

# The Effect of Prism on Preferred Retinal Locus

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## Abstract

Our study evaluated the effect of prism on the preferred retinal locus (PRL) of patients with central vision loss as determined by scanning laser microperimetry. Specifically we investigated if a base-up prism would induce a superior repositioning of the PRL.

#	Age	Gender	Diagnosis	VA OD	VA OS
001	61	M	PDR	20/152	20/332
002	48	M	Cone dystrophy	20/400	20/209
003	67	F	Macular pucker, RP	20/166	20/159
004	87	F	Wet AMD	20/209	20/264
005	76	F	NAION	20/800	20/174
006	77	F	Wet AMD, NPDR	20/264	20/364
008	68	F	PDR	20/138	20/303
009	20	M	Stargardt	20/96	20/145
010	64	F	Macular hole	20/240	20/191
011	75	M	Dry AMD, glaucoma	20/382	20/800
012	74	F	Dry AMD	20/126	20/73
013	61	F	Dry AMD, PDR	20/191	20/219
014	66	F	Myopic maculopathy	20/382	20/152

Table 1. Subjects tested with associated diseases and visual acuity. Testing was only performed on the better seeing eye.

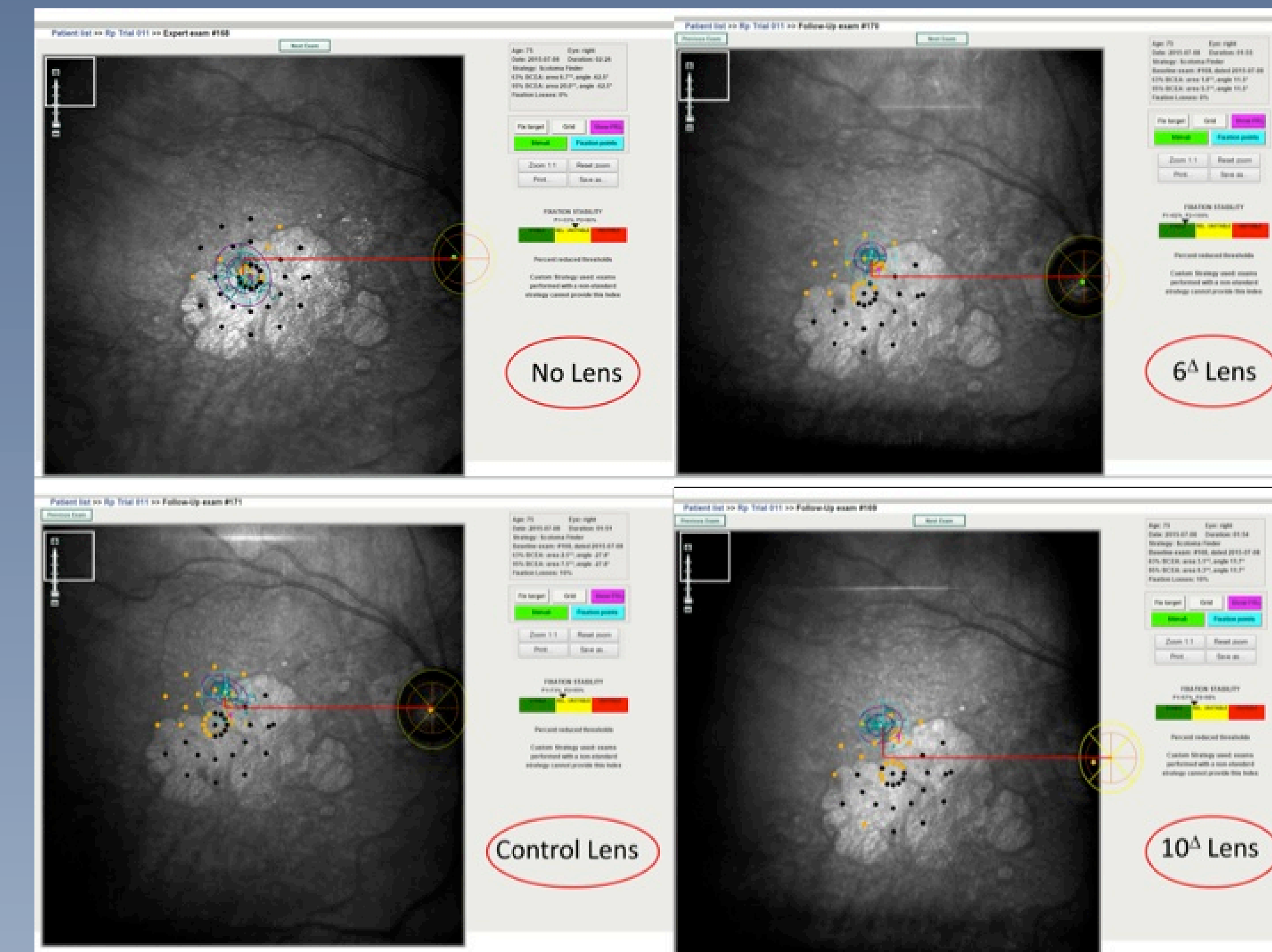
## Introduction

A common cause of functional problems for patients with visual impairment is the development of a central scotoma. This necessitates the patient to learn to fixate with a paracentral, non-foveal point, called the preferred retinal locus (PRL).<sup>1</sup> Of the people who have central scotomas, 95.6% will develop a PRL in at least one eye.<sup>2</sup> Training patients to more effectively fixate with the PRL has been utilized in efforts to improve function.<sup>3,4</sup> Our small pilot study is the first to use microperimetry to measure the movement of the PRL in response to prism in subjects with central scotoma. Base-up prism was used, as that position was the most common position in many studies from Romananda<sup>5</sup> to Smith.<sup>6</sup>

## Methods

We assessed the PRL in 13 low vision subjects with central scotoma under four conditions: No lens, a lens with no prism ("control lens"), 6<sup>Δ</sup> base-up, and 10<sup>Δ</sup> base-up. The PRL was evaluated using the MAIA scanning laser microperimeter with no lens, and then with each of the three lenses in a randomized sequence. The PRL was determined in degrees in horizontal and vertical coordinates from the center of the optic disk using a graphical analysis.

Figure 1. Using PowerPoint to measure the PRL relative to the center of the optic disk. Upper left measurement is with no lens; upper right is with 6<sup>Δ</sup> base-up; lower left is with the control lens; lower right is with 10<sup>Δ</sup> base-up. See text for details.



## Results

Our data showed superior movement of the PRL with base-up prism 84.6% of the time, and the 10<sup>Δ</sup> prism had a higher mean movement than the 6<sup>Δ</sup> prism. However, the magnitude of the movement with both prisms was very small compared with the control lens, and compared with the amount of horizontal movement. It is not clear if the magnitude would be clinically significant, capable of providing a functional advantage for patients. If the underlying premise is true, that light is diverted by a prism onto another part of the retina, and the eye does not move toward the apex in compensation, one would expect the amplitude of the movement to closely match the amplitude of the prism. That was clearly not the case in our study. Our results may have been different had we allowed subjects longer adaptation time, or if we fit people with prisms in full time eyewear and evaluated the PRL weeks later.

Subject	No Lens vs Control Lens		6 <sup>Δ</sup> Base-Up Lens vs Control Lens		10 <sup>Δ</sup> Base-Up Lens vs Control Lens	
	Horizontal (Deg.)	Vertical (Deg.)	Horizontal (Deg.)	Vertical (Deg.)	Horizontal (Deg.)	Vertical (Deg.)
1	2.96	-2.88	-0.22	3.21	-1.04	-1.75
2	-2.27	2.58	0.22	2.27	0.85	1.86
3	-2.96	0.36	4.14	-0.19	-1.84	3.59
4	-0.47	0.03	-0.79	3.18	-0.22	3.21
5	-1.56	-0.74	0.85	0.74	0.90	0.49
6	-11.89	0.63	4.60	-0.05	2.63	1.18
8	-0.49	1.51	1.10	1.34	0.63	4.74
9	-0.74	-0.96	1.12	1.86	-0.60	2.93
10	-0.99	-0.52	1.62	1.84	0.96	1.75
11	-1.45	3.07	0.69	0.74	2.25	2.30
12	0.08	0.16	-0.08	0.71	-0.60	2.03
13	-2.88	4.96	-1.62	1.42	0.74	-0.27
14	1.21	3.92	-0.85	0.71	0.69	0.47
Mean	-1.65	0.93	0.83	1.37	0.41	1.73
Prism Power in Degrees	0.00	0.00	0.00	3.43	0.00	5.71

Table 2. Movement in the horizontal and vertical direction for each subject and each lens condition. For horizontal measurements, temporal movement is positive and nasal movement is negative. For vertical measurements, superior movement is positive and inferior movement is negative.

## Discussion

In our study base-up prism appears to shift the PRL in the direction of the prism base, but not nearly as much as the prism deviates light. More study is indicated to evaluate whether such a small shift is clinically or functionally significant.

## References

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