

Figure S1

AAV9-L7-ChR2-mCherry

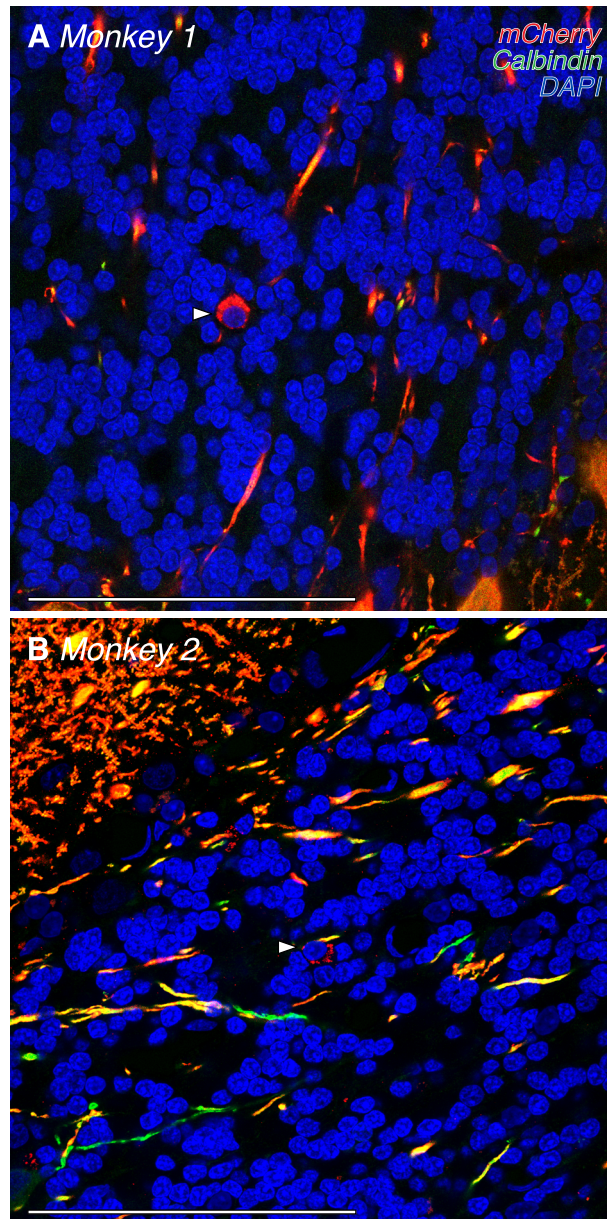


Figure S1 (related to Figures 2 and 3). Transduction pattern of AAV9-L7-ChR2-mCherry in the granule cell layer. (A–B) Confocal images of two histological sections at 63X showing examples of rare transduction of granule cells (white arrows). These images were taken from the regions outlined by dashed black boxes in Figure 3A–B. Scale bars are 100 μm .

Figure S2

AAV1-L7-ChR2-mCherry

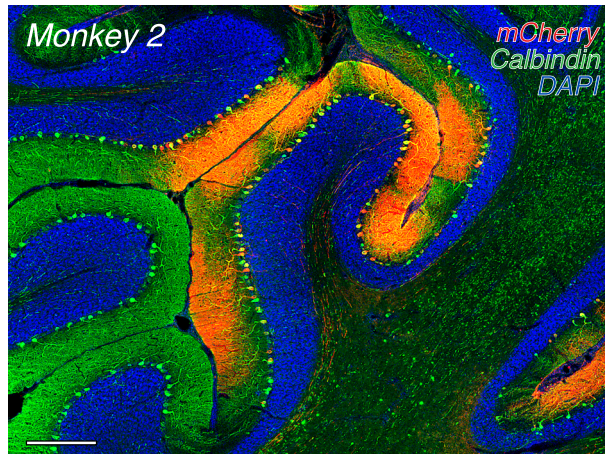


Figure S2 (related to Figures 2 and 3). Transduction pattern of AAV1-L7-ChR2-mCherry. 20X montage of one histological section from Monkey 2. Scale bar is 200 μm .

Figure S3

AAV1-CMV-GFP

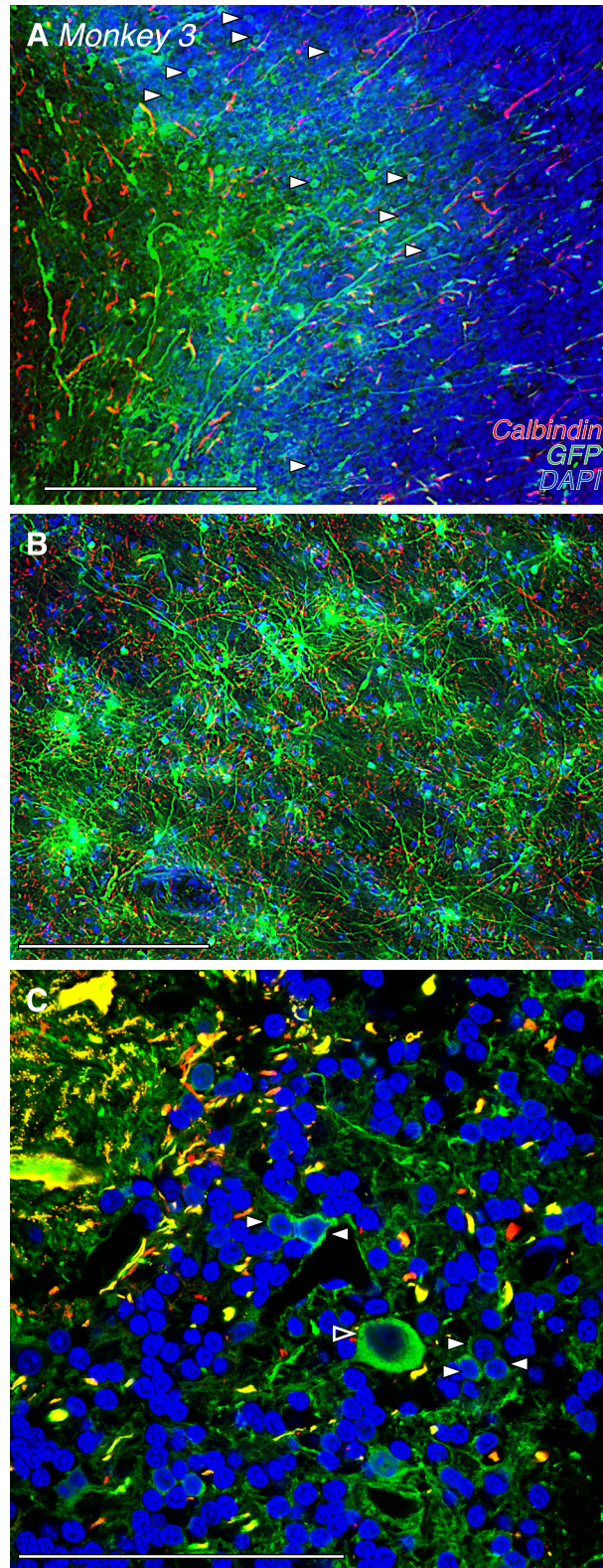


Figure S3 (related to Figure 4). Transduction pattern of AAV1-CMV-GFP. (A-B) 20X montage corresponding to the regions outlined by dashed white boxes in Figure 4A (upper and lower) showing transduced granule cells (A, a subset are marked with white arrows) and glia (B). Scale bars are 200 μm . (C) Confocal image at 63X showing a transduced Golgi cell (open arrow) and several transduced granule cells (white arrows). Scale bar is 100 μm .

Figure S4

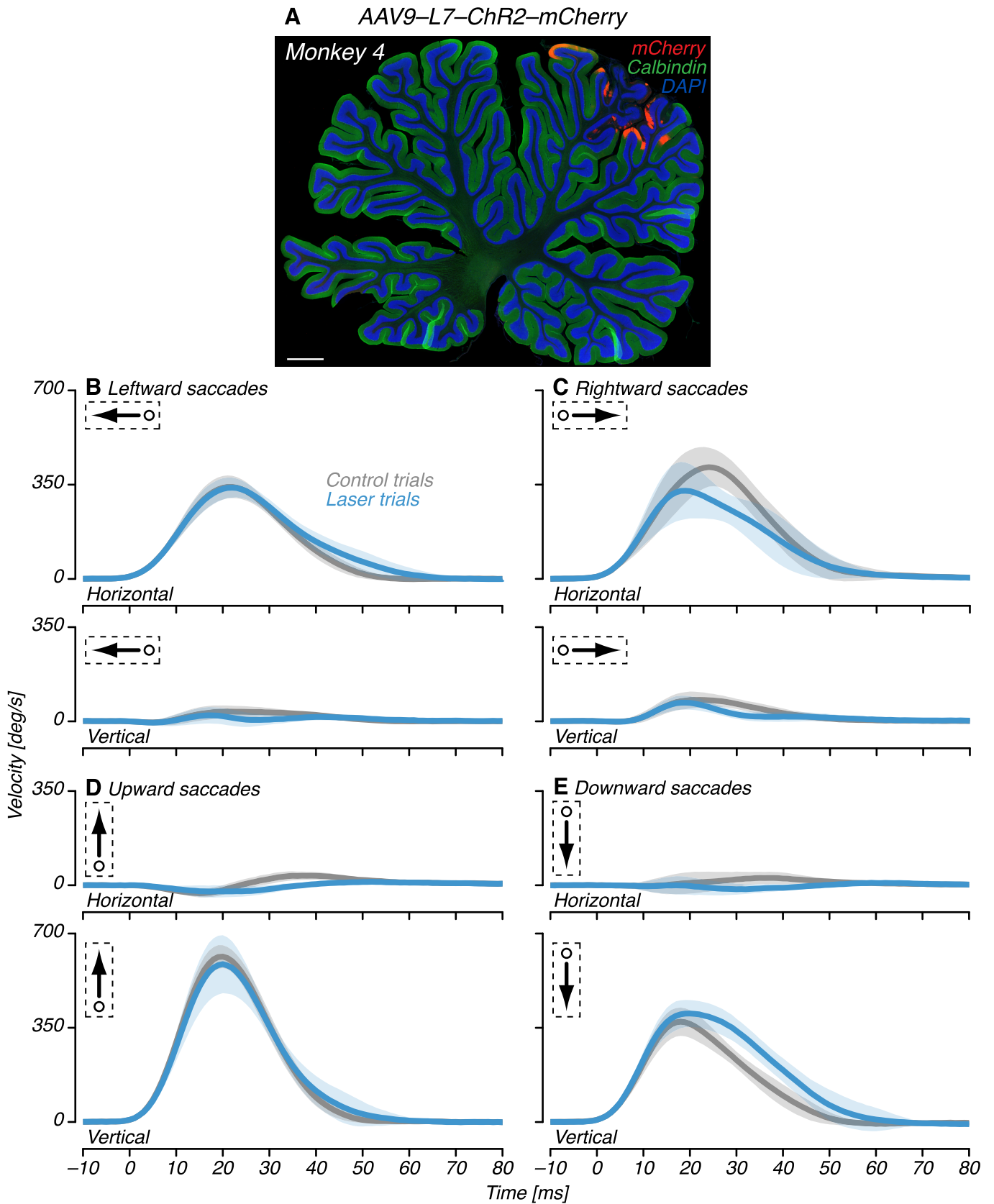


Figure S4 (related to Figure 6). Effects of optical stimulation in the OMV on eye velocity. **(A)** 10X montage of one histological section confirming transduction of the OMV (lobules VIc, VII and VIIIa) in Monkey 4 with AAV9-L7-ChR2-mCherry. Scale bar is 2000 μ m. mCherry-positive cells were restricted to the Purkinje cell layer and were calbindin-positive. The absence of mCherry and calbindin signals in some regions indicates Purkinje cell death. **(B-E)** Eye velocity traces for control (gray) and laser (blue) trials from one example behavioral session (same as in Figure 6B). Stimulation was triggered \sim 6 ms after saccade initiation. Solid curves represent means and bands represent \pm 1 S.D.

Figure S5

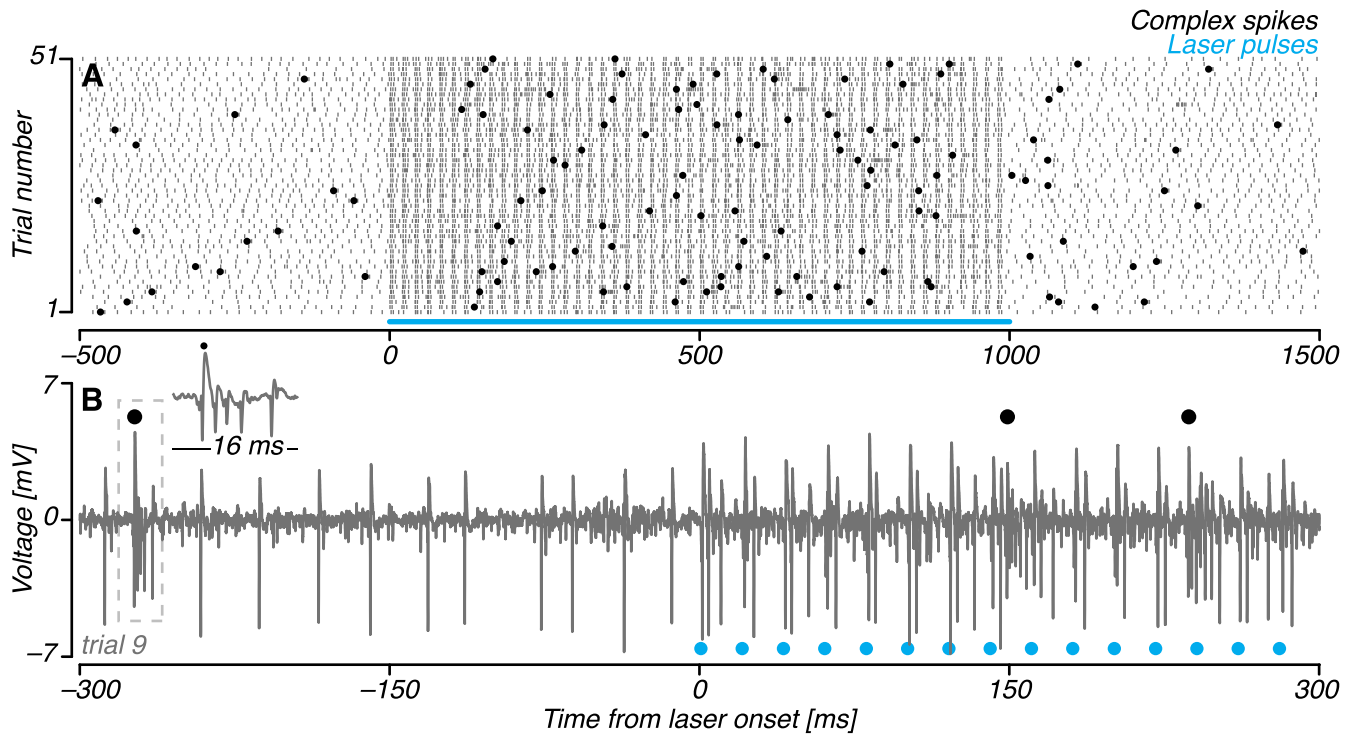


Figure S5 (related to Figure 5). Effects of optical stimulation on Purkinje cell simple and complex spiking. **(A)** Rasters for a single unit tested with a laser pulse train (blue line; 1000 ms pulse train; 1.5 ms per pulse; 50 Hz, 65 mW). Simple (gray) and complex (black) spiking events were classified manually based on waveform. **(B)** Analog voltage trace (gray) from the interval 300 ms before and after the onset of optical stimulation (blue). These data correspond to trial 9 (data in **A**). Three complex spike events were identified (black); the inset shows one of these events in more detail. For this unit, the average rate of complex spikes in the pre-stimulation, stimulation and post-stimulation epochs was: 0.63, 1.67 and 0.86 impulses/s.

Figure S6

AAV9-L7-ChR2-mCherry

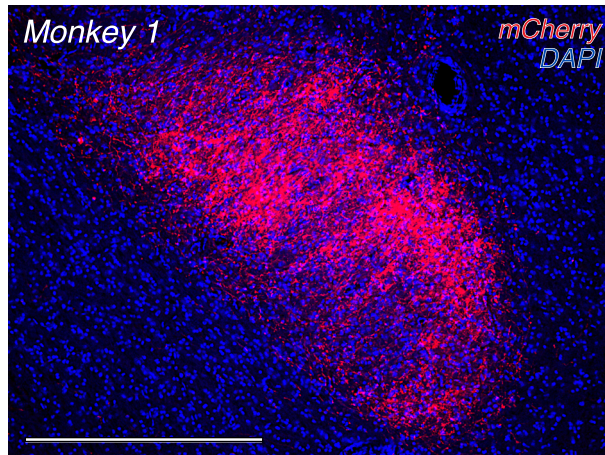


Figure S6 (related to Figure 2). ChR2-mCherry-positive axon terminals in the dentate nucleus. 10X montage of one histological section from Monkey 1. Scale bar is 500 μm .