MAIA™ - Macular Integrity Assessment

MAIA is a non-mydriatic, near infrared, line scanning laser ophthalmoscope which incorporates a high frequency eye tracker and an automated macular perimeter to determine threshold sensitivity and fixation characteristics. The MAIA software, with its normative database and statistical analysis module, is designed to identify the normal, age-related, decrease in sensitivity and differentiate it from the pathological changes associated with macular degenerations and other retinal diseases.

ADVANTAGES OF SLO IMAGING
By using a line scanning laser ophthalmoscope (LSLO) to continuously image the retina, the light reflected by the out-of-focus layers does not degrade the quality of the image. The sharp contrast of the SLO image is due to its confocal properties.

EYE TRACKER
The role of the eye tracker is to compensate for the patient's ocular movements during testing to ensure that point-to-point correspondence exists between the stimulus and the measured retinal location during the test and on subsequent tests. The eye tracker also quantifies a patient's fixation characteristics: the extent of the area covered by fixation points is a measure of fixation stability, while the location of the gravitational center of the fixation points with respect to the fovea is an indication of fixation location.

These indices aid in the determination of stable, relatively unstable or unstable fixation patterns. The automated eye tracker is fast, accurate and robust. It locks onto the entire fundus image and captures fixation changes 25 times per second during testing. Live images of the retina are
processed to “track” anatomical landmarks over the entire image and quantify the corresponding eye movements observed during the test procedure. The software also identifies the Preferred Retinal Locus (PRL) – a retinal position that identifies the patient’s preferred fixation site. This is the location around which the perimetric stimuli will be projected.

MICROPERIMETRY
Following eye-tracking based position corrections, perimetric stimuli are automatically projected in random order using either a supra-threshold or a 4-2 threshold strategy to accurately measure macular threshold sensitivity at predefined retinal locations over the central 10° of the retina using a standard Goldmann III stimulus size. Background luminance is 4 asb; stimulus dynamic range is 36 dB and maximum luminance is 1000 asb. Measured values are averaged and compared with the age-adjusted average for normals. The average macular threshold, along with other variables, serves for the calculation of the macular integrity index, a statistical parameter derived by comparison with normative data that describes the likelihood of threshold values to significantly differ from normal values.

MAIA offers three unique testing procedures – a fast supra-threshold analysis, an expert or detailed threshold test and a follow-up threshold analysis. These tests are designed to quantify macular threshold sensitivity and fixation stability and once an abnormal result is identified, to monitor those parameters over time.

FAST TEST
The Fast test is a supra-threshold assessment to quickly evaluate macular sensitivity.
By performing 1-2 projections at each pre-defined retinal location and by processing the point-results to derive a combined evaluation of all measured points, macular integrity is categorized as normal, suspect or abnormal. Fixation stability is judged as stable, relatively unstable or unstable based on the data obtained from the eye tracking. The preferred retinal locus (PRL) and fixation points can be displayed as needed. The entire Fast test procedure takes around 2 minutes per eye. Patients with either suspect or abnormal results on the Fast test should have the Expert test.
performed to accurately quantify retinal threshold and fixation stability. Other tests, including
dilated fundus examination, optical coherence tomography, conventional fundus imaging and visual
acuity testing, may be required to understand the cause of the abnormal findings.
The Fast test may be performed annually for those patients with a family history of a first-degree
relative with macular degeneration, unexplained vision loss, diabetes, post operative cataract
surgery and cystoid macular edema. The sensitivity of the Fast test to reveal the alterations typical
of Age related Macular Degeneration (AMD) has been clinically assessed to be 90.7% and its
specificity 90.1% (N = 813).

EXPERT TEST
The Expert test should be performed to precisely quantify the extent and severity of functional
visual loss associated with retinal disease. It is used to measure progressive changes in macular
threshold sensitivity and fixation stability.
The Expert test uses a 4-2 staircase to measure macular threshold at each of the pre-determined
points. As a full threshold test, it takes around 5 minutes per eye to complete. Test outputs include:
threshold values in dB at all measured points, average threshold sensitivity in dB, color coded
according to the normality ranges, fixation stability index (the percentage of fixation points within
2° and 4° from the center of fixation) and macular integrity index, indicating the likelihood of
presence of a statistically significant alteration in macular sensitivity when compared with normal
values. The preferred retinal locus (PRL) and fixation points can be displayed as needed. The
sensitivity of the Expert test to reveal the alterations typical of AMD has been clinically assessed to
be 91.2% and its specificity 98.4% (N = 813).

FOLLOW-UP TEST
The follow-up test is identical to the expert test, in that measured points are located at the same
anatomical areas as in the baseline Expert test. The follow-up test starts the threshold intensity for
each point at the last recorded threshold obtained from the previous Expert test. This is designed to
shorten the required time to take the test.
# MAIA SPECIFICATIONS

<table>
<thead>
<tr>
<th>Fundus Imaging</th>
<th>Macular Perimetry</th>
<th>Other Features</th>
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</thead>
<tbody>
<tr>
<td>Linear Scanning Laser Ophthalmoscope</td>
<td>Std macular test: 10°</td>
<td>Minimum pupil diameter: 2.5 mm</td>
</tr>
<tr>
<td>Field of view: 36° x 36°</td>
<td>Max field of view for macular perimetry: 20° x 20°</td>
<td>Focus adjustment range: -15D to +10D</td>
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<tr>
<td>Digital Camera resolution: 1024 x 1024 pix</td>
<td>Tracking speed: 25 Hz</td>
<td>Automatic OD/OS recognition</td>
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<tr>
<td>Optical resolution: 25 µm</td>
<td>Stimulus size: Goldmann III</td>
<td>Autofocus</td>
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<tr>
<td>Optical source: super luminescent diode @ 850 nm</td>
<td>Background luminance: 4 asb</td>
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</tr>
<tr>
<td>Imaging speed: 25 fps</td>
<td>Stimulus dynamic range: 36 dB</td>
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<tr>
<td>Working distance: 30 mm</td>
<td>Maximum luminance: 1000 asb</td>
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