# 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 neurologi** | 294 (32) |
| **1. Peripheral verti** | 185 (20) |
| **2. BPPV** | 78 (9) |
| **3. Vestibular neur** | 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) |

↑↑ cardio (6 mo) and cerebro (30 days) risk (Kim SA et al 2011, Lee CC et al 2012).

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

Navi BB et al, *Mayo Clin Proc 2012*; 87(11): 1080-1088

# 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

CMAJ REVIEW

# 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.

Stroke
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association | American Stroke Association

**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

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***)

**Kattah JC Stroke 2009 40:3504**

# HINTS - NYSTAGMUS

# The basics of vestibular system physiology

- The vestibular receptors have a tonic activity, i.e they are active even when the head is steady
- The CNS uses the signals from both sides to understand if the head is moving
- The tonic discharge is the same in the two sides
- In terms of vestibular signals, the head is still not when there is no activity but when the activity is the same in the two sides.

# The basics of vestibular system physiology

- Leftward head rotation (acceleration) unbalances the activity of the two hemi-systems :
  - ↑ **left (excitation)**
  - ↓ **right (inhibition)**
- CNS

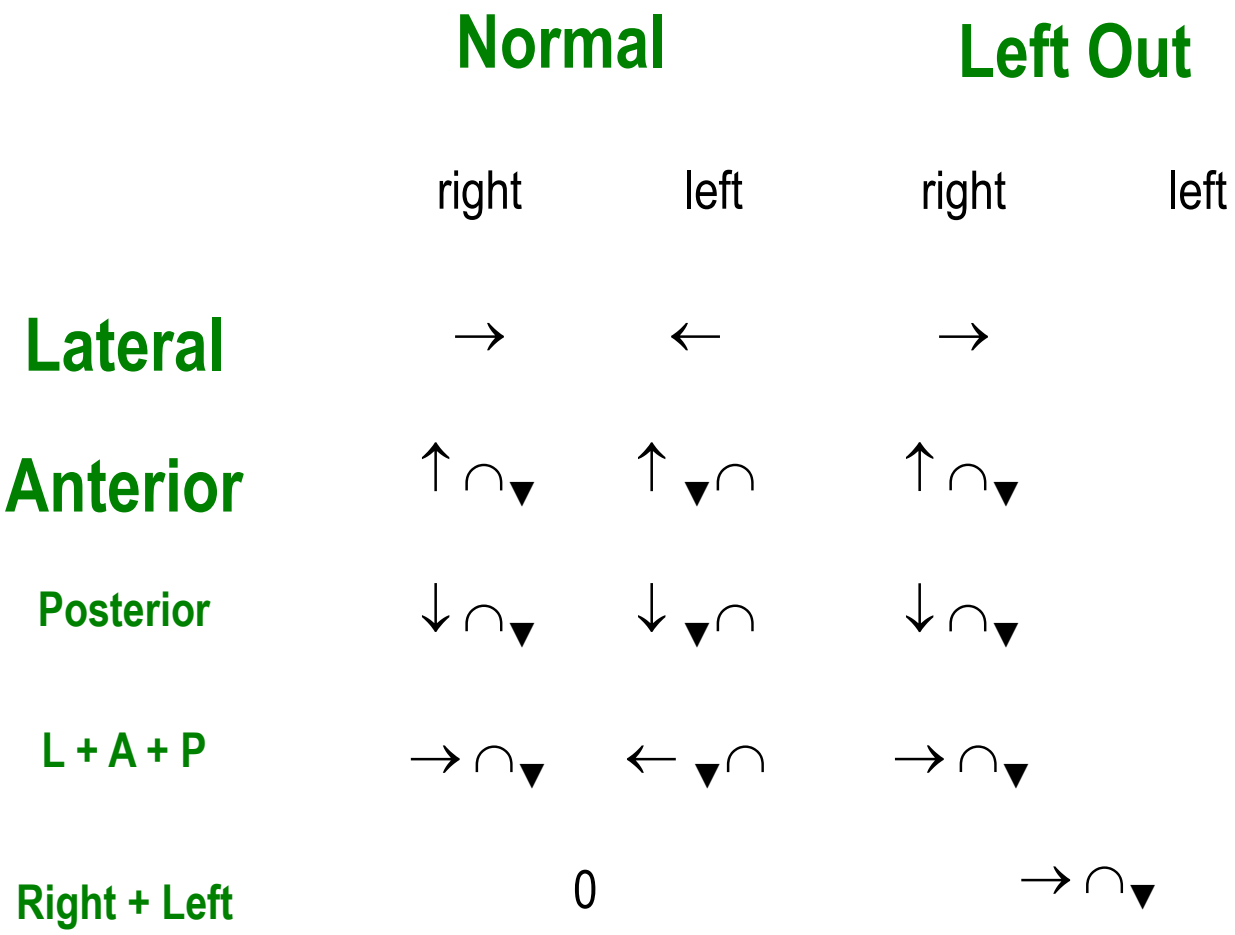
  Unbalanced activity = rotation

  Direction = excited side

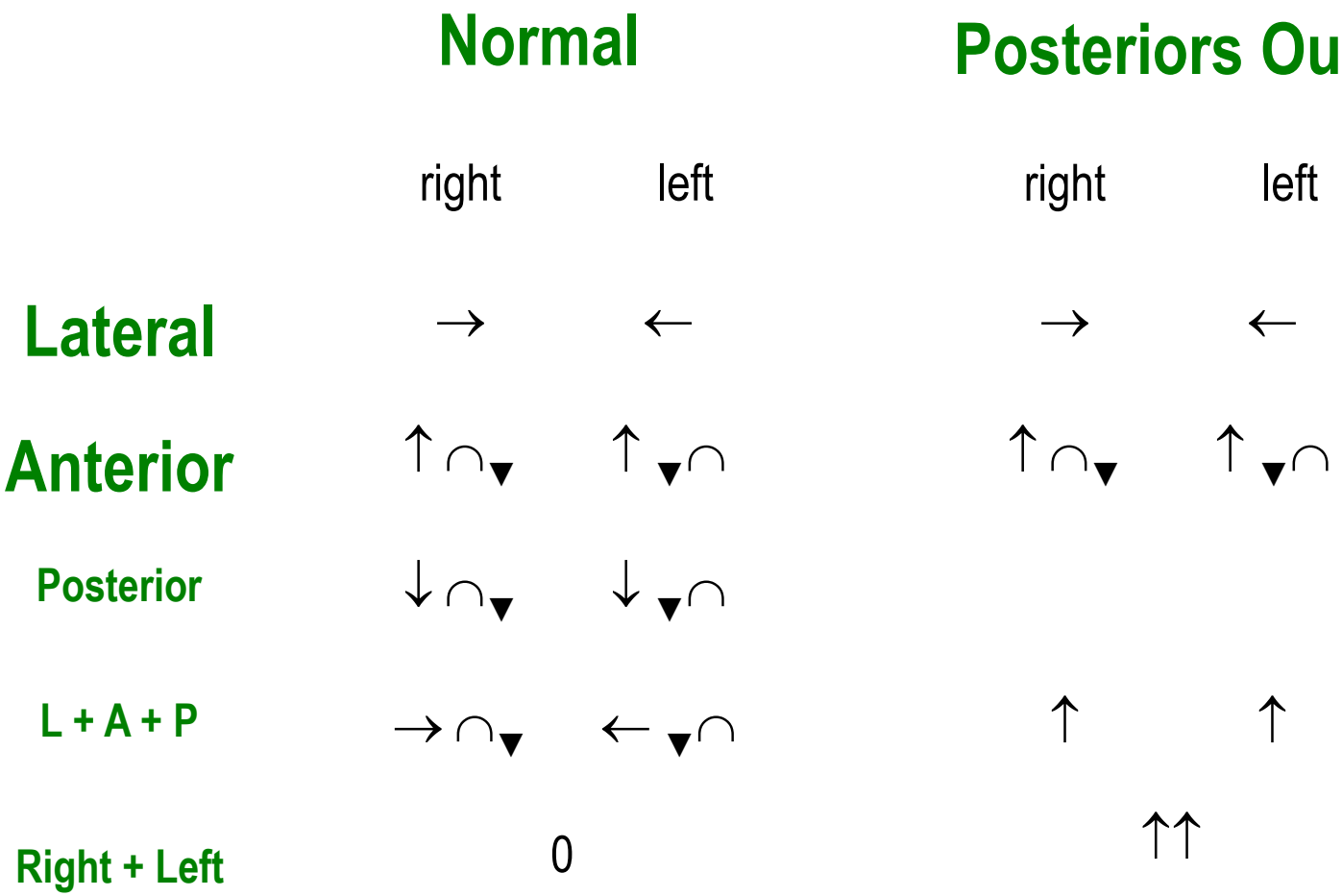
# Vestibulo-Ocular-Reflex
# VOR

- VOR = gaze stabilization in space = the eyes move in the opposite direction with respect to head motion

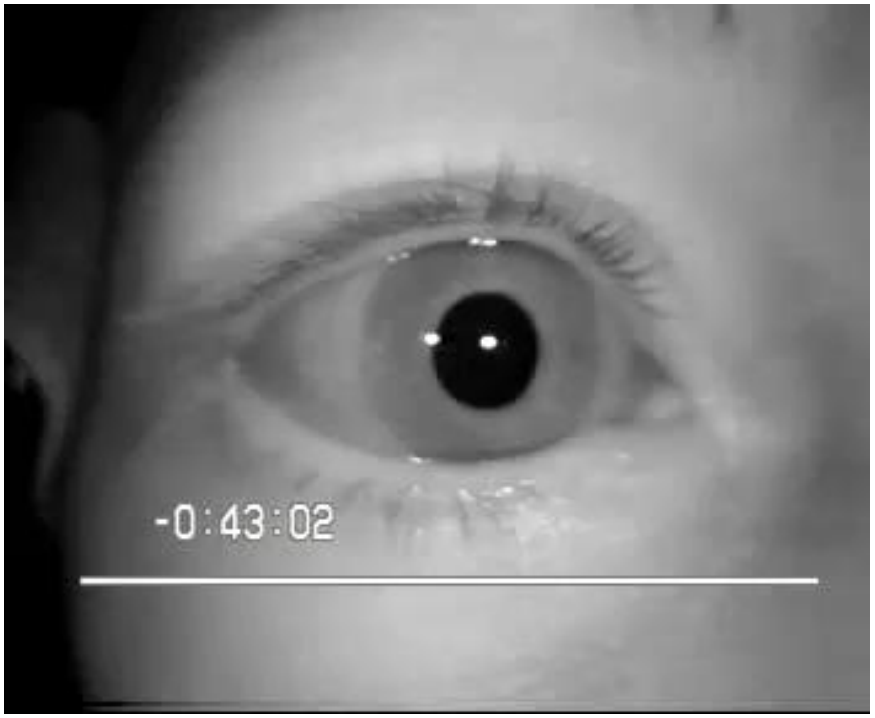
# Vestibular ocular motor connections



# Vestibular ocular motor connections



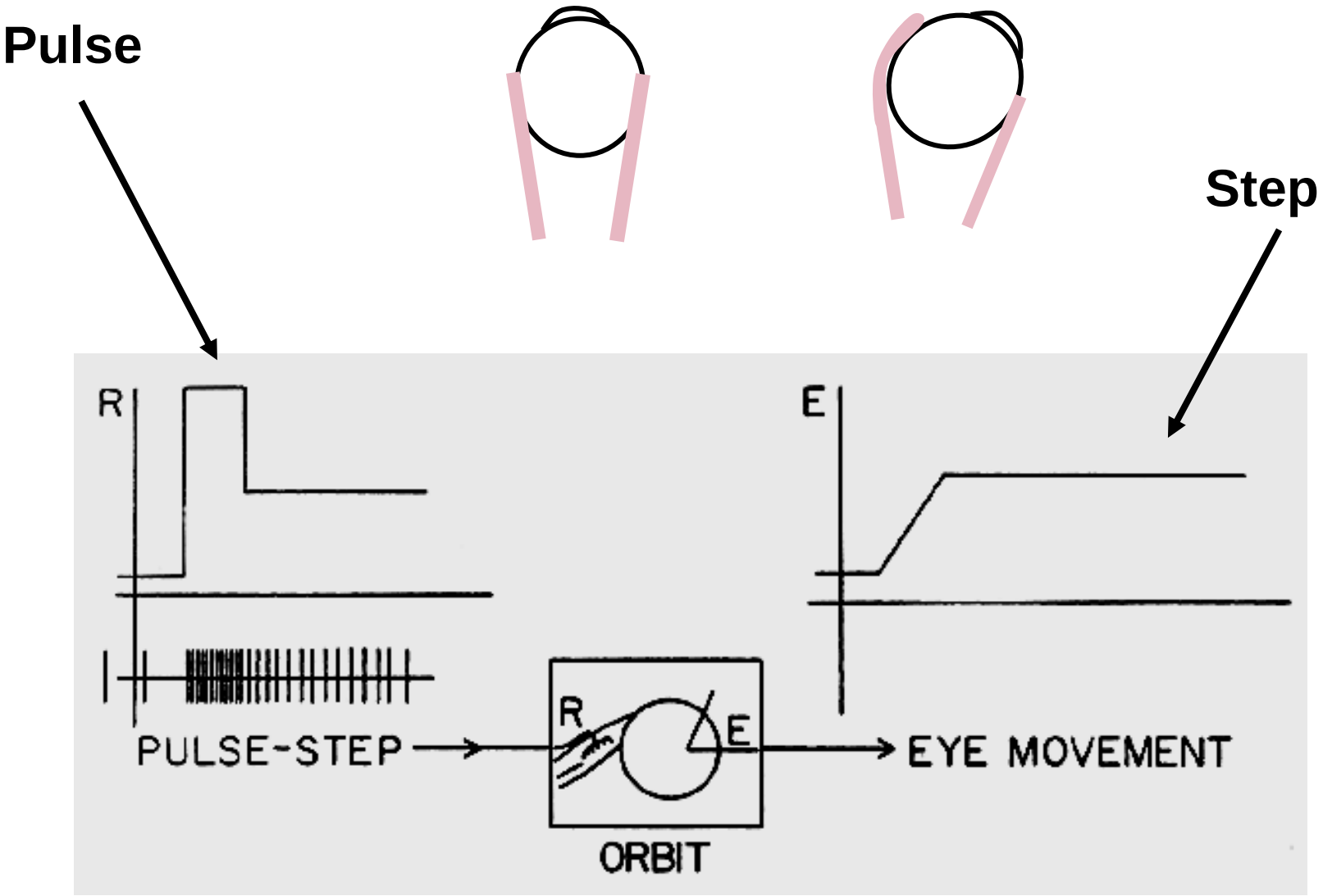
# Peripheral spontaneous nystagmus



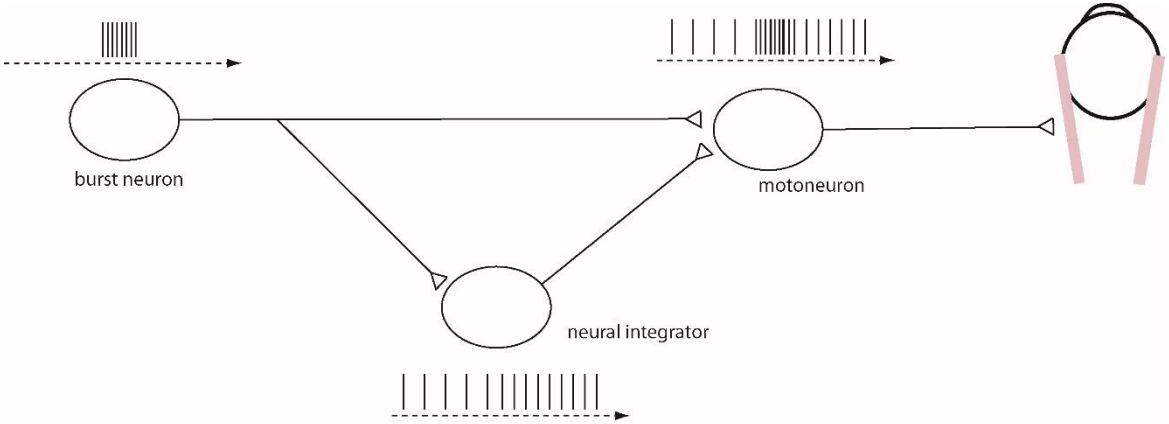
# Peripheral Spontaneous Nystagmus

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

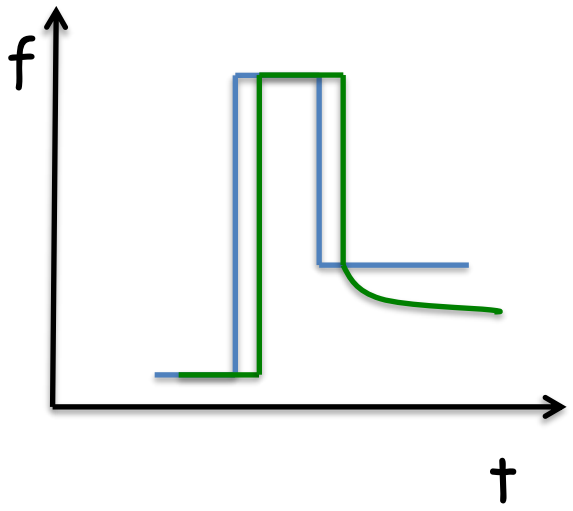
What drives the saccade: Pulse-Step of innervation:
PULSE moves the eye rapidly during the saccade and
STEP holds the eye in position at end of the saccade

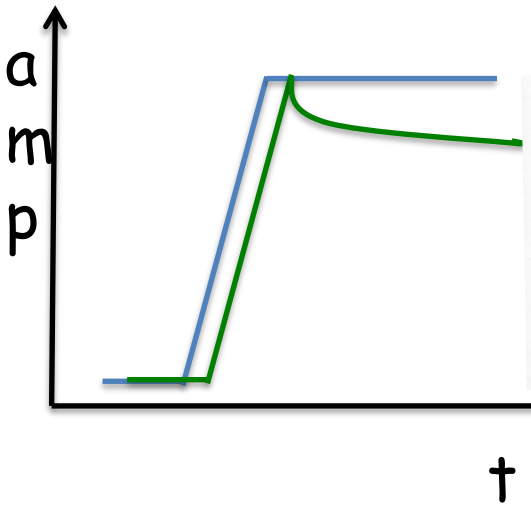


# Brainstem Saccade Generator




| | 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)** |


f
t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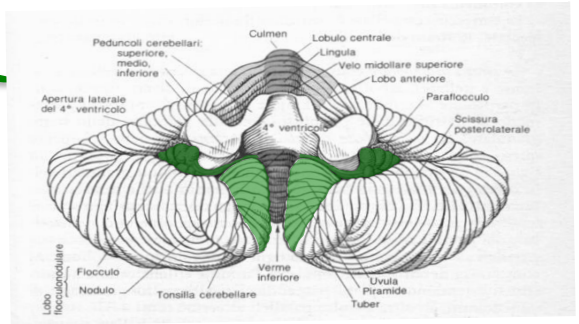
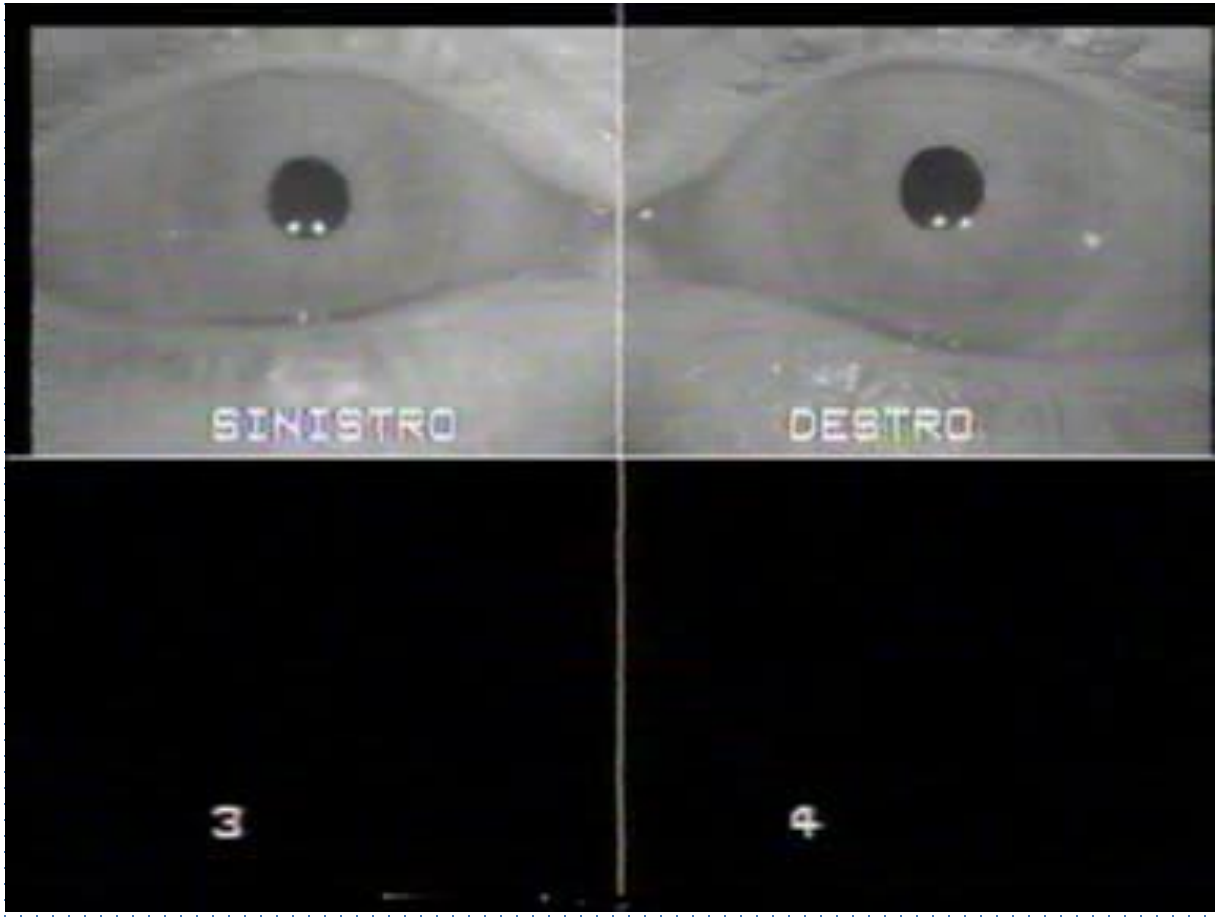

Culmen
Lobulo centrale
Peduncoli cerebellari: superiore, medio, inferiore
Lingula
Velo midollare superiore
Lobo anteriore
Apertura laterale del 4° ventricolo
Paraflocculo
Scissura posterolaterale
4° ventricolo
Flocculo
Nodulo
Verme inferiore
Uvula
Piramide
Tonsilla cerebellare
Tuber
Lobo flocculonodulare

# Gaze-Evoked Nystagmus

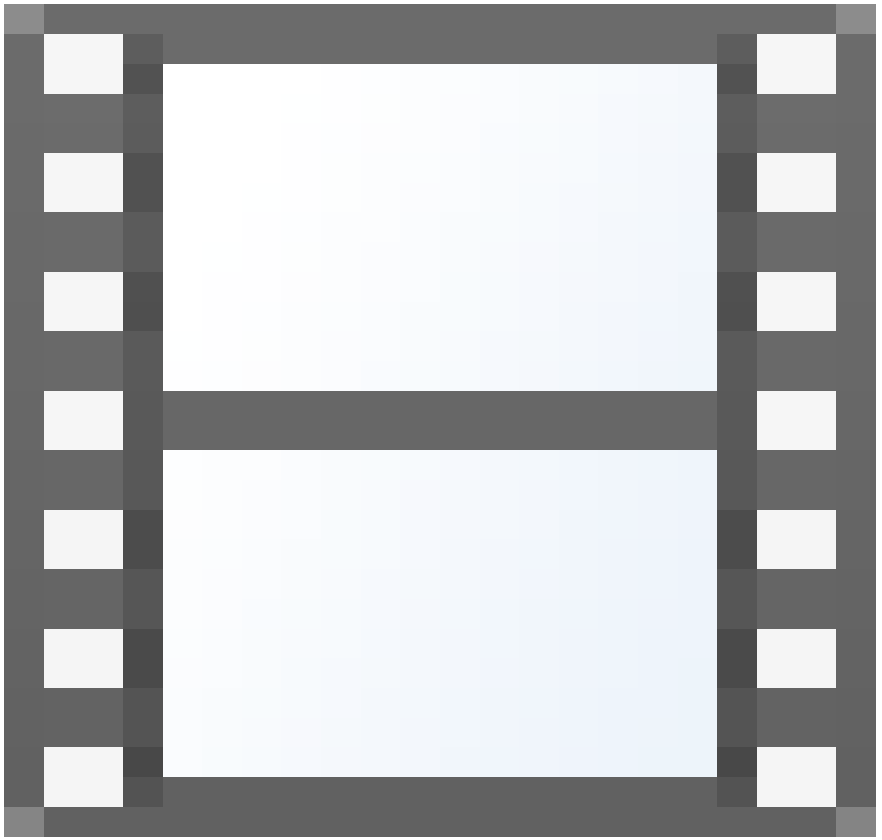
- nystagmus in lateral and/or upward and/or downward gaze beating toward gaze direction
- not influenced by visual fixation

lesion: flocculus

# Gaze-evoked and rebound nystagmus



# 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

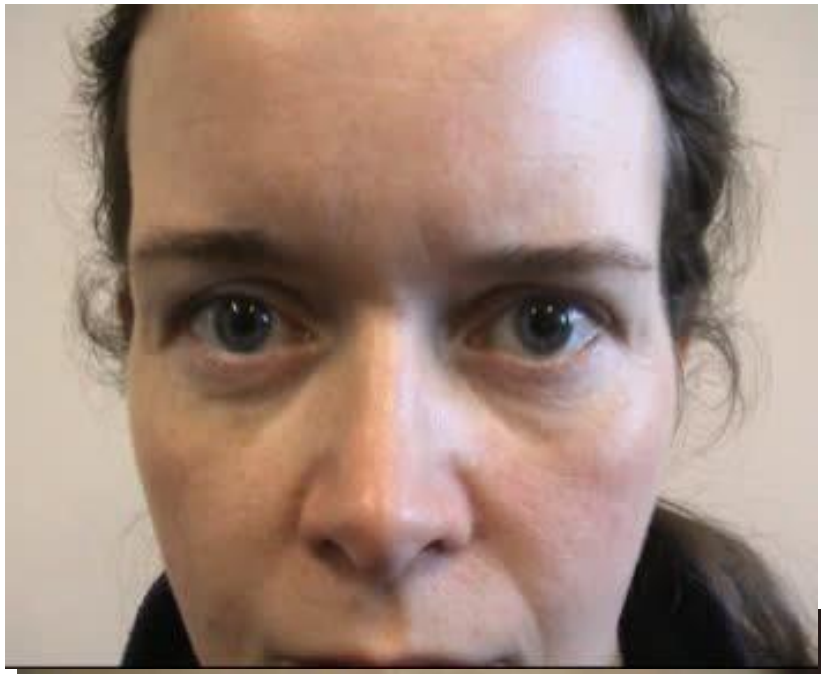
- Down-beating Ny
- Up-beating Ny
- Torsional Ny
- Internuclear ophthalmoplegia
- Pendular Ny

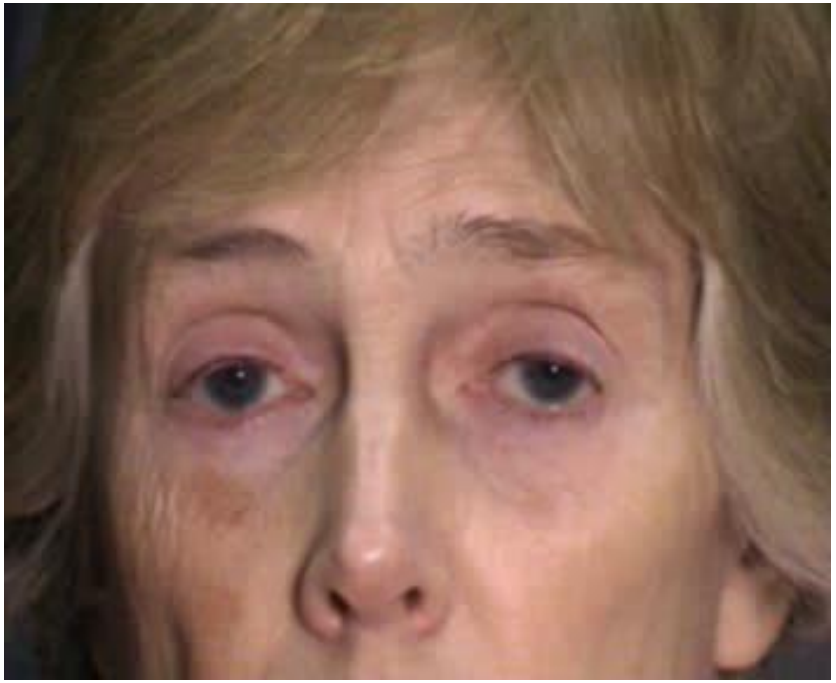
# HINTS – HEAD IMPULSE TEST

# Head impulse test

- Brisk head turn while looking at a target (the examiner's nose)
- When the head is stopped, the examine looks at the subjet'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

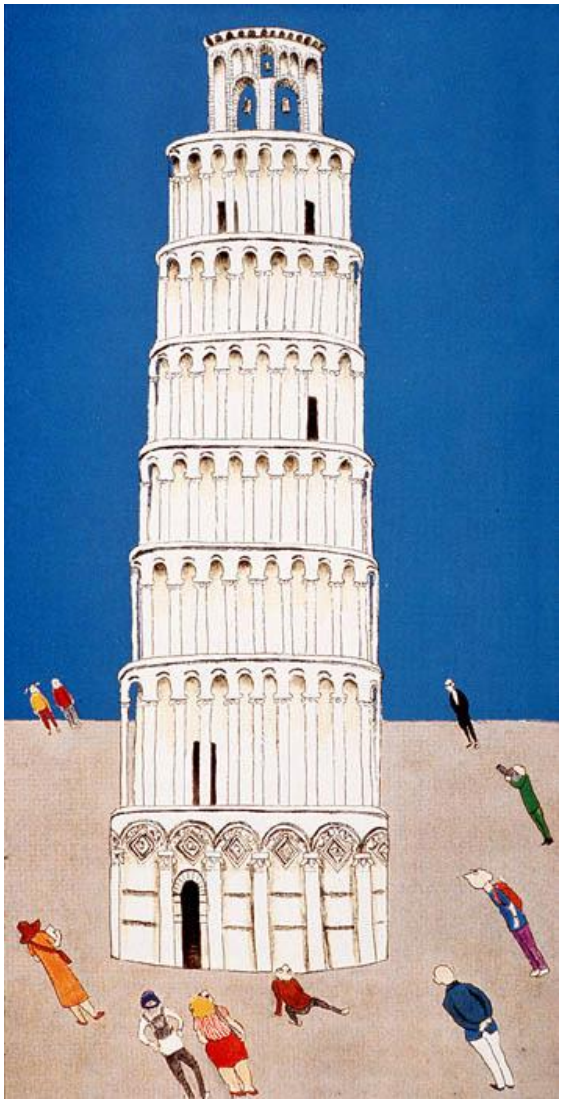
# Head impulse test

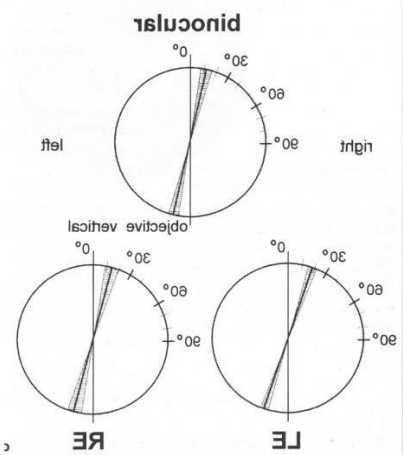


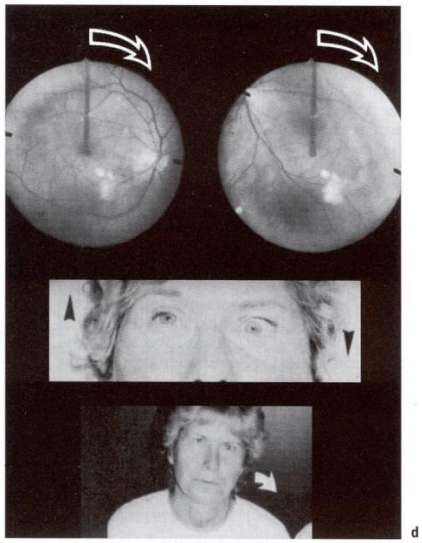


# HINTS – TEST OF SKEW

# OCULAR TILT REACTION





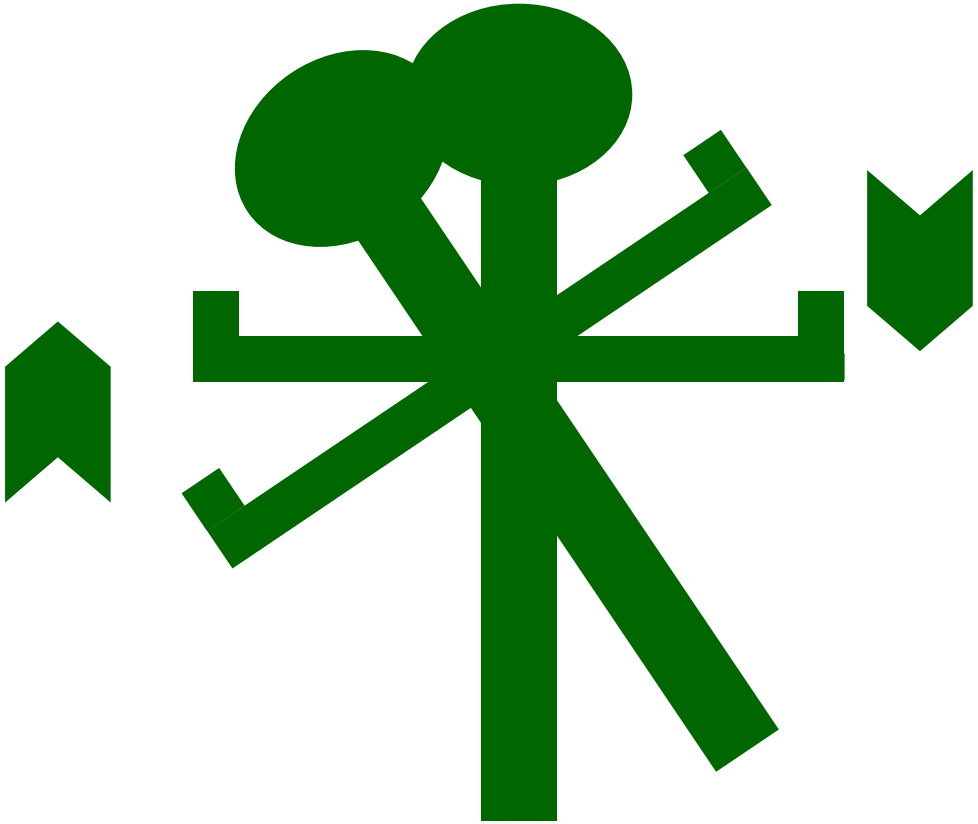



# OTR – SKEW DEVIATION

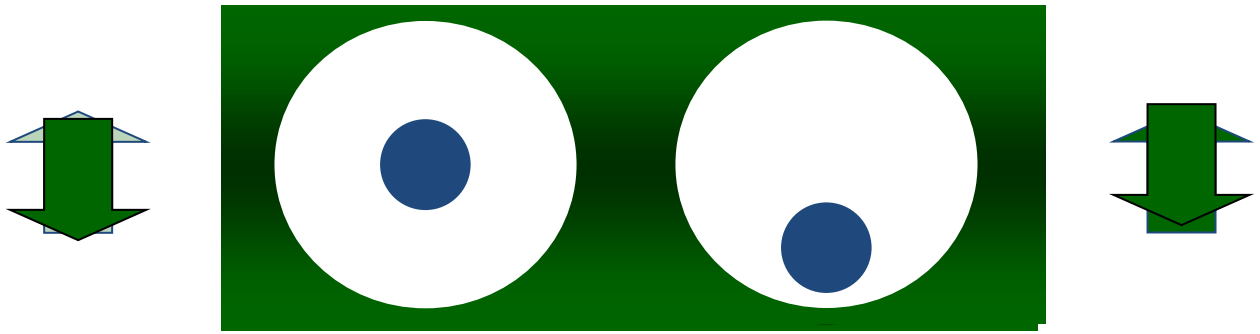
**Acquired vertical comitant misalignment**

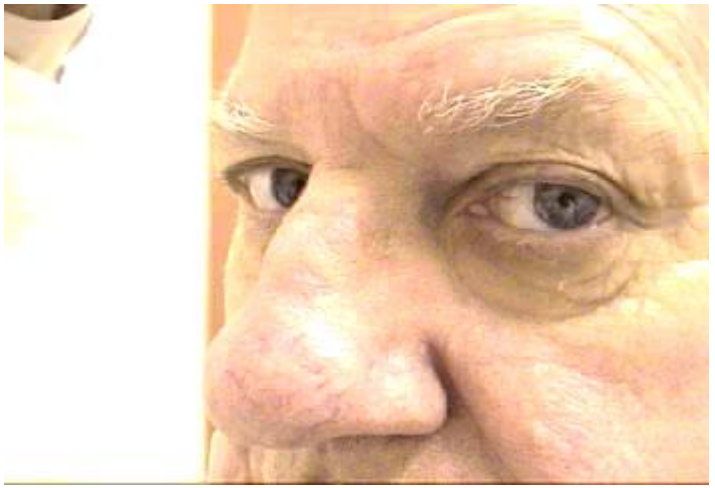
Ocular misalignment = diplopia

# OTR



# Skew deviation: 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

**Kattah JC Stroke 2009 40:3504**

# Risk evaluation

## ABCD2 Score and TIA

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

Johnston SC et al, Lancet 2007; 369: 283-292

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

**Newman-Toker et al, Acad Emer Med 2013; 20: 987-996**

# more than HINTS

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

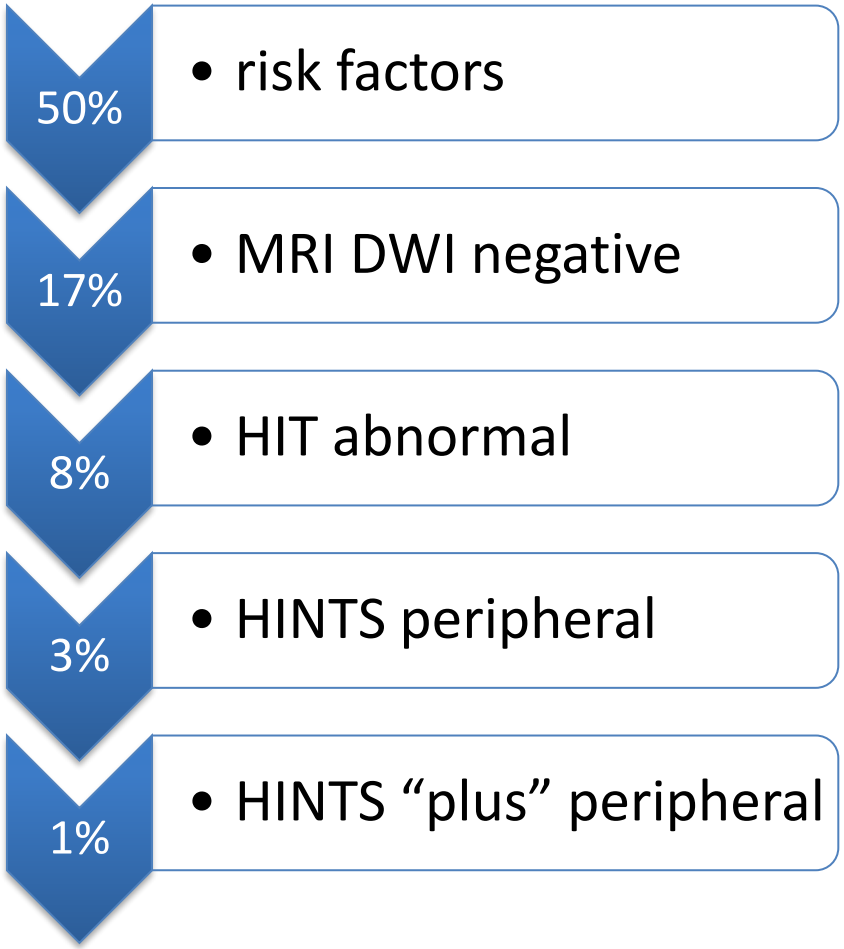
**Table 2. Pretest and Post-Test Probabilities of Stroke Using Different Tests to Rule Out Stroke in the Spontaneous Acute Vestibular Syndrome**

| | 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%[56]; Sp, 95%; NLR, 0.85) | CT brain (Sn, 16%[13]; Sp, 98%[13]; NLR, 0.86) | MRI-DWI brain (Sn, 80%[55]; Sp, 96%[13]; NLR, 0.21) | HINTS+Battery (Sn, 99%[58]; Sp, 97%[58]; NLR, 0.01) |
| 10% (low) | 8.7% | 8.7% | 2.3% | 0.1% |
| 25% (average[55]) | 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.

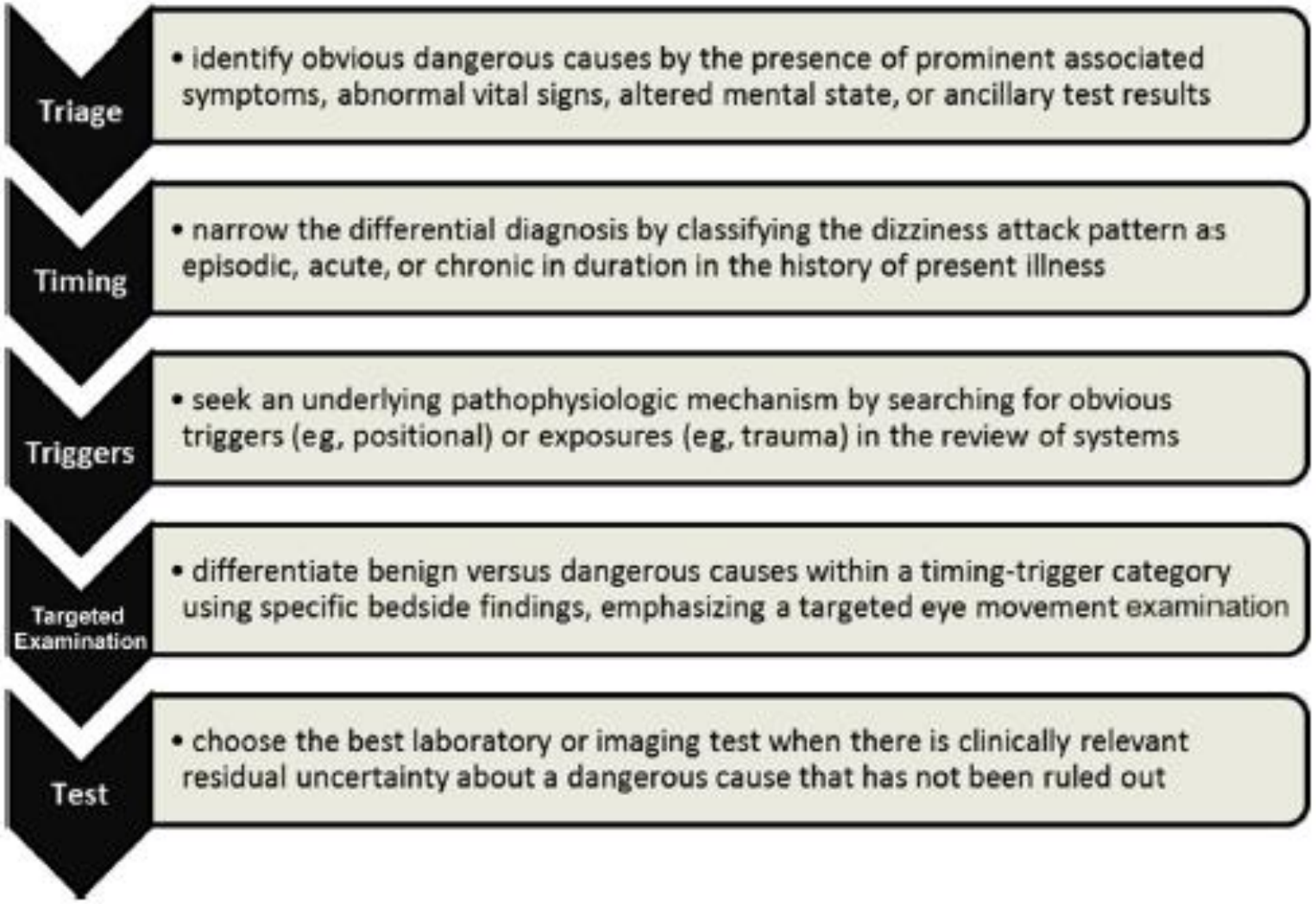
# Neuroimaging

- 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)



# TiTrATE

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



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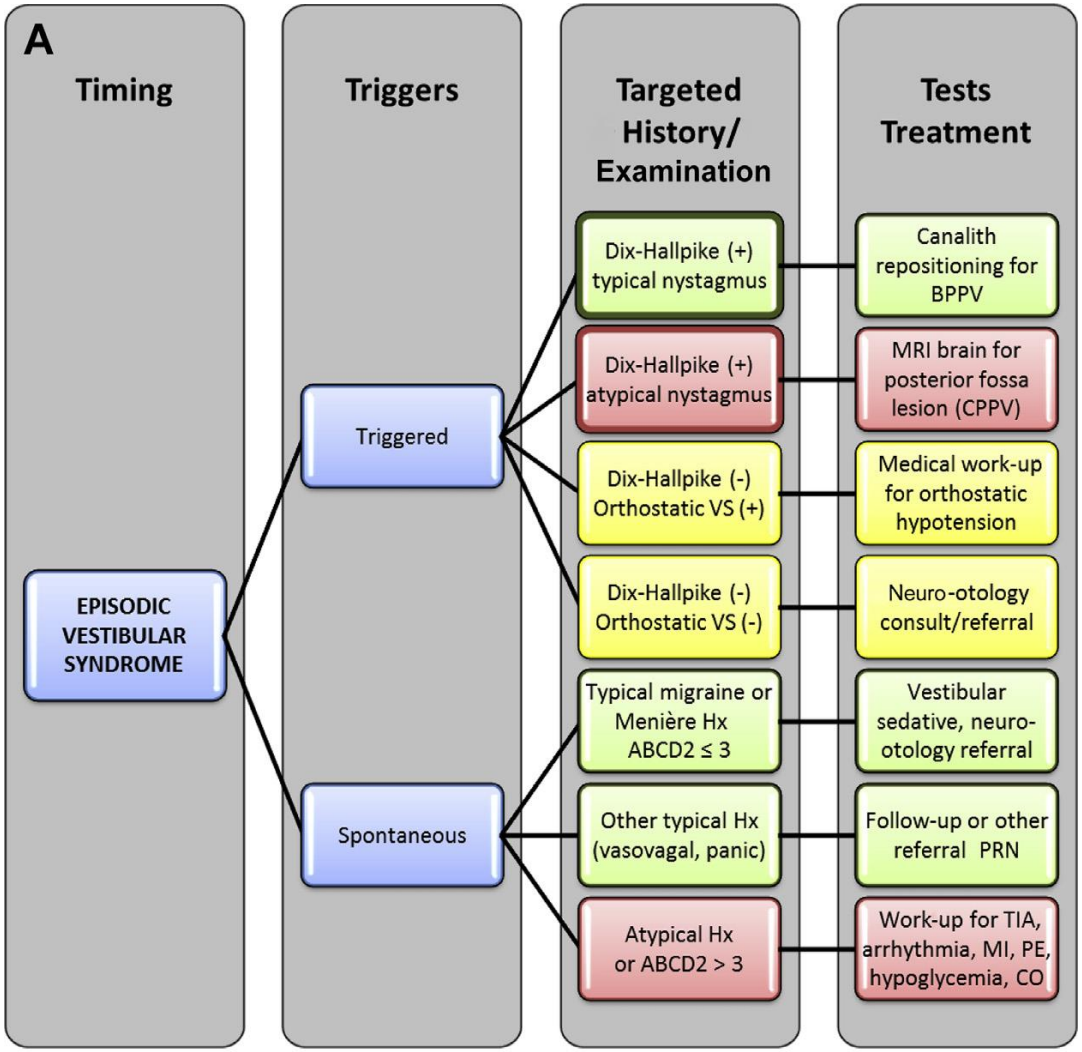
Neurol Clin 33 (2015) 577–599



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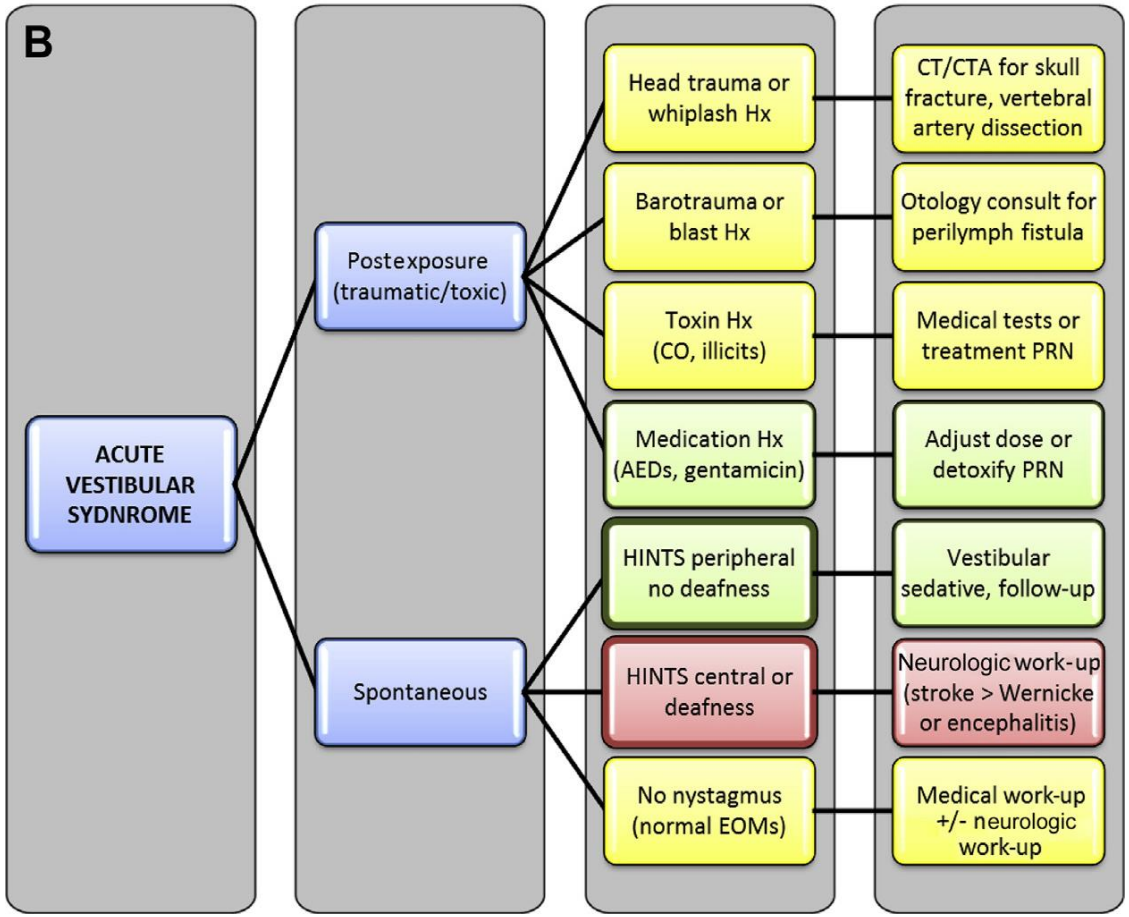
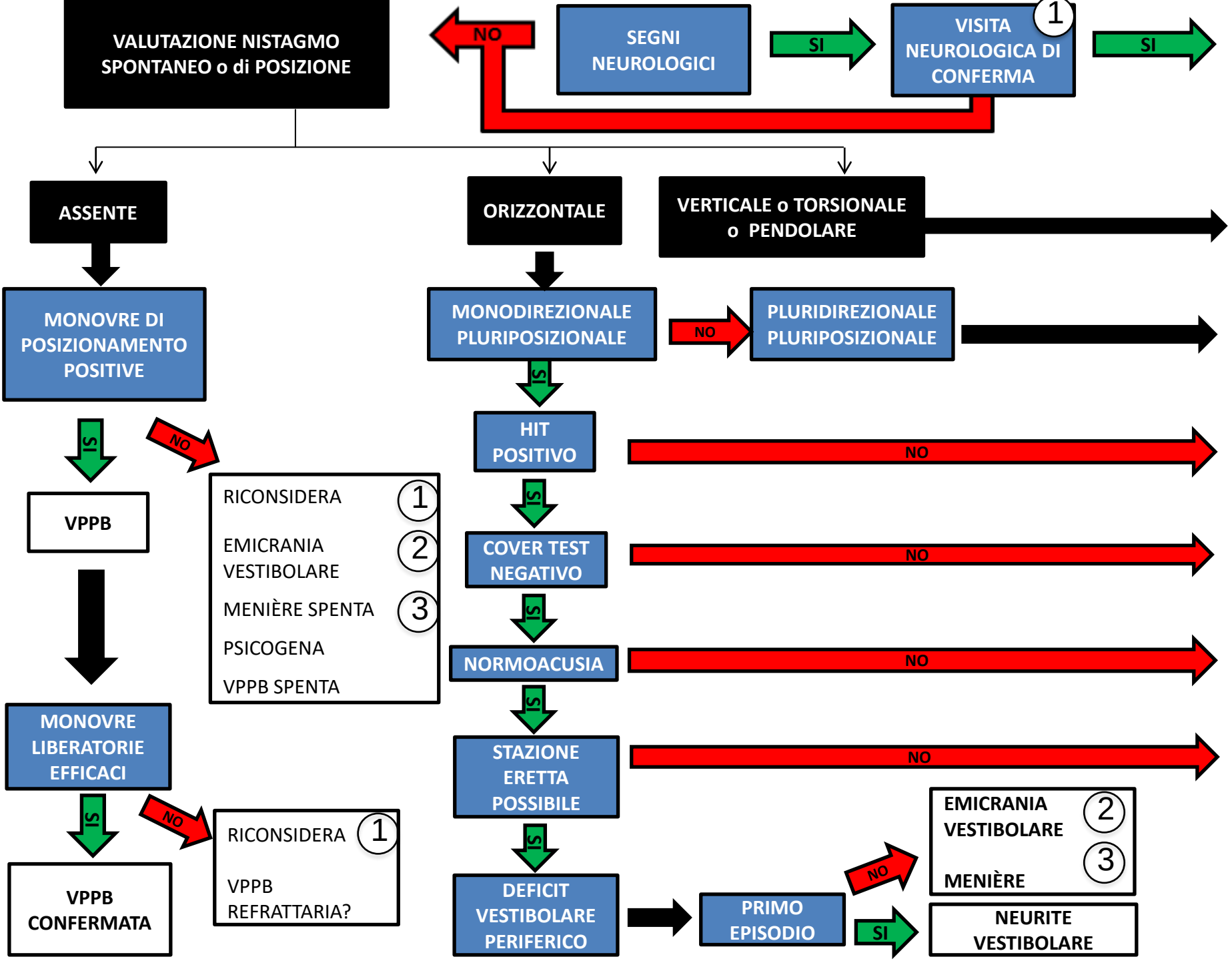
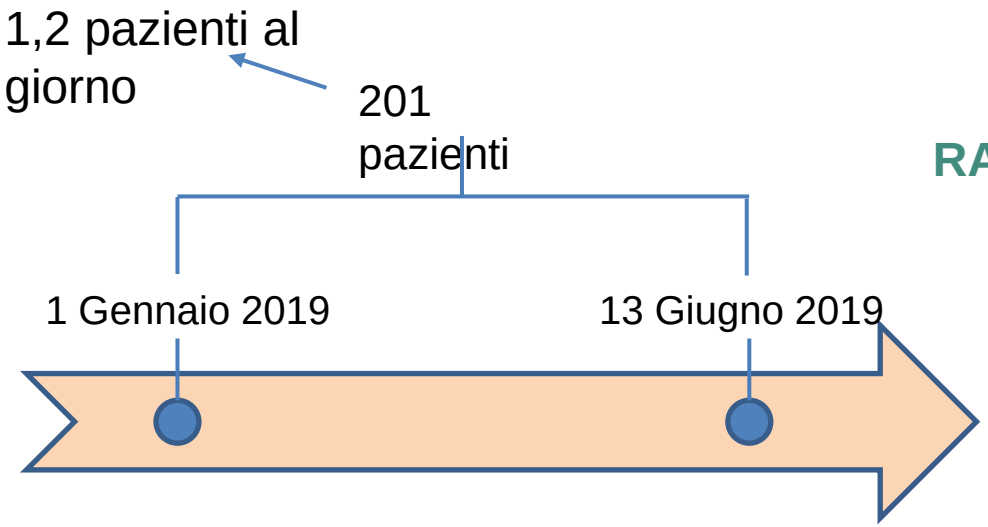



VALUTAZIONE NISTAGMO SPONTANEO o di POSIZIONE
NO
SEGNI NEUROLOGICI
SI
VISITA NEUROLOGICA DI CONFERMA
1
SI
ASSENTE
ORIZZONTALE
VERTICALE o TORSIONALE o PENDOLARE
MONOVRE DI POSIZIONAMENTO POSITIVE
MONODIREZIONALE PLURIPOSIZIONALE
NO
PLURIDIREZIONALE PLURIPOSIZIONALE
SI
SI
NO
VPPB
RICONSIDERA 1
EMICRANIA VESTIBOLARE 2
MENIÈRE SPENTA 3
PSICOGENA
VPPB SPENTA
HIT POSITIVO
NO
SI
COVER TEST NEGATIVO
NO
SI
NORMOACUSIA
NO
SI
STAZIONE ERETTA POSSIBILE
NO
SI
MONOVRE LIBERATORIE EFFICACI
SI
NO
VPPB CONFERMATA
RICONSIDERA 1
VPPB REFRATTARIA?
DEFICIT VESTIBOLARE PERIFERICO
PRIMO EPISODIO
NO
EMICRANIA VESTIBOLARE 2
MENIÈRE 3
SI
NEURITE VESTIBOLARE
PERCORSO DEFCIT NEUROLOGICI FOCALI

# IL NOSTRO STUDIO

- ✓ Iter diagnostico eseguito
- ✓ In quanti pazienti è stato applicato HINTS?
- ✓ In quanti pazienti è stato applicato HINTS-Plus?



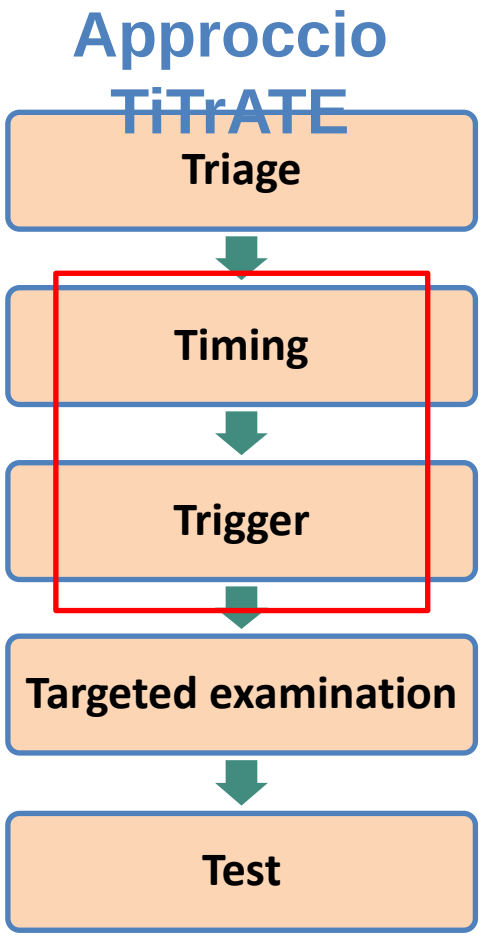

**DATI RACCOLTI**

- Età e sesso
- Codice priorità
- Anamnesi patologica remota e terapia domiciliare
- Anamnesi patologica prossima
- Esame obiettivo e targeted examination
- Consulenze richieste
- Esami di imaging e strumentali
- Terapia in PS
- Tempo medio di permanenza in PS
- Diagnosi di

# RISULTATI: caratteristiche vertigine

| Andamento temporale | N. (%) |
|---|---|
| N. di pazienti in cui è stato valutato (%), di cui: | 169 (84,1%) |
| - Episodio unico | 101 (59,8%) |
| - Crisi ricorrenti | 25 (14,8%) |
| - Crisi a grappolo | 42 (24,8%) |
| - Vertigine persistente | 1 (0,6% |

| Fattori scatenanti | N. (%) |
|---|---|
| N. di pazienti in cui è stato valutato (%), di cui: | 195 (97%) |
| | 115 (59%) |
| - Vertigine spontanea | 31 (15,9%) |
| - Rotazione del capo | 49 (25,1%) |
| - Cambi posturali | |



# RISULTATI: targeted examination

| | N. (%) |
|---|---|
| Pazienti a cui non è stata richiesta nessuna consulenza | 50 (24,8%) |
| Pazienti a cui è stata richiesta una o più consulenze | 151 (75,1%) |
| Numero di consulenze richieste, di cui: | 192 |
| - Audiovestibologia | 134 (69,8%) |
| - Neurologia | 53 (27,6%) |
| - Otorinolaringoiatria | 5 (2,6%) |

| Bedside test | N. pz in cui è stato valutato | Negativo | Positivo |
|---|---|---|---|
| Head shaking test | 63 (31,3%) | 38 (60,3%) | 25 (39,7%) |
| Head impulse test | 49 (24,4%) | 44 (89,8%) | 5 (10,2%) |
| Video HIT | 21 (10,4%) | 20 (95,2%) | 1 (4,8%) |
| Skew deviation | 4 (2%) | 4 (100%) | 0 (0%) |
| Manovra di Dix-Hallpike | 56 (27,9%) | 34 (60,7%) | 22 (39,3%) |
| Manovra di Pagnini-McClure | 18 (9%) | 16 (88,9%) | 2 (11,2%) |
| Manovra di Semont | 3 (1,5%) | 3 (100%) | 0 (0%) |

| | N. (%) |
|---|---|
| Pazienti con trigger: rotazione del capo/cambi posturali | 80 (41%) |
| Manovre posizionali eseguite in questi pazienti | 43 (53,8%) |

| Nistagmo | N. pz in cui è stato valutato | Negativo | Positivo |
|---|---|---|---|
| Nistagmo: | 178 (88,6%) | 108 (60,7%) | 70 (39,3%) |
| - Spontaneo | 176 (98,9%) | 124 (70,5%) | 52 (29,5%) |
| - Posizionale | 10 (5,6%) | 3 (30%) | 7 (70%) |
| - Provocato | 17 (9,6%) | 3 (17,6%) | 14 (82,4%) |
| Piano: | 53 (29,8%) | | |
| - Orizzonto-torsionale | | | 4 (7,5%) |
| - Vertico-torsionale | | | 3 (5,7%) |
| - Puro orizzontale | | | 41 (77,4%) |
| - Puro verticale | | | 4 (7,5%) |
| - Puro rotatorio | | | 1(1,9%) |
| Direzione: | 28 (15,7%) | | |
| - Monodirezionale | | | 26 (92,9%) |
| - Pluridirezionale | | | 2 (7,1%) |
| Fissazione: | 1 (0,56%) | | |
| - Inibito | | | 1 (100%) |
| - Non inibito | | | |

**SOLO NEL 2% (4) PAZIENTI È STATO ESEGUITO IL PROTOCOLLO HINTS COMPLETO**

# RISULTATI: indagini strumentali

| Esami strumentali | N. pz in cui è stato effettuato | Negativo | Positivo |
|---|---|---|---|
| Audiometria | 117 (58,2%) | 58 (49,6%) | Monolaterale: 18 (15,4%) Bilaterale: 41 (35%) |
| Stabilometria | 65 (32,3%) | 49 (77,8%) | Monodirezionale: 6 (9,2%) Pluridirezionale: 10 (15,4%) |
| TC senza mdc | 138 (68,6%) | 136 (98,6%) | 2 (1,4%) |
| Angio TC | 11 (5,5%) | 11 (100%) | |
| RMN | 0 (0%) | | |
| ECD TSA | 2 (1%) | 2 (100%) | |

- Scarsa disponibilità in acuto
- Falsi negativi prime 48 h

- In nessun caso ha identificato la causa sottostante
- Scarsa sensibilità (7-16%) per lesioni ischemiche

# RISULTATI: diagnosi di dimissione

| Diagnosi dimissione | N. (%) |
|---|---|
| Vertigini | 104 (51,7%) |
| Instabilità | 3 (1,5%) |
| VPPB | 39 (19,4%) |
| Neurolabirintopatia acuta/deficit vestibolare periferico | 39 (19,4%) |
| Malattia di Ménière | 4 (2%) |
| Emicrania vestibolare | 4 (2%) |
| Vertigine psicogena | 3 (1,5%) |
| Neurinoma acustico | 1 (0,2%) |
| TIA | 2 (1%) |
| Ictus | 0 (0%) |
| Vertigine cervicogenica | 1 (0,2%) |
| Vertigine iatrogena | 1 (0,2%) |

- Nel 53,2% diagnosi dimissione = a diagnosi d'ingresso
- Migliorare accuratezza diagnostica

**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

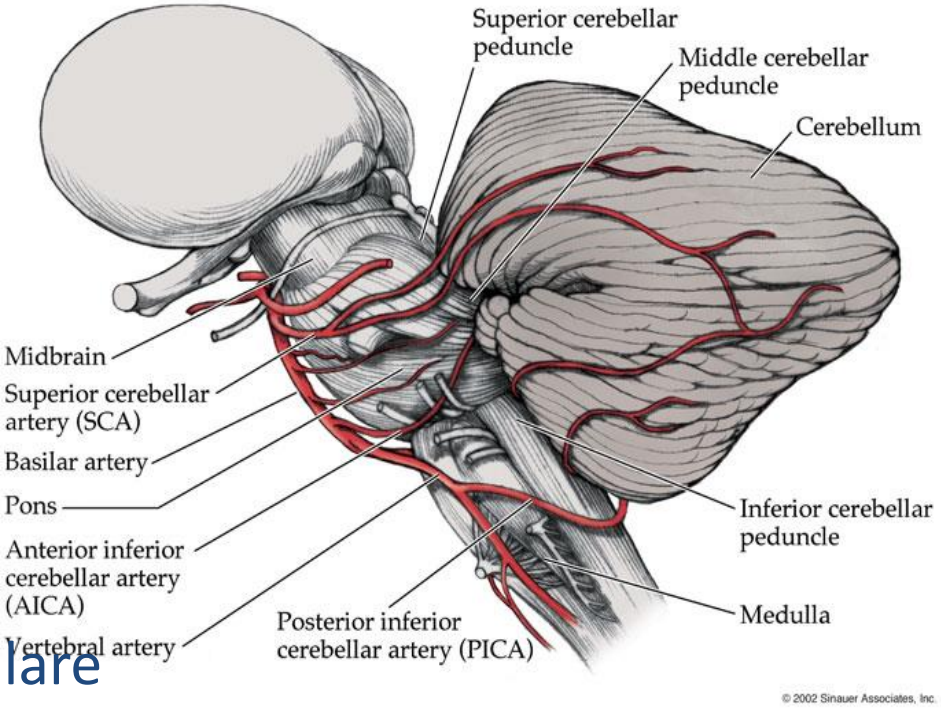
- In letteratura 3-5% delle cause
- Sottostimati?

# Malattie cerebrovascolari

**Prevalenza ictus cerebri 1,6 - 6,5% nella diverse fasce d'età**

Incidenza di 4 sottotipi di ictus cerebri in base alla sede (537 soggetti):

- 17% circolo anteriore (completo)
- 34% circolo anteriore (parziale)
- 24% territorio vertebrobasilare
- 25% arterie perforanti

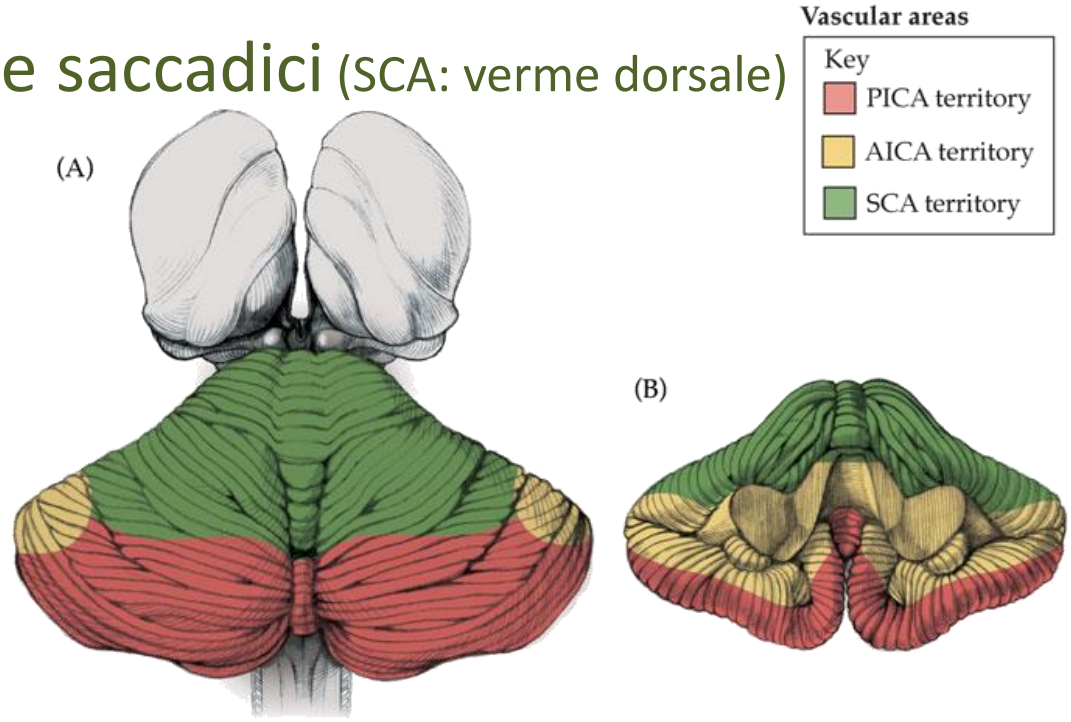



Bamford J et al. **Classification and natural history of clinically identifiable subtypes of cerebral infarction.** Lancet. 1991 Jun 22;337(8756):1521-6.

# Malattie cerebrovascolari

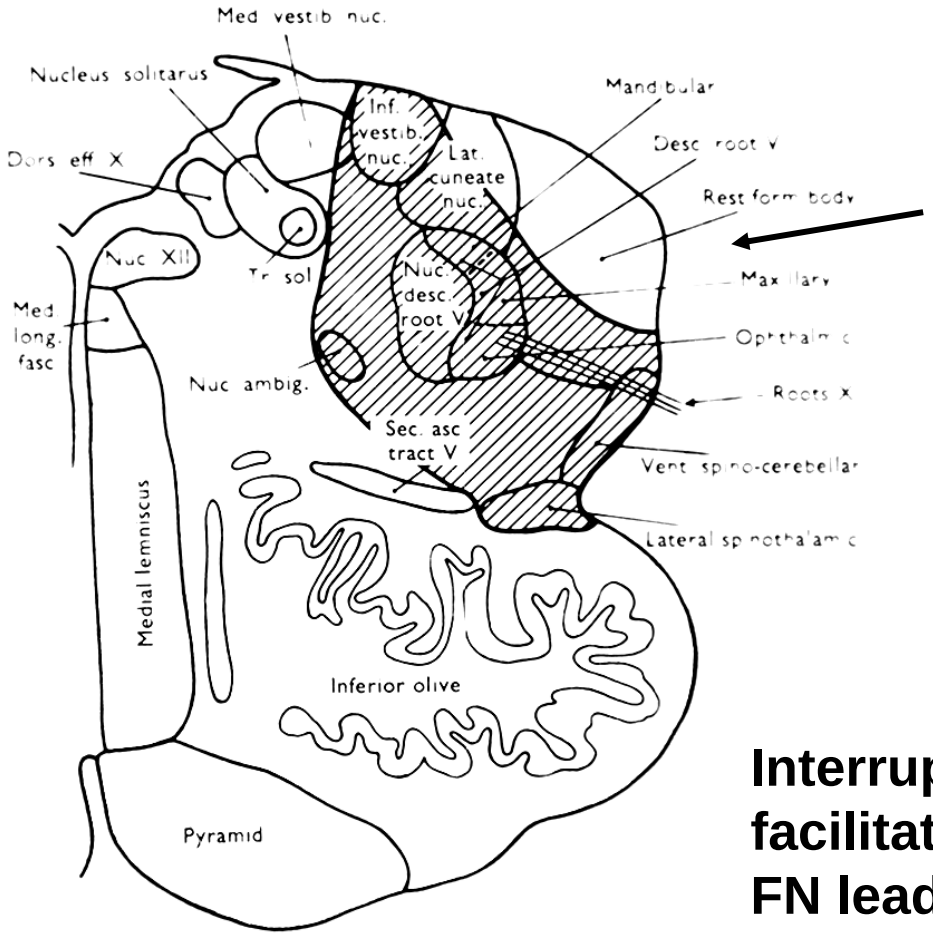
Quadri sindromici determinati dal territorio vascolare interessato:

- Sindrome di Wallenberg (PICA: porzione laterale bulbo, peduncolo cerebellare inferiore, nodulo ed uvula)
- Downbeat nystagmus (AICA: nuclei vestibolari, flocculo)
- Contrapulsione saccadici (SCA: verme dorsale)

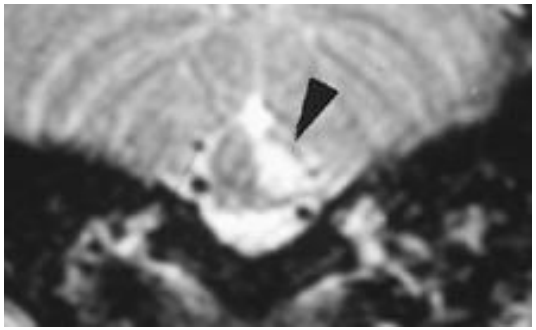


# SINDROME DI WALLENBERG

# Wallenberg's Syndrome – PICA distribution infarct involving the dorsolateral medulla

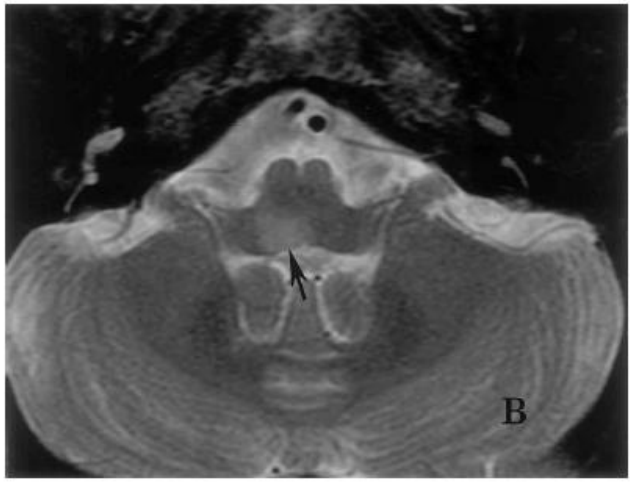



**Restiform body (ICP)**



**Interruption of climbing fibers facilitates Purkinje Cell inhibition of FN leading to a *functional* lesion of the FN and produces saccade lateropulsion**

# Sindrome di Wallenberg




- Lesione
  - Tratto discendente e nucleo del V
  - Fibre del IX e X
  - Peduncolo cerebellare?
  - Vie simpatiche pupillari
  - Nuclei gracile e cuneato
  - Nucleo e tratto solitario
  - ?
  - Tratto spino-talamico
- Segni ipsilaterali
  - Ipoestesia termo-dolorifica emivolto
  - Disartria e disfagia
  - Atassia segmentaria.
  - Sd. di Horner ipsi
    - Ptosi + Miosi + Enoftalmo
  - Ipoestesia tattile discr.emisoma
  - Anageusia
  - Singhiozzo
- Segni controlaterali
  - Ipoestesia termo-dolorifica emisoma

# Sindrome di Wallenberg – segni vestibolari ed oculomotori

- Lesione
  - Nuclei vestibolari + vie otolitiche + fibre olivo-cerebellari (= ipofunzione nucleo del fastigio)
- Sintomi
  - Vertigine e lateropulsione verso il lato leso

# Sindrome di Wallenberg – segni vestibolari ed oculomotori

- Al buio occhi deviano verso il lato leso (“lateropulsion”)
- Ny spontaneo orizzonto-rotatorio (con possibile componente verticale)
- Ocular Tilt Reaction (inclinazione della testa ipsi + skew deviation con ipotropia ipsi + ciclotorsione ipsi + inclinazione della verticale visiva soggettiva ipsi)
- Saccadici orizzontali ipermetrici verso il lato leso e ipometrici verso il lato sano (“ipsipulsion”)
- Saccadici verticali→obliqui (hanno una componente orizzontale verso il lato leso)
- Inseguimento lento deficitario verso il lato sano
- VOR : preponderanza direzionale verso il lato leso

# VERTIGINI E SCLEROSI MULTIPLA

# MS – the essentials

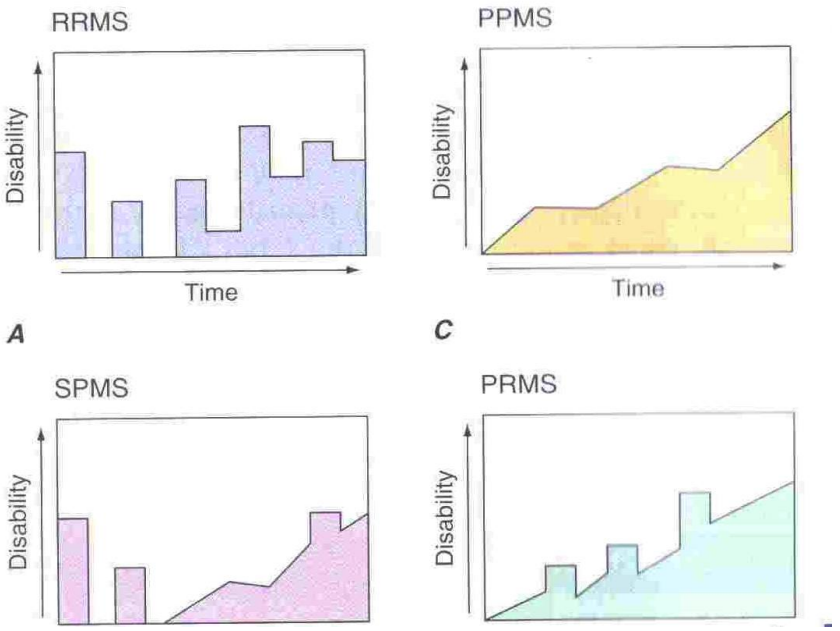
- MS is a chronic disease characterized by inflammation, demyelination (*central not peripheral, oligodendrocytes not Schwann cells*), gliosis and neuronal loss

# MS – the essentials

- The more typical disease course is Relapsing Remitting
- Relapse = discrete attack that evolves over days to week

# MS – the essentials

- Disease courses
  - Relapsing-remitting (RR) – 85%
  - Secondary-progressive (SP)
  - Primary-progressive (PP) – 15%
  - Progressive-relapsing (PR) = a mix of PP and SP




- **Relapse means inflammation, progression means degeneration**
- From RR to SP: about 2% each year
- In 15 years about 75% develop a secondary progressive course

# MS – the essentials

- Diagnosis:
  - there are several diagnostic criteria BUT the diagnosis is clinical (history + examination) and needs (RR) dissemination in space and time = two different sites/relapses (symptoms > 24 h) at different time (interval > 1 month)

# Sintomi iniziali (%)

| Età di esordio | Neurite ottica | Diplopia /vertigine | Motorio | Atassia | Sensitivo |
|---|---|---|---|---|---|
| <20 | 23 | 18 | 10 | 14 | 46 |
| 20-29 | 23 | 12 | 13 | 11 | 52 |
| 30-39 | 13 | 11 | 21 | 15 | 44 |
| 40-49 | 9 | 17 | 34 | 13 | 33 |
| >=50 | 6 | 13 | 51 | 11 | 32 |

Modificata da Weinshenker et al., 1989

# Sindrome clinicamente isolata

- CIS: Clinically Isolated Syndrome
  - –Nell'85% dei pazienti che svilupperanno MS l'esordio è dato dalla comparsa acuta o subacuta di sintomi neurologici dovuti ad una singola lesione della sostanza bianca; tale presentazione è nota come CIS.
  - –Dopo 14 anni il 68% delle CIS sviluppa una MS.
- Presentazione delle CIS:
- 21% NORB
- 46% sintomi e segni di sofferenza delle vie lunghe
- 10% sindrome troncoencefalica
- 23% sintomi multifocali
  - La disseminazione spaziale manca nel 77% delle CIS
  - E' sempre assente la disseminazione temporale

# Sintomi troncoencefalici / cerebellari (%)

| Sintomo | All'esordio | Nel corso della malattia |
|---|---|---|
| vertigine | 4.3 | 36 |
| diplopia | 8 | 51 |
| atassia | 11 | 82 |
| disartria | 13 | 44 |
| Ipoacusia | 0.6 | 17 |
| Disfagia | 0.3 | 13 |

# La causa più frequente di vertigine nella SM? VPPB

## Vertigo in MS: Utility of positional and particle repositioning maneuvers

**Article abstract**—A 4-year experience with new-onset vertigo in a university-based MS population was retrospectively reviewed. Of 1,153 patients with MS, 25 could be clinically evaluated during the vertiginous episode. Of these, 13 (52%) were diagnosed with benign paroxysmal positioning vertigo and eight (32%) had acute MS exacerbations with corresponding lesions within the brainstem. All patients diagnosed with benign paroxysmal positioning vertigo were treated successfully with particle repositioning maneuvers.

NEUROLOGY 2000;55:1566–1568

E.M. Frohman, MD, PhD; H. Zhang, MD, PhD; R.B. Dewey, MD; K.S. Hawker, MD; M.K. Racke, MD; and T.C. Frohman, BA

# Positional nystagmus and vertigo due to a solitary brachium conjunctivum plaque

E Anagnostou, D Mandellos, G Limbitaki, A Papadimitriou and D Anastasopoulos

*J. Neurol. Neurosurg. Psychiatry* 2006;77;790-792
doi:10.1136/jnnp.2005.084624

Journal of the Neurological Sciences 266 (2008) 187–189

www.elsevier.com/locate/jns

Short communication

# A minute demyelinating lesion causing acute positional vertigo

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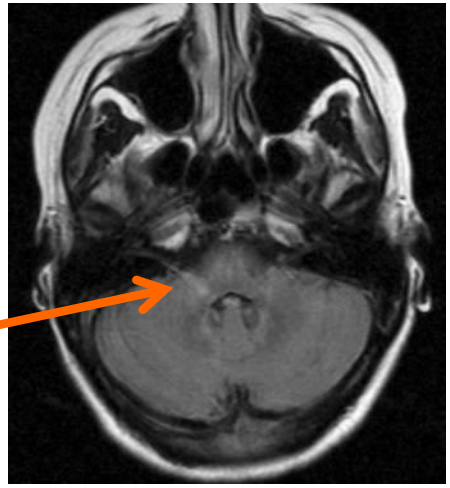
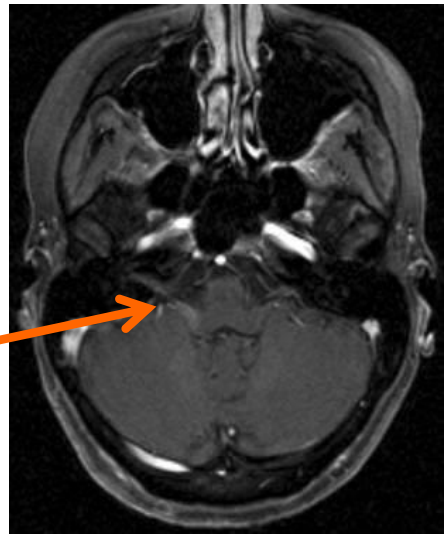
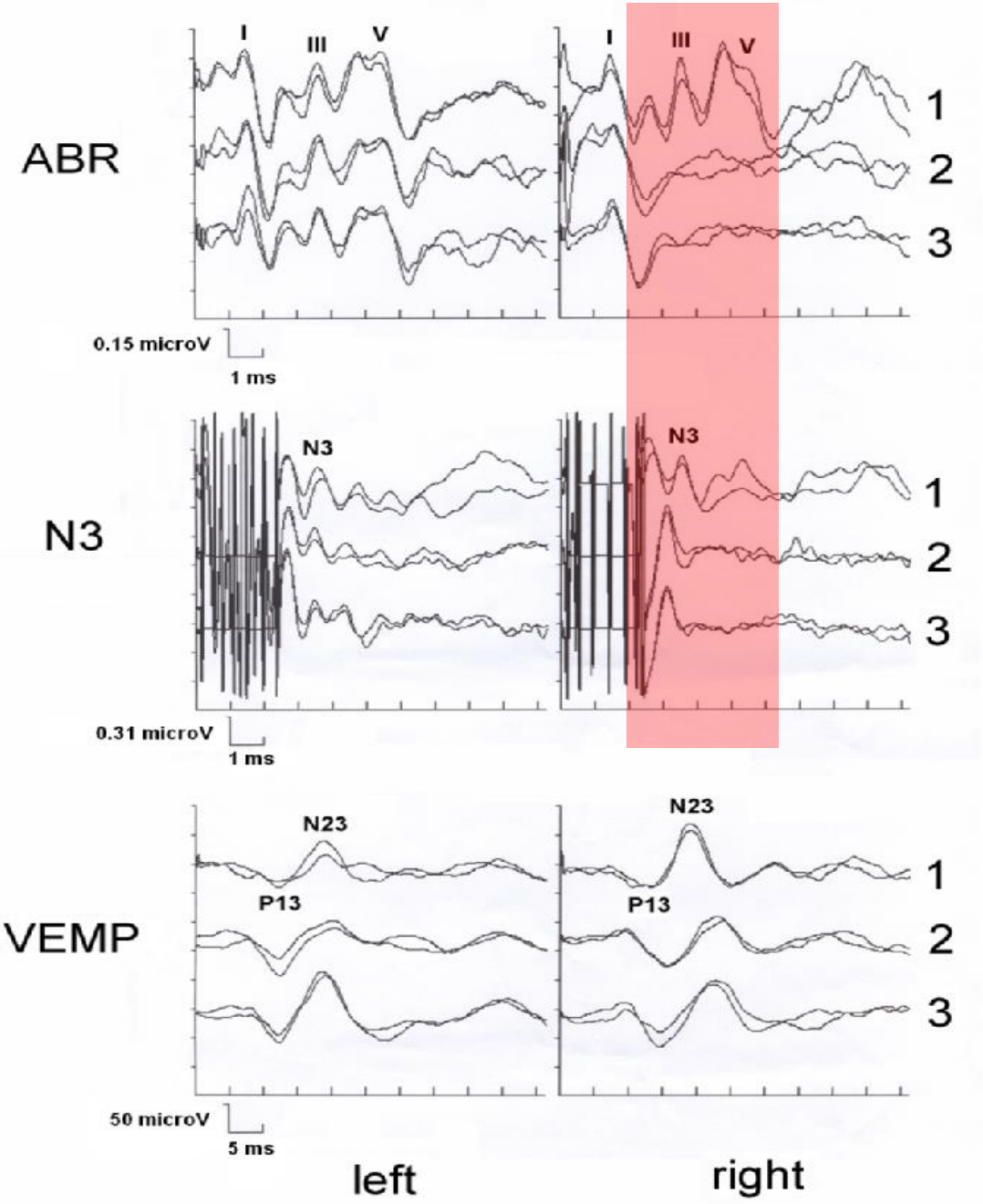
Available online 17 October 2007

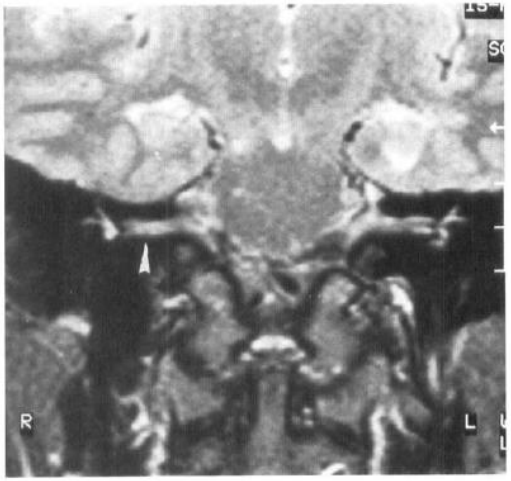
# “Neurite” vestibolare ed SM

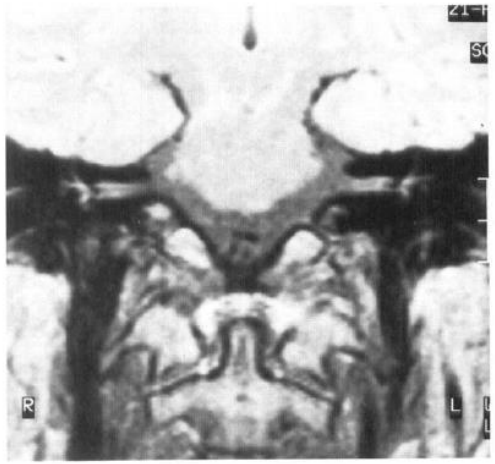






# “Neurite” cocleared SM



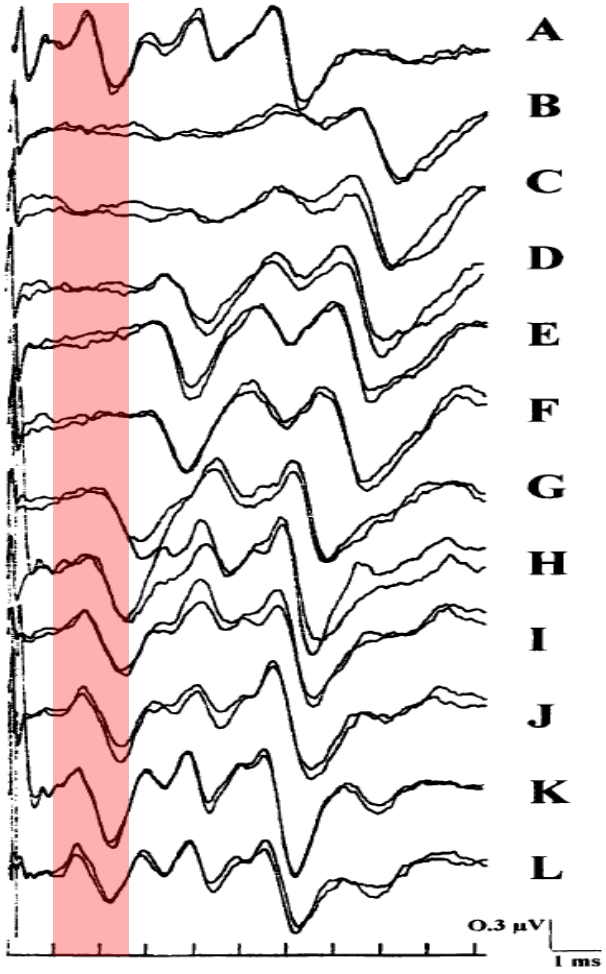




**MRI and brainstem auditory evoked potential evidence of eighth cranial nerve involvement in multiple sclerosis**

**Article abstract**—An MS patient experienced sudden hearing loss. Brainstem auditory evoked potentials, previously normal, showed substantial abnormalities that suggested the impairment of the distal part of the acoustic nerve. MRI detected a small hyperintense lesion along the acoustic nerve; the lesion decreased in size and then disappeared after steroid treatment. This demonstrates that a demyelinating lesion in the distal tract of the eighth cranial nerve may cause an acute hearing loss in MS.

NEUROLOGY 1997;48:270–272

R. Bergamaschi, MD; A. Romani, MD; F. Zappoli, MD; M. Versino, MD; and V. Cosi, MD



# Pseudo-neurite vestibolare ed SM


## Bedside differentiation of vestibular neuritis from central "vestibular pseudoneuritis"

C D Cnyrim, D Newman-Toker, C Karch, T Brandt and Michael Strupp

*J. Neurol. Neurosurg. Psychiatry* 2008;79;458-460
doi:10.1136/jnnp.2007.123596

**Table 1** Clinical characteristics, frequencies of categorical clinical signs, group differences and correlation between signs/parameters and final diagnosis.

| | Vestibular pseudoneuritis | Vestibular neuritis | Group difference (test) | $R^2$ (correlation assessed by) |
|---|---|---|---|---|
| n | 43 | 40 | | |
| Age (y) (mean (SD)) | 53 (17) | 54 (14) | $p = 0.82$ (t test) | |
| Sex (F:M) | 24:19 | 20:20 | $p = 0.60$ ($\chi^2$ test) | |
| Side of lesion (left:right) | 23:20 | 24:16 | $p = 0.55$ ($\chi^2$ test) | |
| Frequency of smooth pursuit deficit (%) | 88 | 20 | $p<0.01$ ($\chi^2$ test) | 0.37 ($\chi^2$ test) |
| Frequency of gaze evoked nystagmus (%) | 56 | 17 | $p<0.01$ ($\chi^2$ test) | 0.12 ($\chi^2$ test) |
| Frequency of skew deviation (%) | 40 | 0 | $p<0.01$ ($\chi^2$ test) | 1.00 (logistic regression) |
| Frequency of pathological head thrust sign (%) | 39 | 92 | $p<0.01$ ($\chi^2$ test) | 0.26 ($\chi^2$ test) |
| Frequency of subjective visual vertical (%) | 100 | 100 | $p = 1$ ($\chi^2$ test) | 0.01 (logistic regression) |

# Oftalmoplegia internucleare