

Natural History of Visual Function Impairment in Patients Post-treatment with Pan-retinal Photocoagulation for Proliferative Diabetic Retinopathy

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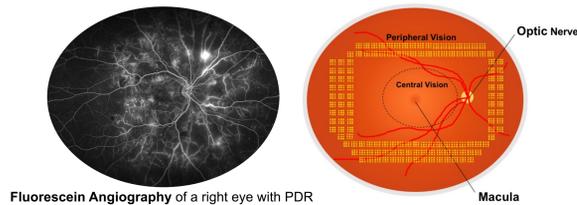
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Introduction

1. **Diabetic retinopathy (DR)** is a leading cause of visual impairment in the world.
2. **Proliferative diabetic retinopathy (PDR)** is the advanced stage of DR, and it is commonly treated with **pan-retinal photocoagulation (PRP)** to prevent risk of severe vision loss.
3. PRP also impairs peripheral and central visual field function.
4. The purpose of this study is to investigate the **natural course of visual function** in patients who had regressed PDR after PRP.



Fluorescein Angiography of a right eye with PDR

Methods

- ❖ **Participants:** 22 adults who received PRP for PDR (post-PRP group) and 11 age-matched controls
 - ❖ Exclusion Criteria: BCVA > 20/400; history of other systemic, neurologic, or ocular disease
- ❖ **Visual Function Tests:** Snellen visual acuity, Pelli-Robson contrast sensitivity, Minnesota reading acuity, frequency doubling perimetry (FDP), Humphrey Field Analyzer (HFA), photostress recovery, and dark adaptation.
- ❖ **Patient-Reported Outcomes:** National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) and Low Luminance Questionnaire (LLQ)
- ❖ **Retinal Images:** Spectral-Domain optical coherence topography

Table 1: Demographics

	Control	Post-PRP	p-value
Gender, M/F	6/5	16/6	
TDM Type, I/II	7/5	7/3	
Age (years)	63.5 (15.1)	64.5 (14.6)	0.84
Diabetes Duration (years)		40.8 (11.5)	
Duration of PRP (years)		18.4 (7.9)	
BMI (kg/m ²)	28.6 (9.1)	30.2 (7.1)	0.18
HbA1c (%)	5.6 (1.4)	7.8 (1.3)	< 0.01

Results

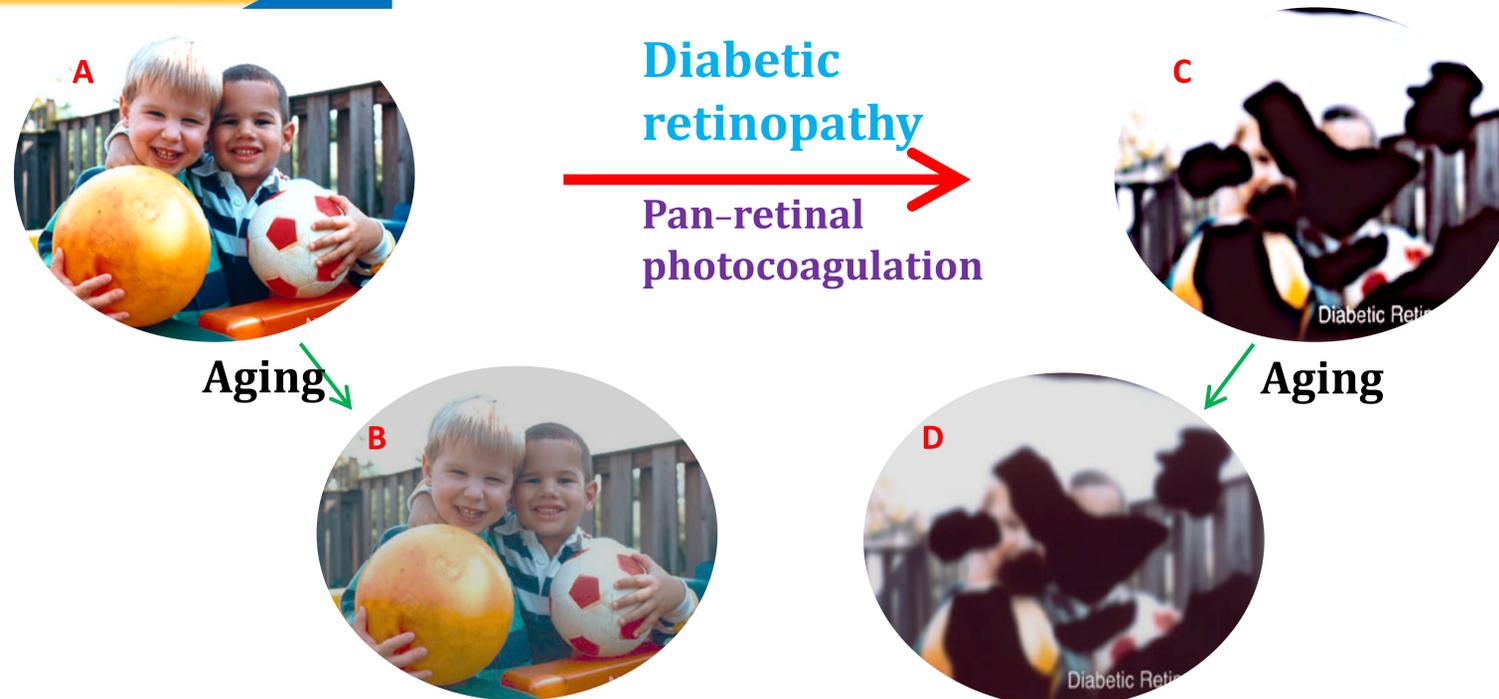
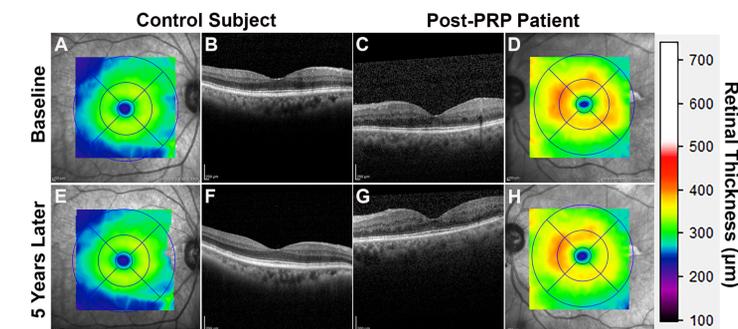


Figure 1. In healthy young individuals, good vision provides a clear view of the world (A). In patients with advanced diabetic retinopathy and after pan-retinal photocoagulation, pathological changes and laser scars in the retina obscure this view (C). We found that the laser treatment reduces progressive vision loss, and declines in these patients' vision over time were likely due to aging (D), which were relatively equivalent to the vision loss of healthy adults over time (B), as illustrated in Table 2.

Table 2: Changes in visual function and quality of life after 5 years were similar between the control and post-PRP groups.

	Control	Post-PRP	p-value
Central vision			
Visual acuity, LogMAR	0.04 (0.07)	0.02 (0.18)	0.87
Reading acuity, LogMAR	0.23 (0.19)	0.18 (0.20)	0.52
Contrast sensitivity, log	-0.12 (0.18)	-0.14 (0.22)	0.85
Central visual field			
FDP 24-2 MD, dB	0.18 (2.53)	-0.98 (4.76)	0.46
HFA 10-2 MD, dB	-1.14 (1.09)	-0.92 (3.07)	0.37
Peripheral visual field			
HFA 60-4, dB	-97.92 (133.61)	-17.43 (112.43)	0.11
Photoreceptor function			
Dark adaptation, min	0.71 (0.71)	1.59 (6.48)	0.98
Photostress recovery, sec	61.92 (185.30)	-4.11 (93.90)	0.46
Quality of life			
LLQ composite score	-3.77 (6.96)	-0.63 (12.47)	0.45
NEI VFQ-25 composite score	-3.06 (4.94)	-1.14 (10.32)	0.57

Figure 2. After 5 years, a post-PRP patient (69-year-old male with BCVA 20/25 and had PRP 9 years ago) and a healthy control subject (77-year-old male with BCVA 20/25) had minimal changes in their retinal thickness and topology.



Discussion

1. After 5 years, patients who previously underwent PRP for PDR showed **modest but significant deterioration** in reading acuity, contrast sensitivity, central visual field.
2. They had **no significant change** in peripheral visual field, photostress recovery, or dark adaptation.
3. Interestingly, declines in all visual function measurements were **equivalent between the post-PRP and control groups**.
4. These patients also showed **no further impairment in daily functioning and vision-related activities** during this period of time.

Conclusion

- ❖ After 5 years, patients with regressed PDR after PRP had **relatively stable visual outcomes and retinal structure** with age-related declines.
- ❖ These findings may be useful in the **design of future clinical trials** to improve visual function in people who have regressed PDR.

Reference

1. Figure 1A-D. Eye Disease Simulations | National Eye Institute. <https://nei.nih.gov/health/examples>. Accessed February 20, 2019.

Acknowledgements

