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**Supplemental Data**

# Tumor Necrosis Factor α Mediates One Component of Competitive, Experience-Dependent Plasticity in Developing Visual Cortex

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## Supplementary Figure 1

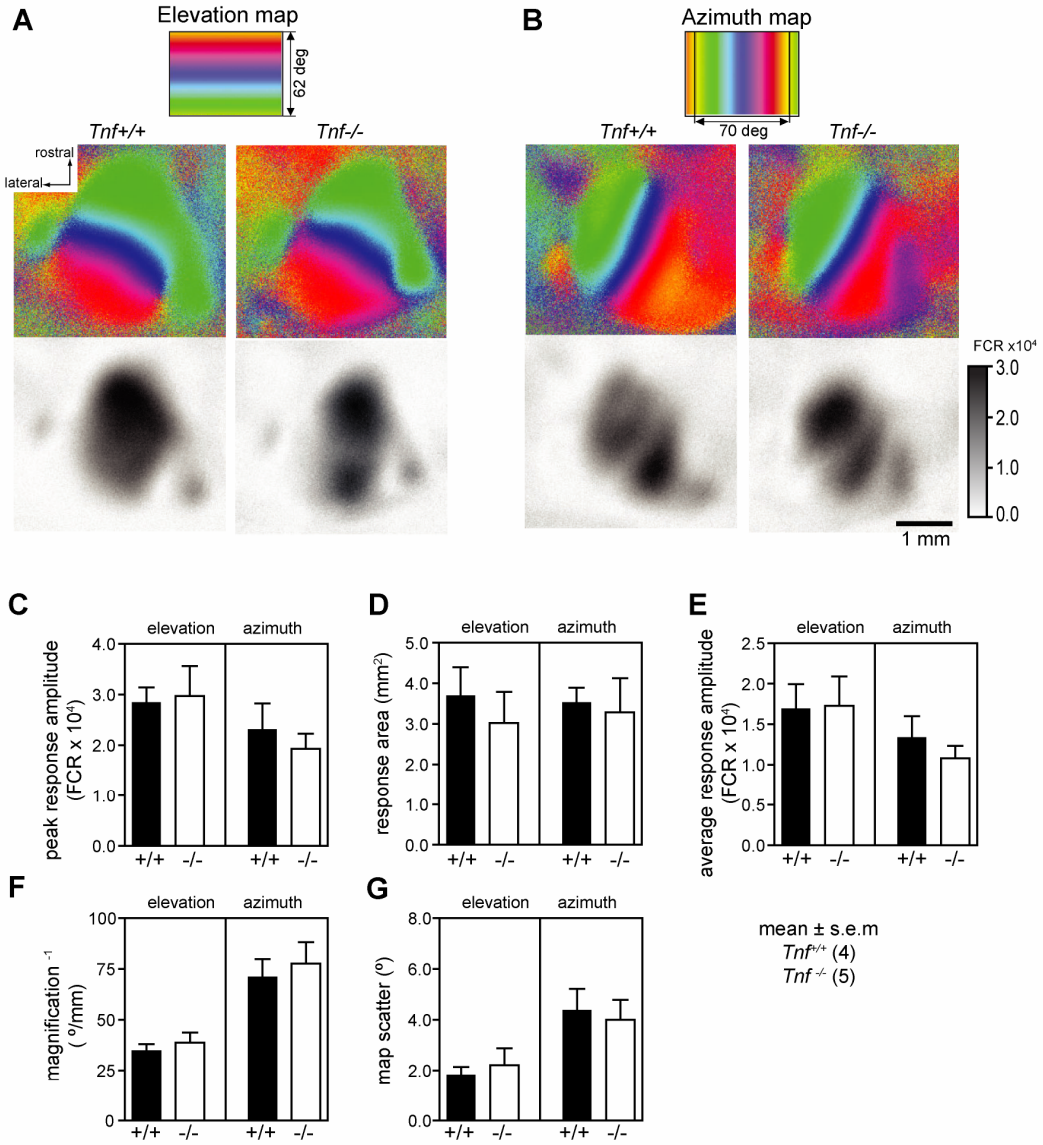


**Figure S1**

Response magnitudes and retinotopic maps in the *Tnf*$^{-/-}$ cortex are indistinguishable from those of wild type animals at a global level examined by intrinsic signal imaging. (A, B) Example cortical elevation maps (A) and azimuth maps (B). The color code used to represent positions of different elevation lines (A) and azimuth lines (B) are shown at the top. Maps for response magnitude are presented in a gray scale. FCR: fractional change in reflectance. (C-G) Quantification of functional visual cortical maps. (C) Peak response amplitude. Response area (D) was calculated by selecting the pixels with the threshold of 30% of the peak amplitude. Average response amplitude (E) was calculated by averaging the values of all pixels within the response area. To assess the quality of the map, we computed the map scatter (G) by calculating the differences between the phase values of the individual pixels within the visual area to those of their near neighbors. These phase differences would be very small if the maps are “high quality” because of the smooth progression of phases.

**Supplementary Figure 2**

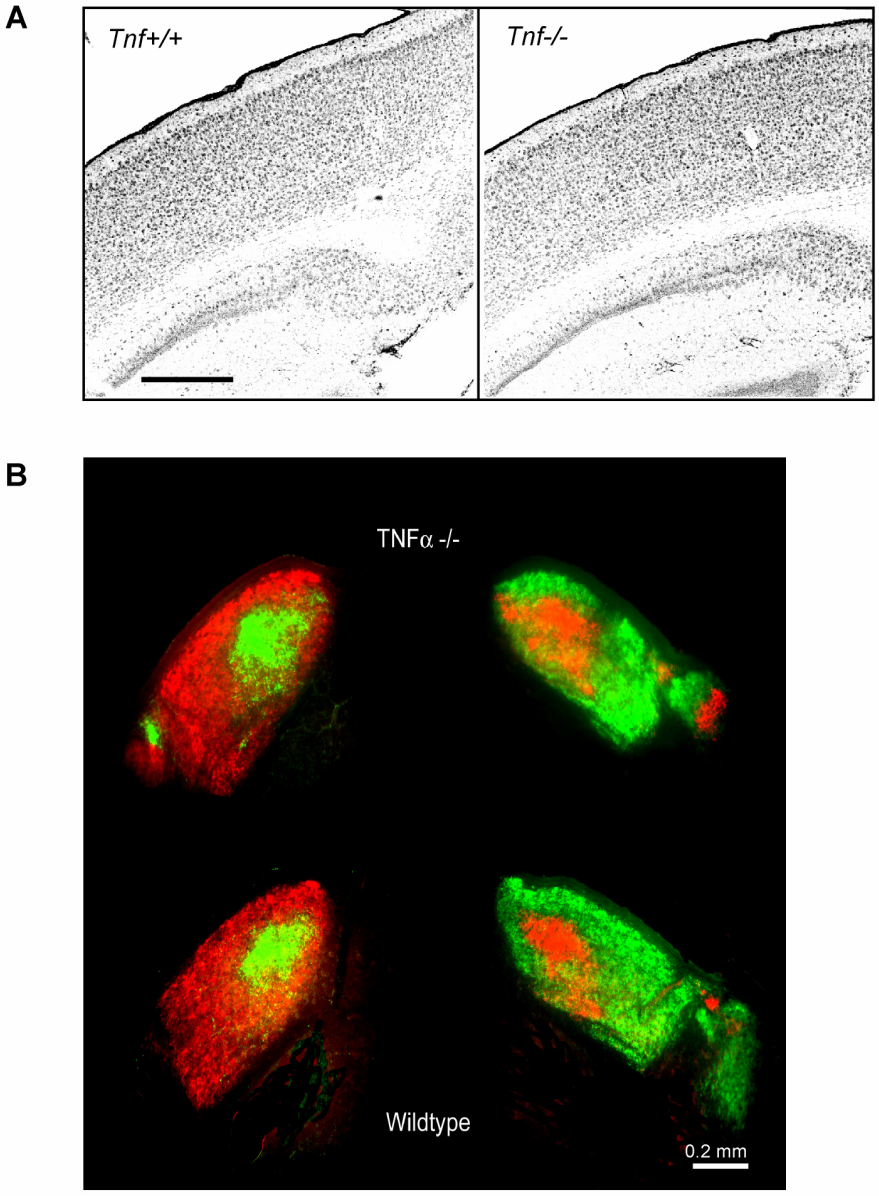


**Figure S2**
Gross morphology of the cerebral cortex and eye-specific segregation of retinal axons in the dLGN are normal in *Tnf-/-* animals. (A) Nissl-stained coronal sections of caudal cerebral cortex from *Tnf+/+* (left) and *Tnf-/-* (right) animals. (B) Anterograde labeling of retinal axon terminals within the dLGN in *Tnf-/-* (top) and wild type (*Tnf+/+)* (bottom) mice.

**Supplementary Figure 3**

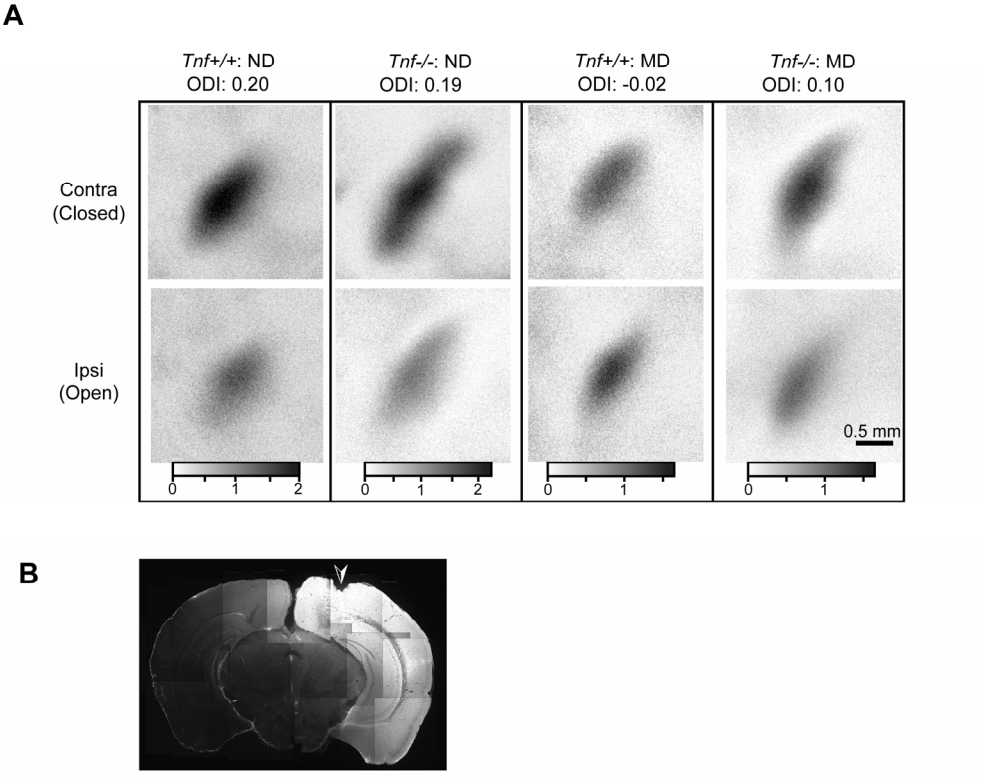


**Figure S3**
(A) Examples of intrinsic signal images showing cortical responses in animals following 5 days of MD or age-matched animals with normal visual experience (ND). Gray scale bars represents fractional change in reflectance x$10^4$. (B) Typical distribution of sTNFR1 after cortical infusion using an osmotic minipump at the rate of 8.75 ng/h. The arrowhead indicates the position where the cannula had been placed.

**Supplementary Figure 4**

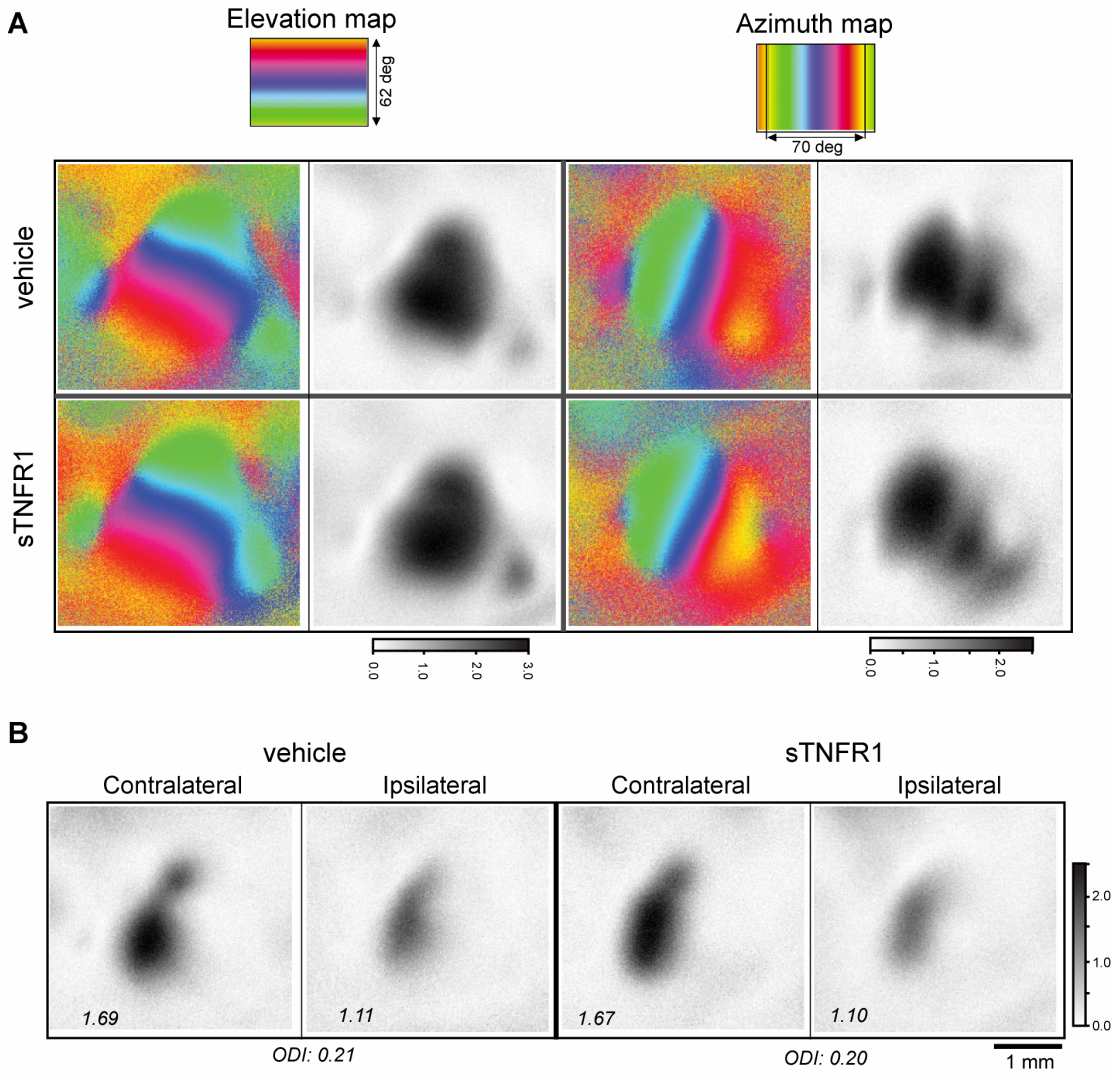


**Figure S4**
Cortical infusion of soluble TNFR1 did not affect visual resoponses at a global level. Optical images of intrinsic signals were recorded in wild type animals after 6 days of cortical infusion of soluble TNF receptor-1 (sTNFR1) or vehicle solution. (A) Visual cortical responses to full-screen moving bars. The color code representing positions of different elevation and azimuth lines on the stimulus monitor are shown at the left. Maps for response magnitude are presented in a gray scale. (B) Visual cortical responses to short bars (20°) presented in the binocular visual field, as used to measure ocular dominance. With normal visual experience, the response magnitude and ocular dominance index in sTNFR1-treated animals were similar to those in vehicle-treated animals. Numbers in the panels indicate average response amplitude, presented as fractional change in reflectance $x10^4$. The spatial scale bar in B applies to all panels both in A and B.

**Supplementary Figure 5**

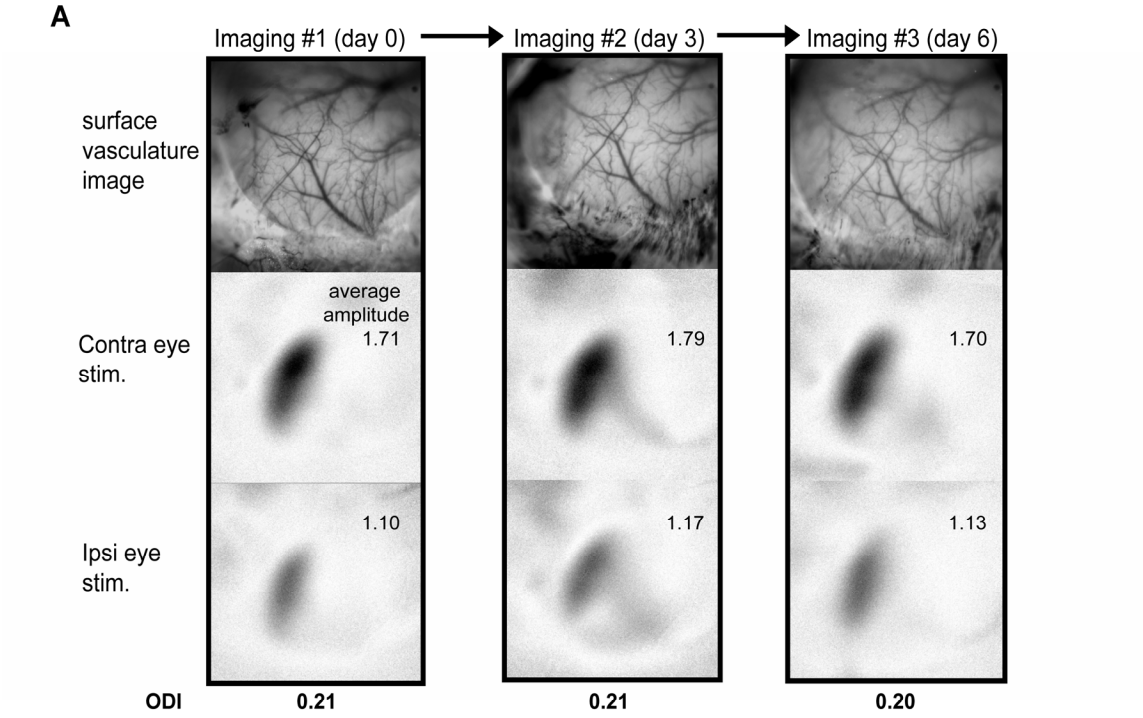


**Figure S5**
(A) Examples of cortical responses measured repeatedly by intrinsic signal imaging in a wild type mouse with normal visual experience starting at P28 with intervals of 2 days. (B) Variability of visually evoked responses and ODIs across experimental days. Each animal was imaged on 3 different days with intervals of 2 days. Each point in the graph represents the mean of 3 sets of measurement in one day. Response magnitude is presented as fractional change in reflectance (FCR).

**Supplementary Figure 6**

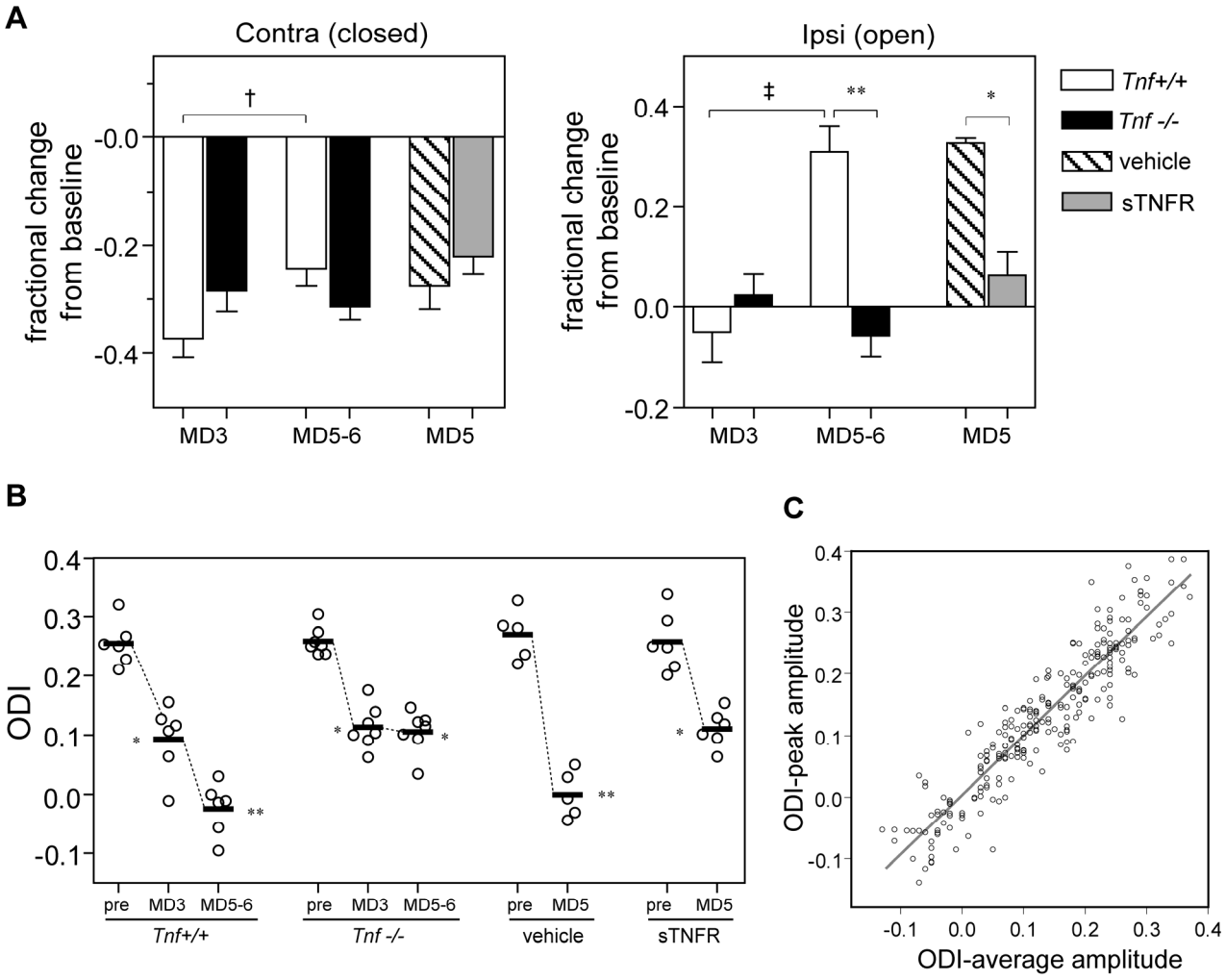


**Figure S6**

Analyses of intrinsic signal optical images using peak response amplitudes, instead of average amplitudes within the ROI defined by the ipsilateral-eye response. Changes in cortical responses to the closed-eye or open-eye stimulation (A) and in the ocular dominace index (ODI) (B), computed from the same set of chronic recordings as shown in Figure 3 of the main text, are all similar to those analyzed with average response amplitudes (compare to Figure 3-E-G in the text). In fact, the ODI computed with peak amplitudes was very similar to that derived from average amplitudes in a given set of contralateral and ipsilateral eye response maps (C). The linear regression analysis revealed a slope of 0.98 (95% confidence interval: ± 0.025) with y-intersept of 0.0016 (± 0.004). The correlation coefficient was 0.933. **P<0.01 and *P<0.05 (ANOVA followed by Bonferroni's multiple comparison), between indicated groups (A) or compared to pre-MD baseline (B). †P<0.05 and ‡P<0.01 paired t-test.

## Supplementary Figure 7

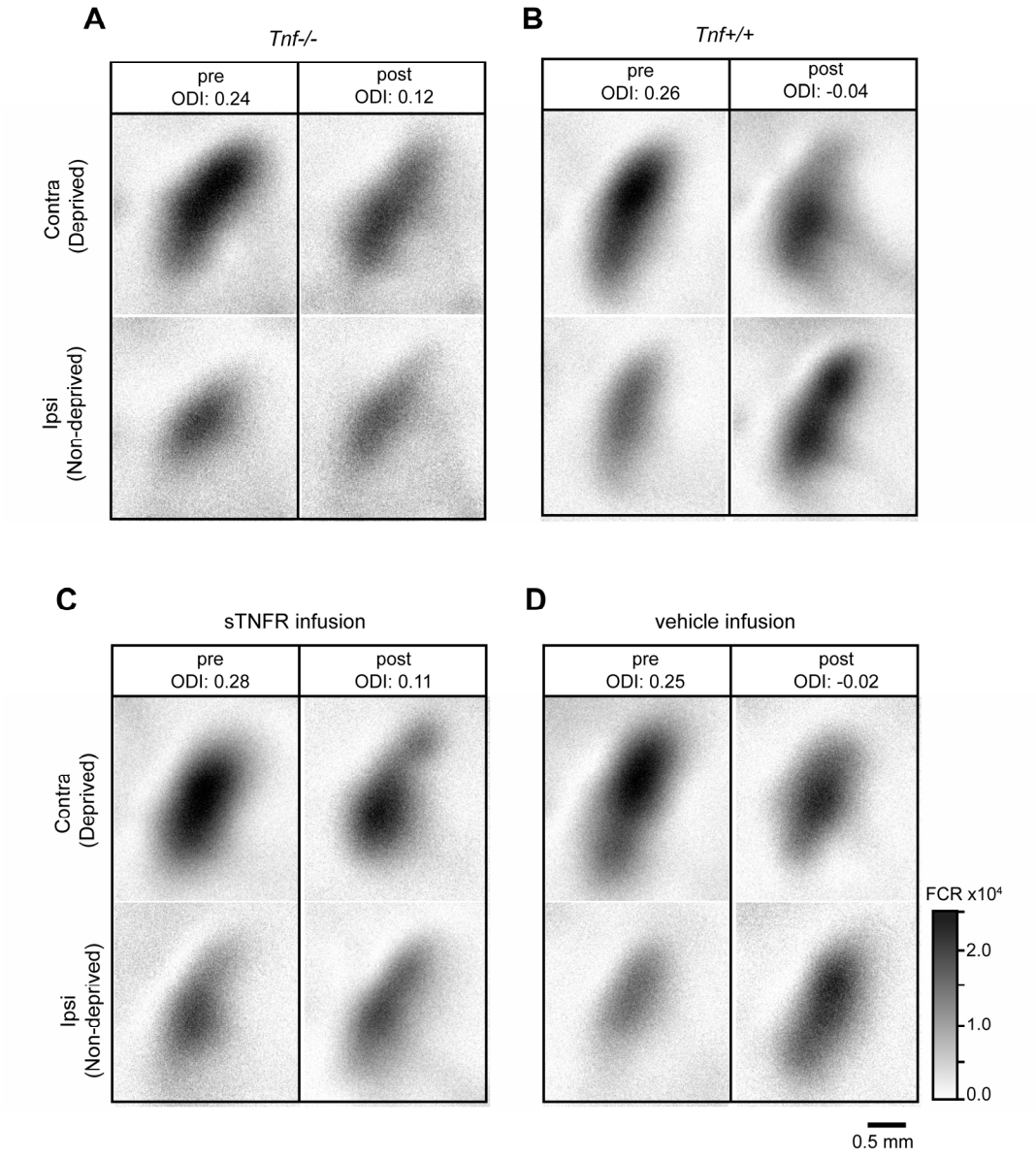


**Figure S7**
Examples of intrinsic signal images recorded in the same individuals before and after 5-6 days of MD in *Tnf*$^{-/-}$ (A) and *Tnf*$^{+/+}$ (B) animals, and in wild type animals treated with cortical infusion of sTNFR1 (C) or vehicle (D). The scales for the dimension and the amplitude apply to all panels. FCR: fractional change in reflectance.