Supplementary Materials

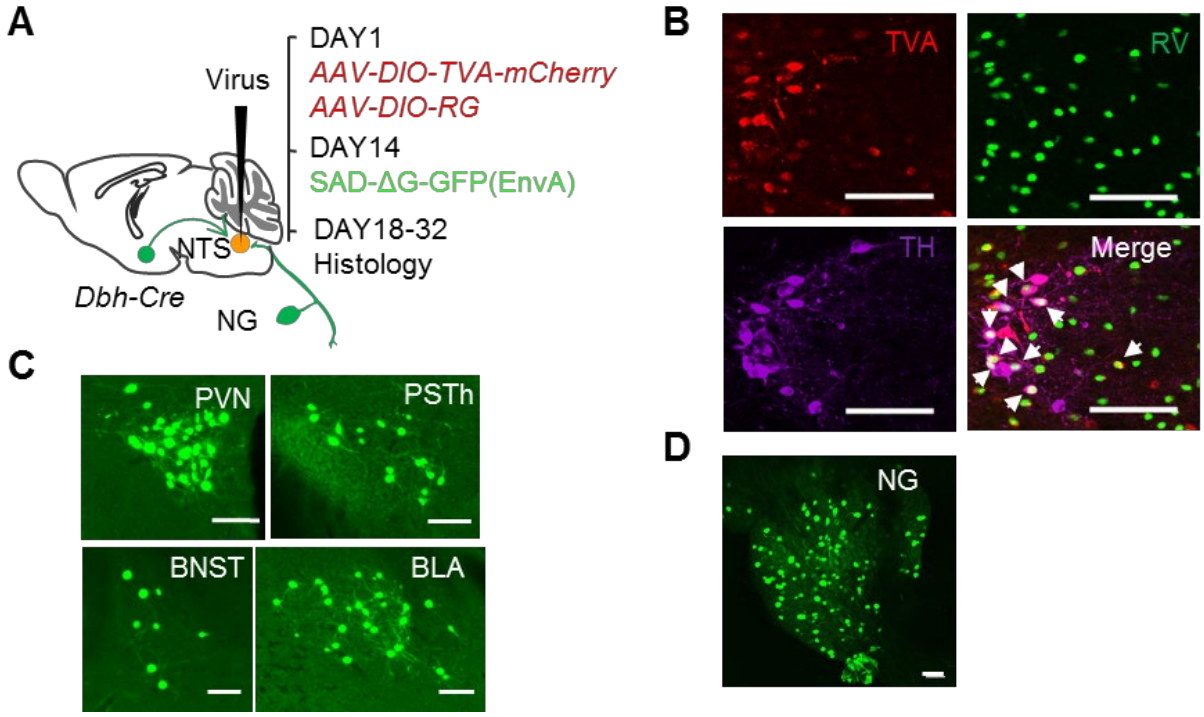

Fig. S1 RV-based retrograde trans-synaptic tracing of CA^{NTS} neurons. **A** Experimental design of genetically modified RV-based tracing. **B** Selective expression of TVA in CA^{NTS} neurons [arrows, starter cells (*i.e.* $TVA^{+}RV^{+}$ neurons); scale bars here and below, 100 μm]. **C** Representative images showing labeled neurons presynaptic to CA^{NTS} neurons in the PVN, BNST, PSTh, and BLA. **D** Representative image of trans-synaptically infected neurons in the NG.

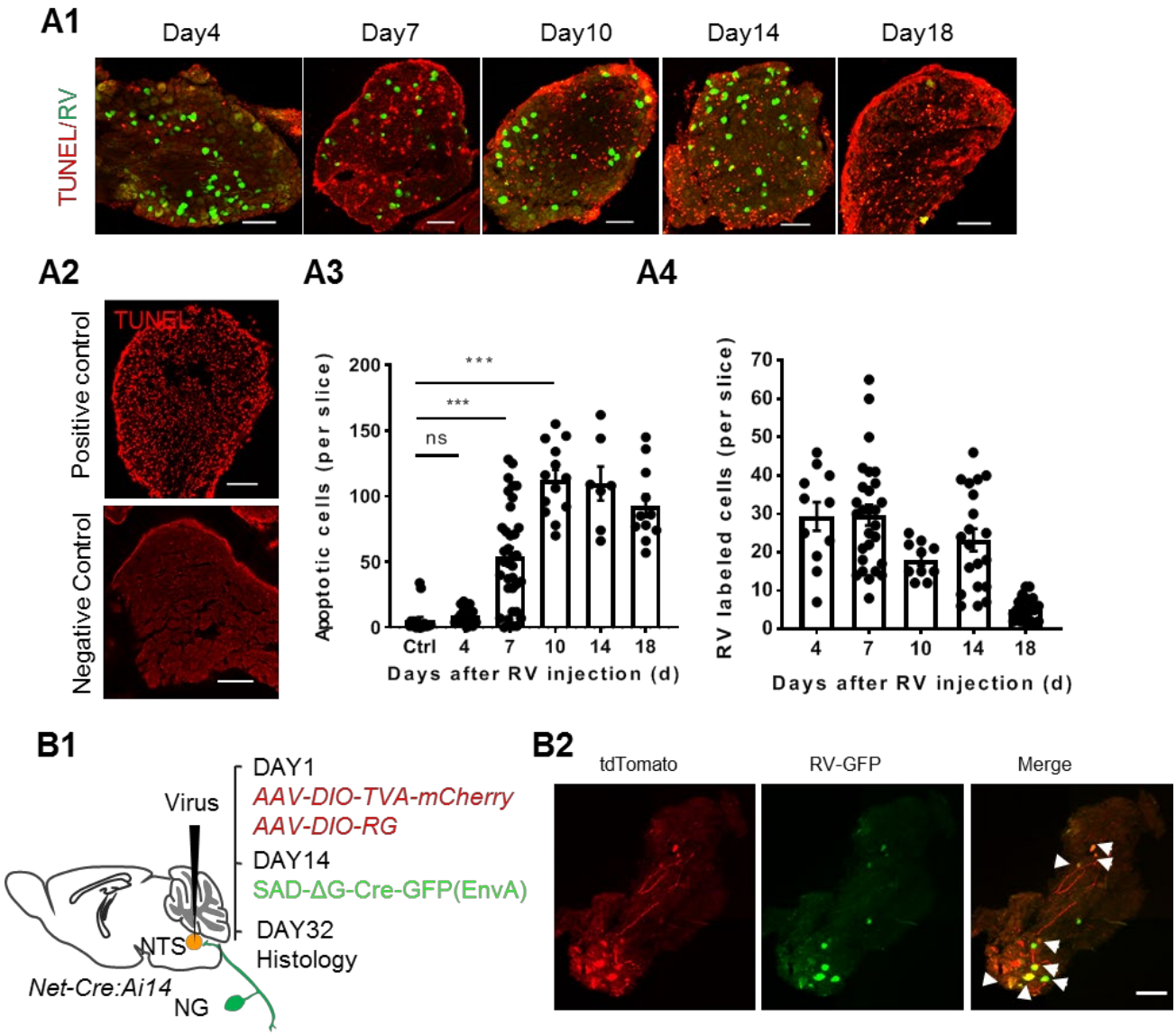

Fig. S2 Apoptosis in nodose ganglia after RV infection. **A1** Representative images showing apoptosis in nodose ganglia from day 4 to day 18 after RV injection (green). Apoptotic cells (red) were detected using the TUNEL assay (scale bars and below, 100 μm). **A2** Upper panel, nodose ganglia treated with an endonuclease DNase for 5 h as positive control; lower panel, nodose ganglia treated with PBS as negative control. **A3**, **A4** Numbers of apoptotic cells (**A3**) and RV-labeled neurons (**A4**) in nodose ganglia on days 4, 7, 10, 14, and 18 after RV injection. Each symbol represents an NG slice (in **A3**, n = 18 on day 4, 35 on day 7, 13 on day 10, 7 on day 14, 11 on day 18, and 17 in the negative control group; in **A4**, n = 11 on day 4, 28 on day 7, 10 on day 10, 20 on day 14, and 24 on day 18). mean ±

s.e.m., Student's *t* test.. **B1**, **B2** RV trans-synaptically-labeled NG neurons in *Net:Ai14* mice. **B1** Experimental design. **B2** Representative images showing tdTomato+ and GFP double-labeled NG neurons (arrows) in *Net-Cre*:Ai14 mice on day 18 after RV infection. n = 248 RV-GFP neurons and 294 tdTomato+ neurons in 40 slices from two *Net-Ai14* mice.

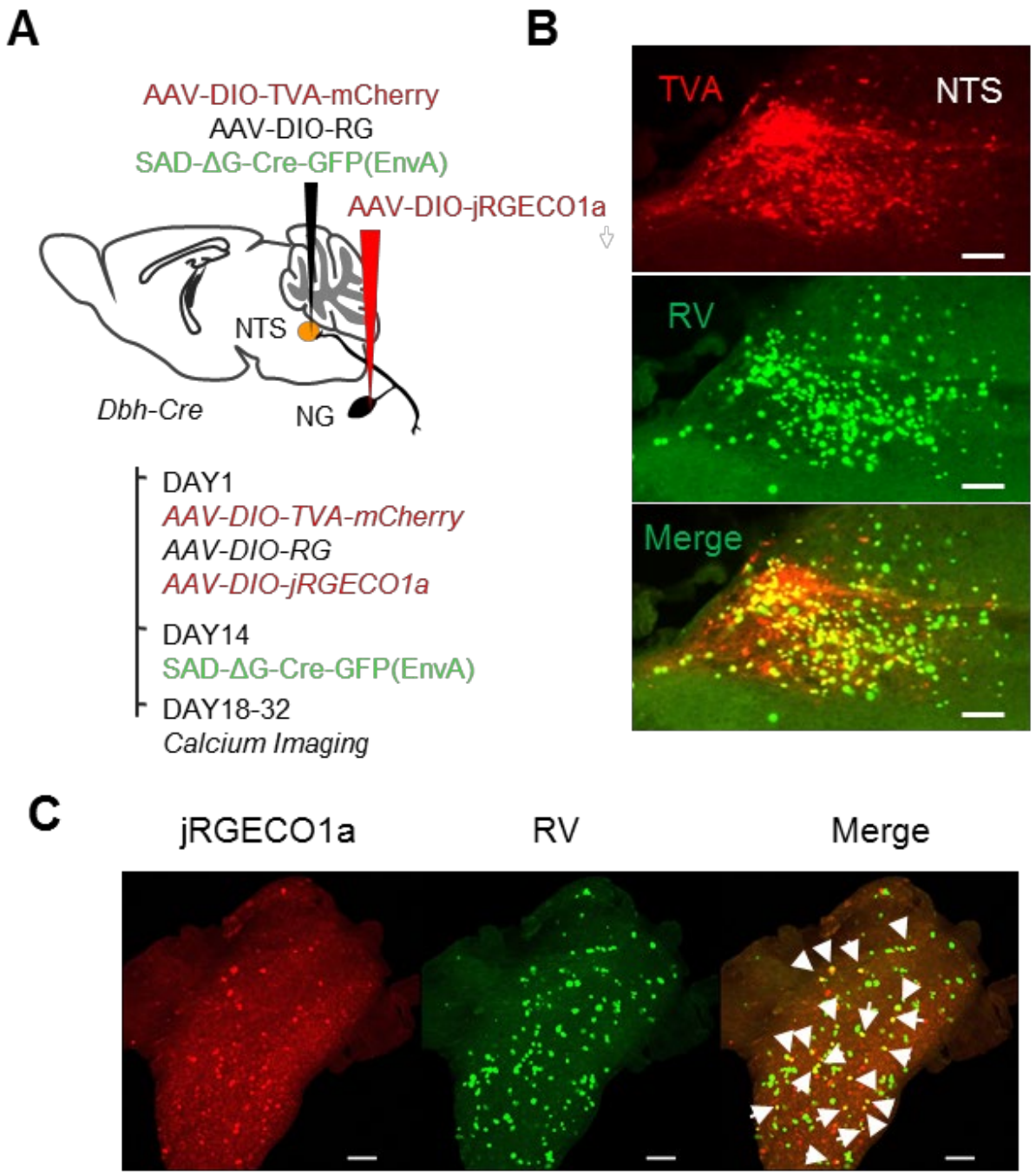

Fig. S3 Selective expression of a fluorescent Ca^{2+} probe in NG neurons that project to CA^{NTS} neurons. **A** Experimental strategy of selective expression of JRGECO1a in CA^{NTS} neuron-projecting NG neurons. **B** Injection site in the NTS. $RV^{+}TVA^{+}$ double-labeled neurons are starter cells (scale bars, 100 μm). **C** Representative images showing the co-localization of JRGECO1a and RV-infected neurons in nodose ganglia on day 10 after RV injection (arrows, double-labeled neurons; scale bars, 100 μm).

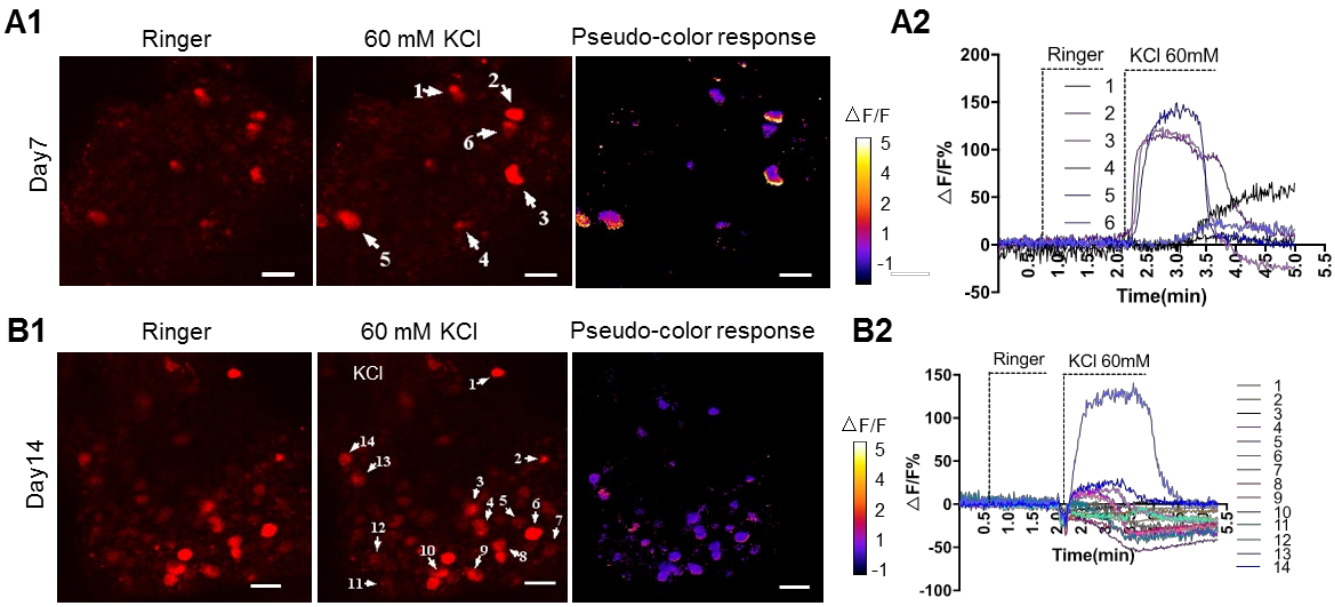

Fig. S4 Viability of trans-synaptically-infected NG neurons. Representative images and tracers showing fluorescence responses to perfusion with Ringer's solution and 60 mM KCl in JRGECO1a-expressing NG neurons on day 7 (**A1**, **A2**) and day14 (**B1**, **B2**) after RV infection. Left panels, representative images and corresponding fluorescence changes; right panels traces of fluorescence changes measured in indicated neurons (scale bars, 50 μm).

Table S1 Summary of Ca^{2+} imaging results

Day after RV injection	positive control-GLP1R	Day4	Day7	Day10	Day14	Day18
Responsive cells /jRGECO1a+	33/35	39/44	36/49	10/15	37/72	0/5
△F/F % (mean±s.e.m)	194.44 ±19.28	164.67 ±18.77	144.58 ±24.10	92.64 ±24.69	35.29 ±5.2	0