Supplemental Figures

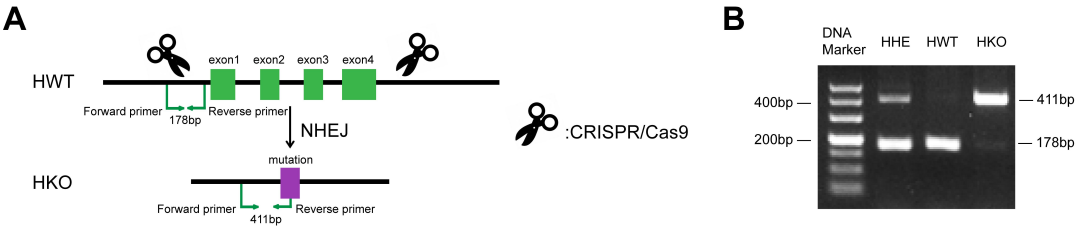

Figure S1. Generation and characterization of *Selenoh* knockout mice.

(A) Schematic diagram. The CRISPR/Cas9 technology was employed to induce a full deletion mutation in the reading frame of the *Selenoh* gene, resulting in functional loss through non-homologous end joining (NHEJ) repair. (B) Representative PCR amplification results from the tail DNA of heterozygous (HHE), wild-type (HWT), and knockout (HKO) mice.

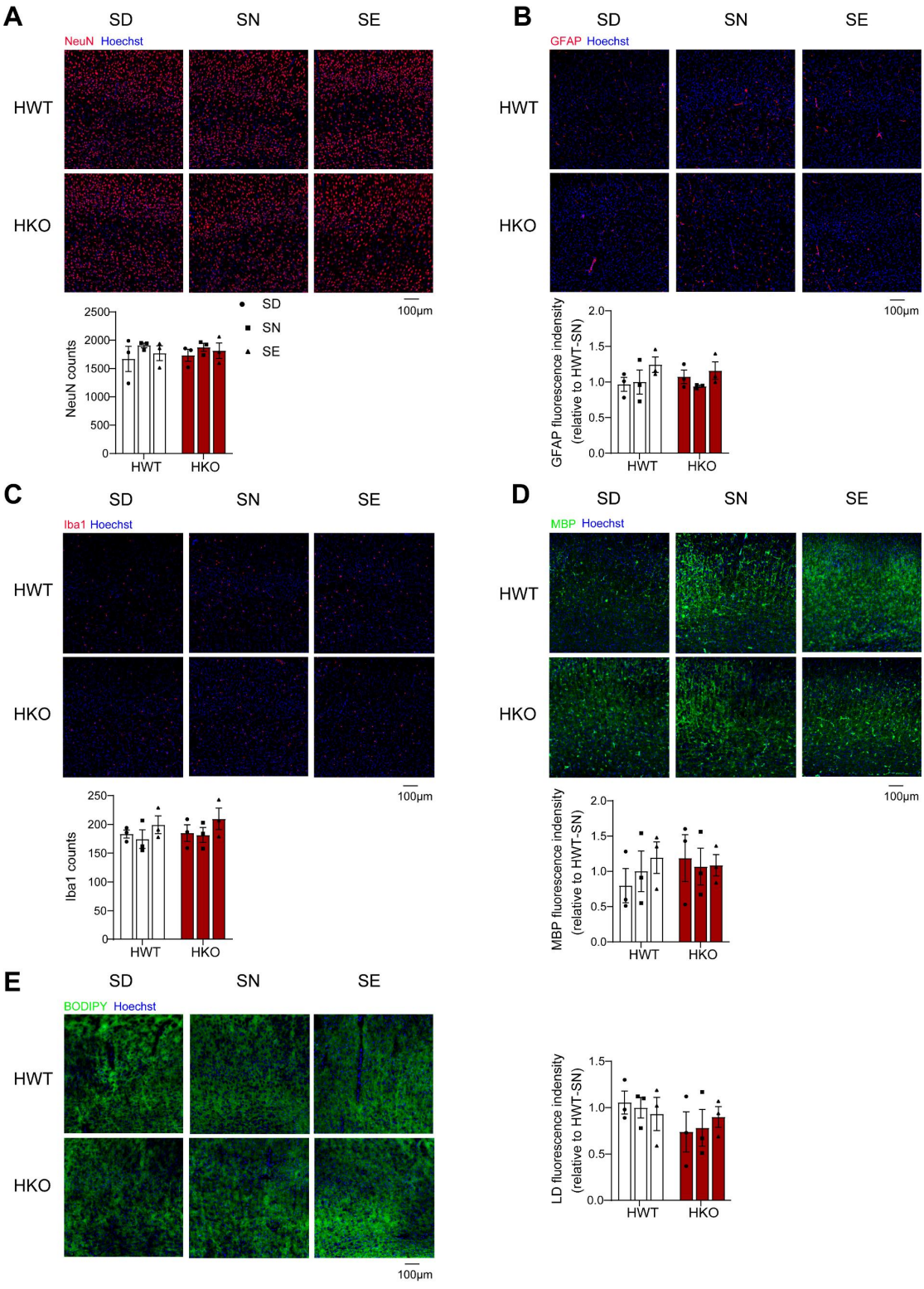

Figure S2. There were no significant changes in various types of cells in the cortex of *Selenoh* knockout mice.

Representative images showing immunostaining of NeuN (A), GFAP (B), Iba1 (C), MBP (D), and BODIPY (E) in the cortex of HWT and HKO mice, with quantification of NeuN cell

counts, Iba1 cell counts, and analysis of GFAP, MBP, and BODIPY fluorescence intensity (*n* = 3 each). Red, NeuN (A), GFAP (B), and Iba1 (C). Green, MBP (D) and BODIPY (E). Blue, nuclear staining with Hoechst. Scale bar, 100 μm (A-E). Analysis by two-way ANOVA with post hoc Tukey test for multiple comparisons. Data are represented as mean ± SEM. Each point represents a biological replication. Abbreviations: SD, selenium-deficient diet; SE, selenium-excessive diet; SN, selenium-normal diet.

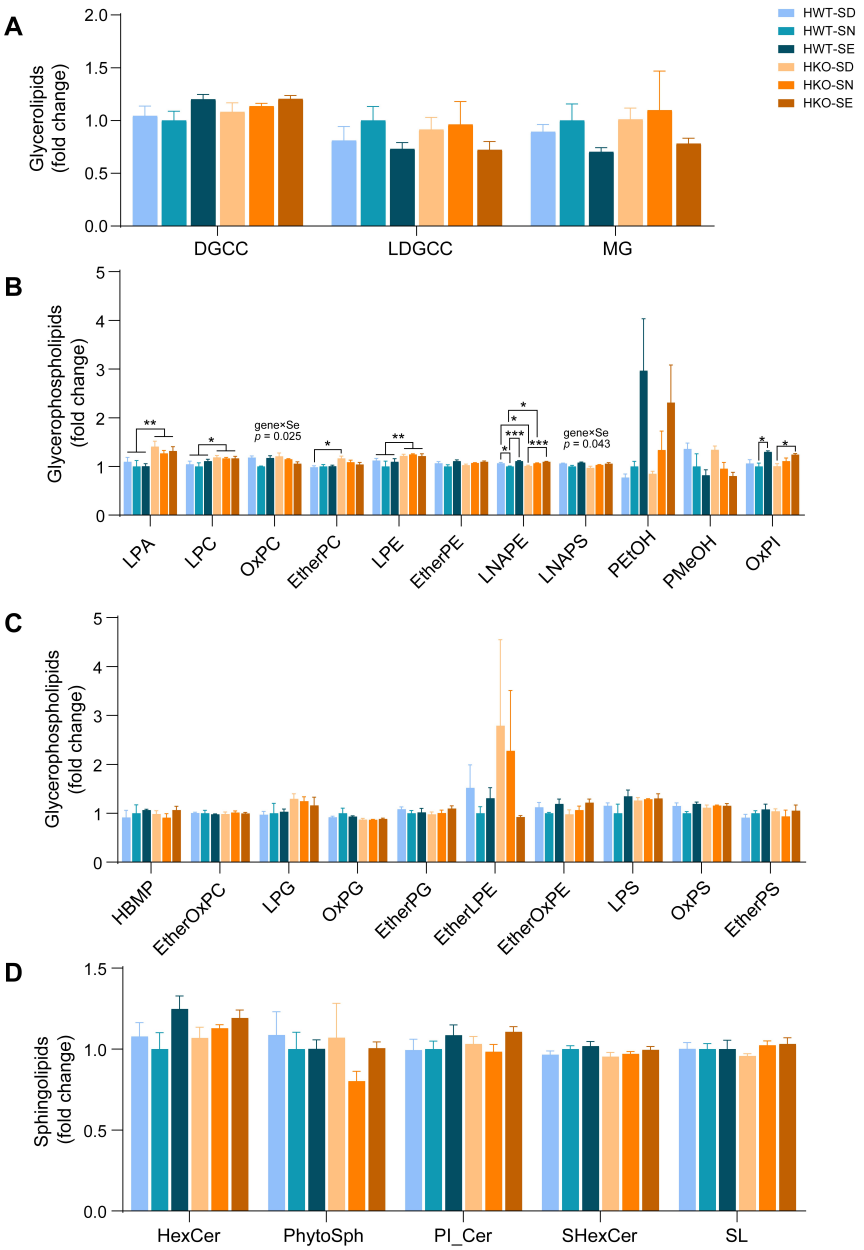

Figure S3. The lipidome profile in the hippocampus of mice.

Lipid classes identified by statistical analysis, include Glycerolipids (A) Glycerophospholipids (B and C), and Sphingolipids(D) [*n* = 4 (HWT-SD), 4 (HWT-SN), 4

(HWT-SE), 4 (HKO-SD), 3 (HKO-SN), and 5 (HKO-SE)]. *p < 0.05, **p < 0.01, and ***p < 0.001 by two-way ANOVA with post hoc Tukey test for multiple comparisons. Data are represented as mean ± SEM.

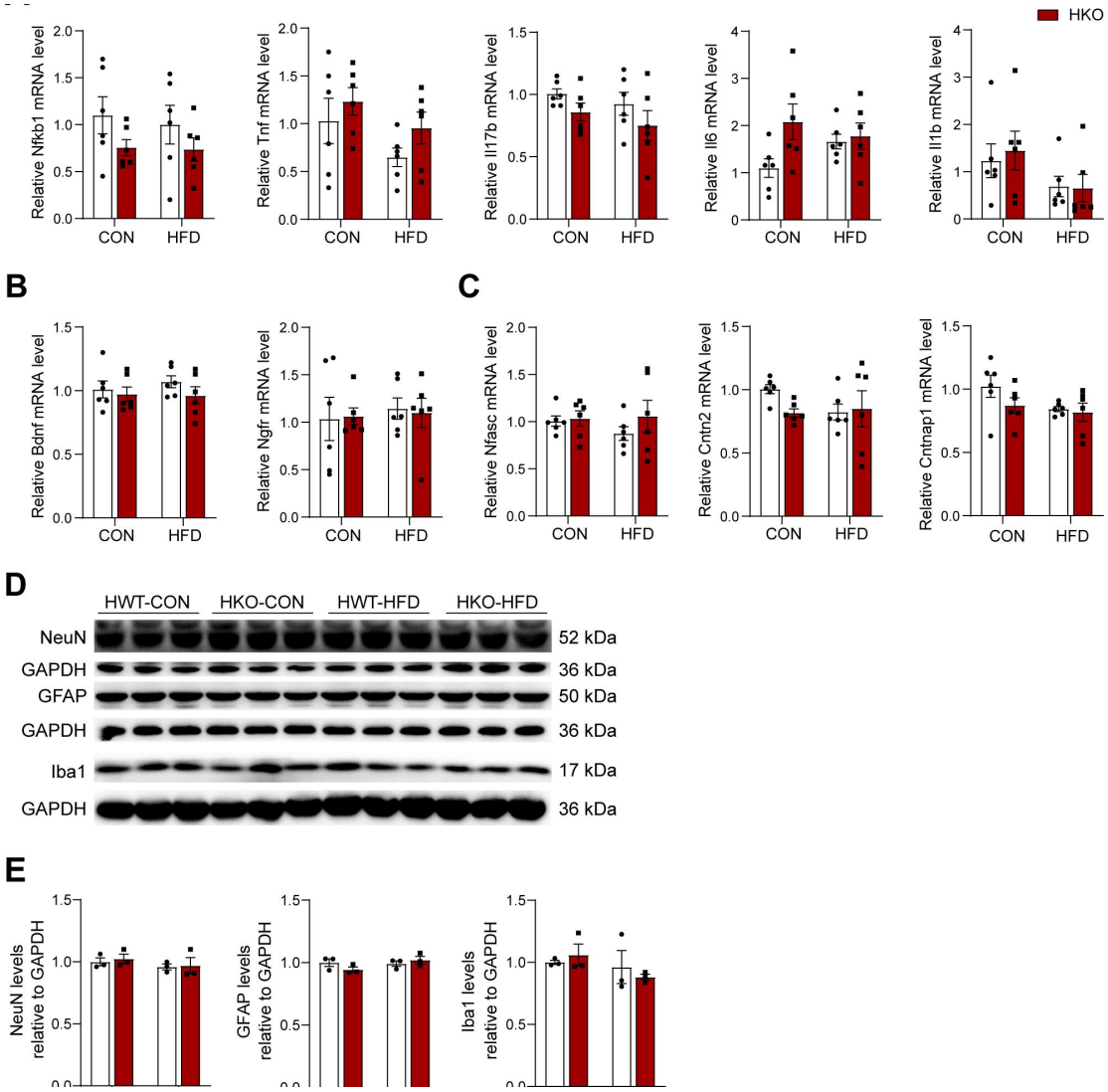

Figure S4. The expression of genes and proteins, pro-inflammatory factors, neurons, and neuroglial cells in the hippocampus.

Expression levels of inflammatory genes (A), neurotrophic factors genes (B), and myelination genes (C) in the hippocampus measured by qPCR. (D and E) Representative western blotting results showing the protein levels of NeuN, GFAP, and Iba1 in hippocampal tissues (n = 3 each). Analysis by two-way ANOVA with post hoc Tukey test for multiple comparisons. Data are represented as mean ± SEM. Each point represents a biological replication (n = 6 each).

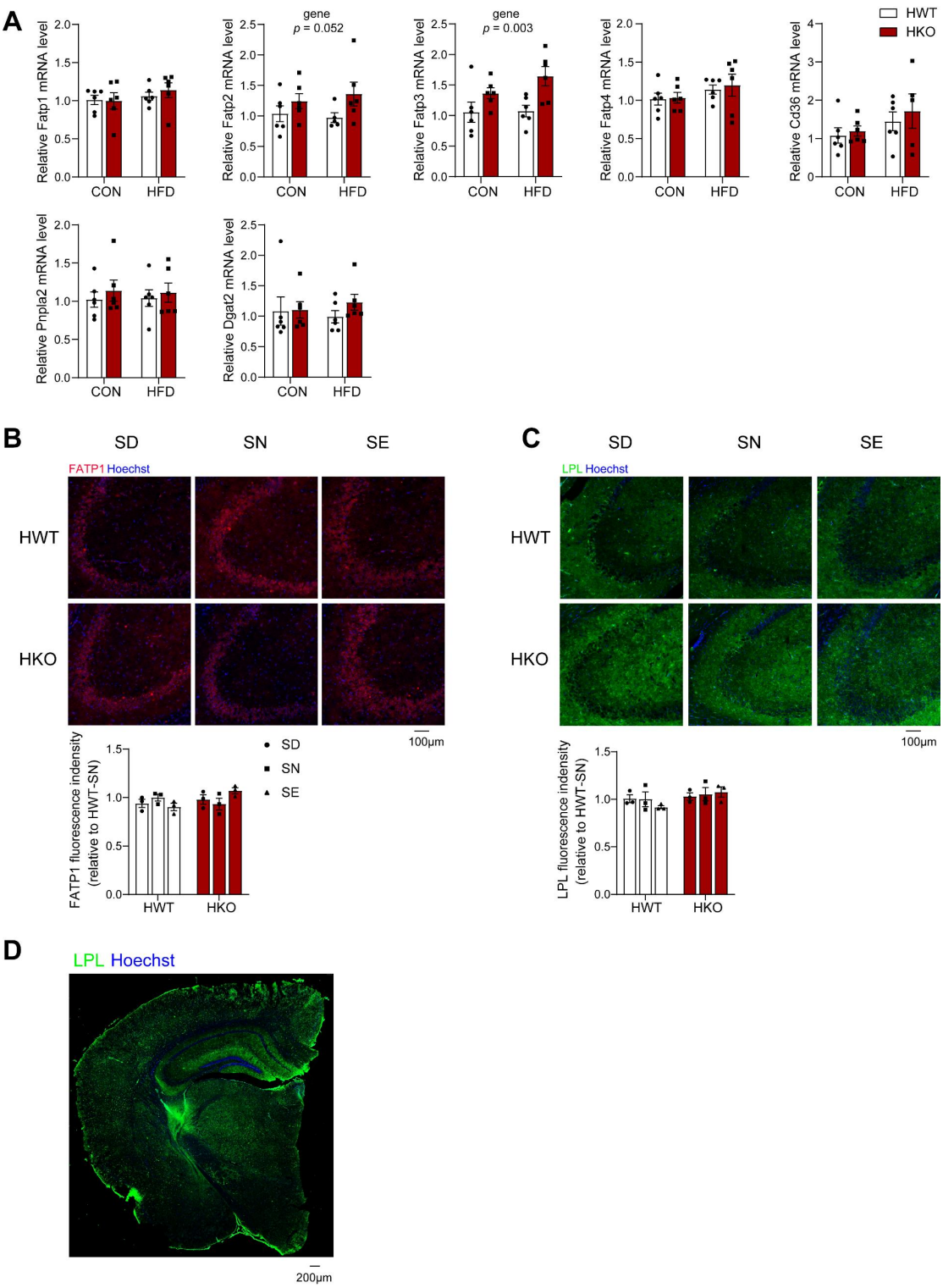

Figure S5. FATPs and LPL expression in the hippocampus of mice.

(A) mRNA level of lipid metabolism-related genes in the hippocampus (*n* = 6 each). Representative images showing immunostaining of FATP1 (B) and LPL (C) in the hippocampus of HWT and HKO mice, with analysis of FATP1 and LPL fluorescence intensity (*n* = 3 each). Red, FATP1 (B). Green, LPL (C). Blue, nuclear staining with

Hoechst (B, C). Scale bar, 100 μm. (D) Representative images showing LPL fluorescence in the brain of mice. Green, LPL. Blue, nuclear staining with Hoechst. Scale bar, 200 μm. Analysis by two-way ANOVA with post hoc Tukey test for multiple comparisons (A-C). Data are represented as mean ± SEM. Each point represents a biological replication. Abbreviations: SD, selenium-deficient diet; SE, selenium-excessive diet; SN, selenium-normal diet.

Table S1 qPCR primer sequences.

Gene	Forward	Reverse
Apc	ACAGCAGGTTATTGCAAGTGTT	ACAGGTTCCATAAGGCACTCA
Arc	AAGTGCCGAGCTGAGATGC	CGACCTGTGCAACCCTTTC
Bdnf	TCATACTTCGGTTGCATGAAGG	AGACCTCTCGAACCTGCCC
Cd36	TGGCTAAATGAGACTGGGAC	TCCAATCCCAAGTAAGGCCAT
Cnp	ACAAGATCATCCCTGGCTCTCG	AGCACAAGAACCCTGATGTCC
Cntn2	TGGGGAACAGTACCAGAGTG	TTTGCCTTCATCCGATCGACT
Cntnap1	GTACCTGCCTCCAGATTTCCC	TAGAACAGCACCAGCATTCCC
Cspg4	ACCCAGGCTGAGGTAAATGCT	AGGACATCTCGTGCTCATACAGA
Dgat2	CAGGTGCCGTCTTGGGTTAT	CAGGAGGATATGCGCCAGAG
Fatp1	AACATGGACGGCAAGGTCGG	AGTGGCTCCATCGTGTCCTC
Fatp2	TCCGGTGGAAAGGAGAGAAC	GCACGCCATACACATTCACT
Fatp3	CCAGGAATCTTTGGCCACT	GGCCCCTATATCTTGGTCCAG
Fatp4	CTGCACAAGACAGGGACCTTC	AACAGCGGGTCTTTCACAAC
Gapdh	TTGGGCTACACTGAGGACCA	GCCGTATTCATTGTCATACCAGG
Il-1b	AGGTCAAAGGTTTGGAAGCA	TGAAGCAGCTATGGCAACTG
Il17b	TACAGCATCAACCACGACCC	GGGATTCACGCAACCCAAAC
Il-6	TGGTACTCCAGAAGACCAGAGG	AACGATGATGCACTTGCAGA
Lgi4	TCACTCACCCACCTAAGCCT	CAGAGTCTCCAAGCCTCGGAA
Mag	CTGGACATCGTCAACACCCC	AACTGACCTCCACTTCCGTTC
Mbp	ACTTGATCCGCCTCTTTTCCC	TCTGAAGCTCGTCGGACTCT

Mog	CCATCGGACTTTTGATCCTC	CTCAAAAGGGGTTTCTTAGCTCT
Myrf	ACAAGGAGCGAATCTTCATGG	CATCAATGCGAGTCTCTAGGTT
Nfasc	ACTCCAACTGCAGCTTACACC	GTACTTGCCACCTCGACTCC
Nfkb1	AGCACATAGATGAACTCCGGGA	TCCTTCCTGCCCATAACCGT
Ngfr	CGTGACCATCTCAGGCCTTT	GGTGCCCCTGTTACCTTCTC
Nr4a1	TCACTGATCGACACGGGCTC	TAGCCATGTGCTCCTTCAGAC
Olig2	CTGGCGCGAAACTACATCCTC	CTTCATCTCCTCCAGCGAGT
Opalin	TCTGAGAATCCTAGGCGGTCAC	CTTCCCGAGACAGTCTTCACA
Pllp	AGCTGCCTCTTTCTTTGCTTG	CCCCAGCCATCTGACTCGTG
Plp1	AAACAGCTGAGTTCCAAATGACC	CCCATGAGTTTAAGGACGGCGAA
Pnpla2	GTCCTTCACCATCCGCTTG	GATGCTACCCGTCTGCTCT
Prl	AAGATAATTAGCCAGGCCTA	GCGCAAAGACAAGATTTTGGA
Tnf	ACTCAAATGGGCTTTCCGAA	GACAGAGGCAACCTGACCAC

Table S2 Antibodies and dilutions used for Western blot analysis.

Antibodies	Dilution	Identifier	Source
anti-SELH	1:500	ab151023	Abcam, Cambridge, MA, USA
anti-PSD95	1:500	sc-32290	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-SYP	1:500	sc-17750	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-PRL	1:500	sc-271773	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-GFAP	1:500	sc-33673	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-MBP	1:500	sc-271524	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-MAG	1:500	sc-166849	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-MOG	1:500	sc-166172	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-OLIG2	1:500	sc-515947	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-CNPase	1:500	sc-166558	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-CC1	1:500	sc-9998	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-FATP4	1:500	sc-393309	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-LPL	1:500	sc-373759	Santa Cruz Biotechnology, Santa Cruz, CA, USA

anti-NG2	1:500	sc-33666	Santa Cruz Biotechnology, Santa Cruz, CA, USA
anti-Iba1	1:1000	#17198	Cell signaling Technology, Danvers, MA, USA
anti-PLIN2	1:5000	15294-1-AP	Proteintech, Wuhan, China
anti-NeuN	1:1000	26975-1-AP	Proteintech, Wuhan, China
anti-ARC	1:5000	66550-1-Ig	Proteintech, Wuhan, China
anti-FATP2	1:2000	14048-1-AP	Proteintech, Wuhan, China
anti-FATP3	1:2000	12943-1-AP	Proteintech, Wuhan, China
anti-PLP1	1:500	A14251	Abclonal, Wuhan, China
anti-FATP1	1:1000	A12847	Abclonal, Wuhan, China
anti-GAPDH	1:5000	Ac002	Abclonal, Wuhan, China