nature neuroscience

Corresponding Author: Lin Mei

Manuscript Number: NN-A54176B

Manuscript Type: Article

Main Figures: 7

Supplementary Figures: 10

Supplementary Tables: 0

Supplementary Videos: 0

Reporting Checklist for Nature Neuroscience

This checklist is used to ensure good reporting standards and to improve the reproducibility of published results. For more information, please read Reporting Life Sciences Research.

Please note that in the event of publication, it is mandatory that authors include all relevant methodological and statistical information in the manuscript.

▶ Statistics reporting, by figure

- Please specify the following information for each panel reporting quantitative data, and where each item is reported (section, e.g. Results, & paragraph number).
- Each figure legend should ideally contain an exact sample size (n) for each experimental group/condition, where n is an exact number and not a range, a clear definition of how n is defined (for example x cells from x slices from x animals from x litters, collected over x days), a description of the statistical test used, the results of the tests, any descriptive statistics and clearly defined error bars if applicable.
- For any experiments using custom statistics, please indicate the test used and stats obtained for each experiment.
- Each figure legend should include a statement of how many times the experiment shown was replicated in the lab; the details of sample collection should be sufficiently clear so that the replicability of the experiment is obvious to the reader.
- For experiments reported in the text but not in the figures, please use the paragraph number instead of the figure number.

Note: Mean and standard deviation are not appropriate on small samples, and plotting independent data points is usually more informative. When technical replicates are reported, error and significance measures reflect the experimental variability and not the variability of the biological process; it is misleading not to state this clearly.

FIGURE NUMBER	TEST USED		n			DESCRIPTIVE STATS (AVERAGE, VARIANCE)		P VALUE		DEGREES OF FREEDOM & F/t/z/R/ETC VALUE	
	WHICH TEST?	SECTION & PARAGRAPH #	EXACT VALUE	DEFINED?	SECTION & PARAGRAPH #	REPORTED?	SECTION & PARAGRAPH #	EXACT VALUE	SECTION & PARAGRAPH #	VALUE	SECTION & PARAGRAPH #
example 1a	one-way ANOVA	Fig. legend	9, 9, 10, 15	mice from at least 3 litters/group	Methods para 8	error bars are mean +/- SEM	Fig. legend	p = 0.044	Fig. legend	$F_{(3, 36)} = 2.97$	Fig. legend
example results, para 6	unpaired t-test	Results para 6	15	slices from 10 mice	Results para 6	error bars are mean +/- SEM	Results para 6	p = 0.0006	Results para 6	$t_{(28)} = 2.808$	Results para 6

FIGURE NUMBER	TEST USED		n			DESCRIPTIVE STATS (AVERAGE, VARIANCE)		P VALUE		DEGREES OF FREEDOM & F/t/z/R/ETC VALUE	
	WHICH TEST?	SECTION & PARAGRAPH #	EXACT VALUE	DEFINED?	SECTION & PARAGRAPH #	REPORTED?	SECTION & PARAGRAPH #	EXACT VALUE	SECTION & PARAGRAPH #	VALUE	SECTION & PARAGRAPH #
1f	unpaired t-test	Fig. legend	15, 15	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.017	Fig. legend	t(28) = 2.538	Fig. legend
1g	unpaired t-test	Fig. legend	15, 15	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.3581	Fig. legend	t(28) = 0.9343	Fig. legend
2b	two-way ANOVA	Fig. legend	11, 11	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.0005	Fig. legend	F(1,60) = 13.55	Fig. legend
2e	unpaired t-test	Fig. legend	7	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0037	Fig. legend	t(12) = 3.594	Fig. legend
2g	unpaired t-test	Fig. legend	13, 14	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0128	Fig. legend	t(25) = 2.682	Fig. legend
2h	unpaired t-test	Fig. legend	13, 14	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.0149	Fig. legend	t(25) = 2.615	Fig. legend
2i	unpaired t-test	Fig. legend	13, 14	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.9012	Fig. legend	t(25) = 0.1254	Fig. legend
3d	paired t-test	Fig. legend	4,4	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.0337	Fig. legend	t(3) = 3.727	Fig. legend

+ -	3g	unpaired t-test	Fig. legend	13, 14	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0419	Fig. legend	t(25) = 2.145	Fig. legend
+ -	3h	unpaired t-test	Fig. legend	13, 14	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.7291	Fig. legend	t(25) = 0.3502	Fig. legend
+ -	3l	two-way ANOVA	Fig. legend	10, 11	4 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	P = 0.0002	Fig. legend	F(1,57) = 16.15	Fig. legend
+ -	3m	unpaired t-test	Fig. legend	7, 8	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.037	Fig. legend	t(13) = 2.32	Fig. legend
+ -	4c	one-way ANOVA; student's t test	Fig. legend	11, 9, 8, 8; 11, 9; 11, 8 8, 8	3 times of culture	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.0032; p = 0.0209; p = 0.5475; p = 0.0031	Fig. legend	F(3,32) = 5.652; t(18) = 2.532; t(17) = 0.6137; t(14) = 3.573	Fig. legend
+ -	4d	one-way ANOVA	Fig. legend	11, 9, 8, 8	3 times of culture	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.4926	Fig. legend	F(3,32) = 0.8197	Fig. legend
+ -	5a	unpaired t-test	Fig. legend	8, 9; 7, 7; 8, 8; 8, 8; 9, 9; 7, 8; 8, 7	at least 3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.8287; P = 0.0123; p = 0.0181; p = 0.0263; p = 0.6567; p = 0.0291; p = 0.4213	Fig. legend	t(15) = 0.2202; t(12) = 2.944 ; t(14) = 2.675; t(14) = 2.483; t(16) = 0.4528; t(13) = 2.451; t(13) = 0.8303	Fig. legend
+ -	5b	unpaired t-test	c	5, 5; 4,4; 8, 8; 5, 5	at least from 3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0104; p = 0.0119; P = 0.0391; p = 0.4804;	Fig. legend	t(8) = 3.33; t(6) = 3.565; t(14) = 2.276; t(8) = 0.7401	Fig. legend
+ -	5d	paired t-test	Fig. legend	4,4	4 dishes from 2 times of culture	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.0613	Fig. legend	t(3) = 2.923	Fig. legend
+ -	5e	paired t-test	Fig. legend	8, 8	8 dishes from 2 times of culture	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.6845	Fig. legend	t(7) = 0.4237	Fig. legend
+ -	5f	unpaired t-test	Fig. legend	5, 5; 4, 4; 6, 6; 4, 4	at least from 3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0094; p = 0.0305; p = 0.0283; p = 0.6506	Fig. legend	t(8) = 3.394; t(6) = 2.816; t(10) = 2.562; t(6) = 0.4766	Fig. legend

+ - -	7b	unpaired t-test	Fig. legend	9, 9; 11,11; 9, 11	at least from 9 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.0279; P = 0.2891; p < 0.0001	Fig. legend	t(16) = 2.417; t(20) = 1.089; t(18) = 5.543	Fig. legend
+ - -	7c	unpaired t-test	Fig. legend	9, 9; 11,11; 9, 11	at least from 9 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0447; p = 0.6749; p = 0.0268	Fig. legend	t(16) = 2.178; t(20) = 0.4257; t(18) = 2.411	Fig. legend
+ - -	7d	unpaired t-test	Fig. legend	9, 9; 11,11; 9, 11	at least from 9 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0391; p = 0.8779; p = 0.0044	Fig. legend	t(16) = 2.246; t(20) = 0.1557; t(18) = 3.258	Fig. legend
+ - -	7f	two-way ANOVA	Fig. legend	9, 9, 12, 12	at least from 9 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.1568	Fig. legend	F(3,190) = 1.757	Fig. legend
+ - -	7g	unpaired t-test	Fig. legend	9, 9; 12, 12	at least from 9 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0241; p = 0.3333; p = 0.0211	Fig. legend	t(16) = 2.49; t(22) = 0.9893; t(19) = 2.513	Fig. legend
+ - -	7h	unpaired t-test	Fig. legend	9, 9; 12, 12	at least from 9 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.034; p = 0.8839; p = 0.0002	Fig. legend	t(16) = 2.318; t(22) = 0.1478; t(19) = 4.625	Fig. legend
+ - -	7j	unpaired t-test	Fig. legend	10, 10	10 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.011	Fig. legend	t(18) = 2.834	Fig. legend
+ - -	7k	unpaired t-test	Fig. legend	8, 8; 6, 6	at least from 6 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0226; p = 0.4434	Fig. legend	t(14) = 2.561; t(10) = 0.798	Fig. legend
+ - -	Supplementary fig 1b	N/A	N/A	3, 3	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	N/A	Fig. legend	N/A	Fig. legend
+ - -	1i	unpaired t-test	Fig. legend	29, 22	5 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0391	Fig. legend	t(49) = 2.12	Fig. legend
+ - -	1j	unpaired t-test	Fig. legend	29, 22	5 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.494	Fig. legend	t(49) = 0.6891	Fig. legend

+ -	1m	unpaired t-test	Fig. legend	9, 9	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0109	Fig. legend	t(16) = 2.879	Fig. legend
+ -	Supplementary fig 1d	two-way ANOVA	Fig. legend	8, 8	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.0573	Fig. legend	F(1,70) = 3.736	Fig. legend
+ -	Supplementary fig 1f	two-way ANOVA	Fig. legend	10, 10	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.7005	Fig. legend	F(1,36) = 0.1503	Fig. legend
+ -	Supplementary fig 2b	paired t-test	Fig. legend	5, 5; 4, 4; 4, 4; 5, 5; 5, 5; 5, 5; 5, 5; 3, 3; 3, 3; 5, 5	at least 3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p < 0.0001; p = 0.6746; p = 0.2212; p = 0.7128; p = 0.8507; p = 0.4459; p = 0.9972; p = 0.7472; p = 5968; p = 0.1151	Fig. legend	t(4) = 28.05; t(3) = 0.4635; t(3) = 1.54; t(4) = 0.3952; t(4) = 0.2008; t(4) = 0.8446; t(2) = 0.003932; t(2) = 0.3696; t(2) = 0.6231; t(4) = 2.008	Fig. legend
+ -	Supplementary fig 3b	two-way ANOVA	Fig. legend	9, 8	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	P = 0.9396	Fig. legend	F(1,150) = 0.006	Fig. legend
+ -	Supplementary fig 3c	unpaired t-test	Fig. legend	9, 8	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.8033	Fig. legend	t(15) = 0.2535	Fig. legend
+ -	Supplementary fig 3d	unpaired t-test	Fig. legend	9, 8	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.4578	Fig. legend	t(15) = 0.7621	Fig. legend
+ -	Supplementary fig 3f	two-way ANOVA	Fig. legend	11, 11	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.2307	Fig. legend	F(1,140) = 1.449	Fig. legend
+ -	Supplementary fig 3g	two-way ANOVA	Fig. legend	11, 11	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	P = 0.8825	Fig. legend	F(1,140) = 0.022	Fig. legend
+ -	Supplementary fig 3h	unpaired t-test	Fig. legend	11, 11	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	P = 0.652	Fig. legend	t(20) = 0.4578	Fig. legend
+ -	Supplementary fig 2d	two-way ANOVA	Fig. legend	15, 15	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.7222	Fig. legend	F(1,363) = 0.1266	Fig. legend

+ - -	Supplementary fig 4b	unpaired t-test	Fig. legend	46, 46; 80, 76	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0427; p = 0.0017	Fig. legend	t(90) = 2.055 t(154) = 3.195	Fig. legend
+ - -	Supplementary fig 4d	unpaired t-test	Fig. legend	63, 67	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.2029	Fig. legend	t(128) = 1.28	Fig. legend
+ - -	Supplementary fig 4e	unpaired t-test	Fig. legend	61, 64	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.737	Fig. legend	t(123) = 0.3366	Fig. legend
+ - -	Supplementary fig 6c	paired t-test	Fig. legend	6, 6	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.2512	Fig. legend	t(5) = 1.297	Fig. legend
+ - -	Supplementary fig 6f	unpaired t-test	Fig. legend	10, 10	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.5206	Fig. legend	t(18) = 0.6552	Fig. legend
+ - -	Supplementary fig 6g	unpaired t-test	Fig. legend	10, 10	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.7455	Fig. legend	t(18) = 0.3296	Fig. legend
+ - -	Supplementary fig 6h	two-way ANOVA	Fig. legend	6, 8	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.8843	NFig. legend	F(1,35) = 0.02	Fig. legend
+ - -	Supplementary fig 7h	unpaired t-test	Fig. legend	8, 8	3 times of culture	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.7876	Fig. legend	t(14) = 0.2747	Fig. legend
+ - -	Supplementary fig 7j	unpaired t-test	Fig. legend	8, 9	3 times of culture	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.9419	Fig. legend	t(15) = 0.074	Fig. legend
+ - -	Supplementary fig 8a	paired t-test	Fig. legend	6, 8	at least 3 mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.0688; p = 0.024	Fig. legend	t(5) = 2.311; t(7) = 2.87	Fig. legend
+ - -	Supplementary fig 8b	paired t-test	Fig. legend	7, 7	at least 3 mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.0645; p = 0.0002	Fig. legend	t(6) = 2.26; t(6) = 7.926	Fig. legend
+ - -	Supplementary fig 8c	paired t-test	Fig. legend	6, 8	at least 3 mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.1097; p = 0.017	Fig. legend	t(5) = 1.943; t(7) = 3.115	Fig. legend

+ - -	Supplementary fig 8d	paired t-test	Fig. legend	6, 9	at least 3 mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.1697; p = 0.0153	Fig. legend	t(5) = 1.604; t(8) = 3.072	Fig. legend
+ - -	Supplementary fig 8e	paired t-test	Fig. legend	5, 7	at least 3 mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.3688; p = 0.0264	Fig. legend	t(4) = 1.012; t(6) = 2.927	Fig. legend
+ - -	Supplementary fig 8f	paired t-test	Fig. legend	6, 8	at least 3 mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.1677; p = 0.0378	Fig. legend	t(5) = 1.613; t(7) = 2.556	Fig. legend
+ - -	Supplementary fig 10b	unpaired t-test	Fig. legend	9, 9	9 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.8832	Fig. legend	t(16) = 0.1493	Fig. legend
+ - -	Supplementary fig 10c	unpaired t-test	Fig. legend	9, 9	9 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.7744	Fig. legend	t(16) = 0.2916	Fig. legend
+ - -	Supplementary fig 10d	unpaired t-test	Fig. legend	9, 9	9 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.4176	Fig. legend	t(16) = 0.8321	Fig. legend
+ - -	Supplementary fig 10f	unpaired t-test	Fig. legend	11, 11	11 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.4188	Fig. legend	t(20) = 0.8256	Fig. legend
+ - -	Supplementary fig 10g	unpaired t-test	Fig. legend	11, 11	11 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.4914	Fig. legend	t(20) = 0.701	Fig. legend
+ - -	Supplementary fig 10h	unpaired t-test	Fig. legend	11, 11	11 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.507	Fig. legend	t(20) = 0.6747	Fig. legend
+ - -	Supplementary fig 10i	unpaired t-test	Fig. legend	9, 9	9 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.5415	Fig. legend	t(16) = 0.6239	Fig. legend
+ - -	Supplementary fig 10j	two-way ANOVA	Fig. legend	9, 9	9 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	P = 0.4047	Fig. legend	F(5,80) = 1.032	Fig. legend
+ - -	Supplementary fig 10k	two-way ANOVA	Fig. legend	9, 9	9 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.979	Fig. legend	F(5,80) = 0.1515	Fig. legend
+ - -	1c	paired t-test	Fig. legend	3, 3	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p < 0.0001	Fig. legend	t(2) = 128.3	Fig. legend
+ - -	6e	paired t-test	Fig. legend	3, 3; 3, 3	3 times	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	P = 0.0298; p = 0.6939	Fig. legend	t(2) = 5.667; t(2) = 0.4547	Fig. legend

+ -	6f	unpaired t-test	Fig. legend	8, 8; 8, 8; 8, 8	3 times	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0001; p = 0.0116; p = 0.4395	Fig. legend	t(14) = 5.217; t(14) = 2.902 t(14) = 0.7957	Fig. legend
+ -	6g	unpaired t-test	Fig. legend	8, 10; 8, 9; 9, 10; 9, 9	at least 3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0456; p = 0.0039; p = 0.6231; p = 0.3052	Fig. legend	t(16) = 2.168; t(15) = 3.412; t(17) = 0.5006; t (16) = 1.059	Fig. legend
+ -	Supplementary fig 4f	unpaired t-test	Fig. legend	249, 263	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.4391	Fig. legend	t(510) = 0.7743	Fig. legend
+ -	Supplementary fig 4g	unpaired t-test	Fig. legend	164, 172	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.1815	Fig. legend	t(334) = 1.339	Fig. legend
+ -	Supplementary fig 5e	unpaired t-test	Fig. legend	47, 40; 74, 77	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.3151; p = 0.1537	Fig. legend	t(85) = 1.011; t(149) = 1.434	Fig. legend
+ -	3j	unpaired t-test	Fig. legend	13, 12	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.0266	Fig. legend	t(23) = 2.368	Fig. legend
+ -	3k	unpaired t-test	Fig. legend	13, 12	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.8027	Fig. legend	t(23) = 0.2528	Fig. legend
+ -	3p	unpaired t-test	Fig. legend	8, 7	4 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.035	Fig. legend	t(13) = 2.354	Fig. legend
+ -	Supplementary fig 7c	two-way ANOVA	Fig. legend	6, 7	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.149	Fig. legend	F(1,22) = 2.236	Fig. legend
+ -	Supplementary fig 7d	unpaired t-test	Fig. legend	32, 31	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.1856	Fig. legend	t(61) = 1.339	Fig. legend

legend

+ -	Supple mentary fig 7e	unpaired t- test	Fig. legend	70, 65	3 pairs of mice	Fig. legend	data were presented as median with interquartile range, whiskers are the minimum and maximum	Fig. legend	p = 0.5286	Fig. legend	t(133) = 0.6318	Fig. legend
+ -	Supple mentary fig 7f	two-way ANOVA	Fig. legend	32, 31	3 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.0941	Fig. legend	F(1,486) = 2.814	Fig. legend
+ -	Supple mentary fig 9c	unpaired t- test	Fig. legend	3, 4	3 times	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.0257	Fig. legend	t(5) = 3.137	Fig. legend
+ -	Supple mentary fig 9e	unpaired t- test	Fig. legend	8, 8	3 times	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p < 0.0001	Fig. legend	t(14) = 6.966	Fig. legend
+ -	Supple mentary fig 9g	one-way ANOVA	Fig. legend	12, 12, 12, 12	3 times	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.904	Fig. legend	F(1,44) = 0.188	Fig. legend
+ -	1k	two-way ANOVA	Fig. legend	9, 9	4 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p < 0.0001	Fig. legend	F(1,112) = 20.35	Fig. legend
+ -	3n	two-way ANOVA	Fig. legend	8,7	4 pairs of mice	Fig. legend	Data were presented as mean +/- s.e.m	Fig. legend	p = 0.0003	Fig. legend	F(1,91) = 14.52	Fig. legend

▶ Representative figures

1. Are any representative images shown (including Western blots and immunohistochemistry/staining) in the paper?

   If so, what figure(s)?

   > Yes,
   > Fig 1b; Fig 1e; Fig 1h; Fig 1l; Fig 2a; Fig 2c; Fig 2f; Fig 3a; Fig 3b; Fig 3c; Fig 3f; Fig 3i; ; Fig 3o; Fig 4b; Fig 5c; Fig 6a; Fig 6d; Fig 7a; Fig 7e; Fig 7i;
   >
   > Supplementary Fig 1a, 1c, 1e; Supplementary Fig 2a, 2c; Supplementary Fig 3a, 3e; Supplementary Fig 4a, 4c; Supplementary Fig 5a, 5c, 5d; Supplementary 6a, 6b, 6e; Supplementary Fig 7a, 7b, 7g, 7i; Supplementary Fig 9a, 9b, 9d, 7f; Supplementary Fig 10a, 10e

2. For each representative image, is there a clear statement of how many times this experiment was successfully repeated and a discussion of any limitations in repeatability?

   If so, where is this reported (section, paragraph #)?

   > yes, figure legends.

▶ Statistics and general methods

1. Is there a justification of the sample size?

   If so, how was it justified?

   Where (section, paragraph #)?

   Even if no sample size calculation was performed, authors should report why the sample size is adequate to measure their effect size.

   > Yes. Sample size choice was based on previous studies, not predetermined by a statistical method.
   >
   > Statistical analysis, paragraph 1.

2. Are statistical tests justified as appropriate for every figure?

    Where (section, paragraph #)?

    > yes. Statistical analysis, paragraph 1.

    a. If there is a section summarizing the statistical methods in the methods, is the statistical test for each experiment clearly defined?

        > Yes.

    b. Do the data meet the assumptions of the specific statistical test you chose (e.g. normality for a parametric test)?

        Where is this described (section, paragraph #)?

        > assumed yes. Statistical analysis, paragraph 1.

    c. Is there any estimate of variance within each group of data?

        Is the variance similar between groups that are being statistically compared?

        Where is this described (section, paragraph #)?

        > No.

    d. Are tests specified as one- or two-sided?

        > Yes

    e. Are there adjustments for multiple comparisons?

        > No.

3. Are criteria for excluding data points reported?

    Was this criterion established prior to data collection?

    Where is this described (section, paragraph #)?

    > yes.
    > yes.
    >
    > Electrophysiological recording, paragraph 9.

4. Define the method of randomization used to assign subjects (or samples) to the experimental groups and to collect and process data.

    If no randomization was used, state so.

    Where does this appear (section, paragraph #)?

    > No randomization was used.
    >
    > "statistical analysis", paragraph 1.

5. Is a statement of the extent to which investigator knew the group allocation during the experiment and in assessing outcome included?

    If no blinding was done, state so.

    Where (section, paragraph #)?

    > yes.
    > Data collection and analysis were not performed blind to the conditions of the experiments except behavioral tests and spine, synapse analysis
    > section of "Golgi staining", "Electron Microscopy Analysis" and "Behavioral analysis", paragraph 6.

6. For experiments in live vertebrates, is a statement of compliance with ethical guidelines/regulations included?

    Where (section, paragraph #)?

    > yes.
    >
    > section of "Animals", paragraph 1.

7. Is the species of the animals used reported?

    Where (section, paragraph #)?

    > yes. section of "Animals", paragraph 1.

8. Is the strain of the animals (including background strains of KO/ transgenic animals used) reported?

    Where (section, paragraph #)?

    > No

9. Is the sex of the animals/subjects used reported?

    Where (section, paragraph #)?

    > yes. Section of "Animals", paragraph 1; "Electrophysiological recording", paragraph 1.

10. Is the age of the animals/subjects reported?

    Where (section, paragraph #)?

    > yes, Section of "Electrophysiological recording", paragraph 1.

11. For animals housed in a vivarium, is the light/dark cycle reported?

    Where (section, paragraph #)?

    > yes, section of "Animals", paragraph 1.

12. For animals housed in a vivarium, is the housing group (i.e. number of animals per cage) reported?

    Where (section, paragraph #)?

    > yes, section of "Animals", paragraph 1.

13. For behavioral experiments, is the time of day reported (e.g. light or dark cycle)?

    Where (section, paragraph #)?

    > No.

14. Is the previous history of the animals/subjects (e.g. prior drug administration, surgery, behavioral testing) reported?

    Where (section, paragraph #)?

    > No.

    a. If multiple behavioral tests were conducted in the same group of animals, is this reported?

        Where (section, paragraph #)?

        > No

15. If any animals/subjects were excluded from analysis, is this reported?

    Where (section, paragraph #)?

    > yes, Section of "Electrophysiological recording", paragraph 10

    a. How were the criteria for exclusion defined?

        Where is this described (section, paragraph #)?

        > Cells would be rejected if membrane potentials were more positive than -60 mV; or if series resistance fluctuated more than 20% of initial values

    b. Specify reasons for any discrepancy between the number of animals at the beginning and end of the study.

        Where is this described (section, paragraph #)?

        > N/A

▶ Reagents

1. Have antibodies been validated for use in the system under study (assay and species)?

    > yes

    a. Is antibody catalog number given?

        Where does this appear (section, paragraph #)?

        > yes. experimental procedures, paragraph 1.

b. Where were the validation data reported (citation, supplementary information, Antibodypedia)?

Where does this appear (section, paragraph #)?

> N/A

2. Cell line identity

a. Are any cell lines used in this paper listed in the database of commonly misidentified cell lines maintained by ICLAC and NCBI Biosample?

Where (section, paragraph #)?

> N/A

b. If yes, include in the Methods section a scientific justification of their use--indicate here in which section and paragraph the justification can be found.

> N/A

c. For each cell line, include in the Methods section a statement that specifies:

- the source of the cell lines

- have the cell lines been authenticated? If so, by which method?

- have the cell lines been tested for mycoplasma contamination?

Where (section, paragraph #)?

> N/A

▶ Data deposition

Data deposition in a public repository is mandatory for:

    a. Protein, DNA and RNA sequences
    b. Macromolecular structures
    c. Crystallographic data for small molecules
    d. Microarray data

Deposition is strongly recommended for many other datasets for which structured public repositories exist; more details on our data policy are available here. We encourage the provision of other source data in supplementary information or in unstructured repositories such as Figshare and Dryad.

We encourage publication of Data Descriptors (see Scientific Data) to maximize data reuse.

1. Are accession codes for deposit dates provided?

Where (section, paragraph #)?

> N/A

▶ Computer code/software

Any custom algorithm/software that is central to the methods must be supplied by the authors in a usable and readable form for readers at the time of publication. However, referees may ask for this information at any time during the review process.

1. Identify all custom software or scripts that were required to conduct the study and where in the procedures each was used.

> N/A

2. If computer code was used to generate results that are central to the paper's conclusions, include a statement in the Methods section under "**Code availability**" to indicate whether and how the code can be accessed. Include version information as necessary and any restrictions on availability.

N/A

▶ Human subjects

1. Which IRB approved the protocol?

   Where is this stated (section, paragraph #)?

   N/A

2. Is demographic information on all subjects provided?

   Where (section, paragraph #)?

   N/A

3. Is the number of human subjects, their age and sex clearly defined?

   Where (section, paragraph #)?

   N/A

4. Are the inclusion and exclusion criteria (if any) clearly specified?

   Where (section, paragraph #)?

   N/A

5. How well were the groups matched?

   Where is this information described (section, paragraph #)?

   N/A

6. Is a statement included confirming that informed consent was obtained from all subjects?

   Where (section, paragraph #)?

   N/A

7. For publication of patient photos, is a statement included confirming that consent to publish was obtained?

   Where (section, paragraph #)?

   N/A

▶ fMRI studies

For papers reporting functional imaging (fMRI) results please ensure that these minimal reporting guidelines are met and that all this information is clearly provided in the methods:

1. Were any subjects scanned but then rejected for the analysis after the data was collected?

   N/A

   a. If yes, is the number rejected and reasons for rejection described?

      Where (section, paragraph #)?

      N/A

2. Is the number of blocks, trials or experimental units per session and/ or subjects specified?

    Where (section, paragraph #)?

    N/A

3. Is the length of each trial and interval between trials specified?

    N/A

4. Is a blocked, event-related, or mixed design being used? If applicable, please specify the block length or how the event-related or mixed design was optimized.

    N/A

5. Is the task design clearly described?

    Where (section, paragraph #)?

    N/A

6. How was behavioral performance measured?

    N/A

7. Is an ANOVA or factorial design being used?

    N/A

8. For data acquisition, is a whole brain scan used?

    If not, state area of acquisition.

    N/A

    a. How was this region determined?

    N/A

9. Is the field strength (in Tesla) of the MRI system stated?

    N/A

    a. Is the pulse sequence type (gradient/spin echo, EPI/spiral) stated?

    N/A

    b. Are the field-of-view, matrix size, slice thickness, and TE/TR/ flip angle clearly stated?

    N/A

10. Are the software and specific parameters (model/functions, smoothing kernel size if applicable, etc.) used for data processing and pre-processing clearly stated?

    N/A

11. Is the coordinate space for the anatomical/functional imaging data clearly defined as subject/native space or standardized stereotaxic space, e.g., original Talairach, MNI305, ICBM152, etc? Where (section, paragraph #)?

    N/A

12. If there was data normalization/standardization to a specific space template, are the type of transformation (linear vs. nonlinear) used and image types being transformed clearly described? Where (section, paragraph #)?

    N/A

13. How were anatomical locations determined, e.g., via an automated labeling algorithm (AAL), standardized coordinate database (Talairach daemon), probabilistic atlases, etc.?

    N/A

14. Were any additional regressors (behavioral covariates, motion etc) used?

> N/A

15. Is the contrast construction clearly defined?

> N/A

16. Is a mixed/random effects or fixed inference used?

> N/A

    a. If fixed effects inference used, is this justified?

> N/A

17. Were repeated measures used (multiple measurements per subject)?

> N/A

    a. If so, are the method to account for within subject correlation and the assumptions made about variance clearly stated?

> N/A

18. If the threshold used for inference and visualization in figures varies, is this clearly stated?

> N/A

19. Are statistical inferences corrected for multiple comparisons?

> N/A

    a. If not, is this labeled as uncorrected?

> N/A

20. Are the results based on an ROI (region of interest) analysis?

> N/A

    a. If so, is the rationale clearly described?

> N/A

    b. How were the ROI's defined (functional vs anatomical localization)?

> N/A

21. Is there correction for multiple comparisons within each voxel?

> N/A

22. For cluster-wise significance, is the cluster-defining threshold and the corrected significance level defined?

> N/A

▶ Additional comments

Additional Comments