**Smoking Effects in Glaucoma**

**“Healthy life, healthy body, healthy optic nerve”**

According to the Centers for Disease Control and Prevention (CDC), smoking cigarettes increases one’s risk for coronary heart disease by 2 to 4 times; for stroke by 2 to 4 times; for men developing lung cancer by 25 times; and for women developing lung cancer by almost 26 times.

These effects of smoking may be well known and understood. What has not been explored in as much depth until recently is how smoking affects a person’s eyes and vision. Researchers at medical schools across the country have been investigating the effects of smoking on eyes and their findings show that smoking does adversely affect one’s eyesight.

Sasan Moghimi, MD, Associate Professor of Ophthalmology at the University of Alabama-Birmingham. Robert N. Weinreb, MD, Professor of Ophthalmology, at the Shiley Eye Institute and Viterbi Family Department of Ophthalmology at UC San Diego’s Jacobs School of Medicine. Dr. Weinreb, along with Feng Zhang, PhD, at the Broad Institute of MIT and Harvard and Dr. Skowronska-Krawczyk, MSc, PhD, Assistant Professor, Physiology & Biophysics and Ophthalmology and faculty of the Center for Translational Vision Research at the UC Irvine School of Medicine. Dr. Skowronska-Krawczyk completed her post-doctoral fellowship at UC San Diego’s Shiley Eye Institute from 2006-2010 and then was on the SEI staff.

The research spanned a couple of glaucoma studies conducted by the Hamilton Glaucoma Center at SEI with the Edward S. Harkness Eye Institute at Columbia University Medical Center and the Bernard School of Medicine at the University of Alabama-Birmingham. In one of their reports, started in 2020 and published in the Academy of Ophthalmology’s (AAO) Ophthalmology magazine, patients with primary open angle glaucoma (POAG) were followed for over three years with at least 5 visual field (VF) tests and 5 visits of optical coherence tomography (OCT). OCT is an imaging test of the eye using light waves to take cross-section pictures of the retina. The findings showed that smokers’ eyes had VF progression 2.2 times more than non-smokers’—meaning the smokers’ eyes had VF progression faster rates of thinning of their retinal nerve fiber layer (RNFL). The RNFL is made primarily of ganglion cells, which are the retinal neurons that communicate directly with the brain.

“The research clearly shows that smoking damages a person’s vision. When someone stops smoking, they help their overall health and may help their sight,” stated Dr. Moghimi.

Interestingly, they demonstrated that after ≥25 years of smoking cessation, the risk of VF progression in former heavy smokers becomes similar to never smokers. This is in line with previous reports showed that heavy smokers had faster rates of thinning of their retinal nerve fiber layer (RNFL). The RNFL is made primarily of ganglion cells, which are the retinal neurons that communicate directly with the brain.

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In collaboration with Dr. Skowronska-Krawczyk, our research was initiated at SEI and shows that the aging factor can accelerate progressive retinal ganglion cell (RGC) death and its axon loss, as well as the visual dysfunction in acute model of aged glaucoma,” said Dr. Ju.

The team’s research shows how fluctuations in eye pressure affects retinal tissue, creating epigenetic (how cells control gene activity without changing DNA) changes such as one would find with natural aging.

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Further studies are needed to see if the smoker stops smoking whether this will decrease the glaucoma progression.

**Robert N. Weinreb, MD, Chair and Distinguished Professor of Ophthalmology and Won-Kyu Ju, PhD, Professor of Ophthalmology, at the Shiley Eye Institute and Viterbi Family Department of Ophthalmology collaborated on research which shows that repetitive stress in retinal tissue accelerates aging of the eye. The study was first authored by Dorota Skowronska-Krawczyk, Msc, PhD, Assistant Professor, Physiology & Biophysics and Ophthalmology and faculty of the Center for Translational Vision Research at the UC Irvine School of Medicine. Dr. Skowronska-Krawczyk completed her post-doctoral fellowship at UC San Diego’s Shiley Eye Institute from 2006-2010 and then was on the SEI staff.

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