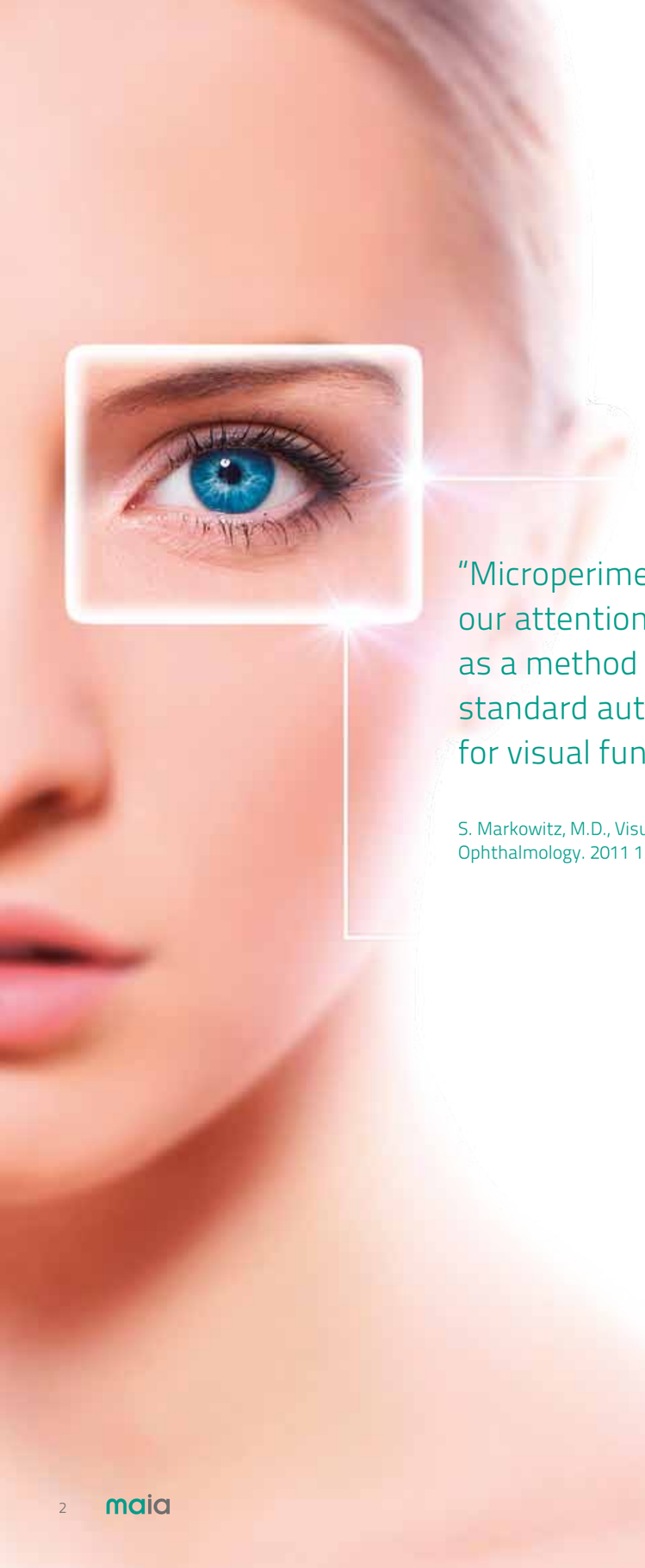
maia

Macular Integrity Assessment

The New Frontier of Microperimetry



"Microperimetry is attracting our attention more and more as a method that is superior to standard automated perimetry for visual function assessment."

S. Markowitz, M.D., Visual function and Glaucoma, Ophthalmology. 2011 118:2528-9.

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Company Profile

Our goal is to offer user-friendly diagnostic devices and high-value services that allow Eye Care Specialists to preserve patients' sight and quality of vision, in particular by detecting preventable diseases.

CenterVue designs and manufactures highly automated medical devices for the diagnosis and management of ocular pathologies, including those that represent the leading causes of blindness.

Our goal is to offer user-friendly diagnostic devices and high-value services that allow Eye Care Specialists to preserve patients' sight and quality of vision, in particular by detecting preventable diseases.

CenterVue is headquartered in Padova, Italy, with the US branch in San Jose, California. CenterVue is present in over 70 countries with his distribution network.

"Visual acuity is unable to represent the functional impact of neovascular or atrophic AMD on daily-life activities. Limited information about retinal fixation, and presence and density of central scotoma in these patients is available. Conventional visual field examination is inadequate for the accurate functional evaluation when foveal function is compromised [...] Automatic microperimetry may overcome this limitation."

Midena E. et al., Fixation pattern and macular sensitivity in eyes with subfoveal choroidal neovascularization secondary to age-related macular degeneration. A microperimetry study; Seminars in Ophthalmology 2004, Vol. 19, Nos. 1–2, pp. 55–61.

Microperimetry

Microperimetry is a technology that allows concurrent analysis of structural and functional aspects of the retina. It combines fundus imaging, retinal sensitivity mapping and fixation analysis in one exam and has been used over a decade as a powerful tool to detect, describe and follow-up pathologies affecting the macular area.

Its great advantage is the ability to track patients' fixation activity while measuring visual field, hence eliminating errors caused by fixation losses.

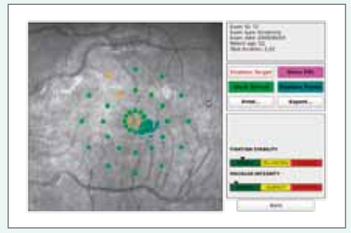
Fixation assessment is unique to microperimetry and ensures correlation between microperimetric outcomes and subjective perception of visual quality.

Presenting Maia

MAIA represents the latest advance in confocal microperimetry. Retinal images are acquired by Scanning Laser Ophthalmoscopy (SLO). An eye tracker allows accurate, real-time, compensation of eye movements. Luminance levels are compliant with existing standards (1000 asb.). MAIA is highly automated, very easy to use, non mydriatic and combines the best aspects of its predecessors.

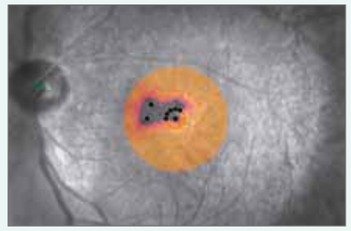
Similarly to Standard Automated Perimetry (SAP), MAIA measures light sensitivity of the retina by projecting Goldmann III stimuli over different retinal locations within the field of view. The main difference and great advantage over SAP is that retinal sensitivity is measured while simultaneously imaging the retina in real time. Retinal images, created by SLO technology, are processed by an eye tracker to calculate and compensate eye shifts (fixation losses) occurring during visual field measurement, in both physiological and pathological conditions. Fixation analysis is the second, fundamental, outcome of of the Maia eye tracker.

MAIA performs different types of microperimetry tests with supra and full-threshold strategies, and follow-up test to monitor functional progression. Each exam provides a measure of retinal sensitivity and fixation analysis (stability and position of the Preferred Retinal Locus). The MAIA sensitivity scale is 0 to 36 dB.



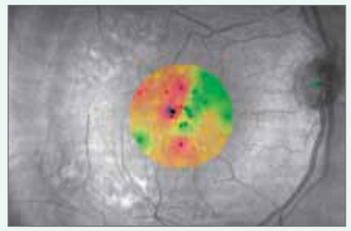
Fast

A supra-threshold test, measuring 2 levels of sensitivity (27 dB and 25 dB). Values are color coded in comparison with reference values obtained on normal subjects. Typical duration (37 stimuli) is 2 min per eye.



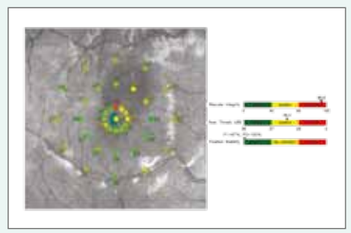
Scotoma finder

A supra-threshold test, used to examine highly pathologic patients, measuring one level of sensitivity (0 dB). Typical duration (37 stimuli) is about 2 min per eye.



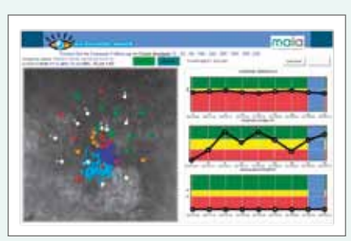
4 Levels fixed

A supra-threshold test, used to examine pathologic patients, measuring 4 levels of sensitivity (0 dB, 5 dB, 15 dB, 25 dB). Typical duration (37 stimuli) is about 3 min per eye.



Full threshold 4-2

Test used to examine retinal sensitivity in detail. The average threshold (dB) is color coded in comparison with reference values obtained on normal subjects. Typical duration (37 stimuli) is less than 6 min per eye.



Follow-up

Measures exactly the same locations with the same projection strategy as in the baseline test, independently of fixation shifts.

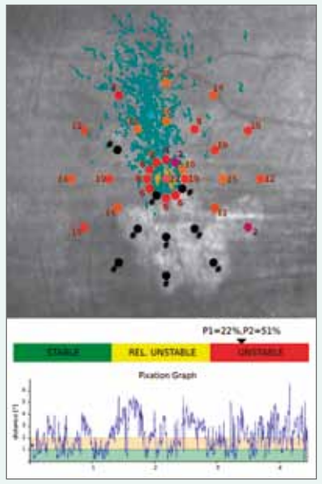
Fixation Test

Fixation analysis

Fixation is the process of attempting to "look at" a selected visual target and consists of optically aligning a functional area of the retina to that target. In normal subjects the retinal area predominantly used for fixation is the fovea, whereas when pathology affects the central retina, fixation degrades and patients may use extra-foveal regions. MAIA provides accurate and objective information regarding retinal location and stability of a patient's fixation. Such parameters are assessed by tracking eye movements 25 times / sec and by plotting the resulting distribution over the SLO image.

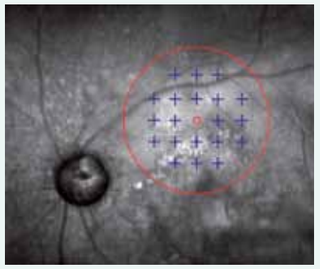
The region encompassed by these movements identifies the Preferred Retinal Locus (PRL) and describes the location of fixation, while their extension is an indication of fixation stability.

Fixation parameters are fundamental in describing retinal function and are as important prognostic factors as visual acuity and retinal sensitivity in patients with macular diseases.



Multi-fixation targets

MAIA is also able to project multiple fixation targets at selectable locations to help patients with central scotoma visualize the target during the sensitivity test. This new feature enhances the identification of the PRL and decreases the examination time in patients with highly unstable fixation.



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Macular Integrity Assessment

Great Ergonomic Advantages

Maia offers great ergonomic advantages in terms of easy interaction between the operator, the patient and the device.

Thanks to its Scanning Laser Ophthalmoscope (SLO) MAIA operates with a minimum pupil diameter of 2,5 mm, thus not requiring the use of dilating drops.

Ergonomic and motorized chin rest. Improved cleanability of the patient rest cushions thanks to the silicone material and detachable front rest.

The system is entirely operated via the integrated 10.4" touch-screen with 1024x768 resolution.

The patient push button is designed for improved ergonomics and can be hang on the system via a magnetic support.

The integrated PC offers dual USB and Ethernet interfaces.

Intended Use

MAIA is indicated for measuring macular sensitivity, fixation stability and the locus of fixation, as well as providing infrared retinal images. It contains a reference database for the quantitative comparison of measured sensitivity values to those observed in normal subjects.

Thanks to its combined structure-function analysis, microperimetry represents in clinical practice an essential tool for:

- Deriving the correct diagnostic decision in a variety of retinal diseases
- Monitoring progression of retinal pathologies
- Monitoring a treatment's efficacy
- Assessing macular function prior to cataract surgery
- Describing fixation characteristics prior to laser treatment
- Examining patients with unexplained vision loss
- Educating patients about their eccentric viewing

All of the following pathologies affect macular sensitivity:

- Age related macular degeneration
- Diabetic macular edema and retinopathy
- Macular puckers
- Macular holes
- Central serous retinopathy
- Stargardt's disease
- Choroideraemia
- Central retinal vein occlusion
- Macular telangiectasia
- Retinitis pigmentosa

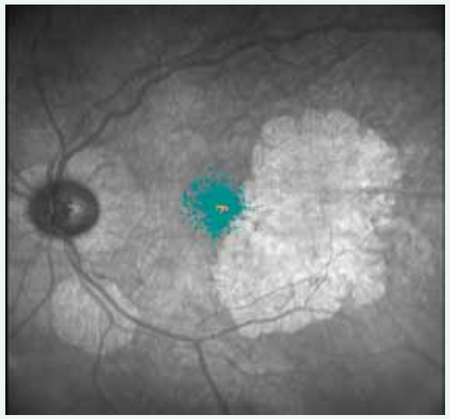
Maia in the Low Vision Clinic

MAIA can be an important tool in the low vision clinic, particularly in patients with eccentric and unstable fixation due to large central scotoma.

PRL outcome quantities residual visual function and helps explaining patients how to use more effectively their residual vision capabilities.

With the aid of the MAIA eye tracker, it is possible to map macular sensitivity even in cases of severe vision loss with poor fixation.

Thanks to the new dynamic multi-fixation target, Low Vision clinics are able to perform the MAIA examination using eccentric fixation targets. In addition, the ability to project multiple fixation targets help low vision specialists to better understand visual span in low vision patients.



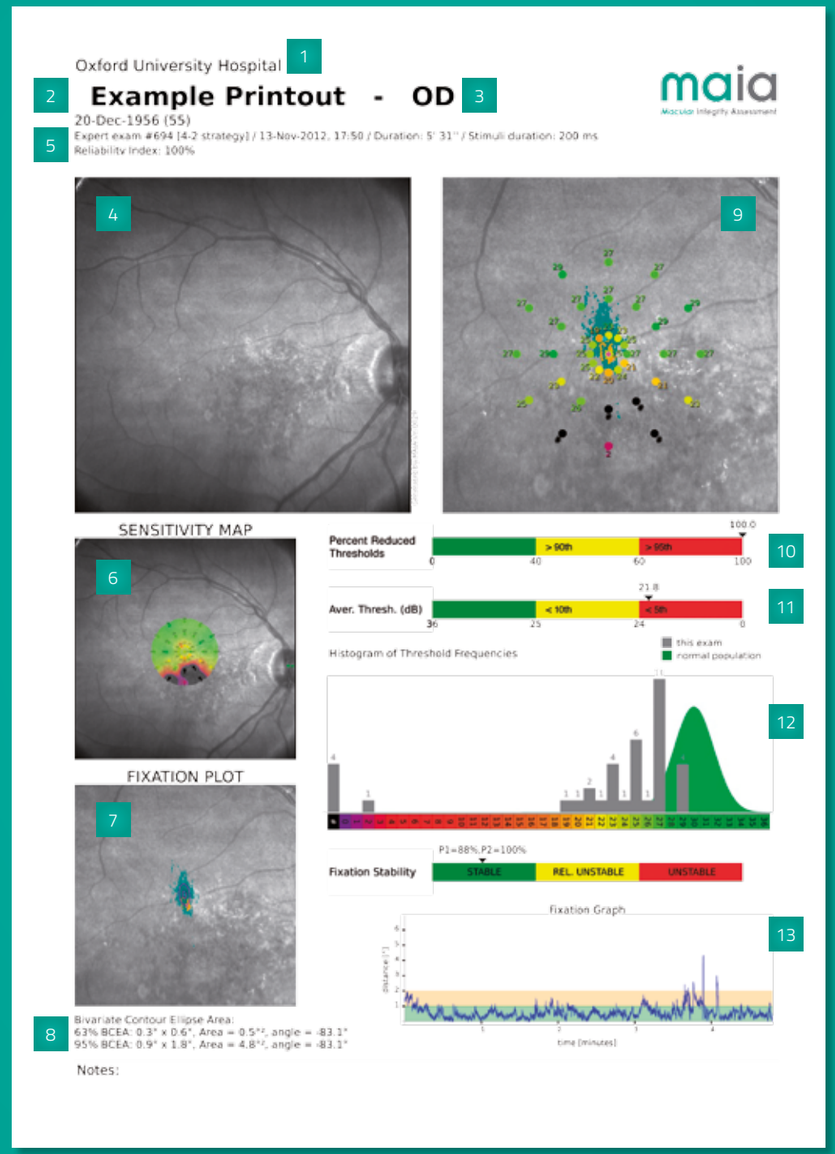
Eccentric PRL on a patient with large central scotoma

How to Read Printouts

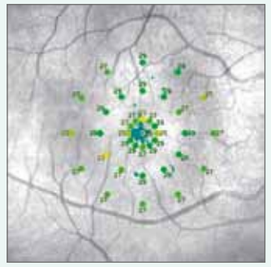
MAIA contains a reference database for the quantitative comparison of retinal sensitivity to the corresponding values obtained on normal subjects. MAIA provides a very detailed printout that encompasses all collected information.

Legend

1. Clinic name
2. Patient info
3. Examined eye
4. SLO image of fundus
5. Exam Info
6. Interplated sensitivity map over full SLO image
7. Fixation Plot over zoomed SLO image and PRL identification
8. Bivariate Contour Ellipse Area indices
9. Sensitivity values (dB) and PRL over zoomed SLO image
10. Color Code Percent Reduced Thresholds
11. Color Code Average Threshold (dB)
12. Histogram of Threshold values (grey) compared with normal distribution (green)
13. Fixation graph describing amplitude of eye movements vs. time

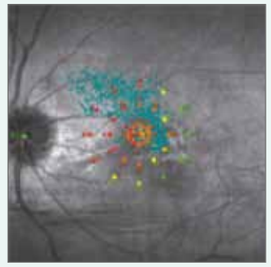


Clinical Examples



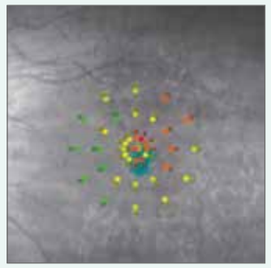
Early AMD

Reduced retinal sensitivity in localized macular areas.



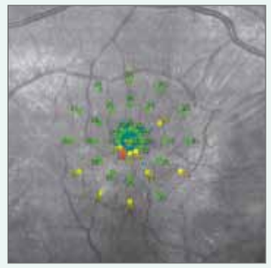
Severe AMD

The PRL has shifted over a low sensitivity area causing unstable fixation and visual discomfort.



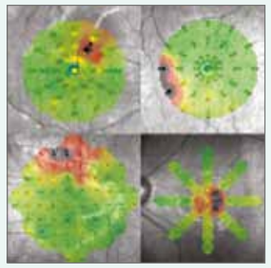
Macular Edema

Peri-foveal PRL and partially preserved macular sensitivity may indicate positive prognosis following treatment.



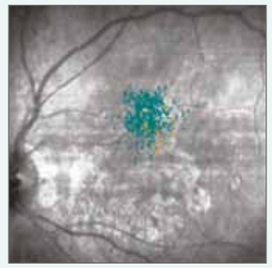
Macular Pucker

Traction lines, clearly visible on the SLO image and localized functional losses explain reported visual discomfort.



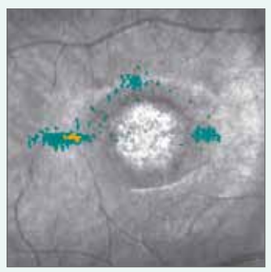
Interpolated color map

Interpolated sensitivity maps showing localized functional defects. Scotoma is represented in black.



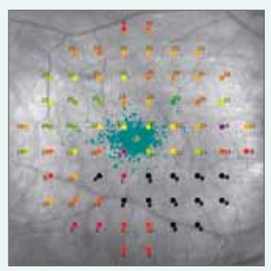
Central Geographic Atrophy

The PRL has shifted in the superior hemi-field, with unstable fixation.



Stargardt's disease

Multiple PRLs are visible, surrounding the central atrophic region



Glaucoma

Advanced stages of glaucoma may threaten central fixation. Maia can be used to assess the rate of disease progression.

Benefits, Features and Specifications

BENEFITS	FEATURES
Sensitive to functional changes due to macular pathologies even in the early stages	36 dB measurement range, 25 Hz eye tracker, 4 asb background, reference values on normal subjects
Easy interpretation	Comparison with reference values on normal subjects
Patient comfort	Test can be paused and automatically restarted at any time
Facilitates correct diagnostic decision	Overlay of structural and functional information
Highly repeatable	25 Hz eye tracking + high resolution confocal imaging
High quality imaging	Confocal SLO imaging (25 microns optical resolution)

Technical specifications*

Fundus imaging:

- Line scanning laser ophthalmoscope
- Field of view: 36° x 36°
- Digital camera resolution: 1024 x 1024 pixel
- Optical resolution on the retina: 25 microns
- Optical source: infrared super luminescent diode (850 nm)
- Imaging speed: 25 fps
- Working distance: 33 mm

Fundus Perimetry:

- Projection field: 30° x 30°
- Tracking speed: 25 Hz
- Stimuli size: Goldmann III (26 arcmin)
- Background luminance: 4 asb
- Maximum luminance: 1000 asb
- Stimuli dynamic range: 36 dB

Other features:

- Non mydriatic operation (minimum pupil diameter: 2.5 mm)
- Auto-focus (-15D to +10D)
- Automatic OD/OS recognition

Dimensions:

- Unit size: W 348 x H 580 x D 600 mm (13.7 x 22.8 x 23.6 in)
- Unit weight: 23 kg (50.7 lbs)

Power requirement:

- Voltage: 100-240 VAC, 50-60 Hz, fuse 3.15 A (T type)
- Power consumption: 300 VA

Laser classification:

- Class I laser product conforming with 60825-1 IEC:2007

Accessories:

- power cord, push-button, spare fuses, operating manual, dust cover, front lens cap, silicon head-rest, eye occluder

* Specifications are subject to change without notice for improvement.

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Macular Integrity Assessment

The best tool for detecting and monitoring retinal functional changes

Microperimetry provides important contributions to Eye Care Specialists for a precise understanding of the anatomy, physiology and functionality of the macula. This turns into enhanced prevention, more accurate diagnosis and better treatment.

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Macular Integrity Assessment

Centervue SpA	Via San Marco 9H 35129 Padova - Italy	Ph: +39 049 7396 147 Fax +39 049 7396 148	info@centervue.com www.centervue.com
Centervue Inc.	92 Bonaventura Drive, San Jose CA 95134 - USA	Ph: +1 408 988 8404 Fax: +1 408 716 3271	infous@centervue.com www.centervue.com

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