
(neg)2,4-Dinitrophenol herbicide	0.805555556	LL-2,6-DIAMINOHEPTANEDIOATE	0.831111111
		N-METHYL-D-ASPARTIC ACIDO-ACETYL	0.826666667
neg= negative ion mode		(neg) CREATINE	0.826666667
		(neg) 4-COUMARATE	0.826666667
		(neg) 4-ACETAMIDOBUTANOATE	0.822222222
		(neg) PYRIDOXAL	0.822222222
		(neg) SARCOSINE/BETA-ALANINE	0.817777778

	Tryptophan	0.817777778
	Pantothenic Acid_220.1169-6.59	0.817777778
	(neg) Pantothenic Acid	0.817777778
	(neg) GUANOSINE 5'-MONOPHOSPHATE	0.817777778
	L-PROLINE	0.813333333
	N-Methylnicotinamide	0.813333333
	(neg) ALPHA-HYDROXYISOBUTYRIC ACID	0.813333333
	(neg) CITRULLINE	0.813333333
	(neg) L-ANSERINE	0.804444444
	(neg) 3-HYDROXYPHENYLACETATE	0.804444444
	(neg) 3,4-DIHYDROXY-L-PHENYLALANINE	0.804444444
	Tauroursodeoxycholic acid T-UDCA	0.8

Supplemental Table 4. Biomarker Meta-Analysis - Combining P-values Method (Stouffer's method)

Metabolite	CombinedPval
6-DEOXY-HEXOSE	1.23E-09
ALDO/KETO-HEXOSE	9.91E-09
5-Hydroxymethyl-2-furaldehyde	9.91E-09
(neg) GLUCOSE/FRUCTOSE	9.91E-09
GLUCOSAMINE/MANNOSAMINE	1.02E-08
(neg) C6H12O6-HEXOSE/KETOSE/INOSITOL	4.36E-08
(neg) DISACCHARIDE 6C/6C/2-alpha-D-glucosyl-D-glucose	6.35E-07
(neg) L-GLUTAMINE	1.07E-06
N-ACETYL-L-ASPARTIC ACID	2.14E-06
(neg) N-ACETYL-L-ASPARTIC ACID	2.63E-06
(neg) L-VALINE	6.83E-06
(neg) ALPHA-HYDROXYISOBUTYRIC ACID	2.01E-05
4-AMINOBUTANOATE GABA	2.19E-05
URIDINE	4.80E-05
L-Isoleucine	5.08E-05
(neg)CITRAMALATE	5.08E-05
(neg)D-GLUCURONIC ACID/D-GLUCURONOLACTONE/D--GALACTURONIC ACID	5.90E-05
(neg)HEXANESULFONIC ACID-Sulfate	5.90E-05
(neg)N-ACETYL-D-MANNOSAMINE	6.83E-05
ETHYLMALONIC ACID	6.92E-05
METHYL BETA-D-GALACTOSIDE	8.71E-05
(neg)L-HISTIDINE	9.62E-05
(neg)URIDINE	9.72E-05
Anthranilate	9.72E-05
L-GLUTAMINE	0.00015231
Allopurinol	0.00015231
(neg)L-ISOLEUCINE	0.00015231
N-METHYL-D-ASPARTIC ACID	0.00016315
L-LYSINE	0.00016908
(neg)INDOXYL SULFATE	0.00021931
(neg)GLUCONIC ACID/D-GULONIC ACID GAMA-LACTONE	0.00022147
D-Ribose	0.00025935
L-KYNURENINE	0.00028451
(neg)3-METHYL-2-OXOVALERIC ACID	0.00028451
(neg)N-ACETYL-DL-SERINE	0.00039692
(neg)N-ACETYL-DL-GLUTAMIC ACID	0.00045343
(neg)GLYCERIC ACID	0.00066186
CREATININE	0.00066562

METHYL INDOLE-3-ACETATE	0.00078589
(neg)CREATININE	0.00086178
URACIL	0.0011991
Glycerophosphocholine	0.0012167
PYRIDOXAL	0.0012167
(neg)CREATINE	0.0012317
(neg)2-deoxy-D-galactose fructose/glucose	0.001238
CREATINE	0.0013581
(neg)SARCOSINE/BETA-ALANINE	0.0013777
5-METHYLCYTOSINE HYDROCHLORIDE	0.0022476
L-HISTIDINE	0.0022546
(neg)N-ACETYLNEURAMINATE	0.0023345
N-ACETYL-L-ALANINE	0.0024662
(neg)Linoleic Acid 182	0.0024662
Isobutyrylcarnitine	0.0025445
4-IMIDAZOLEACETIC ACID	0.0029199
(neg)URACIL	0.0036081
THREONINE/HOMOSERINE	0.0037806
(neg)N-ALPHA-ACETYL-L-LYSINE	0.0037806
Propionylcarnitine	0.0038881
(neg)D-SACCHARIC ACID	0.004109
(neg)L-GLUTAMIC ACID	0.0051749
GLYCINE	0.0071071
L-ARGININE	0.0073157
(neg)ASCORBIC ACID	0.0073157
(neg)N-ACETYL-L-ALANINE	0.0073157
N-Methylnicotinamide	0.0095661
(neg)ASPARTATE	0.0095661
(neg)L-TYROSINE	0.010059
(neg)MEVALOLACTONE	0.010325
N-ALPHA-ACETYL-L-LYSINE	0.010745
BETAINE	0.013038
(neg)LL-2,6-DIAMINOHEPTANEDIOATE	0.013267
(neg)CARNOSINE	0.013267
(neg)4-ACETAMIDOBUTANOATE	0.017381
LL-2,6-DIAMINOHEPTANEDIOATE	0.01935
PHOSPHOCHOLINE	0.01935
(neg)N-METHYL-L-GLUTAMATE	0.019502
L-PROLINE	0.023954
(neg)URATE	0.025028

(neg)Ferulic acid sulfate	0.025028
(neg)GLYCOLATE	0.025493
(neg)Taurochenodesoxycholic acid T-CDCA_	0.0335
ALLANTOIN	0.036497
(neg)THREONINE/HOMOSERINE	0.036497
(neg)Arachidonic Acid 204	0.036497
3-UREIDOPROPIONATE	0.036497
Pantothenic Acid	0.036497
(neg)3-UREIDOPROPIONATE	0.036497
URATE	0.038485
TAURINE	0.043316
(neg)Tauroursodeoxycholic acid T-UDCA	0.04335

neg= negative ion mode

Supplemental Table 5**log10 GABA**

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	3.577	0.09461	3.387 to 3.767	37.81	<0.0001
Age	0.002276	0.009007	-0.01581 to 0.02036	0.2527	0.8015
Group[2]	-0.3085	0.06253	-0.4341 to -0.1830	4.934	<0.0001

log10 N-acetyl-L-aspartic acid

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	1.774	0.04467	1.685 to 1.864	39.72	<0.0001
Age	-0.005179	0.004253	-0.01372 to 0.003359	1.218	0.2289
Group[2]	0.1107	0.02953	0.05145 to 0.1700	3.75	0.0005

log10 2,6-diaminoheptanedioate

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	1.487	0.1186	1.249 to 1.725	12.54	<0.0001
Age	0.000199	0.01129	-0.02246 to 0.02286	0.01763	0.986
Group[2]	0.147	0.07837	-0.01032 to 0.3043	1.876	0.0664

log10 Histidine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	2.745	0.05077	2.643 to 2.847	54.07	<0.0001
Age	-0.000183	0.004833	-0.009887 to 0.009520	0.03795	0.9699
Group[2]	-0.0311	0.03356	-0.09847 to 0.03627	0.9267	0.3585

log10 Glycine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	2.218	0.09	2.038 to 2.399	24.65	<0.0001
Age	-0.007882	0.008568	-0.02508 to 0.009319	0.9199	0.3619
Group[2]	0.03272	0.05948	-0.08670 to 0.1521	0.55	0.5847

log10 Proline

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	4.419	0.08799	4.243 to 4.596	50.23	<0.0001
Age	-0.006052	0.008376	-0.02287 to 0.01076	0.7225	0.4733
Group[2]	0.0933	0.05816	-0.02346 to 0.2100	1.604	0.1148

log10 Pyridoxal

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	1.962	0.1097	1.742 to 2.182	17.88	<0.0001

Age	-0.008379	0.01044	-0.02935 to 0.01259	0.8022	0.4261
Group[2]	-0.02412	0.07251	-0.1697 to 0.1215	0.3326	0.7408

log10 Isoleucine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	4.11	0.09947	3.911 to 4.310	41.32	<0.0001
Age	0.009087	0.009469	-0.009923 to 0.02810	0.9596	0.3418
Group[2]	-0.2349	0.06574	-0.3669 to -0.1029	3.573	0.0008

log10 Citramalate

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	1.988	0.1322	1.722 to 2.253	15.04	<0.0001
Age	0.0008682	0.01259	-0.02440 to 0.02614	0.06898	0.9453
Group[2]	-0.2561	0.08739	-0.4316 to -0.08070	2.931	0.005

log10 Leucine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	4.503	0.08909	4.324 to 4.682	50.54	<0.0001
Age	0.005522	0.008482	-0.01151 to 0.02255	0.6511	0.5179
Group[2]	-0.1907	0.05889	-0.3089 to -0.07250	3.239	0.0021

log10 5-hydroxymethyl-2-furaldehyde

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	0.7921	0.07584	0.6399 to 0.9444	10.45	<0.0001
Age	0.01129	0.00722	-0.003209 to 0.02578	1.563	0.1242
Group[2]	-0.03822	0.05013	-0.1388 to 0.06241	0.7624	0.4493

log10 Kynurenine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	2.538	0.09693	2.343 to 2.733	26.18	<0.0001
Age	0.01419	0.009228	-0.004341 to 0.03271	1.537	0.1304
Group[2]	0.2891	0.06407	0.1605 to 0.4177	4.513	<0.0001

log10 Serotonin

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	3.163	0.1054	2.951 to 3.374	30.01	<0.0001
Age	-0.01303	0.01003	-0.03317 to 0.007114	1.299	0.1999
Group[2]	-0.03466	0.06966	-0.1745 to 0.1052	0.4975	0.621

log10 Tryptophan

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	4.314	0.07593	4.161 to 4.466	56.81	<0.0001
Age	0.01867	0.007228	0.004159 to 0.03318	2.583	0.0127
Group[2]	0.1539	0.05019	0.05312 to 0.2546	3.066	0.0035

log10 Kynurenic Acid

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	2.828	0.1697	2.487 to 3.168	16.66	<0.0001
Age	0.008701	0.01616	-0.02374 to 0.04114	0.5384	0.5926
Group[2]	0.1605	0.1122	-0.06476 to 0.3857	1.43	0.1587

log10 Anthranilic Acid

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	1.051	0.1174	0.8151 to 1.287	8.95	<0.0001
Age	-0.000747	0.01118	-0.02319 to 0.02169	0.06685	0.947
Group[2]	0.278	0.07761	0.1222 to 0.4338	3.582	0.0008

log10 Tauroursodeoxycholic Acid

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	0.7395	0.1876	0.3629 to 1.116	3.942	0.0002
Age	0.04242	0.01786	0.006568 to 0.07827	2.375	0.0213
Group[2]	0.5312	0.124	0.2823 to 0.7801	4.285	<0.0001

log10 Glucosamine/Mannosamine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	5.007	0.04411	4.919 to 5.096	113.5	<0.0001
Age	-0.002857	0.004199	-0.01129 to 0.005573	0.6803	0.4994
Group[2]	0.09051	0.02915	-0.3671 to -0.05027	3.105	0.0031

log10 Indoxyl Sulfate

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	2.872	0.2172	2.436 to 3.308	13.23	<0.0001
Age	0.03174	0.02067	-0.009764 to 0.07324	1.535	0.1309
Group[2]	0.741	0.1435	0.4528 to 1.029	5.162	<0.0001

log10 Tyrosine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	4.017	0.0631	3.890 to 4.143	63.66	<0.0001
Age	0.007623	0.006007	-0.004436 to 0.01968	1.269	0.2102
Group[2]	0.1288	0.04171	0.04512 to 0.2126	3.089	0.0032

log10 Glutamine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	5.007	0.04411	4.919 to 5.096	113.5	<0.0001
Age	-0.002857	0.004199	-0.01129 to 0.005573	0.6803	0.4994
Group[2]	0.09051	0.02915	0.03198 to 0.1490	3.105	0.0031

log10 Valine

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	4.481	0.07299	4.334 to 4.627	61.39	<0.0001
Age	0.009502	0.006949	-0.004448 to 0.02345	1.367	0.1775
Group[2]	-0.2269	0.04824	-0.3237 to -0.1300	4.703	<0.0001

log10 2-hydroxyisobutyric acid

Variable	Estimate	Standard error	95% CI (asymptotic)	t	P value
Intercept	4.038	0.1494	3.738 to 4.338	27.03	<0.0001
Age	0.01193	0.01413	-0.01646 to 0.04033	0.8444	0.4026
Group[2]	-0.492	0.09993	-0.6929 to -0.2912	4.924	<0.0001