

Supplementary Information

Sexually dimorphic brain fatty acid composition in low and high fat diet-fed animals

Carlos Rodriguez-Navas¹, Eugenia Morselli^{2*} and Deborah J. Clegg^{3*}

¹Department of Molecular Genetics, University of Texas Southwestern Medical Center, 75390-8857, Dallas, Texas, USA, ²Department of Physiology, Faculty of Biological Sciences, Pontificia Universidad Católica de Chile, 8331150, Santiago, Chile ³Cedars-Sinai Diabetes and Obesity Research Institute, Department of Biomedical Research, 90048, Los Angeles, California, USA

* Eugenia Morselli and Deborah J. Clegg share senior authorship

Supplementary Figure

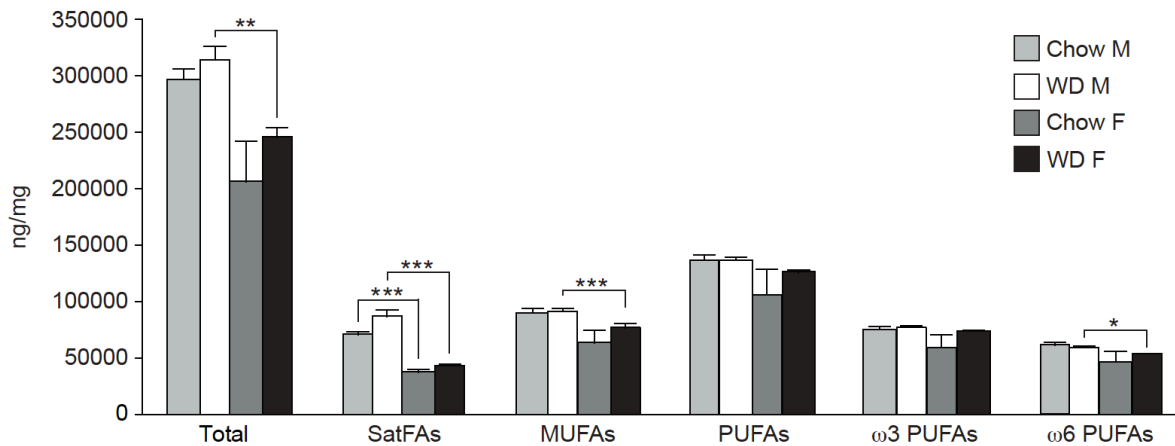


Figure S1

Figure S1: Brain Total Fatty Acid (TFA) Concentration: Concentration of the different classes of TFAs in the brain of male and female mice fed chow or WD. All data are presented as mean \pm SEM, and *p < 0.05, **p < 0.01, ***p < 0.001. n=4/group.

Supplementary Tables

Table S1. Free FAs in brain (ng/mg of tissue)

FA	Chow M		WD M		Chow F		WD F	
	Av	SEM	Av	SEM	Av	SEM	Av	SEM
14:0	4.7	0.2	7.2	0.1	4.9	0.3	7.5	0.4
16:1 ω 7	62.8	1.3	68.0	1.2	59.8	2.5	62.2	4.2
16:0	1086.3	30.6	1042.1	31.3	1098.8	48.8	1035.6	80.6
18:3 ω 3	1.2	0.0	0.7	0.0	1.2	0.0	0.6	0.0
18:3 ω 6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
18:2 ω 6	60.7	1.9	30.5	1.2	61.4	2.3	29.0	1.0
18:1 ω 6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
18:1 ω 7	266.6	7.4	263.2	7.0	271.6	14.4	248.4	11.4
18:1 ω 9	1022.4	26.1	1014.3	28.3	1033.5	51.0	978.2	41.6
18:0	719.8	24.7	681.7	27.2	743.3	49.3	708.3	58.0
20:5 ω 3	3.6	0.1	5.1	0.1	3.3	0.2	5.5	0.2
20:4 ω 6	1176.7	26.2	1103.2	49.0	1212.5	46.6	1079.6	65.4
20:3 ω 3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:3 ω 6	34.9	1.2	35.2	0.9	32.0	1.3	36.2	0.9
20:2 ω 6	8.3	0.2	3.5	0.1	8.9	0.5	3.7	0.1
20:1 ω 3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω 6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω 9	41.7	1.5	37.4	1.3	43.6	2.6	38.6	1.0
20:0	4.0	0.2	3.4	0.1	3.8	0.4	3.3	0.1

22:6 ω3	1621.1	43.6	1485.6	37.5	1789.7	85.4	1610.3	67.7
22:5 ω3	16.2	0.5	17.0	0.8	14.6	0.7	15.6	0.2
22:5 ω6	26.0	0.8	24.7	0.6	25.9	1.5	22.5	0.8
22:4 ω6	150.9	4.5	123.7	4.3	155.7	7.1	128.7	4.5
22:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
22:2 ω6	0.2	0.0	0.1	0.0	0.2	0.0	0.1	0.0
22:1 ω9	5.5	0.3	4.8	0.2	5.4	0.4	4.5	0.1
22:0	2.8	0.2	2.3	0.1	2.6	0.3	2.1	0.1
24:1 ω9	4.4	0.3	3.6	0.2	4.2	0.4	3.2	0.1
24:0	3.4	0.3	2.7	0.2	2.9	0.4	2.2	0.0
Total	6324.6	156.7	5960.2	177.2	6580.3	262.9	6026.1	329.8
SatFAs	1822.4	56.2	1742.6	58.7	1858.0	97.3	1761.9	139.6
UnsatFAs	4503.6	101.9	4220.9	121.2	4723.9	215.3	4267.2	191.0
MUFAs	1403.4	38.3	1391.5	39.2	1418.2	74.1	1335.3	55.7
PUFAs	3100.3	69.3	2829.4	91.2	3305.8	144.7	2931.9	136.6
omega3	1642.1	43.9	1508.3	37.3	1808.8	86.4	1632.0	67.7
omega6	1458.2	32.5	1321.1	55.3	1497.0	61.4	1299.9	71.7

Table S2. Total FAs in brain (ng/mg of tissue)

	Chow M		WD M		Chow F		WD F	
	Av	SEM	Av	SEM	Av	SEM	Av	SEM
14:0	11.3	0.4	19.3	1.0	7.3	0.5	12.0	0.7
16:1 ω7	113.8	4.0	133.2	3.3	83.3	13.1	105.9	5.0
16:0	3038.8	145.9	3742.2	232.3	1630.2	162.6	1946.9	84.5
18:3 ω3	1.7	0.1	1.1	0.1	1.2	0.3	0.9	0.0
18:3 ω6	0.48	0.2	0.36	0.2	0.34	0.1	0.07	0.0
18:2 ω6	157.7	9.0	95.0	4.8	120.2	23.9	79.9	3.8
18:1 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
18:1 ω7	1392.2	61.8	1445.1	39.4	968.6	175.2	1158.5	68.1

18:1 ω9	6318.4	297.9	6405.4	168.1	4556.3	883.9	5462.2	325.0
18:0	3788.0	225.9	4775.7	319.1	1929.5	203.7	2254.2	114.9
20:5 ω3	6.5	0.3	9.8	0.2	4.8	1.0	10.1	0.2
20:4 ω6	4029.1	142.2	3994.7	128.6	3134.7	650.3	3643.8	46.5
20:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:3 ω6	157.6	5.1	172.8	4.3	105.7	22.4	155.5	6.2
20:2 ω6	55.8	3.9	27.9	1.3	40.0	7.9	23.9	2.0
20:1 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω9	1054.6	74.6	1024.1	45.4	701.2	112.3	840.4	90.3
20:0	74.7	6.1	88.0	7.2	32.5	3.6	36.5	4.4
22:6 ω3	7483.0	235.8	7615.8	161.4	5826.6	1232.4	7256.3	167.0
22:5 ω3	75.0	3.5	77.5	1.2	47.9	11.1	75.8	2.5
22:5 ω6	161.2	6.6	171.6	5.9	116.3	25.2	138.4	2.8
22:4 ω6	1552.8	63.6	1437.2	35.8	1160.9	239.4	1271.9	41.2
22:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
22:2 ω6	6.1	0.5	4.0	0.3	3.9	0.6	2.9	0.4
22:1 ω9	88.0	6.1	84.4	3.7	54.4	5.3	59.4	6.1
22:0	41.6	3.7	48.3	4.1	17.3	2.0	17.8	2.3
24:1 ω9	38.5	3.1	37.7	2.5	20.2	1.7	19.9	2.4
24:0	34.7	3.0	39.5	3.7	14.0	1.6	13.7	1.9
Total	29681.5	1070.2	31450.8	1087.3	20577.6	3737.2	24587.0	791.4
SatFAs	7030.7	380.8	8776.4	561.2	3660.3	372.9	4317.7	204.2
UnsatFAs	22693.2	872.0	22759.0	550.4	16949.8	3390.6	20318.7	641.5
MUFAs	9006.2	441.3	9151.1	249.5	6387.2	1189.9	7659.1	489.8
PUFAs	13687.0	464.5	13607.9	335.6	10562.6	2213.1	12659.5	239.5
omega3	7566.3	239.2	7704.3	162.0	5880.6	1244.7	7343.1	167.3
omega6	6120.7	227.1	5903.6	173.7	4682.0	969.0	5316.4	96.3

Table S3. Free FAs in plasma (ng/ul plasma)

FA	Chow M		WD M		Chow F		WD F	
	Av	SEM	Av	SEM	Av	SEM	Av	SEM
14:0	4.2	0.9	6.5	0.7	2.7	1.0	7.6	1.0
16:1 ω7	21.1	3.9	14.8	1.7	16.2	2.1	13.4	1.5
16:0	57.0	7.3	34.0	1.2	47.2	9.7	37.5	3.1
18:3 ω3	0.4	0.1	0.1	0.0	0.5	0.3	0.1	0.0
18:3 ω6	2.08	0.3	0.32	0.0	2.5	0.4	0.3	0.0
18:2 ω6	36.7	4.8	4.8	0.3	42.5	7.3	4.8	0.3
18:1 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
18:1 ω7	6.5	0.9	7.0	0.8	5.9	2.7	5.4	0.4
18:1 ω9	45.0	6.7	36.8	2.1	53.1	5.9	41.9	3.5
18:0	13.8	1.2	10.3	0.6	11.8	2.4	14.5	1.1
20:5 ω3	0.3	0.0	0.2	0.0	0.2	0.2	0.3	0.0
20:4 ω6	3.9	0.4	1.7	0.1	3.7	1.4	2.2	0.1
20:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:3 ω6	0.8	0.1	0.4	0.0	0.5	0.7	0.5	0.0
20:2 ω6	0.4	0.0	0.1	0.0	0.4	0.2	0.1	0.0
20:1 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω9	1.0	0.1	0.7	0.0	1.0	0.4	0.6	0.0
20:0	0.3	0.0	0.2	0.0	0.2	0.1	0.2	0.0
22:6 ω3	1.6	0.1	1.1	0.0	1.9	1.0	1.7	0.1
22:5 ω3	0.3	0.0	0.2	0.0	0.2	0.1	0.2	0.0
22:5 ω6	0.3	0.0	0.1	0.0	0.4		0.1	0.0
22:4 ω6	0.3	0.0	0.1	0.0	0.4	0.1	0.1	0.0
22:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
22:2 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
22:1 ω9	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
22:0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24:1 ω9	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

24:0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Total	196.2	25.3	119.5	4.6	191.9	33.6	131.7	10.6
SatFAs	78.9	9.2	55.6	1.8	63.1	12.8	64.0	5.2
UnsatFAs	122.3	16.2	69.9	3.5	128.9	21.4	67.7	5.5
MUFAs	75.3	11.7	60.8	3.5	76.5	4.8	62.6	5.5
PUFAs	47.0	5.7	9.1	0.1	52.4	16.8	5.1	0.1
omega3	2.6	0.2	1.6	0.1	2.7	1.3	2.3	0.2
omega6	44.4	11.3	7.5	0.1	49.7	8.6	2.8	0.1

Table S4. Total FAs in plasma (ng/ul of plasma).

FA	Chow M		WD M		Chow F		WD F	
	Av	SEM	Av	SEM	Av	SEM	Av	SEM
14:0	4.9	0.7	8.6	0.4	6.6	0.8	6.7	0.3
16:1 ω7	50.6	6.7	52.3	2.5	44.6	4.4	32.5	1.9
16:0	334.6	42.9	427.6	23.6	259.7	72.8	238.9	24.4
18:3 ω3	3.9	0.1	2.0	0.8	4.9	0.3	1.7	0.1
18:3 ω6	6.6	0.5	1.2	0.8	7.1	0.1	1.0	0.1
18:2 ω6	472.3	28.4	196.6	41.5	462.1	22.1	162.1	3.9
18:1 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
18:1 ω7	13.0	2.1	27.8	1.5	12.8	5.6	15.3	1.9
18:1 ω9	66.5	9.6	115.3	9.6	91.2	15.4	95.1	7.5
18:0	200.9	25.3	291.8	21.3	142.5	41.5	206.3	22.5
20:5 ω3	4.5	0.6	9.3	1.6	5.7	1.2	10.2	0.6
20:4 ω6	205.8	10.3	163.6	21.3	231.5	28.6	156.3	12.6
20:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:3 ω6	33.2	4.9	57.2	7.8	29.9	9.3	45.6	3.7
20:2 ω6	4.8	0.6	3.5	0.2	4.6	0.5	2.6	0.1
20:1 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-

20:1 ω9	6.8	0.8	6.8	0.5	7.7	1.1	4.4	0.4
20:0	2.6	0.3	2.1	0.1	0.9	0.2	1.2	0.1
22:6 ω3	75.1	3.9	93.4	9.3	86.0	14.7	101.3	11.2
22:5 ω3	6.4	0.6	5.4	0.7	3.9	0.5	3.6	0.3
22:5 ω6	6.3	0.6	7.3	0.8	7.7	1.1	5.7	0.3
22:4 ω6	4.4	0.4	3.8	0.4	4.6	0.7	2.5	0.3
22:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
22:2 ω6	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
22:1 ω9	0.3	0.0	0.2	0.1	0.4	0.0	0.1	0.0
22:0	0.4	0.0	0.4	0.1	0.3	0.0	0.2	0.0
24:1 ω9	0.2	0.0	0.2	0.1	0.4	0.0	0.1	0.0
24:0	0.3	0.0	0.2	0.1	0.4	0.0	0.1	0.0
Total	1507.1	119.5	1481.8	79.2	1419.0	212.4	1097.2	82.6
SatFAs	546.0	69.6	734.7	40.7	413.4	115.0	456.3	47.2
UnsatFAs	961.2	65.1	747.1	45.2	1005.7	103.4	641.0	40.1
MUFAs	137.8	19.2	203.6	11.7	157.6	26.3	148.4	11.1
PUFAs	823.3	48.0	543.5	42.7	848.1	78.1	492.6	29.7
omega3	89.9	4.9	110.2	10.9	100.5	16.5	116.8	12.1
omega6	733.4	43.1	433.3	48.9	747.6	61.8	375.8	17.9

Table S5. Free FAs in cells (ng FA/ug protein).

	BSA		LA		PA		PA + LA	
	Av	SEM	Av	SEM	Av	SEM	Av	SEM
FA								
14:0	0.7	0.1	0.4	0.1	1.0	0.0	0.8	0.0
16:1 ω7	1.0	0.2	0.7	0.2	2.1	0.1	1.5	0.2
16:0	10.2	2.0	6.9	1.8	38.5	2.7	39.8	11.4
18:3 ω3	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0

18:3 ω6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18:2 ω6	0.4	0.1	3.3	0.5	0.6	0.0	5.5	1.4
18:1 ω6	n.d.	-	n.d.	-	n.d.	-	n.d.	-
18:1 ω7	2.4	0.5	1.7	0.4	4.1	0.3	2.4	0.2
18:1 ω9	7.0	1.3	5.6	1.4	11.3	0.6	8.1	0.8
18:0	7.9	0.6	6.9	1.6	12.7	0.7	10.1	0.3
20:5 ω3	0.1	0.0	0.1	0.0	0.3	0.1	0.2	0.0
20:4 ω6	0.7	0.2	0.8	0.1	1.1	0.1	0.8	0.1
20:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:3 ω6	0.2	0.1	0.3	0.1	0.3	0.0	0.4	0.1
20:2 ω6	0.0	0.0	0.3	0.0	0.1	0.0	0.3	0.1
20:1 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
20:1 ω6	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0
20:1 ω9	0.4	0.0	0.2	0.1	0.4	0.0	0.3	0.0
20:0	0.2	0.0	0.1	0.0	0.3	0.0	0.2	0.0
22:6 ω3	0.5	0.1	0.4	0.1	0.6	0.0	0.5	0.1
22:5 ω3	0.4	0.1	0.3	0.1	0.5	0.0	0.4	0.0
22:5 ω6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22:4 ω6	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
22:3 ω3	n.d.	-	n.d.	-	n.d.	-	n.d.	-
22:2 ω6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22:1 ω9	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
22:0	0.2	0.0	0.1	0.0	0.2	0.0	0.2	0.0
24:1 ω9	0.3	0.0	0.2	0.1	0.4	0.0	0.3	0.0
24:0	0.7	0.1	0.4	0.1	0.8	0.1	0.6	0.1
Total	34.2	5.2	29.8	6.6	76.8	2.6	73.6	10.7
SatFAs	20.4	2.6	15.4	3.6	54.5	3.2	52.4	11.0
UnsatFAs	13.8	2.6	14.4	3.0	22.3	0.6	21.2	2.6
MUFAs	11.3	2.0	8.7	2.3	18.8	0.8	13.0	1.1
PUFAs	2.5	0.7	5.7	0.9	3.6	0.2	8.2	1.7

omega3	1.0	0.3	0.8	0.2	1.4	0.1	1.1	0.1
omega6	1.5	0.4	4.9	0.7	2.2	0.1	7.1	1.6