Electronic Supplementary Material (ESI) for Analyst.

Supporting Information

SI.1

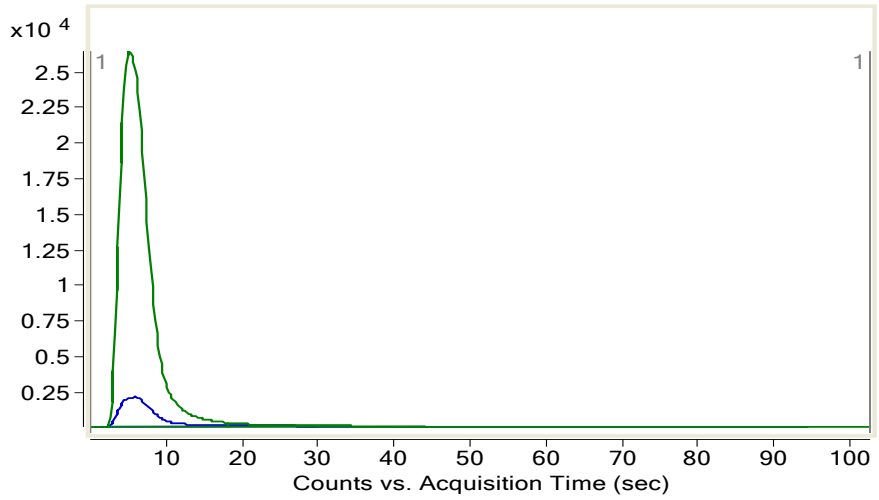
SI.1 FAs monitored in plasma

	Ions pair		Retention time/min	
	Normal tagged	Heavy tagged	Normal tagged	Heavy tagged
AT1	548.0 -> 254.0	568.0 -> 274.0	7.72	7.41
AT2	546.0 -> 254.0	566.0 -> 274.0	6.91	6.64
AT3	542.0 -> 254.0	562.0 -> 274.0	5.66	5.37
AT4	540.0 -> 254.0	560.0 -> 274.0	5.37	5.08
AT5	540.0 -> 254.0	560.0 -> 274.0	5.97	5.75
AT6	538.0 -> 254.0	558.0 -> 274.0	4.69	4.39
AT7	520.0 -> 254.0	540.0 -> 274.0	6.67	6.39
AT8	518.0 -> 254.0	538.0 -> 274.0	5.94	5.65
AT9	518.0 -> 254.0	538.0 -> 274.0	6.66	6.41
AT10	516.0 -> 254.0	536.0 -> 274.0	5.204	4.92
AT11	516.0 -> 254.0	536.0 -> 274.0	6.05	5.82
AT12	514.0 -> 254.0	534.0 -> 274.0	4.504	4.20
AT13	512.0 -> 254.0	532.0 -> 274.0	3.87	3.40
AT14	506.0 -> 254.0	528.0 -> 274.0	6.13	5.864
AT15	492.0 -> 254.0	512.0 -> 274.0	5.60	5.322
AT16	492.0 -> 254.0	512.0 -> 274.0	6.43	6.18
AT17	490.0 -> 254.0	510.0 -> 274.0	4.80	4.49
AT18	478.0 -> 254.0	498.0 -> 274.0	5.03	4.69
AT19	464.0 -> 254.0	484.0 -> 274.0	4.36	4.00
AT20	458.0 -> 254.0	478.0 -> 274.0	2.47	2.056
AT21	436.0 -> 254.0	456.0 -> 274.0	2.4	2.07
BT1	684.0 -> 254.0	704.0 -> 274.0	2.58	2.204

BT2	630.0 -> 254.0	650.0 -> 274.0	5.146	4.803
BT3	602.0 -> 254.0	622.0 -> 274.0	8.75	8.54
BT4	600.0 -> 254.0	620.0 -> 274.0	3.54	2.98
BT5	592.0 -> 254.0	612.0 -> 274.0	5.71	5.4
BT6	590.0 -> 254.0	610.0 -> 274.0	4.97	4.68
BT7	588.0 -> 254.0	608.0 -> 274.0	4.12	3.76
BT8	576.0 -> 254.0	596.0 -> 274.0	8.63	8.33
BT9	574.0 -> 254.0	594.0 -> 274.0	7.88	7.56
BT10	568.0 -> 254.0	588.0 -> 274.0	6.08	5.79
BT11	566.0 -> 254.0	586.0 -> 274.0	5.40	5.07
BT12	566.0 -> 254.0	586.0 -> 274.0	5.962	5.73
BT13	564.0 -> 254.0	584.0 -> 274.0	4.53	4.21
BT14	544.0 -> 254.0	564.0 -> 274.0	6.20	5.92
IS1	454.0 -> 254.0		3.223	
IS2	342.0 -> 324.0		7.22	

SI.2 **Derivatization yield**

As shown in bellowing, 1mg/mL PA was analyzed before and after derivatizaion. More than 90% of PA were converted to hydrazides.



EIC (extracted ions chromatogram) of PA. 1mg/mL PA before derivatization (green line) and after derivatization (blue line) were analyzed with HPLC-MS. After derivatization, less than 10% PA were left.

SI.3 LOD, dynamic range, linearity, and reproducibility for individual Fatty acids standards

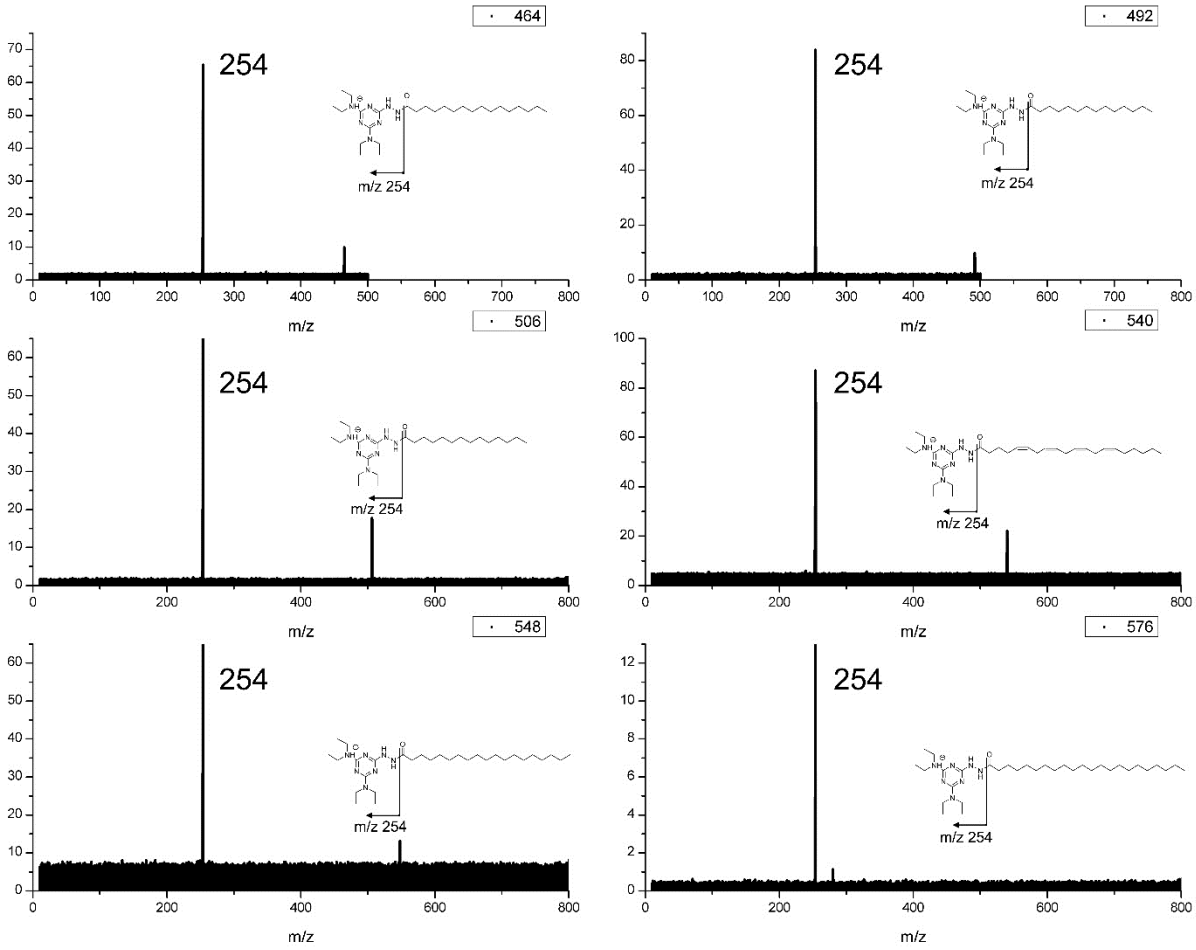
SI.3 **LOD, dynamic range, linearity, and reproducibility for individual Fatty acids standards**

	LOD	Dynamic range	R	Reproducibility
	ng/mL	ng/mL		RSD
MA	1.00×10^{-1}	2.00×10^{-1} - 5.00×10^{3}	0.9998	4.89
PA	1.00	5.00 - 5×10^{5}	0.9990	10.7
HA	2.00×10^{-1}	5.00×10^{-1} -5.00×10^{3}	0.9991	6.31
AA	5.00×10^{-1}	1.00 - 5.00×10^{3}	0.9996	2.00
ARA	5.00×10^{-1}	1.00 -5.00×10^{4}	0.9991	4.05
BA	1.00×10^{-2}	1.00×10^{-1} -5.00×10^{3}	0.9995	3.00

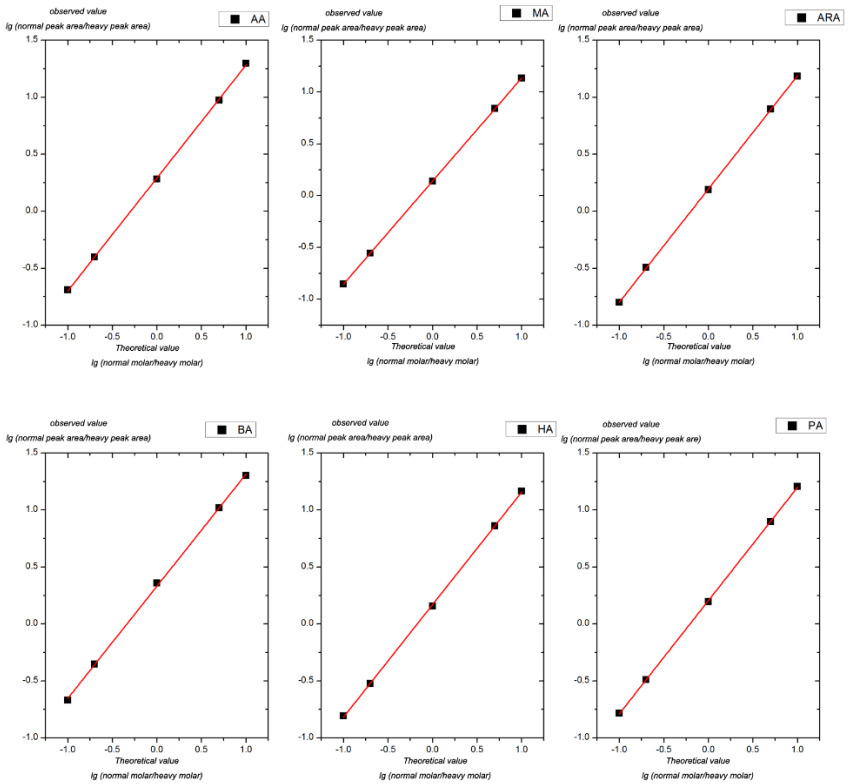
The reproducibility of each FA were calculated under the concentration of 500ng/mL (n=6).

SI.4 MS/MS spectra of different FAs.

The 254 m/z fragments were observed in the MS/MS spectra of six different FA derivatives. These fragments are generated through the fragmentation process, as shown below.



SI.5 Relative quantification analysis



Relative quantification based on ratios of “normal” and “heavy” tagged FAs showed good linear relationship. This indicated this strategy showed good agreement with the expected ratio.

Quantification results comparison between ISTD and ESTD

ID	Peak Area	Linear relationship	ESTD ng/mL	ISTD ng/mL	Ratio %
1	63738.32	y=40.7206x+1008.038 R=0.9999	1.54×10^3	1.50×10^3	97.4
2	128685.9		3.14×10^3	3.00×10^3	95.7

The comparison was carried out with BA. The quantification results of ISTD is close to ESTD. This indicated the relative quantification is comparable with the classical ESTD method.

SI.6

SI.6 Statistical analysis of FAs in plasma

Compound	OPLS-DA analysis		
	VIP(>1)	Jack-knife(>0)	Pcorr(>0.58)
AT10**	1.15047	0.1705981	0.872339
AT12**	1.13208	0.1399155	0.849407
AT13**	1.14578	0.1524128	0.85804
AT15***	1.22366	0.1317099	0.890092
AT16*	1.21917	0.096167	0.897197
AT17**	1.10697	0.0943761	0.798911
AT19***	1.30934	0.1742674	0.966637
AT2**	1.18897	0.1585336	0.867255
AT21***	1.27173	0.1615318	0.905519
AT3***	1.22503	0.1493259	0.907871
AT4***	1.16241	0.1264132	0.887541
AT8**	1.10556	0.1251008	0.827057
BT1	1.07861	0.047673	0.790033
BT11**	1.1523	0.1503661	0.854977
BT13***	1.21637	0.1417778	0.889454
BT3**	1.05307	0.1111463	0.796992
BT6**	1.04131	0.0941234	0.771279
BT7**	1.09343	0.1510907	0.82858
BT9***	1.26696	0.1640355	0.931002

The number of * indicates the significances between aged and young groups

*:p < 0.05
**:p < 0.01
***:p < 0.005
****:p < 0.001