Circular contrast perimetry via a web application: a patient appraisal and validation study

Joshua Meyerov, Linda Deng, Deus Bigirimana, Simon E Skalicky

THE UNIVERSITY OF MELBOURNE · Microsoft · eyeonic

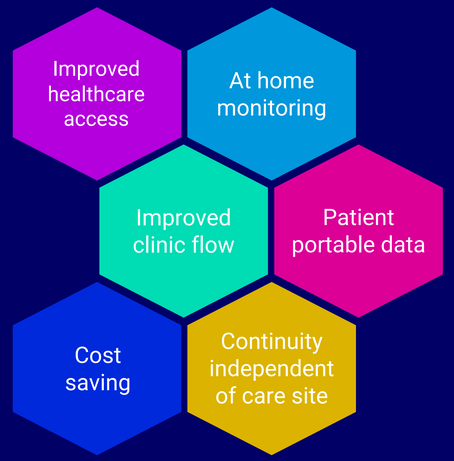
Introduction

Perimetry can be performed on any personal computer, via a web application.

Online perimetry offers advantages over standard perimetry

Can it be made more enjoyable?

How does it compare to standard automated perimetry (SAP)?



Eyeonic Online Circular Contrast Perimetry (OCCP)

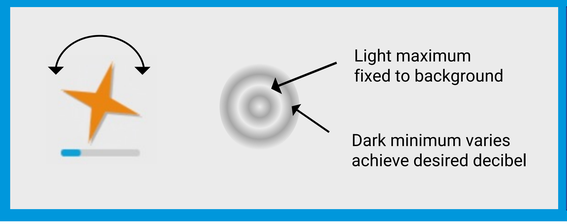
A
Fixation target
- Spinning gold star
- Progress bar underneath

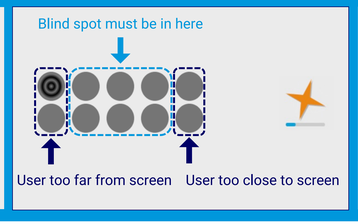
B
Flickering test target
- appears for 360 msec
- Over 3 x pos/neg cycles

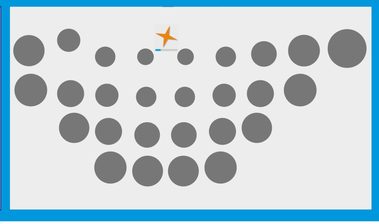
C
Blind spot localisation
- Optimise viewing distance
- Count fixation loss

D
Moving fixation
1. Star at top; inferior hemifield tested
2. Star moves to screen bottom
3. Then superior hemifield tested

E
User monitoring
- Webcam monitors user
- AI face detection (not recognition)









Methods

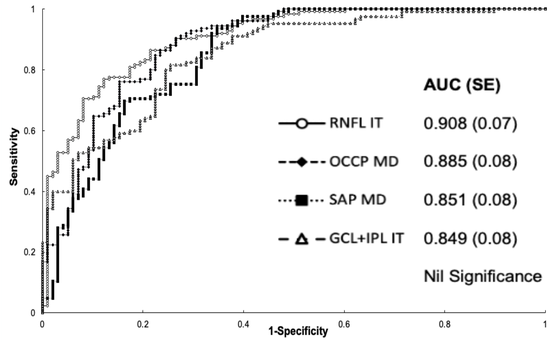
Cohort
98 glaucoma, 135 controls;
One eye randomly included

Tests
Standard automated perimetry (SAP), online circular contrast perimetry (OCCP), OCT RNFL and GCC

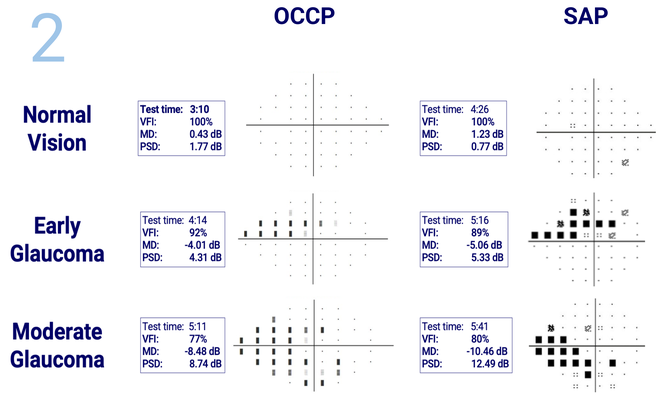
Questionnaires
2x 10-item surveys: user satisfaction of SAP vs OCCP

Results

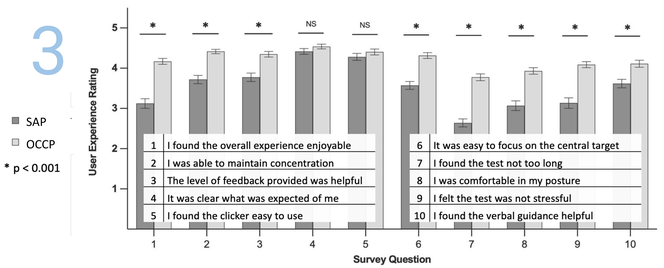
1



2



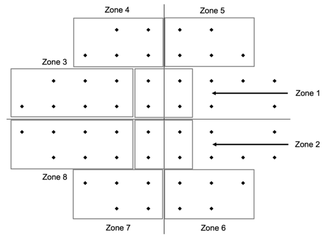
3



4

	ICC	P value	Pearson's correlation (linear regression)	P value	Bias (95% LoA) (dB)*
MD	0.89	<0.0001	0.90 (0.8)	<0.0001	0.51 (-4.20, 5.22)
PSD	0.76	<0.0001	0.87 (0.51)	<0.0001	0.005 (-3.81, 3.82)
Zone analysis					
Zone 1	0.87	0.001	0.99 (0.83)	<0.0005	0.55 (0.17, 0.94)
Zone 2	0.98	<0.001	0.99 (0.99)	<0.001	0.20 (-0.08, 0.48)
Zone 3	0.97	<0.001	0.99 (1.06)	<0.0001	-0.38 (-1.02, 0.26)
Zone 4	0.94	<0.001	0.92 (0.92)	0.025	0.02 (-0.89, 0.94)
Zone 5	0.93	<0.001	0.97 (0.71)	<0.001	0.18 (-0.78, 1.13)
Zone 6	0.85	0.02	0.90 (0.60)	0.035	0.11 (-0.68, 0.90)
Zone 7	0.91	0.004	0.93 (0.84)	0.022	-0.22 (-0.91, 0.47)
Zone 8	0.97	<0.001	0.97 (0.94)	<0.0005	-0.24 (-1.28, 0.79)

*Calculated on Bland-Altman plots. ICC = Intraclass correlation coefficient; MD = mean deviation; PSD = pattern standard deviation; LoA = limits of agreement



1 Glaucoma Diagnostic Accuracy
OCCP MD had similar AUC to:
- SAP: MD
- OCT: RNFL
- OCT: GCC+IPL Inferior thickness (IT)

2 Similar pattern: OCCP v SAP
- Similar VFI, MD, PSD, field loss pattern
- OCCP has shorter test time than SAP

3 User Experience Rating
- 8/10 items: preference towards OCCP
- 82% users preferred OCCP to SAP

4 MD, PSD, Zone-based agreement
Excellent agreement OCCP and SAP
- MD, PSD, zones 1-8

Conclusions

Users prefer OCCP to SAP

OCCP has similar perimetric metrics to SAP

OCCP has similar diagnostic metrics to SAP, OCT GCC, OCT RNFL

Online perimetry on personal computers is possible, with many benefits

Simon Skalicky is a director of Eyeonic Pty Ltd
Contact: seskalicky@eyeonic.com.au