Role of TNF-α in capillary degeneration following NMDA-induced neurotoxicity in the neonatal rat retina

Daiki Asano¹, Akane Morita¹, Asami Mori², Kenji Sakamoto², Toshihide Kashihara¹, Tsutomu Nakahara¹


Tumor necrosis factor (TNF)-α is a major pro-inflammatory cytokine involved in the pathogenesis of several ocular diseases. Previous studies have shown that capillary degeneration and inflammatory responses occur in the retina following an intravitreal injection of N-methyl-D-aspartic acid (NMDA) in rats. In this study, we aimed to determine the role of TNF-α in capillary degeneration in an NMDA-induced retinal injury model of neonatal rats. Intravitreal injection of NMDA (200 nmol) was performed on postnatal day (P) 7. We examined 1) changes in protein level and distribution of TNF-α and 2) effects of TNF-α neutralizing antibody (anti-TNF-α Ab) on the capillary degeneration in retinas of NMDA-injected eyes. The protein level of TNF-α increased 2 days (i.e., P9) after NMDA injection, and the enhanced immunoreactivity for TNF-α was observed in the ganglion cell layer. Intravitreal injection of anti-TNF-α Ab (0.1 μg) at 2 days after NMDA injection suppressed retinal capillary degeneration. These results suggest that TNF-α plays an important role in capillary degeneration following neurotoxicity in the retina.