**Supplementary Information**

**A smartphone-based tool for rapid, portable, and automated wide-field retinal imaging**

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**Supplementary Table S1:**

**Assessment of Diabetic Retinopathy Severity Agreement between Graders**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Grader 2 | | | | |  |
| Grader 1 | *None* | *Mild NPDR* | *Moderate NPDR* | *Severe NPDR* | *PDR* | *Weighted Kappa (95% CI)* |
| None | 4 | 11 | 2 | 1 | 1 | **0.66** (0.57, 0.74) |
| Mild NPDR | 0 | 4 | 6 | 1 | 0 |
| Moderate NPDR | 0 | 4 | 14 | 0 | 1 |
| Severe NPDR | 0 | 0 | 16 | 9 | 6 |
| PDR | 0 | 0 | 0 | 3 | 36 |

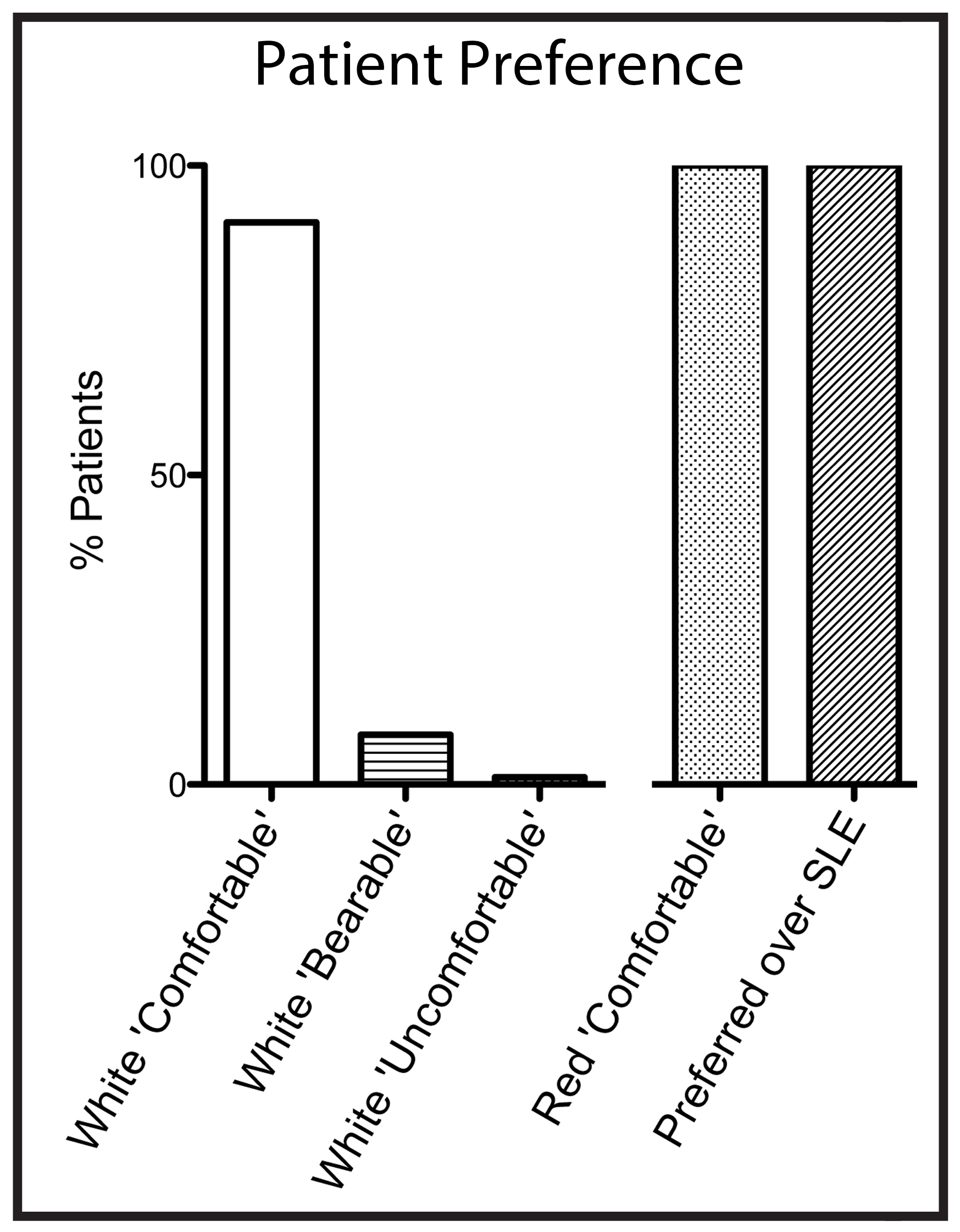
NPDR = non-proliferative diabetic retinopathy; PDR = proliferative diabetic retinopathy

**Supplementary Table S2:**

**Grader Assessments of Macular Edema of CellScope Retina Images versus Clinical Fundus Exam**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Gold Standard Clinical Diagnosis | |
| Grader Diagnosis | | | CSDME | No CSDME | Sensitivity (95% CI) | Specificity (95% CI) |
| **Grader 1** | | |  |  |  |  |
| CSDME | | | 5 | 2 | **29.4** (10.3, 56.0) | **98.0** (92.3, 99.8) |
| No CSDME | | | 12 | 97 |
| **Grader 2** | | |  |  |  |  |
| CSDME | | | 11 | 16 | **68.8** (41.3, 89.0) | **83.3** (74.4, 90.2) |
| No CSDME | | | 5 | 80 |

CSDME = Clinically significant edema

**Supplementary Figure S1:**

**Continuous red illumination with white flash is comfortable for patients.** Red illumination is used for focusing and alignment on the retina with white flash for image capture. Of surveyed patients, 90.8% reported white flash with CellScope Retina was ‘comfortable’ throughout examination (N=79/87), 8.0% reported white flash was ‘bearable’ (N=7/87), and 1.1% reported white flash was ‘uncomfortable’ (N=1/87). 100% of patients reported continuous red illumination with CellScope Retina was ‘comfortable’ for the duration of examination (N=87/87). 100% of surveyed patients that also underwent slit-lamp examination reported that illumination from CellScope Retina was more comfortable than illumination from the slit-lamp (N=72/72).

**Supplementary Movie S1, Caption:**

**CellScope Retina imaging sequence viewed from the patient perspective**. The red illumination annulus (center) is focused onto the peripheral cornea. With a properly positioned eye, the annulus is defocused to evenly illuminate the retina. The magnetically-attached fixation display can be switched to either side of the instrument. An image-capture sequence cycles a 2mm diameter green fixation dot through different positions, orienting the patient’s gaze to allow sequential imaging of the central, inferior, superior, nasal, and temporal retinal fields. Illumination for focusing is deep red (655nm) and images are acquired using white flash. Five 50-degree fields are captured and then computationally merged to create an approximately 100-degree montage of the retina.