

**Supplementary Table 1. Adjusted mean levels\* of alcohol-related metabolites by different types of alcohol beverage**

Metabolite names	Super_pathway	Sub_pathway	type of alcoholic beverage predominantly consumed	age-, sex-, BMI-, eGFR- and smoking status-adjusted means of alcohol beverage consumption*	p values for difference from non-drinkers
2-aminobutyrate	Amino acid	Butanoate metabolism	non-drinker	-0.08	_
2-aminobutyrate	Amino acid	Butanoate metabolism	wine	0.01	9.80E-01
2-aminobutyrate	Amino acid	Butanoate metabolism	beer	0.17	2.26E-03
2-aminobutyrate	Amino acid	Butanoate metabolism	hard_liquor	0.22	3.40E-03
2-aminobutyrate	Amino acid	Butanoate metabolism	no-preference	0.20	2.63E-03
2-hydroxybutyrate (AHB)	Amino acid	Cysteine, methionine, SAM, taurir	non-drinker	-0.05	_
2-hydroxybutyrate (AHB)	Amino acid	Cysteine, methionine, SAM, taurir	wine	-0.16	9.63E-01
2-hydroxybutyrate (AHB)	Amino acid	Cysteine, methionine, SAM, taurir	beer	0.01	8.31E-01
2-hydroxybutyrate (AHB)	Amino acid	Cysteine, methionine, SAM, taurir	hard_liquor	0.44	2.17E-07
2-hydroxybutyrate (AHB)	Amino acid	Cysteine, methionine, SAM, taurir	no-preference	0.07	4.41E-01
5-oxoproline	Amino acid	Glutathione metabolism	non-drinker	0.09	_
5-oxoproline	Amino acid	Glutathione metabolism	wine	0.49	1.03E-01
5-oxoproline	Amino acid	Glutathione metabolism	beer	-0.31	1.48E-07
5-oxoproline	Amino acid	Glutathione metabolism	hard_liquor	-0.45	1.01E-08
5-oxoproline	Amino acid	Glutathione metabolism	no-preference	0.00	7.49E-01
indolelactate	Amino acid	Tryptophan metabolism	non-drinker	-0.05	_
indolelactate	Amino acid	Tryptophan metabolism	wine	-0.06	1.00E+00
indolelactate	Amino acid	Tryptophan metabolism	beer	0.21	7.02E-04
indolelactate	Amino acid	Tryptophan metabolism	hard_liquor	0.15	6.04E-02
indolelactate	Amino acid	Tryptophan metabolism	no-preference	-0.01	9.75E-01
alpha-hydroxyisovalerate	Amino acid	Valine, leucine and isoleucine met	non-drinker	-0.08	_
alpha-hydroxyisovalerate	Amino acid	Valine, leucine and isoleucine met	wine	-0.10	1.00E+00
alpha-hydroxyisovalerate	Amino acid	Valine, leucine and isoleucine met	beer	0.06	1.66E-01
alpha-hydroxyisovalerate	Amino acid	Valine, leucine and isoleucine met	hard_liquor	0.71	1.00E-12
alpha-hydroxyisovalerate	Amino acid	Valine, leucine and isoleucine met	no-preference	0.02	6.00E-01
alpha-hydroxyisocaproate	Amino acid	Valine, leucine and isoleucine met	non-drinker	-0.06	_
alpha-hydroxyisocaproate	Amino acid	Valine, leucine and isoleucine met	wine	-0.15	9.72E-01
alpha-hydroxyisocaproate	Amino acid	Valine, leucine and isoleucine met	beer	0.10	7.99E-02
alpha-hydroxyisocaproate	Amino acid	Valine, leucine and isoleucine met	hard_liquor	0.43	6.99E-08
alpha-hydroxyisocaproate	Amino acid	Valine, leucine and isoleucine met	no-preference	0.00	9.05E-01
2-hydroxyisobutyrate	Amino acid	Valine, leucine and isoleucine met	non-drinker	-0.05	_
2-hydroxyisobutyrate	Amino acid	Valine, leucine and isoleucine met	wine	-0.44	9.72E-02
2-hydroxyisobutyrate	Amino acid	Valine, leucine and isoleucine met	beer	0.20	1.45E-03
2-hydroxyisobutyrate	Amino acid	Valine, leucine and isoleucine met	hard_liquor	0.11	2.49E-01
2-hydroxyisobutyrate	Amino acid	Valine, leucine and isoleucine met	no-preference	0.10	1.83E-01
malate	Energy	Krebs cycle	non-drinker	-0.05	_
malate	Energy	Krebs cycle	wine	0.10	8.58E-01

malate	Energy	Krebs cycle	beer	0.13	4.93E-02
malate	Energy	Krebs cycle	hard_liquor	0.23	6.78E-03
malate	Energy	Krebs cycle	no-preference	0.04	6.53E-01
osapentaenoate (n3 DPA; 22:5	Lipid	Essential fatty acid	non-drinker	-0.07	_
osapentaenoate (n3 DPA; 22:5	Lipid	Essential fatty acid	wine	0.01	9.89E-01
osapentaenoate (n3 DPA; 22:5	Lipid	Essential fatty acid	beer	0.23	2.17E-04
osapentaenoate (n3 DPA; 22:5	Lipid	Essential fatty acid	hard_liquor	0.33	5.68E-05
osapentaenoate (n3 DPA; 22:5	Lipid	Essential fatty acid	no-preference	-0.04	9.93E-01
isovalerate	Lipid	Fatty acid metabolism	non-drinker	-0.04	_
isovalerate	Lipid	Fatty acid metabolism	wine	0.05	9.74E-01
isovalerate	Lipid	Fatty acid metabolism	beer	0.06	5.00E-01
isovalerate	Lipid	Fatty acid metabolism	hard_liquor	0.21	1.51E-02
isovalerate	Lipid	Fatty acid metabolism	no-preference	0.04	7.84E-01
5-HETE	Lipid	Fatty acid, monohydroxy	non-drinker	-0.08	_
5-HETE	Lipid	Fatty acid, monohydroxy	wine	0.07	8.75E-01
5-HETE	Lipid	Fatty acid, monohydroxy	beer	0.31	4.47E-07
5-HETE	Lipid	Fatty acid, monohydroxy	hard_liquor	0.17	2.06E-02
5-HETE	Lipid	Fatty acid, monohydroxy	no-preference	0.10	8.27E-02
palmitoleate (16:1n7)	Lipid	Long chain fatty acid	non-drinker	-0.11	_
palmitoleate (16:1n7)	Lipid	Long chain fatty acid	wine	0.22	1.92E-01
palmitoleate (16:1n7)	Lipid	Long chain fatty acid	beer	0.37	1.18E-11
palmitoleate (16:1n7)	Lipid	Long chain fatty acid	hard_liquor	0.29	1.72E-05
palmitoleate (16:1n7)	Lipid	Long chain fatty acid	no-preference	0.12	1.03E-02
adrenate (22:4n6)	Lipid	Long chain fatty acid	non-drinker	-0.10	_
adrenate (22:4n6)	Lipid	Long chain fatty acid	wine	-0.14	9.99E-01
adrenate (22:4n6)	Lipid	Long chain fatty acid	beer	0.30	1.98E-07
adrenate (22:4n6)	Lipid	Long chain fatty acid	hard_liquor	0.42	3.25E-08
adrenate (22:4n6)	Lipid	Long chain fatty acid	no-preference	0.04	3.22E-01
10-heptadecenoate (17:1n7)	Lipid	Long chain fatty acid	non-drinker	-0.08	_
10-heptadecenoate (17:1n7)	Lipid	Long chain fatty acid	wine	0.04	9.33E-01
10-heptadecenoate (17:1n7)	Lipid	Long chain fatty acid	beer	0.28	2.30E-06
10-heptadecenoate (17:1n7)	Lipid	Long chain fatty acid	hard_liquor	0.19	8.64E-03
10-heptadecenoate (17:1n7)	Lipid	Long chain fatty acid	no-preference	0.08	1.59E-01
palmitate (16:0)	Lipid	Long chain fatty acid	non-drinker	-0.06	_
palmitate (16:0)	Lipid	Long chain fatty acid	wine	0.01	9.93E-01
palmitate (16:0)	Lipid	Long chain fatty acid	beer	0.21	7.06E-04
palmitate (16:0)	Lipid	Long chain fatty acid	hard_liquor	0.19	2.35E-02
palmitate (16:0)	Lipid	Long chain fatty acid	no-preference	0.01	8.92E-01
eicosenoate (20:1n9 or 11)	Lipid	Long chain fatty acid	non-drinker	-0.09	_
eicosenoate (20:1n9 or 11)	Lipid	Long chain fatty acid	wine	0.00	9.79E-01
eicosenoate (20:1n9 or 11)	Lipid	Long chain fatty acid	beer	0.30	4.89E-07

eicosenoate (20:1n9 or 11)	Lipid	Long chain fatty acid	hard_liquor	0.27	2.64E-04
eicosenoate (20:1n9 or 11)	Lipid	Long chain fatty acid	no-preference	0.06	2.36E-01
dihomo-linoleate (20:2n6)	Lipid	Long chain fatty acid	non-drinker	-0.09	_
dihomo-linoleate (20:2n6)	Lipid	Long chain fatty acid	wine	0.09	8.05E-01
dihomo-linoleate (20:2n6)	Lipid	Long chain fatty acid	beer	0.28	1.78E-06
dihomo-linoleate (20:2n6)	Lipid	Long chain fatty acid	hard_liquor	0.31	4.35E-05
dihomo-linoleate (20:2n6)	Lipid	Long chain fatty acid	no-preference	0.04	3.93E-01
oleate (18:1n9)	Lipid	Long chain fatty acid	non-drinker	-0.08	_
oleate (18:1n9)	Lipid	Long chain fatty acid	wine	0.02	9.70E-01
oleate (18:1n9)	Lipid	Long chain fatty acid	beer	0.28	2.95E-06
oleate (18:1n9)	Lipid	Long chain fatty acid	hard_liquor	0.16	2.75E-02
oleate (18:1n9)	Lipid	Long chain fatty acid	no-preference	0.14	2.12E-02
stearidonate (18:4n3)	Lipid	Long chain fatty acid	non-drinker	-0.06	_
stearidonate (18:4n3)	Lipid	Long chain fatty acid	wine	0.10	8.46E-01
stearidonate (18:4n3)	Lipid	Long chain fatty acid	beer	0.20	1.31E-03
stearidonate (18:4n3)	Lipid	Long chain fatty acid	hard_liquor	0.22	7.36E-03
stearidonate (18:4n3)	Lipid	Long chain fatty acid	no-preference	0.01	8.79E-01
myristate (14:0)	Lipid	Long chain fatty acid	non-drinker	-0.04	_
myristate (14:0)	Lipid	Long chain fatty acid	wine	0.06	9.65E-01
myristate (14:0)	Lipid	Long chain fatty acid	beer	0.17	1.12E-02
myristate (14:0)	Lipid	Long chain fatty acid	hard_liquor	0.15	1.18E-01
myristate (14:0)	Lipid	Long chain fatty acid	no-preference	-0.03	9.99E-01
myristoleate (14:1n5)	Lipid	Long chain fatty acid	non-drinker	-0.06	_
myristoleate (14:1n5)	Lipid	Long chain fatty acid	wine	0.17	5.86E-01
myristoleate (14:1n5)	Lipid	Long chain fatty acid	beer	0.23	3.26E-04
myristoleate (14:1n5)	Lipid	Long chain fatty acid	hard_liquor	0.13	1.40E-01
myristoleate (14:1n5)	Lipid	Long chain fatty acid	no-preference	0.01	8.74E-01
tadecanoylglycerophosphoch	Lipid	Lysolipid	non-drinker	0.07	_
tadecanoylglycerophosphoch	Lipid	Lysolipid	wine	0.10	1.00E+00
tadecanoylglycerophosphoch	Lipid	Lysolipid	beer	-0.16	6.87E-03
tadecanoylglycerophosphoch	Lipid	Lysolipid	hard_liquor	-0.28	6.04E-04
tadecanoylglycerophosphoch	Lipid	Lysolipid	no-preference	-0.13	5.70E-02
aroylglycerophosphoethanol	Lipid	Lysolipid	non-drinker	-0.06	_
aroylglycerophosphoethanol	Lipid	Lysolipid	wine	-0.16	9.67E-01
aroylglycerophosphoethanol	Lipid	Lysolipid	beer	0.26	3.50E-05
aroylglycerophosphoethanol	Lipid	Lysolipid	hard_liquor	0.13	1.43E-01
aroylglycerophosphoethanol	Lipid	Lysolipid	no-preference	0.07	3.82E-01
donoylglycerophosphoethano	Lipid	Lysolipid	non-drinker	-0.07	_
donoylglycerophosphoethano	Lipid	Lysolipid	wine	-0.09	1.00E+00
donoylglycerophosphoethano	Lipid	Lysolipid	beer	0.20	1.09E-03
donoylglycerophosphoethano	Lipid	Lysolipid	hard_liquor	0.25	2.70E-03

donoylglycerophosphoethano	Lipid	Lysolipid	no-preference	0.06	4.06E-01
lmitoleoylglycerophosphochol	Lipid	Lysolipid	non-drinker	-0.04	
lmitoleoylglycerophosphochol	Lipid	Lysolipid	wine	-0.06	1.00E+00
lmitoleoylglycerophosphochol	Lipid	Lysolipid	beer	0.25	2.45E-04
lmitoleoylglycerophosphochol	Lipid	Lysolipid	hard_liquor	-0.06	9.99E-01
lmitoleoylglycerophosphochol	Lipid	Lysolipid	no-preference	0.04	7.86E-01
5-HEPE	Lipid	Metabolite of EPA	non-drinker	-0.07	
5-HEPE	Lipid	Metabolite of EPA	wine	-0.08	1.00E+00
5-HEPE	Lipid	Metabolite of EPA	beer	0.22	4.89E-04
5-HEPE	Lipid	Metabolite of EPA	hard_liquor	0.30	2.74E-04
5-HEPE	Lipid	Metabolite of EPA	no-preference	0.01	8.04E-01
rosten-3beta,17beta-diol disulf	Lipid	Sterol/Steroid	non-drinker	-0.14	
rosten-3beta,17beta-diol disulf	Lipid	Sterol/Steroid	wine	-0.21	9.86E-01
rosten-3beta,17beta-diol disulf	Lipid	Sterol/Steroid	beer	0.31	2.15E-10
rosten-3beta,17beta-diol disulf	Lipid	Sterol/Steroid	hard_liquor	0.69	1.00E-12
rosten-3beta,17beta-diol disulf	Lipid	Sterol/Steroid	no-preference	0.17	1.46E-04
androstan-3beta,17beta-diol d	Lipid	Sterol/Steroid	non-drinker	-0.13	
androstan-3beta,17beta-diol d	Lipid	Sterol/Steroid	wine	-0.09	9.99E-01
androstan-3beta,17beta-diol d	Lipid	Sterol/Steroid	beer	0.29	3.14E-10
androstan-3beta,17beta-diol d	Lipid	Sterol/Steroid	hard_liquor	0.57	1.00E-12
androstan-3beta,17beta-diol d	Lipid	Sterol/Steroid	no-preference	0.17	1.62E-04
leucylleucine	Peptide	Dipeptide	non-drinker	-0.04	
leucylleucine	Peptide	Dipeptide	wine	-0.06	1.00E+00
leucylleucine	Peptide	Dipeptide	beer	0.13	8.00E-02
leucylleucine	Peptide	Dipeptide	hard_liquor	0.07	6.34E-01
leucylleucine	Peptide	Dipeptide	no-preference	0.12	1.74E-01
gamma-glutamylleucine	Peptide	gamma-glutamyl	non-drinker	0.10	
gamma-glutamylleucine	Peptide	gamma-glutamyl	wine	-0.08	7.64E-01
gamma-glutamylleucine	Peptide	gamma-glutamyl	beer	-0.35	2.54E-09
gamma-glutamylleucine	Peptide	gamma-glutamyl	hard_liquor	-0.37	6.98E-07
gamma-glutamylleucine	Peptide	gamma-glutamyl	no-preference	-0.04	2.44E-01
gamma-glutamylvaline	Peptide	gamma-glutamyl	non-drinker	0.10	
gamma-glutamylvaline	Peptide	gamma-glutamyl	wine	-0.09	7.52E-01
gamma-glutamylvaline	Peptide	gamma-glutamyl	beer	-0.34	8.79E-09
gamma-glutamylvaline	Peptide	gamma-glutamyl	hard_liquor	-0.36	1.08E-06
gamma-glutamylvaline	Peptide	gamma-glutamyl	no-preference	-0.05	2.50E-01
gamma-glutamylglutamate	Peptide	gamma-glutamyl	non-drinker	0.09	
gamma-glutamylglutamate	Peptide	gamma-glutamyl	wine	-0.15	5.52E-01
gamma-glutamylglutamate	Peptide	gamma-glutamyl	beer	-0.29	4.99E-07
gamma-glutamylglutamate	Peptide	gamma-glutamyl	hard_liquor	-0.35	3.33E-06
gamma-glutamylglutamate	Peptide	gamma-glutamyl	no-preference	-0.04	3.67E-01

gamma-glutamylisoleucine*	Peptide	gamma-glutamyl	non-drinker	0.10	_	
gamma-glutamylisoleucine*	Peptide	gamma-glutamyl	wine	-0.11		6.74E-01
gamma-glutamylisoleucine*	Peptide	gamma-glutamyl	beer	-0.38		3.88E-10
gamma-glutamylisoleucine*	Peptide	gamma-glutamyl	hard_liquor	-0.30		4.92E-05
gamma-glutamylisoleucine*	Peptide	gamma-glutamyl	no-preference	0.00		6.34E-01
gamma-glutamylphenylalanine	Peptide	gamma-glutamyl	non-drinker	0.08	_	
gamma-glutamylphenylalanine	Peptide	gamma-glutamyl	wine	-0.05		9.20E-01
gamma-glutamylphenylalanine	Peptide	gamma-glutamyl	beer	-0.25		2.89E-05
gamma-glutamylphenylalanine	Peptide	gamma-glutamyl	hard_liquor	-0.36		5.23E-06
gamma-glutamylphenylalanine	Peptide	gamma-glutamyl	no-preference	-0.02		5.69E-01
gamma-glutamylalanine	Peptide	gamma-glutamyl	non-drinker	0.08	_	
gamma-glutamylalanine	Peptide	gamma-glutamyl	wine	-0.09		8.01E-01
gamma-glutamylalanine	Peptide	gamma-glutamyl	beer	-0.25		2.19E-05
gamma-glutamylalanine	Peptide	gamma-glutamyl	hard_liquor	-0.27		4.07E-04
gamma-glutamylalanine	Peptide	gamma-glutamyl	no-preference	-0.05		3.30E-01
gamma-glutamyltyrosine	Peptide	gamma-glutamyl	non-drinker	0.06	_	
gamma-glutamyltyrosine	Peptide	gamma-glutamyl	wine	-0.02		9.90E-01
gamma-glutamyltyrosine	Peptide	gamma-glutamyl	beer	-0.21		8.42E-04
gamma-glutamyltyrosine	Peptide	gamma-glutamyl	hard_liquor	-0.21		1.16E-02
gamma-glutamyltyrosine	Peptide	gamma-glutamyl	no-preference	0.01		9.48E-01
piperine	Xenobiotics	Food component/Plant	non-drinker	-0.09	_	
piperine	Xenobiotics	Food component/Plant	wine	0.04		9.26E-01
piperine	Xenobiotics	Food component/Plant	beer	0.20		3.29E-04
piperine	Xenobiotics	Food component/Plant	hard_liquor	0.22		2.15E-03
piperine	Xenobiotics	Food component/Plant	no-preference	0.22		5.05E-04

\*Number of glasses of wine per week, or number of bottles/cans of beer per week; or number of drinks of hard liquor per week.