

Capstone for Impact Submission | GY2020

Project Title: Disorganization of Retinal Inner Layers (DRIL) and Visual Function in Diabetic Retinopathy

Student Name(s): Christopher Sesi

Advisor Names(s): Tom Gardner, MD

Branch: Systems and Hospital-Based Care

Path of Excellence: none

If this project can be continued by another UMMS student, please include your contact information or any other details you would like to share here:

PURPOSE. To elucidate the relationship between disorganization of retinal inner layers (DRILs) and retinal function in diabetic patients without diabetic retinopathy (DR) and with nonproliferative DR, but without diabetic macular edema (DME).

METHODS. Fifty-seven participants with diabetes mellitus (DM) and 18 healthy controls underwent comprehensive ophthalmic examination, fundus photography, and spectral domain optical coherence tomography. Scans of the fovea were evaluated for the presence of DRIL. Retinal function was evaluated using Early Treatment Diabetic Retinopathy Study (ETDRS) visual acuity, the quick contrast sensitivity function (qCSF) on the AST Sentio Platform, short-wavelength automated perimetry (SWAP), standard automated perimetry (SAP), and frequency doubling perimetry (FDP). ANOVA and Kruskal-Wallis were used to compare retinal function in subjects with and without DRIL. Tukey-Kramer test and Wilcoxon were used for post hoc analysis.

RESULTS. DRIL was identified in 9 of 57 diabetic subjects. DRIL subjects had higher body mass index and longer diabetes duration compared to diabetic subjects without DRIL ($P = 0.03$ and $P = 0.009$, respectively). Subjects with DRIL had reduced ETDRS visual acuity ($P = 0.003$), contrast sensitivity function ($P = 0.0003$), and SAP performance (PSD, $P < 0.0001$) compared to controls and diabetic subjects without DRIL. Structural analysis revealed inner retinal thinning, and some outer retinal thinning, associated with DRIL.

CONCLUSIONS. Diabetic subjects with DRIL have reduced retinal function compared to those without DRIL, and defective retinal lamination may be an early cellular consequence of diabetes responsible for this in some patients. Following further longitudinal studies, DRIL may be a readily available and reliable structural biomarker for reduced retinal function in early diabetic neuroretinal disease.

Reflection/Impact Statement:

The importance of this impact project is manifested by the prevalence of diabetic retinopathy (DR) in the United States as well as around the world. DR continues to be a leading cause of blindness, despite the amazing advances that have already been made within the field. Many treatments have been studied and implemented in patients with clinically significant DR, but early diagnosis and management has been a major area of research due to the lack of reliable diagnostic tools at early stages of the disease. My project aims to introduce one such reliable diagnostic tool that can help change the way DR is diagnosed, as well as the time at which it is treated. This project reminds me of my reason to pursue ophthalmology as a career, that is to improve quality of life by restoring or preserving vision.

Having completed this project and currently applying into ophthalmology, I have grown to really enjoy the retina and am now considering pursuing a retina fellowship following completion of my ophthalmology residency. Retinal pathology is always interesting to learn about and treat, but more importantly, often devastating for patients. The thought of restoring vision will always be exciting, and the results, so rewarding. My advice for future students completing the CFI is to really think hard about what matters most to them, because once this is identified, choosing and successfully completing a project will not only become a realistic endeavor, but undoubtedly an enjoyable one as well.