Low Luminance Visual Acuity and Low Luminance Deficit in Proliferative Diabetic Retinopathy

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Aims: This study aimed to determine the relation of best corrected visual acuity (BCVA) and low luminance visual acuity (LLVA) in proliferative diabetic retinopathy (PDR) and following treatment with either aflibercept or panretinal photocoagulation (PRP).

Participants: Patients with Type 1 or 2 diabetes with treatment naïve PDR or active PDR post initial PRP with BCVA of 54 or more Early Diabetic Retinopathy Study (ETDRS) letters with sufficient media clarity were deemed eligible for the study.

Methods: The study was conducted as a post-hoc analysis of the CLARITY trial in which treatment naïve and PRP treated PDR patients were randomised to receive either aflibercept or PRP. BCVA and LLVA were assessed at baseline and at week 52.

Statistical Analysis: Independent t–test or nonparametric Mann Whitney U test was used to compare between groups based on the normality of data. *p* values of <0.05 were considered statistically significant. Spearman Correlation coefficients were reported to show the rank association between BCVA and LLVA in various treatment subgroups reported with 95% CIs.

Main outcome measure: We evaluated the relation between BCVA and LLVA in treatment naïve eyes at baseline. We then analyzed whether there was a difference between BCVA and LLVA outcome following anti-VEGF or PRP at 52 weeks. We also examined whether LLVA and LLD worsened with repeated PRP.

Figure 1: Demographic characteristics of treatment naïve eyes at baseline.

Baseline	Treatment Naïve (n = 110)	Repeated PRP Group (n = 48)
Age Mean ± SD	54.37 (14.56)	57.71 (12.04)
Age categories	N (%)	
30–50 years	50 (45.45%)	11 (22.92)
51–70 years	45 (40.91%)	30 (62.5)
71–80 years	15 (13.64%)	7 (14.58)
Male	67 (60.91%)	34 (70.83)
Female	43 (39.09%)	14 (29.17)
T1DM	55 (50.00%)	21 (43.75)
T2DM	55 (50.00%)	27 (56.25)
Eyes with NVD+/−NVE	36 (32.73%)	19 (39.58%)
Eyes with NVE only	72 (65.45%)	28 (58.33%)
Pseudo-phakic	12 (10.91%)	6 (12.5)
Phakic	98 (89.09%)	42 (87.5)
Mean best corrected visual acuity (BCVA) (SD)	82.94 (SD 7.59)	81.48 (7.65)
Median BCVA (IQR)	84 (80–88)	82 (77–86.75)
Mean low luminance visual acuity (LLVA) (SD)	71.15 (SD 9.94)	67.88 (7.52)
Median LLVA (IQR)	73 (66–78)	68 (64.25–73)
Mean low luminance deficit (LLD) (SD)	11.79 (SD 6.08)	13.60(5.51)
Median LLD (IQR)	11 (7–15)	14 (10–16.75)
LLD 1–5 letters	13 (11.81)	3(6.25%)
LLD 6–10 letters	38 (34.55%)	11(22.92%)
LLD 11–14 letters	30 (27.27%)	12(25.00%)
LLD 15–19 letters	21 (19.09%)	17(35.42%)
LLD 20 or more letters	8 (7.27%)	5(10.42%)
Proportion > mean + 2SD	2 (1.82%)	2(4.17%)

Figure 2: The relation between BCVA and LLVA in treatment naïve proliferative diabetic retinopathy (PDR) eyes.

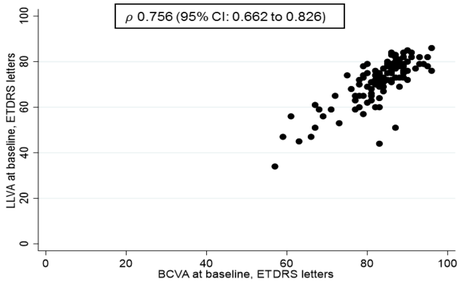
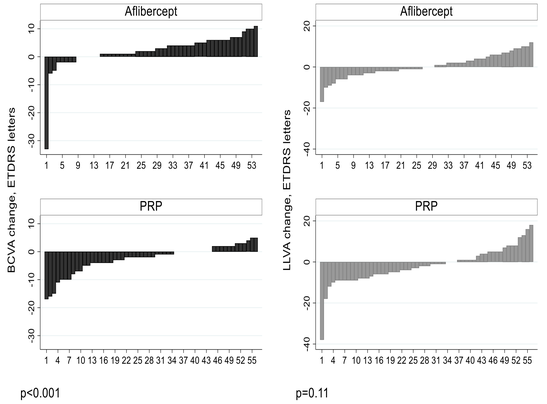
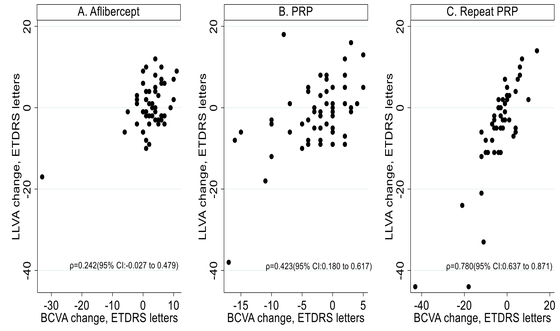


Figure 3: The individual patient-level response to treatment with aflibercept and PRP in treatment-naïve eyes at 52 weeks.



p<0.001 p=0.11

Figure 4:Correlation between mean change in BCVA and LLVA in the three treatment groups



Results:

- BCVA and LLVA correlate well in treatment naïve PDR with an average low luminance deficit of 11.79 ETDRS letters. However, LLVA at lower levels of BCVA showed more variance.
- Post aflibercept therapy, the mean change in BCVA and LLVA at 52 weeks after aflibercept was +2.1 (SD 6.05) letters and +0.39 (SD 5.6) letters, respectively. Similarly, after PRP, it was -2.5 (SD 4.9) letters and -1.9 (SD 8.7) letters respectively. When compared between treatment arms, BCVA change was found to be statistically significant (P<0.001) whereas LLVA was not (p=0.11).
- There was a statistically significant correlation between change in BCVA and change in LLVA in treatment naïve eyes receiving PRP and eyes that had repeat PRP (p = 0.001, p < 0.001 for treatment naïve and repeat PRP eyes). The Spearman correlation coefficient for aflibercept eyes was not statistically significant (p = 0.073).

Conclusions:

These findings show that LLVA does not respond as well as BCVA does following any treatment for PDR, even though BCVA and LLVA both test foveal function.

References:

Sivaprasad, et al. Clinical efficacy of intravitreal aflibercept versus panretinal photocoagulation for best corrected visual acuity in patients with proliferative diabetic retinopathy at 52 weeks (CLARITY): a multicentre, single-blinded, randomised, controlled, phase 2b, non-inferiority trial. *Lancet* **2017**, *389*, 2193–2203.

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