Vestibular anatomy and physiology: Complicated signal processing but clinically important

David S. Zee
Department of Neurology, Johns Hopkins School of Medicine

Proposition 1: Vestibular anatomy and physiology are complex and confusing: TRUE
Proposition 2: Vestibular complexity prevents the clinician from correctly diagnosing and treated patients with vestibular disorders: FALSE
Proposition 3: A focused, careful and ordered bedside exam, following a few fundamental physiological principles, allows the general neurologist to successfully manage patients with dizziness, vertigo and imbalance: TRUE
Here we will show, using videos of patients with vestibular disorders, a bedside approach to the history and exam that will enable the general neurologist to be more comfortable tackling these often difficult clinical problems. Our approach will be based on a few fundamental principles of vestibular physiology including 1) Ewald's and Alexander's laws, 2) Patterns of nystagmus elicited by stimulating an individual canal, 3) Effects of fixation upon nystagmus, and 4) Anatomy of otolith and semicircular canal projections to the brainstem and cerebellum. The clinical approach will emphasize a targeted history based on the triggers and duration of spells, and a simple bedside examination focusing on 1) the patterns of eye misalignment (skews and diplopia), 2) the patterns of spontaneous and gaze-evoked nystagmus, 3) bedside oscillopsia and head impulse testing, and 4) the patterns of positional and head-shaking nystagmus. A thorough and informative bedside exam of eye movements and essential vestibular function can be completed in less than 10 minutes!