

Supplementary Table 1

	Cohort 1 (Ipilimumab)	Cohort 2 (Mixed ICB)	Cohort 3 (Pembrolizumab)
Location	UK Southampton	UCSD-Moores Cancer Center	Yale University
Total Patients (n)	87	62	58
Patients with Serial Sampling (n)	65	32	53
Total Serial Samples	253	143	357
Age (Range)	61 (19-81)	60 (27-87)	68 (47-92)
Men (%)	47 (54)	36 (58)	23 (40)
Tumor Histology (%)	Melanoma (100)	Melanoma (27), NSCLC (23), HNSCC (18), Breast (11), Colorectal (8), Skin (Non-Melanoma) (5), Renal (2), SCLC (2), Myoepithelial (2), Appendiceal (2), Small Bowel (2)	NSCLC (92), Melanoma (8)
Therapy (%)	Ipilimumab (100)	Pembrolizumab (42), Nivolumab (24), Ipilimumab + Nivolumab (21), Ipilimumab (6), Pembrolizumab + SBRT (3), Tremelimumab + anti-PD-L1 (2), Avelumab (2)	Pembrolizumab (78), Pembrolizumab + SBRT (22)
RECIST 1.1 % (CR:PR:SD:PD)	1:11:10:60	0:13:27:48	0:30:16:42
irAE Severity % (None : Grade I/II : Grade III/IV)	41:52:7	52:31:18	28:61:12

Supplementary Table 2

Cohort 1: Ipilimumab-Treated Advanced Melanoma UK Southampton

	Total	None	Grade I/II	Grade III/IV	p-value
n (%)	65 (100)	23 (35)	37 (57)	5 (8)	--
Male (% per Group)	37 (57)	18 (78)	18 (49)	1 (20)	0.11
Age (Range)	63 (19-81)	57 (44-72)	65 (19-76)	70 (53-81)	0.13
Response (% per Group)	17 (31)	6 (40)	10 (28)	1 (33)	0.83

Supplementary Table 3

Cohort 1: Ipilimumab-Treated Melanoma Maximum Excursion Associations for Identified Metabolites

ID	class	adduct	m/z	irAE log(OR)	irAE pval	RECIST log(OR)	RECIST pval
b-Muricholic Acid	Bile Acid	[M-H]	407.2805	0.08 [0.01 - 0.17]	4.14E-02	0.02 [-0.07 - 0.12]	7.00E-01
Chenodeoxycholic Acid	Bile Acid	[M-H+Acetate]	451.3068	0.05 [-0.03 - 0.13]	2.74E-01	-0.01 [-0.10 - 0.08]	8.18E-01
Deoxycholic Acid	Bile Acid	[M-H]	391.2861	-0.01 [-0.08 - 0.07]	8.52E-01	-0.03 [-0.12 - 0.05]	3.99E-01
Glycochenodeoxycholic Acid	Bile Acid	[M-H]	448.3075	-0.19 [-0.38 - -0.01]	4.29E-02	0.04 [-0.13 - 0.22]	6.46E-01
Glycoursodeoxycholic Acid	Bile Acid	[M-H]	448.3071	-0.18 [-0.32 - -0.06]	7.30E-03	-0.08 [-0.22 - 0.05]	2.45E-01
Lithocholic Acid	Bile Acid	[M-H+Acetate]	435.3115	-0.08 [-0.22 - 0.06]	2.76E-01	-0.05 [-0.20 - 0.10]	4.83E-01
Taurochenodeoxycholic Acid	Bile Acid	[M-H]	498.2843	-0.02 [-0.16 - 0.12]	7.82E-01	-0.10 [-0.25 - 0.04]	1.59E-01
Tauroursodeoxycholic Acid	Bile Acid	[M-H]	498.2903	-0.14 [-0.28 - -0.02]	3.20E-02	-0.04 [-0.17 - 0.09]	5.92E-01
10,11-DiHDPA	Docosanoid	[M-H]	361.2386	0.21 [-0.02 - 0.46]	7.93E-02	0.03 [-0.22 - 0.27]	8.20E-01
13,14-EpDPA	Docosanoid	[M-H]	343.2283	0.06 [-0.08 - 0.20]	4.36E-01	0.02 [-0.13 - 0.19]	7.55E-01
19,20-DiHDPA	Docosanoid	[M-H]	361.2389	-0.13 [-0.42 - 0.14]	3.51E-01	0.13 [-0.14 - 0.43]	3.58E-01
7,8-DiHDPA	Docosanoid	[M-H]	361.2423	-1.19 [-2.49 - 0.04]	6.39E-02	0.41 [-0.80 - 1.68]	5.12E-01
MCTR2	Docosanoid	[M-H]	519.247	0.04 [-0.29 - 0.38]	8.18E-01	0.02 [-0.33 - 0.39]	9.00E-01
Resolvin D1	Docosanoid	[M-H]	375.2218	0.09 [-0.18 - 0.37]	5.08E-01	0.14 [-0.16 - 0.47]	3.86E-01
11(12)-EpETE	Eicosanoid	[M-H]	317.2125	0.22 [0.04 - 0.43]	2.42E-02	0.26 [0.05 - 0.51]	2.14E-02
11,12-diHETrE	Eicosanoid	[M-H+Acetate]	397.2578	0.09 [-0.15 - 0.33]	4.57E-01	0.11 [-0.16 - 0.42]	4.51E-01
11b dhk PGF2a	Eicosanoid	[M-H]	353.2338	0.12 [-0.31 - 0.55]	5.88E-01	0.13 [-0.34 - 0.62]	5.97E-01
11-beta-PGE1	Eicosanoid	[M-H]	353.2336	-0.04 [-0.31 - 0.22]	7.39E-01	0.07 [-0.23 - 0.37]	6.41E-01
11-dehydro-2,3-dinor-TXB2	Eicosanoid	[M-H+Acetate]	399.1949	0.06 [-0.09 - 0.21]	4.65E-01	-0.03 [-0.22 - 0.15]	7.77E-01
11-HETE	Eicosanoid	[M-H]	319.2281	0.12 [0.01 - 0.23]	4.12E-02	0.11 [-0.01 - 0.23]	8.10E-02
12,13 diHOME	Eicosanoid	[M-H]	313.2388	0.09 [-0.06 - 0.25]	2.52E-01	-0.02 [-0.19 - 0.15]	7.95E-01
12,13 EpOME	Eicosanoid	[M-H]	295.2281	0.03 [-0.27 - 0.34]	8.34E-01	0.17 [-0.16 - 0.53]	3.17E-01
12-HHTrE	Eicosanoid	[M-H]	279.1969	0.08 [0.01 - 0.15]	3.41E-02	0.12 [0.03 - 0.23]	1.60E-02
12-OPDA	Eicosanoid	[M-H+Acetate]	351.2162	0.01 [-0.28 - 0.29]	9.65E-01	0.25 [-0.08 - 0.63]	1.53E-01
12-oxoETE	Eicosanoid	[M-H]	317.2122	-0.01 [-0.20 - 0.17]	8.97E-01	0.07 [-0.13 - 0.27]	4.73E-01
12S-HpEPE	Eicosanoid	[M-H]	333.205	-0.08 [-0.28 - 0.12]	4.51E-01	0.33 [0.05 - 0.65]	3.26E-02

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12S-HpETE	Eicosanoid	[M-H]	335.2228	0.33 [0.07 - 0.63]	1.77E-02	0.28 [0.00 - 0.58]	5.16E-02
13(S) HOTrE(y)	Eicosanoid	[M-H+Acetate]	353.2313	0.08 [-0.19 - 0.35]	5.45E-01	0.36 [0.05 - 0.72]	3.33E-02
13,14-dihydro-15-keto-PGA2	Eicosanoid	[M-H+Acetate]	393.2287	-0.03 [-0.19 - 0.13]	7.56E-01	-0.08 [-0.28 - 0.10]	3.87E-01
13,14-dihydro-15-keto-tetranor-PGF1alpha	Eicosanoid	[M-H+Acetate]	359.2108	-0.02 [-0.58 - 0.55]	9.50E-01	-0.07 [-0.68 - 0.54]	8.12E-01
13,14-dihydro-PGE1	Eicosanoid	[M-H]	355.2462	-0.10 [-0.87 - 0.69]	8.09E-01	0.39 [-0.53 - 1.73]	5.04E-01
13-HODE	Eicosanoid	[M-H]	295.228	-0.08 [-0.27 - 0.10]	4.15E-01	0.10 [-0.09 - 0.30]	3.11E-01
13-HpODE	Eicosanoid	[M-H]	311.2233	-0.11 [-0.37 - 0.14]	3.80E-01	0.05 [-0.25 - 0.34]	7.57E-01
13-oxoODE	Eicosanoid	[M-H+Acetate]	353.2315	-0.05 [-0.30 - 0.18]	6.71E-01	0.12 [-0.14 - 0.42]	3.68E-01
13S-HpOTrEy	Eicosanoid	[M-H]	309.2074	-0.10 [-0.31 - 0.11]	3.69E-01	0.14 [-0.12 - 0.42]	3.15E-01
14(15) EpETE	Eicosanoid	[M-H]	317.2119	0.20 [-0.11 - 0.53]	2.18E-01	NA [NA - NA]	NA
14,15 LTD4	Eicosanoid	[M-H]	495.2607	0.15 [-0.04 - 0.36]	1.26E-01	0.14 [-0.08 - 0.38]	2.26E-01
14,15-DiHETE	Eicosanoid	[M-H+Acetate]	395.2419	0.04 [-0.18 - 0.27]	7.25E-01	-0.18 [-0.47 - 0.07]	1.81E-01
14,15-diHETrE	Eicosanoid	[M-H+Acetate]	397.2624	0.40 [0.01 - 0.83]	5.66E-02	0.22 [-0.22 - 0.68]	3.36E-01
14,15-EET	Eicosanoid	[M-H]	319.2292	0.02 [-0.18 - 0.23]	8.25E-01	0.09 [-0.13 - 0.32]	4.06E-01
15 oxoEDE	Eicosanoid	[M-H]	321.2437	0.06 [-0.20 - 0.33]	6.35E-01	0.19 [-0.08 - 0.48]	1.82E-01
15(S) HEPE	Eicosanoid	[M-H]	317.2124	0.03 [-0.08 - 0.14]	5.75E-01	0.02 [-0.10 - 0.14]	6.96E-01
15(S) HETrE	Eicosanoid	[M-H]	321.2437	0.04 [-0.06 - 0.14]	4.07E-01	0.06 [-0.05 - 0.17]	2.60E-01
15d PGA2	Eicosanoid	[M-H]	315.1967	0.23 [-0.14 - 0.66]	2.49E-01	-0.16 [-0.65 - 0.25]	4.73E-01
15d PGJ2	Eicosanoid	[M-H]	315.2003	0.11 [-0.24 - 0.48]	5.40E-01	0.32 [-0.08 - 0.75]	1.30E-01
15-epi-PGA1	Eicosanoid	[M-H+Acetate]	395.2441	-0.02 [-0.60 - 0.55]	9.34E-01	-0.12 [-0.72 - 0.45]	6.94E-01
15-HETE	Eicosanoid	[M-H+Acetate]	379.2473	0.09 [-0.19 - 0.36]	5.27E-01	0.04 [-0.25 - 0.34]	7.92E-01
15-keto-PGA1	Eicosanoid	[M-H+Acetate]	393.2307	0.19 [-0.14 - 0.54]	2.72E-01	-0.10 [-0.48 - 0.26]	5.96E-01
15S-HpETE	Eicosanoid	[M-H]	335.2227	0.09 [-0.14 - 0.33]	4.44E-01	0.32 [0.03 - 0.64]	3.93E-02
17k DPA	Eicosanoid	[M-H+Acetate]	403.2462	0.08 [-0.04 - 0.21]	1.91E-01	NA [NA - NA]	NA
18(+/-)-HETE	Eicosanoid	[M-H]	319.2232	0.15 [-0.47 - 0.77]	6.40E-01	0.73 [-0.08 - 1.71]	1.06E-01
20cooh AA	Eicosanoid	[M-H]	333.2083	-0.13 [-0.62 - 0.36]	5.96E-01	0.05 [-0.49 - 0.58]	8.57E-01
5(S) HEPE	Eicosanoid	[M-H+Acetate]	377.2312	0.04 [-0.22 - 0.29]	7.71E-01	0.05 [-0.22 - 0.32]	7.07E-01

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5(S) HETrE	Eicosanoid	[M-H]	321.2437	-0.07 [-0.29 - 0.15]	5.44E-01	0.21 [-0.01 - 0.45]	7.17E-02
5,12-DiHETE	Eicosanoid	[M-H]	335.2232	0.12 [-0.03 - 0.28]	1.26E-01	0.13 [-0.03 - 0.30]	1.16E-01
5,6-diHETE	Eicosanoid	[M-H]	335.2238	-0.04 [-0.38 - 0.29]	7.89E-01	0.22 [-0.14 - 0.61]	2.39E-01
5,6-diHETrE	Eicosanoid	[M-H]	337.2386	0.07 [-0.36 - 0.49]	7.59E-01	-0.16 [-0.66 - 0.33]	5.33E-01
5,6-EET	Eicosanoid	[M-H]	319.2281	0.09 [-0.14 - 0.32]	4.17E-01	0.20 [-0.05 - 0.45]	1.16E-01
5-HETE	Eicosanoid	[M-H]	319.2282	0.09 [-0.02 - 0.22]	1.19E-01	0.14 [0.01 - 0.29]	4.57E-02
5-oxoETE	Eicosanoid	[M-H]	317.2126	0.00 [-0.21 - 0.20]	9.83E-01	0.11 [-0.07 - 0.30]	2.36E-01
5S-HpEPE	Eicosanoid	[M-H]	333.205	-0.14 [-0.40 - 0.10]	2.54E-01	0.45 [0.16 - 0.79]	4.95E-03
6t LTB4	Eicosanoid	[M-H]	335.2232	0.13 [-0.01 - 0.29]	8.19E-02	0.15 [-0.01 - 0.33]	7.90E-02
7 HDoHE	Eicosanoid	[M-H]	343.2277	0.03 [-0.14 - 0.20]	7.39E-01	0.06 [-0.13 - 0.26]	5.32E-01
8(9)-EpETE	Eicosanoid	[M-H+Acetate]	377.2303	-0.06 [-0.31 - 0.20]	6.61E-01	-0.03 [-0.30 - 0.24]	8.08E-01
8(S) HEPE	Eicosanoid	[M-H]	317.2125	0.11 [-0.06 - 0.29]	2.00E-01	0.07 [-0.12 - 0.27]	4.45E-01
8(S) HETrE	Eicosanoid	[M-H+Acetate]	381.2614	-0.14 [-0.36 - 0.05]	1.71E-01	0.09 [-0.11 - 0.29]	3.60E-01
8,12-iso-iPF2 α -VI-1,5-lactone	Eicosanoid	[M-H]	335.2229	0.15 [-0.11 - 0.42]	2.60E-01	0.21 [-0.10 - 0.53]	1.90E-01
8,12-iso-iPF2 α -VI γ	Eicosanoid	[M-H]	353.2334	0.20 [0.02 - 0.39]	3.64E-02	0.12 [-0.07 - 0.31]	2.08E-01
8,15-diHETE	Eicosanoid	[M-H]	335.2231	0.17 [-0.11 - 0.45]	2.28E-01	0.15 [-0.16 - 0.48]	3.35E-01
8,9-diHETrE	Eicosanoid	[M-H+Acetate]	397.2574	0.03 [-0.16 - 0.23]	7.29E-01	0.09 [-0.13 - 0.31]	4.25E-01
8,9-EET	Eicosanoid	[M-H]	319.2287	0.06 [-0.23 - 0.36]	6.69E-01	NA [NA - NA]	NA
8-iso-PGA1	Eicosanoid	[M-H]	335.2231	-0.09 [-0.31 - 0.12]	3.85E-01	-0.07 [-0.33 - 0.17]	5.61E-01
8-iso-PGF1a	Eicosanoid	[M-H]	355.2485	-0.27 [-0.55 - -0.02]	4.39E-02	-0.03 [-0.32 - 0.25]	8.11E-01
9(S) HOTrE	Eicosanoid	[M-H]	293.2126	0.08 [-0.08 - 0.26]	3.21E-01	0.07 [-0.11 - 0.25]	4.69E-01
9,10 EpOME	Eicosanoid	[M-H]	295.2269	0.10 [-0.36 - 0.56]	6.64E-01	0.21 [-0.25 - 0.67]	3.58E-01
9-HpODE	Eicosanoid	[M-H]	311.2217	-0.10 [-0.30 - 0.09]	2.96E-01	0.04 [-0.19 - 0.25]	6.92E-01
9-oxoODE	Eicosanoid	[M-H]	293.2125	-0.05 [-0.37 - 0.26]	7.47E-01	0.02 [-0.30 - 0.35]	8.86E-01
9-oxoOTrE	Eicosanoid	[M-H]	291.1968	0.04 [-0.16 - 0.25]	6.79E-01	0.10 [-0.11 - 0.34]	3.51E-01
9S-HpOTrE	Eicosanoid	[M-H]	309.2074	-0.03 [-0.27 - 0.21]	7.90E-01	0.19 [-0.10 - 0.49]	2.03E-01
ent-8-iso Prostaglandin F2 α	Eicosanoid	[M-H]	353.234	-0.05 [-0.58 - 0.50]	8.66E-01	0.66 [-0.11 - 1.64]	1.50E-01

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HXA3	Eicosanoid	[M-H]	335.2234	0.20 [0.02 - 0.40]	3.84E-02	0.20 [0.00 - 0.42]	5.98E-02
PDX	Eicosanoid	[M-H+Acetate]	419.2386	0.35 [-0.12 - 0.87]	1.58E-01	0.92 [0.35 - 1.60]	3.15E-03
PGD2	Eicosanoid	[M-H]	351.218	0.09 [-0.12 - 0.30]	4.25E-01	-0.02 [-0.25 - 0.19]	8.24E-01
Resolvin E1	Eicosanoid	[M-H]	349.2023	0.04 [-0.05 - 0.13]	4.15E-01	-0.03 [-0.13 - 0.07]	5.14E-01
tetranor 12(R) HETE	Eicosanoid	[M-H+Acetate]	325.2027	-0.06 [-0.29 - 0.17]	6.30E-01	0.69 [0.32 - 1.17]	1.36E-03
D-erythro-Sphingosine C-18	Endocannabinoid	[M-H+Acetate]	358.2961	0.22 [-0.15 - 0.61]	2.53E-01	0.38 [-0.06 - 0.85]	9.88E-02
Docosahexaenoyl Ethanolamide	Endocannabinoid	[M-H+Acetate]	430.2968	0.20 [-0.13 - 0.55]	2.38E-01	0.26 [-0.08 - 0.62]	1.42E-01
N-oleoyl Dopamine	Endocannabinoid	[M-H]	416.3105	0.12 [-0.08 - 0.33]	2.40E-01	0.04 [-0.17 - 0.27]	6.84E-01
Oleoyl Ethanolamide	Endocannabinoid	[M-H+Acetate]	384.3121	0.00 [-0.28 - 0.28]	9.99E-01	-0.03 [-0.35 - 0.28]	8.36E-01
Adrenic Acid	Free Fatty Acid	[M-H]	331.2603	-0.02 [-0.15 - 0.12]	7.90E-01	0.03 [-0.14 - 0.19]	7.05E-01
α -linolenic Acid	Free Fatty Acid	[M-H]	277.2172	0.04 [-0.14 - 0.23]	6.38E-01	0.13 [-0.07 - 0.34]	2.18E-01
Arachidic Acid	Free Fatty Acid	[M-H]	311.2957	0.11 [-0.30 - 0.53]	6.08E-01	0.56 [0.07 - 1.12]	3.47E-02
Arachidonic Acid	Free Fatty Acid	[M-H]	303.2329	0.17 [-0.20 - 0.54]	3.66E-01	0.00 [-0.44 - 0.41]	9.89E-01
Behenic Acid	Free Fatty Acid	[M-H]	339.3269	0.09 [-0.15 - 0.34]	4.51E-01	0.10 [-0.16 - 0.39]	4.62E-01
Dihomo- γ -linolenic Acid	Free Fatty Acid	[M-H]	305.2492	0.19 [-0.11 - 0.51]	2.32E-01	0.05 [-0.29 - 0.40]	7.75E-01
Docosadienoic Acid	Free Fatty Acid	[M-H]	335.2961	0.04 [-0.18 - 0.26]	7.53E-01	0.13 [-0.13 - 0.38]	3.29E-01
Docosaenoic Acid	Free Fatty Acid	[M-H]	337.3118	0.14 [-0.11 - 0.39]	2.78E-01	0.10 [-0.16 - 0.37]	4.47E-01
Docosahexaenoic Acid	Free Fatty Acid	[M-H]	327.2329	-0.02 [-0.30 - 0.25]	8.65E-01	0.20 [-0.10 - 0.52]	1.94E-01
Docosapentaenoic Acid	Free Fatty Acid	[M-H]	329.2491	0.01 [-0.17 - 0.19]	9.19E-01	0.11 [-0.09 - 0.32]	2.74E-01
Docosatrienoic Acid	Free Fatty Acid	[M-H]	333.2805	0.04 [-0.15 - 0.24]	6.55E-01	0.10 [-0.10 - 0.32]	3.24E-01
Eicosadienoic Acid	Free Fatty Acid	[M-H]	307.2645	0.01 [-0.18 - 0.20]	9.43E-01	0.22 [0.01 - 0.45]	4.60E-02
Eicosapentaenoic Acid	Free Fatty Acid	[M-H]	301.2173	0.03 [-0.13 - 0.20]	7.06E-01	0.02 [-0.15 - 0.29]	8.10E-01
Eicosatrienoic Acid	Free Fatty Acid	[M-H]	305.2488	0.10 [-0.12 - 0.34]	3.68E-01	0.08 [-0.18 - 0.34]	5.48E-01
Eicosenoic Acid	Free Fatty Acid	[M-H]	309.2799	0.05 [-0.11 - 0.22]	5.29E-01	0.16 [-0.02 - 0.35]	8.05E-02
Gondolic Acid	Free Fatty Acid	[M-H]	309.2799	0.04 [-0.12 - 0.21]	5.91E-01	0.16 [-0.02 - 0.35]	7.55E-02
Heptadecaenoic Acid	Free Fatty Acid	[M-H+Acetate]	327.2545	-0.07 [-0.18 - 0.05]	2.64E-01	-0.04 [-0.17 - 0.08]	5.36E-01
Heptadecanoic Acid	Free Fatty Acid	[M-H]	269.2485	0.03 [-0.26 - 0.31]	8.62E-01	0.25 [-0.07 - 0.59]	1.43E-01

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Lignoceric Acid	Free Fatty Acid	[M-H]	367.3581	0.12 [-0.17 - 0.41]	4.27E-01	0.28 [-0.08 - 0.74]	1.76E-01
Linoleic Acid	Free Fatty Acid	[M-H]	279.2341	0.02 [-0.15 - 0.18]	8.41E-01	0.06 [-0.12 - 0.23]	5.26E-01
Myristic Acid	Free Fatty Acid	[M-H]	227.2013	0.00 [-0.54 - 0.55]	9.87E-01	-0.39 [-0.98 - 0.19]	1.85E-01
Nervonic Acid	Free Fatty Acid	[M-H]	365.3427	0.10 [-0.23 - 0.45]	5.45E-01	0.36 [-0.01 - 0.76]	6.32E-02
Oleic Acid	Free Fatty Acid	[M-H]	281.2487	0.00 [-0.17 - 0.17]	9.72E-01	0.08 [-0.12 - 0.27]	4.38E-01
Osbond Acid	Free Fatty Acid	[M-H]	329.248	0.04 [-0.14 - 0.22]	6.62E-01	0.14 [-0.06 - 0.34]	1.67E-01
Palmitic Acid	Free Fatty Acid	[M-H+Acetate]	315.2544	-0.06 [-0.30 - 0.16]	5.88E-01	0.23 [-0.03 - 0.51]	8.64E-02
Palmitoleic Acid	Free Fatty Acid	[M-H+Acetate]	313.2388	-0.04 [-0.27 - 0.18]	7.06E-01	-0.16 [-0.42 - 0.09]	2.10E-01
Pentadecanoic Acid	Free Fatty Acid	[M-H]	241.2172	0.09 [-0.27 - 0.46]	6.21E-01	0.25 [-0.13 - 0.67]	2.05E-01
Petroselenic Acid	Free Fatty Acid	[M-H]	341.2701	0.01 [-0.19 - 0.20]	9.45E-01	0.05 [-0.18 - 0.28]	6.93E-01
Tricosanoic Acid	Free Fatty Acid	[M-H]	353.3427	-0.22 [-0.50 - 0.05]	1.22E-01	-0.02 [-0.31 - 0.28]	8.89E-01
Tricosenoic Acid	Free Fatty Acid	[M-H]	351.3271	-0.13 [-0.46 - 0.19]	4.37E-01	0.10 [-0.23 - 0.43]	5.64E-01
LPC (14:0), Peak 1	Lysolipid	[M+Cl-]	502.2706	-0.22 [-0.76 - 0.30]	4.02E-01	-1.01 [-1.73 - -0.38]	3.20E-03
LPC (14:0), Peak 2	Lysolipid	[M+Cl-]	502.2713	0.08 [-0.48 - 0.65]	7.84E-01	-0.75 [-1.52 - -0.09]	3.73E-02
LPC (15:0), Peak 1	Lysolipid	[M-H+Acetate]	540.3315	0.14 [-0.49 - 0.78]	6.67E-01	-1.36 [-2.32 - -0.54]	2.41E-03
LPC (15:0), Peak 2	Lysolipid	[M-H+Acetate]	540.3314	-0.02 [-0.65 - 0.63]	9.61E-01	-0.78 [-1.89 - -0.01]	9.71E-02
LPC (16:0), Peak 1	Lysolipid	[M+Cl-]	530.3024	-1.03 [-4.72 - 2.46]	5.60E-01	-2.90 [-7.83 - 1.28]	2.12E-01
LPC (16:0), Peak 2	Lysolipid	[M+Cl-]	530.3024	-6.53 [-11.46 - -2.28]	4.63E-03	4.68 [0.02 - 9.92]	6.22E-02
LPC (16:1), Peak 1	Lysolipid	[M-H+Acetate]	552.3334	0.20 [-0.44 - 0.86]	5.40E-01	-1.01 [-1.89 - -0.21]	1.70E-02
LPC (16:1), Peak 2	Lysolipid	[M-H+Acetate]	552.3314	0.17 [-0.28 - 0.62]	4.67E-01	-0.11 [-0.62 - 0.46]	6.50E-01
LPC (17:0), Peak 1	Lysolipid	[M-H+Acetate]	568.363	-0.11 [-0.78 - 0.55]	7.40E-01	-1.40 [-2.42 - -0.51]	3.64E-03
LPC (17:0), Peak 2	Lysolipid	[M-H+Acetate]	568.3621	-0.05 [-0.69 - 0.59]	8.69E-01	-0.63 [-1.59 - 0.10]	1.26E-01
LPC (17:1), Peak 1	Lysolipid	[M-H+Acetate]	566.3475	0.26 [-0.26 - 0.80]	3.23E-01	-0.33 [-1.02 - 0.26]	2.71E-01
LPC (17:1), Peak 2	Lysolipid	[M-H+Acetate]	566.3502	0.18 [-0.53 - 0.91]	6.24E-01	-1.58 [-2.74 - -0.59]	3.50E-03
LPC (18:0), Peak 1	Lysolipid	[M+Cl-]	558.3333	-0.02 [-0.51 - 0.48]	9.36E-01	-0.07 [-0.62 - 0.63]	7.91E-01
LPC (18:0), Peak 2	Lysolipid	[M+Cl-]	558.3334	-0.63 [-2.36 - 1.12]	4.70E-01	-0.49 [-2.40 - 1.44]	6.05E-01
LPC (18:1), Peak 1	Lysolipid	[M-H+Acetate]	580.3627	0.19 [-0.29 - 0.67]	4.30E-01	-0.11 [-0.66 - 0.50]	6.70E-01

ID	class	adduct	m/z	irAE log(OR)	irAE pval	RECIST log(OR)	RECIST pval
LPC (18:1), Peak 2	Lysolipid	[M-H+Acetate]	580.3619	0.53 [-0.84 - 1.91]	4.48E-01	-0.42 [-2.00 - 1.21]	5.64E-01
LPC (18:2), Peak 1	Lysolipid	[M+Cl-]	554.3004	-0.15 [-1.15 - 0.85]	7.60E-01	-1.14 [-2.43 - 0.02]	6.26E-02
LPC (18:2), Peak 2	Lysolipid	[M+Cl-]	554.3024	-4.53 [-9.35 - -0.21]	4.74E-02	2.19 [-2.41 - 7.53]	3.80E-01
LPC (18:3), Peak 1	Lysolipid	[M-H+Acetate]	576.3323	0.03 [-0.43 - 0.49]	9.09E-01	-0.28 [-0.80 - 0.25]	2.82E-01
LPC (18:3), Peak 2	Lysolipid	[M-H+Acetate]	576.3314	-0.04 [-0.48 - 0.39]	8.44E-01	-0.16 [-0.63 - 0.33]	5.13E-01
LPC (19:1)	Lysolipid	[M-H+Acetate]	594.3799	0.34 [-0.23 - 0.92]	2.46E-01	-0.57 [-1.42 - 0.08]	1.17E-01
LPC (20:1), Peak 1	Lysolipid	[M-H+Acetate]	608.3909	-0.35 [-1.20 - 0.48]	4.11E-01	-1.39 [-2.69 - -0.29]	2.12E-02
LPC (20:1), Peak 2	Lysolipid	[M-H+Acetate]	608.3928	-0.20 [-0.94 - 0.54]	5.95E-01	-0.88 [-1.91 - 0.02]	6.69E-02
LPC (20:2), Peak 1	Lysolipid	[M-H+Acetate]	606.3781	-0.01 [-0.55 - 0.55]	9.77E-01	-0.51 [-1.25 - 0.12]	1.29E-01
LPC (20:2), Peak 2	Lysolipid	[M-H+Acetate]	606.3787	0.22 [-0.34 - 0.79]	4.36E-01	-0.26 [-0.91 - 0.37]	4.10E-01
LPC (20:3), Peak 1	Lysolipid	[M-H+Acetate]	604.3636	0.28 [-0.41 - 1.00]	4.29E-01	-0.65 [-1.50 - 0.14]	1.16E-01
LPC (20:3), Peak 2	Lysolipid	[M-H+Acetate]	604.363	0.19 [-0.37 - 0.74]	5.13E-01	-0.28 [-0.99 - 0.34]	3.58E-01
LPC (20:4), Peak 1	Lysolipid	[M-H+Acetate]	602.3474	0.30 [-0.69 - 1.34]	5.54E-01	-0.75 [-2.01 - 0.41]	2.17E-01
LPC (20:4), Peak 2	Lysolipid	[M-H+Acetate]	602.3475	0.74 [-1.02 - 2.61]	4.15E-01	-1.88 [-4.37 - 0.28]	1.10E-01
LPC (20:5), Peak 1	Lysolipid	[M-H+Acetate]	600.3315	0.06 [-0.46 - 0.60]	8.11E-01	-0.55 [-1.25 - 0.10]	1.08E-01
LPC (20:5), Peak 2	Lysolipid	[M-H+Acetate]	600.3321	0.02 [-0.35 - 0.40]	9.02E-01	-0.05 [-0.47 - 0.46]	8.10E-01
LPC (22:4), Peak 2	Lysolipid	[M-H+Acetate]	630.3779	0.51 [-0.16 - 1.20]	1.36E-01	-0.11 [-0.85 - 0.69]	7.72E-01
LPE (14:0), Peak 1	Lysolipid	[M-H]	424.2472	-0.02 [-0.36 - 0.32]	9.11E-01	-0.44 [-0.88 - -0.05]	3.44E-02
LPE (14:0), Peak 2	Lysolipid	[M-H]	424.2484	0.10 [-0.27 - 0.48]	5.84E-01	-0.34 [-0.78 - 0.06]	1.08E-01
LPE (15:0), Peak 2	Lysolipid	[M-H]	438.2631	0.33 [-0.26 - 0.94]	2.85E-01	-0.61 [-1.35 - 0.08]	8.96E-02
LPE (16:0), Peak 1	Lysolipid	[M-H]	452.2788	0.14 [-0.58 - 0.87]	7.01E-01	-1.24 [-2.23 - -0.38]	7.87E-03
LPE (16:0), Peak 2	Lysolipid	[M-H]	452.2787	0.16 [-0.55 - 0.88]	6.64E-01	-0.51 [-1.39 - 0.26]	2.00E-01
LPE (16:1), Peak 2	Lysolipid	[M-H]	450.2629	0.26 [-0.11 - 0.65]	1.70E-01	0.00 [-0.41 - 0.49]	9.96E-01
LPE (17:0), Peak 1	Lysolipid	[M-H]	466.2921	0.20 [-0.07 - 0.49]	1.55E-01	-0.07 [-0.37 - 0.23]	6.62E-01
LPE (17:0), Peak 2	Lysolipid	[M-H]	466.2939	0.15 [-0.31 - 0.62]	5.30E-01	-0.61 [-1.25 - -0.05]	4.35E-02
LPE (17:1), Peak 1	Lysolipid	[M-H]	464.2784	0.34 [-0.16 - 0.86]	1.82E-01	-0.23 [-0.75 - 0.27]	3.66E-01
LPE (17:1), Peak 2	Lysolipid	[M-H]	464.2784	0.45 [-0.07 - 1.00]	9.41E-02	-0.29 [-0.94 - 0.33]	3.67E-01

ID	class	adduct	m/z	irAE log(OR)	irAE pval	RECIST log(OR)	RECIST pval
LPE (18:0), Peak 1	Lysolipid	[M-H]	480.3077	-0.04 [-0.65 - 0.58]	9.09E-01	-0.59 [-1.37 - 0.13]	1.16E-01
LPE (18:0), Peak 2	Lysolipid	[M-H]	480.31	-0.04 [-0.83 - 0.75]	9.26E-01	-1.09 [-2.10 - -0.19]	2.32E-02
LPE (18:1), Peak 1	Lysolipid	[M-H]	478.2943	0.10 [-0.42 - 0.63]	7.03E-01	-0.38 [-1.02 - 0.23]	2.34E-01
LPE (18:1), Peak 2	Lysolipid	[M-H]	478.2939	0.06 [-0.52 - 0.64]	8.45E-01	-0.10 [-0.75 - 0.59]	7.63E-01
LPE (18:2), Peak 1	Lysolipid	[M-H]	476.2781	0.07 [-0.41 - 0.56]	7.71E-01	-0.49 [-1.12 - 0.10]	1.12E-01
LPE (18:2), Peak 2	Lysolipid	[M-H]	476.2788	0.06 [-0.36 - 0.48]	7.85E-01	-0.11 [-0.59 - 0.39]	6.09E-01
LPE (18:3), Peak 1	Lysolipid	[M-H]	474.263	0.00 [-0.40 - 0.41]	9.82E-01	-0.37 [-0.85 - 0.09]	1.19E-01
LPE (18:3), Peak 2	Lysolipid	[M-H]	474.2628	0.03 [-0.33 - 0.40]	8.67E-01	-0.16 [-0.57 - 0.25]	4.32E-01
LPE (20:2), Peak 1	Lysolipid	[M-H]	504.31	0.03 [-0.48 - 0.55]	9.07E-01	-0.35 [-0.97 - 0.23]	2.38E-01
LPE (20:2), Peak 2	Lysolipid	[M-H]	504.3099	0.41 [-0.12 - 0.97]	1.38E-01	-0.29 [-0.91 - 0.32]	3.57E-01
LPE (20:3), Peak 1	Lysolipid	[M-H]	502.2947	0.27 [-0.27 - 0.85]	3.28E-01	-0.46 [-1.16 - 0.19]	1.76E-01
LPE (20:3), Peak 2	Lysolipid	[M-H]	502.2946	0.17 [-0.33 - 0.67]	5.06E-01	-0.21 [-0.81 - 0.38]	4.74E-01
LPE (20:4), Peak 1	Lysolipid	[M-H]	500.2789	0.83 [0.03 - 1.70]	4.99E-02	-0.12 [-1.03 - 0.82]	8.02E-01
LPE (20:4), Peak 2	Lysolipid	[M-H]	500.279	1.07 [0.11 - 2.13]	3.58E-02	0.01 [-1.05 - 1.11]	9.83E-01
LPE (20:5), Peak 1	Lysolipid	[M-H]	498.2632	0.14 [-0.31 - 0.60]	5.40E-01	-0.49 [-1.13 - 0.08]	1.07E-01
LPE (20:5), Peak 2	Lysolipid	[M-H]	498.2632	0.19 [-0.29 - 0.69]	4.34E-01	-0.47 [-1.12 - 0.12]	1.31E-01
LPE (22:4), Peak 1	Lysolipid	[M-H]	528.3026	0.48 [-0.46 - 1.44]	3.10E-01	0.03 [-1.02 - 1.05]	9.59E-01
LPE (22:4), Peak 2	Lysolipid	[M-H]	528.3026	0.37 [-0.83 - 1.66]	5.52E-01	-1.45 [-3.37 - 0.10]	1.01E-01
LPI (16:0)	Lysolipid	[M-H]	571.292	0.70 [-0.36 - 1.76]	1.96E-01	0.73 [-0.64 - 2.11]	2.94E-01
LPI (18:0)	Lysolipid	[M-H]	599.319	0.51 [-0.24 - 1.27]	1.81E-01	0.52 [-0.35 - 1.55]	2.86E-01
LPI (18:1)	Lysolipid	[M-H]	597.3002	0.17 [-0.07 - 0.42]	1.65E-01	0.05 [-0.20 - 0.31]	6.78E-01
LPI (18:2)	Lysolipid	[M-H]	595.2843	-0.08 [-0.12 - 0.41]	7.63E-01	0.00 [-0.59 - 0.59]	9.93E-01
LPI (20:4)	Lysolipid	[M-H]	619.2946	0.12 [-0.23 - 0.46]	5.04E-01	0.21 [-0.20 - 0.62]	3.18E-01
LysoPAF (16:0)	Lysolipid	[M+Cl-]	516.3226	0.04 [-0.95 - 1.04]	9.29E-01	-1.22 [-2.65 - 0.05]	7.38E-02
11-keto-testosterone	Sterol	[M-H+Acetate]	361.2029	-0.08 [-0.23 - 0.06]	2.55E-01	0.07 [-0.08 - 0.24]	3.55E-01
Aldosterone	Sterol	[M-H+Acetate]	419.2101	0.03 [-0.08 - 0.14]	5.90E-01	0.03 [-0.09 - 0.16]	6.03E-01

Supplementary Table 4

Sub-Cohort from FINRISK-2002

	Control	Autoimmune	p-value
n	1712	158	--
Male (%)	651 (38)	54 (34)	0.34
Age (Range)	39 (24-72)	53 (25-74)	0.003
BMI (Range)	24 (16-48)	27 (18-41)	0.45

Supplementary Table 5

Description	Category	LPC (18:2) Standard			LPC (16:0) Standard		
		Effect Size	Error	P-Value	Effect Size	Error	P-Value
Other cheeses	Dairy	0.50	0.09	2.94E-06	0.15	0.10	3.61E-01
Low-fat cheese	Dairy	-0.21	0.09	1.21E-01	0.01	0.10	9.67E-01
Cultured milk or yoghurt	Dairy	0.07	0.09	6.95E-01	-0.02	0.10	9.57E-01
Sweet cookies or pies	Dessert, Carbohydrates	0.56	0.09	1.37E-07	0.13	0.10	4.85E-01
DELICACIES	Dessert, Carbohydrates	0.40	0.09	3.52E-04	0.10	0.10	5.94E-01
Sugared soft drinks	Dessert, Carbohydrates	0.33	0.10	8.70E-03	0.23	0.10	1.35E-01
Dark wheat or mixed grain bread	Dessert, Carbohydrates	0.31	0.09	1.13E-02	-0.14	0.10	4.45E-01
FIBER_RICH_B READ	Dessert, Carbohydrates	0.31	0.09	1.13E-02	-0.01	0.10	9.61E-01
Low-calorie soft drinks	Dessert, Carbohydrates	-0.25	0.10	9.53E-02	0.03	0.11	9.19E-01
Macaroni, pasta or rice	Dessert, Carbohydrates	-0.20	0.10	1.60E-01	-0.22	0.10	1.35E-01
Pastries	Dessert, Carbohydrates	0.20	0.10	1.64E-01	0.07	0.10	7.27E-01
Chocolate	Dessert, Carbohydrates	0.20	0.09	1.71E-01	-0.12	0.10	5.00E-01
Rye bread, rye crisp	Dessert, Carbohydrates	0.18	0.10	2.61E-01	0.13	0.11	5.14E-01
Candy	Dessert, Carbohydrates	0.07	0.09	6.95E-01	0.06	0.10	7.72E-01
Ice cream etc	Dessert, Carbohydrates	0.06	0.10	7.52E-01	-0.04	0.10	8.31E-01
White bread	Dessert, Carbohydrates	0.06	0.10	7.72E-01	0.08	0.10	7.01E-01
Diabetic diet	Diet	-1.38	0.31	2.64E-04	-1.14	0.30	3.64E-03
Weight diet	Diet	-0.91	0.22	7.54E-04	-0.10	0.23	8.29E-01
Meals	Diet	0.30	0.10	2.09E-02	0.25	0.10	8.82E-02
Healthiness of eating habits / range 1-5, greater number equals unhealthier diet	Diet	-0.16	0.10	3.65E-01	0.19	0.11	2.93E-01
Low cholesterol diet	Diet	-0.26	0.17	3.66E-01	0.17	0.18	6.37E-01
FIBER_TOTAL	Diet	0.12	0.09	4.94E-01	0.16	0.10	3.43E-01
Lactose-free diet	Diet	0.14	0.16	6.65E-01	0.02	0.17	9.60E-01
Store bought ready-to-eat meals	Diet	0.06	0.10	7.52E-01	-0.18	0.10	3.09E-01
Glutein-free diet	Diet	-0.23	0.51	8.28E-01	-0.65	0.52	5.00E-01
Vegetarian	Diet	0.04	0.31	9.60E-01	-0.35	0.32	5.84E-01
Fresh salad and vegetables	Fruits, Vegetables	0.29	0.09	2.10E-02	0.09	0.10	6.50E-01
Fruit and berry juices	Fruits, Vegetables	0.19	0.09	1.71E-01	0.27	0.10	4.22E-02
Fresh or frozen berries	Fruits, Vegetables	-0.17	0.09	2.31E-01	0.07	0.10	7.20E-01
HEALTHY_VEG ETABLES	Fruits, Vegetables	0.14	0.09	3.89E-01	0.16	0.10	3.38E-01

Cooked vegetables	Fruits, Vegetables	0.09	0.09	6.20E-01	0.18	0.10	2.31E-01
Cooked or mashed potatoes	Fruits, Vegetables	0.09	0.10	6.29E-01	0.13	0.10	4.91E-01
Fruits	Fruits, Vegetables	-0.07	0.09	7.27E-01	-0.02	0.10	9.57E-01
Vegetarian foods	Fruits, Vegetables	0.02	0.09	9.41E-01	0.06	0.10	7.43E-01
FRUITS_BERRIES	Fruits, Vegetables	0.01	0.09	9.74E-01	0.20	0.10	1.73E-01
CEREALS	Grains or Nuts	0.20	0.09	1.53E-01	0.02	0.10	9.57E-01
Nuts	Grains or Nuts	0.25	0.14	2.79E-01	-0.09	0.15	7.52E-01
Herbs	Grains or Nuts	-0.13	0.10	4.55E-01	0.10	0.10	6.29E-01
Seeds	Grains or Nuts	0.08	0.14	7.85E-01	0.01	0.15	9.76E-01
Muesli or cereal	Grains or Nuts	0.03	0.10	9.31E-01	-0.02	0.10	9.57E-01
Spreads	Oils	0.52	0.10	2.66E-06	0.14	0.10	4.55E-01
Dressing	Oils	0.32	0.09	8.70E-03	0.02	0.10	9.57E-01
Salmon	Protein	-0.53	0.10	2.66E-06	-0.31	0.10	2.20E-02
Fish and fish dishes	Protein	-0.40	0.10	7.54E-04	-0.21	0.10	1.60E-01
Sausages and wieners	Protein	0.31	0.09	1.13E-02	0.20	0.10	1.79E-01
Herring	Protein	-0.33	0.11	2.77E-02	-0.17	0.12	4.12E-01
WHITE_MEAT	Protein	-0.28	0.09	2.77E-02	-0.18	0.10	2.46E-01
Cold cuts (e.g. salami)	Protein	0.23	0.09	8.72E-02	0.14	0.10	4.12E-01
Other fish	Protein	-0.21	0.09	1.37E-01	0.00	0.10	9.90E-01
Soy	Protein	0.35	0.16	1.45E-01	0.35	0.17	1.78E-01
RED_MEAT	Protein	0.18	0.09	2.15E-01	0.16	0.10	2.97E-01
PROCESSED_MEAT	Protein	0.17	0.09	2.31E-01	0.13	0.10	4.14E-01
Cold meat cuts (e.g. cooked ham)	Protein	-0.14	0.09	3.89E-01	0.02	0.10	9.57E-01
Meat dishes	Protein	0.09	0.10	6.51E-01	0.18	0.10	2.79E-01
Poultry meat	Protein	-0.07	0.10	7.21E-01	-0.08	0.10	7.08E-01
Eggs	Protein	0.06	0.09	7.32E-01	0.06	0.10	7.77E-01
JUNK_FOOD	Unhealthy Foods	0.29	0.09	2.20E-02	0.08	0.10	7.01E-01
Fried potatoes or french fries	Unhealthy Foods	0.28	0.10	3.97E-02	0.10	0.10	6.22E-01
Pizza	Unhealthy Foods	0.27	0.10	7.92E-02	-0.10	0.11	6.49E-01
Salty snacks	Unhealthy Foods	0.27	0.12	1.30E-01	0.11	0.12	6.75E-01
Fast food	Unhealthy Foods	0.05	0.13	8.73E-01	0.04	0.13	9.32E-01
Burgers	Unhealthy Foods	0.03	0.12	9.41E-01	-0.02	0.13	9.55E-01