Validation and Application of a Novel 24-2 Rapid Protocol of Melbourne Rapid Fields AI enabled online Perimeter on Glaucoma Screening

George Kong FRANZCO, PhD[1, 2], Kae Sugihara, MD[3], Bibhuti Thapa MD[4], Mitsuto Hosokawa, MD, PhD[3], Toshio Okanouchi, MD, PhD[3], Suman Thapa MBBS, MS, PhD[4], Algis J. Vingrys, PhD[3,5]

Consultant Ophthalmologist, Glaucoma specialist

1 Department of Ophthalmology, Kurashiki Medical Center, Kurashiki, Okayama, Japan
2 Royal Victorian Eye and Ear Hospital, East Melbourne, Australia
3 Centre of Eye Research Australia, Department of Ophthalmology, The University of Melbourne, East Melbourne, Australia
4 Nepal Eye Hospital, Kathmandu, Nepal.
5 Department of Optometry and Vision Sciences, The University of Melbourne, East Melbourne, Australia

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Disclosure

- Consultancy
  - Allergan/Abbvie, Alcon, Glaukos
- Provisional Patent for online based perimetry with webcam analysis of testing conditions
- Director for GLANCE Optical Pty Ltd. Makers of Melbourne Rapid Fields software

In partnership with

the royal victorian eye and ear hospital

THE UNIVERSITY OF MELBOURNE

Melbourne Rapid Fields is registered as a Class 1 Medical device (perimeter) with:
TGA (Australia), CEMark (Europe), MHRA (UK)

MT WAVERLEY Eye Surgeons

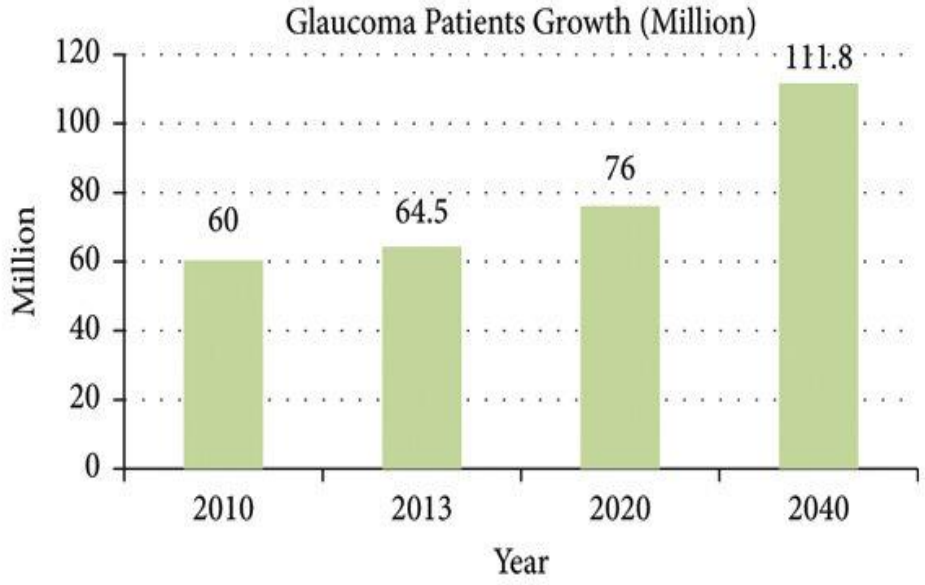
ORIA ADVANCING EYE RESEARCH

Glance Optical Pty.Ltd.

The Problem (Glaucoma)

- Glaucoma is a disease that causes irreversible progressive loss of peripheral vision.
- Glaucoma affects 80 million people globally, with 300,000 affected in Australia alone. This figure is expected to increase by 47% by 2040.
- It is estimated that the direct & indirect cost of glaucoma is $4.3 billion/yr in Australia.
- 50% of glaucoma remain undiagnosed.

Dirani M., Crowston J.G., Taylor P.S. et al., Economic impact of primary open-angle glaucoma in Australia. Clin Exp Ophthalmol. 2011 Oct;39(7):623–32.

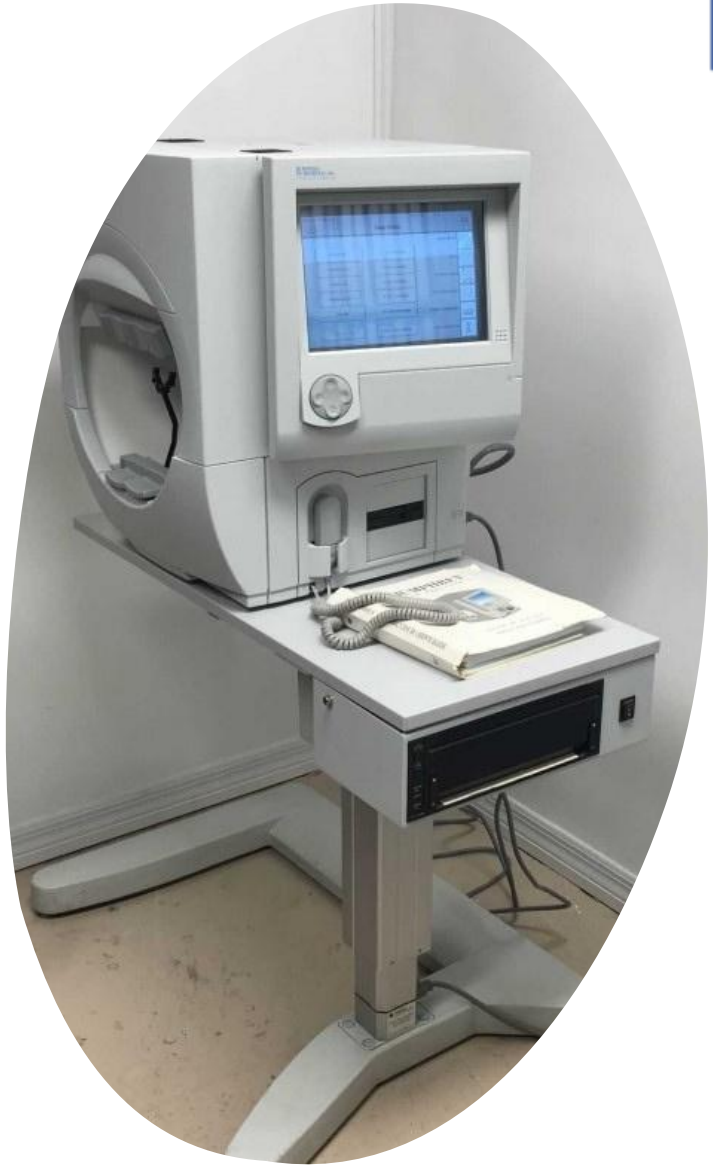


Global projection of glaucoma prevalence

Tham, et al. Ophthalmology 2014

Standard Visual Field Technology Limitations

- Bulky - Large footprint
- Traditional algorithms are slow.
  Not scalable to meet clinic demands.
- Expensive to purchase and maintain
- No telehealth function
- Not easily portable
- Requires trained personnel to perform



The technology

Melbourne Rapid Fields MRF

Online AI-enabled visual field testing platform for diagnosis & management of glaucoma & other eye diseases

Device Independent

Visual field test with web-browser on any digital device.

Easily deployed in across multiple centers (scalable).

Glaucoma home-monitoring.

Comprehensive

Comprehensive **White-on-white** visual field test protocols for glaucoma & eye diseases. Threshold 24-2, 10-2, 30-2, binocular & screening.

AI-Enabled

Testing optimized with Patented intelligent webcam for reliable results.

AI-assisted design of algorithm to allow fast testing and consistency of results.

Validated & Commercialised

22 publications & 7 independent studies.

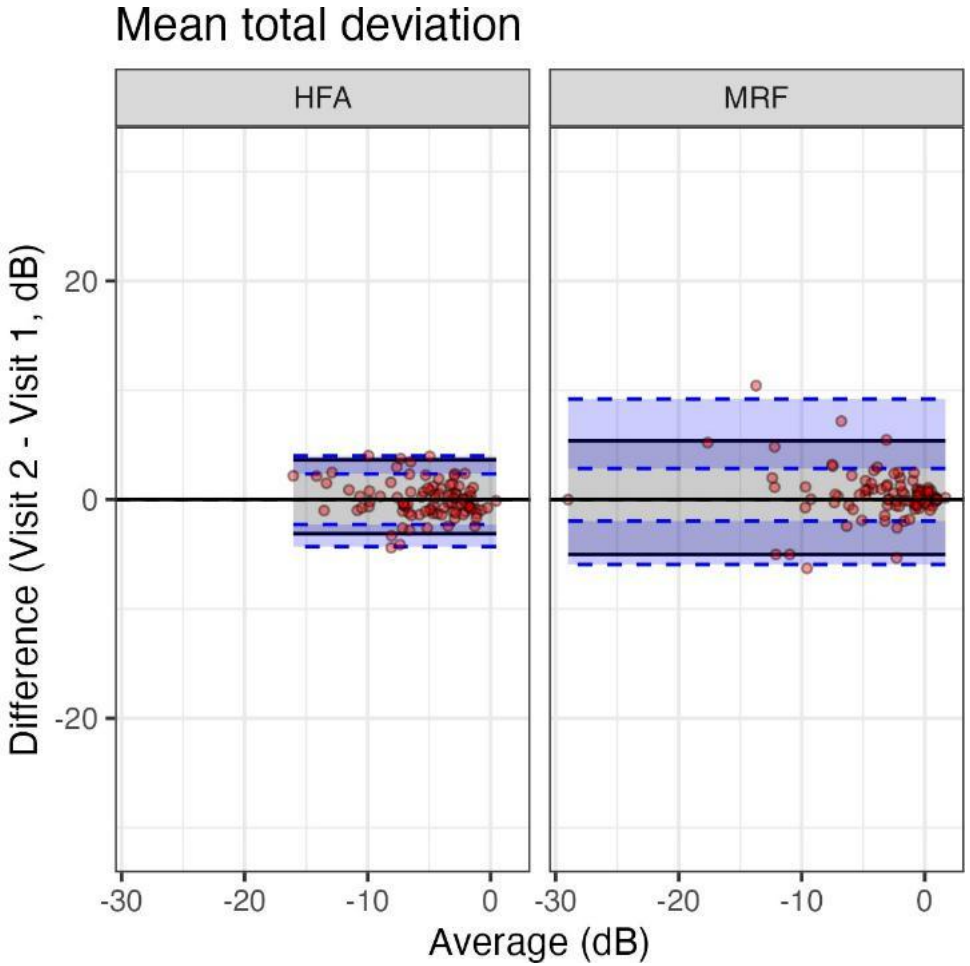
100,000+ tests done to date.

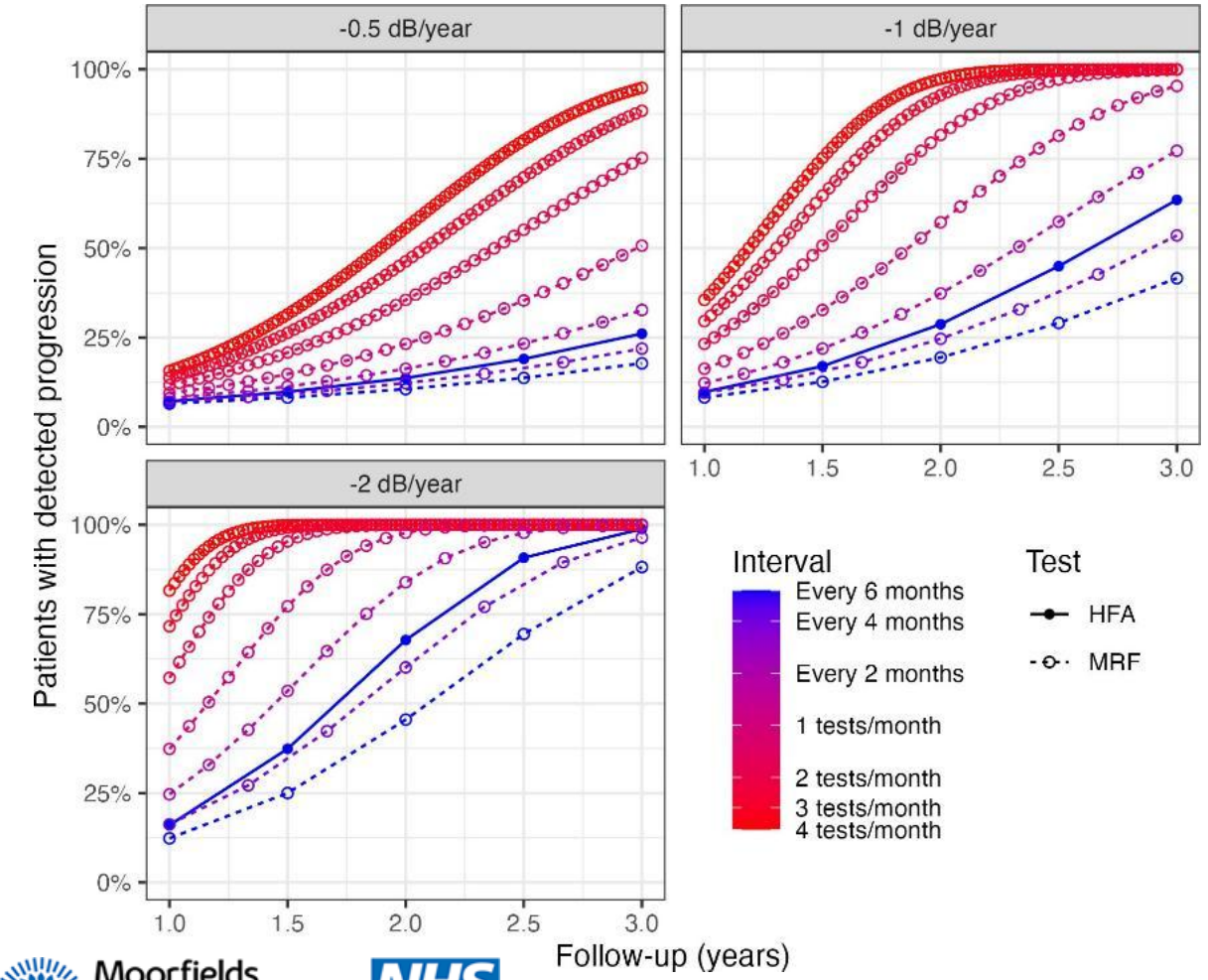
Used by 500+ clinics globally

TGA, MedSafe, CE Mark, MHRA, CDSCO, ANVISA

VALIDATION STUDIES

Home Monitoring of Glaucoma showed 2 monthly home-based test detect progression faster than 6 monthly clinic test





Montesano et al. British Journal of Ophthalmology 2026

Moorfields Eye Hospital NHS Foundation Trust

NHS

n=100 of LiGHT study trial patients

Vision System - Google Chrome

iondata.net.au/mrfweb/mrf.cfm

ame: John Smith
nique ID: ID00001
ge: 64

Melbourne Rapid Fields (MRF) - Vision System

pice guidance language: English Fixation Target: Normal **Reminder: Please ensure screen brightness is set to maximum**

ration | Visual Field 24-2 | 10-2 | 30-2 | Screening | 24-2 Rapid | 24-2N | Binocular | Visual acuity VA | Low contrast VA | Noise VA | Save

Calibration

Show instructions

Calibration not done

Start Calibration

You should repeat this calibration step if you are using a different computer screen to perform the test.

Specify whether your screen is Flat or Curved:

Flat screen (Standard)

ebcam Viewing Distance Estimation

his analysis will begin once reference distance has been set.
he webcam analysis uses machine learning computer vision to ensure **optimal viewing distance and testing onditions** during vision assessments. This analysis is performed entirely locally, with no image data being ansferred online, ensuring privacy and security.

Webcam: Detected
Please place face 33 cm from the screen then click the Reset Reference button below

Reset Reference

Viewing Distance is 54.5 cm (move closer)
Covered eye: _____

Background level: Okay

Next Section

Validation Study design

Aims

- Standard MRF 24-2 was found to be 1 minute faster than SITA-Standard but take longer than HFA-SITA-Faster Tiang et al. 2025.

- Developed MRF 24-2 Rapid protocol (MRFr) aimed at increases testing speed by **eliminating false negative trials, faster fixation change**.
- Test performance compared with SITA-Standard (HFA-SS) and SITA-Faster (HFA-SFr)

Method

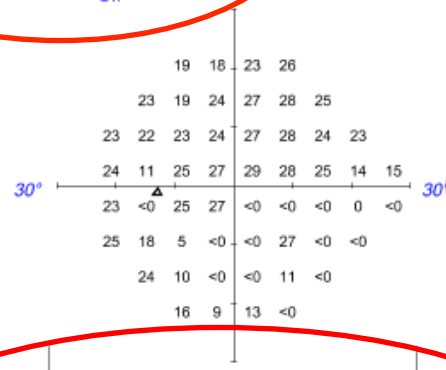
- 223 patients enrolled. 92 patients had MRFr vs HFA-SS, 131 patients had MRFr vs HFA-SFr
- All patients underwent 2 assessments with MRFr to establish test-retest reliability.
- Standard darken testing environment, near vision correction.
- Exclusion criteria:
  - Visual acuity worse than 6/12 (20/40).
  - Intraocular surgery in the past 6-months.

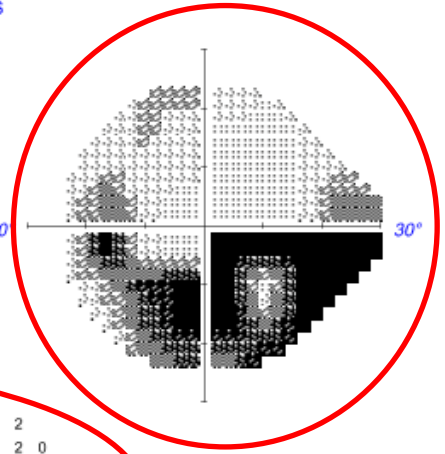
Example

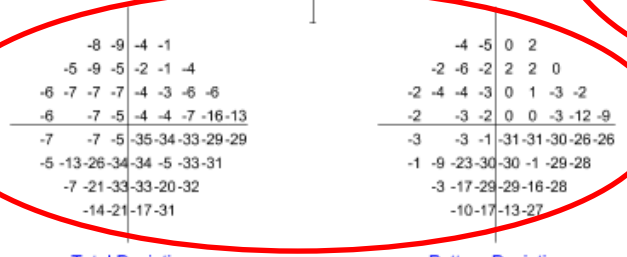
HFA SITA-Faster

OS Single Field Analysis — Central 24-2 Threshold Test

Fixation Monitor:	Gaze/Blind Spot	Stimulus:	III, White
Fixation Target:	Central	Background:	31.5 asb
Fixation Losses:	2/12	Strategy:	SITA Faster
False POS Errors:	3%	Pupil Diameter:	
False NEG Errors:	Off	Visual Acuity:	
Test Duration:	04:19	Rx:	+2.25 DS
Fovea:	Off		







Total Deviation

Pattern Deviation

GHT: Outside Normal Limits

VFI: 65%
MD24-2: -15.10 dB P < 0.5%
PSD24-2: 12.91 dB P < 0.5%

:: P < 5%
P < 2%
P < 1%
P < 0.5%

Comments

Signature

ZEISS

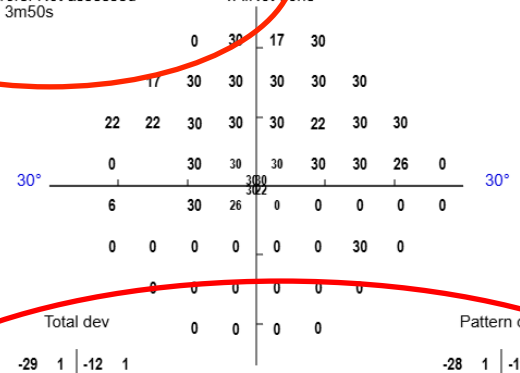
MRF 24-2 Rapid

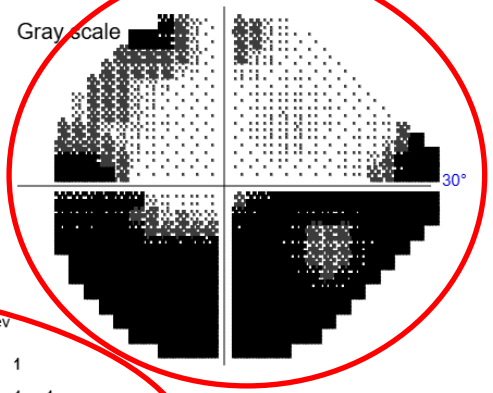
Single Field Analysis - MRF

L

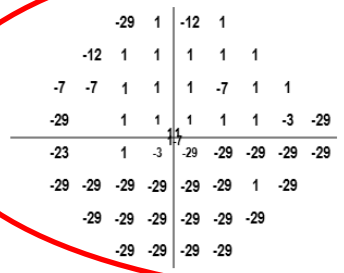
Central 24-2 Rapid Grid Threshold Test

Fixation Monitor: Blind Spot	Stimulus: Scaled WHITE
Fixation Target: Central+Corners	Device: PC at 50cm
Fixation Losses: 5/12 (41%)	Strategy: Neighbourhood ZEST
False POS Errors: 0/12 (0%)	F/T:28.00
False NEG Errors: Not assessed	VA:Not done
Test Duration: 3m50s	

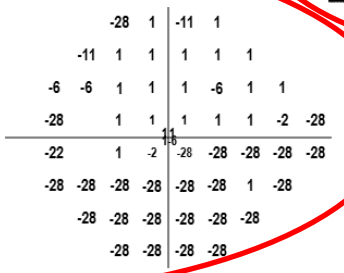


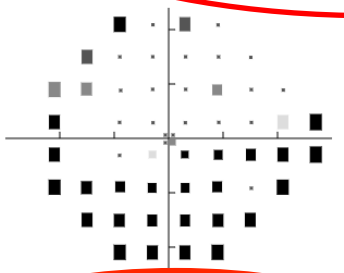


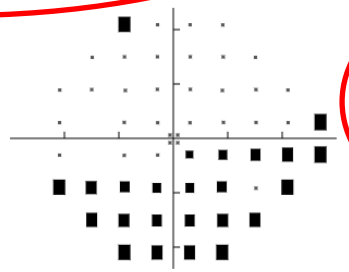
Total dev



Pattern dev







Abnormal
VC: 53.80%

MD: -16.20
PD: 14.00

Mt Waverley Eye Surgeons
Tel: (03) 8080 1082

Notes:

Results

Table 1. Demographics of Patients Included in the Analysis

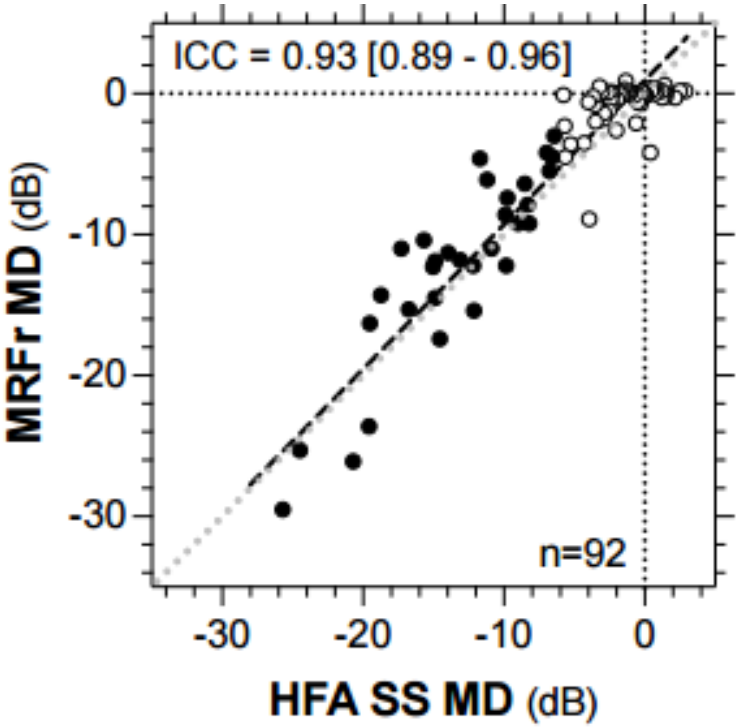
	Total	HFA SS	HFA SFR	P
Eyes (n)	223	92	131	
Age (mean ± SD) (years) (range)	64.6±13.2 (21, 99)	63.4±11.8 (34, 85)	65.4±14.1 (21, 99)	0.185[a]
Sex(Female/Male) (n)	162/97	57/35	69/62	0.174[b]
Test eye (Right /Left) (n)	191/32	60/32	131/0	<0.001[b]
MD (mean ± SD) (dB) (range)	-5.73±6.76 (-30.61, 2.91)	-5.35±6.66 (-25.71, 2.91)	-6.00±6.85 (-30.61, 1.35)	0.169[a]
PSD (mean ± SD) (dB) (range)	5.52±4.19 (1.02, 15.50)	6.19±4.64 (1.15, 15.50)	5.04±3.79 (1.02, 14.06)	0.197[a]
Glaucoma stage(n) Preperimetric to mild(MD>-6dB) Moderate (-12dB≤MD≤-6dB) Advanced (MD<-12dB)	 152 (68%) 32 (14%) 39 (18%)	 61 14 17	 91 18 22	0.883[c]
Glaucoma type (n) NTG/POAG/PEXG/PACG/Suspect/OHT/ CG/Normal/PAC/Pigmentary Glaucoma	 56/103/3/22/20/7/ 1/8/1/1	 38/24/3/4/13/3/ 0/6/0/0	 18/79/0/18/7/4/ 1/2/1/1	<0.001[c]

Results

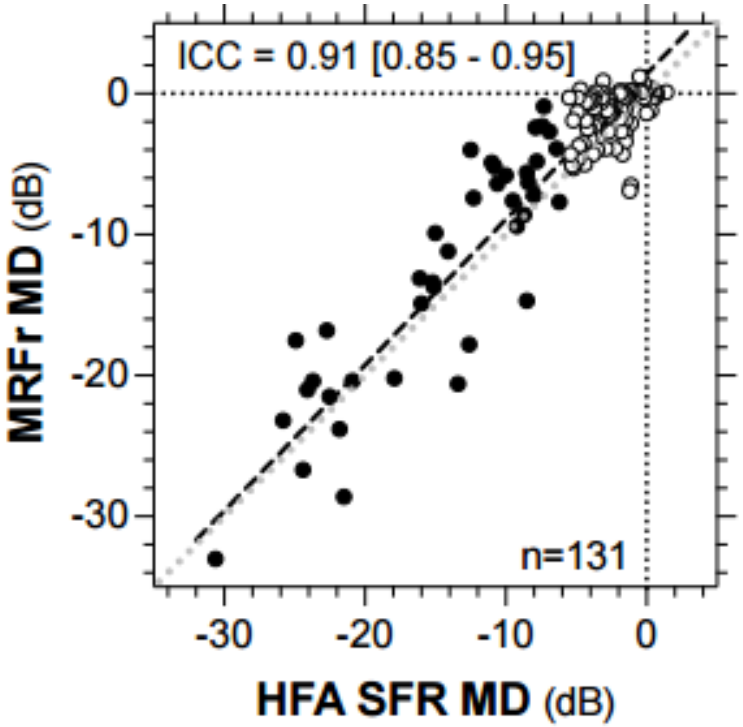
MRF 24-2 Rapid has strong concordance with HFA SITA-Standard and SITA-Faster

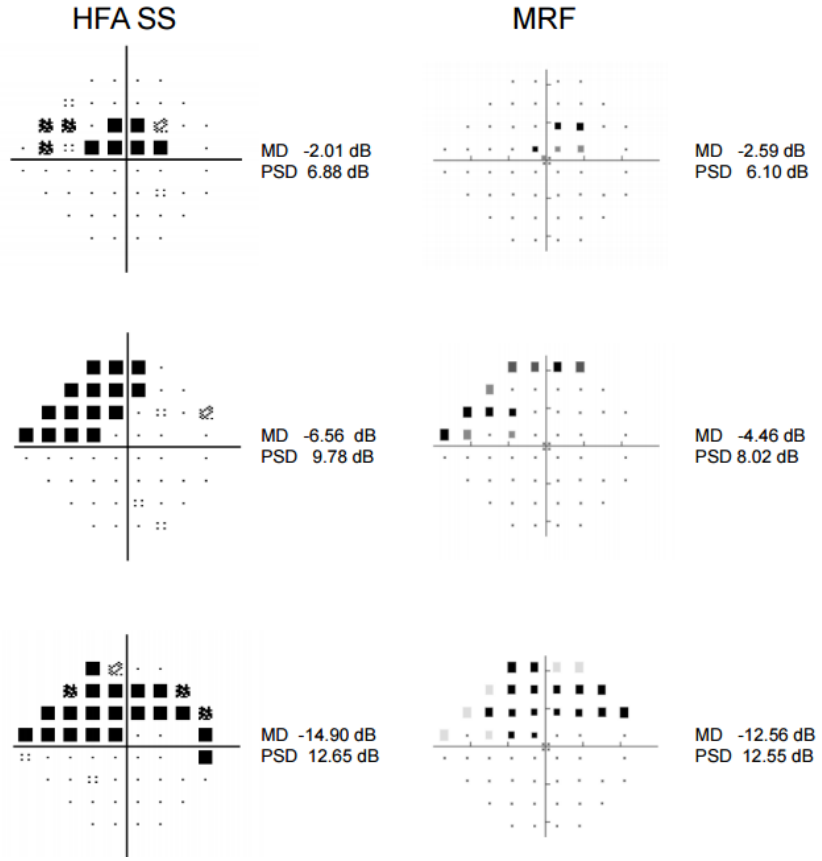
MD Correlation

MRFr vs HFA-SS



MRFr vs HFA-SFR



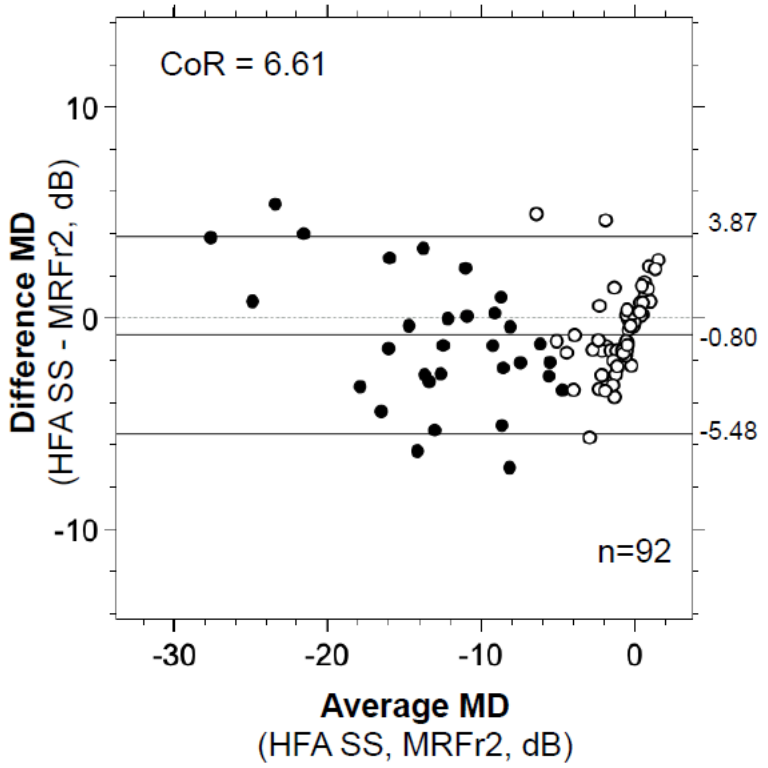


Results

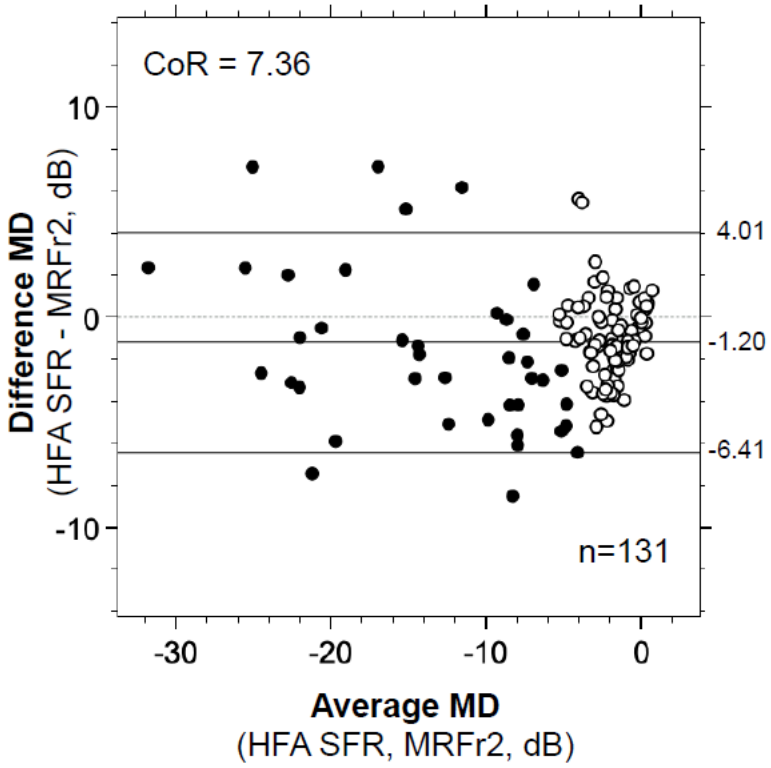
MRF 24-2 Rapid has strong concordance with HFA SITA-Standard and SITA-Faster

MD Bland-Altman Analysis

MRFr vs HFA-SS



MRFr vs HFA-SFR

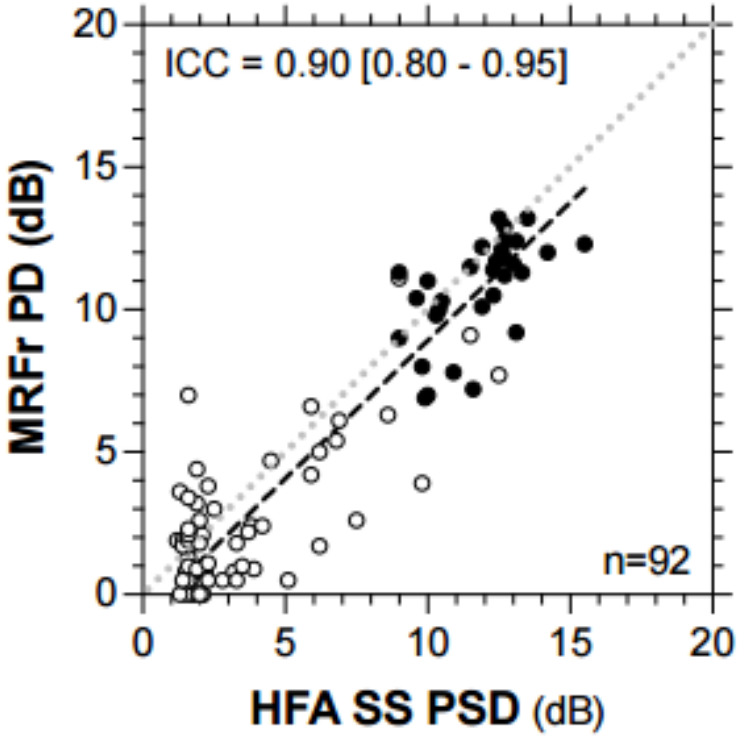


Results

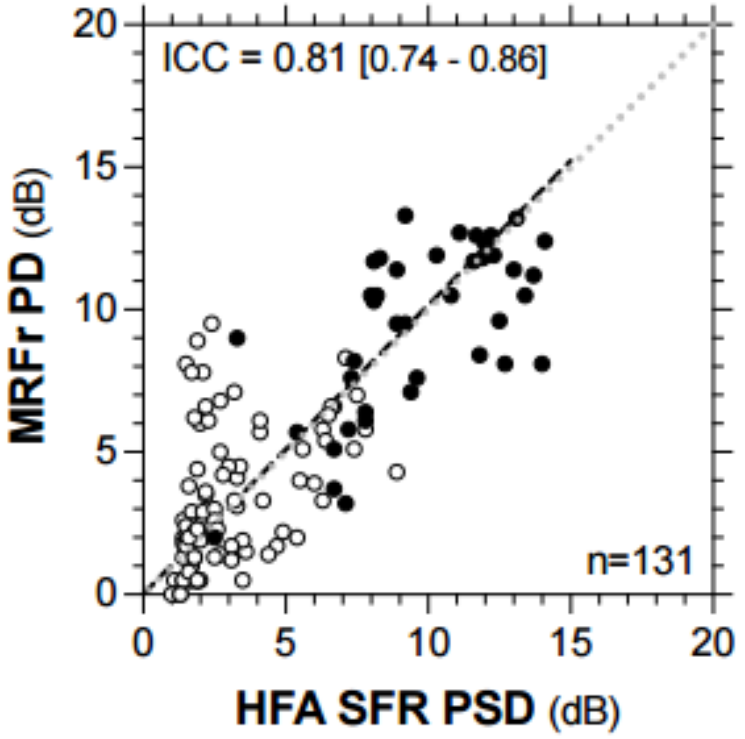
MRF 24-2 Rapid has strong concordance with HFA SITA-Standard and SITA-Faster

PSD Correlation

MRFr vs HFA-SS

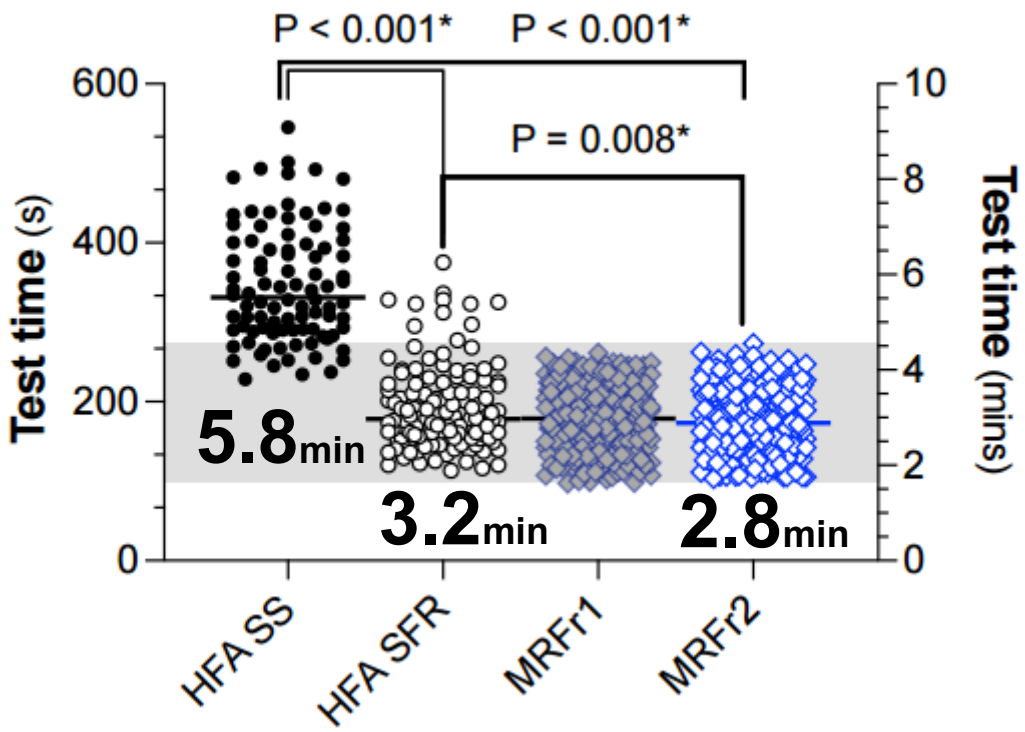


MRFr vs HFA-SFR



Results

MRF 24-2 Rapid is 50% faster than HFA SITA-Standard and marginally faster than SITA-Faster



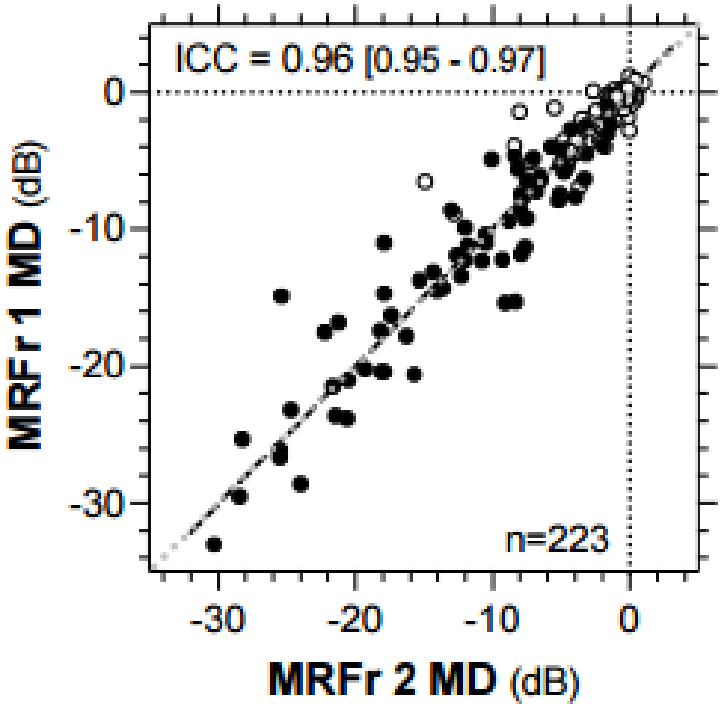
MRF 24-2 Rapid has less false positive errors and less fixation loss than HFA-SFr

	HFA SS vs MRFr (n=92)			HFA SFR vs MRFr (n=131)		
	HFA SS	MRFr	P value	HFA SFR	MRFr	P value
False Positive Rate (mean ± SD) (%) (range)	2.6 ± 4.0 (0, 25)	2.8 ± 5.5 (0, 25)	0.327[d]	7.1 ± 9.4 (0, 42)	4.1 ± 6.8 (0, 50)	0.002[d] *
Fixation Loss Rate (mean ± SD) (%) (range)	7.3 ± 10.1 (0, 53)	3.9 ± 7.4 (0, 25)	**0.029 [a]***	17.3 ± 21.5 (0, 100)	7.9 ± 13.1 (0, 75)	<0.001 [d]*

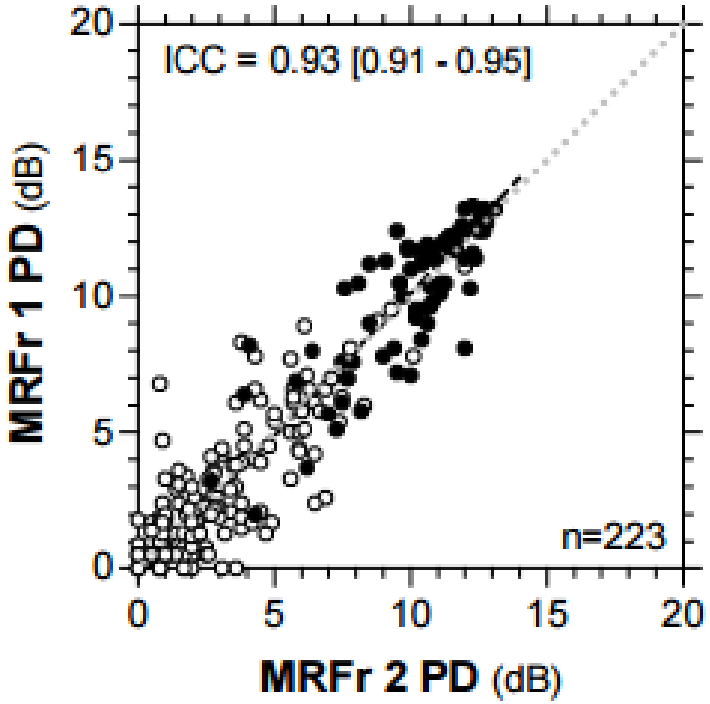
Results

MRF 24-2 Rapid has very good test-retest reliability

Mean Deviation (test 1 vs test 2)



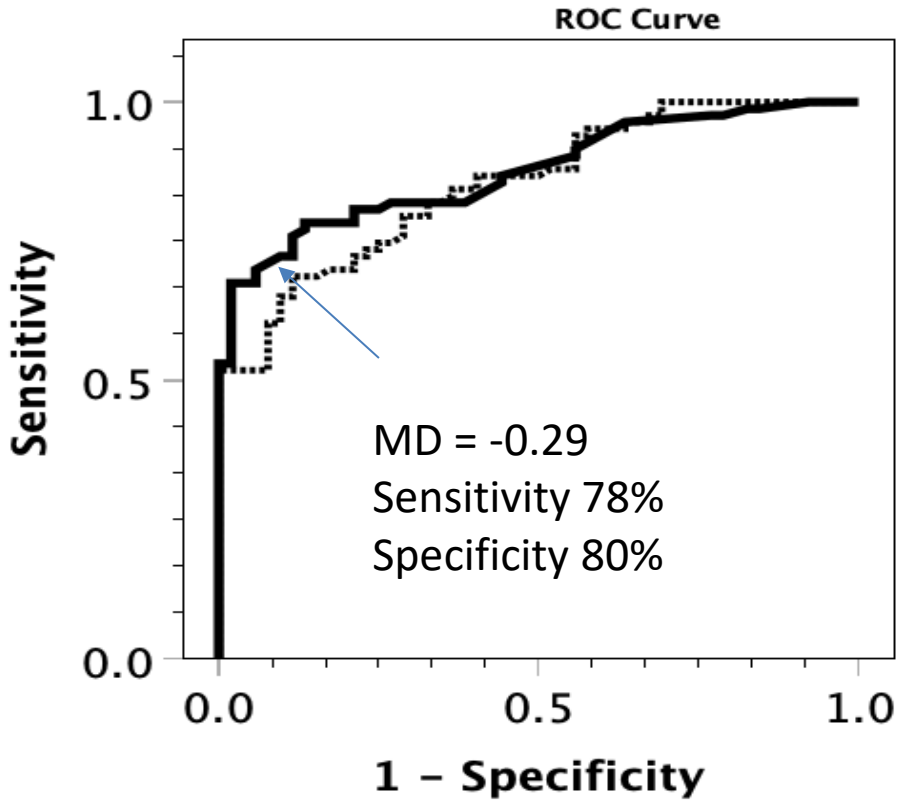
Pattern Deviation (test 1 vs test 2)



Results

Diagnostic Capacity

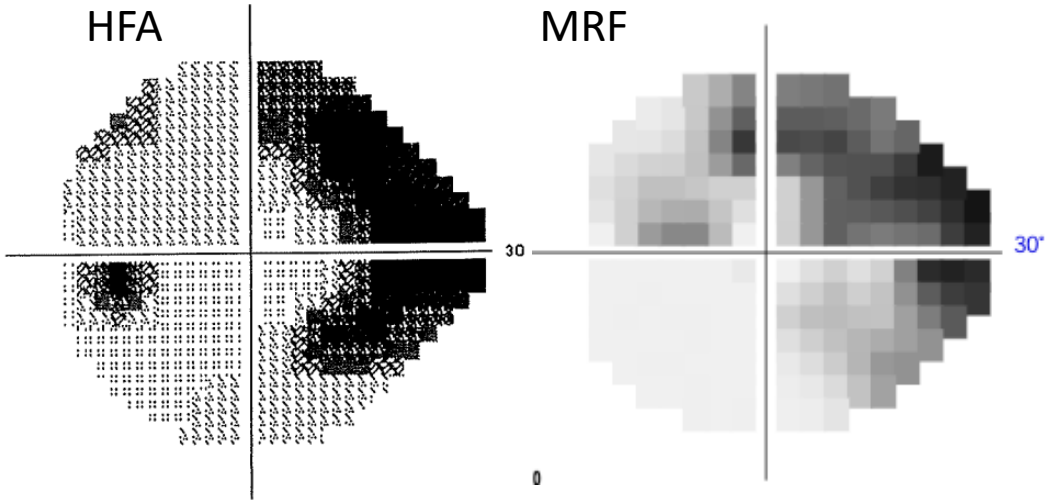
MRF 24-2 Rapid had slightly higher AUC for Receiver-Operator-Curve compared to HFA-SITA Standard

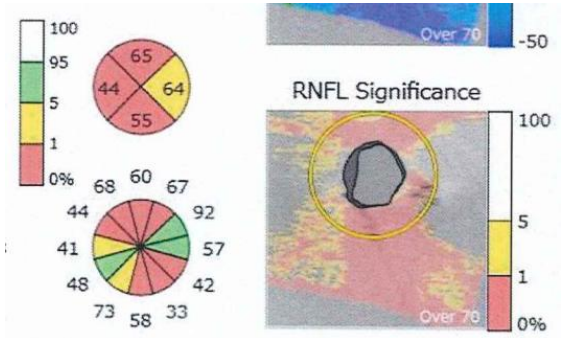


Source of the Curve
HFA MD
MRF1MD

AUC
HFA = 0.853
MRF = 0.876

Example





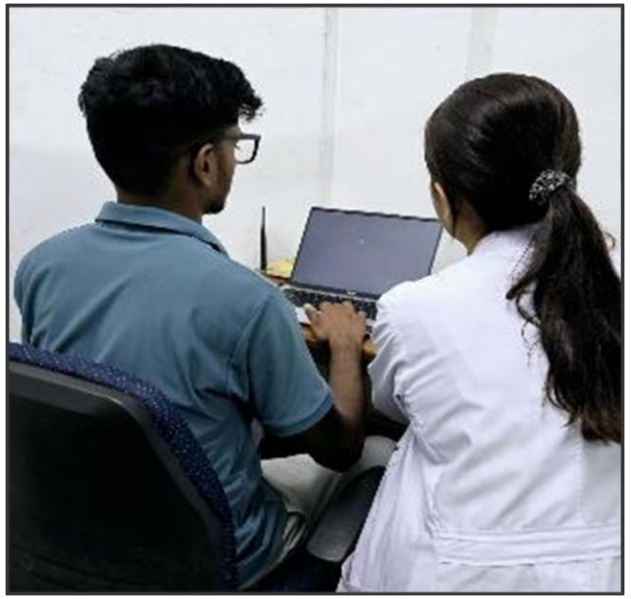
Nepal Study

Aims

- Application of MRF 24-2 Rapid in Nepal Eye Hospital General Clinic

Method

- 209 patients (418 eyes) enrolled over 6 weeks.
- All patients underwent assessments with MRFr.
- Subsequent clinical diagnosis with optic nerve assessment, IOP measurement, HFA test to confirm diagnosis.
- Standard darken testing environment, near vision correction.
- Exclusion criteria:
  - Visual acuity worse than 6/12 (20/40).
  - Intraocular surgery in the past 6-months.



Nepal Eye Hospital, Kathmandu

Results

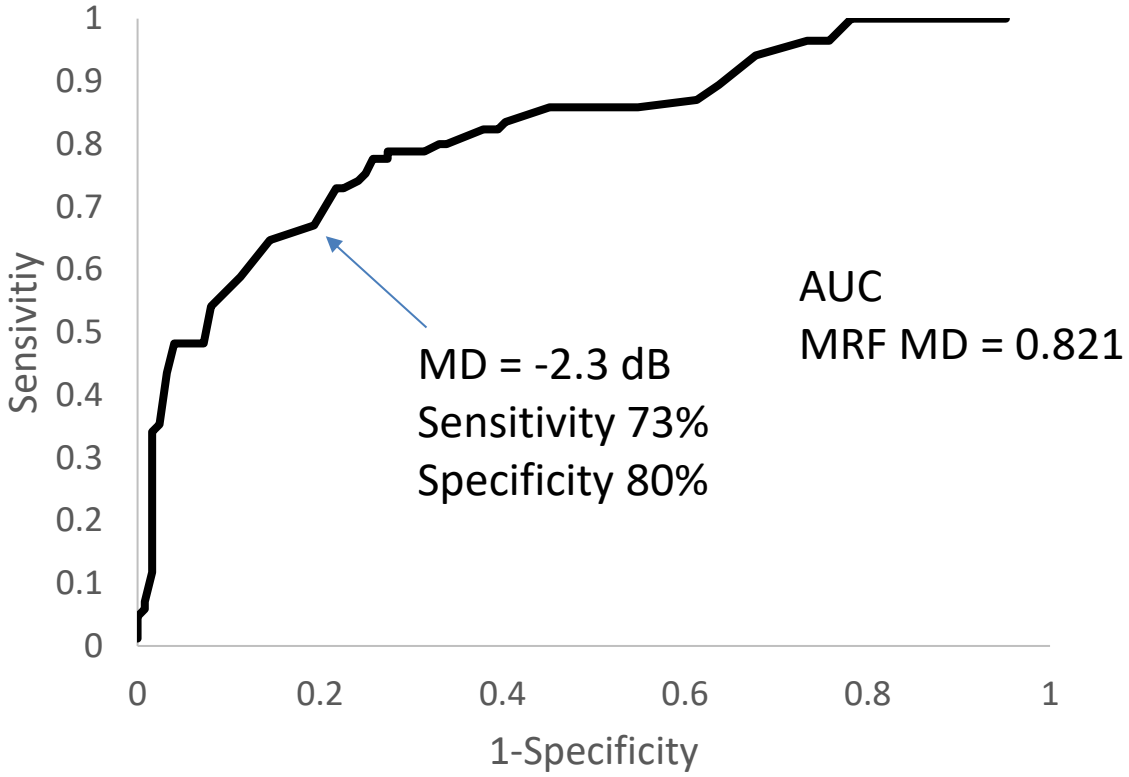
Table 2. Demographics of Patients Included in the Analysis

	Number
Patients (n)	209
Age (mean ± SD) (years) (range)	48.1±15.4 (15, 84)
Normal or Glaucoma Suspect	124
POAG	65
PACG	20
Glaucoma Severity	
Normal or Glaucoma Suspect	244 (58%)
Mild (MD>-6dB)	128 (31%)
Moderate (-12dB≤MD≤-6dB)	24 (5.7%)
Advanced (MD<-12dB)	18 (4.3%)
Eyes (n)	418

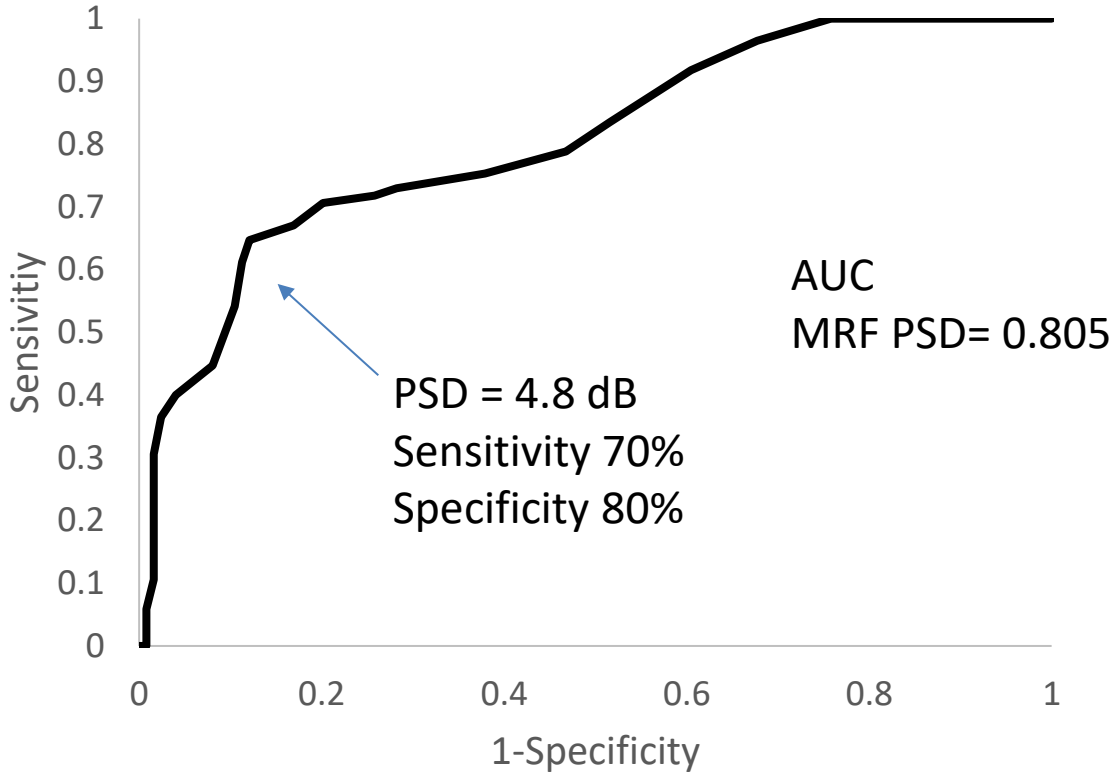
Results Diagnostic Capability

MRF 24-2 Rapid in Nepal population shows fair level of diagnostic capability
Threshold to achieve 80% specificity was at -2.3 dB for MD and +4.8dB for PSD, this may reflect higher proportion of patients with untreated cataracts
100% of moderate / advanced glaucoma patients detected.

Mean Deviation MD



Pattern Deviation PSD



Future application for Glaucoma Screening

Combining Structural Imaging and MRF (if OCT +ve) can lead to better diagnostic ability for glaucoma screening

	Prevalence	MRF		OCT		OCT + MRFr	
		PPV	NPV	PPV	NPV	PPV	NPV
Low	1.10%	4.1%	99.7%	3.6%	100%	**6.5%**	99.8%
Medium	3.40%	12.1%	99.0%	10.7%	99.9%	**18.0%**	99.3%
High	7.00%	22.7%	99.8%	20.3%	99.8%	**31.9%**	98.6%

OCT Sensitivity = 97.6% Specificity = 71.2%
Low = e.g. Rotterdam Study (Netherlands), Dielemans et al Ophthalmology 1994.
Medium = e.g. Singapore Malay Eye Study, Shen et al Arch Ophthalmol 2008.
High = e.g. Barbados Eye Study, Leske et al Arch Ophthalmol 1994.

+

Conclusion

- Melbourne Rapid Fields 24-2 Rapid delivers standard white-on-white visual field outputs with **substantially reduced test times**, **without compromising reliability.**
- By removing the need for dedicated hardware, **it enables scalable, globally accessible visual field testing for both glaucoma screening and longitudinal monitoring**.
- Future studies will further examine the **diagnostic capability of MRF Rapid combined with structural assessment** such as optic nerve examination, OCT imaging or AI-enabled fundus photography.

IAPB Valued Supplier Scheme

Gurgaon, India

China

Ghana

Nepal

Thank you – we welcome collaboration

Email contact: georgekong008@gmail.com

Australian Site mrfvision.au
International Site mrfvision.com

Institutions

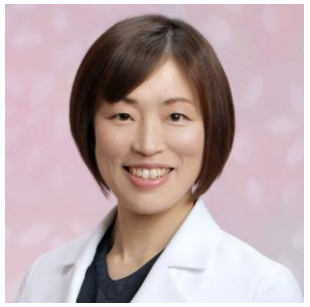
University of Melbourne
Centre for Eye Research of Australia
Royal Victorian Eye and Ear Hospital

ParagonCare
DESIGNS FOR VISION

Funding Sources

- auDA Foundation
- Glaucoma Australia
- Ophthalmic Research Institute of Australia /Australian Vision Research (New Investigator Grant)
- Perpetual Fund
- University of Melbourne Innovation Award
- Hector Maclean Scholarship Grant
- RVEEH Early Career Research Grant
- Tomorrow Maker's Grant

Thanks to Our Collaborators



Dr Kae Sugihara

Kurashiki Medical Center, Kurashiki, Okayama, Japan

Dr Suman Thapa

Nepal Eye Hospital, Kathmandu, Nepal.