**Title** Microglial markers within the DBA/2J visual projection

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**Objectives**

The goal of the experiment was to identify glaucomatous DBA/2J mouse microglia in their two different activation states, anti-inflammatory versus pro-inflammatory, which were characterized by ramified and amoeboid phenotypes. Interleukin 4 altering of cytokine production from pro-inflammatory to anti-inflammatory in glaucomatous DBA/2J mice was also studied.

**Abstract**

Glaucoma, the second leading cause of irreversible blindness, is characterized by gradual optic nerve degeneration and the loss of retinal ganglion cells. Microglia, the resident immune cells of the central nervous system, play a major role in the progression of glaucoma pathology and neuroinflammation. Normally, microglia are resting sentinels sampling their environment, but they can also become activated and exhibit cytotoxic pro-inflammatory properties (M1 activation) or be used for anti-inflammatory, repair and regeneration (M2 activation), characterized by ramified and amoeboid phenotypes. Tumor necrosis factor alpha (TNFα) and Iba-1 were used in immunofluorescence staining to examine the M1 activation state of microglia versus resting microglia, respectively, in glaucomatous DBA/2J mice of increasing age groups. Interleukins, another group of cells involved in the immune system, were also studied. In models of neurotrauma, interleukin 4 (Il-4) has been shown to induce a switch in microglial phenotype from the M1 to M2 state. Il-4 was injected into glaucomatous mice, and a multiplex analysis of select cytokine levels was run to determine if the microglial phenotype could be changed. Overall, a general increase in number of microglia present was seen with increased age and pathology in glaucomatous mice. An increase in the number of ramified microglia and a higher percentage of amoeboid microglia was also seen in older mice. Il-4 injections exhibited a beneficial effect in reducing pro-inflammatory cytokine production in 8-month DBA/2J retinal projections, suggesting that microglial phenotype and cytokine production may respond to treatment and that age may play an important role in therapeutic window.