Abstract
Nystagmus presents a significant diagnostic challenge. An overview of nystagmus leads into strategies for evaluating this condition in pediatric and adult patients. Differential diagnostic variables highlight evaluation strategies in differential diagnosis. Management approaches emphasize the role of the optometrist in the care of nystagmus.

I. Overview of Nystagmus
   A. Introduction/Definition
   B. Prevalence
   C. Etiological Considerations
   D. Genetics

CEMAS CLASSIFICATION OF NYSTAGMUS TYPES
Classification of Eye Movement Abnormalities and Strabismus (CEMAS) Involuntary Ocular Oscillations
1. Peripheral Vestibular Imbalance: Meniere, Drug toxicity
2. Central Vestibular Imbalance: Downbeat, Upbeat, Drug toxicity
3. Instability of Vestibular Mechanisms: Periodic Alternating Nystagmus
4. Disorders of Visual Fixation: Vision Loss, See-Saw Nystagmus, Drug toxicity
5. Disorders of Gaze Holding: Gaze Evoked, Acquired Pendular, Drug toxicity
6. Acquired Pendular Nystagmus: Central myelin, Oculopalatal, Whipple, Drug toxicity
7. Saccadic Intrusions and Oscillations: Square Wave Jerks, Macro-saccadic oscillations, opsoclonus, flutter, pulses
8. Miscellaneous Eye Movements: Superior Oblique Myokymia, Ocular motor neuromyotonia
9. Infantile Nystagmus Syndrome: Congenital, motor, sensory, idiopathic, nystagmus blockage
10. Fusion Maldevelopment Nystagmus Syndrome: Old "Latent, manifest latent," nystagmus blockage
11. Spasmus Nutans Syndrome: Without optic pathway glioma, With optic pathway glioma

II. Case History
   A. Onset
   B. Associations (infections, fever, meds, trauma)
   C. Variability (frequency, amplitude, gaze, time characteristics)
D. Symptoms (developmental and neurological factors)
E. General history
F. Family history (genetic factors vs. spontaneous gene mutation)

III. Observations (Slit lamp, Ophthalmoscopy)
A. Global (posture, head position, asymmetry)
B. Type (pendular, jerk, mixed)
C. Direction (horizontal, vertical, rotary; fast phase of jerk)
D. Amplitude (small < 2°; moderate = 2-10°; large > 10°)
E. Frequency (slow <Hz, moderate, fast >2 Hz)
F. Constancy (constant, intermittent, periodic)
G. Conjugacy (conjugate or disjunctive)
H. Symmetry (symmetrical, asymmetrical, monocular)
I. Latency (change with occlusion of either eye)
J. Field of gaze/convergence changes (null point, dampening, increase)

IV. Differential Diagnosis with Video Presentations

A. Infantile Nystagmus Syndrome

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<th>CEMAS CRITERIA FOR INFANTILE NYSTAGMUS SYNDROME</th>
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**Common Associated Findings:**
Conjugate, horizontal-torsional, increases with fixation attempt, progression from pendular to jerk, family history often positive, constant, conjugate, with or without associated sensory system deficits (e.g., albinism, achromatopsia), associated strabismus or refractive error, decreases with convergence, null and neutral zones present, associated head posture or head shaking, may exhibit a "latent" component, "reversal" with OKN stimulus, or (a) periodicity to the oscillation. Candidates on Chromosome X and 6. May decrease with induced convergence, increased fusion, extraocular muscle surgery, contact lenses, and sedation.

**General Comments:**
Waveforms may change in early infancy, head posture usually evident by 4 years of age. Vision prognosis dependent on integrity of sensory system.

B. Spasmus Nutans

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**Common Associated Findings:**
Dysconjugate, asymmetric, multiplanar, family history of strabismus, may be greater in one (aBDucting) eye, constant, head posture/oscillation (horizontal or vertical), usually no associated sensory system deficits, may have associated strabismus and amblyopia, may increase with convergence, head bobbing, head posture may be compensatory. Normal fundus exam. Decreases with increased fusion (binocular function).

**General Comments:**
Usually spontaneously remits clinically in 2-8 years, remains present with eye movement recordings.

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**C. Acquired Nystagmus**
1. Peripheral Vestibular Nystagmus
   a. Vestibular nystagmus
   b. Menieres Disease
   c. Benign Paroxysmal Positional Vertigo
2. Central Vestibular
   a. Downbeat
   b. Upbeat
3. Gaze Evoked Nystagmus
4. Acquired Pendular Nystagmus
   a. Multiple Sclerosis
   b. Oculopalatal myoclonus or tremor
5. Periodic Alternating Nystagmus
6. See-Saw Nystagmus

**V. Treatment Considerations**

It is possible to improve acuity, ocular motor control, cosmesis, and visual comfort using sequential considerations of:
1. correction of refractive error with spectacles or CL’s
2. prisms to improve fusion, induce convergence, and/or reduce a head turn
3. vision therapy to improve fusion capability & enhance stability of fixation
4. surgery to reduce a head turn or increase foveation time
5. medication to dampen the nystagmus and/or reduce oscillopsia

**VI. Optical Management**

A. Best correction
B. Contact lenses
C. Plus adds
D. Yoked prisms
E. Base Out prisms

**VII. Vision Therapy**
A. Orthoptic vision therapy
B. Visual Biofeedback/Auditory Biofeedback
C. Vertical Line Counting

VIII. Medical Management

A. Pharmacological Management: who and when
   1. Clonazepam, Diazepam, Lorazepam (all symptomatic)
   2. Baclofen (Central Vestibular, Acquired Pendular, Periodic Alternating)
   3. Memantine (Central Vestibular, Acquired Pendular, Periodic Alternating)
   4. Gabapentin (Gaze Evoked, Acquired Pendular, Periodic Alternating)
   5. Scopolamine (“sea sickness” symptoms)

B. Surgical Management: who and when
   1. Kestenbaum procedure
   2. Approaches for Nystagmus Blockage Syndrome
   3. Experimental new procedures (Botulinum Toxin, other surgeries)

IX. Summary

Suggested Readings
