Window to the Brain: Using Retinal Biomarkers to Predict Progression of Alzheimer's and Parkinson's Diseases

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Alzheimer’s disease and Parkinson’s disease are chronic, debilitating neurodegenerative disorders, and the ability to accurately diagnose and monitor these diseases is critical for treatment and intervention. The thickness of four retinal biomarkers were identified to detect Alzheimer’s disease and Parkinson’s disease: the choroid, nerve fiber layer, retinal vein, and ganglion cell layer. Software was developed by the author to access scans remotely, quickly, with low incidence of crashes, and with accuracy equal to or exceeding commercial software. A total of 4,675 retinal scans from 375 patients were analyzed using this software. Results of the analysis of serial scans of the retina show that when the Alzheimer’s group was compared to the control group, all four biomarkers were significantly thinner, and average rate of change of all four biomarkers was significantly different. When the Parkinson’s group was compared to the control group, the nerve fiber layer and ganglion cell layer were significantly thicker, the retinal vein was significantly thinner, and average rate of change of choroidal thickness was significantly different. Results suggest that monitoring how retinal biomarkers change can be used to predict the progression of the patient’s disease. Confidence intervals were calculated for biomarker measurements and their average rate of change for each test group. These ranges were added to the new remote software and utilized to diagnose, predict, and monitor Alzheimer’s and Parkinson’s in patients. The software is 99% accurate in identifying patients with Alzheimer’s disease and 97% accurate in identifying patients with Parkinson’s disease.

Awards Won:
Patent and Trademark Office Society: First Award of $1,000, and an American flag and a framed copy of the first patent granted in the USA