

# Conclusioni

- La vertigine in PS, seppur raramente, può essere l'espressione di una condizione di rischio grave ma potenzialmente trattabile
- Sindrome vestibolare acuta: neurite vestibolare vs stroke
- La valutazione clinica (o con un minimo supporto strumentale) è meglio della RM
- La TC encefalo solo molto raramente è utile

Diagnosis		Patients No (%)
Peripheral neurologic	↑↑ cardio (6 mo) and cerebro (30 days) risk (Kim SA et al 2011, Lee CC et al 2012).	294 (32)
1. Peripheral vertigo		185 (20)
2. BPPV		78 (9)
3. Vestibular neuritis		27 (3)
4. Meniere disease		4 (<1)
Serious neurologic disease		49 (5)
1. Ischemic stroke		24 (3)
2. TIA		8 (1)
3. Brain neoplasm		6 (1)
4. Intracerebral hemorrhage		5 (1)
5. Seizure		4 (<1)
6. Demyelinating disease		2 (<1)
Other neurologic disease		388 (43)
1. Dizziness NOS		199 (22)
2. Orthostasis/near syncope		121 (13)
3. Migraine		37 (4)
4. Syncope		20 (2)
5. Concussion		11 (1)
Psychiatric conditions		22 (2)
Serious cardiac disease		35 (4)
1. Arrhythmia		22 (2)
2. Hypertensive emergency		10 (1)
3. Acute coronary syndrome		2 (<1)
4. Heart failure		1 (<1)
Other medical condition		119 (13)
1. Drug/substance ingestion/withdrawal		46 (5)
2. Systemic infection		34 (4)
3. Electrolyte disorder		14 (2)
4. Anemia		10 (1)
5. Hypoglycemia		4 (<1)
6. Other		11 (1)

Dizziness without neurological signs or symptoms: 0.7% has a vascular cause

# Target

- Acute vestibular syndrome
  - rapid onset (seconds to hours) of vertigo, nausea/vomiting, and gait unsteadiness in association with head motion intolerance, and nystagmus, lasting days to weeks

# High Risks

- 25% isolated AVS have a vascular origin, and AVS is the condition that most frequently leads to a misdiagnosed stroke (Tehrani A. et al, 2014).
- Mortality is about 40% in ED dizzy patients with a misdiagnosed cerebellar stroke

## Does my dizzy patient have a stroke? A systematic review of bedside diagnosis in acute vestibular syndrome

Alexander A. Tarnutzer MD, Aaron L. Berkowitz MD PhD, Karen A. Robinson PhD, Yu-Hsiang Hsieh PhD, David E. Newman-Toker MD PhD

*CMAJ* 2011. DOI:10.1503/  
cmaj.100174

### KEY POINTS

- The most common causes of acute vestibular syndrome are vestibular neuritis (often called labyrinthitis) and ischemic stroke in the brainstem or cerebellum.
- Vertebrobasilar ischemic stroke may closely mimic peripheral vestibular disorders, with obvious focal neurologic signs absent in more than half of people presenting with acute vestibular syndrome due to stroke.
- Computed tomography has poor sensitivity in acute stroke, and diffusion-weighted magnetic resonance imaging (MRI) misses up to one in five strokes in the posterior fossa in the first 24–48 hours.
- Expert opinion suggests a combination of focused history and physical examination as the initial approach to evaluating whether acute vestibular syndrome is due to stroke.
- A three-component bedside oculomotor examination — HINTS (horizontal head impulse test, nystagmus and test of skew) — identifies stroke with high sensitivity and specificity in patients with acute vestibular syndrome and rules out stroke more effectively than early diffusion-weighted MRI.

## **HINTS to Diagnose Stroke in the Acute Vestibular Syndrome : Three-Step Bedside Oculomotor Examination More Sensitive Than Early MRI Diffusion-Weighted Imaging**

Jorge C. Kattah, Arun V. Talkad, David Z. Wang, Yu-Hsiang Hsieh and David E. Newman-Toker

*Stroke*. 2009;40:3504-3510; originally published online September 17, 2009;  
doi: 10.1161/STROKEAHA.109.551234

*Stroke* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Copyright © 2009 American Heart Association, Inc. All rights reserved.

Print ISSN: 0039-2499. Online ISSN: 1524-4628

HINTS:	sensitivity 100%	specificity 96%
Early MRI with DWI:	sensitivity 72%	specificity 100%

HINTS to INFARCT: Impulse (test) Normal, Fast (phase) Alternating, Refixation on Cover Test

# DIAGNOSIS

H(ead)I(mpulse)N(ystagmus)T(est for)S(kew)

- Nystagmus
  - Peripheral = Horizontal(-torsional), unidirectional, multipositional
  - **CNS** = horizontal, direction changing (bidirectional, pluripositional) → gaze evoked nystagmus (*+ vertical or torsional*)
- Head impulse test (**normal / untestable**)
- Cover test per skew deviation (**refixation movement / untestable**)

# **HINTS - NYSTAGMUS**



# Vestibular ocular motor connections

	Normal		Left Out	
	right	left	right	left
<b>Lateral</b>	→	←	→	
<b>Anterior</b>	↑ ∩ ▼	↑ ▼ ∩	↑ ∩ ▼	
<b>Posterior</b>	↓ ∩ ▼	↓ ▼ ∩	↓ ∩ ▼	
<b>L + A + P</b>	→ ∩ ▼	← ▼ ∩	→ ∩ ▼	
<b>Right + Left</b>	0		→ ∩ ▼	

# Vestibular ocular motor connections

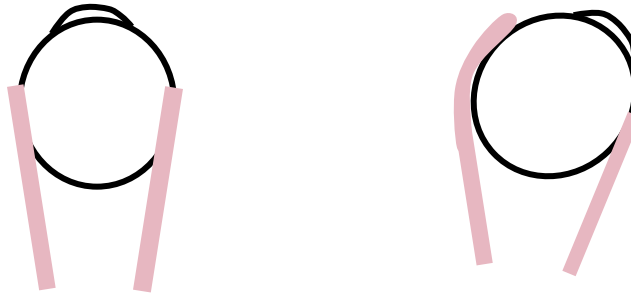
	Normal		Posteriors Out	
	right	left	right	left
Lateral	→	←	→	←
Anterior	↑ ∩ ▼	↑ ▼ ∩	↑ ∩ ▼	↑ ▼ ∩
Posterior	↓ ∩ ▼	↓ ▼ ∩		
L + A + P	→ ∩ ▼	← ▼ ∩	↑	↑
Right + Left	0		↑↑	

# Peripheral Spontaneous Nystagmus

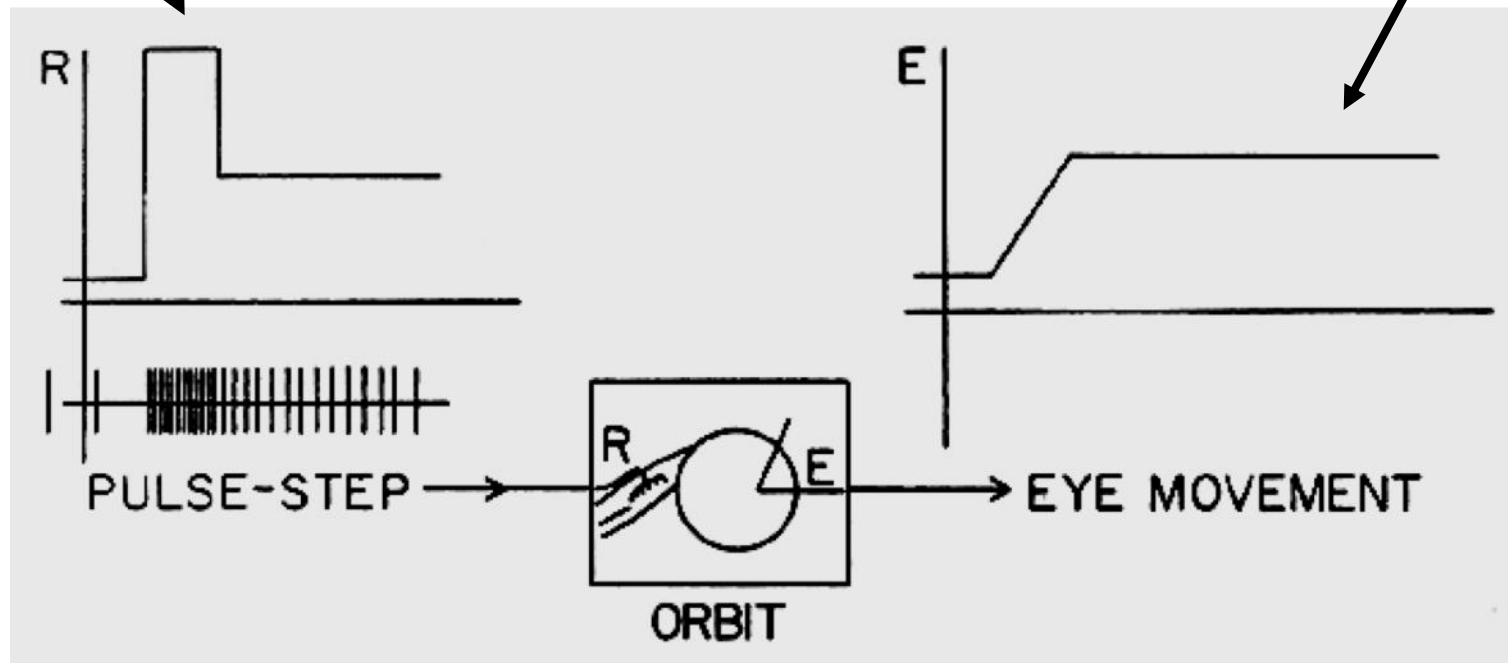
- Horizontal torsional
- Unidirectional: direction does not change depending on eye position
- Reduced by visual fixation, enhanced when visual fixation is removed (pen-light test)

What drives the saccade: Pulse-Step of innervation:  
PULSE moves the eye rapidly during the saccade and  
STEP holds the eye in position at end of the saccade

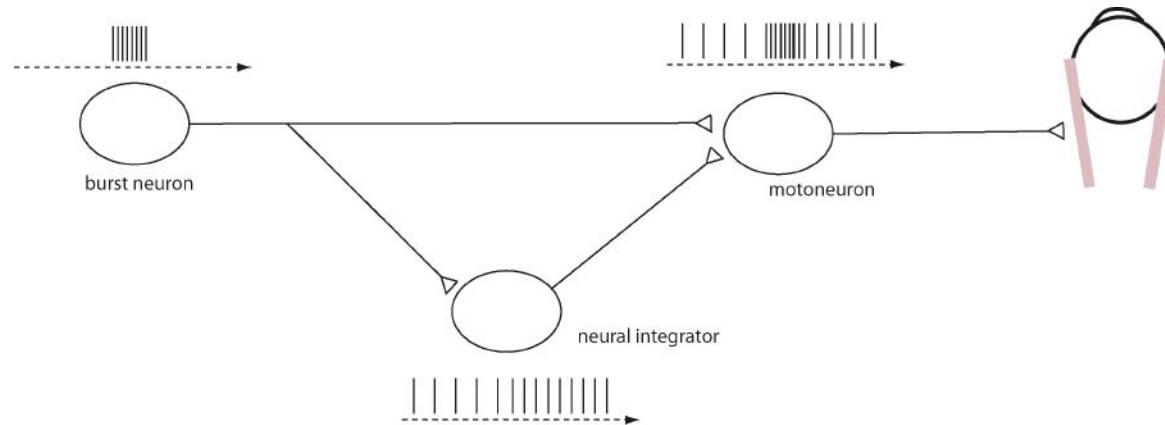
**Pulse**



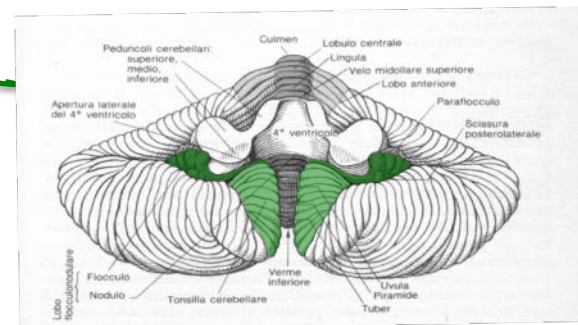
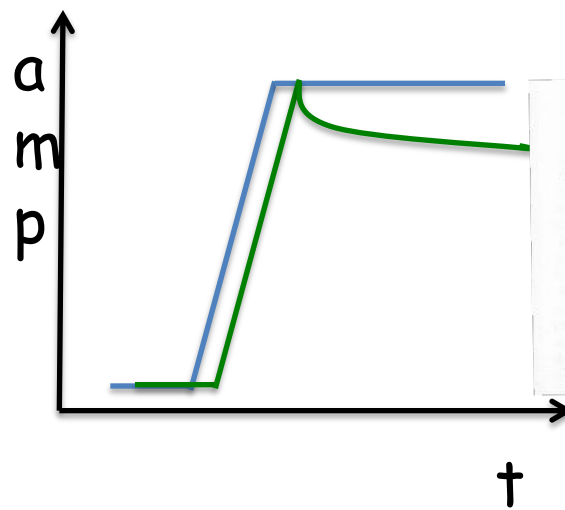
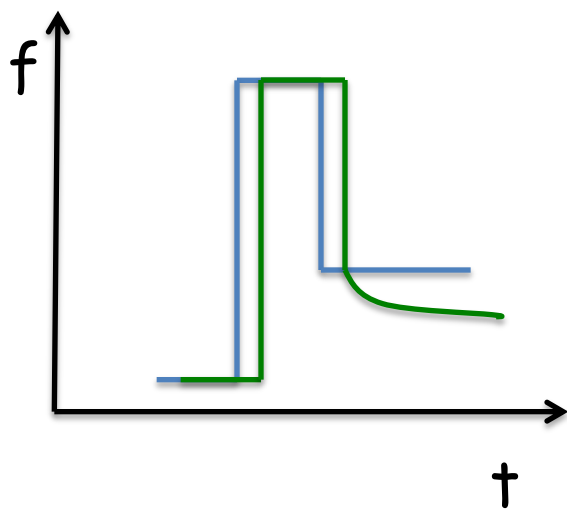
**Step**



# Brainstem Saccade Generator



	Horizontal (pons)	Vertical (midbrain)
Burst neurons	Paramedian pontine reticular formation (PPRF)	Rostral interstitial nucleus of the MLF (riMLF)
Neural integrator	Medial vestibular nucleus/nucleus prepositus hypoglossi	Interstitial nucleus of Cajal (INC)

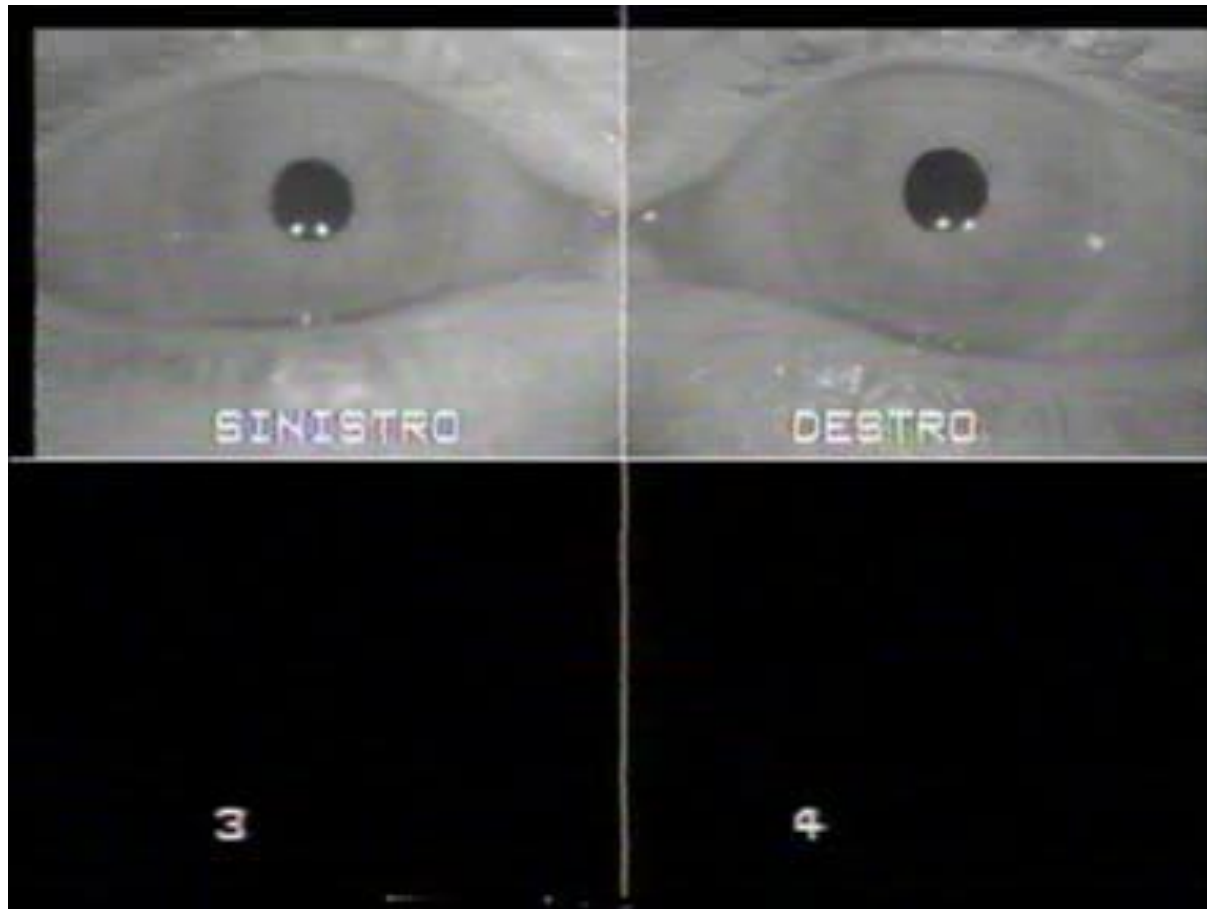


# Gaze-Evoked Nystagmus

- nystagmus in lateral and/or upward and/or downward gaze beating toward gaze direction
- not influenced by visual fixation

lesion: flocculus

# Gaze-evoked and rebound nystagmus





# (physiological) end-point nystagmus

- in far-lateral gaze only
- small amplitude
- influenced (usually reduced) by visual fixation
- not associated to other floccular or cerebellar signs

# Nystagmus too neurological to be considered by HINTS

- Down-beating Ny
- Up-beating Ny
- Torsional Ny
- Internuclear ophthalmoplegia
- Pendular Ny

# **HINTS – HEAD IMPULSE TEST**

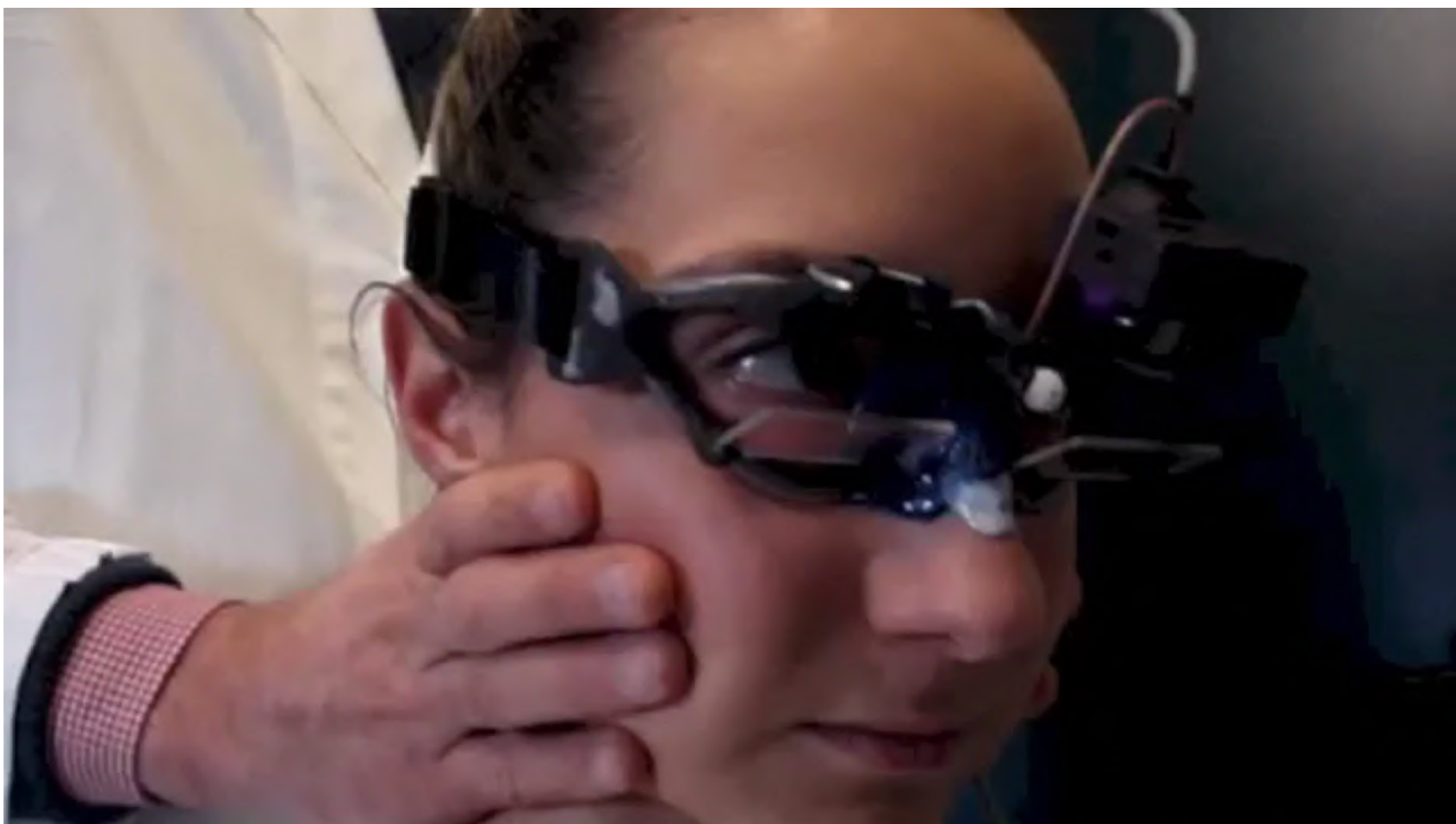
# Head impulse test

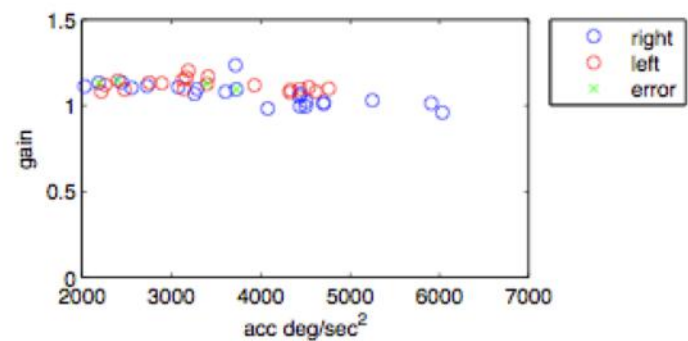
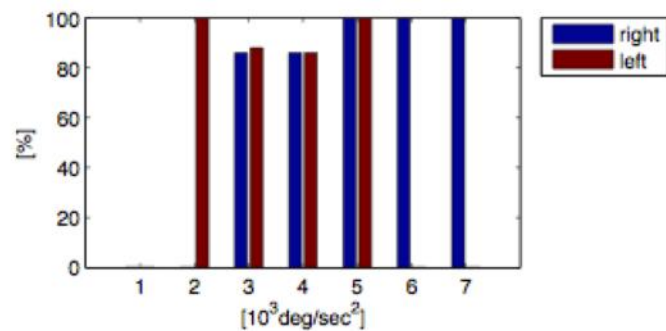
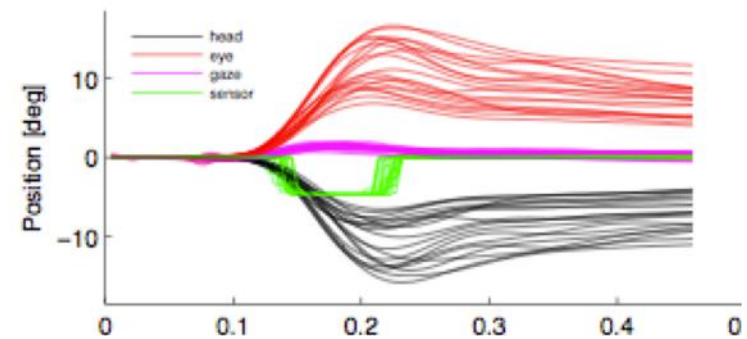
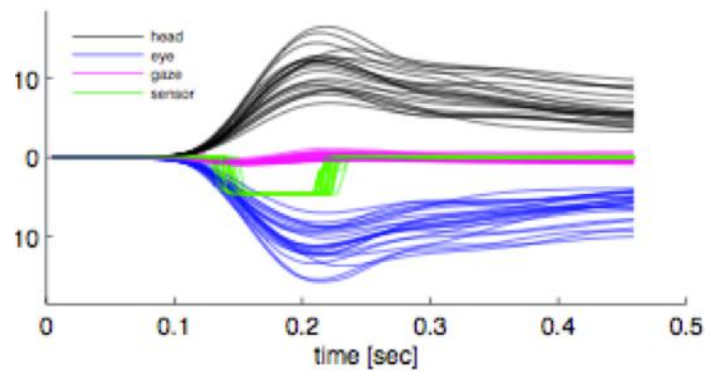
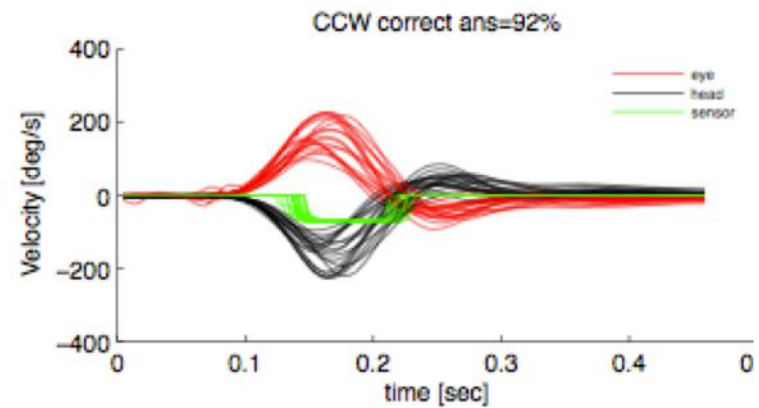
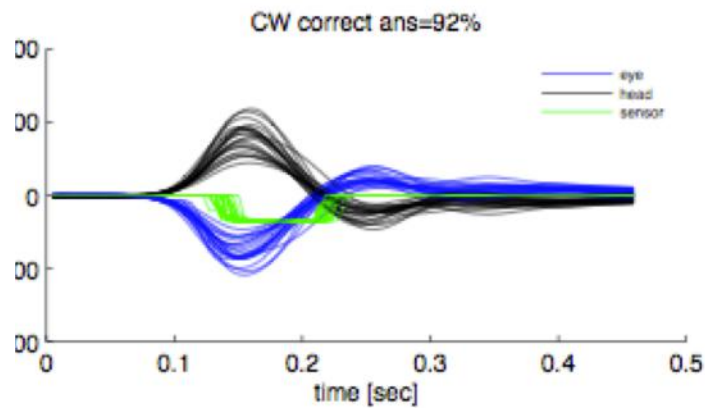
- Brisk head turn while looking at a target (the examiner's nose)
- When the head is stopped, the examinee looks at the subject's eyes
  - The VOR is normal:
    - No eye movement
  - The VOR is defective (the eyes move less than the head)
    - A saccade in the opposite direction with respect to head turn
  - The VOR is hyperactive (the eyes move more than the head)
    - A saccade in the same direction with respect to head turn

# Head impulse test



- <http://www.cbsnews.com/video/watch/?id=50142278n> - sthash.ipD3bfzn.dpuf

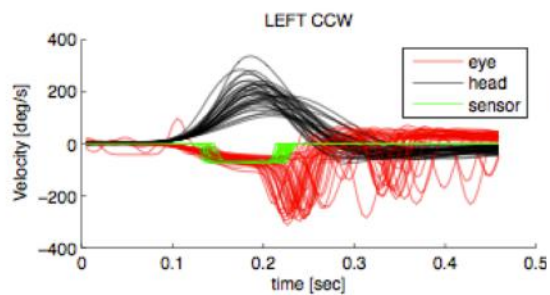
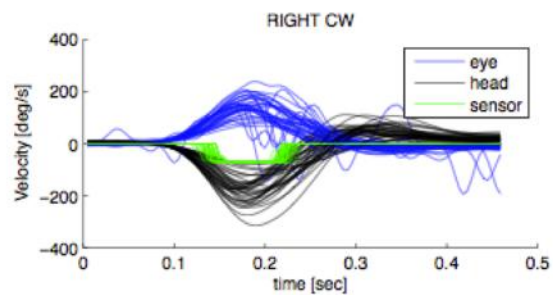




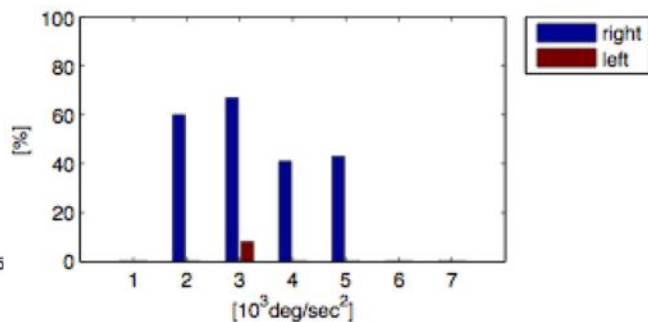
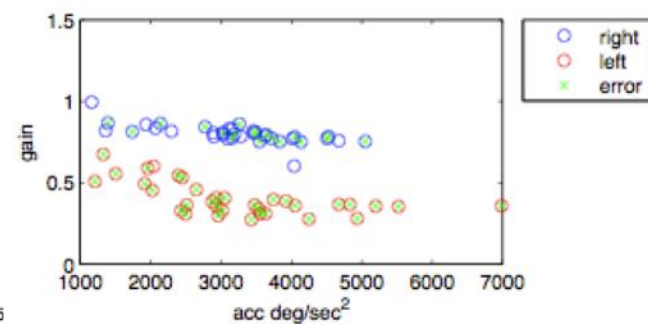
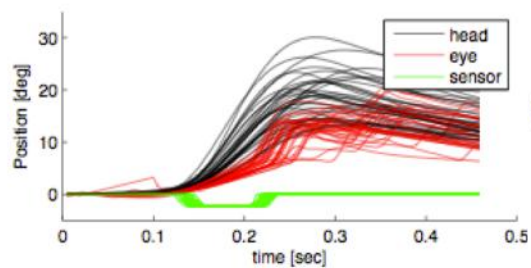
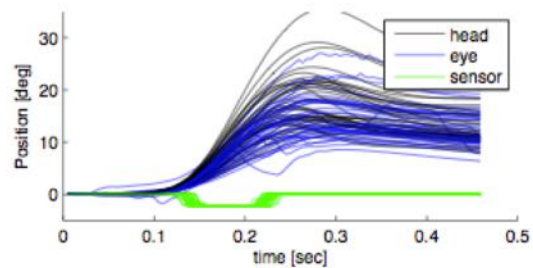
Percentage of correct answers

$$\text{Gain} = \frac{\text{eye velocity}}{\text{head velocity}}$$





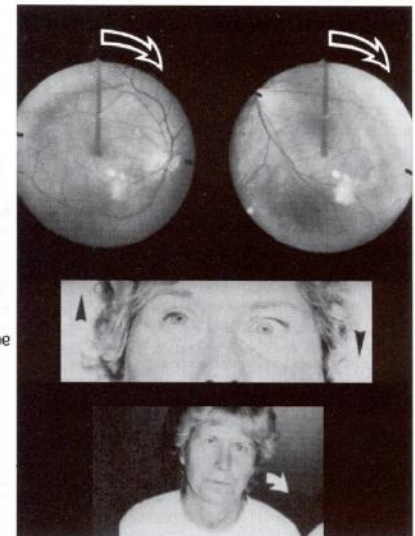
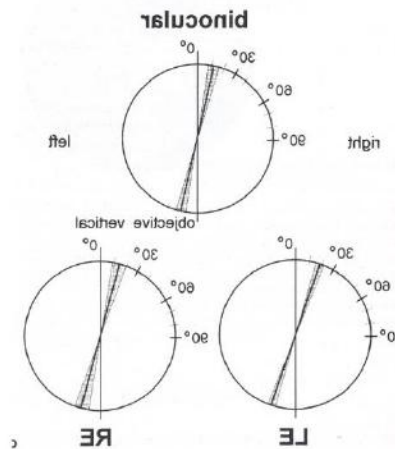
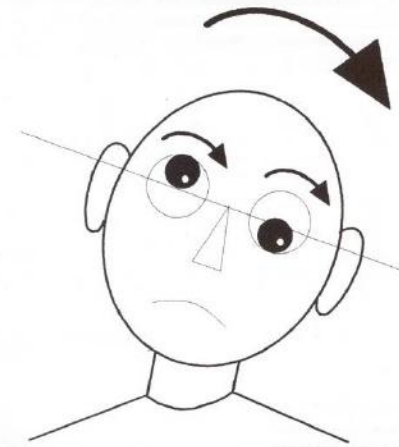
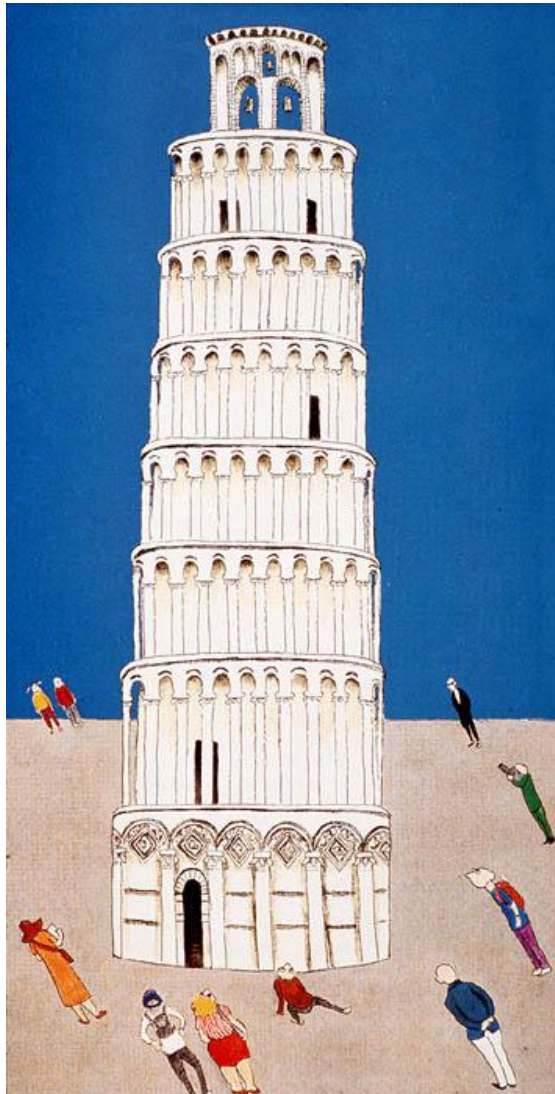
gain CW:0.80 std:0.06  
gain CCW:0.40 std:0.10



correct ans CW:47%  
correct ans CCW:3%

# **HINTS – TEST OF SKEW**

# OCULAR TILT REACTION

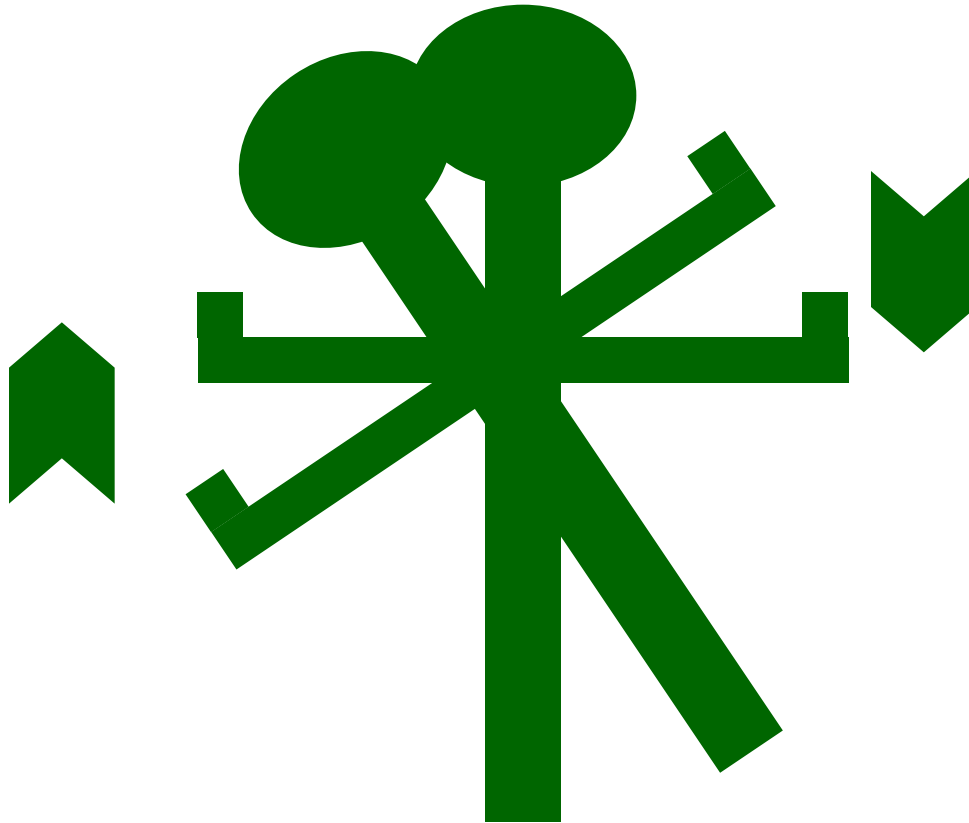


# OTR – SKEW DEVIATION

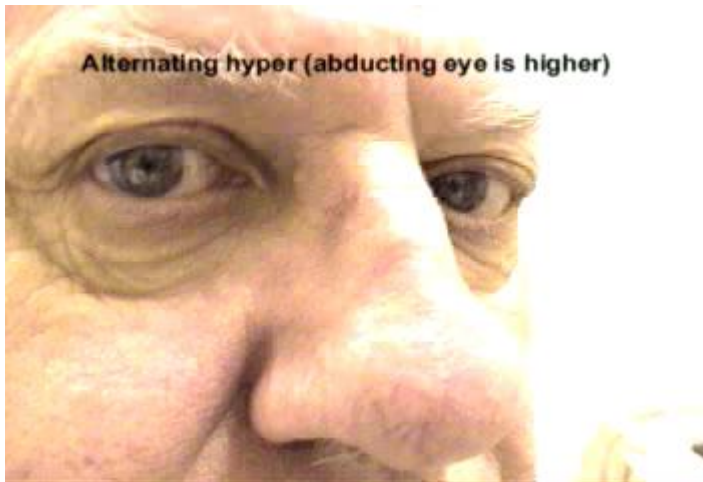
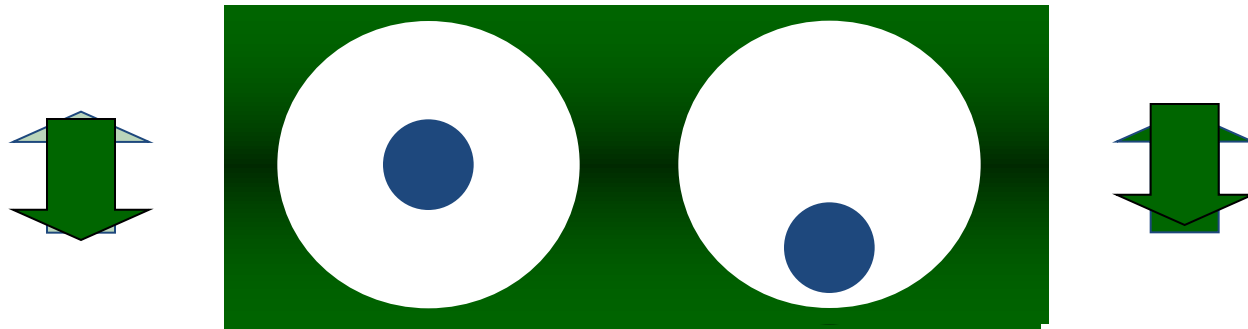
## **Acquired vertical comitant misalignment**

Ocular misalignment = diplopia

OTR



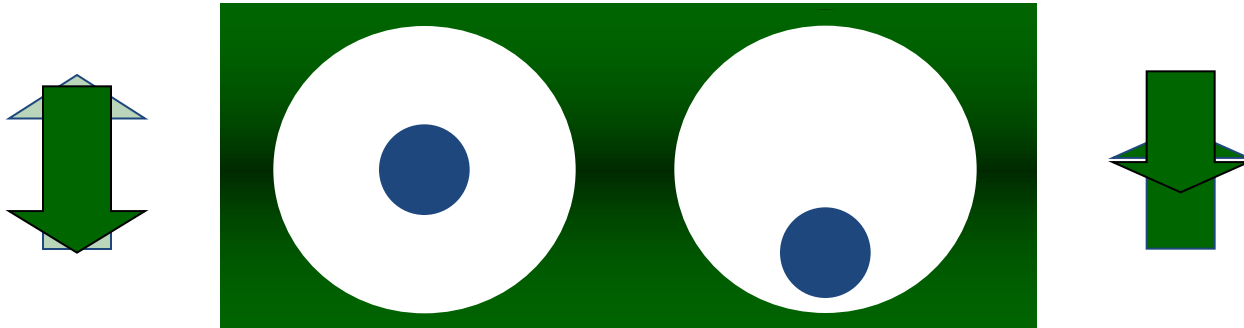
# Skew deviation: cover test



# Skew deviation: cover test



# Ophthalmoparesis: cover test







# DIAGNOSIS

H(ead)I(mpulse)N(ystagmus)T(est for)S(kew)

- Vestibular Neuritis
  - *Peripheral* nystagmus **AND** *Abnormal* HIT **AND** *Normal* Cover test
- Stroke
  - *GE* nystagmus **OR** *Normal* HIT **OR** *Refixation on* Cover test

# Risk evaluation

## ABCD2 Score and TIA

Predictors	Point
Age	A >60 years =1
Blood pressure	B systolic $\geq 140$ mmHg, diastolic $\geq 90$ mmHg = 1
Clinical features	C Unilateral weakness = 2 Speech disturbance without weakness = 1 Any other symptom = 0
Duration of symptoms	D <10 min =0 10-59 min=1 $\geq 60$ min=2
Diabetes	D present = 1

Score	2-day risk
0-1	0%
2-3	1.3%
4-5	4.1%
6-7	8.1%

	<b>Sensitivity</b>	<b>Specificity</b>	<b>NLR central cause (95% CI)</b>
<b>ABCD2&gt;4</b>	58%	61%	0.69 (0.52-0.92)
<b>HIT</b>	91%	100%	0.09 (0.05-0.16)
<b>HINTS</b>	97%	98%	0.03 (0.01-0.09)
<b>HINTS plus</b>	99%	97%	0.01 (0.0-0.06)

	<b>Sensitivity</b>	<b>Specificity</b>	<b>NLR Stroke only (95% CI)</b>
<b>ABCD2&gt;4</b>	61%	62%	0.62 (0.47-0.83)
<b>HIT</b>	90%	87%	0.11 (0.06-0.2)
<b>HINTS</b>	96%	84%	0.04 (0.02-0.11)
<b>HINTS plus</b>	99%	83%	0.01 (0.0-0.08)

# HINTS

- INFARCT
  - Impulse (test) Normal, **F**ast (phase) **A**lternating, **R**efixation on **C**over **T**est
- SEND HIM ON HOME
  - SEND: **S**traight **E**ye (=no skew) **N**o **D**eafness
  - HIM: **H**ead **I**mpulse **M**isses (=full amplitude saccade)
  - ON: **O**ne-way **N**ystagmus
  - HOME: **H**ealthy **O**ptic and **M**astoid **E**xamination

# more than HINTS

- Age > 60 years
- ABCD2 score > 4
- Headache
- “Subtle” neurological (*ocular motor*) signs
- Truncal and gait ataxia
- Unable to keep upright position unassisted (STANDING)
- Positive tandem test





**Table 2. Pretest and Post-Test Probabilities of Stroke Using Different Tests to Rule Out Stroke in the Spontaneous Acute Vestibular Syndrome**

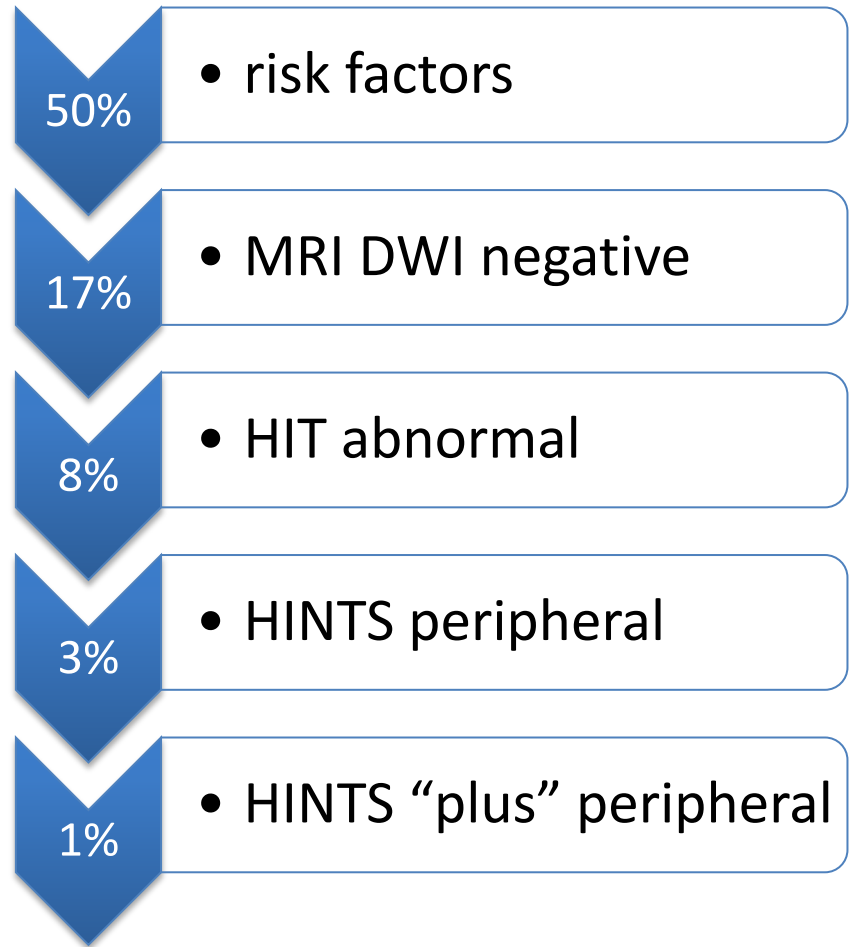
	Post-Test Probability of Stroke Following a Negative Test Obtained in First 24 h			
Pretest probability of stroke (vascular risk profile)	General neuro examination (Sn, 19% <sup>56</sup> ; Sp, 95%; NLR, 0.85)	CT brain (Sn, 16% <sup>13</sup> ; Sp, 98% <sup>13</sup> ; NLR, 0.86)	MRI-DWI brain (Sn, 80% <sup>55</sup> ; Sp, 96% <sup>13</sup> ; NLR, 0.21)	HINTS+Battery (Sn, 99% <sup>58</sup> ; Sp, 97% <sup>58</sup> ; NLR, 0.01)
10% (low)	8.7%	8.7%	2.3%	0.1%
25% (average <sup>55</sup> )	22.2%	22.3%	6.5%	0.3%
50% (high)	46.1%	46.2%	17.2%	0.8%
75% (very high)	71.9%	72.1%	38.5%	2.4%

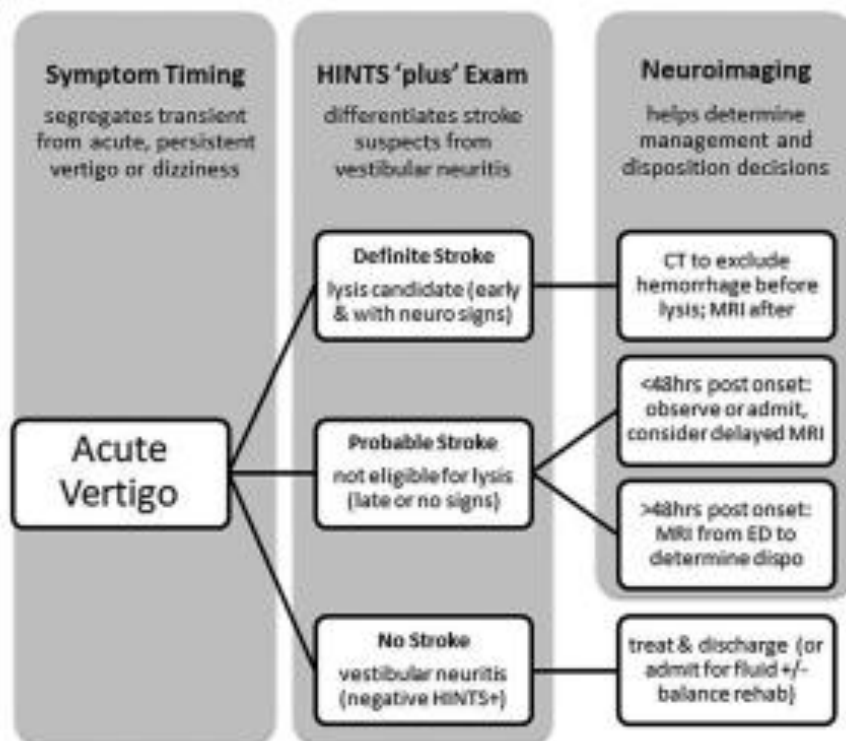
CT indicates computed tomography; HINTS, head impulse, nystagmus, test of skew, plus hearing; MRI-DWI, magnetic resonance imaging with diffusion-weighted imaging; NLR, negative likelihood ratio; Sn, sensitivity; and Sp, specificity.

Adapted from Newman-Toker et al<sup>23</sup> with permission. Copyright ©2015, Georg Thieme Verlag KG.

# Neuroimaging

- Stroke lateral brainstem / cerebellum
- acute stage (48 hours)
  - sensibility TC: 7% (Ozono et al. 2014)
  - sensibility MRI DWI: 80
    - 90% (Tarnutzer et al., 2011; Kim et al., 2013)



**B**

# Vertigo syndromes

Benign Paroxysmal Positional Vertigo 19.6%

(lifelong prevalence 2.4%, ED prevalence 10%)

Psychogenic Vertigo	15.9%
---------------------	-------

“Central Vertigo”	14.5%
-------------------	-------

Vestibular Migraine	07.9%
---------------------	-------

Menière’s disease	07.5%
-------------------	-------

Vestibular neuritis	06.7%
---------------------	-------

Bilateral vestibulopathy	02.6%
--------------------------	-------

# Medico d'urgenza

**Medico di urgenza – Caratteristiche anamnestiche – Nota: se SI alle domande 2 e/o 9 considera ORL per manovre diagnostiche e liberatorie per vertigine parossistica**

1)	In questo momento ha la vertigine? Vedo le cose che ruotano	SI
	Mi sento ruotare	SI
	Mi sembra di cadere	SI
	Mi sento instabile	SI
		NO
2)	Ha la vertigine solo se si muove, cambia posizione della testa, (Stando fermo il disturbo passa, si attenua significativamente)	SI
		NO
3)	In questo momento ha altri disturbi (mancanza di forza o sensibilità a un braccio e/o a una gamba, ha difficoltà a parlare, vede doppio - se SI descrivere nelle note)?	SI
		NO
4)	In questo momento ha mal di testa o mal di collo?	SI
		NO
5)	Con la vertigine ha sentito un rumore ad un orecchio e/o le sembrava di sentire meno e/ o l'orecchio sembrava pieno ?	SI
		NO
6)	E' la prima volta che ha questa vertigine?	SI
		NO
7)	Ha avuto recenti traumi?	SI
		NO
8)	Mentre ha la vertigine e gli occhi aperti vede muovere le cose?	SI
		NO
9)	Ha la vertigine intensa solo quando muove la testa o quando si sdraia nel letto?	SI
		NO
10)	Ha la vertigine quando tiene la testa ferma?	SI
		NO
11)	Ha la vertigine solo quando è in piedi?	SI
		NO
12)	Ha assunto di recente o sta assumendo: gentamicina, litio, carbamazepina?	SI
		NO

NOTE

NEUROLOGO \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NOTE

OTORINO \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Medico d'urgenza

**Medico di urgenza – Valutazione generale – Nota: se SI ad una domanda, procedere alla normalizzazione prima di riconsiderare il paziente per una valutazione ulteriore**

1)	E' presente un'alterazione significativa dell'EO, dei parametri vitali (PA, FC, Temperatura)?	SI
		NO
2)	E' presente bradi- o tachi-cardia?	SI
		NO
3)	Sono presenti delle alterazioni di significato ischemico acuto)	SI
		NO
4)	E' presente ipotensione ortostatica?	SI
		NO

# Medico d'urgenza

## Medico di urgenza – Valutazione neurologica –

1)	E' presente un deficit di forza in almeno dei quattro arti?	SI	→ NEUROLOGO
		NO	
2)	E' presente un deficit del VII nervo cranico?	SI	→ NEUROLOGO (Se isolato e periferico considera ORL)
		NO	
3)	E' presente disartria?	SI	→ NEUROLOGO
		NO	
4)	E' presente una alterazione della coordinazione in almeno uno dei quattro arti?	SI	→ NEUROLOGO
		NO	
5)	E' presente l'impossibilità di mantenere la stazione eretta senza aiuto?	SI	→ NEUROLOGO
		NO	
5)	E' presente ipo/anacusia?	SI	→ NEUROLOGO
		NO	

# Medico d'urgenza

## Medico di urgenza – Valutazione vestibolare –

1)	E' presente nistagmo in qualche posizione di sguardo?	SI NO	→ ANALIZZA NY (da 2 a 5) ◇ CONSIDERA 6)
2)	Il nistagmo è verticale?	SI NO	→ NEUROLOGO ◇ CONSIDERA 3)
3)	Il nistagmo è orizzontale?	SI NO	→ CONSIDERA 4) → CONSIDERA 6)
4)	Il nistagmo orizzontale batte nella stessa direzione in tutte le posizioni di sguardo in cui è presente	SI NO	→ OTORINO ◇ CONSIDERA 5)
5)	Il nistagmo cambia direzione in funzione della posizioni di sguardo (batte a destra nello sguardo verso destra, a sinistra nello sguardo verso sinistra)	SI NO	→ NEUROLOGO ◇ CONSIDERA 6)
6)	Nessuna delle precedenti		→NEUROLOGO



# Neurologo

## Neurologo

1)	Sono presenti deficit focali ai quattro arti?	SI NO
2)	Sono presenti deficit dei nervi cranici?	SI NO
3)	Sono presenti saccadi ipermetrici che e/o alterazione dei movimenti d'inseguimento lenti?	SI NO
4)	E' presente atassia segmentaria ?	SI NO
5)	E' presente disartria?	SI NO
6)	La prova del funambolo è correttamente eseguita?	SI NO
7)	HINTS "centrale"?	SI NO

ESAME VESTIBOLARE – HINTS (Head Impulse, Nystagmus, Test for skew)

Almeno uno indica un pattern centrale:

1) impulse test normale

2) presenza di nistagmo verticale, torsionale, evocato dallo sguardo, orizzontale non inibito dalla fissazione

3) presenza di skew deviation

Conclusioni diagnostiche, suggerimenti diagnostici e terapeutici per il medico urgentista

Necessità di ricovero

NO ☐

SI ☐

## Otorino

Da 1-3 se non è presente nistagmo spontaneo

Da 4 –8 la risposta NO suggerisce la necessità di valutazione neurologica

1)	La manovra di Dix-Hallpike è positiva?	SI
		NO
2)	La manovra di Mc Clure è positiva?	SI
		NO
3)	Le manovre liberatorie sono risultate efficaci?	SI
		NO
4)	Lo studio del nistagmo sotto lenti di Frenzel evidenzia un nistagmo orizzonto-rotatorio monodirezionale pluriposizionale inibito dalla fissazione?	SI
		NO
5)	L'head impulse test è positivo?	SI
		NO
6)	L'head shaking test è positivo (risposta periferica: ny orizzontale, rinforzo ny spontaneo)	SI
		NO
7)	Ice water test positivo?	SI
		NO
8)	HINTS "periferico"	SI
		NO

ESAME VESTIBOLARE – HINTS (Head Impulse, Nystagmus, Test for skew)

Periferico se: 1) impulse test alterato **E** 2) presenza di nistagmo orizzonto(rotatorio) monodirezionale e pluriposizionale **E** 3) assenza di skew deviation

Conclusioni diagnostiche, suggerimenti diagnostici e terapeutici per il medico urgentista

Necessità di ricovero

NO ☐

SI ☐

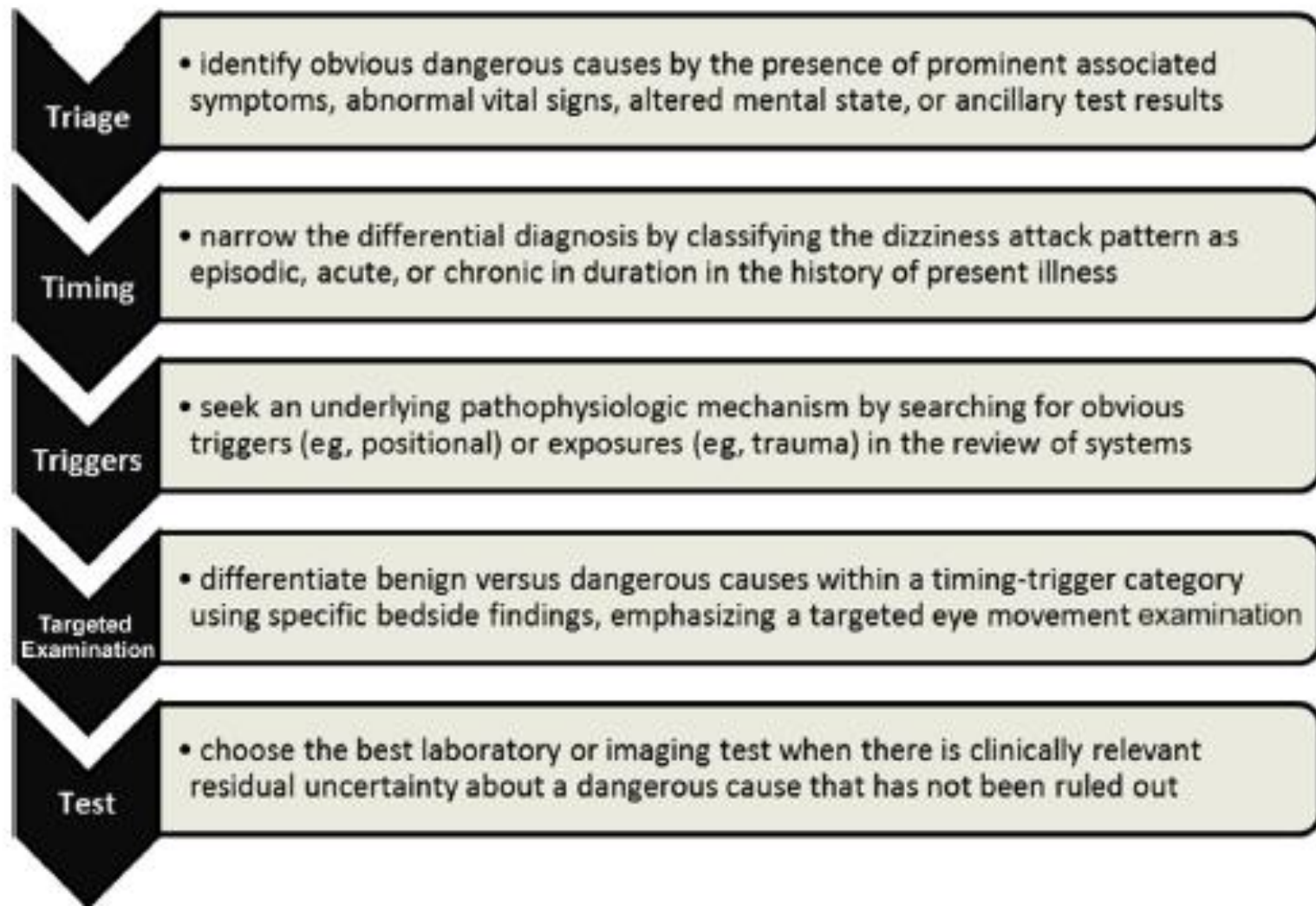
# Topical Review

**Table 3. Ten Pitfalls and Pearls in the Diagnosis of Stroke in Acute Dizziness and Vertigo**

Pitfall	Pearl	Notes
True vertigo implies an inner ear disorder.	Focus on timing and triggers, rather than type.	Cerebrovascular disorders frequently present with true vertigo symptoms. <sup>62,63</sup>
Worse with head movement implies peripheral.	Differentiate triggers from exacerbating factors.	Acute dizziness/vertigo is usually exacerbated by head movement, whether peripheral or central. <sup>51</sup>
Auditory symptoms imply a peripheral cause.	Beware auditory symptoms of vascular cause.	Lateral pontine and inner ear strokes often cause tinnitus or hearing loss. <sup>46,48,58</sup>
Diagnose vestibular migraine when headaches accompany dizziness.	Inquire about headache characteristics and associated symptoms.	Sudden, severe, or sustained pain in the head or neck may indicate aneurysm, dissection, or other vascular pathology; <sup>51</sup> photophobia may point to migraine. <sup>52</sup>
Isolated vertigo is not a TIA symptom.	Some TIA definitions do not recognize certain transient vertebrobasilar neurological symptoms (including isolated vertigo) as TIAs.	Isolated vertigo is the most common vertebrobasilar warning symptom before stroke <sup>11,44</sup> ; it is rarely diagnosed correctly as a vascular symptom at first contact. <sup>7,11</sup>
Strokes causing dizziness or vertigo will have limb ataxia or other focal signs.	Focus on eye exams: VOR by head impulse test, nystagmus, eye alignment.	Fewer than 20% of stroke patients presenting with AVS have focal neurological signs. <sup>55,56</sup> NIH stroke scales of 0 occur with posterior circulation strokes. <sup>64</sup>
Young patients have migraine rather than stroke.	Do not overfocus on age and vascular risk factors. Consider vertebral artery dissection in young patients.	Vertebral artery dissection mimics migraine closely <sup>50</sup> ; young patients 18–44 with stroke are 7-fold more likely to be misdiagnosed than patients over age 75. <sup>9</sup>
CT is needed to rule out cerebellar hemorrhage in patients with isolated acute dizziness or vertigo.	Intracerebral hemorrhage rarely mimics benign dizziness or vertigo presentations.	Only 2.2% (n=13/595) of intracerebral hemorrhages presented with dizziness or vertigo and only 0.2% (n=1/595) presented with isolated dizziness. <sup>65</sup>
CT is useful to search for acute posterior fossa stroke.	Recognize the limitations of imaging, especially CT.	Although some retrospective studies <sup>66,67</sup> suggest CT may be up to 42% sensitive, prospective studies suggest the sensitivity is no higher than 16%. <sup>13,68</sup>

# TiTrATE

## A Novel, Evidence-Based Approach to Diagnosing Acute Dizziness and Vertigo



**Box 1****International consensus definitions for major vestibular symptoms<sup>5,6</sup>**

Dizziness is the sensation of disturbed or impaired spatial orientation without a false or distorted sense of motion. This includes sensations sometimes referred to as giddiness, lightheadedness, or nonspecific dizziness but does not include vertigo.

Presyncope (also near-syncope or faintness) is the sensation of impending loss of consciousness. This sensation may or may not be followed by syncope. When patients report "lightheadedness," it should be classified as presyncope, dizziness, or both.

Syncope (also faint) is transient loss of consciousness due to transient global cerebral hypoperfusion characterized by rapid onset, short duration, and spontaneous complete recovery. Syncope usually leads to loss of postural control and falling.

Vertigo is the sensation of self-motion (of head/body) when no self-motion is occurring or the sensation of distorted self-motion during an otherwise normal head movement.

Unsteadiness is the feeling of being unstable while seated, standing, or walking without a particular directional preference. This sensation has previously been called disequilibrium or imbalance.

# TiTrATE

## A Novel, Evidence-Based Approach to Diagnosing Acute Dizziness and Vertigo

David E. Newman-Toker, MD, PhD<sup>a,\*</sup>, Jonathan A. Edlow, MD<sup>b</sup>

Neurol Clin 33 (2015) 577–599

**Table 1**  
**Timing-and-trigger-based vestibular<sup>a</sup> syndromes**

Timing	Obligate Triggers <sup>b</sup> Present	No Obligate Triggers <sup>b</sup>
New, episodic	t-EVS (eg, BPPV)	s-EVS (eg, cardiac arrhythmia)
New, continuous	t-AVS (eg, post gentamicin)	s-AVS (eg, posterior fossa stroke)
Chronic, persistent	Context-specific chronic vestibular syndrome (eg, uncompensated unilateral vestibular loss, present only with head movement)	Spontaneous chronic vestibular syndrome (eg, chronic, persistent dizziness associated with cerebellar degeneration)



# Topical Review

## Diagnosing Stroke in Acute Dizziness and Vertigo Pitfalls and Pearls

Ali S. Saber Tehrani, MD; Jorge C. Kattah, MD; Kevin A. Kerber, MD, MS;  
Daniel R. Gold, DO; David S. Zee, MD; Victor C. Urrutia, MD; David E. Newman-Toker, MD, PhD

**Table 1. Cerebrovascular Causes Linked to 4 Acute Dizziness/Vertigo Syndromes**

Syndrome	TIA	Ischemic Stroke	Hemorrhage
t-EVS (brief, repetitive)	Rotational vertebral artery syndrome <sup>30</sup>	CPPV from small ischemic strokes near the fourth ventricle <sup>31</sup>	CPPV from small hemorrhages near the fourth ventricle <sup>32</sup>
s-EVS (<24 h)*	PICA–isolated vertigo; AICA–vertigo±tinnitus or hearing loss*	Small ischemic strokes presenting transient symptoms <sup>49</sup>	Subarachnoid hemorrhages mimicking TIA <sup>33</sup>
t-AVS (>24 h)	Overlap syndrome with trauma and vertebral artery dissection/TIA	Overlap syndrome with trauma and vertebral artery dissection/stroke	Overlap syndrome with trauma and traumatic hemorrhage (subdural, subarachnoid, etc)
s-AVS (>24 h)*	Not yet reported (would be difficult to differentiate from vestibular migraine)	PICA–isolated vertigo; AICA–vertigo±tinnitus or hearing loss*	Small to medium-sized cerebellar hemorrhages

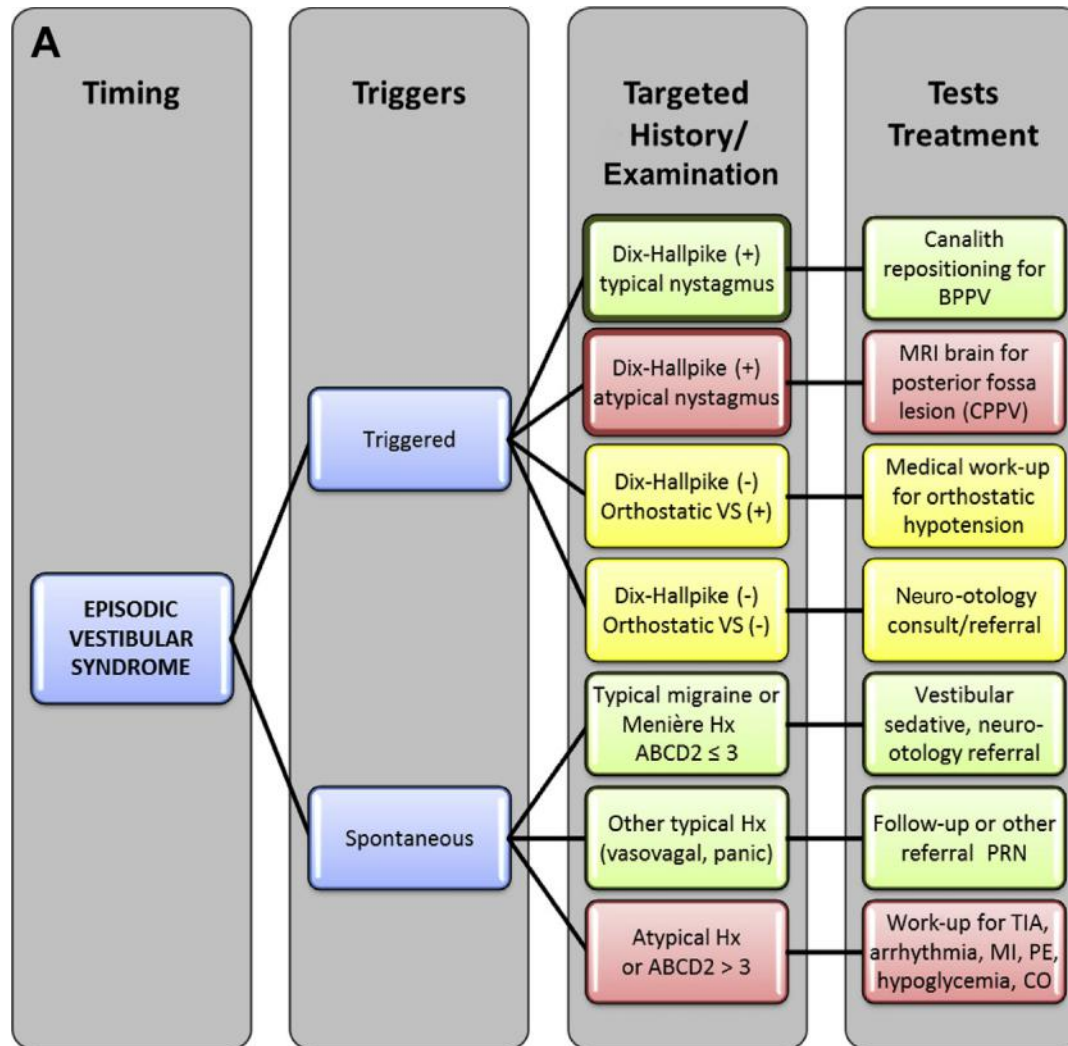
AICA indicates anterior inferior cerebellar artery; PICA, posterior inferior cerebellar artery; t-AVS, spontaneous acute vestibular syndrome; s-EVS, spontaneous

# TiTrATE

## A Novel, Evidence-Based Approach to Diagnosing Acute Dizziness and Vertigo

David E. Newman-Toker, MD, PhD<sup>a,\*</sup>, Jonathan A. Edlow, MD<sup>b</sup>

Neurol Clin 33 (2015) 577–599





# TiTrATE

## A Novel, Evidence-Based Approach to Diagnosing Acute Dizziness and Vertigo

David E. Newman-Toker, MD, PhD<sup>a,\*</sup>, Jonathan A. Edlow, MD<sup>b</sup>

Neurol Clin 33 (2015) 577–599

