

Demyelination processes affect temporal aspects of perception: a longitudinal optic neuritis study

N. Raz¹, S. Dotan², S. Chokron³, T. Ben-Hur¹, N. Levin¹

¹Neurology, ²Ophthalmology, Hadassah University Hospital, Jerusalem, Israel, ³Service de Neurologie, Fondation Ophtalmologique Rothschild, Paris, France

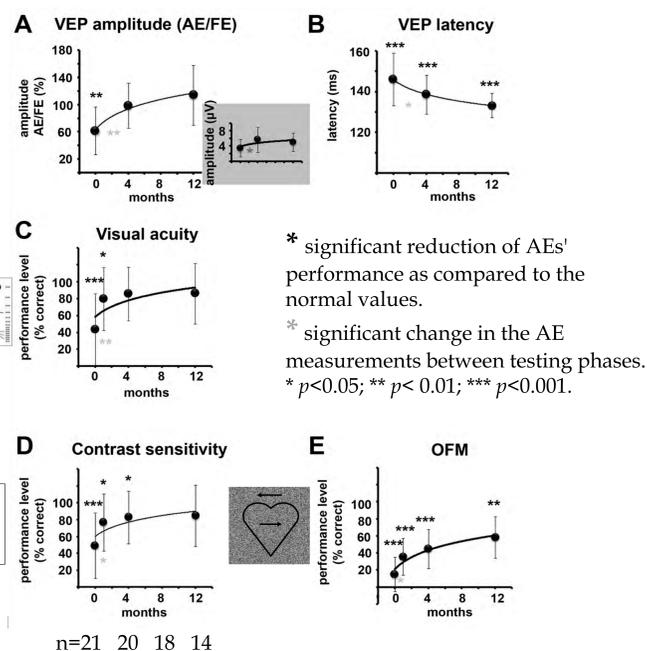
Objective: Visual Evoked Potentials (VEP) following acute optic neuritis (ON) remains chronically prolonged, although standard visual tests indicate full recovery. No behavioral correlate for this prolongation, which is considered the gold standard test for ON, was previously identified.

Methods: 21 patients with acute unilateral, first-ever ON were studied over the course of one year. Static visual functions (visual acuity and contrast sensitivity); dynamic visual tasks (OFM); and VEPs (amplitudes & latencies) were assessed repeatedly. Functional MRI (fMRI) were performed to study the neuronal correlates for the behavioral findings.

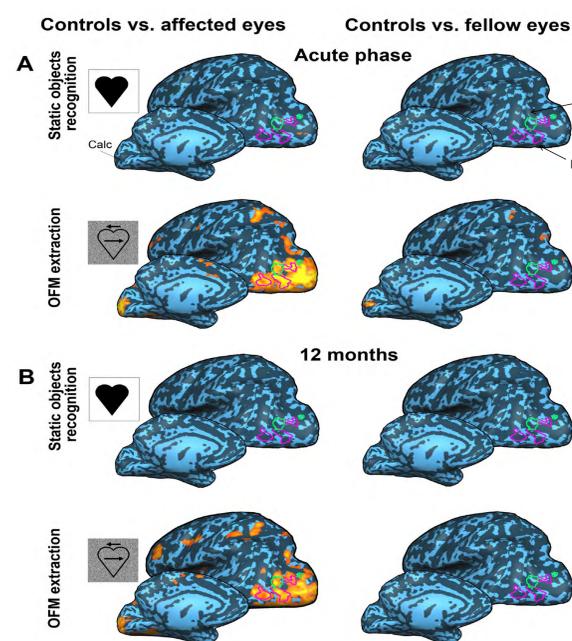
OFM (Object From Motion): an array of dots composed an object by moving the dots within the image rightward while moving the dots outside the image leftward (or vice versa). Object recognition is dependent on motion perception.



VEP latency remains prolonged and motion perception remains impaired throughout the 12 month period

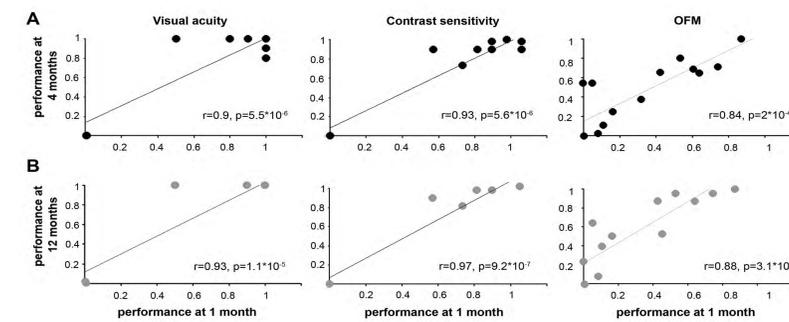


* significant reduction of AEs' performance as compared to the normal values.
* significant change in the AE measurements between testing phases.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

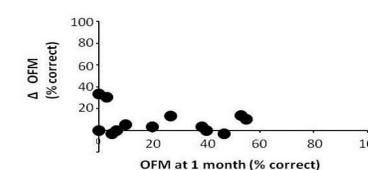


Sustained reduction in cortical activation while processing motion-defined forms projected to the AE. Calc - calcarine sulcus, LOC - objects related region, MT - motion related region. The figure plots regions which have increased activation in the matched control subjects in comparison to the affected or fellow eyes of the ON patients.

Visual performance one month following the acute phase was found to be strongly predictive of visual outcome.

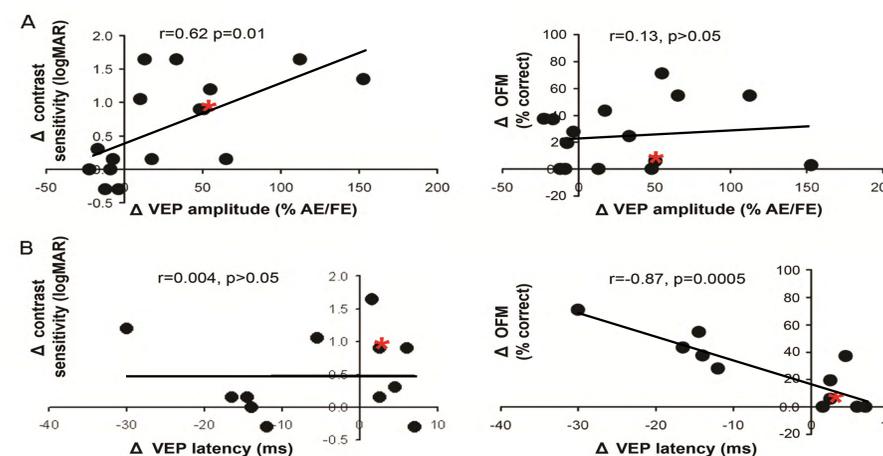
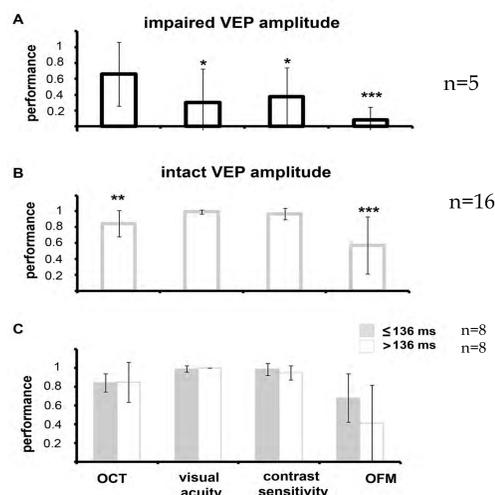


The magnitude of improvement in motion perception was constant across patients, independent of the initial deficit level.



Improvement is defined as the delta between patients' performance at the 1 and 4 month phases (4-1 months scores).

A strong correlation was found between VEP latencies and motion perception.



Each symbol corresponds to one subject, indicating the delta between his acute and 4 month phases (4 months - acute scores). Asterisks denote one specific patient. His data is marked to demonstrate the reliance of contrast sensitivity improvement on VEP amplitudes restoration and the insufficiency of this condition to accomplish dynamic visual function (OFM).

Conclusions:

- Dynamic visual functions remain chronically impaired following ON (evident both behaviorally and cortically).
- Motion perception deficit is closely correlated to prolongation of VEP latencies, implicating the need for rapid transmission of visual input in order to perceive motion.
- Dynamic visual functions may be used as a quantifiable tool to demonstrate the process of myelin preservation and remyelination in the visual pathways.

This work was supported by the Caesarea Edmond & Benjamin de Rothschild foundations.

Dr. Raz reports no disclosures.
Dr. Dotan reports no disclosures.
Dr. Chokron reports no disclosures.
Prof. Ben-Hur reports no disclosures.
Dr. Levin reports no disclosures.