

**Table S1.** Concentrations of lipid species presented in Figure 1-7.

Lipid	Control (n=9) [nmol/ml]	eOA (n=17) [nmol/ml]	IOA (n=13) [nmol/ml]	RA (n=18) [nmol/ml]
<b>SM 34:0</b>	<b>0.45 (0.40-0.64)</b>	<b>1.24 (0.80-1.32)</b>	<b>1.42 (1.26-3.85)</b>	<b>1.71 (1.42-2.39)</b>
	0.45 (0.40-0.64)	0.86 (0.78-1.35)	1.02 (0.94-1.20)	1.93 (1.58-2.56)
<b>SM 36:0</b>	<b>0.11 (0.06-0.13)</b>	<b>0.16 (0.08-0.34)</b>	<b>0.34 (0.23-0.54)</b>	<b>0.37 (0.25-0.52)</b>
	0.11 (0.06-0.13)	0.15 (0.05-0.29)	0.23 (0.14-0.35)	0.40 (0.33-0.69)
<b>SM 32:1</b>	<b>1.08 (0.76-1.54)</b>	<b>3.06 (1.83-4.60)</b>	<b>5.17 (3.58-11.5)</b>	<b>5.42 (4.40-5.93)</b>
	1.08 (0.76-1.54)	2.68 (1.18-4.68)	3.36 (2.96-3.59)	5.71 (4.91-6.52)
<b>SM 33:1</b>	<b>0.65 (0.48-0.89)</b>	<b>1.48 (1.18-2.49)</b>	<b>2.16 (1.80-5.84)</b>	<b>2.76 (2.65-3.16)</b>
	0.65 (0.48-0.89)	1.25 (0.66-2.28)	1.61 (1.38-1.79)	3.30 (2.67-3.75)
<b>SM 34:1</b>	<b>17.0 (11.7-17.7)</b>	<b>33.6 (23.4-52.8)</b>	<b>52.6 (36.5-112.7)</b>	<b>46.4 (41.8-58.6)</b>
	17.0 (11.7-17.7)	28.9 (20.4-37.9)	<b>30.3 (27.6-33.8)</b>	55.2 (47.0-65.8)
<b>SM 35:1</b>	<b>0.15 (0.12-0.17)</b>	<b>0.33 (0.21-0.57)</b>	<b>0.60 (0.43-1.33)</b>	<b>0.43 (0.37-0.55)</b>
	0.15 (0.12-0.17)	0.34 (0.18-0.41)	0.36 (0.33-0.39)	0.50 (0.44-0.61)
<b>SM 36:1</b>	<b>2.13 (0.88-2.40)</b>	<b>3.85 (2.95-7.60)</b>	<b>7.86 (5.08-12.9)</b>	<b>8.24 (5.69-12.2)</b>
	2.13 (0.88-2.40)	3.55 (2.38-5.25)	4.44 (3.62-5.22)	10.0 (7.53-12.6)
<b>SM 38:1</b>	<b>0.29 (0.15-0.54)</b>	<b>0.90 (0.50-1.59)</b>	<b>1.92 (1.46-3.31)</b>	<b>1.88 (0.99-3.96)</b>
	0.29 (0.15-0.54)	1.04 (0.40-1.49)	1.40 (0.73-1.75)	2.48 (0.98-3.48)
<b>SM 40:1</b>	<b>0.77 (0.30-1.27)</b>	<b>2.11 (1.64-4.23)</b>	<b>4.29 (3.14-8.88)</b>	<b>4.71 (3.07-8.09)</b>
	0.77 (0.30-1.27)	1.98 (1.22-3.50)	2.77 (2.06-3.11)	6.27 (3.78-7.74)
<b>SM 42:1</b>	<b>0.89 (0.65-1.33)</b>	<b>2.71 (1.66-4.15)</b>	<b>3.99 (3.05-9.17)</b>	<b>4.64 (3.62-6.70)</b>
	0.89 (0.65-1.33)	2.17 (1.44-3.48)	2.65 (2.10-3.03)	5.61 (4.02-7.47)
<b>SM 34:2</b>	<b>2.18 (1.42-2.35)</b>	<b>4.34 (3.11-7.47)</b>	<b>7.20 (5.28-13.8)</b>	<b>6.02 (5.11-6.72)</b>
	2.18 (1.42-2.35)	3.48 (2.71-5.40)	4.15 (3.68-4.68)	6.64 (5.99-7.91)
<b>SM 35:2</b>	<b>0.35 (0.25-0.47)</b>	<b>0.78 (0.61-1.09)</b>	<b>1.20 (0.86-3.12)</b>	<b>1.37 (1.17-1.58)</b>
	0.35 (0.25-0.47)	0.65 (0.37-1.03)	0.76 (0.63-0.91)	1.56 (1.37-1.76)
<b>SM 36:2</b>	<b>0.99 (0.50-1.17)</b>	<b>1.70 (1.47-3.15)</b>	<b>3.42 (2.14-4.99)</b>	<b>3.43 (2.11-4.20)</b>
	0.99 (0.50-1.17)	1.54 (1.12-2.38)	1.95 (1.59-2.29)	3.81 (3.16-4.34)
<b>SM 38:2</b>	<b>0.54 (0.27-0.56)</b>	<b>0.91 (0.72-1.57)</b>	<b>1.66 (1.20-2.47)</b>	<b>1.68 (1.05-1.99)</b>
	0.54 (0.27-0.56)	0.73 (0.57-1.23)	0.98 (0.79-1.23)	1.88 (1.46-2.10)
<b>SM 40:2</b>	<b>1.51 (0.80-1.85)</b>	<b>3.25 (2.15-5.92)</b>	<b>6.42 (4.11-10.6)</b>	<b>6.22 (4.33-7.78)</b>
	1.51 (0.80-1.85)	2.64 (1.88-4.12)	3.58 (2.77-4.17)	7.06 (5.64-8.24)
<b>SM 42:2</b>	<b>4.91 (3.46-5.87)</b>	<b>10.4 (6.99-15.4)</b>	<b>16.5 (11.7-33.0)</b>	<b>16.7 (13.3-21.0)</b>
	4.91 (3.46-5.87)	8.81 (6.00-13.9)	9.52 (8.65-11.6)	18.8 (14.4-25.4)
<b>SM 40:3</b>	<b>0.18 (0.16-0.24)</b>	<b>0.33 (0.16-0.54)</b>	<b>0.54 (0.38-1.07)</b>	<b>0.66 (0.50-0.86)</b>
	0.18 (0.16-0.24)	0.22 (0.13-0.57)	0.38 (0.20-0.51)	0.74 (0.56-0.90)
<b>SM 42:3</b>	<b>3.21 (2.12-3.32)</b>	<b>5.79 (4.19-9.21)</b>	<b>10.1 (6.17-17.9)</b>	<b>8.63 (6.47-10.2)</b>
	3.21 (2.12-3.32)	4.77 (3.49-7.36)	5.43 (4.66-5.93)	10.4 (7.28-11.2)
<b>SM 42:4</b>	<b>0.28 (0.19-0.46)</b>	<b>0.51 (0.34-0.86)</b>	<b>0.54 (0.48-2.00)</b>	<b>0.64 (0.42-0.70)</b>
	0.28 (0.19-0.46)	0.45 (0.28-0.64)	0.43 (0.42-0.51)	0.72 (0.57-0.79)
<b>Cer d18:1/16:0</b>	<b>0.21 (0.17-0.33)</b>	<b>0.32 (0.22-0.47)</b>	<b>0.45 (0.34-1.08)</b>	<b>0.54 (0.43-0.70)</b>
	0.21 (0.17-0.33)	0.26 (0.17-0.38)	0.28 (0.24-0.35)	0.61 (0.53-0.74)
<b>Cer d18:1/18:0</b>	<b>0.06 (0.05-0.10)</b>	<b>0.08 (0.06-0.10)</b>	<b>0.09 (0.05-0.31)</b>	<b>0.08 (0.06-0.10)</b>
	0.06 (0.05-0.10)	0.06 (0.05-0.08)	0.05 (0.04-0.06)	0.10 (0.07-0.11)

<b>Cer d18:1/22:0</b>	<b>0.12 (0.08-0.15)</b>	<b>0.17 (0.11-0.30)</b>	<b>0.28 (0.23-0.53)</b>	<b>0.35 (0.21-0.51)</b>
	0.12 (0.08-0.15)	0.13 (0.09-0.20)	0.18 (0.16-0.22)	0.45 (0.33-0.49)
<b>Cer d18:1/23:0</b>	<b>0.17 (0.16-0.24)</b>	<b>0.32 (0.17-0.44)</b>	<b>0.39 (0.32-0.92)</b>	<b>0.56 (0.36-0.72)</b>
	0.17 (0.16-0.24)	0.24 (0.15-0.33)	0.25 (0.22-0.35)	0.69 (0.48-0.85)
<b>Cer d18:1/24:0</b>	<b>0.31 (0.28-0.39)</b>	<b>0.72 (0.47-1.26)</b>	<b>1.23 (1.04-2.24)</b>	<b>1.54 (0.99-2.08)</b>
	0.31 (0.28-0.39)	0.60 (0.41-1.08)	0.74 (0.58-1.02)	1.97 (1.33-2.15)
<b>Cer d18:1/24:1</b>	<b>0.38 (0.34-0.46)</b>	<b>0.61 (0.43-0.95)</b>	<b>0.93 (0.64-1.60)</b>	<b>1.10 (0.82-1.32)</b>
	0.38 (0.34-0.46)	0.45 (0.33-0.69)	0.62 (0.46-0.71)	1.22 (1.03-1.38)
<b>HexCer d18:1/16:0</b>	<b>57.4 (43.1-74.1)</b>	<b>132.4 (86.6-239.1)</b>	<b>202.6 (168.1-351.3)</b>	<b>364.3 (262.5-418.6)</b>
	57.4 (43.1-74.1)	126.9 (71.4-210.4)	132.6 (101.0-183.6)	411.6 (301.0-526.3)
<b>HexCer d18:1/22:0</b>	<b>56.6 (33.8-94.0)</b>	<b>198.1 (114.1-321.2)</b>	<b>220.2 (198.1-479.9)</b>	<b>326.6 (226.5-377.1)</b>
	56.6 (33.8-94.0)	168.7 (87.4-263.6)	143.8 (121.3-223.1)	366.1 (282.8-495.2)
<b>HexCer d18:1/23:0</b>	<b>25.8 (17.1-45.4)</b>	<b>95.0 (55.5-156.7)</b>	<b>126.9 (105.7-251.3)</b>	<b>188.4 (128.7-229.2)</b>
	25.8 (17.1-45.4)	86.3 (47.2-142.1)	77.7 (57.2-124.9)	219.1 (160.0-276.7)
<b>HexCer d18:1/24:0</b>	<b>83.8 (54.7-151.5)</b>	<b>305.8 (172.6-465.8)</b>	<b>345.6 (300.8-683.2)</b>	<b>510.1 (398.0-687.4)</b>
	83.8 (54.7-151.5)	274.0 (150.2-381.0)	238.7 (178.7-328.6)	622.9 (424.6-816.3)
<b>HexCer d18:1/24:1</b>	<b>114.3 (82.1-141.1)</b>	<b>282.6 (145.5-472.7)</b>	<b>397.2 (282.6-609.7)</b>	<b>546.9 (358.5-702.1)</b>
	114.3 (82.1-141.1)	256.6 (139.5-412.6)	250.5 (205.9-314.7)	660.4 (445.2-877.0)
<b>Hex<sub>2</sub>Cer d18:1/16:0</b>	<b>186.8 (85.6-262.2)</b>	<b>432.4 (297.4-572.0)</b>	<b>511.1 (364.3-1199.8)</b>	<b>1189.3 (788.0-1328.1)</b>
	186.8 (85.6-262.2)	433.2 (250.5-673.8)	377.2 (266.4-491.5)	1465.4 (997.0-1720.2)
<b>Hex<sub>2</sub>Cer d18:1/22:0</b>	<b>16.5 (7.60-18.8)</b>	<b>28.2 (23.9-50.5)</b>	<b>31.4 (24.5-76.1)</b>	<b>77.9 (43.3-92.0)</b>
	16.5 (7.60-18.8)	27.1 (20.4-44.5)	27.1 (17.4-35.1)	86.1 (64.2-108.4)
<b>Hex<sub>2</sub>Cer d18:1/23:0</b>	<b>4.55 (0.79-5.10)</b>	<b>9.89 (7.15-17.1)</b>	<b>10.7 (7.08-19.2)</b>	<b>20.4 (12.2-23.8)</b>
	4.55 (0.79-5.10)	10.3 (6.24-14.7)	7.54 (5.06-12.0)	26.4 (14.5-28.5)
<b>Hex<sub>2</sub>Cer d18:1/24:0</b>	<b>16.1 (12.0-19.5)</b>	<b>38.4 (25.5-49.9)</b>	<b>39.6 (30.1-94.3)</b>	<b>100.1 (56.1-117.9)</b>
	16.1 (12.0-19.5)	33.8 (24.5-67.0)	28.6 (21.5-41.2)	122.2 (93.2-142.2)
<b>Hex<sub>2</sub>Cer d18:1/24:1</b>	<b>64.3 (35.8-90.3)</b>	<b>126.0 (96.8-167.4)</b>	<b>151.9 (99.8-314.6)</b>	<b>329.6 (281.9-437.1)</b>
	64.3 (35.8-90.3)	119.5 (79.8-198.3)	108.6 (65.6-142.3)	450.9 (351.2-597.5)
<b>PA 34:1</b>	<b>0.37 (0.18-0.50)</b>	<b>0.54 (0.36-1.29)</b>	<b>1.08 (0.82-2.11)</b>	<b>1.19 (0.78-1.54)</b>
	0.37 (0.18-0.50)	0.61 (0.34-0.88)	0.61 (0.49-1.04)	1.33 (1.08-1.91)
<b>PA 36:1</b>	<b>0.15 (0.06-0.22)</b>	<b>0.23 (0.17-0.49)</b>	<b>0.46 (0.27-0.78)</b>	<b>0.83 (0.56-1.45)</b>
	0.15 (0.06-0.22)	0.22 (0.16-0.33)	0.25 (0.18-0.37)	1.16 (0.71-1.58)
<b>PA 36:2</b>	<b>0.27 (0.11-0.35)</b>	<b>0.47 (0.27-1.42)</b>	<b>1.14 (0.69-1.80)</b>	<b>1.24 (0.78-1.63)</b>
	0.27 (0.11-0.35)	0.46 (0.25-0.96)	0.59 (0.48-0.79)	1.47 (1.22-2.16)
<b>PA 38:4</b>	<b>0.03 (0.00-0.10)</b>	<b>0.16 (0.00-0.42)</b>	<b>0.22 (0.18-0.47)</b>	<b>0.35 (0.22-0.47)</b>
	0.03 (0.00-0.10)	0.14 (0.00-0.29)	0.17 (0.12-0.23)	0.43 (0.25-0.56)
<b>LPA 16:0</b>	<b>0.27 (0.07-0.54)</b>	<b>0.71 (0.50-1.70)</b>	<b>1.37 (0.93-2.49)</b>	<b>1.26 (0.87-2.78)</b>
	0.27 (0.07-0.54)	0.64 (0.46-1.27)	0.89 (0.61-1.45)	1.64 (1.22-3.43)
<b>LPA 18:0</b>	<b>0.10 (0.00-0.11)</b>	<b>0.18 (0.08-0.37)</b>	<b>0.20 (0.13-0.33)</b>	<b>0.25 (0.16-0.44)</b>
	0.10 (0.00-0.11)	0.12 (0.10-0.28)	0.16 (0.08-0.24)	0.31 (0.22-0.56)

<b>LPA 18:1</b>	<b>0.31 (0.08-0.41)</b>	<b>0.45 (0.32-1.18)</b>	<b>0.87 (0.52-1.17)</b>	<b>0.75 (0.52-1.17)</b>
	0.31 (0.08-0.41)	0.40 (0.30-0.88)	0.46 (0.31-0.82)	0.82 (0.75-1.33)
<b>LPA 18:2</b>	<b>0.87 (0.15-2.22)</b>	<b>2.36 (1.80-7.09)</b>	<b>5.21 (2.44-6.34)</b>	<b>3.34 (1.61-4.94)</b>
	0.87 (0.15-2.22)	2.75 (1.82-6.76)	2.57 (1.31-3.63)	3.97 (2.94-5.33)
<b>LPA 20:4</b>	<b>2.84 (1.19-5.02)</b>	<b>5.11 (3.66-10.7)</b>	<b>9.46 (5.24-11.8)</b>	<b>7.22 (4.40-10.7)</b>
	2.84 (1.19-5.02)	4.72 (4.01-7.24)	5.37 (2.86-8.26)	8.18 (6.67-12.3)
<b>PG 34:1</b>	<b>0.22 (0.09-0.44)</b>	<b>0.42 (0.33-0.54)</b>	<b>0.58 (0.31-1.43)</b>	<b>0.80 (0.58-0.92)</b>
	0.22 (0.09-0.44)	0.43 (0.33-0.49)	0.40 (0.30-0.44)	0.92 (0.68-1.16)
<b>PG 36:1</b>	<b>0.18 (0.10-0.24)</b>	<b>0.48 (0.37-0.53)</b>	<b>0.48 (0.36-1.27)</b>	<b>0.72 (0.53-0.98)</b>
	0.18 (0.10-0.24)	0.39 (0.34-0.54)	0.39 (0.27-0.46)	0.88 (0.69-1.20)
<b>PG 36:2</b>	<b>0.34 (0.29-0.49)</b>	<b>0.66 (0.43-0.76)</b>	<b>0.68 (0.43-2.66)</b>	<b>0.80 (0.65-0.90)</b>
	0.34 (0.29-0.49)	0.61 (0.51-0.66)	0.54 (0.48-0.61)	1.01 (0.78-1.17)
<b>PG 36:3</b>	<b>0.00 (0.00-0.08)</b>	<b>0.15 (0.11-0.19)</b>	<b>0.12 (0.05-0.15)</b>	<b>0.20 (0.16-0.23)</b>
	0.00 (0.00-0.08)	0.15 (0.12-0.16)	0.10 (0.07-0.13)	0.23 (0.19-0.29)
<b>PG 38:4</b>	<b>0.00 (0.00-0.00)</b>	<b>0.08 (0.00-0.14)</b>	<b>0.05 (0.00-0.11)</b>	<b>0.14 (0.10-0.15)</b>
	0.00 (0.00-0.00)	0.11 (0.00-0.12)	0.06 (0.00-0.09)	0.17 (0.13-0.27)
<b>LPG 16:0</b>	<b>0.28 (0.05-0.44)</b>	<b>0.29 (0.22-0.51)</b>	<b>0.34 (0.10-0.66)</b>	<b>0.45 (0.36-0.52)</b>
	0.28 (0.05-0.44)	0.30 (0.22-0.37)	0.28 (0.12-0.46)	0.53 (0.41-0.67)
<b>LPG 18:1</b>	<b>1.69 (0.96-2.44)</b>	<b>1.43 (1.05-1.73)</b>	<b>1.82 (1.00-2.50)</b>	<b>1.21 (1.06-1.56)</b>
	1.69 (0.96-2.44)	1.20 (1.07-1.67)	1.11 (1.00-1.34)	1.50 (1.27-1.75)
<b>SPH d18:0</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>11.8 (0.00-47.6)</b>
	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-68.2)
<b>SPH d18:1</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>27.3 (18.3-40.2)</b>
	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	39.4 (27.0-55.5)
<b>SPC d18:0</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-1.79)</b>
	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-2.32)
<b>SPC d18:1</b>	<b>0.00 (0.00-1.66)</b>	<b>7.49 (0.00-17.5)</b>	<b>9.35 (4.30-12.3)</b>	<b>16.1 (10.8-31.2)</b>
	0.00 (0.00-1.66)	8.44 (0.00-12.8)	8.82 (5.02-9.81)	21.1 (11.6-50.1)
<b>CL 36:4/36:4</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>0.00 (0.00-0.00)</b>	<b>0.02 (0.01-0.03)</b>
	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.02 (0.01-0.03)
<b>BMP 18:1/18:1</b>	<b>0.37 (0.23-0.62)</b>	<b>0.31 (0.21-0.50)</b>	<b>0.49 (0.31-1.00)</b>	<b>0.32 (0.26-0.41)</b>
	0.37 (0.23-0.62)	0.33 (0.21-0.46)	0.30 (0.25-0.42)	0.42 (0.33-0.53)
<b>BMP 18:1/18:2</b>	<b>0.21 (0.12-0.27)</b>	<b>0.22 (0.15-0.34)</b>	<b>0.34 (0.21-0.62)</b>	<b>0.25 (0.19-0.31)</b>
	0.21 (0.12-0.27)	0.22 (0.12-0.33)	0.21 (0.18-0.25)	0.30 (0.24-0.39)

Lipids were determined by electrospray ionization tandem mass spectrometry or liquid chromatography coupled with tandem mass spectrometry as outlined in *Material and*

*Methods.* Data (nmol/ml or pmol/ml) obtained were either uncorrected (normal font) or corrected with the dilution factor per Kraus *et al.* (34, bold font). Values are median and interquartile range. The concentrations of urea were determined within serum and SF to calculate a dilution factor for SF; this procedure was formerly developed to adjust for the dilution introduced by lavage during some biomarker studies. eOA-early osteoarthritis, IOA-late osteoarthritis, RA-rheumatoid arthritis, SM-sphingomyelin, Cer-ceramide, HexCer-hexosylceramide (most likely glucosylceramide), Hex<sub>2</sub>Cer-dihexosylceramide (most likely lactosylceramide), PA-phosphatidic acid, LPA-lysophosphatidic acid, PG-phosphatidylglycerol, LPG-lysophosphatidylglycerol, SPH-sphingosine, SPC-sphingosylphosphorylcholine, CL-cardiolipin, BMP-bis(monoglycero)phosphate.