

# NEURO-OPTOMETRIC REHABILITATION OF INFANTILE NYSTAGMUS SYNDROME USING THE VISAGRAPH II™ FOR NEURO-FEEDBACK: A CASE STUDY

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## BACKGROUND

### Infantile Nystagmus Syndrome (INS):

- Previously known as congenital nystagmus
- Abnormal repetitive eye movement oscillations
- Usually conjugate and horizontal, but can be vertical and torsional movement
- Null point is commonly found
- Typical onset at 2 to 3 months of age
- Males affected twice as often as females
- Neuropathology is variable
- Treatment options include optical correction with glasses or contact lens, prism, vision therapy, surgery, and medication

## CASE SUMMARY

### History

- 13-year-old Asian male, previously diagnosed with INS
- Chief complaint of longstanding blur at distance
- Developmental history: full-term, no birth complications, no delays
- Prior brain scan showed no abnormality
- Family ocular history: (+) nystagmus on maternal side
- Goal: explore vision therapy to help control nystagmus in order to improve distance vision

### Pertinent Clinical Findings:

- Horizontal right beat jerk nystagmus with left head tilt
- Current habitual prescription (PAL):
  - OD -4.25-25x052 20/200+1 RS 100
  - OS -4.50-0.25x140 20/100 RS 80+
  - OU +2.00 add
- Subjective refraction:
  - OD -4.50-2.00x015 20/150
  - OS -4.00-1.50x030 20/100-1
- Orthophoria at primary gaze
- Intermittent LXT of 30-40Δ (up/up-left gaze), right hypertropia (up-left gaze)
- Stereopsis: 400" LD, 500" RDS
- Amplitudes: 15D/15D/20D
- Worth 4 Dot: grade A fusion D/N
- Park's 3 Step: right hyper
- Ocular health: unremarkable

### Diagnosis

- Infantile Nystagmus Syndrome
- Intermittent LXT
- Right superior oblique palsy
- Binocular and oculomotor dysfunctions

### Management

- Continue with habitual SRx
- Weekly office-based vision therapy
- Therapy techniques included:
  - neuro-feedback
  - visual-vestibular integration
  - binocular and oculomotor training
  - peripheral awareness training

### Outcome:

- Improved subjective distance vision
- Increase in aided distance visual acuity
  - OD 20/200+1 to **20/80**
  - OS 20/100 to **20/80+1**
  - OU 20/100 to **20/80**
- Visagraph II™ showed reduction in the amplitude of the nystagmus

## PROCEDURES

Table 1. Visagraph II™ Set-Up Instructions

1. Set up Visagraph using standard protocol
2. Select "visual skills" recording
3. Use a clear, hand-held plexiglass board with an "X" marked at the center
4. Hold at approximately 16" with the computer 20" away
5. Instruct patient to fixate on the "X" while noting the Visagraph recording
6. Instruct patient to use different techniques to help attenuate the nystagmus while receiving real-time biofeedback
7. Goal: find combination of techniques that minimizes the nystagmus

Table 2. Office-Based Vision Therapy

Multisensory	Binocular	Oculomotor	Peripheral Awareness
<ul style="list-style-type: none"> <li>• Airex Foam</li> <li>• VOR stimulation</li> <li>• Balance board</li> </ul>	<ul style="list-style-type: none"> <li>• Brock String</li> <li>• Vectograms</li> <li>• Eccentric Circles</li> <li>• Bernell Tranaglyph TV Stereo Trainer</li> </ul>	<ul style="list-style-type: none"> <li>• Space Fixator</li> <li>• Hart Chart</li> <li>• 4 Charts</li> <li>• Wayne Directional Sequencer</li> <li>• Michigan Tracking</li> </ul>	<ul style="list-style-type: none"> <li>• VO Star Card</li> <li>• Sherman Card</li> <li>• McGraw Card</li> </ul>



Figure 1: Visagraph II™ Equipment Set-Up

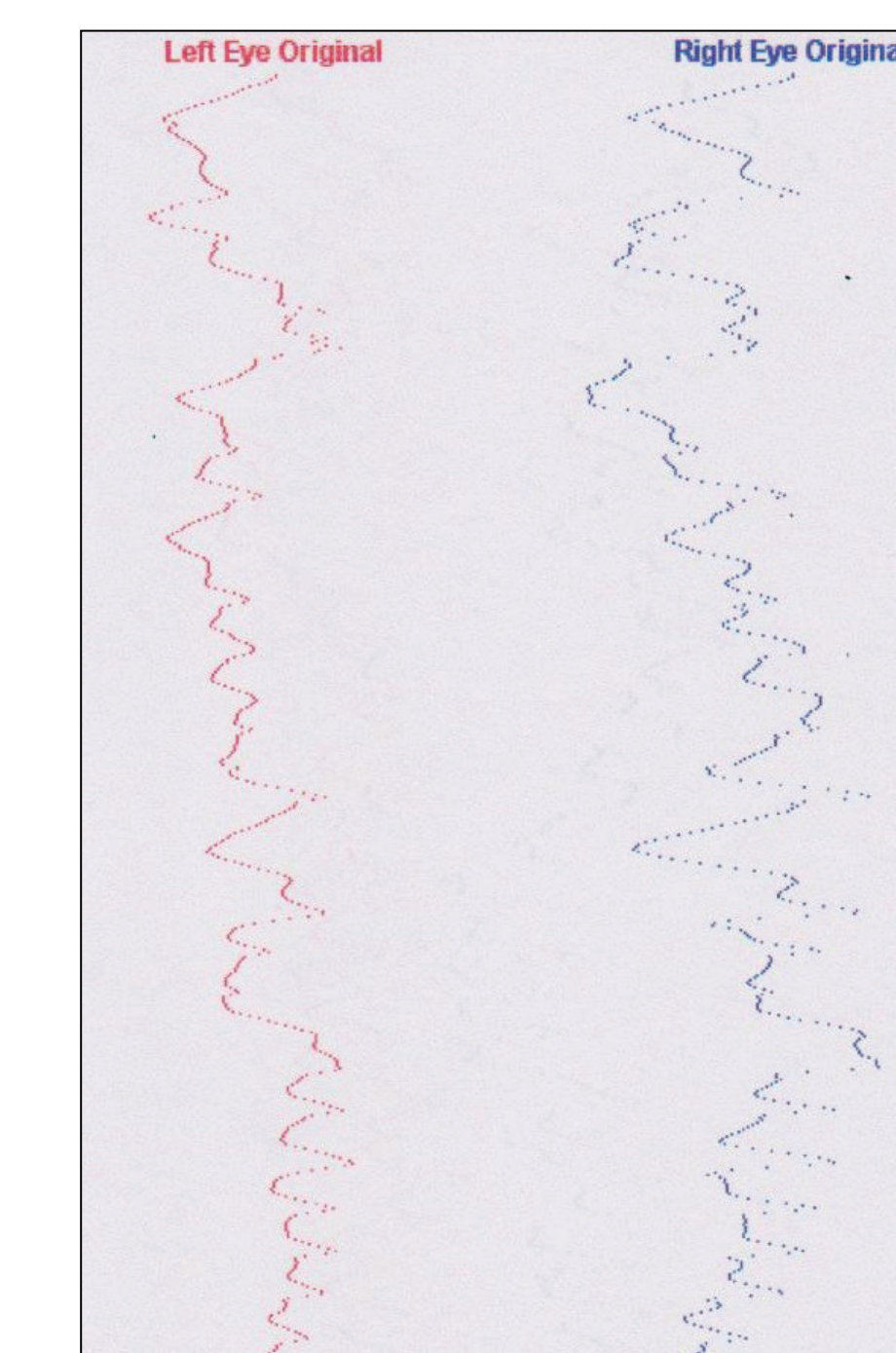


Figure 2. Visagraph Findings Pre-Therapy



Figure 3a. Visagraph Findings after 15 Weeks of Therapy (minimal effort)

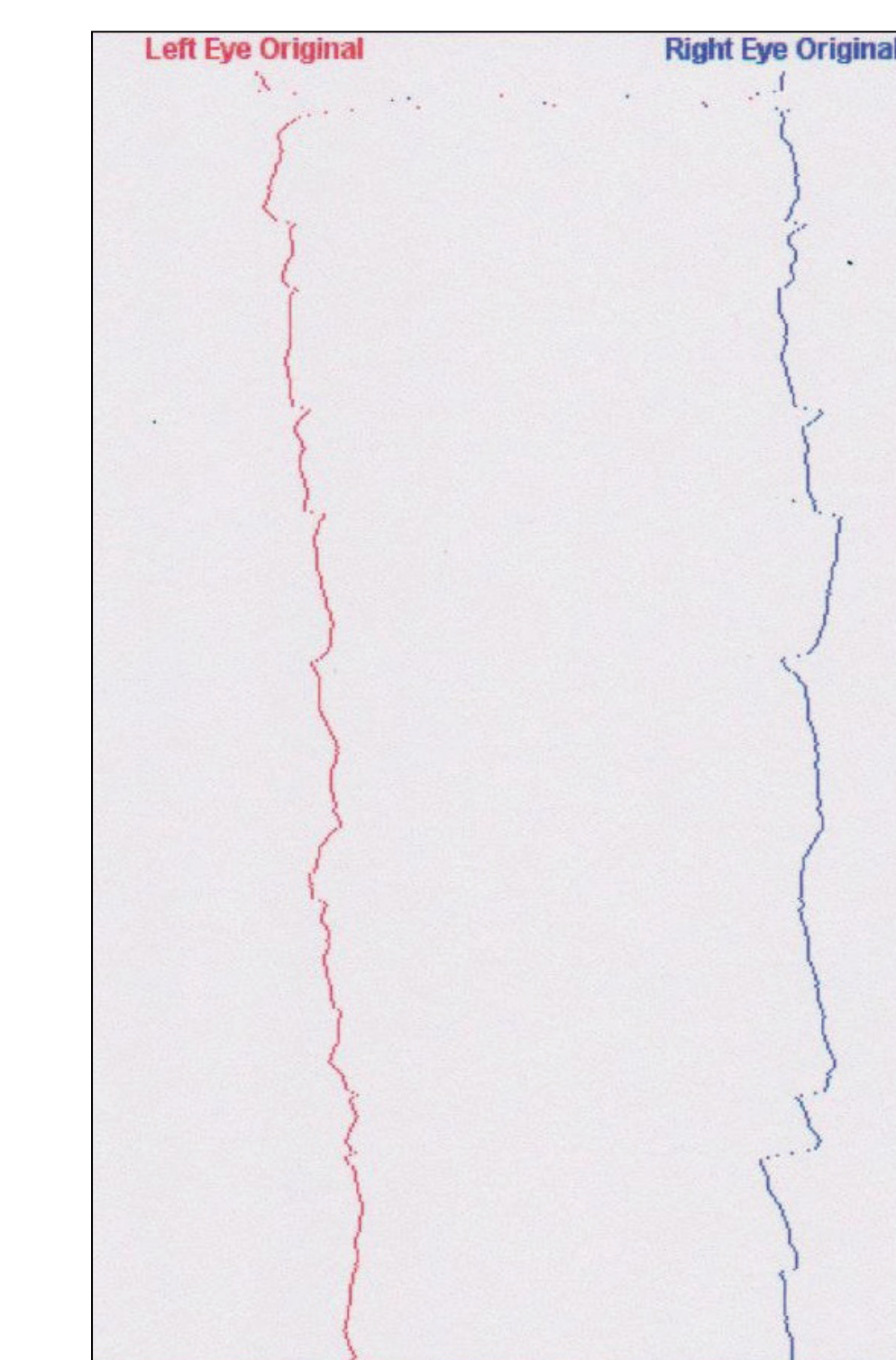


Figure 3b. Visagraph Findings after 15 Weeks of Therapy (best effort)

## CONCLUSION

- Neuro-optometric rehabilitation using the Visagraph II™ for neuro-feedback can be an effective management option for patients with INS.
- Improvement in visual acuity may occur along with reduction in amplitude of the nystagmus.

## REFERENCES

1. Griffin JR, Grisham JD. *Binocular Anomalies Diagnosis and Vision Therapy Third Edition*. Massachusetts: Betterworth-Heinemann, 1995: 248-56.
2. Scheiman M, Wick B. *Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders*. Philadelphia: J.B. Lippincott Company, 1994:509-42.
3. Leigh RJ, Zee DS. *The Neurology of Eye Movements Third Edition*. New York: Oxford University Press, 1999:405-63.
4. Ciuffreda MA, McCann AL, Gruning CF, Ciuffreda KJ. *Multimodal Treatment of Congenital Nystagmus A Case Study*. *Journal of Behavioral Optometry*. 2003;14(4): 143-8.
5. Ciuffreda MA, McCann AL, Gruning CF, Ciuffreda KJ. *Multimodal Treatment of Congenital Nystagmus A Case Study Update*. *Journal of Behavioral Optometry* 2004;15(5):122-3.
6. Ciuffreda KJ, Goldrich SG, Neary C. Use of Eye Movement Auditory Biofeedback in the Control of Nystagmus. *Am J Optom & Physiol Optics* 1982;59(5):396-409.
7. Ordonez XP, Ciuffreda KJ. Reading Eye Movements in Patients with Nystagmus and Proposed Therapeutic Paradigms. *J Behav Optom* 1997;8(4): 99-103.

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