Everything About oculera

Oculera Clinical Device

- Visual Field Testing(VFA)
- Visual Acuity
- Color Vision
- Contrast Sensitivity
- Pupillometry
- Ocular Motility
- Frequency Doubling Technology (FDT)
- SWAP
- Cover Test

Oculera Clinical Device

Visual Field Testing (VFA)

- The visual field is the full extent of the area an eye can see while looking straight ahead, and perimetry of this field is essential for detecting glaucoma, optic nerve damage, and neurological lesions.
- Oculera's VR visual field test delivers perimetric stimuli through a lightweight headset with integrated eye-tracking, making screenings faster, more engaging for children, and fully portable compared to traditional bowl or tent perimeters.
- Certified by CE Class IIa medical device regulation, Oculera's Visual Field is independently audited.

Features

Screening Test
- C40, C76, FF-120
- C80, C64

Threshold Test
- 24-2, 30-2, 10-2
- Macula, 60-4

Specialty Tests
- Esterman Binocular 1-2
- Ptosis tests: Superior 36, Superior 64

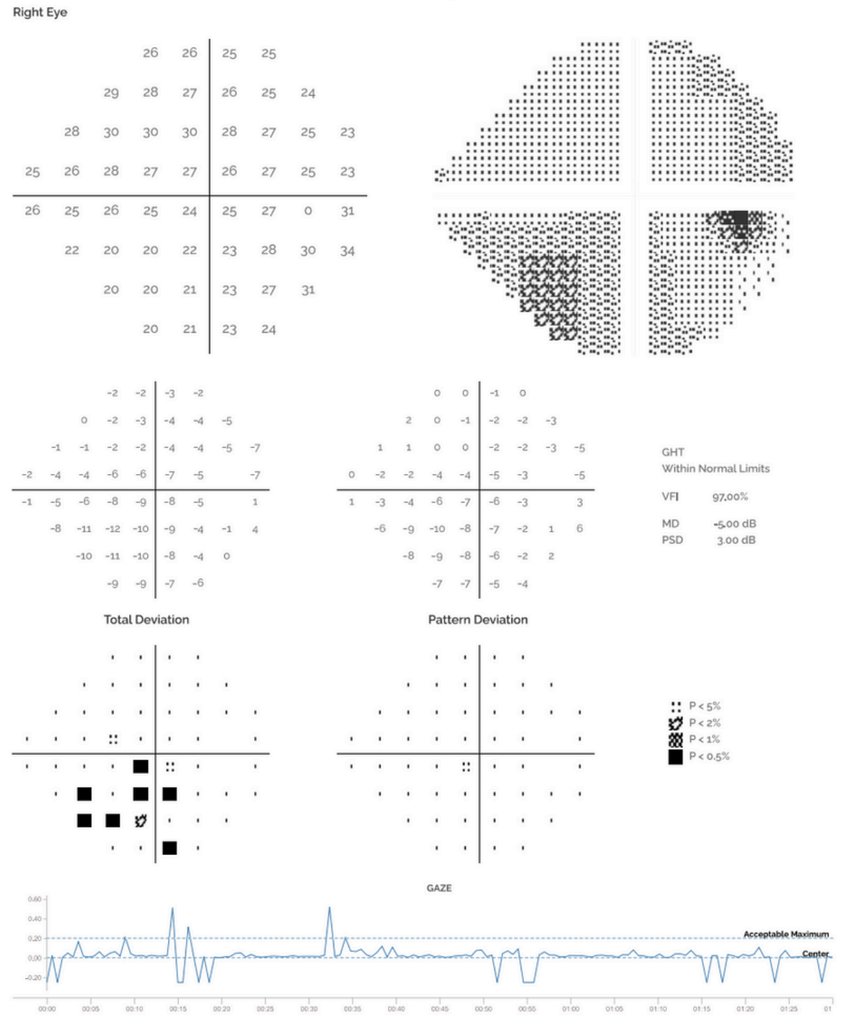
Strategies
- Oculera Interactive (4-6 min per eye),
- Fast Tracking (1 min per eye)
- Supra-Threshold (45 sec per eye)
- Full-Threshold

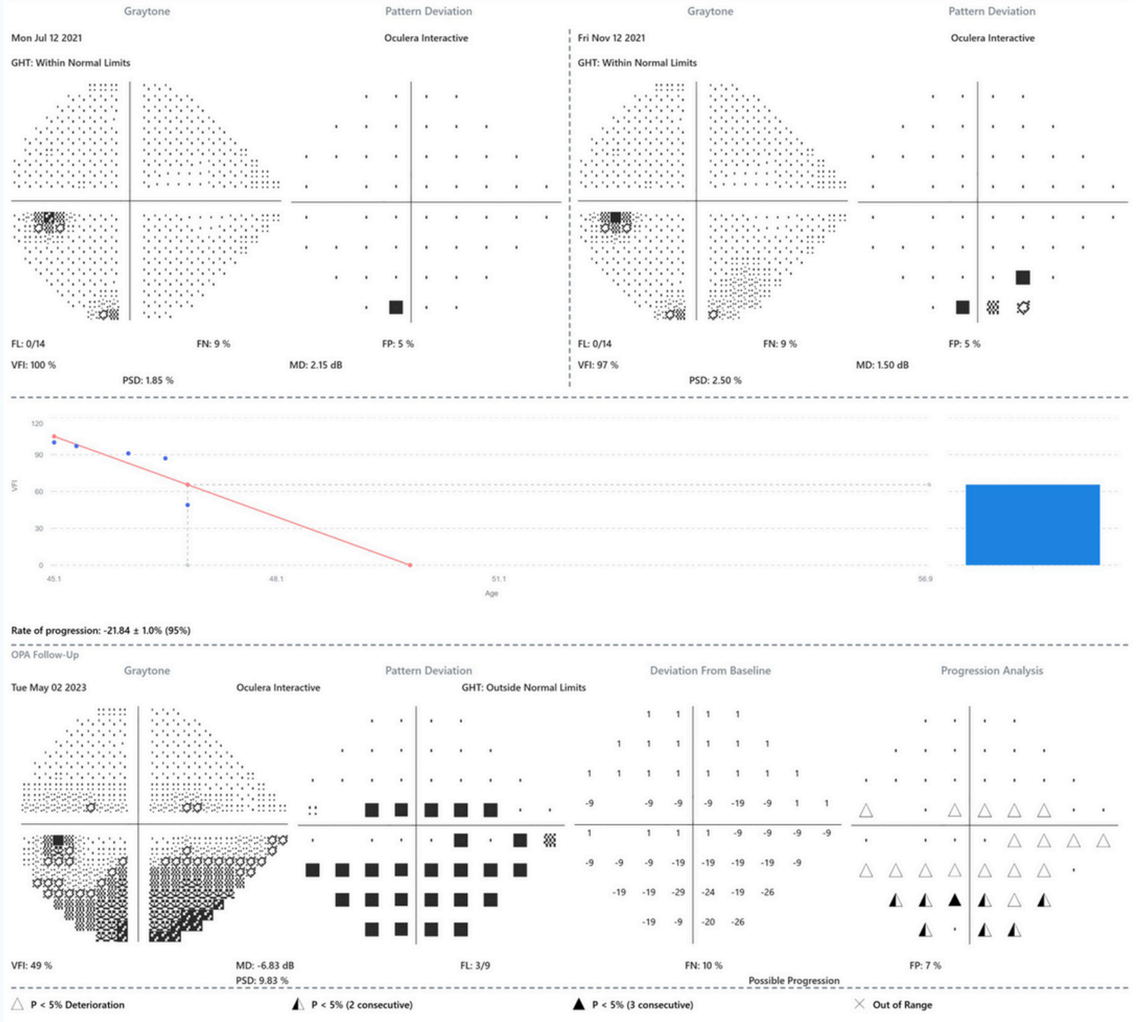
Fixation Control
- Heijl-Krakau blind spot monitor
- Gaze tracking

Diagnostic Parameters
- MD, PSD, GHT, VFI
- GPA
  - Event analysis
  - Trend analysis

Specialty Tests
- Esterman Binocular 1-2
- Ptosis tests: Superior 36, Superior 64

Oculera Clinical Device





Oculera Clinical Device

Visual Acuity

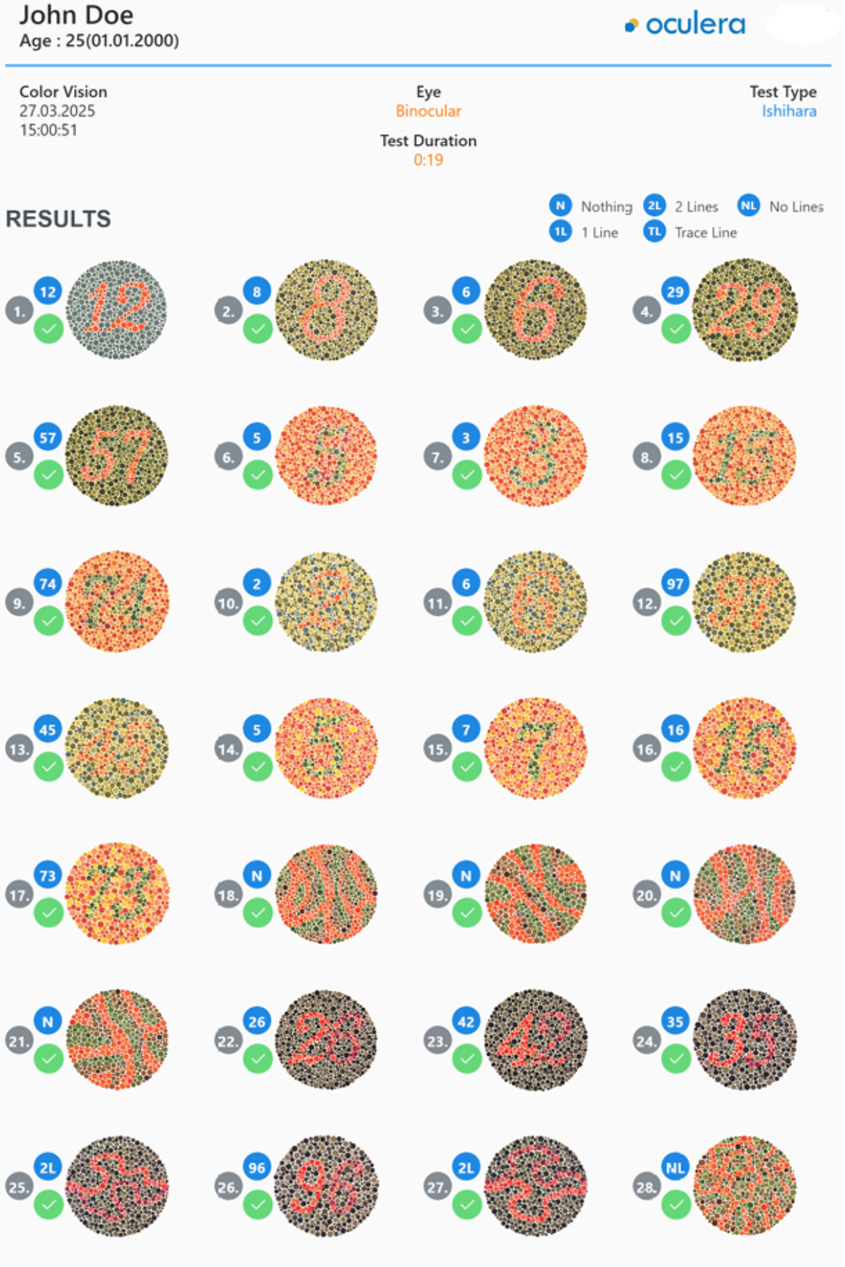
- The Visual Acuity test uses a standardized chart with letters arranged in a logarithmic size progression to quantify visual clarity on a continuous scale.
- It measures the minimum angle of resolution by assigning precise LogMAR scores based on which letters the patient can correctly identify at a fixed distance.
- LogMAR testing aids diagnosis and monitoring of amblyopia, refractive errors (myopia, hyperopia, astigmatism), and ocular diseases such as cataracts and macular degeneration.

The Bailey–Lovie LogMAR chart was co-developed by Ian Bailey at the University of California, Berkeley School of Optometry

Oculera Clinical Device

Color Vision

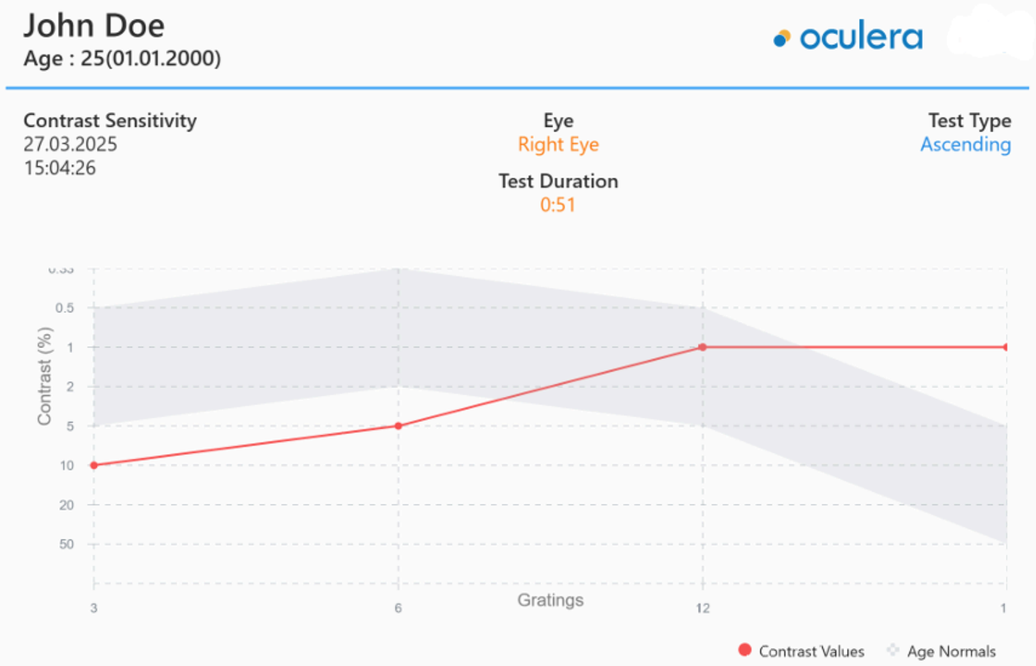
- The Color Vision Test (Ishihara) presents a series of pseudoisochromatic plates composed of colored dots that form numbers or patterns, used in a quick, non-invasive screening
- It measures red–green chromatic discrimination by identifying how many plates the subject reads correctly, revealing errors in hue perception.
- Ishihara testing aids diagnosis of congenital red–green deficiencies (protanopia, deuteranopia) and flags acquired color–vision defects from optic neuropathies, diabetes, or neurotoxic exposures.



Oculera Clinical Device

Contrast Sensitivity

- A psychophysical assessment presenting striped (grating) patterns at varying contrasts and spatial frequencies to evaluate visual contrast detection.
- It measures the minimum contrast level at which a person can distinguish gratings across low to high spatial frequencies, reflecting fine detail versus coarse pattern sensitivity.
- Contrast sensitivity testing can help detect and monitor ocular conditions such as glaucoma, cataracts, diabetic retinopathy, amblyopia, and neuro-ophthalmic disorders affecting visual processing.



References:

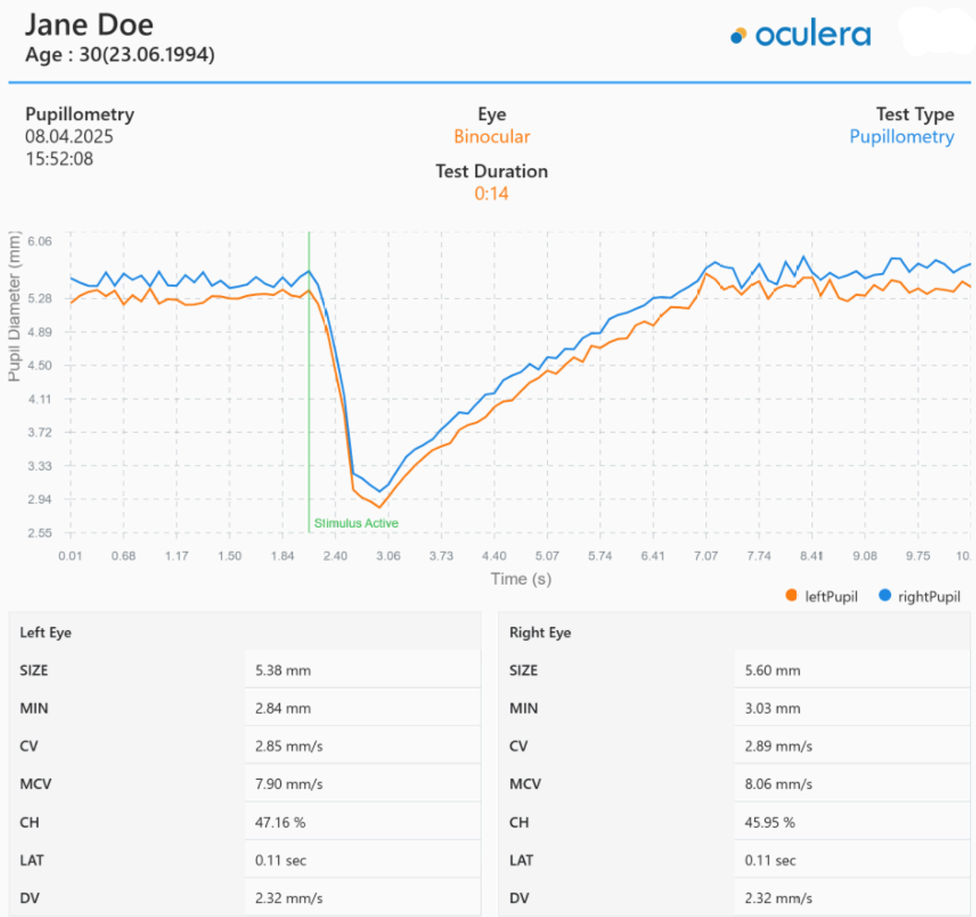
- https://pubmed.ncbi.nlm.nih.gov/7295611
- https://pmc.ncbi.nlm.nih.gov/articles/PMC6085342/
- https://pmc.ncbi.nlm.nih.gov/articles/PMC7591734/
- https://pmc.ncbi.nlm.nih.gov/articles/PMC2747105

FrACT, the first automated grating contrast-sensitivity test, developed by Michael Bach.

Oculera Clinical Device

Pupillometry

- Pupillometry is the non-invasive measurement of pupil size and dynamics over time using infrared eye-trackers.
- It provides objective data on autonomic and neurological function.
- It records changes in pupil diameter—constriction and dilation—in response to light which reflects activity in the autonomic nervous system and underlying cognitive processing.
- Pupillometry can help diagnose and monitor neurological disorders (e.g., Alzheimer's, Parkinson's), autonomic dysfunctions (e.g., Horner's syndrome), and neurodevelopmental/psychiatric conditions such as ADHD, autism spectrum disorder, and depression.



Left Eye		Right Eye	
SIZE	5.38 mm	SIZE	5.60 mm
MIN	2.84 mm	MIN	3.03 mm
CV	2.85 mm/s	CV	2.89 mm/s
MCV	7.90 mm/s	MCV	8.06 mm/s
CH	47.16 %	CH	45.95 %
LAT	0.11 sec	LAT	0.11 sec
DV	2.32 mm/s	DV	2.32 mm/s

References:

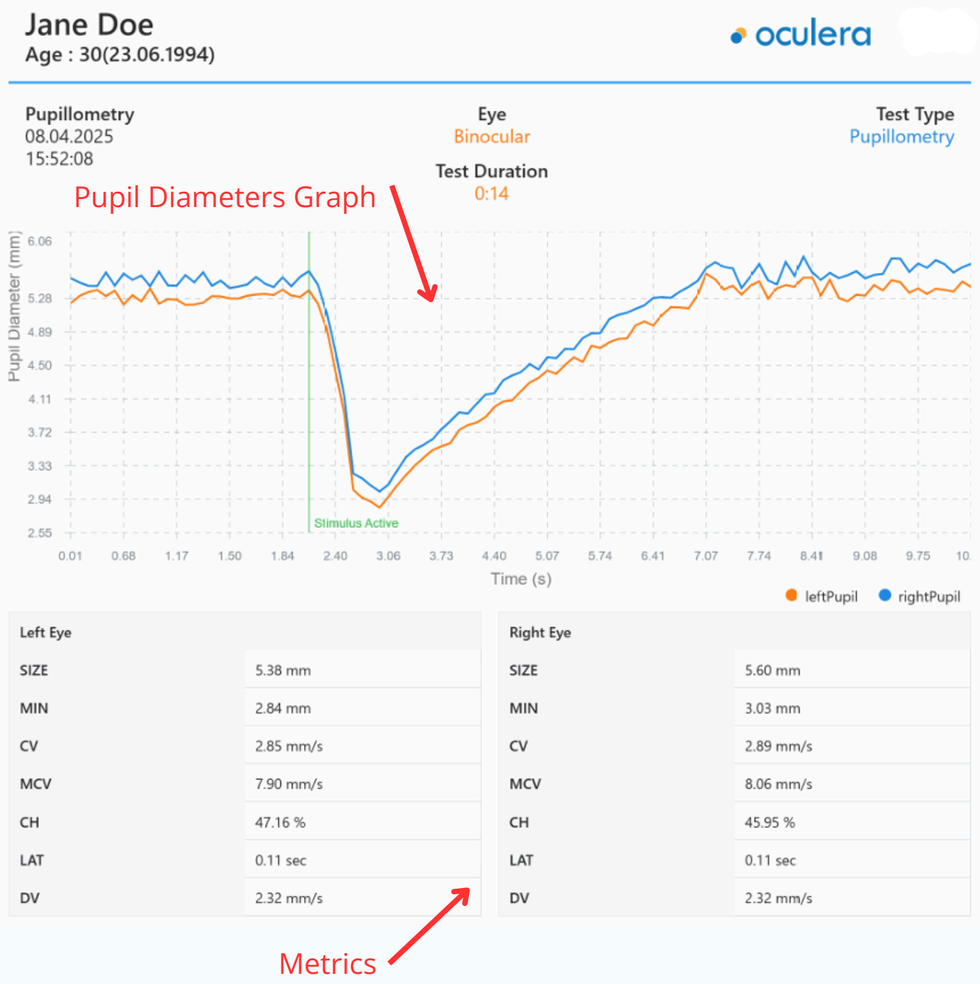
- https://www.frontiersin.org/journals/neurology/articles/10.3389/fneur.2020.00211/full
- https://www.researchgate.net/publication/24400374
- https://pmc.ncbi.nlm.nih.gov/articles/PMC7773233
- https://www.frontiersin.org/journals/human-neuroscience/articles/10.3389
- https://www.researchgate.net/publication/346376212

Oculera Clinical Device

Pupillometry

Metrics:

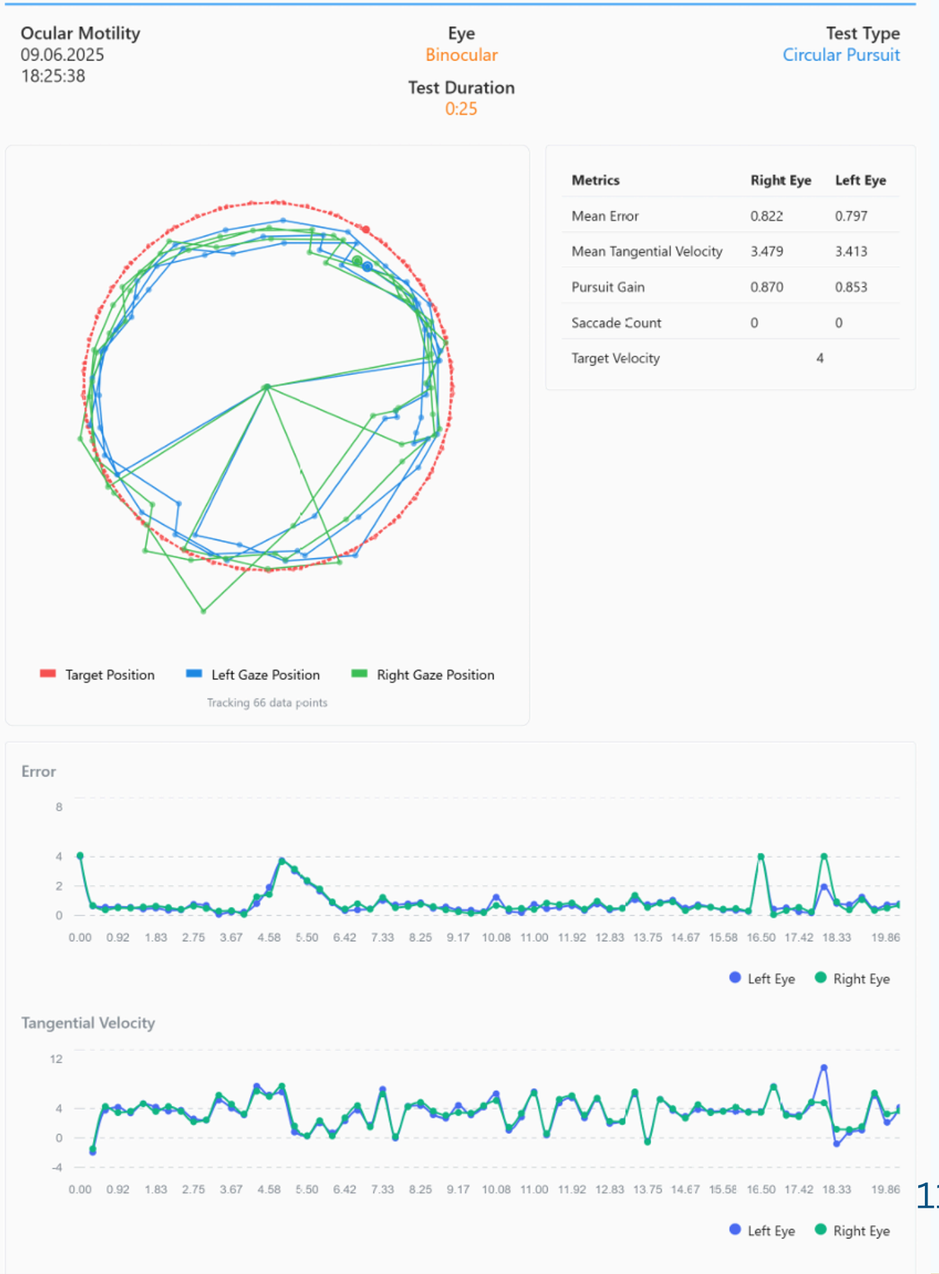
SIZE: The baseline pupil diameter measured just before the light stimulus.
MIN: The smallest pupil diameter reached following the stimulus.
CV (constriction velocity): The average speed at which the pupil constricts during the constriction phase.
MCV (maximum constriction velocity): The peak speed of pupil constriction immediately after stimulus onset.
CH (constriction amplitude): The magnitude of change in pupil diameter from baseline to its minimum.
LAT (latency): The time interval between stimulus presentation and the start of the pupil's constriction.
DV (dilation velocity): The average speed at which the pupil re-dilates back toward baseline after constriction.



Oculera Clinical Device

Ocular Motility

- Ocular motility (for example, circular pursuit) assesses smooth eye tracking by having the subject follow a target moving in a circular path.
- It measures metrics such as tracking error, pursuit gain, mean tangential velocity, and saccade count to evaluate oculomotor control.
- Ocular motility testing can aid diagnosis of vestibular and cerebellar disorders, Parkinson's disease, oculomotor nerve palsies, and neurodevelopmental conditions like ADHD and autism spectrum disorder.
- Strabismus & Binocular Disorders: Misalignment during pursuit can indicate strabismus, risking amblyopia and poor depth perception.



References:

- https://pmc.ncbi.nlm.nih.gov/articles/PMC6109371
- https://www.sciencedirect.com/science/article/abs/pii/S1877184X09700437
- https://pmc.ncbi.nlm.nih.gov/articles/PMC7694101

MARTIN-LUTHER-UNIVERSITÄT
HALLE-WITTENBERG

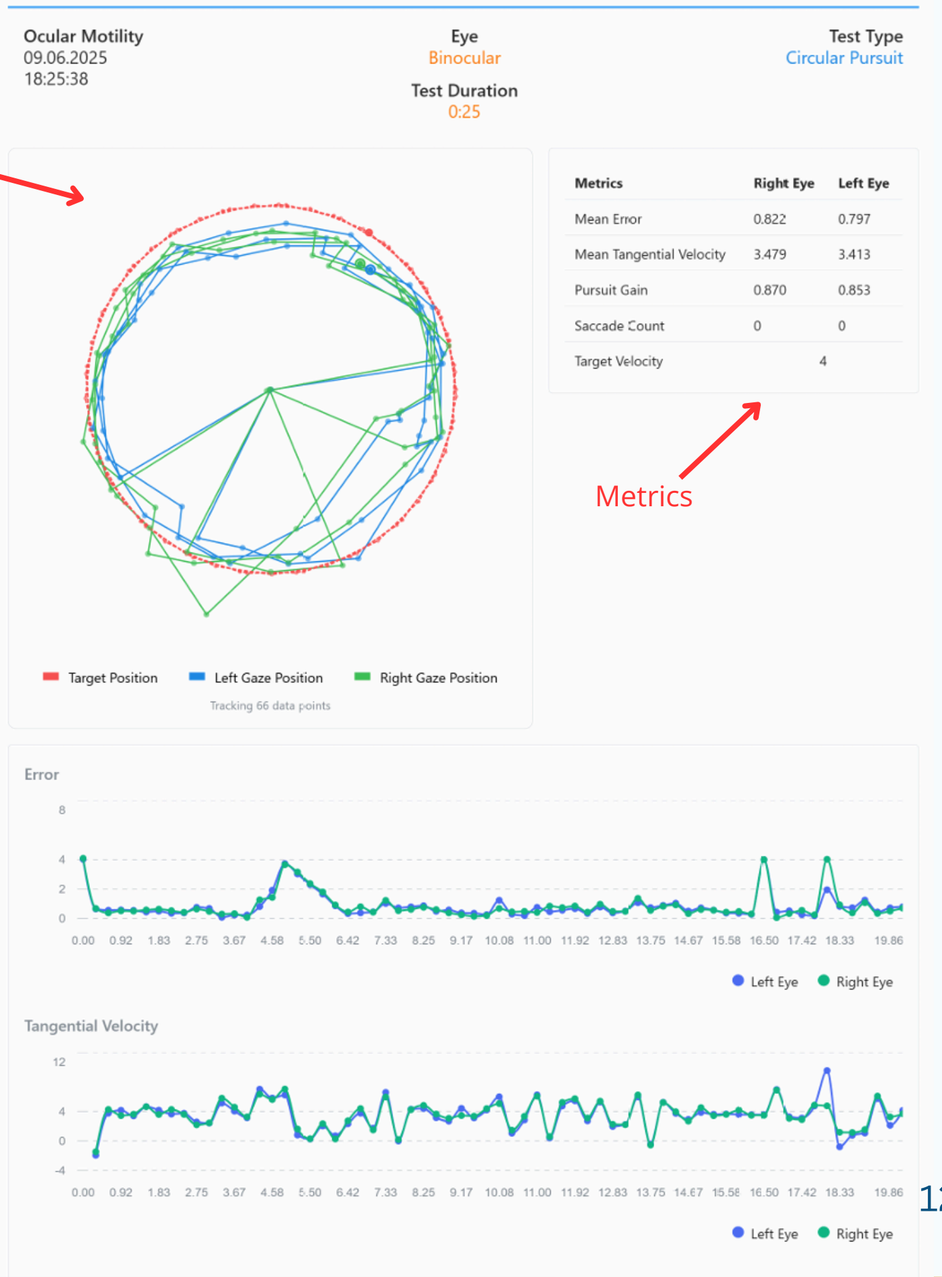
The first truly modern studies by Benno Erdmann and Raymond Dodge

Oculera Clinical Device

Ocular Motility

Metrics:

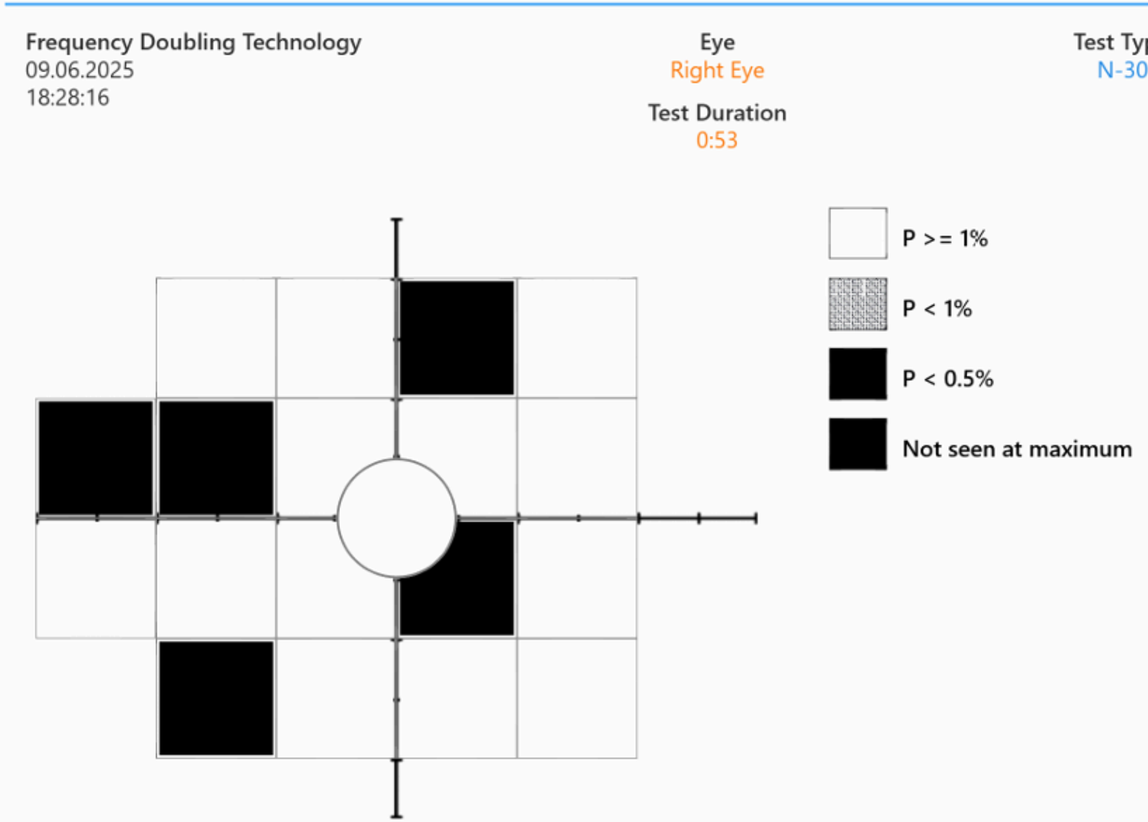
- **Mean Error:** The average angular deviation between the eye's gaze point and the moving target along the circular path.
- **Mean Tangential Velocity:** The average speed of eye movement projected tangentially to the circle's circumference during pursuit.
- **Pursuit Gain:** The ratio of eye velocity to target velocity, reflecting how closely the eyes match the target's speed (ideal = 1).
- **Saccade Count:** The total number of rapid corrective eye movements (catch-up saccades) made when gaze falls behind the moving target.



Oculera Clinical Device

Frequency Doubling Technology (FDT)

- FDT perimetry uses low–spatial frequency, high–temporal frequency gratings that “frequency–double” when flickered, to map the visual field with a rapid, portable test.
- It measures contrast sensitivity to flickering targets at multiple locations, quantifying localized deficits in ganglion cell–mediated pathways.
- FDT perimetry aids early detection of glaucoma, optic neuropathies, and lesions in the visual pathways such as neurological or ischemic damage.
- FDT perimetry outperforms standard automated perimetry with faster test times, lower test–retest variability in low-sensitivity regions, and heightened sensitivity to early magnocellular ganglion-cell loss, while being less affected by refractive error or cataract.



References:

- https://www.nature.com/articles/s41598-022-13781-2
- https://www.researchgate.net/publication/24400374
- https://glaucomatoday.com/articles/2008-sept-oct/GT0908_05-php

The first automated FDT perimetry test was conducted by Chris A. Johnson and Samuels S.J. at the University of Iowa

Oculera Clinical Device

SWAP

- Short-wavelength automated perimetry (SWAP) isolates the blue-cone (S-cone) pathway by presenting flickering blue stimuli on a yellow adapting background.
- It measures S-cone pathway contrast sensitivity by determining threshold responses to blue-on-yellow stimuli across multiple visual field locations
- SWAP aids early detection of glaucoma and optic neuropathies by revealing short-wavelength sensitivity deficits before they appear on standard perimetry.
- First developed by Chris A. Johnson's team at the University of Iowa

References:

- https://webeye.ophth.uiowa.edu/ips/PerimetryHistory/images/SWAP.pdf
- https://glaucomatoday.com/articles/2009-nov-dec/1109_04-php
- https://www.ophthalmology.theclinics.com/article/S0896-1549(03)00010-5/abstract
- https://pmc.ncbi.nlm.nih.gov/articles/PMC3788819
- https://pmc.ncbi.nlm.nih.gov/articles/PMC2643302

Oculera Clinical Device

Cover Test

- Oculera's VR-based automated cover test alternates virtual occluders between eyes inside a headset and uses built-in infrared eye-tracking to replicate manual occlusion steps and record gaze shifts.
- It measures ocular alignment by quantifying the latency and magnitude of eye position shifts to calculate heterotropia and heterophoria angles during each virtual cover-uncover cycle.
- This test aids objective diagnosis of strabismus subtypes—esotropia, exotropia, vertical deviations—and binocular control issues such as latent heterophoria.

References:

- https://bmcophthalmol.biomedcentral.com/articles/10.1186/s12886-021-02016-z
- https://www.sciencedirect.com/science/article/abs/pii/S0169260719309733
- https://pmc.ncbi.nlm.nih.gov/articles/PMC11650622
- https://eyewiki.org/Cover_Tests

Ernest E. Maddox's "Tests and Studies of the Ocular Muscles" (1898)

THE UNIVERSITY of EDINBURGH