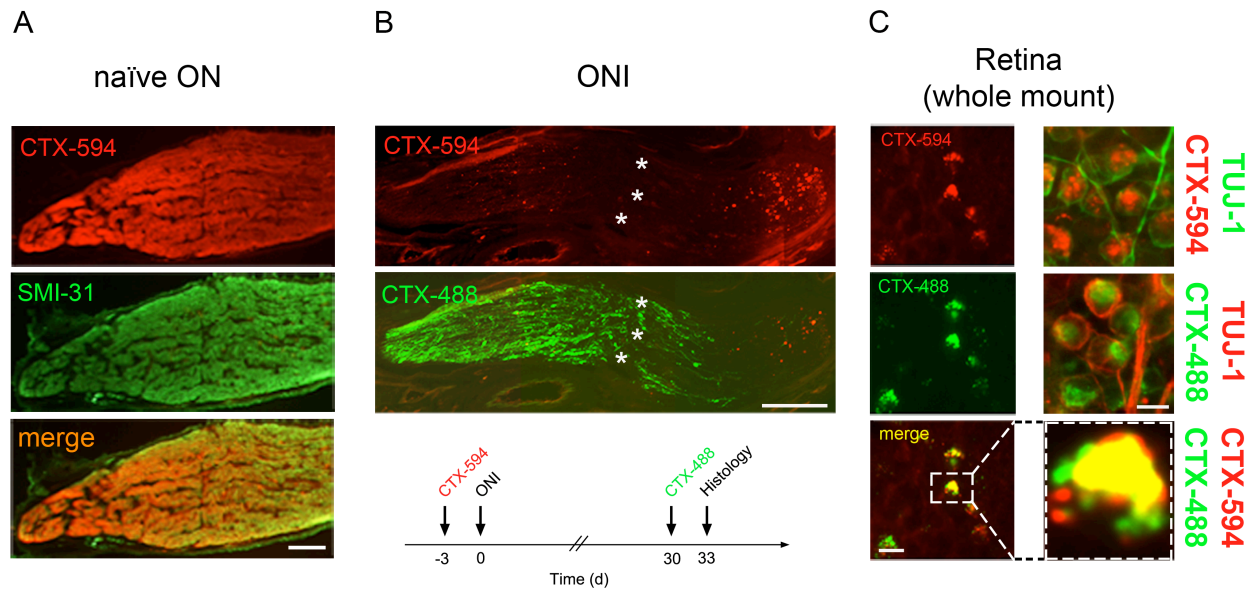


Supplemental Information



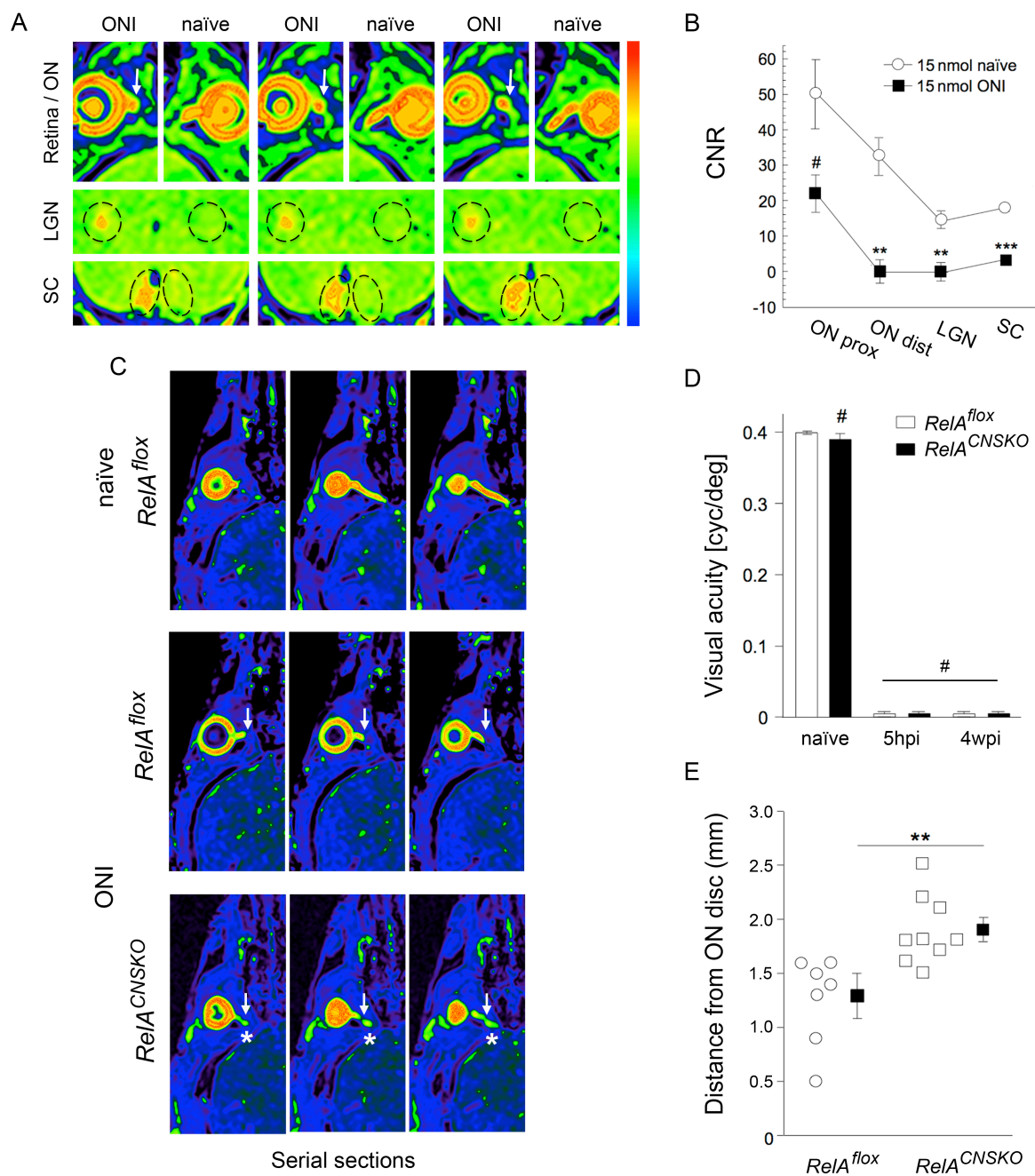
Suppl. Figure 1

Suppl. Figure 1. Tracer-based axonal de- versus regeneration for growth studies after ONI.

(A) In the naïve state, intravitreal applied CTX-594 (red) becomes anterogradely transported along the optic nerve (ON) and co-localizes with the axonal marker SMI-31. Scale bar, 150 μ m.

(B) Disappearance of CTX-594 applied prior to ONI indicated Wallerian degeneration of injured RGC axons. Complementary CTX-488 (green) introduced at the end of the growth period solely labeled *de novo* generated axons (asterisks, lesion site). Scale bar, 200 μ m. Bottom: Scheme on tracer application 3 days before and 4 weeks after ONI.

(C) Origin of regenerating fibers from surviving, but initially deafferented RGC was verified by uptake of both markers into individual cell somata (left panel). Note that intracellular precipitated and granular CTX does not label the cell membrane (dotted box: magnification of merge image). Scale bar, 30 μ m. Right panel: Incorporation of complementary Alexa-594 and Alexa-488 CTX conjugates into naïve and post-lesional RGCs was proven by TUJ-1 co-staining. Scale bar, 25 μ m.



Suppl. Figure 2

Suppl. Figure 2. Serial MEMRI for mapping viability, de- and regeneration of optic nerve axons. (A) Imaging of the visual projection by MEMRI delineated tracer propagation along the intact right optic nerve (ON), contralateral lateral geniculate nucleus (LGN) and superior colliculus (SC), whereas injury of the left optic nerve (arrows in top panel) resulted in complete signal extinction caudal to the injury site (empty dashed circles; n=5). Scale bar: warm colors indicate high signal intensity. (B) Quantitative analysis confirmed a decline of CNR to background levels caudal to the lesion site (n=5). (C) Four weeks after ONI, tracer propagation was partially restituted beyond the lesion site (arrows) in *RelA^{CNSKO}* mice (bottom panel; asterisks), but not in controls (middle panel) (n=9). Since manganese transport is an active process that requires calcium exchange, positive CNR reflects fiber vitality. (D) Measurement of visual acuity indicated complete blindness of all animals immediately after ONI that persisted for more than 4 weeks and thus excluded a transient conduction block (n=5). (E) Retro-bulbar distances of axonal manganese transport in *RelA^{CNSKO}* mice were significantly increased as compared to controls (n=9 for *RelA^{CNSKO}*; n=7 for *RelA^{fllox}*). hpi, hours post injury; wpi, weeks post injury.