Supplementary Table captions:-

Table.S.1.a UPLC gradient mobile phase conditions for fatty acids.

Table.S.1.b UPLC gradient mobile phase conditions for triglycerides.

Table.S.2. Mass spectrometry source parameters for lipids

Table.S.3.a Mass fragmentation parameters of fatty acids by LC-ESI-MS/MS using negative ionization mode.

Table.S.3.b Mass fragmentation parameters of triglycerides by LC-ESI-MS/MS using positive ionization mode.

Table.S.4. Experimental factors screening studied in 2^{7-4} PBD.

Table.S.5. Factors levels with design matrix for the 2^3 CCD.

Table.S.6. Comparison of IL-VASEME to traditional methods.

Table.S.7. Lipid concentration in human serum samples

Table.S.1a.

Time (min)	Flow rate (mL/min)	A (%)	B (%)
Initial	0.3	95.0	5.0
0.2	0.3	95.0	5.0
0.7	0.4	96.0	4.0
1.2	0.4	96.0	4.0
1.7	0.5	97.0	3.0
2.2	0.5	97.0	3.0
2.5	0.6	98.0	2.0
3.0	0.6	98.0	2.0
3.5	0.3	95.0	5.0
5.0	0.3	95.0	5.0

A= Acetonitrile (LC-MS grade), B= 0.1% formic acid

Table.S.1b.

Time (min)	Flow rate (mL/min)	A (%)	B (%)
Initial	0.3	95.0	5.0
0.2	0.3	95.0	5.0
1.0	0.5	97.0	3.0
1.5	0.5	97.0	3.0
2.3	0.3	95.0	5.0
3.0	0.3	95.0	5.0

A= Acetonitrile (LC-MS grade), B= Ammonium Acetate Buffer (5mM)

Stationary phase- C-18 column Column temp-35^{o}C

Table.S.2.

Mass Parameters	Fatty acids (-ve)	Triglycerides (+ve)
CAD (Collision activated dissociation gas)	12psi	12psi
CUR (Curtain gas)	20psi	12psi
GS1 (Nebulizer gas)	18psi	10psi
GS2 (Turbo gas)	15psi	10psi
IS (Ion spray voltage)	4500v	5500v
Temperature	350 ^{o}C	350 ^{o}C

Table.S.3a.

Fatty acids	Parent ion $[M-H]^-$ (m/z)	Product ion (m/z)	Quantifier ion (m/z)	DP (eV)	EP (eV)	CE (eV)	CXP (eV)
HA (C6:0)	115	96.7, 60.0, 41.0	96.7	40	10	15	10
ONA (C8:0)	142.7	125.2, 45.3	125.2	23	8	22	10
DA (C10:0)	171.1	153.2,73.0	153.1	30	10	22	10
MA (C14:0)	227.2	113.1, 209.3	209.3	30	10	15	10
PTA (C16:1)	252.2	237.2, 219.2, 171.1, 143.1	143.1	30	10	23	10
PA (C16:0)	255.1	237.3, 227.1	237.3	35	15	21	12
LA (C18:2)	279.1	263.1, 142.9	142.9	32	9	19	10
OA (C18:1) cis-9	281.1	265.2, 247.2, 143	143	42	12	18	10
ODA (C18:0)	283.2	265.2, 266.5	265.2	30	10	20	9
AA (C20:4) ω-6	303.1	287.2, 221.2, 269.2, 142.8	142.8	42	10	22	12
PSA (C18:1)	281.3	142.9, 57.8, 73.0	142.9	30	10	20	12
DHA(C22:6) n-3	327.2	311.6,283.2,269.5	283.2	30	10	19	8
NA (C24:1)	365.1	347.1, 331.4,205.1	347.1	38	15	17	13
BA (C22:0)	339	322.5, 295.2, 183	183	33	10	15	10

EA (C22:1) ω-9	337.3	321.2, 303.3, 255.1, 97.0	97	42	10	23	9
ELA (C18:1T)	281.1	263.1, 142.9	263.1	46	10	21	12

Table.S.3b.

Triglyceride	**Parent ion $[M+H]^+$ (m/z)**	**Product ion (m/z)**	**Quantifier ion (m/z)**	**DP (eV**	**EP (eV)**	**CE (eV)**	**CXP (eV)**
1-monolauroyl-rac-glycerol (C15:1)	275.4	183.0, 257.3	183.0	88.0	10.0	10.0	12.0
1-monopalmitoyl rac-glycerol (C19:1)	331.5	313.3, 239.0	313.3	74.0	10.0	20.0	9.0
1-monomyristoyl-rac-glycerol (C17:1)	303.1	109.1, 285.0	109.1	124.0	15.0	25.0	20
1-monostearoyl-rac-glycerol (C21:1)	359.4	341.2, 267.1	267.1	100.0	15.0	19.0	15
Dilaurin (C27:2)	457.3	439.4, 257.3	439.4	90.0	15.0	21.0	15.0
Dipalmitin (C35:2)	569.9	551.3	551.3	74.0	13.0	21.0	7.0
Dimyristin (C31:2)	513.5	468.3, 495.4, 285.4	285.4	131.0	15.0	28.0	14.0
Distearin (C39:2)	626.0	637.2	637.2	112.0	10.0	22.0	13.0
Trimyristin (C45:3)	724.1	493.3	493.3	49.0	15.0	28.0	10.0
Tripalmitin (C51:3)	808.6	549.5	549.5	79.0	10.0	29.0	12.0
Trilaurin (C39:3)	640.5	607.3	607.3	101.0	10.0	23.0	16.0
LPC (C22:2)	468.4	184.1	184.1	110.0	8.0	33.0	12.0
PC (C42:3)	761.1	584.1	584.1	130.0	5.0	40.0	13.0
PE (C40:3)	735.5	576.6	576.6	116.0	8.0	30.0	15.0

DP= Declustering potential, EP=Entrance potential, CE=Collision energy, CXP= Cell exit potential

Table.S.4.

Factor	Levels	
	Low(-1)	**High (+1)**
pH	5	9
IL Volume (µL)	30	70
Centrifuge speed (rpm)	2000	6000
Centrifuge time (min)	3	7
Surfactant (%)	0	2
Surfactant Volume (µL)	80	160
Vortex time (min)	3	7

Table.S.5.

Factor	**Levels**			**Star point α=1.673**	
	Low(-1)	**Central(0)**	**High (+1)**	**α**	**β**
(X_1)pH	**5**	**7**	**9**	**3.653**	**10.346**
(X_2) IL Volume (µL)	**30**	**50**	**70**	**16.534**	**83.467**
(X_3) Surfactant (%)	**0**	**1**	**2**	**- 0.6733**	**2.673**

Runs	**X_1**	**X_2**	**X_3**
1	-1(5)	-1(30)	-1(0)
2	-1(5)	1(70)	1(2)
3	1(9)	-1(30)	1(2)
4	1(9)	1(70)	-1(0)
5(C)	0(7)	0(50)	0(1)
6	-1(5)	-1(30)	1(2)
7	-1(5)	1(70)	-1(0)
8	1(9)	-1(30)	-1(0)
9	1(9)	1(70)	1(2)
10(C)	0(7)	0(50)	0(1)
11	-1.673(3.653)	0(50)	0(1)
12	1.673(10.346)	0(50)	0(1)
13	0(7)	-1.673(16.534)	0(1)
14	0(7)	1.673(83.467)	0(1)
15	0(7)	0(50)	-1.673(-0.673)
16	0(7)	0(50)	1.673(2.673)
17(C)	0(7)	0(50)	0(1)

Table.S.6.

Parameters	IL-VASEME	FOLCH (1957)	BLIGH (1959)
Sample size (mL)	0.1	0.1	0.1
Extraction Solvent	Ionic liquid+surfactant	Chloroform+methanol	Methanol+chloroform
Solvent Ratio	45:160	320:160	320:160
Total extracted solvent volume (µL)	40±10	400±30	400±20
No of steps for extraction	1 time	2 time	2 time
Evaporation of organic solvent by N_2	No	yes	yes
Make up volume by methanol (µL)	150	200	200
Total Extraction Time (min)	20 min	40-50 min	30-40 min
Cost	Low consumption of organic solvent	compare IL-VASEME more volume of organic solvent consumption	compare IL-VASEME more volume of organic solvent consumption
Health Effect	No exposure	Exposure to Chloroform	Exposure to Chloroform
Follow Green chemistry principles	Followed	NO	NO
Linearity Range (ng/mL)	0.018-0.5	0.026-1.6	0.020-1.2
LOD Range (ng/mL)	0.012-0.034	0.022-0.090	0.017-0.084
Recovery (%)	90.9-114	95.2-107	92.7-110
Intraday RSD (%)	1.42-4.88	2.74-6.45	1.83-5.74
Interday RSD (%)	3.75-10.8	5.44-11.21	4.35-12.48

Table.S.7.

Lipids	Serum samples
	n= 20 (ng/ml)
	Mean± SD
HA (C6:0)	8.79±0.59
ONA (C8:0)	nd
DA (C10:0)	2.42±0.36
MA (C14:0)	8.24±1.78
PTA (C16:1)	4.84±0.19
PA (C16:0)	90.08±0.67
LA (C18:2)	6.68±0.24

OA (C18:1) cis-9	3.59±0.58
ODA (C18:0)	12.5±0.41
AA (C20:4) ω-6	22.04±0.22
PSA (C18:1)	36.25±1.17
DHA(C22:6) n-3	24.10±0.02
NA (C24:1)	125.68±1.25
BA (C22:0)	69.13±0.84
EA (C22:1) ω-9	73.63±0.11
ELA (C18:1T)	18.4±1.41
1-monolauroyl-rac-glycerol (C15:1)	23.99±0.32
1-monopalmitoyl rac-glycerol (C19:1)	4.32±1.34
1-monostearoyl-rac-glycerol (C21:1)	5.26±0.19
Dilaurin (C27:2)	8.5±0.27
Dimyristin (C31:2)	6.18±0.59
Tripalmitin (C51:3)	45.33±0.52
Dipalmitin (C35:2)	21.38±0.35
Trilaurin (C39:3)	6.03±0.51
LPC (C22:2)	4.36±0.62
PC (C42:3)	18.50±1.10
PE (C40:3)	7.29±0.51

Fig. S.A.

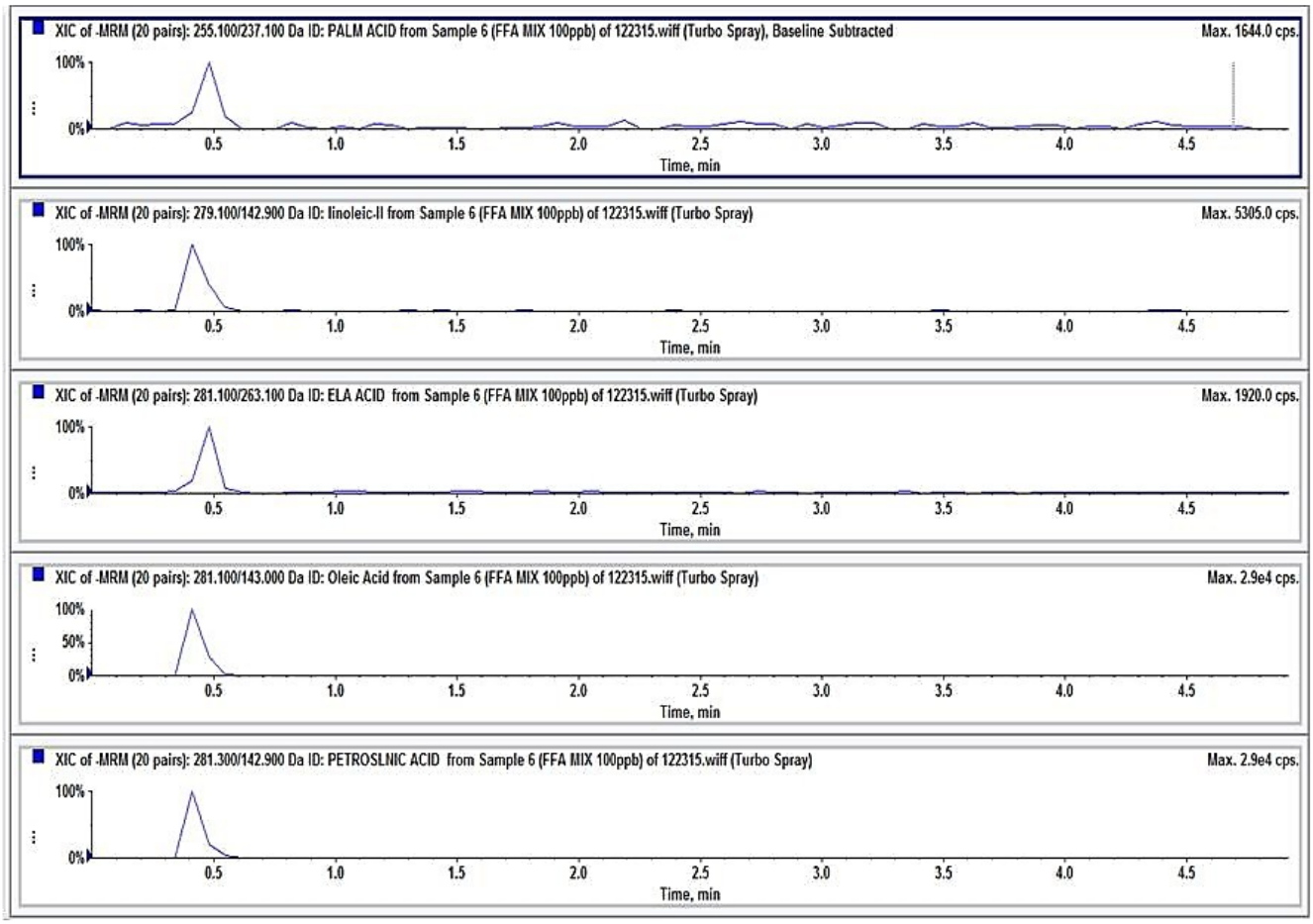

XIC of -MRM (20 pairs): 255.100/237.100 Da ID: PALM ACID from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray), Baseline Subtracted
Max. 1644.0 cps.
XIC of -MRM (20 pairs): 279.100/142.900 Da ID: linoleic-II from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 5305.0 cps.
XIC of -MRM (20 pairs): 281.100/263.100 Da ID: ELA ACID from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 1920.0 cps.
XIC of -MRM (20 pairs): 281.100/143.000 Da ID: Oleic Acid from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 2.9e4 cps.
XIC of -MRM (20 pairs): 281.300/142.900 Da ID: PETROSLNIC ACID from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 2.9e4 cps.
100%
50%
0%
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Time, min

Fig. S.B.

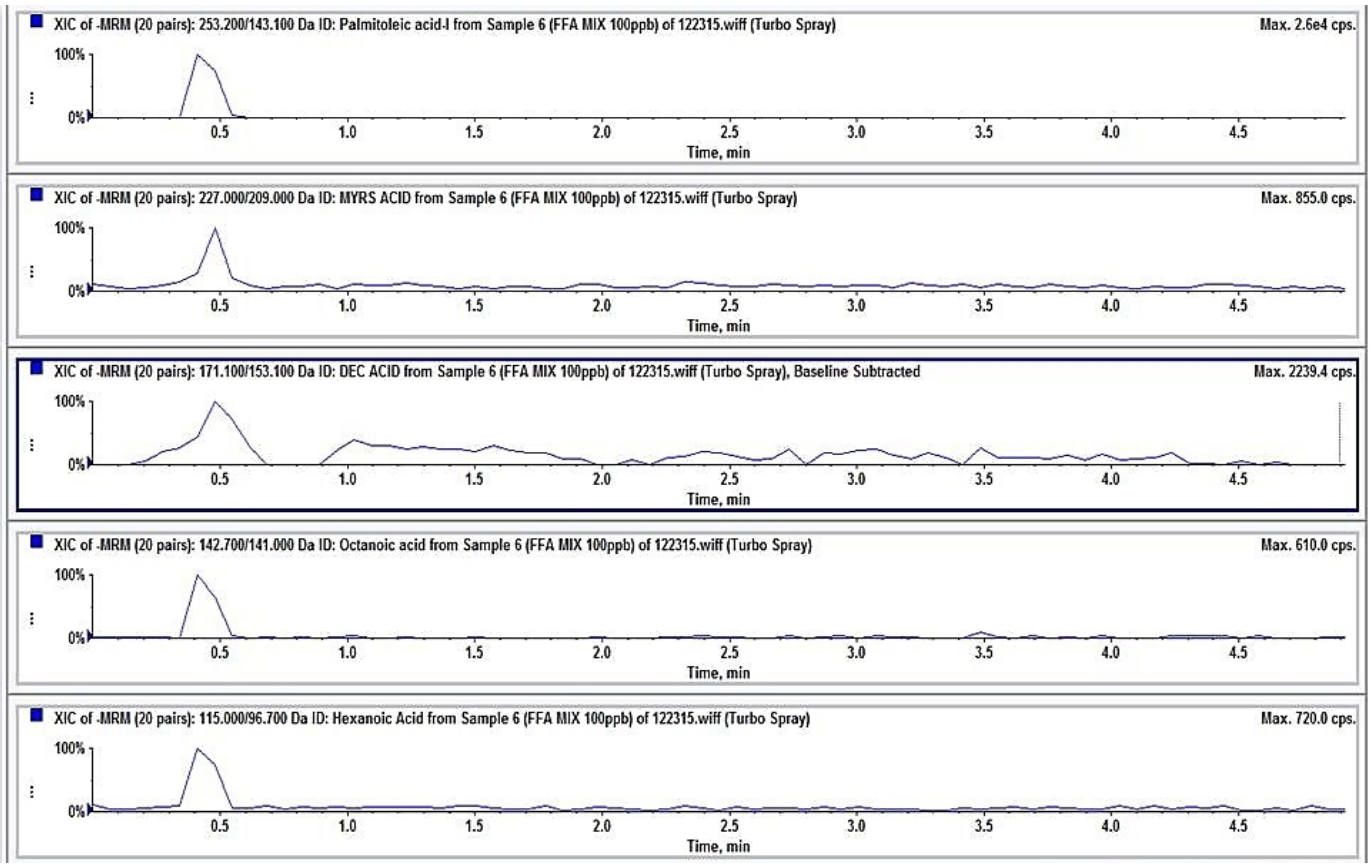
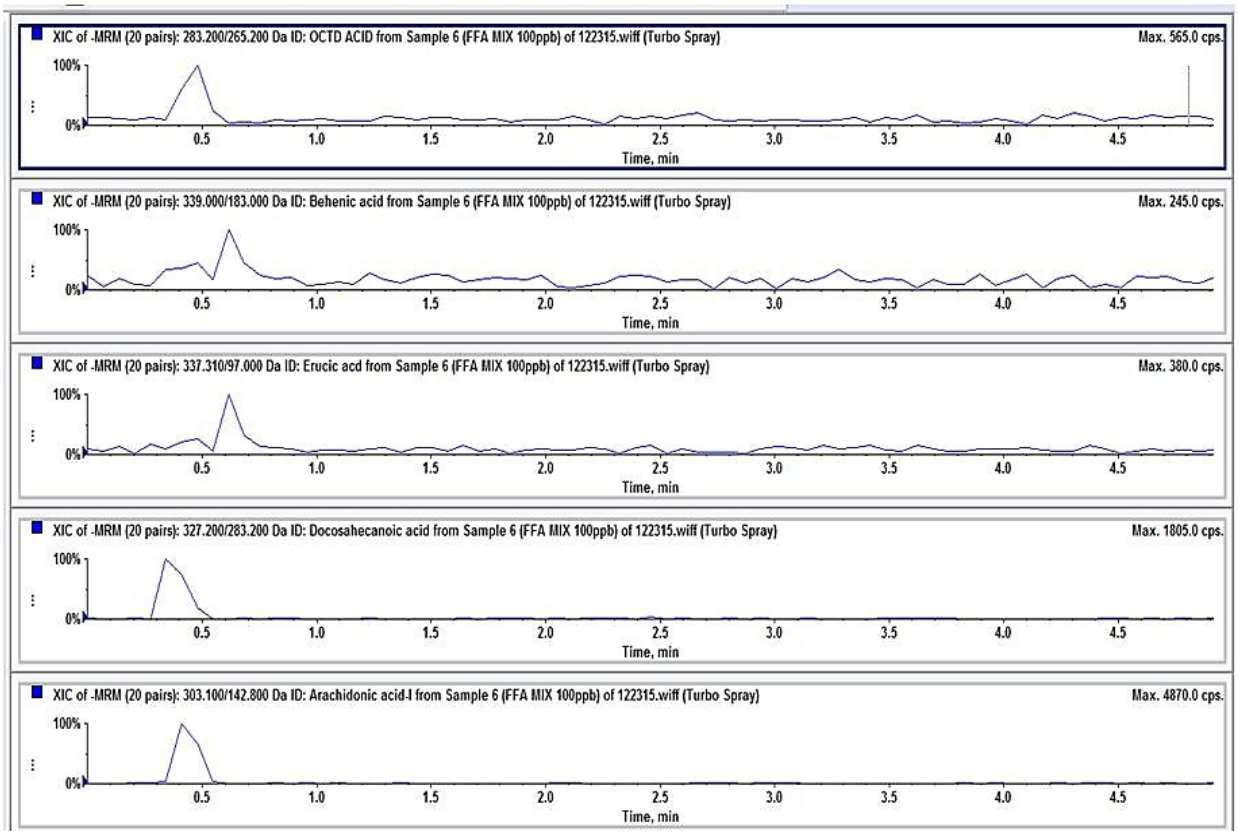

XIC of -MRM (20 pairs): 253.200/143.100 Da ID: Palmitoleic acid-I from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 2.6e4 cps.
XIC of -MRM (20 pairs): 227.000/209.000 Da ID: MYRS ACID from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 855.0 cps.
XIC of -MRM (20 pairs): 171.100/153.100 Da ID: DEC ACID from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray), Baseline Subtracted
Max. 2239.4 cps.
XIC of -MRM (20 pairs): 142.700/141.000 Da ID: Octanoic acid from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 610.0 cps.
XIC of -MRM (20 pairs): 115.000/96.700 Da ID: Hexanoic Acid from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 720.0 cps.
100%
0%
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Time, min

Fig.S.C.


XIC of -MRM (20 pairs): 283.200/265.200 Da ID: OCTD ACID from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 565.0 cps.
XIC of -MRM (20 pairs): 339.000/183.000 Da ID: Behenic acid from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 245.0 cps.
XIC of -MRM (20 pairs): 337.310/97.000 Da ID: Erucic acd from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 380.0 cps.
XIC of -MRM (20 pairs): 327.200/283.200 Da ID: Docosahecanoic acid from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 1805.0 cps.
XIC of -MRM (20 pairs): 303.100/142.800 Da ID: Arachidonic acid-I from Sample 6 (FFA MIX 100ppb) of 122315.wiff (Turbo Spray)
Max. 4870.0 cps.
100%
0%
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Time, min