

**Supplementary Table 1. Brain fatty acid composition (% total fatty acids; male offspring).**

Pre-conception diet	Chow			HFSD	
Post-conception diet	Chow	$\omega$ 3	HFSD	Chow	$\omega$ 3
C16:0	33.1 ± 0.4	29.9 ± 0.8 *	32.0 ± 0.7	31.3 ± 0.2	30.3 ± 1.0 *
C16:1 $\omega$ -7	2.1 ± 0.1	2.3 ± 0.1	2.2 ± 0.1	2.1 ± 0.1	2.1 ± 0.1
C18:0	16.9 ± 0.3	16.4 ± 0.6	16.4 ± 0.5	16.6 ± 0.1	15.5 ± 0.7
C18:1 $\omega$ -9	12.6 ± 0.3	13.1 ± 0.4	12.6 ± 0.3	12.6 ± 0.2	13.2 ± 0.5
C18:2 $\omega$ -6	0.9 ± 0.0	0.6 ± 0.0 *, \$	0.6 ± 0.0 *, \$	0.9 ± 0.0	0.5 ± 0.1 *, \$
C20:1 $\omega$ -9	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.1
C20:2 $\omega$ -6	0.2 ± 0.0	0.0 ± 0.0	0.1 ± 0.1	0.1 ± 0.1	0.0 ± 0.0
C20:3 $\omega$ -6	0.5 ± 0.0	0.4 ± 0.0	0.4 ± 0.0	0.5 ± 0.0	0.4 ± 0.0
C20:4 $\omega$ -6	12.9 ± 0.3	9.3 ± 0.2 *	14.0 ± 0.6 ^, “	14.0 ± 0.2 ^, “	9.4 ± 0.6 *
C20:5 $\omega$ -3	0.2 ± 0.1	1.1 ± 0.1 *	0.1 ± 0.1 ^, “	0.2 ± 0.1 ^, “	1.2 ± 0.2 *
C22:1 $\omega$ -9	0.2 ± 0.1	0.1 ± 0.1	0.2 ± 0.1	0.1 ± 0.1	0.1 ± 0.1
C22:6 $\omega$ -3	13.5 ± 0.6	20.0 ± 1.3 *	13.8 ± 1.1 ^, “	14.8 ± 0.4 ^, “	19.2 ± 1.2 *
Total PUFAs	43.4 ± 0.7	47.4 ± 1.2	44.5 ± 1.4	45.7 ± 0.5	46.6 ± 1.4
Total $\omega$ -3	13.7 ± 0.6	21.2 ± 1.3 *	13.9 ± 1.1 ^, “	15.0 ± 0.4 ^, “	20.3 ± 1.3 *
Total $\omega$ -6	14.8 ± 0.4	10.6 ± 0.3 *	15.0 ± 0.6 ^, “	15.8 ± 0.2 ^, “	10.6 ± 0.6 *
Total $\omega$ -9	12.9 ± 0.3	13.4 ± 0.5	12.9 ± 0.4	12.9 ± 0.2	13.6 ± 0.6

HFSD: high-fat-high-sugar diet. PUFAs: polyunsaturated fatty acids. Data were analysed by two-way ANOVA followed by Tukey's *post hoc* tests. *Post hoc* differences: \* versus the chow-chow group; ^ versus the chow- $\omega$ 3 group; # versus the HFSD-HFSD group; \$ versus the HFSD-chow group; “ versus the HFSD- $\omega$ 3 group.  $p < 0.05$ . Data are mean ± SEM (n = 4-5 per group).

**Supplementary Table 2. Brain fatty acid composition (% total fatty acids; female offspring).**

Pre-conception diet	Chow			HFSD	
Post-conception diet	Chow	$\omega 3$	HFSD	Chow	$\omega 3$
C16:0	35.9 ± 1.9	33.2 ± 1.0	35.6 ± 1.7	38.2 ± 3.3	34.1 ± 0.2
C16:1 $\omega$ -7	1.8 ± 0.1	1.9 ± 0.1	2.1 ± 0.2	1.7 ± 0.2	2.1 ± 0.0
C18:0	20.4 ± 1.7	19.3 ± 0.9	20.0 ± 1.6	21.9 ± 2.2	19.4 ± 0.3
C18:1 $\omega$ -9	13.7 ± 0.7	13.9 ± 0.4	13.8 ± 0.7	11.7 ± 2.2	14.0 ± 0.3
C18:2 $\omega$ -6	0.8 ± 0.1	0.6 ± 0.0	0.6 ± 0.1	0.7 ± 0.1	0.5 ± 0.0 *
C20:1 $\omega$ -9	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.1 ± 0.1	0.2 ± 0.0
C20:2 $\omega$ -6	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.1	0.2 ± 0.0
C20:3 $\omega$ -6	0.4 ± 0.1	0.4 ± 0.1	0.4 ± 0.0	0.3 ± 0.2	0.4 ± 0.0
C20:4 $\omega$ -6	10.0 ± 2.0	7.4 ± 0.6	10.7 ± 1.6	8.6 ± 2.3	7.3 ± 0.4
C20:5 $\omega$ -3	0.1 ± 0.1	0.9 ± 0.1 *	0.1 ± 0.0 ^, “	0.1 ± 0.1 ^, “	0.8 ± 0.0 *
C22:1 $\omega$ -9	0.3 ± 0.1	0.2 ± 0.0	0.2 ± 0.0	0.3 ± 0.1	0.3 ± 0.0
C22:6 $\omega$ -3	9.7 ± 2.6	15.0 ± 1.7	9.2 ± 2.2	7.9 ± 2.4	13.6 ± 0.0
Total PUFAs	37.9 ± 4.0	41.4 ± 2.0	38.1 ± 3.4	32.3 ± 7.1	40.0 ± 0.5
Total $\omega$ -3 <sup>m</sup>	10.0 ± 2.6	16.1 ± 1.7	9.4 ± 2.2	8.1 ± 2.5	14.5 ± 0.5
Total $\omega$ -6	11.9 ± 2.1	9.0 ± 0.6	12.3 ± 1.7	10.3 ± 2.7	8.8 ± 0.4
Total $\omega$ -9	14.3 ± 0.8	14.4 ± 0.3	14.3 ± 0.6	12.2 ± 1.9	14.7 ± 0.4

HFSD: high-fat-high-sugar diet. PUFAs: polyunsaturated fatty acids. Data were analysed by two-way ANOVA followed by Tukey's *post hoc* tests. *Post hoc* differences: \* versus the chow-chow group; ^ versus the chow- $\omega 3$  group; # versus the HFSD-HFSD group; \$ versus the HFSD-chow group; “ versus the HFSD- $\omega 3$  group. m – main effect of pregnancy diet (with no *post hoc* differences).  $p < 0.05$ . Data are mean ± SEM (n = 3-5 per group).