Purpose: To investigate the effect of monocyte chemoattractant protein-1/CC chemokine ligand 2 (MCP-1/CCL2) on the aqueous humor outflow facility.

Methods: Enucleated porcine eyes were subjected to measure the aqueous humor outflow facility in a constant pressure perfusion system with or without MCP-1/CCL2 (1600 ng/mL). Schlemm’s canal (SC) cells were isolated from Cynomolgus monkey eyes, and cultured in Dulbecco Modified Eagle Medium supplemented with 10% fetal bovine serum. Expressions of MCP-1/CCL2 receptors, CCR2 and CCR5, in SC cells were examined by reverse transcriptase-polymerase chain reaction (RT-PCR). The effect of MCP-1/CCL2 (0-800 ng/mL) on the permeability of SC-cell monolayer was evaluated with or without CCR2 antagonist (10 nM) by measurement of transendothelial electrical resistance (TEER). The effects of MCP-1/CCL2 (0-800 ng/mL) on viability of SC cells were evaluated by Cell Counting Kit-8 assay.

Results: In perfusion experiments with porcine eyes, the calculated aqueous humor outflow facility was 121 ± 18% of the basal levels for MCP-1/CCL2-treated eyes, which is statistically significantly higher from that for control eyes, 106 ± 7, at 80 minutes after perfusion. (n = 8, p < 0.05). Statistically significant increase in the outflow facility was found at numerous time points after 80 minutes. The gene product specific for CCR2 was amplified by RT-PCR, but not for CCR5. TEER of SC-cell monolayer at 3 hours after treatment with MCP-1/CCL2 at 800 ng/mL was 7.6 ± 2.4 Ω cm², which is significantly lower than that for control experiments, 10.8 ± 1.4 Ω cm² (n = 8, p < 0.05). Also, the TEER-decreasing effects of MCP-1/CCL2 were attenuated by CCR2 antagonist. Cell viability was not influenced by MCP-1/CCL2 treatment.

Conclusions: Our previous work showed that, in human aqueous humor samples, MCP-1/CCL2 at high levels were contained, especially in pseudophakic glaucomatous eyes, suggesting some roles in changes in intraocular pressure after cataract surgery. The present results revealed that MCP-1/CCL2 increased the aqueous humor outflow facility and also that it decreased the TEER via CCR2. These data suggest that MCP-1/CCL2 may be a modulator of aqueous humor outflow through the conventional pathway.