

Fatigue-resistant hydrogel optical fibers enable peripheral nerve optogenetics during locomotion

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This Supplementary Information contains

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Supplementary Tables

Supplementary Table 1. Mouse information for animal studies.

Mouse No.	Strain	Age at surgery	Gender	Behavioral experiments	Notes
ChR2_C1M1	Thy1::ChR2-EYFP	15 weeks	Female	Horizontal ladder; von Frey	Involved in final data
ChR2_C1M2	Thy1::ChR2-EYFP	12 weeks	Female	Horizontal ladder; von Frey	Involved in final data
ChR2_C2M1	Thy1::ChR2-EYFP	15 weeks	Male	Horizontal ladder; von Frey	Involved in final data
ChR2_C2M2	Thy1::ChR2-EYFP	15 weeks	Male	Horizontal ladder; von Frey	Involved in final data
ChR2_C2M3	Thy1::ChR2-EYFP	15 weeks	Male	Horizontal ladder; von Frey	Involved in final data
ChR2_C3M1	Thy1::ChR2-EYFP	12 weeks	Male	Horizontal ladder; von Frey	Involved in final data
ChR2_C3M2	Thy1::ChR2-EYFP	12 weeks	Male	Horizontal ladder; von Frey	Involved in final data
ChR2_C3M3	Thy1::ChR2-EYFP	12 weeks	Male	Horizontal ladder; von Frey	Involved in final data
ChR2_C3M4	Thy1::ChR2-EYFP	9 weeks	Male	Horizontal ladder; von Frey	Involved in final data
ChR2_853	Thy1::ChR2-EYFP	21 weeks	Male	Photosimulation; VVRT	Involved in final data
ChR2_854	Thy1::ChR2-EYFP	23 weeks	Male	Photosimulation; VVRT	Involved in final data
ChR2_855	Thy1::ChR2-EYFP	21 weeks	Male	Photosimulation; VVRT	Involved in final data
ChR2_183	Thy1::ChR2-EYFP	66 weeks	Male	Photosimulation; VVRT	Involved in final data
ChR2_184	Thy1::ChR2-EYFP	66 weeks	Male	Photosimulation; VVRT	Involved in final data
ChR2_185	Thy1::ChR2-EYFP	66 weeks	Male	Photosimulation; VVRT	Involved in final data
TRPV1_C1M1	TRPV1::Cre	11 weeks	Male	von Frey; hot plate	Cuff was broken at week 6
TRPV1_C1M2	TRPV1::Cre	11 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C1M3	TRPV1::Cre	11 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C1M4	TRPV1::Cre	11 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C2M1	TRPV1::Cre	11 weeks	Female	von Frey; hot plate	Involved in final data
TRPV1_C2M2	TRPV1::Cre	11 weeks	Female	von Frey; hot plate	Involved in final data
TRPV1_C2M3	TRPV1::Cre	11 weeks	Female	von Frey; hot plate	Involved in final data
TRPV1_C2M4	TRPV1::Cre	11 weeks	Female	von Frey; hot plate	Surgery failed
TRPV1_C3M1	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C3M2	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C3M3	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C3M4	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Involved in final data

TRPV1_C4M1	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C4M2	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Involved in final data
TRPV1_C4M3	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Ferrule was broken at Week 4
TRPV1_C5M1	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Ferrule dropped at Week 5
TRPV1_C5M2	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Ferrule dropped at Week 6
TRPV1_C5M3	TRPV1::NpH R-EYFP	14 weeks	Male	von Frey; hot plate	Ferrule was broken at Week 1
TRPV1_C6M1	TRPV1::NpH R-EYFP	14 weeks	Female	von Frey; hot plate	Involved in final data
TRPV1_C6M2	TRPV1::NpH R-EYFP	14 weeks	Female	von Frey; hot plate	Involved in final data
TRPV1_C6M3	TRPV1::NpH R-EYFP	14 weeks	Female	von Frey; hot plate	Involved in final data
TRPV1_C6M4	TRPV1::NpH R-EYFP	14 weeks	Female	von Frey; hot plate	Involved in final data

Supplementary Table 2. Statistical information for Figures 1g, 1i, 1j, and 1k.

Figure number	Fig. 1g	Fig. 1i	Fig. 1j	Fig. 1k
Independent sample size	n = 3	n = 4	n = 6	n = 6
Data presentation	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD

Supplementary Table 3. Statistical information for Figures 1l, 2d, 2g, 3b, and 4b.

Figure number (representative data)	Fig. 1l	Fig. 2d	Fig. 2g	Fig. 3b	Fig. 4b
Independent sample size	n = 3	n = 3	n = 3	n = 3	n=3

Supplementary Table 4. Statistical information for Figure 3i.

Figure number	Fig. 3i	
Independent sample size	n = 6	
Animal strain	6 Thy1::ChR2-EYFP mice	
Data presentation	mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA	
Multiple comparison test	Sidak's multiple comparison test	
P value	Stimulation vs. non-stimulation, week 0	**** $P < 0.0001$
	Stimulation vs. non-stimulation, week 1	** $P = 0.0024$
	Stimulation vs. non-stimulation, week 2	**** $P < 0.0001$
	Stimulation vs. non-stimulation, week 3	**** $P < 0.0001$
	Stimulation vs. non-stimulation, week 4	**** $P < 0.0001$
	Stimulation vs. non-stimulation, week 5	**** $P < 0.0001$
	Stimulation vs. non-stimulation, week 6	**** $P < 0.0001$
	Stimulation vs. non-stimulation, week 7	$P = 0.0932$

	Stimulation vs. non-stimulation, week 8	$P = 0.8107$
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Supplementary Table 5. Statistical information for Figure 4d.

Figure number	Fig. 4d	
Independent sample size	n = 20	
Animal strain	10-13 TRPV1::NpHR-EYFP mice, 6-7 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM	
Statistical test	Friedman tests	
Multiple comparison test	Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test	
P value	baseline vs. before CFA	$P > 0.9999$
	baseline vs. after CFA	**** $P < 0.0001$
	before CFA vs. after CFA	**** $P < 0.0001$

Supplementary Table 6. Statistical information for Figure 4f.

Figure number	Fig. 4f	
Independent test size	n = 66 tests for NpHR, n = 39 tests for Cre	
Animal strain	10-13 TRPV1::NpHR-EYFP mice, 6-7 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM	
Statistical test	Kruskal-Wallis ANOVA	
Multiple comparison test	Dunn's multiple comparison test	
P value	NpHR ipsi- vs. NpHR contra-	** $P = 0.0080$
	NpHR ipsi- vs. Cre ipsi-	**** $P < 0.0001$
	NpHR ipsi- vs. Cre contra-	**** $P < 0.0001$

Supplementary Table 7. Statistical information for Figure 4g (FD represents Friedman tests with Dunn's multiple comparison test due to the non-normality).

Figure number	Fig. 4g, week 3		Fig. 4g, week 4		Fig. 4g, week 5	
Independent test size	n = 13		n = 12		n = 11	
Animal strain	13 TRPV1::NpHR-EYFP mice		12 TRPV1::NpHR-EYFP mice		11 TRPV1::NpHR-EYFP mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA		One-way repeated measures ANOVA		One-way repeated measures ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test		Turkey's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	*** $P = 0.0002$	pre- vs. during	*** $P = 0.0002$	pre- vs. during	* $P = 0.03$
	during vs. post-	* $P = 0.0275$	during vs. post-	** $P = 0.0028$	during vs. post-	$P > 0.9999$ (FD)
	pre- vs. post-inhibition	$P = 0.9313$	pre- vs. post-inhibition	$P = 0.8634$	pre- vs. post-inhibition	* $P = 0.0426$ (FD)
Figure number	Fig. 4g, week 6		Fig. 4g, week 7		Fig. 4g, week 8	

Independent test size	n = 10		n = 10		n = 10	
Animal strain	10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA		One-way repeated measures ANOVA		One-way repeated measures ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test		Turkey's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$**P = 0.009$	pre- vs. during	$**P = 0.0022$	pre- vs. during	$*P = 0.0304$ (FD)
	during vs. post-	$P = 0.3019$	during vs. post-	$P = 0.05$	during vs. post-	$*P = 0.0161$
	pre- vs. post-inhibition	$P = 0.0569$	pre- vs. post-inhibition	$P = 0.7769$	pre- vs. post-inhibition	$P > 0.9999$ (FD)

Supplementary Table 8. Statistical information for Figure 4i.

Figure number	Fig. 4i	
Independent test size	n = 66 tests for NpHR, n = 39 tests for Cre	
Animal strain	10-13 TRPV1::NpHR-EYFP mice, 6-7 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM	
Statistical test	Kruskal-Wallis ANOVA	
Multiple comparison test	Dunn's multiple comparison test	
P value	NpHR ipsi- vs. NpHR contra-	$****P < 0.0001$
	NpHR ipsi- vs. Cre ipsi-	$****P < 0.0001$
	NpHR ipsi- vs. Cre contra-	$**P = 0.0042$

Supplementary Table 9. Statistical information for Figure 4j.

Figure number	Fig. 4j, week 3		Fig. 4j, week 4		Fig. 4j, week 5	
Independent test size	n = 13		n = 12		n = 11	
Animal strain	13 TRPV1::NpHR-EYFP mice		12 TRPV1::NpHR-EYFP mice		11 TRPV1::NpHR-EYFP mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$***P = 0.0006$	pre- vs. during	$***P = 0.0005$	pre- vs. during	$***P = 0.0009$
	during vs. post-	$***P = 0.0003$	during vs. post-	$**P = 0.0011$	during vs. post-	$**P = 0.0019$

	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$
Figure number	Fig. 4j, week 6		Fig. 4j, week 7		Fig. 4j, week 8	
Independent test size	n = 10		n = 10		n = 10	
Animal strain	10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$**P = 0.0024$	pre- vs. during	$**P = 0.0024$	pre- vs. during	$**P = 0.0010$
	during vs. post-	$**P = 0.0024$	during vs. post-	$**P = 0.0024$	during vs. post-	$**P = 0.0052$
	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$

Supplementary Table 10. Statistical information for Extended Data Figures 3b-i, 3o-r, 8f.

Figure number	ED Fig. 3b	ED Fig. 3c	ED Fig. 3d	ED Fig. 3e	ED Fig. 3f	ED Fig. 3g	ED Fig. 3h
Independent sample size	n = 3	n = 4	n = 3	n = 3	n = 4	n = 3	n = 3
Data presentation	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD
Figure number	ED Fig. 3i	ED Fig. 3o	ED Fig. 3p	ED Fig. 3q	ED Fig. 3r	ED Fig. 8c	ED Fig. 8f
Independent sample size	n = 3	n = 4	n = 3	n = 3	n = 4	n = 3	n = 3
Data presentation	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SEM	mean $\pm$ SEM

Supplementary Table 11. Statistical information for Extended Data Figures 3l, 3m, 4e, 5a, 5d, 5f-j, 6a-d, and 7g-j.

Figure number (representative data)	ED Fig. 3l	ED Fig. 3m	ED Fig. 4e	ED Fig. 5a	ED Fig. 5d	ED Fig. 5f
Independent sample size	n = 3	n = 3	n = 3	n = 10	n = 8	n = 6
Figure number (representative data)	ED Fig. 5g	ED Fig. 5h	ED Fig. 5i	ED Fig. 5j	ED Fig. 6a	ED Fig. 6b
Independent sample size	n = 6	n = 6	n = 6	n = 6	n = 3	n = 3
Figure number (representative data)	ED Fig. 6c	ED Fig. 6d	ED Fig. 7g	ED Fig. 7h	ED Fig. 7i	ED Fig. 7j
Independent sample size	n = 3	n = 3	n = 3	n=3	n = 5	n = 5

Supplementary Table 12. Statistical information for Extended Data Figures 3r, 4g, and 4h.

Figure number	ED Fig. 3r		ED Fig. 4g		ED Fig. 4h	
Independent sample size	n = 4		n = 3		n = 3	
Data presentation	mean $\pm$ SD		mean $\pm$ SD		mean $\pm$ SD	
Statistical test	one-way ANOVA		one-way ANOVA		one-way ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test		Turkey's multiple comparison test	
P value	Month 0 vs. month 1	$P = 0.9905$	Month 0 vs. month 1	$P = 0.1925$	Month 0 vs. month 1	$P = 0.9908$
	Month 0 vs. month 2	$P > 0.9999$	Month 0 vs. month 2	$P = 0.9641$	Month 0 vs. month 2	$P > 0.9999$
	Month 0 vs. month 3	$P = 0.9757$	Month 0 vs. month 3	$P = 0.1338$	Month 0 vs. month 3	$P = 0.9783$
	Month 0 vs. month 4	$P = 0.9991$	Month 0 vs. month 4	$P = 0.9967$	Month 0 vs. month 4	$P = 0.9972$
	Month 0 vs. month 5	$P > 0.9999$	Month 0 vs. month 5	$P = 0.7051$	Month 0 vs. month 5	$P > 0.9999$
	Month 0 vs. month 6	$P > 0.9999$	Month 0 vs. month 6	$P = 0.962$	Month 0 vs. month 6	$P = 0.9992$

Supplementary Table 13. Statistical information for Extended Data Figure 5b, 5c, 5e, 5m, and 5o (FD represents Friedman tests with Dunn's multiple comparison test due to the non-normality).

Figure number	ED Fig. 5b		ED Fig. 5c		ED Fig. 5e	
Independent test size	n = 10		n = 8		n = 8	
Animal strain	6 Thy1::ChR2-EYFP mice		6 Thy1::ChR2-EYFP mice		6 Thy1::ChR2-EYFP mice	
Data presentation	mean ± SD		mean ± SD		mean ± SD	
Statistical test	one-way ANOVA		one-way ANOVA		one-way ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test		Turkey's multiple comparison test	
P value	Week 0 vs. week 1	<i>P</i> = 0.2235 (FD)	Week 0 vs. week 1	<i>P</i> = 0.6395	Running vs. rearing	<i>P</i> = 0.7176
	Week 0 vs. week 2	<i>P</i> = 0.7231 (FD)	Week 0 vs. week 2	<i>P</i> = 0.9086	Running vs. grooming	** <i>P</i> = 0.0052
	Week 0 vs. week 4	<i>P</i> = 0.9884	Week 0 vs. week 4	<i>P</i> = 0.4288 (FD)	Rearing vs. grooming	* <i>P</i> = 0.0301
	Week 0 vs. week 6	<i>P</i> = 0.8011	Week 0 vs. week 6	<i>P</i> = 0.7390		
Figure number	ED Fig. 5m		ED Fig. 5o			
Independent test size	n = 6		n = 6			
Animal strain	6 Thy1::ChR2-EYFP mice		6 Thy1::ChR2-EYFP mice			
Data presentation	mean ± SD		mean ± SD			
Statistical test	one-way ANOVA		one-way ANOVA			

Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test	
P value	Week 0 vs. week 1	$P = 0.4123$ (FD)	Week 0 vs. week 1	**** $P < 0.0001$
	Week 0 vs. week 2	$P = 0.2511$ (FD)	Week 0 vs. week 2	* $P = 0.038$
	Week 0 vs. week 4	$P = 0.9991$	Week 0 vs. week 4	$P = 0.4177$
	Week 0 vs. week 6	$P > 0.9999$	Week 0 vs. week 6	$P = 0.9993$

Supplementary Table 14. Statistical information for Extended Data Figure 7b, 7c, 7f, and 7k.

Supplementary Table 14: Statistical information for Extended Data Figure 7b, 7c, 7f, and 7k.

Figure number	ED Fig. 7b		ED Fig. 7c	
Independent test size	n = 9		n = 9	
Animal strain	9 Thy1::Chr2-EYFP mice		9 Thy1::Chr2-EYFP mice	
Data presentation	mean ± SEM		mean ± SEM	
Statistical test	Kruskal-Wallis ANOVA		Kruskal-Wallis ANOVA	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test	
P value	Week 0 vs. week 1	<i>P</i> = 0.2620	Week 0 vs. week 1	<i>P</i> = 0.0520
	Week 0 vs. week 2	<i>P</i> = 0.1681	Week 0 vs. week 2	<i>P</i> = 0.0823
	Week 0 vs. week 4	<i>P</i> = 0.1021	Week 0 vs. week 4	<i>P</i> = 0.3252
Figure number	ED Fig. 7f		ED Fig. 7k	
Independent test size	n = 22		n = 5	
Animal strain	9 Thy1::Chr2-EYFP mice		9 Thy1::Chr2-EYFP mice	
Data presentation	mean ± SEM		mean ± SEM	
Statistical test	Kruskal-Wallis ANOVA		Unpaired t test (two-tailed)	
Multiple comparison test	Dunn's multiple comparison test			
P value	Week 0 vs. week 1	**** <i>P</i> < 0.0001	Ipsi- vs. contra-	<i>P</i> = 0.2354
	Week 0 vs. week 2	**** <i>P</i> < 0.0001		
	Week 0 vs. week 4	* <i>P</i> = 0.0206		
	Week 0 vs. week 8	<i>P</i> = 0.0860		

Supplementary Table 15. Statistical information for Extended Data Figure 9c (FD represents Friedman tests with Dunn's multiple comparison test due to the non-normality).

Figure number	ED Fig. 9c, week 3	ED Fig. 9c, week 4	ED Fig. 9c, week 5
Independent test size	n = 13	n = 12	n = 11
Animal strain	13 TRPV1::NpHR-EYFP mice	12 TRPV1::NpHR-EYFP mice	11 TRPV1::NpHR-EYFP mice
Data presentation	mean $\pm$ SEM	mean $\pm$ SEM	mean $\pm$ SEM
Statistical test	One-way repeated measures ANOVA	One-way repeated measures ANOVA	One-way repeated measures ANOVA
Multiple comparison test	Turkey's multiple comparison test	Turkey's multiple comparison test	Turkey's multiple comparison test

One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P = 0.0843$	pre- vs. during	$P = 0.122$	pre- vs. during	$P = 0.8346$
	during vs. post-	$P = 0.6263$	during vs. post-	$P = 0.0742$ (FD)	during vs. post-	$P = 0.4696$
	pre- vs. post-inhibition	$P = 0.5657$	pre- vs. post-inhibition	$P = 0.5701$	pre- vs. post-inhibition	$P = 0.4361$
Figure number	ED Fig. 9c, week 6		ED Fig. 9c, week 7		ED Fig. 9c, week 8	
Independent test size	n = 10		n = 10		n = 10	
Animal strain	10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA		One-way repeated measures ANOVA		One-way repeated measures ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test		Turkey's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$*P = 0.0193$	pre- vs. during	$P = 0.0611$	pre- vs. during	$P = 0.3573$
	during vs. post-	$P = 0.0617$	during vs. post-	$P = 0.2328$	during vs. post-	$P = 0.0674$
	pre- vs. post-inhibition	$P = 0.8072$	pre- vs. post-inhibition	$P = 0.0984$	pre- vs. post-inhibition	$P > 0.9999$ (FD)

Supplementary Table 16. Statistical information for Extended Data Figure 9d.

Figure number	ED Fig. 9d, week 3		ED Fig. 9d, week 4		ED Fig. 9d, week 5	
Independent test size	n = 7		n = 7		n = 7	
Animal strain	7 TRPV1::Cre mice		7 TRPV1::Cre mice		7 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA		Friedman tests		One-way repeated measures ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Dunn's multiple comparison test		Turkey's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P = 0.1097$	pre- vs. during	$P = 0.1841$	pre- vs. during	$P = 0.144$
	during vs. post-	$P = 0.7144$	during vs. post-	$P = 0.5443$	during vs. post-	$P = 0.9998$
	pre- vs. post-inhibition	$P = 0.5584$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P = 0.6637$
Figure number	ED Fig. 9d, week 6		ED Fig. 9d, week 7		ED Fig. 9d, week 8	

Independent test size	n = 6		n = 6		n = 6	
Animal strain	6 TRPV1::Cre mice		6 TRPV1::Cre mice		6 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA		One-way repeated measures ANOVA		One-way repeated measures ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test		Turkey's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P = 0.0565$	pre- vs. during	$P = 0.3162$	pre- vs. during	$P = 0.5665$
	during vs. post-	$P = 0.0771$	during vs. post-	$P = 0.8526$	during vs. post-	$P = 0.4542$
	pre- vs. post-inhibition	$P = 0.74$	pre- vs. post-inhibition	$P = 0.7486$	pre- vs. post-inhibition	$P = 0.9922$

Supplementary Table 17. Statistical information for Extended Data Figure 9e.

Figure number	ED Fig. 9e, week 3		ED Fig. 9e, week 4		ED Fig. 9e, week 5	
Independent test size	n = 7		n = 7		n = 7	
Animal strain	7 TRPV1::Cre mice		7 TRPV1::Cre mice		7 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA		Friedman tests		One-way repeated measures ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Dunn's multiple comparison test		Turkey's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P = 0.3521$	pre- vs. during	$P = 0.1364$	pre- vs. during	$P = 0.5631$
	during vs. post-	$P = 0.619$	during vs. post-	$P = 0.6198$	during vs. post-	$P = 0.2497$
	pre- vs. post-inhibition	$P = 0.6633$	pre- vs. post-inhibition	$P = 0.6111$	pre- vs. post-inhibition	$P = 0.9962$
Figure number	ED Fig. 9e, week 6		ED Fig. 9e, week 7		ED Fig. 9e, week 8	
Independent test size	n = 6		n = 6		n = 6	
Animal strain	6 TRPV1::Cre mice		6 TRPV1::Cre mice		6 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	One-way repeated measures ANOVA		One-way repeated measures ANOVA		One-way repeated measures ANOVA	
Multiple comparison test	Turkey's multiple comparison test		Turkey's multiple comparison test		Turkey's multiple comparison test	

One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P = 0.3154$	pre- vs. during	$P = 0.1466$	pre- vs. during	$P = 0.2026$
	during vs. post-	$P = 0.1054$	during vs. post-	$P = 0.1499$	during vs. post-	$P = 0.1783$
	pre- vs. post-inhibition	$P = 0.5776$	pre- vs. post-inhibition	$P = 0.54$	pre- vs. post-inhibition	$P = 0.6371$

Supplementary Table 18. Statistical information for Extended Data Figure 9h.

Figure number	ED Fig. 9h, week 3		ED Fig. 9h, week 4		ED Fig. 9h, week 5	
Independent test size	n = 13		n = 12		n = 11	
Animal strain	13 TRPV1::NpHR-EYFP mice		12 TRPV1::NpHR-EYFP mice		11 TRPV1::NpHR-EYFP mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$
	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$
	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$
Figure number	ED Fig. 9h, week 6		ED Fig. 9h, week 7		ED Fig. 9h, week 8	
Independent test size	n = 10		n = 10		n = 10	
Animal strain	10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice		10 TRPV1::NpHR-EYFP mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P > 0.9999$	pre- vs. during	$P = 0.5391$	pre- vs. during	$P > 0.9999$
	during vs. post-	$P > 0.9999$	during vs. post-	$P = 0.9429$	during vs. post-	$P > 0.9999$
	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$

Supplementary Table 19. Statistical information for Extended Data Figure 9i.

Figure number	ED Fig. 9i, week 3	ED Fig. 9i, week 4	ED Fig. 9i, week 5
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Independent test size	n = 7		n = 7		n = 7	
Animal strain	7 TRPV1::Cre mice		7 TRPV1::Cre mice		7 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$
	during vs. post-	$P = 0.6873$	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$
	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$
Figure number	ED Fig. 9i, week 6		ED Fig. 9i, week 7		ED Fig. 9i, week 8	
Independent test size	n = 6		n = 6		n = 6	
Animal strain	6 TRPV1::Cre mice		6 TRPV1::Cre mice		6 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$
	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$
	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$

Supplementary Table 20. Statistical information for Extended Data Figure 9j.

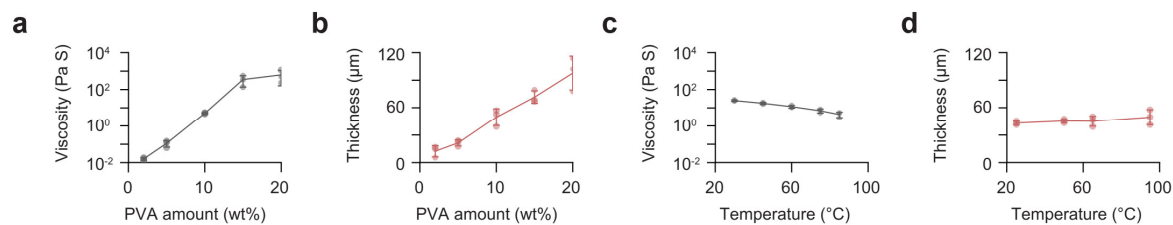
Figure number	ED Fig. 9j, week 3		ED Fig. 9j, week 4		ED Fig. 9j, week 5	
Independent test size	n = 7		n = 7		n = 7	
Animal strain	7 TRPV1::Cre mice		7 TRPV1::Cre mice		7 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$

	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$
	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$
Figure number	ED Fig. 9j, week 6		ED Fig. 9j, week 7		ED Fig. 9j, week 8	
Independent test size	n = 6		n = 6		n = 6	
Animal strain	6 TRPV1::Cre mice		6 TRPV1::Cre mice		6 TRPV1::Cre mice	
Data presentation	mean $\pm$ SEM		mean $\pm$ SEM		mean $\pm$ SEM	
Statistical test	Friedman tests		Friedman tests		Friedman tests	
Multiple comparison test	Dunn's multiple comparison test		Dunn's multiple comparison test		Dunn's multiple comparison test	
One- or two-tailed tests	Two-tailed test		Two-tailed test		Two-tailed test	
P value	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$	pre- vs. during	$P > 0.9999$
	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$	during vs. post-	$P > 0.9999$
	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$	pre- vs. post-inhibition	$P > 0.9999$

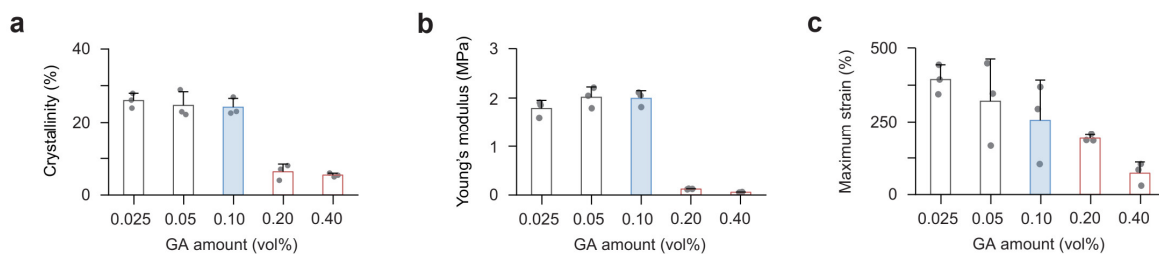
Supplementary Table 21. Statistical information for Supplementary Figures 1 and 2.

Figure number	S Fig. 1a	S Fig. 1b	S Fig. 1c	S Fig. 1d	S Fig. 2a	S Fig. 2b	S Fig. 2c
Independent sample size	n = 3	n = 3	n = 3	n = 3	n = 3	n = 3	n = 3
Data presentation	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD

Supplementary Figures



Supplementary Figure 1. Engineering hydrogel coating thickness. a-b, Viscosity of the dip-coating solution (**a**) and thickness of the PVA hydrogel coating (**b**) as a function of PVA amount in the solution for PVA hydrogel coatings. **c-d,** Viscosity of the dip-coating solution (**c**) and thickness of the PVA hydrogel coating (**d**) as a function of coating temperature for PVA hydrogel coatings.



Supplementary Figure 2. Engineered mechanical performances of hydrogel fibers. a-c, Crystallinity **(a)**, Young's modulus **(b)**, maximum tensile strain **(c)** for the hydrogel core materials with different GA amounts.