



Transforming CNS Drug development with eye movement biomarkers

Platform validation in clinical trials - A summary of peer-reviewed publications

NeuraLight is solving the most pressing challenge in CNS:
The inability to reliably track disease progression

Our platform has been validated across multiple prospective clinical trials in diverse CNS indications, with a growing body of scientific publications, demonstrating:

- ☑ The use of NeuraLight's platform as a biomarker to monitor disease progression
- ☑ Clinical Validation in multiple clinical trials in patients with various CNS diseases
- ☑ Outperforming gold-standard clinical scales in the assessment of Parkinson's disease, ALS, and MS

Our publication track record serves as strong validation of NeuraLight's clinical utility and reinforces our credibility with pharmaceutical partners

1

Mini-review: Eye movement technology (Band et al. 2024)



Aim

Review of current eye movement technologies, and their emerging use in clinical practice and drug development

Short summary

Eye movements are a powerful indicator of neurological health, engaging complex motor and cognitive pathways with rapid response. Abnormalities can reflect disease severity and distinguish phenotypes. With advances in imaging and AI, eye movement analysis is rapidly emerging as a key tool in assessing neurodegenerative diseases

Take Home Message

Using an easy-to-use eye movement software-based platform can change the clinical practice and drug development ecosystem, providing clinicians and pharma with a scalable solution to evaluate patients with CNS diseases

Link to read: <https://shorturl.at/7xivH>

2

Video-Based Gaze Detection for measuring oculomotor patterns (Harpaz et al. 2024)



Aim

Presenting the NeuraLight unique technology, enabling the use of a laptop and a webcam in clinical practice

Short summary

Measuring oculomotor abnormalities is challenging due to the precise spatio-temporal sensitivity of oculometric measures. We introduce a self-calibrating neural network for gaze detection, designed for oculomotor abnormality assessment. The model integrates stimulus target locations during visual tasks and calibrates gaze estimation in real time

Take Home Message

Using an easy-to-use eye movement software-based platform can change the clinical practice and drug development ecosystem, providing clinicians and pharma with a scalable solution to evaluate patients with CNS diseases

Link to read: <https://shorturl.at/aSJS7>

3

Validation of the NeuraLight Platform (Rosset et al. 2022)



Aim

Validation of the NeuraLight's platform compared with commercially-available eye movement system



Short summary

82 participants performed different oculometric tasks with both NeuraLight platform using only a laptop and a webcam, and Tobii Pro (Sweden), with high correlation found ($r > 0.9$) across all oculometric tasks



Take Home Message

NeuraLight's eye movement software-based platform is accurate and scalable to be implemented in clinical trials

Link to read: <https://shorturl.at/IRKZj>

4

Correlation of eye movements with disease severity of Parkinson's disease (Reiner et al. 2022)



Aim

Evaluate the correlation between NeuraLight's eye movement and PD disease severity



Short summary

215 PD patients (with/without levodopa) and 215 healthy subjects assessed using the NeuraLight platform and MDS-UPDRS motor scale, Latency, error rate, and gain were significantly correlated with clinical scores and severity



Take Home Message

Oculometric measures worsened as PD severity increases, and were correlated with MDS-UPDRS scores

Link to read: <https://shorturl.at/VrxaH>

5

Correlation of eye movements with traditional clinical scales of Multiple Sclerosis (Levy et al. 2024)



Clinical trials



Aim

Assess the correlation between NeuraLight's eye movements with cognitive and motor disability in MS



Short summary

57 MS patients tested with EDSS, NHPT, SDMT and NeuraLight's oculometric software-based platform, with strong significant correlations with traditional scales



Take Home Message

Using NeuraLight Oculometric test can reflect both physical and cognitive MS impairments.

Link to read: <https://shorturl.at/VhBpt>

6

Correlation of eye movements with clinical scales of ALS (Raveh et al. 2022)



Clinical trials



Aim

Evaluate the correlation between NeuraLight's eye movements with ALSFRS-R scores in ALS patients



Short summary

32 ALS patients in a Phase IIb drug trial and 129 healthy subjects were evaluated with ALSFRS-R and NeuraLight platform. Corrective saccadic latency and anti-saccade error rates correlated with both bulbar symptoms and ALSFRS-R



Take Home Message

Eye movements are correlated with ALSFRS-R and its bulbar subscale, and can provide insights into patient subtypes

Link to read: <https://shorturl.at/Cfm9c>

7

Correlation of eye movements with cognitive aspects of Parkinson's disease (Tosin et al. 2024)



Clinical
trials



Aim

Investigating the correlations of eye movement patterns with cognitive aspects in PD in a multi-center trial



Short summary

123 PD patients completed cognitive tests and a software-based eye movement evaluation. Significant correlations found between oculometric features and a valid cognitive scale (MoCA scores)



Take Home Message

Eye movements offer a scalable biomarker of the evaluation of cognitive function in PD

Link to read: <https://shorturl.at/pOJMm>

8

Differences in Oculometric measures between patients with different genetic subtypes in Parkinson's disease (Djaldetti et al. 2024)



Clinical
trials



Aim

Examining the use of oculometric measures as a tool to differentiate patients with Leucine-Rich Repeat Kinase (LRRK2) - associated and idiopathic Parkinson's disease



Short summary

18 LRRK2 patients and 108 matched patients with iPD were evaluated using an oculometric software-based platform. Oculometric patterns of PD patients were found to be statistically significant different between the 2 groups



Take Home Message

Future clinical trials can potentially use oculometric measures as an additional stratification and pre-screening tool in trials involving patients with genetic mutations

Link to read: <https://shorturl.at/1ecj4>

9

Using eye movements to monitor ALS disease progression (Berkman et al. 2024)



Aim

Using changes in eye movements over time to follow ALS disease progression



Short summary

28 ALS patients in a Phase IIb drug trial were followed longitudinally with ALSFRS-R and NeuraLight platform. A significant increase of saccadic intrusions during fixation was observed over time



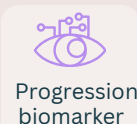
Take Home Message

Saccadic intrusions can serve as a biomarker to follow ALS disease progression, reducing the required sample size to detect drug effect over time

Link to read: <https://shorturl.at/Heruk>

10

Using eye movements to monitor PD disease progression - a single-site results (Gurevich et al. 2024)



Aim

Comparing eye movements with motor assessments in a sample of PD patients and controls over 9 months in a single center



Short summary

Over a 9-month period, changes in eye movements were observed in a small sample of 30 PD patients examined every 3 months, despite stable MDS-UPDRS III scores



Take Home Message

Oculometric measures could be a valuable tool for assessing individuals with Parkinson's disease and monitoring disease progression

Link to read: <https://shorturl.at/OLm6s>

11

Using eye movements to monitor PD disease progression - Results from a multicenter trial (Tosin et al, 2025)



Progression
biomarker



Aim

Assessment of saccadic hypometria as a sensitive biomarker to monitor Parkinson's Disease (PD) progression in a multicenter trial



Short summary

Saccadic hypometria was measured using a software-based platform and motor symptoms were assessed using MDS-UPDRS III, in a multicenter (4 sites) cohort including 216 patients and healthy controls. A significant increase in saccadic hypometria across all tasks was consistently observed over time in PD patients but not in healthy subjects, while MDS-UPDRS III scores remained unchanged.



Take Home Message

Saccadic hypometria can serve as a biomarker to follow PD progression, with consistent results in different sites

Link to read: <https://shorturl.at/CfDzp>



List of publications

Last Update: January 2025

1. Band TG., et al. Advancements in eye movement measurement technologies for assessing neurodegenerative diseases. *Frontiers in digital health* (2024)., 6, 1423790. Doi: 10.3389/fdgth.2024.1423790
2. Harpaz E., et al. Video-Based Gaze Detection for Oculomotor Abnormality Measurements. *Applied Sciences* (2024)., 14(4), 1519. doi: 10.3390/app14041519
3. Rosset I, et al. Validation of a novel software-based platform to extract oculometric measures. *Acta Ophthalmol* (2022), 100:. doi: 10.1111/j.1755-3768.2022.0359
4. Reiner J, et al. Oculometric measures as a tool for assessment of clinical symptoms and severity of Parkinson's disease. *J Neural Transm.* (2023) 130:1241–8. doi: 10.1007/s00702-023- 02681-y
5. Levy S, et al. Correlations Between Oculometric Measures and Traditional Clinical Assessments in Multiple Sclerosis. *Mult Scler Relat Disord.* 2025 Jan 10;94:106265. doi: 10.1016/j.msard.2025.106265. Epub ahead of print. PMID: 39827539.
6. Raveh E, et al. Correlation between oculometric measures and clinical assessment in ALS patients participating in a phase IIb clinical drug trial. *Amyotroph Lateral Scler Front Degener.* (2023) 24(5–6):495–501. doi: 10.1080/21678421.2023.2196315
7. Tosin M, et al. Evaluating Cognitive Status in Parkinson's Disease Using a Software-based Eye-Tracking Platform: Preliminary Results of the PALOMA Clinical Trial [abstract]. *Mov Disord.* 2024; 39 (suppl 1)
8. Djaldetti R, et al. Differences in Oculometric Measures between Patients with LRRK2-associated and Idiopathic Parkinson's Disease . *Mov Disord.* 2024; 39 (suppl 1).
9. Berkman O, et al. Changes in saccadic intrusions over time as an objective biomarker to follow ALS disease progression. *Amyotrophic lateral sclerosis & frontotemporal degeneration* (2024) 1-7. doi:10.1080/21678421.2024.2376732
10. Gurevich, T, et al. Monitoring Parkinson's Progression: Eye Movements vs. MDS-UPDRS III. *Parkinsonism & Related Disorders* 134 (2025).
11. Tosin M, et al. Saccadic hypometria as a sensitive biomarker for tracking PD progression, under review