

	Young	Old	Old n-3	Young v. Old		Old n-3 v. Old	
	N=12	N=12	N=12	ratio	Adj P	ratio	Adj P
2-Aminobutyrate	26.0 ± 2.1	27.7 ± 1.8	28.1 ± 1.1	0.94	0.861	1.01	0.908
2-Hydroxybutyrate	44.1 ± 2.9	46.6 ± 3.5	43.9 ± 2.6	0.95	0.861	0.95	0.718
2-Hydroxyisovalerate	6.88 ± 0.74	5.35 ± 0.68	5.23 ± 0.48	1.29	0.358	0.99	0.924
2-Oxoisovalerate	13.3 ± 0.5	13.4 ± 0.7	12.2 ± 0.4	0.99	0.950	0.91	0.336
2-Oxoglutarate	5.55 ± 0.60	7.10 ± 0.83	7.38 ± 0.72	0.74	0.370	1.13	0.79
2-Oxoisocaproate	30.5 ± 1.47	25.7 ± 1.5	22.8 ± 1.1	1.19	0.179	0.90	0.105
3-Hydroxybutyrate	76.2 ± 12.6	87.9 ± 26.2	124 ± 22	0.87	0.917	1.29	0.718
3-Hydroxyisobutyrate	16.6 ± 1.0	16.4 ± 1.2	14.8 ± 1.1	1.01	0.950	0.91	0.336
3-Methyl-2-oxovalerate	23.0 ± 1.0	19.1 ± 0.7	17.1 ± 0.6	1.20	0.090	0.89	0.053
Acetate	105 ± 11	92.0 ± 11.9	103 ± 10	1.15	0.752	1.12	0.099
Acetoacetate	22.1 ± 2.6	24.6 ± 6.6	28.6 ± 5.4	0.90	0.917	1.17	0.746
Acetone	16.4 ± 3.3	15.6 ± 3.1	23.1 ± 4.2	1.05	0.950	1.38	0.379
Alanine	215 ± 21	225 ± 17	203 ± 17	0.96	0.917	0.91	0.501
Asparagine	36.7 ± 2.5	37.1 ± 2.8	43.4 ± 4.0	0.99	0.950	1.18	0.393
Betaine	36.9 ± 3.5	39.3 ± 2.4	44.5 ± 2.9	0.94	0.861	1.13	0.099
Choline	5.78 ± 0.75	5.75 ± 0.33	6.23 ± 0.70	1.00	0.977	1.08	0.746
Citrate	101 ± 6	134 ± 8	130 ± 8	0.76	0.057	0.96	0.746
Creatine	39.4 ± 3.2	50.6 ± 3.8	55.2 ± 4.0	0.78	0.179	1.07	0.718
Creatinine	61.9 ± 3.0	66.6 ± 2.9	66.0 ± 2.5	0.93	0.585	1.00	0.908
Formate	49.2 ± 3.5	42.3 ± 3.62	44.5 ± 2.8	1.16	0.402	1.08	0.718
Glucose	4070 ± 64	4297 ± 104	4281 ± 106	0.95	0.234	1.00	0.807
Glutamate	36.8 ± 2.6	39.9 ± 2.0	44.7 ± 2.8	0.92	0.666	1.08	0.344
Glutamine	426 ± 17	424 ± 18	413 ± 13	1.01	0.950	0.97	0.746
Glycerol	36.8 ± 2.6	557 ± 7.68	51.9 ± 4.7	0.67	0.179	0.95	0.837
Glycine	189 ± 13	198 ± 9	218 ± 11	0.95	0.861	1.09	0.226
Histidine	84.6 ± 5.4	71.8 ± 1.9	68.1 ± 2.4	1.18	0.179	0.94	0.414
Isoleucine	67.7 ± 4.4	64.1 ± 3.6	62.6 ± 1.7	1.06	0.861	0.98	0.746
Lactate	562 ± 52	727 ± 72	622 ± 82	0.77	0.234	0.86	0.379
Leucine	101 ± 5	102 ± 3	101 ± 4	0.99	0.950	0.98	0.863
Lysine	128 ± 6	135 ± 4	131 ± 5	0.95	0.666	0.99	0.863
Mannose	56.6 ± 2.3	57.1 ± 1.8	58.2 ± 1.8	0.99	0.950	1.03	0.718
Methionine	20.7 ± 1.4	21.3 ± 0.9	19.2 ± 0.8	0.97	0.917	0.89	0.336
N,N-Dimethylglycine	2.59 ± 0.24	3.30 ± 0.21	3.78 ± 0.27	0.79	0.179	1.13	0.336
Ornithine	30.1 ± 2.4	39.0 ± 4.1	36.3 ± 2.2	0.77	0.234	0.92	0.703
Phenylalanine	45.4 ± 2.0	50.1 ± 1.9	50.1 ± 2.3	0.91	0.272	1.02	0.746
Proline	185 ± 13	187 ± 22	182 ± 14	0.99	0.950	0.98	0.807
Pyruvate	70.9 ± 7.7	75.5 ± 8.7	63.4 ± 8.3	0.94	0.917	0.84	0.105
Serine	91.1 ± 5.6	77.7 ± 4.5	85.1 ± 6.1	1.17	0.235	1.09	0.559
Succinate	3.87 ± 0.30	3.63 ± 0.23	3.76 ± 0.20	1.07	0.861	1.02	0.908
Threonine	140 ± 9	120 ± 6	114 ± 8	1.16	0.272	0.96	0.809
Tryptophan	47.4 ± 1.8	42.2 ± 1.5	39.3 ± 1.6	1.12	0.179	0.92	0.336
Tyrosine	55.7 ± 3.9	67.3 ± 3.9	63.9 ± 3.0	0.83	0.179	0.94	0.648

Urea	1078 ± 64	1535 ± 106	1513 ± 116	0.70	0.056	1.00	<i>0.940</i>
Valine	220 ± 11	214 ± 7	209 ± 8	1.03	<i>0.917</i>	0.98	<i>0.718</i>
myo-Inositol	20.7 ± 2.5	28.2 ± 1.2	29.4 ± 3.3	0.74	<i>0.153</i>	1.05	<i>0.837</i>
π-Methylhistidine	18.3 ± 3.5	32.7 ± 3.7	33.7 ± 3.9	0.56	<i>0.118</i>	1.00	<i>0.951</i>
Unknown**	ND	ND	50.9 ± 5.6				

Supplemental Table 1. ¹H NMR small metabolite profiling. Data are shown as mean ± SEM with p-values adjusted for multiple comparisons using the Benjamini-Hochberg Adjustment. ND, not detected.

	Young N=12	Old N=12	Old n-3 N=12	Young v. Old		Old n-3 v. Old	
				ratio	Adj P	ratio	Adj P
Acylcarnitines							
AC(0:0)	41.1 ± 2.7	45.2 ± 1.3	41.7 ± 2.1	0.90	0.661	0.92	0.290
AC(2:0)	6.10 ± 0.73	7.93 ± 0.62	8.06 ± 0.49	0.76	0.609	1.01	0.899
AC(3:0)	0.51 ± 0.06	0.41 ± 0.04	0.38 ± 0.03	1.23	0.661	0.93	0.515
Amino Acids							
Alanine	253 ± 25	266 ± 21	239 ± 20	0.93	0.896	0.89	0.274
Arginine	74.2 ± 6.4	72.3 ± 4.2	71.5 ± 5.3	1.03	0.948	0.98	0.876
Asparagine	44.9 ± 2.3	41.1 ± 2.1	40.3 ± 1.9	1.10	0.661	0.97	0.694
Aspartate	5.36 ± 0.25	5.18 ± 0.25	5.58 ± 0.58	1.04	0.873	1.06	0.712
Citrate	28.8 ± 1.9	41.7 ± 3.2	38.5 ± 1.7	0.68	0.232	0.91	0.343
Glutamine	634 ± 31	698 ± 14	683 ± 15	0.91	0.609	0.98	0.567
Glutamate	57.7 ± 3.1	61.3 ± 3.8	64.5 ± 3.4	0.96	0.836	1.06	0.393
Glycine	216 ± 14	237 ± 10	258 ± 13	0.92	0.661	1.08	0.105
Histidine	90.2 ± 5.7	79.2 ± 2.2	76.0 ± 2.2	1.12	0.609	0.95	0.447
Isoleucine	94.2 ± 5.5	92.7 ± 4.4	88.0 ± 2.1	1.01	0.963	0.95	0.450
Lysine	180 ± 9	185 ± 6	186 ± 7	0.97	0.896	1.01	0.793
Methionine	24.0 ± 1.1	21.6 ± 0.9	21.0 ± 0.3	1.10	0.609	0.96	0.659
Ornithine	53.5 ± 3.9	67.3 ± 4.6	65.9 ± 4.1	0.80	0.505	0.98	0.838
Phenylalanine	54.4 ± 1.7	58.8 ± 2.5	54.8 ± 1.44	0.92	0.661	0.92	0.119
Proline	177 ± 13	195 ± 25	189 ± 13	0.89	0.836	0.96	0.712
Serine	107 ± 4	94.1 ± 5.7	95.2 ± 4.9	1.14	0.609	1.00	0.751
Threonine	135 ± 10	117 ± 5	113 ± 7	1.16	0.648	0.96	0.567
Tryptophan	54.9 ± 2.0	47.0 ± 2.0	42.4 ± 2.2	1.18	0.407	0.89	0.120
Tyrosine	51.3 ± 3.3	62.3 ± 3.8	58.6 ± 2.3	0.82	0.518	0.93	0.356
Valine	274 ± 13	270 ± 9	264 ± 9	1.01	0.932	0.98	0.556
xLeucine	191 ± 1.	185 ± 9	181 ± 7	1.03	0.896	0.98	0.692
Biogenic Amines							
ADMA	0.46 ± 0.02	0.51 ± 0.01	0.52 ± 0.01	0.90	0.609	1.02	0.576
Creatinine	70.1 ± 3.6	73.8 ± 3.9	73.8 ± 3.3	0.93	0.836	0.99	0.983
Kynurenine	1.68 ± 0.07	2.37 ± 0.21	2.09 ± 0.22	0.70	0.297	0.89	0.013
Sarcosine	3.90 ± 0.44	3.52 ± 0.47	4.08 ± 0.53	1.11	0.861	1.18	0.536
SDMA	0.42 ± 0.02	0.55 ± 0.03	0.57 ± 0.03	0.76	0.117	1.03	0.437
Serotonin	0.12 ± 0.03	0.17 ± 0.03	0.17 ± 0.04	0.80	0.661	0.95	0.963
t4-OH-Pro	8.92 ± 0.53	8.98 ± 0.40	11.6 ± 0.5	1.01	0.996	1.30	0.001
Taurine	49.5 ± 3.4	56.8 ± 2.3	55.0 ± 3.9	0.89	0.609	0.95	0.712

Supplemental Table 2: Amines and acylcarnitines. Data are shown as mean ± SEM with p values adjusted for multiple comparisons using the Benjamini-Hochberg Adjustment.

	Young N=12	Old N=12	Old n-3 N=12	Young v. Old		Old n-3 v. Old	
				ratio	Adj P	ratio	Adj P
Glycerophospholipids							
LPC(16:0)	50.8 ± 2.95	42.2 ± 1.9	42.3 ± 2.1	1.21	0.470	1.00	0.963
LPC(16:1)	1.26 ± 0.07	1.06 ± 0.04	0.91 ± 0.04	1.17	0.443	0.84	0.010
LPC(17:0)	1.10 ± 0.11	0.94 ± 0.07	0.97 ± 0.07	1.16	0.661	1.01	0.692
LPC(18:0)	35.0 ± 3.4	33.1 ± 2.0	33.7 ± 2.5	1.07	0.896	1.00	0.790
LPC(18:1)	22.8 ± 1.8	19.2 ± 1.4	17.6 ± 1.3	1.18	0.633	0.91	0.095
LPC(18:2)	38.8 ± 4.3	28.9 ± 2.7	25.4 ± 2.1	1.33	0.609	0.87	0.023
LPC(20:4)	5.5 ± 0.7	4.0 ± 0.4	3.1 ± 0.3	1.32	0.609	0.76	0.003
LPC(22:6)	1.70 ± 0.20	1.32 ± 0.11	1.82 ± 0.14	1.28	0.609	1.37	0.001
PC(30:0)	2.57 ± 0.21	2.24 ± 0.20	2.19 ± 0.26	1.11	0.665	0.96	0.800
PC(30:3)	3.27 ± 0.40	4.34 ± 0.29	2.82 ± 0.43	0.74	0.518	0.62	0.065
PC(32:0)	13.1 ± 0.9	13.6 ± 0.9	14.7 ± 1.0	0.96	0.896	1.08	0.139
PC(32:1)	11.8 ± 1.2	11.3 ± 0.9	9.41 ± 0.75	1.03	0.896	0.82	0.007
PC(32:2)	4.45 ± 0.31	4.48 ± 0.29	3.55 ± 0.24	0.98	0.996	0.78	0.009
PC(33:0)	0.86 ± 0.06	0.83 ± 0.07	0.83 ± 0.06	1.02	0.896	0.99	0.963
PC(33:1)	3.03 ± 0.13	2.94 ± 0.22	2.52 ± 0.15	1.02	0.896	0.85	0.026
PC(33:2)	3.36 ± 0.24	3.49 ± 0.22	2.90 ± 0.19	0.96	0.896	0.82	0.009
PC(33:3)	1.17 ± 0.06	1.22 ± 0.06	1.19 ± 0.05	0.96	0.870	0.96	0.803
PC(34:1)	191 ± 10	193 ± 11	171 ± 9	0.99	0.996	0.88	0.023
PC(34:2)	408 ± 23	435 ± 22	373 ± 21	0.94	0.773	0.85	0.001
PC(34:3)	10.9 ± 0.7	12.0 ± 0.6	8.8 ± 0.5	0.91	0.665	0.72	0.001
PC(34:4)	1.11 ± 0.10	1.05 ± 0.12	0.77 ± 0.08	1.03	0.899	0.72	0.024
PC(35:1)	3.04 ± 0.13	3.32 ± 0.22	3.05 ± 0.17	0.91	0.665	0.91	0.133
PC(35:2)	8.27 ± 0.53	9.55 ± 0.54	8.23 ± 0.48	0.86	0.609	0.85	0.008
PC(35:3)	2.43 ± 0.14	2.45 ± 0.13	1.86 ± 0.11	0.99	0.996	0.75	0.003
PC(35:4)	0.98 ± 0.05	0.89 ± 0.12	0.77 ± 0.07	1.07	0.836	0.84	0.121
PC(36:1)	28.0 ± 4.0	33.4 ± 5.0	36.5 ± 2.6	0.88	0.785	1.13	0.567
PC(36:2)	191 ± 10	214 ± 9	183 ± 10	0.90	0.609	0.85	0.003
PC(36:3)	128 ± 10	132 ± 6	90.7 ± 4.2	0.98	0.920	0.69	0.001
PC(36:4)	159 ± 11	164 ± 18	132 ± 11	0.96	0.961	0.80	0.011
PC(37:1)	0.71 ± 0.05	0.90 ± 0.09	0.58 ± 0.06	0.78	0.609	0.68	0.020
PC(37:2)	0.96 ± 0.06	1.10 ± 0.06	0.93 ± 0.06	0.87	0.609	0.84	0.011
PC(37:3)	1.83 ± 0.14	2.08 ± 0.14	1.38 ± 0.09	0.87	0.661	0.66	0.001
PC(37:4)	4.57 ± 0.20	5.21 ± 0.54	4.08 ± 0.38	0.87	0.665	0.77	0.009
PC(37:5)	4.01 ± 0.22	4.07 ± 0.21	5.14 ± 0.33	0.99	0.965	1.24	0.041
PC(37:6)	1.49 ± 0.10	1.38 ± 0.15	1.70 ± 0.11	1.07	0.836	1.20	0.081
PC(38:0)	34.0 ± 3.0	33.8 ± 3.5	32.1 ± 2.9	1.05	0.996	1.00	0.708
PC(38:1)	5.28 ± 0.65	5.19 ± 0.53	5.16 ± 0.45	1.04	0.996	1.04	0.963
PC(38:2)	3.57 ± 0.63	3.67 ± 0.63	3.48 ± 0.34	1.04	0.996	0.99	0.807
PC(38:3)	35.2 ± 2.4	39.1 ± 2.6	25.4 ± 2.0	0.90	0.665	0.65	0.001
PC(38:4)	96.8 ± 5.4	111 ± 11	89.5 ± 7.5	0.86	0.665	0.80	0.014
PC(38:5)	42.8 ± 2.8	45.5 ± 3.7	90.3 ± 5.7	0.94	0.861	1.95	0.001
PC(38:6)	45.2 ± 5.9	50.0 ± 4.8	96.9 ± 6.6	0.92	0.836	1.92	0.001
PC(38:7)	2.97 ± 0.51	2.72 ± 0.36	3.97 ± 0.47	1.13	0.896	1.41	0.050
PC(39:3)	0.95 ± 0.04	0.94 ± 0.06	0.76 ± 0.04	1.00	0.979	0.79	0.009
PC(39:4)	0.99 ± 0.05	0.99 ± 0.05	1.29 ± 0.07	1.01	0.996	1.28	0.010
PC(39:5)	0.57 ± 0.06	0.65 ± 0.06	1.04 ± 0.09	0.87	0.665	1.56	0.003

PC(39:6)	1.65 ± 0.15	1.90 ± 0.15	2.88 ± 0.21	0.87	0.661	1.47	0.002
PC(39:7)	0.78 ± 0.08	0.79 ± 0.11	1.43 ± 0.11	0.99	0.996	1.73	0.007
PC(40:2)	0.80 ± 0.11	0.54 ± 0.09	0.49 ± 0.06	1.46	0.609	0.91	0.583
PC(40:4)	2.40 ± 0.30	2.92 ± 0.22	1.28 ± 0.25	0.83	0.661	0.48	0.005
PC(40:5)	9.77 ± 0.79	11.4 ± 0.9	16.2 ± 1.5	0.86	0.661	1.36	0.020
PC(40:6)	14.8 ± 2.0	18.5 ± 1.7	38.3 ± 3.0	0.83	0.661	2.03	0.001
PC(40:7)	1.86 ± 0.45	1.86 ± 0.59	4.37 ± 0.53	1.24	0.997	2.71	0.001
PC(40:8)	1.29 ± 0.13	1.19 ± 0.21	0.83 ± 0.24	1.04	0.896	0.52	0.406
PC(41:4)	0.72 ± 0.06	0.71 ± 0.08	0.73 ± 0.08	0.99	0.996	0.97	0.849
PC(42:3)	2.41 ± 0.38	1.51 ± 0.29	2.16 ± 0.10	1.64	0.609	1.49	0.114
PC(42:4)	0.41 ± 0.05	0.46 ± 0.05	0.42 ± 0.07	0.90	0.824	0.89	0.712
PC(42:6)	0.18 ± 0.09	0.60 ± 0.13	0.74 ± 0.06	0.33	0.443	1.32	0.260
PC(42:7)	0.75 ± 0.12	0.61 ± 0.08	0.66 ± 0.11	1.28	0.746	1.05	0.790
PC(42:10)	0.66 ± 0.18	0.94 ± 0.22	0.49 ± 0.11	0.65	0.729	0.52	0.107
PC(44:1)	1.60 ± 0.21	1.39 ± 0.28	0.71 ± 0.08	1.10	0.861	0.50	0.040
PC(46:2)	1.86 ± 0.28	1.62 ± 0.19	0.79 ± 0.11	1.14	0.836	0.47	0.005
PC-O(32:0)	1.76 ± 0.14	1.34 ± 0.13	0.10 ± 0.04	1.29	0.518	0.07	0.001
PC-O(32:1)	1.40 ± 0.24	1.04 ± 0.17	1.17 ± 0.18	1.26	0.661	1.04	0.614
PC-O(34:0)	0.60 ± 0.04	0.59 ± 0.04	0.46 ± 0.03	1.02	0.996	0.78	0.006
PC-O(34:1)	4.50 ± 0.34	4.76 ± 0.33	3.91 ± 0.23	0.95	0.869	0.82	0.011
PC-O(34:2)	8.37 ± 0.68	8.95 ± 0.61	6.90 ± 0.46	0.93	0.836	0.76	0.002
PC-O(34:3)	9.22 ± 0.80	9.24 ± 0.71	7.97 ± 0.55	0.99	0.996	0.85	0.011
PC-O(34:4)	0.40 ± 0.07	0.47 ± 0.07	0.37 ± 0.07	0.90	0.836	0.80	0.282
PC-O(35:3)	1.05 ± 0.07	1.01 ± 0.08	0.87 ± 0.06	1.03	0.896	0.85	0.090
PC-O(36:2)	2.63 ± 0.17	2.73 ± 0.17	1.92 ± 0.11	0.96	0.896	0.70	0.001
PC-O(36:3)	7.26 ± 0.53	7.55 ± 0.52	5.26 ± 0.32	0.94	0.896	0.69	0.001
PC-O(36:4)	19.5 ± 1.4	19.2 ± 1.9	13.6 ± 1.1	0.99	0.996	0.70	0.002
PC-O(36:5)	13.7 ± 1.2	14.3 ± 1.6	16.1 ± 1.2	0.93	0.920	1.12	0.145
PC-O(38:3)	1.01 ± 0.20	0.81 ± 0.14	0.39 ± 0.13	1.31	0.795	0.40	0.010
PC-O(38:4)	10.1 ± 0.6	10.1 ± 0.7	5.7 ± 0.3	0.99	0.996	0.56	0.001
PC-O(38:5)	18.3 ± 1.3	19.8 ± 1.8	16.2 ± 1.0	0.91	0.836	0.82	0.027
PC-O(38:6)	5.73 ± 0.46	6.63 ± 0.61	11.8 ± 0.7	0.86	0.661	1.76	0.001
PC-O(40:4)	1.19 ± 0.09	1.16 ± 0.07	0.66 ± 0.03	1.03	0.920	0.57	0.001
PC-O(40:5)	2.43 ± 0.16	2.55 ± 0.15	1.92 ± 0.08	0.95	0.870	0.76	0.003
PC-O(40:6)	2.56 ± 0.23	2.92 ± 0.18	3.78 ± 0.20	0.87	0.661	1.28	0.002
PC-O(40:7)	1.44 ± 0.20	1.88 ± 0.17	3.43 ± 0.21	0.77	0.609	1.81	0.001
PC-O(42:4)	0.58 ± 0.05	0.53 ± 0.02	0.37 ± 0.02	1.10	0.743	0.69	0.001
PC-O(42:5)	1.26 ± 0.12	1.23 ± 0.09	0.89 ± 0.05	1.03	0.968	0.72	0.003
PC-O(42:6)	0.97 ± 0.09	1.04 ± 0.08	1.09 ± 0.06	0.93	0.861	1.03	0.397

Supplemental Table 3: Phospholipids. Data are shown as mean ± SEM with p values adjusted for multiple comparisons using the Benjamini-Hochberg Adjustment.

	Young N=12	Old N=12	Old n-3 N=12	Young v. Old		Old n-3 v. Old	
				ratio	Adj P	ratio	Adj P
Sphingolipids							
Cer(42:1)	2.18 ± 0.13	2.47 ± 0.14	2.27 ± 0.15	0.89	0.648	0.92	0.214
SM(32:1)	7.30 ± 0.48	8.48 ± 0.46	8.83 ± 0.51	0.85	0.609	1.02	0.484
SM(32:2)	0.71 ± 0.03	0.82 ± 0.04	0.82 ± 0.06	0.87	0.518	0.99	0.576
SM(33:1)	14.1 ± 0.8	15.1 ± 0.8	14.1 ± 0.6	0.92	0.748	0.90	0.437
SM(34:1)	89.1 ± 4.2	101 ± 4	106 ± 5	0.88	0.609	1.04	0.303
SM(34:2)	12.4 ± 0.5	15.2 ± 0.7	15.3 ± 0.9	0.82	0.297	1.00	0.803
SM(35:1)	2.50 ± 0.11	2.82 ± 0.15	2.97 ± 0.16	0.88	0.609	1.04	0.169
SM(36:0)	1.59 ± 0.53	1.93 ± 0.65	2.07 ± 0.58	0.76	0.896	1.07	0.849
SM(36:1)	28.5 ± 1.2	31.2 ± 2.3	32.6 ± 2.1	0.92	0.678	1.03	0.328
SM(36:2)	5.26 ± 0.20	6.02 ± 0.45	6.36 ± 0.47	0.88	0.633	1.04	0.189
SM(37:1)	1.88 ± 0.10	2.02 ± 0.18	2.11 ± 0.19	0.93	0.836	1.03	0.484
SM(38:1)	17.3 ± 0.9	19.4 ± 1.1	18.3 ± 1.0	0.89	0.648	0.92	0.401
SM(38:2)	6.93 ± 0.30	7.73 ± 0.54	7.80 ± 0.57	0.91	0.661	1.00	0.819
SM(39:1)	5.85 ± 0.34	6.67 ± 0.51	6.89 ± 0.54	0.86	0.661	1.00	0.604
SM(39:2)	0.90 ± 0.08	1.04 ± 0.09	1.15 ± 0.13	0.86	0.665	1.11	0.343
SM(40:1)	11.1 ± 4.0	14.0 ± 3.9	20.7 ± 4.1	0.73	0.870	1.38	0.138
SM(40:2)	21.6 ± 1.4	26.6 ± 1.4	26.3 ± 1.6	0.81	0.443	0.98	0.833
SM(41:1)	13.0 ± 0.6	14.1 ± 0.9	14.8 ± 1.0	0.91	0.665	1.03	0.335
SM(41:2)	9.83 ± 0.40	10.9 ± 0.8	11.3 ± 0.9	0.89	0.661	1.02	0.497
SM(42:1)	23.1 ± 1.6	24.8 ± 1.3	25.5 ± 1.5	0.93	0.785	1.02	0.567
SM(42:2)	50.4 ± 3.0	53.9 ± 3.1	55.3 ± 3.4	0.94	0.785	1.02	0.567
SM(42:3)	23.9 ± 1.4	21.1 ± 3.0	27.2 ± 1.9	1.17	0.785	1.31	0.133
SM(43:1)	2.32 ± 0.13	2.31 ± 0.27	1.94 ± 0.19	0.98	0.996	0.82	0.110
SM(43:2)	3.09 ± 0.19	3.10 ± 0.28	3.07 ± 0.27	0.99	0.996	0.97	0.849
SM(44:1)	1.03 ± 0.08	1.13 ± 0.13	1.10 ± 0.14	0.89	0.836	0.97	0.712
SM(44:2)	0.80 ± 0.05	0.85 ± 0.09	1.02 ± 0.08	0.93	0.870	1.20	0.139

Supplemental Table 4: Sphingolipids. Data are shown as mean ± SEM with p values adjusted for multiple comparisons using the Benjamini-Hochberg Adjustment.

	Young	Old	Old n-3	Young v. Old		Old n-3 v. Old	
	N=12	N=12	N=12	ratio	Adj P	ratio	Adj P
Cholesterol							
CE(16:0)	132 ± 11	155 ± 14	172 ± 12	0.85	0.661	1.08	0.219
CE(16:1)	59.6 ± 3.7	71.0 ± 6.4	67.6 ± 7.3	0.83	0.633	0.94	0.548
CE(18:1)	236 ± 49	244 ± 58	330 ± 89	0.97	0.996	1.43	0.218
CE(18:2)	3461 ± 238	4053 ± 202	3789 ± 215	0.85	0.609	0.91	0.300
CE(18:3)	124 ± 12	139 ± 10	113 ± 11	0.89	0.691	0.80	0.009
CE(20:4)	978 ± 88	1205 ± 153	1105 ± 106	0.79	0.661	0.90	0.349
CE(20:5)	108 ± 13	115 ± 12	970 ± 79	0.92	0.896	8.03	0.001
CE(22:5)	53.9 ± 3.7	51.5 ± 2.5	54.5 ± 3.3	1.05	0.870	1.07	0.258
CE(22:6)	121 ± 18	143 ± 11	271 ± 20	0.85	0.673	1.81	0.001
Diglycerides							
DG(34:1)	5.54 ± 0.50	5.93 ± 0.63	4.48 ± 0.47	0.92	0.894	0.75	0.011
DG(36:2)	5.40 ± 0.51	6.16 ± 0.60	4.47 ± 0.40	0.86	0.724	0.72	0.011
DG(36:3)	7.07 ± 0.80	8.60 ± 0.71	6.58 ± 0.47	0.81	0.661	0.76	0.015
DG(36:4)	3.13 ± 0.38	3.95 ± 0.33	3.15 ± 0.24	0.79	0.609	0.79	0.025
DG(39:0)	3.7 ± 0.5	4.2 ± 0.5	46.6 ± 3.7	0.86	0.836	10.60	0.001
DG(41:1)	4.8 ± 0.7	5.9 ± 0.6	13.0 ± 1.2	0.82	0.661	2.13	0.001
DG(42:0)	3.66 ± 0.29	3.65 ± 0.36	3.43 ± 0.29	1.01	0.996	0.93	0.712
DG(42:1)	13.8 ± 1.1	15.2 ± 1.1	13.9 ± 0.8	0.92	0.748	0.90	0.497
DG(44:3)	5.09 ± 0.53	5.67 ± 0.86	4.54 ± 0.43	0.89	0.861	0.79	0.161
DG-O(32:2)	2.85 ± 0.27	3.28 ± 0.30	2.67 ± 0.24	0.86	0.673	0.81	0.001
DG-O(34:1)	11.4 ± 1.3	12.5 ± 0.9	9.7 ± 0.8	0.91	0.836	0.77	0.001
DG-O(36:4)	3.29 ± 0.15	3.79 ± 0.14	3.51 ± 0.20	0.86	0.470	0.91	0.328
Triglycerides							
TG(44:1)	2.06 ± 0.20	1.56 ± 0.35	1.86 ± 0.44	1.28	0.661	1.18	0.369
TG(44:2)	1.22 ± 0.12	0.87 ± 0.19	0.74 ± 0.24	1.38	0.633	0.88	0.712
TG(48:1)	19.3 ± 1.6	18.4 ± 2.8	14.2 ± 2.7	1.02	0.925	0.77	0.040
TG(48:2)	14.0 ± 1.0	13.9 ± 2.3	10.7 ± 2.0	0.96	0.996	0.76	0.067
TG(48:3)	5.94 ± 1.03	6.80 ± 1.53	2.28 ± 1.23	0.87	0.896	0.36	0.023
TG(49:1)	3.86 ± 0.36	3.68 ± 0.66	2.58 ± 0.74	1.01	0.954	0.70	0.056
TG(49:2)	2.92 ± 0.25	2.86 ± 0.61	2.36 ± 0.47	0.97	0.996	0.81	0.297
TG(50:1)	44.6 ± 4.4	44.3 ± 6.3	32.2 ± 5.2	0.97	0.996	0.72	0.024
TG(50:2)	65.6 ± 5.9	69.2 ± 8.4	50.1 ± 5.9	0.92	0.896	0.71	0.015
TG(50:3)	40.9 ± 2.9	44.5 ± 4.9	33.8 ± 3.2	0.90	0.836	0.75	0.020
TG(50:4)	20.8 ± 1.0	22.0 ± 1.6	17.9 ± 2.0	0.94	0.836	0.80	0.064
TG(51:1)	2.25 ± 0.30	2.41 ± 0.60	0.59 ± 0.32	0.91	0.948	0.26	0.050
TG(51:2)	6.68 ± 0.53	7.19 ± 1.00	6.03 ± 0.78	0.91	0.896	0.83	0.139
TG(51:3)	6.43 ± 0.53	7.11 ± 0.79	5.57 ± 0.50	0.89	0.836	0.77	0.022
TG(51:4)	2.87 ± 0.24	3.21 ± 0.30	2.83 ± 0.17	0.88	0.750	0.88	0.144
TG(52:2)	183 ± 17	196 ± 19	144 ± 11	0.92	0.873	0.72	0.011
TG(52:3)	244 ± 24	278 ± 23	220 ± 12	0.87	0.678	0.78	0.022
TG(52:4)	123 ± 13	145 ± 12	121 ± 7	0.85	0.661	0.82	0.059
TG(52:5)	27.0 ± 2.7	30.8 ± 2.8	27.7 ± 1.8	0.88	0.724	0.89	0.318
TG(52:6)	3.99 ± 0.51	4.77 ± 0.53	7.23 ± 0.56	0.84	0.665	1.52	0.002
TG(53:3)	5.88 ± 0.56	7.01 ± 0.74	4.26 ± 1.04	0.83	0.661	0.57	0.059
TG(53:4)	3.67 ± 0.35	4.12 ± 0.38	4.04 ± 0.28	0.88	0.750	0.97	0.845

TG(53:5)	1.44 ± 0.11	1.65 ± 0.14	1.89 ± 0.18	0.86	0.661	1.13	0.318
TG(54:3)	60.9 ± 6.2	67.5 ± 5.4	49.8 ± 3.5	0.89	0.785	0.73	0.010
TG(54:4)	80.6 ± 8.3	94.7 ± 5.9	70.7 ± 4.9	0.85	0.661	0.73	0.008
TG(54:5)	62.0 ± 6.1	73.4 ± 4.3	59.3 ± 3.6	0.85	0.634	0.80	0.033
TG(54:6)	32.4 ± 3.4	38.1 ± 2.7	43.1 ± 2.7	0.85	0.661	1.12	0.260
TG(54:7)	6.46 ± 0.92	6.41 ± 0.74	18.1 ± 1.5	1.01	0.996	2.81	0.001
TG(56:6)	9.46 ± 0.50	10.6 ± 0.8	14.0 ± 0.9	0.88	0.661	1.32	0.005
TG(56:7)	11.9 ± 0.9	13.4 ± 1.1	30.7 ± 2.1	0.87	0.665	2.26	0.001
TG(56:8)	4.27 ± 0.57	5.27 ± 0.55	24.90 ± 2.16	0.80	0.661	4.71	0.001

Supplemental Table 4: Cholesterol, diglycerides, triglycerides. Data are shown as mean ± SEM with p values adjusted for multiple comparisons using the Benjamini-Hochberg Adjustment.

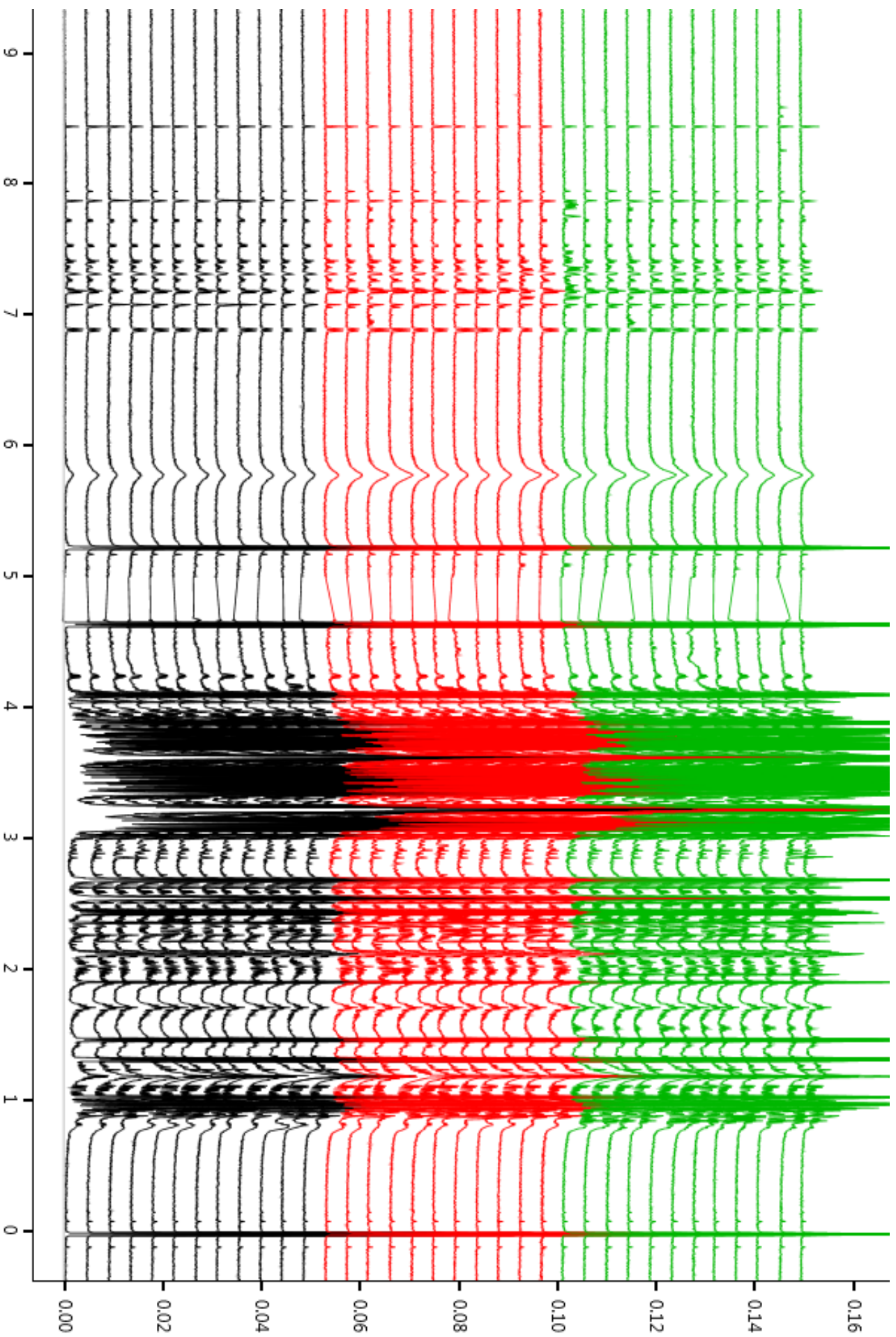


Figure S1. The plasma ^1H NMR spectra of young adults, **older adults at baseline** and **older adults after n3-PUFA supplementation** (full scale)

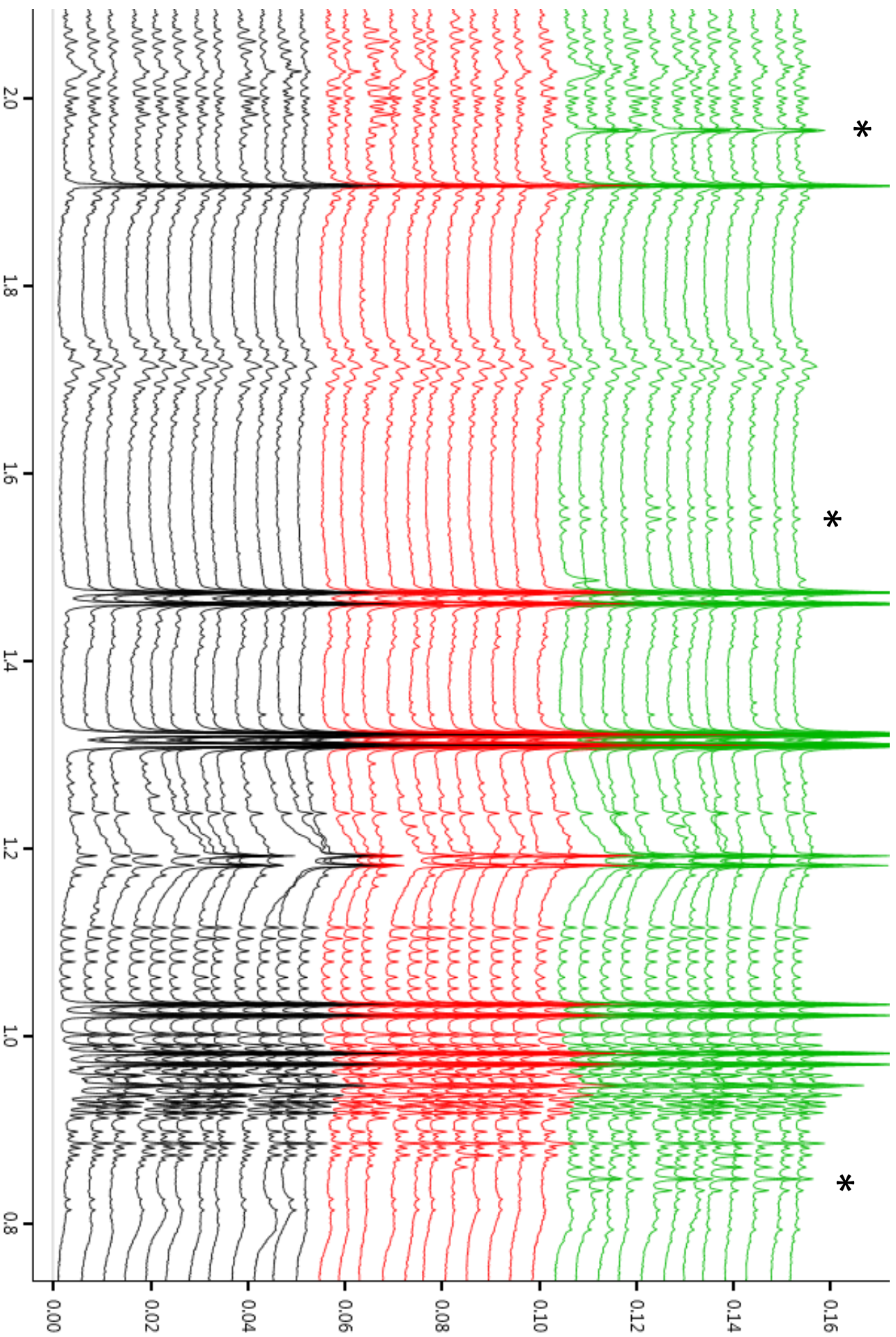


Figure S2. The plasma ^1H NMR spectra expansion: the signals present only in older adults after n3-PUFA supplementation are indicated by *

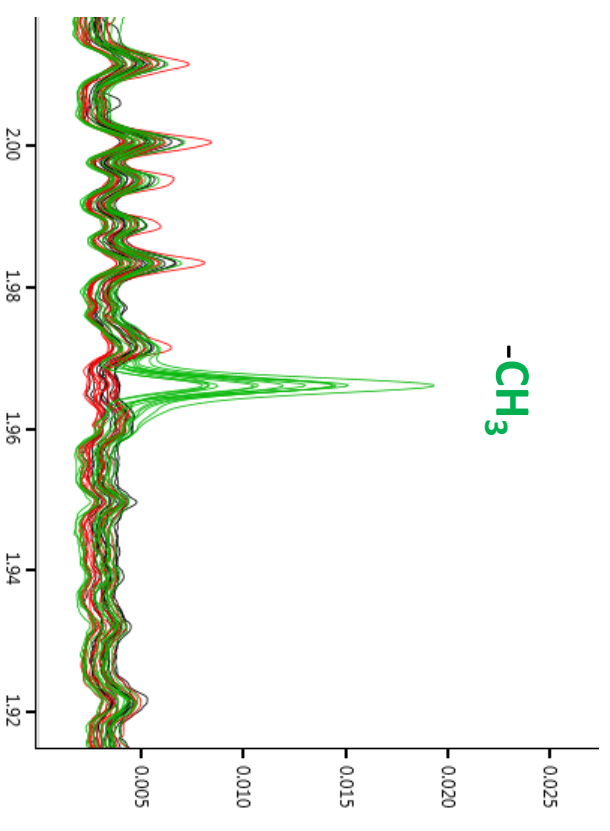
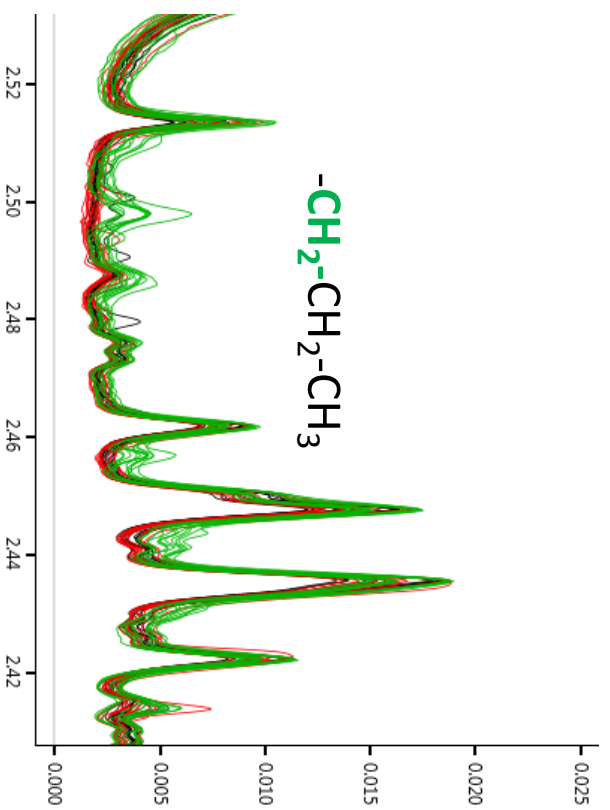
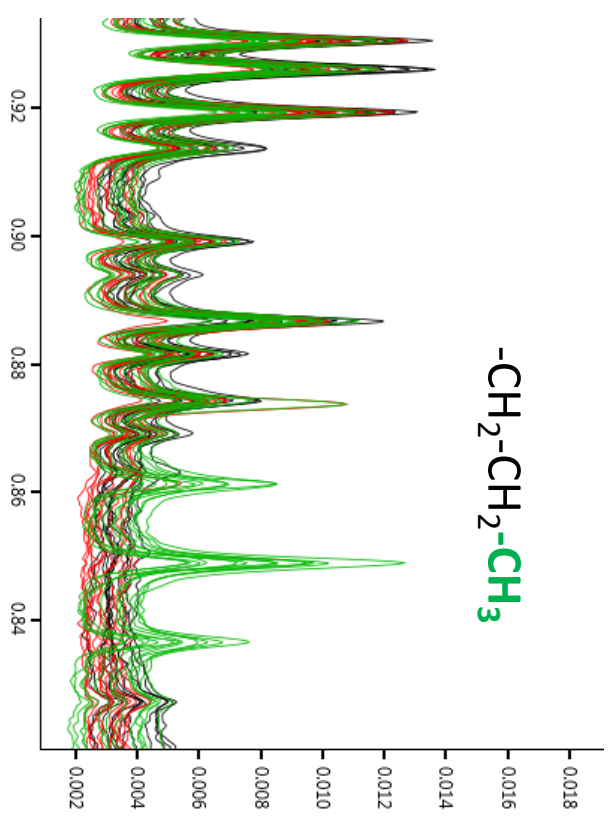
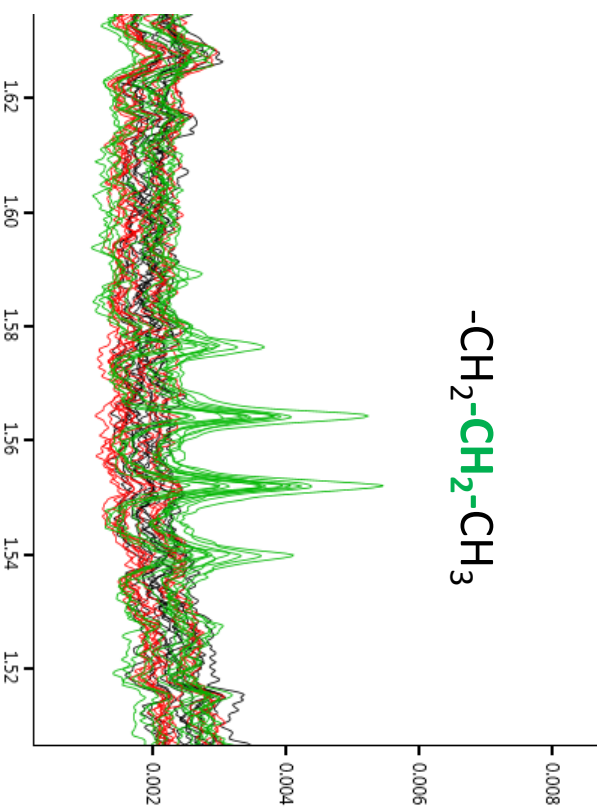


Figure S3. ^1H NMR spectra overlays: the signals present only in older adults after n3-PUFA supplementation with the assignments

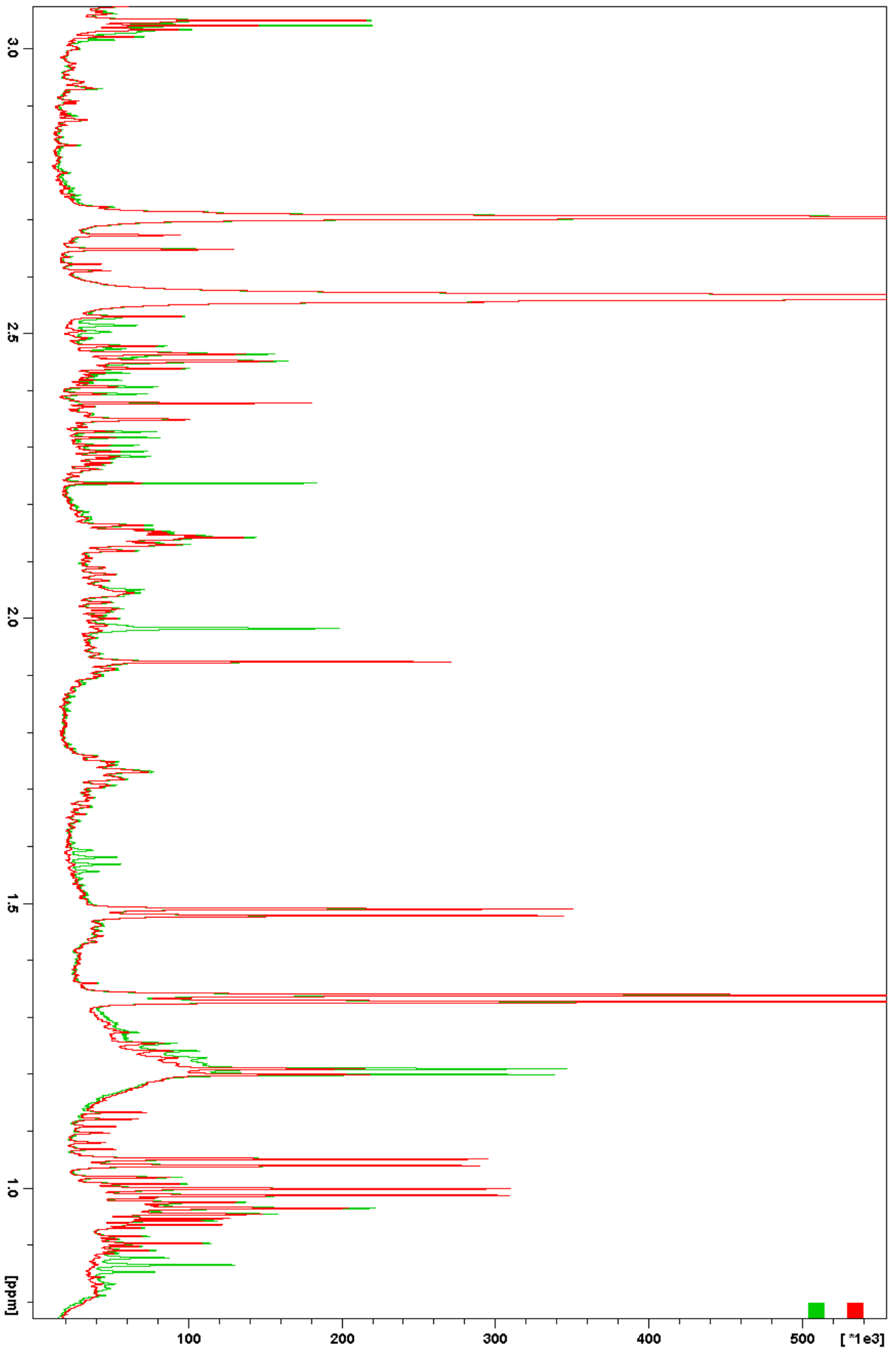


Figure S4. The comparison between ¹H NMR spectra of older adult **before** and **after** n3-PUFA supplementation

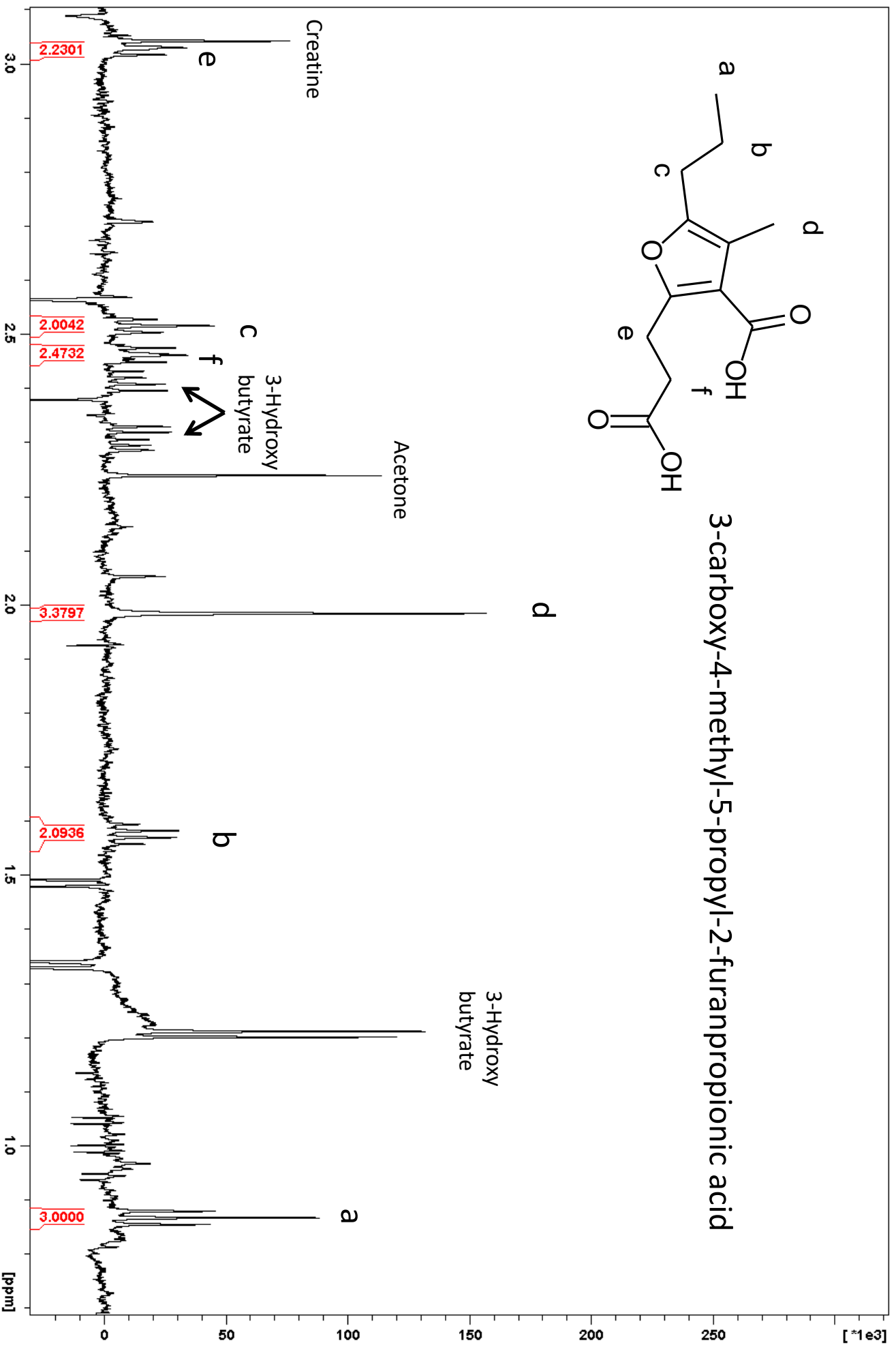


Figure S5. The ¹H NMR spectral difference between older adult before and after n3-PUFA supplementation with assignments

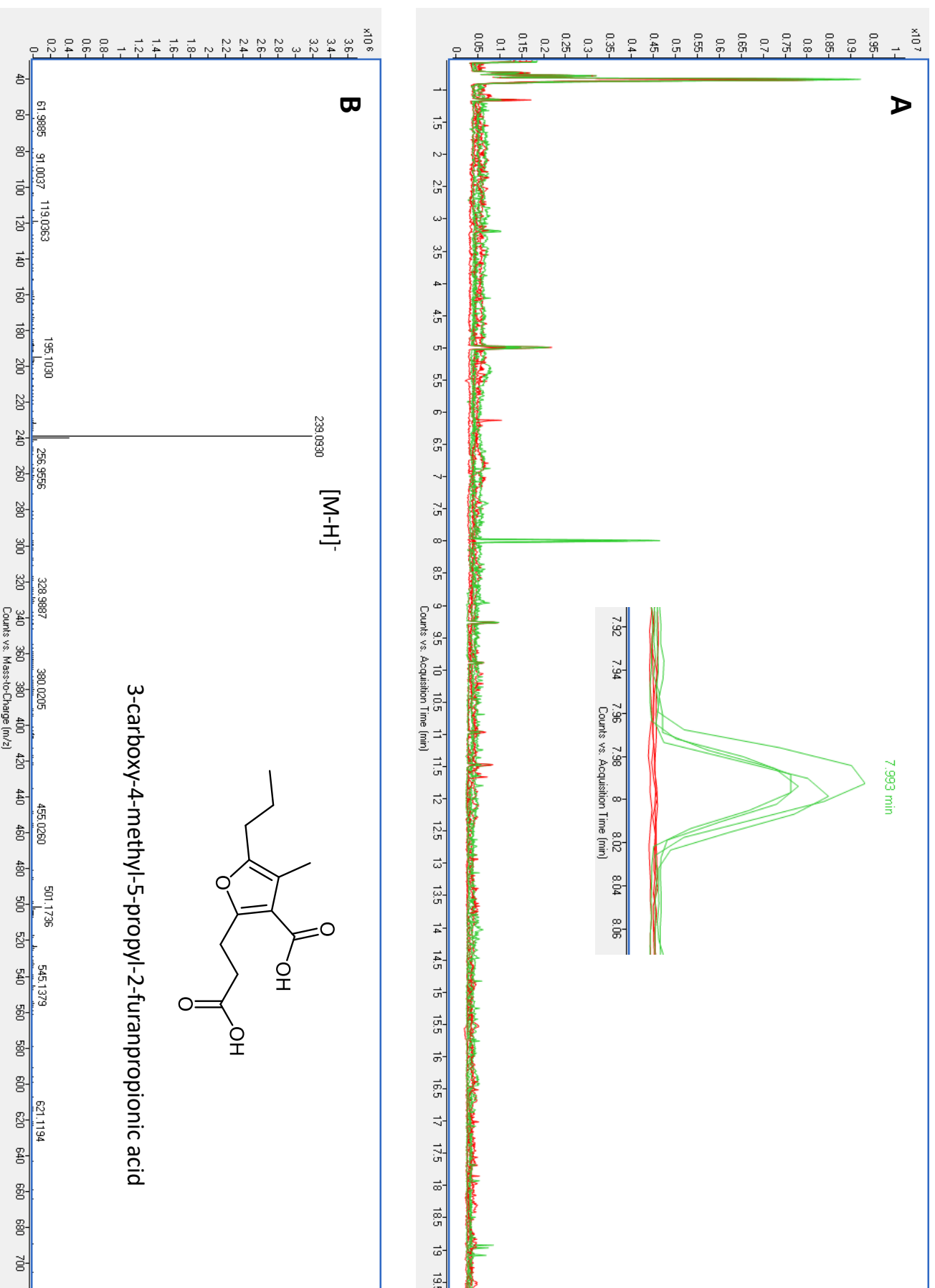


Figure S6. The plasma LC-MS chromatograms of four older adults **before** and **after n3-PUFA supplementation** (A) and negative ESI MS spectrum of the peak at 7.99 min

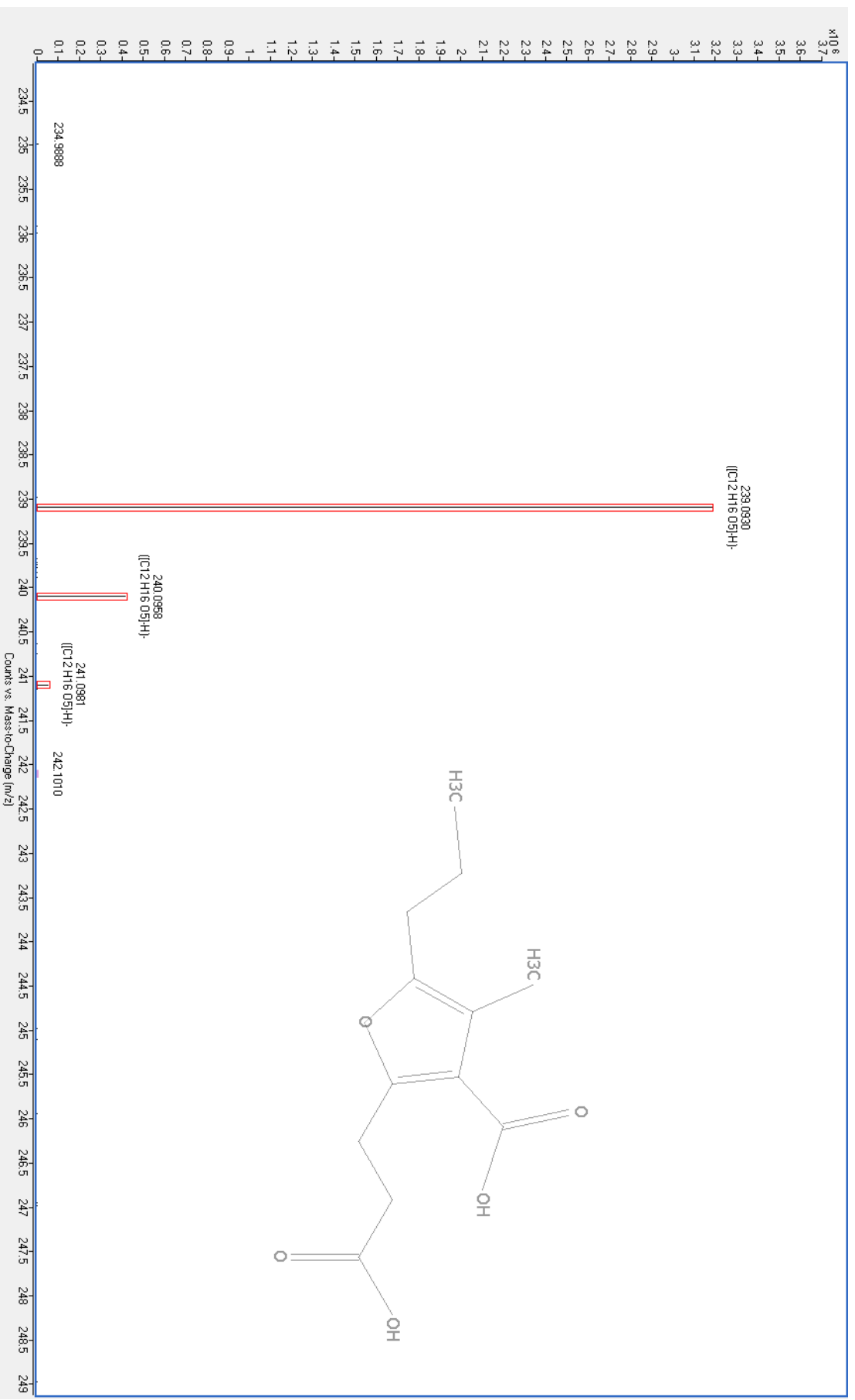


Figure S7. The library search (METLIN) of the negative ESI MS spectrum of the peak at 7.99 min

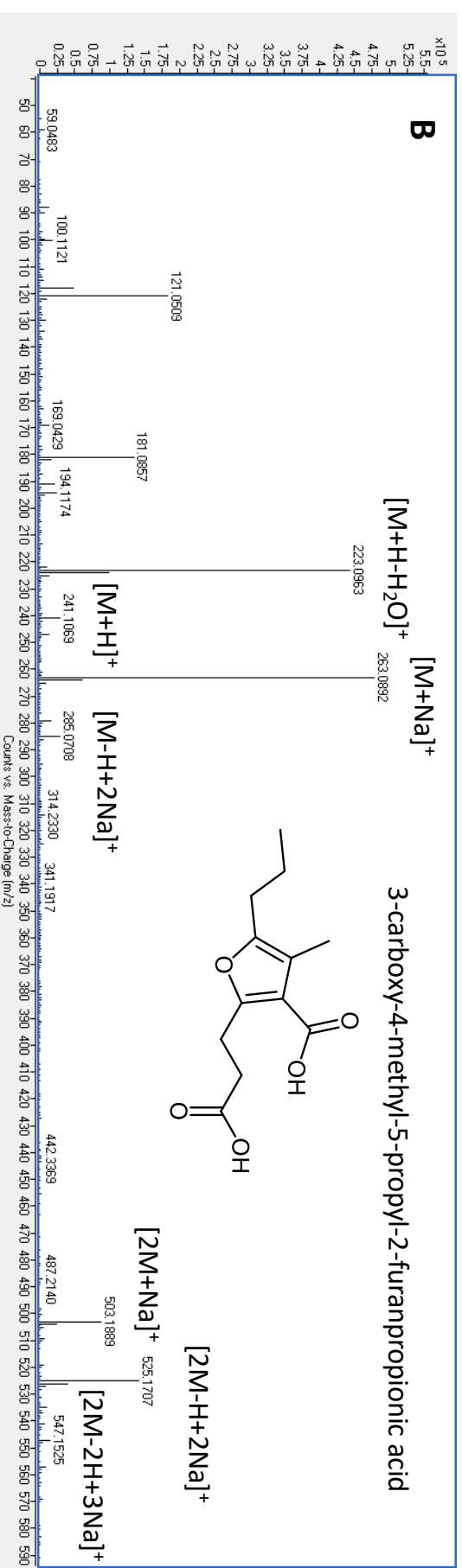
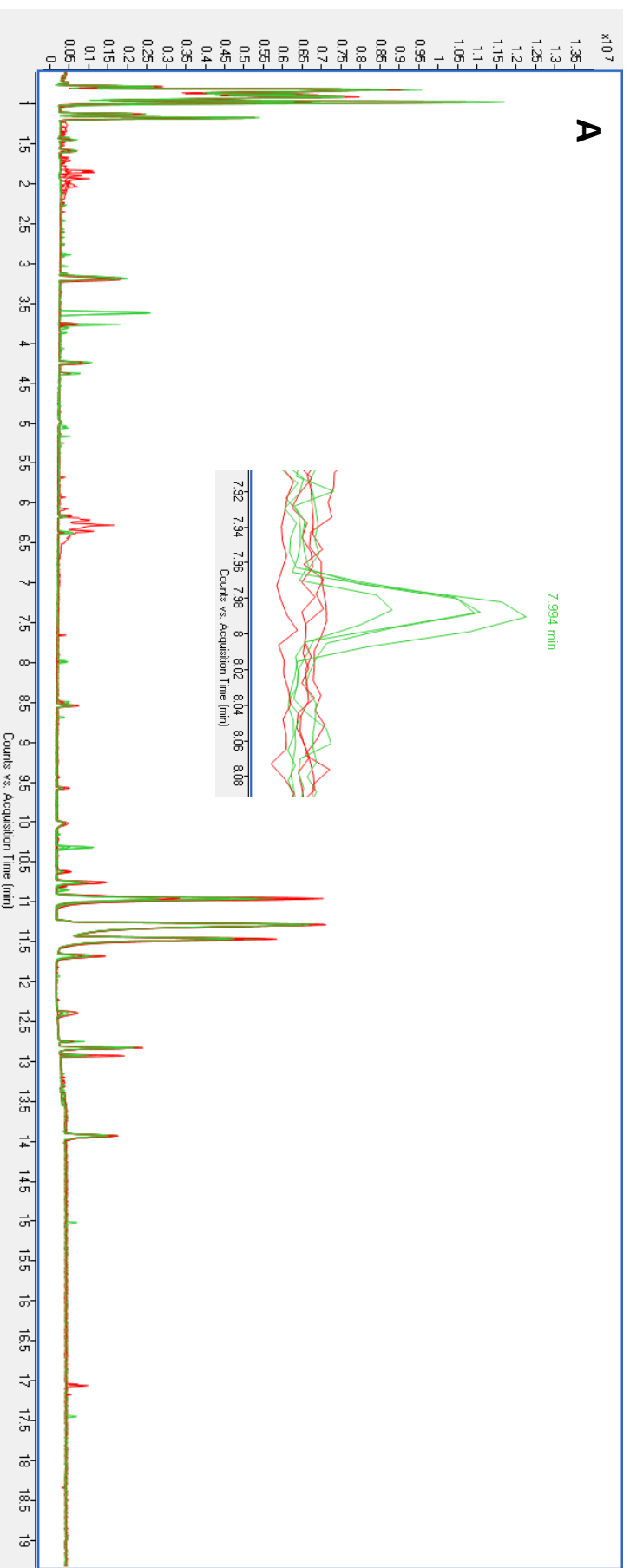


Figure S8. The plasma LC-MS chromatograms of four older adults **before** and **after n3-PUFA supplementation** (A) and positive ESI MS spectrum of the peak at 7.99 min

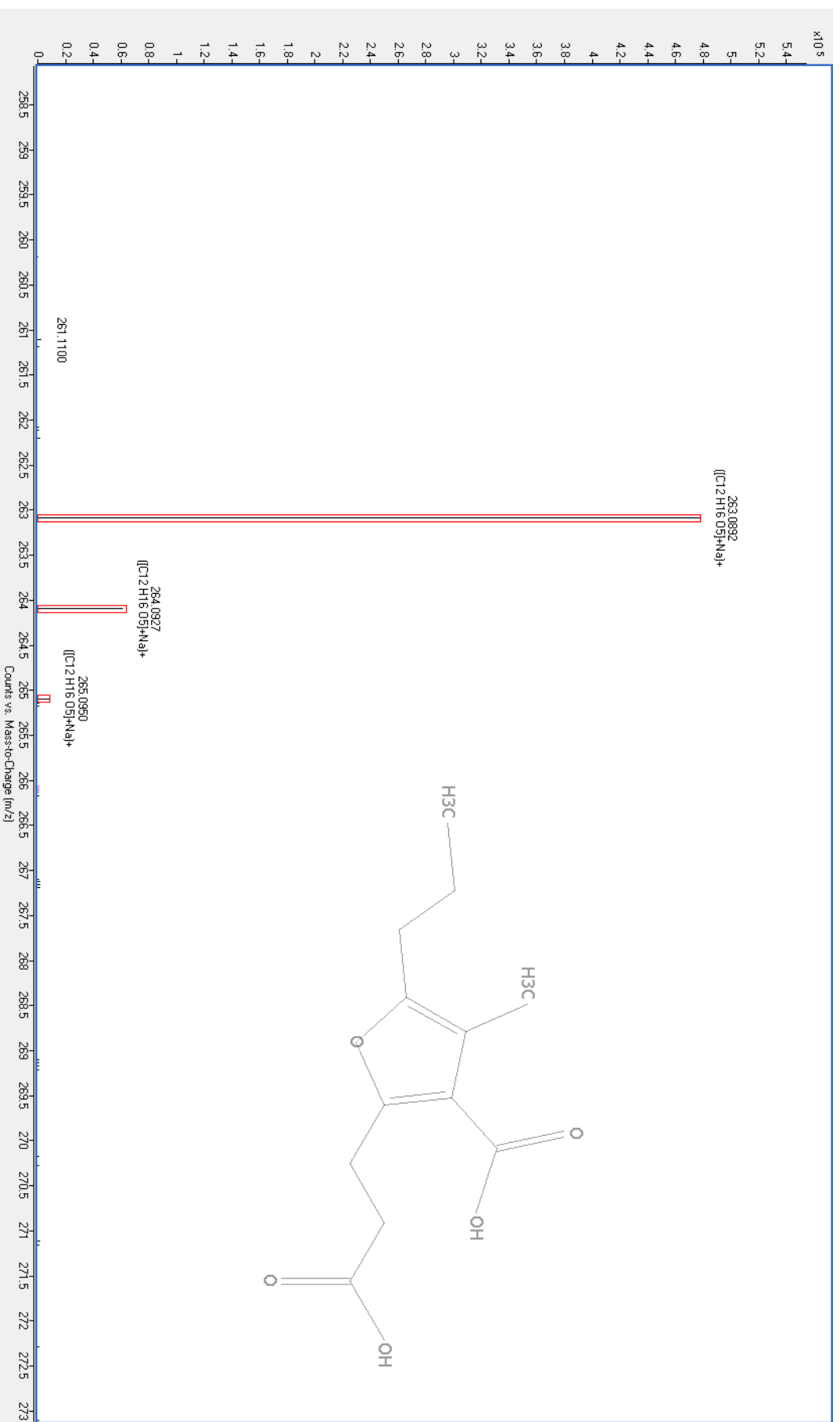


Figure S9. The library search (METLIN) of the positive ESI MS spectrum of the peak at 7.99 min

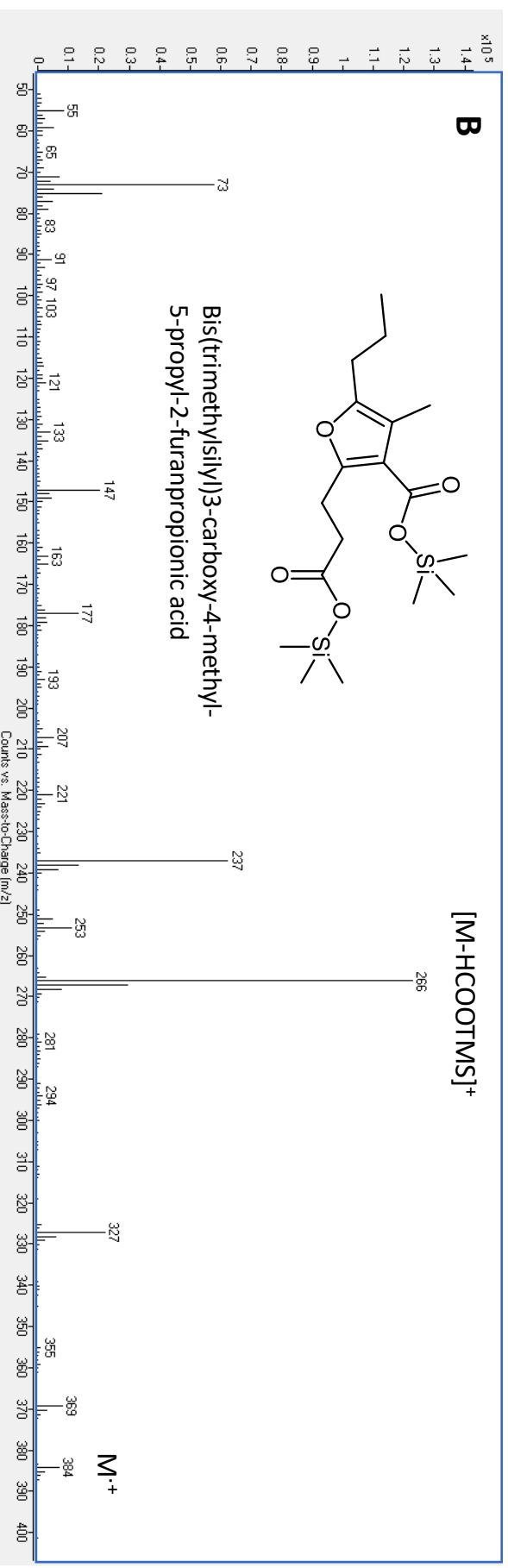
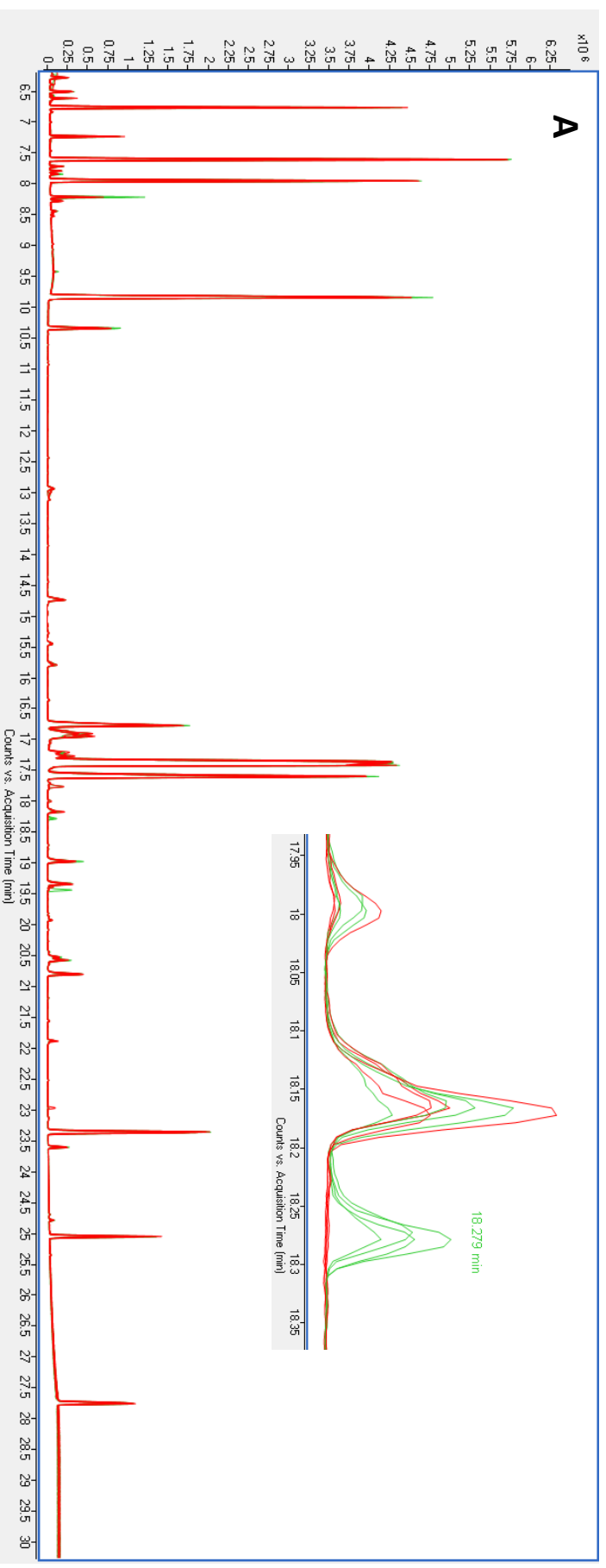


Figure S10. The plasma GC-MS chromatograms of four older adults **before** and **after** n3-PUFA supplementation (A) and positive EI MS spectrum of the peak at 18.28 min