

## Atelier EQUILIBRE 3

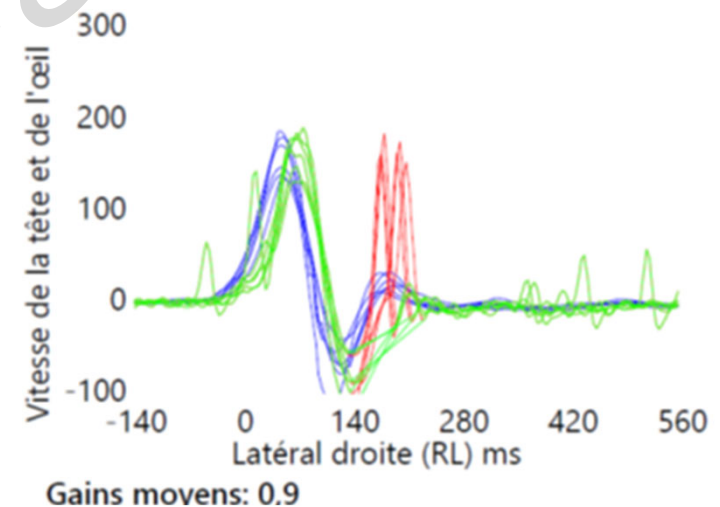
# Quand un Video Head Impulse Test (vHIT) peut-il être considéré « normal » ?

Assises ORL 2022

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EX - CHU Erasme et Brugmann  
Unité de Neuro-Ophtalmologie  
Unité Troubles de l'Équilibre et Vertiges



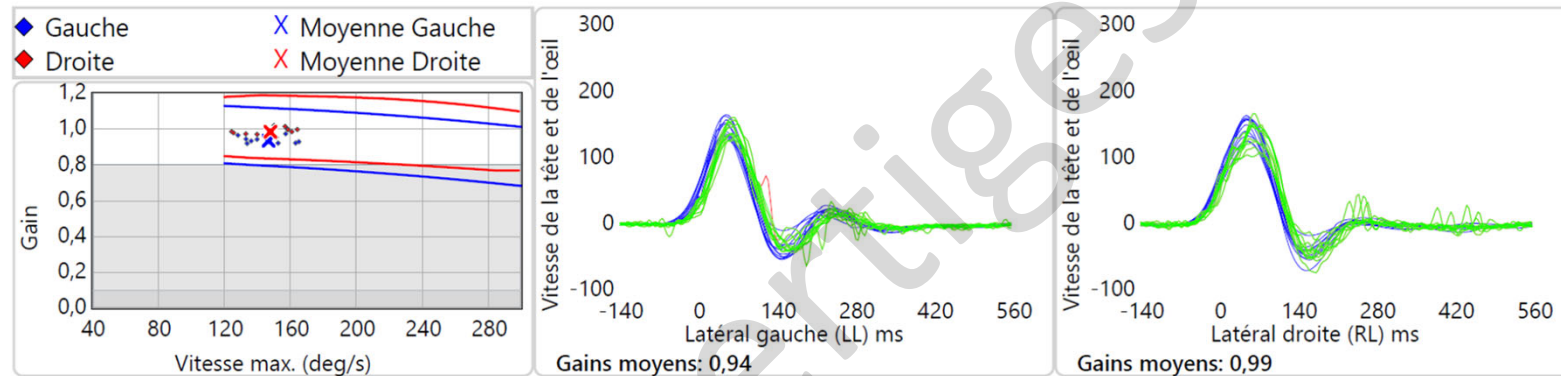
## Aucun Conflit d'intérêt en rapport avec la présentation

- Honoraires de conférence : néant
- Participation à un « Advisory Board » : néant
- Etudes cliniques sponsorisées en cours : néant
- Consultance : néant
- Voyages-Congrès : néant



# Quand un VHIT est-il le témoin d'un RVO normal ?

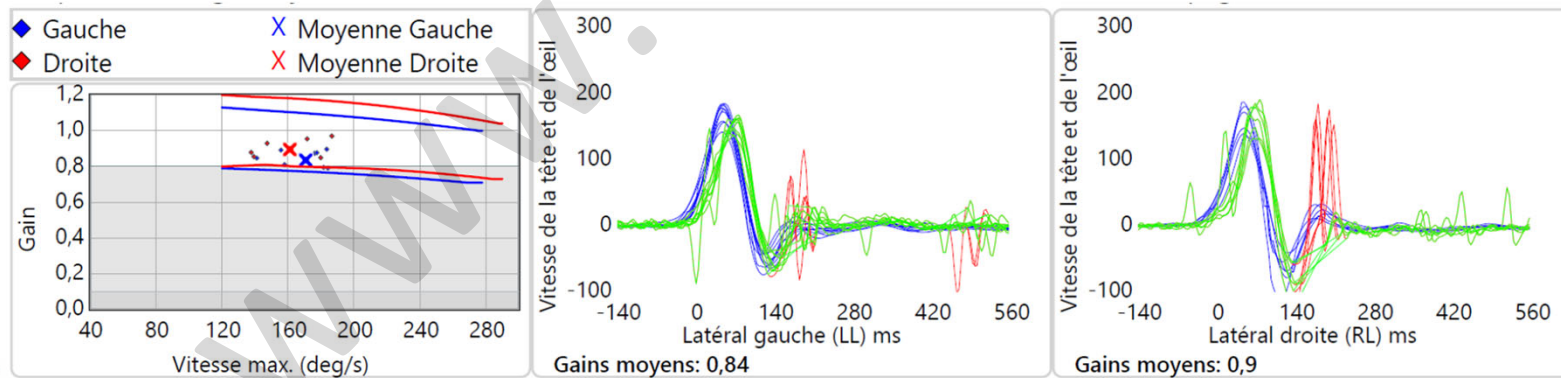
BOH.M. 40 ans



Gain = 0.94

Gain = 0.99

P.J. 82 ans



Gain = 0.84

Gain = 0.90



## SOMMAIRE:

**Le RVO normal ou pathologique ?**

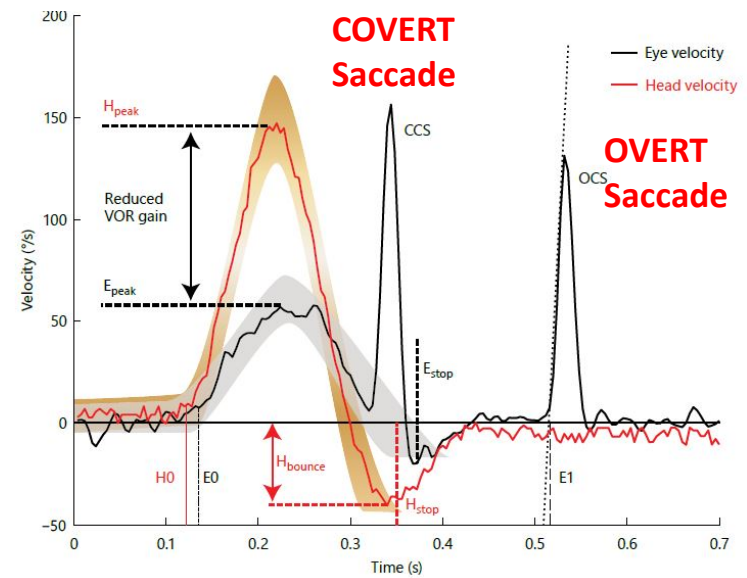
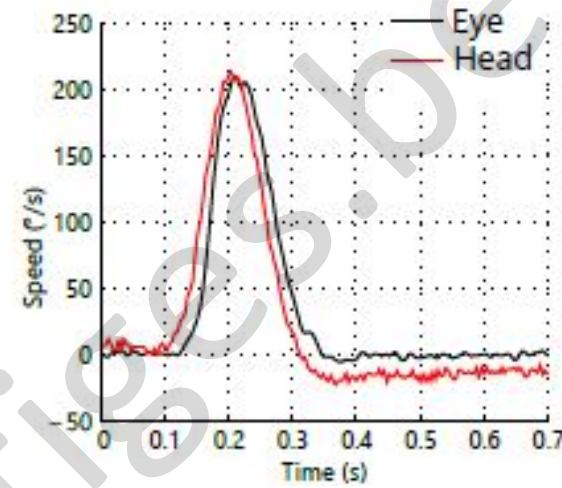
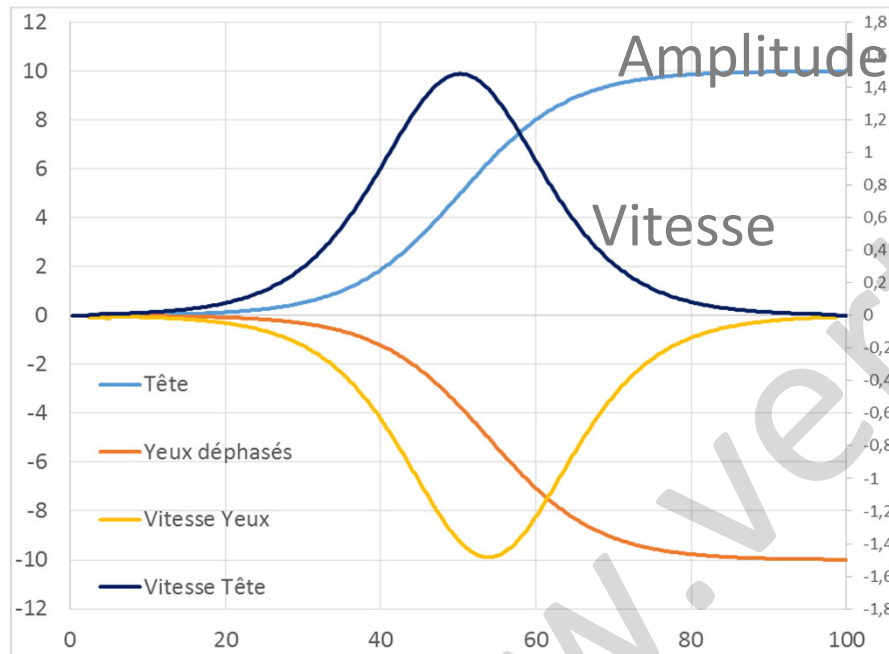
**Le VHIT normal ou pathologique ?**

**vHIT normal = RVO normal ?**





# Le RVO normal ou pathologique ?



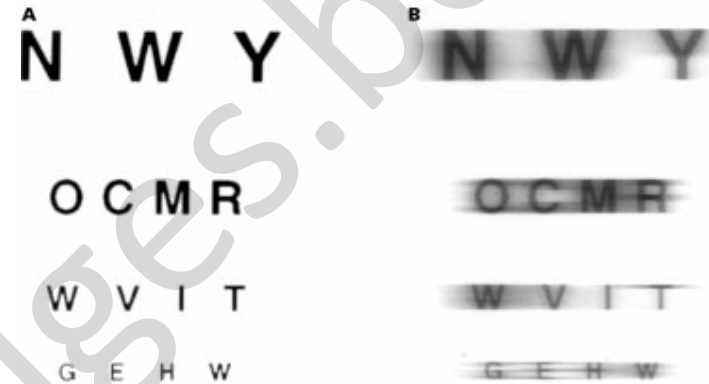
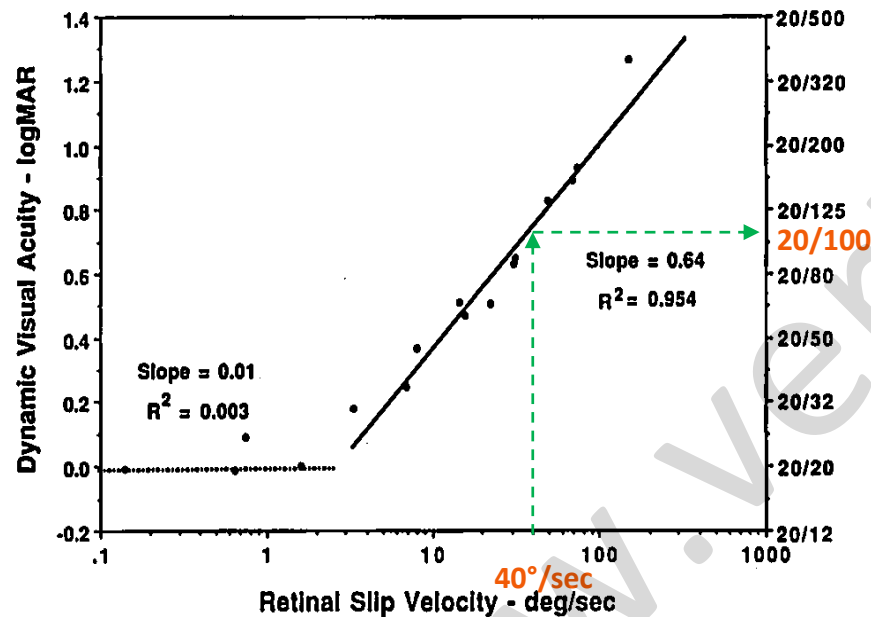
**Quantifying the Vestibulo-Ocular Reflex with Video-Oculography: Nature and Frequency of Artifacts**

Georgios Mantokoudis<sup>a</sup> Ali S. Saber Tehrani<sup>a</sup> Jorge C. Kattah<sup>c</sup>  
 Karin Eibenberger<sup>b</sup> Cynthia I. Guede<sup>c</sup> David S. Zee<sup>a</sup> David E. Newman-Toker<sup>a, b</sup>

Audiol Neurotol 2015;20:39-50



# Une image **stable**



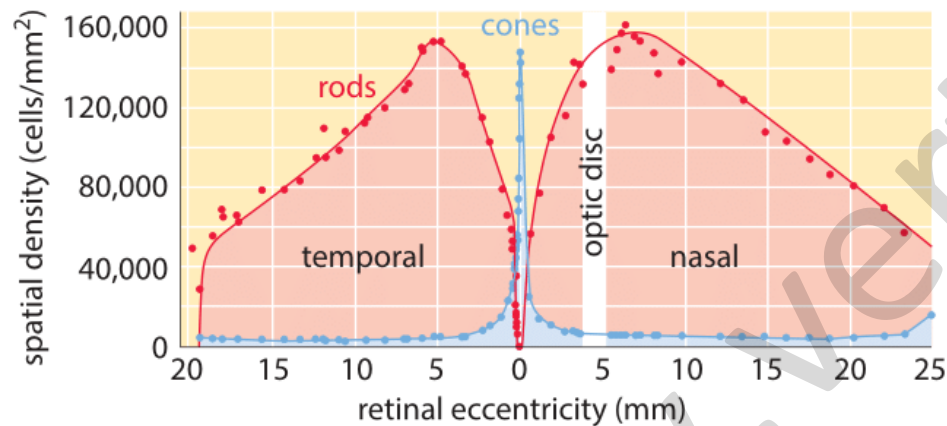
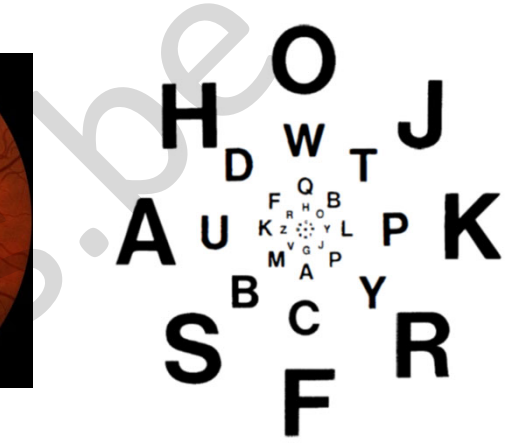
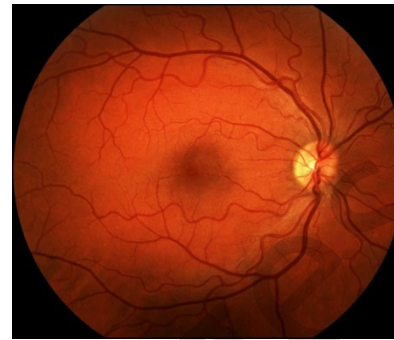
**Glissement rétinien  
< 4 deg/sec**

Dell'Osso LF. Acta Neurol Belg. 1991;91(2):105-13.

**Pour un rotation de tête à 200°/sec.  
un gain du RVO à 0,8 ( 160°/sec.)  
réduit l' Acuité Visuelle à 2/10.**

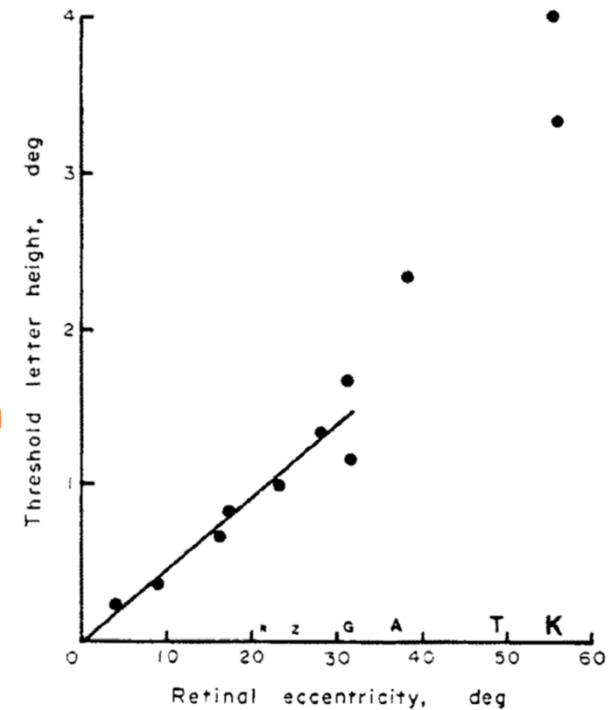


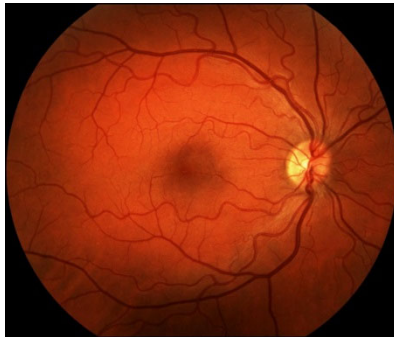
Une image **stable**  
sur la partie le plus sensible  
de la rétine (**la macula**)



Pour chaque degré d'excentration, l'écart minimum discriminable augmente de 2,5 min d'angle.

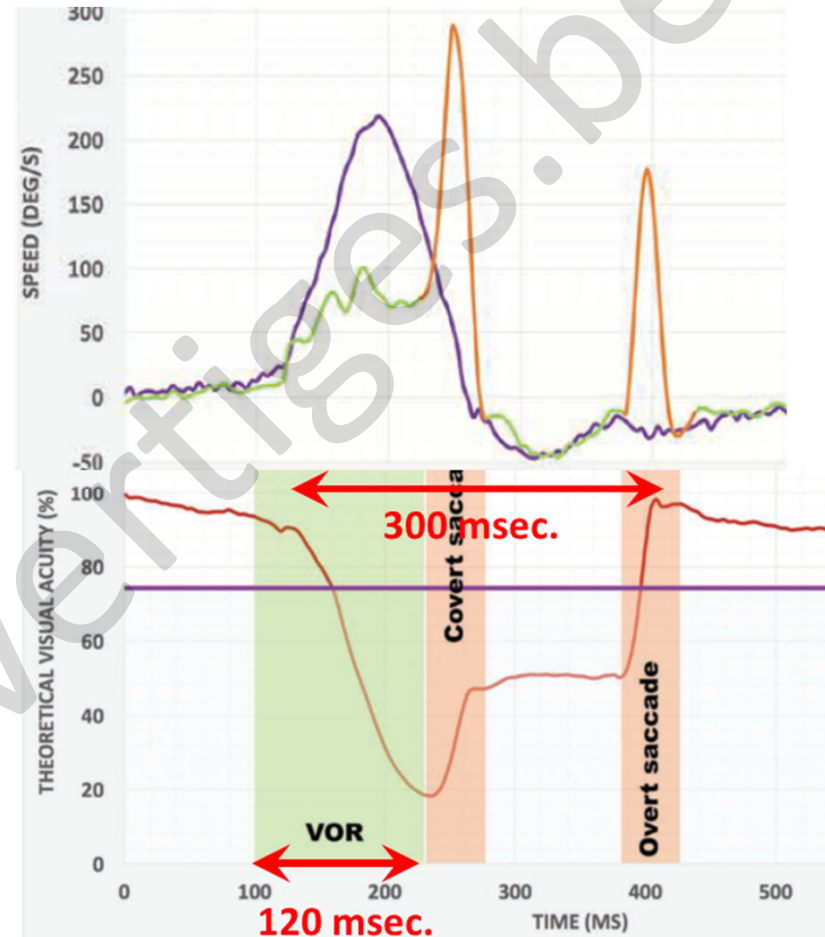
$$AV = 1/2.5' = 4/10$$





Baisse d'Acuité  
Visuelle liée à  
l'excentration de  
l'image sur la rétine.

Ne tient pas compte  
du glissement  
rétinien.



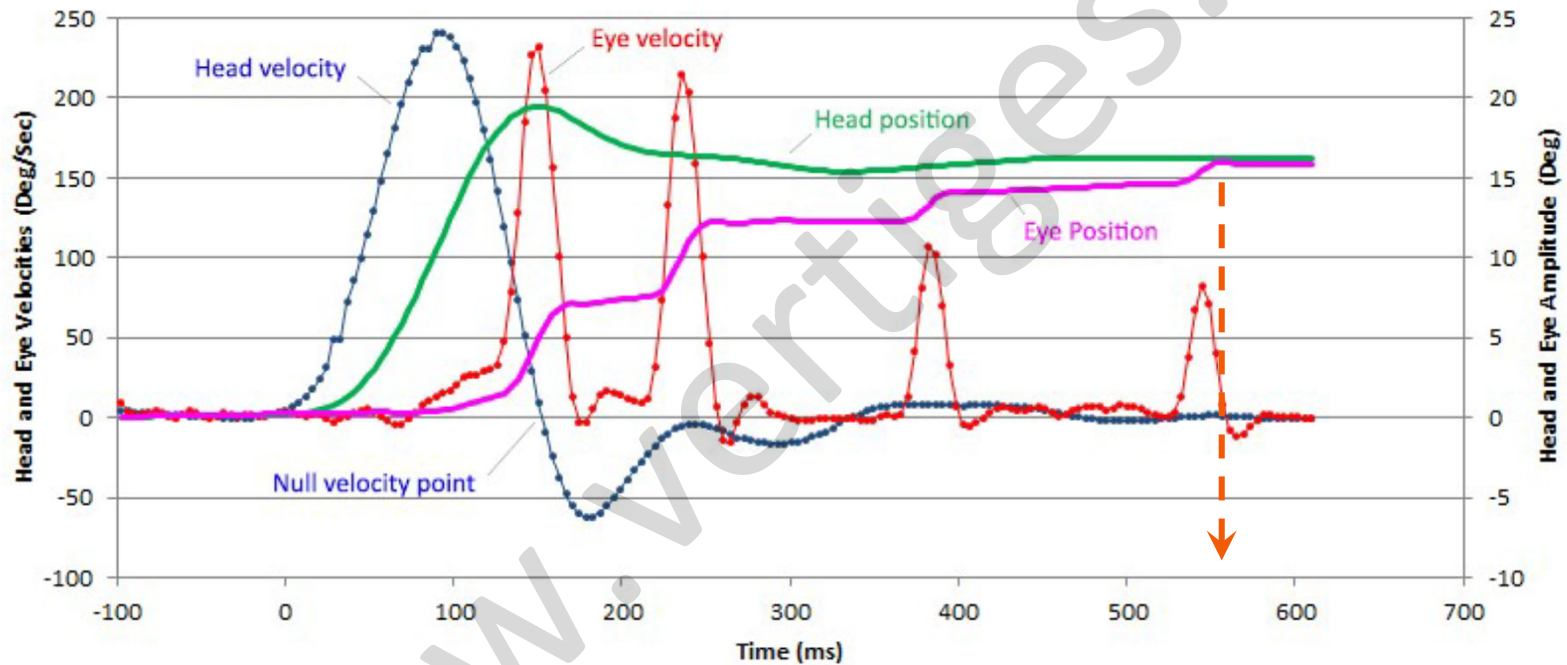
Visual Performance and Perception as  
a Target of Saccadic Strategies in Patients  
With Unilateral Vestibular Loss

Gabriel Trinidad-Ruiz,<sup>1</sup> Jorge Rey-Martinez,<sup>2</sup> Angel Batuecas-Caletrio,<sup>3</sup>  
Eusebi Matño-Soler,<sup>4</sup> and Nicolas Perez-Fernandez<sup>5</sup>

(Ear & Hearing 2018;XX;00-00)



# Délai d'identification de l'image après le mouvement



Visual Input is the Main Trigger and Parametric Determinant for Catch-Up Saccades during Video Head Impulse Test in Bilateral Vestibular Loss.

Christian Van Nechel<sup>1,2,3,4\*</sup>, Alionka Bostan<sup>1,2</sup>, Ulla Duquesne<sup>3,4</sup>, Charlotte Hautefort<sup>3,5</sup> and Michel Toupet<sup>3,6</sup>

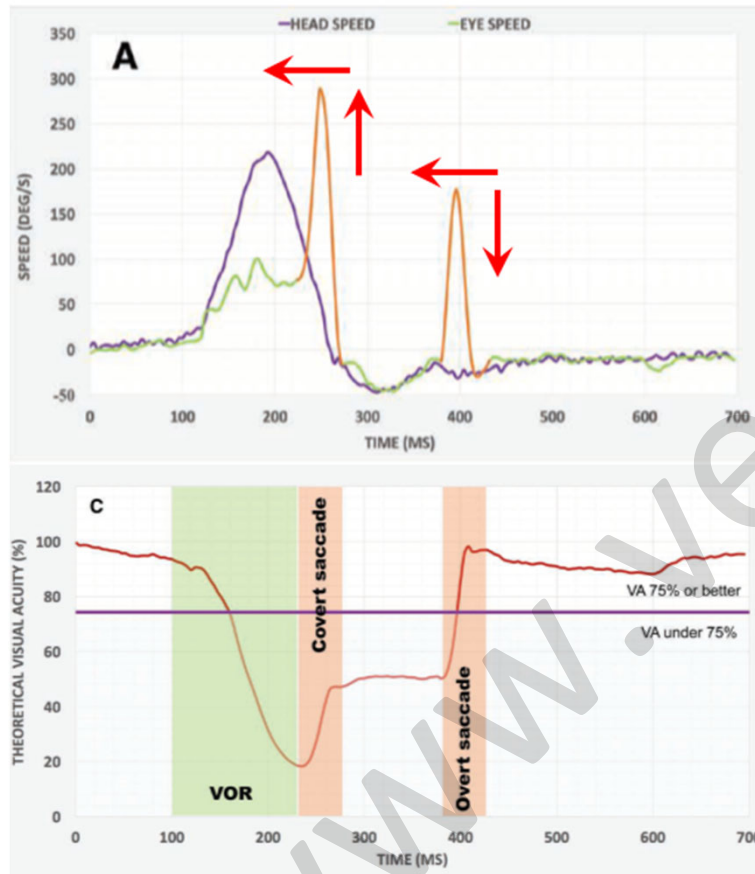
frontiers  
in Neurology

ORIGINAL RESEARCH  
published: 04 January 2019  
doi: 10.3389/fneur.2018.01138



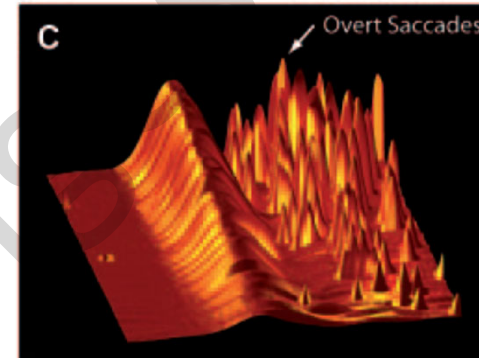


# Objectifs de la Rééducation par mouvements actifs



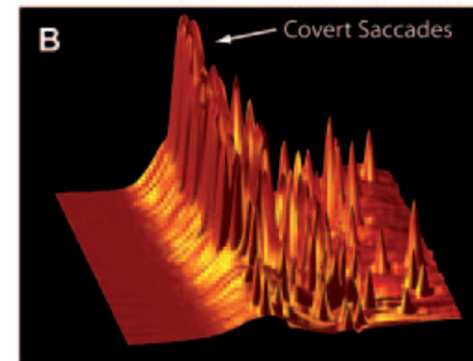
2 semaines post-névrite

Vestibular Neuritis



4 ans post-névrite

Vestibular Neuritis



Une image **stable**  
sur la partie la plus sensible de la rétine (**la macula**)  
pendant un **temps suffisant** pour l'identifier.

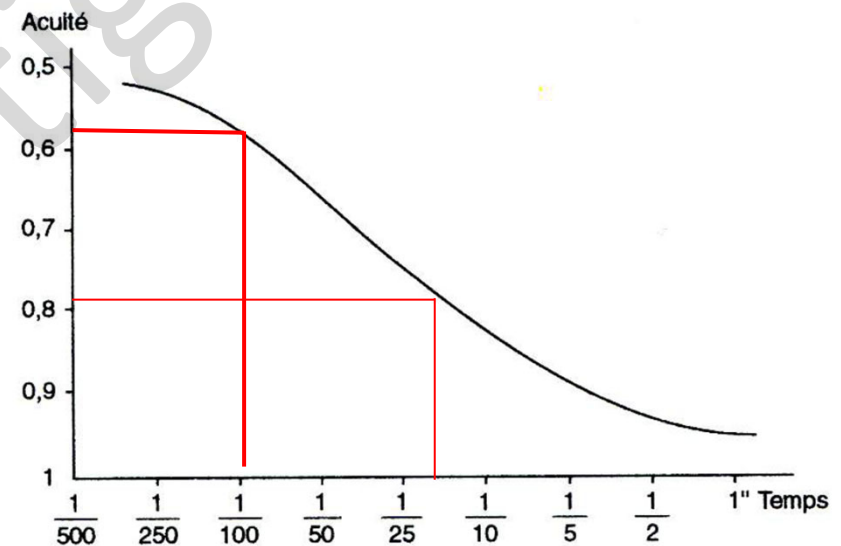
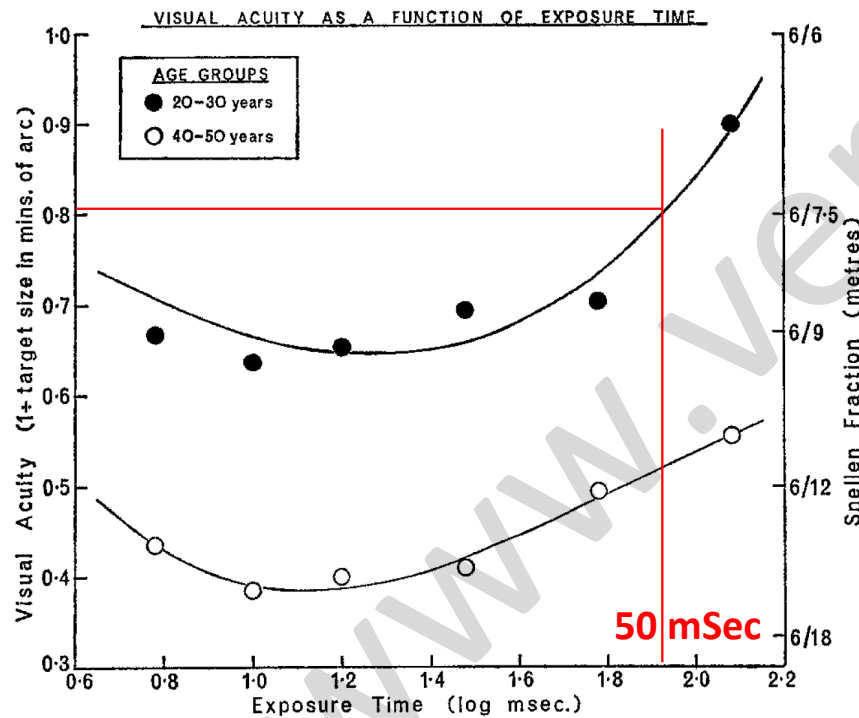


FIG. 7-8. — Variation de l'acuité en fonction du temps d'exposition (d'après Zanen et Klaassen-Nanquin, extrait de CORBE *et al.* [18]).



VERONICA M. READING



## RVO: Que retenir :

Une Acuité Visuelle optimale requiert une image **stable** sur la partie la plus sensible de la rétine (**la macula**) pendant un **temps suffisant**.

Un réflexe vestibulo-oculaire efficace à un gain  $\approx 1$  ( $\gg 0,8$ )

La présence de saccades de refixation témoigne de la perte de fixation pendant le mouvement.

Ces saccades retardent la récupération d'une AV optimale.

La variabilité tolérée est fonction de l'exigence de la tâche visuelle.





## SOMMAIRE:

**Le RVO normal ou pathologique ?**

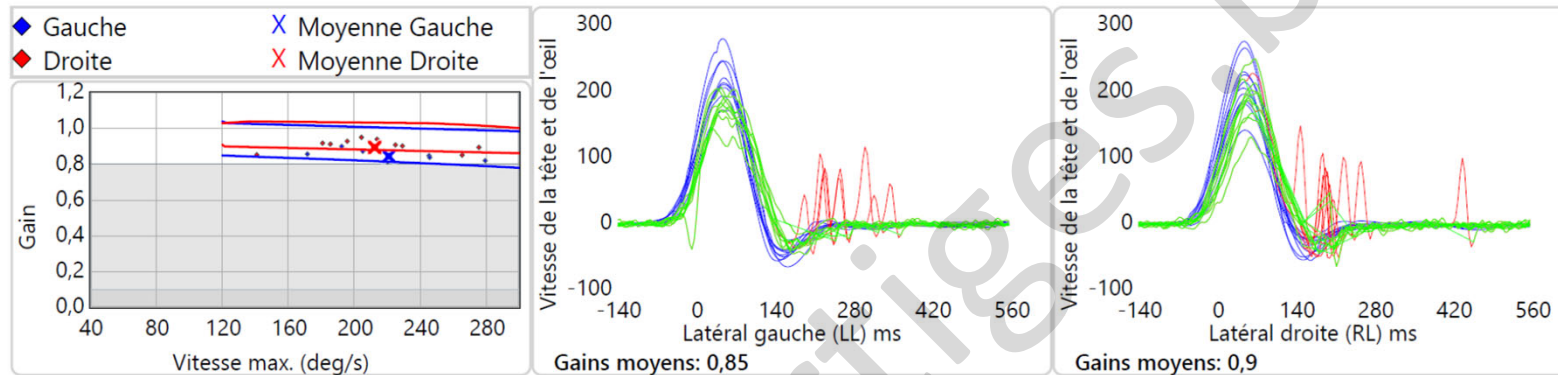
**Le VHIT normal ou pathologique ?**

**vHIT normal = RVO normal ?**



# Le VHIT normal ou pathologique ?

R.M. 29 ans

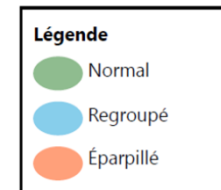


Gain = 0.85

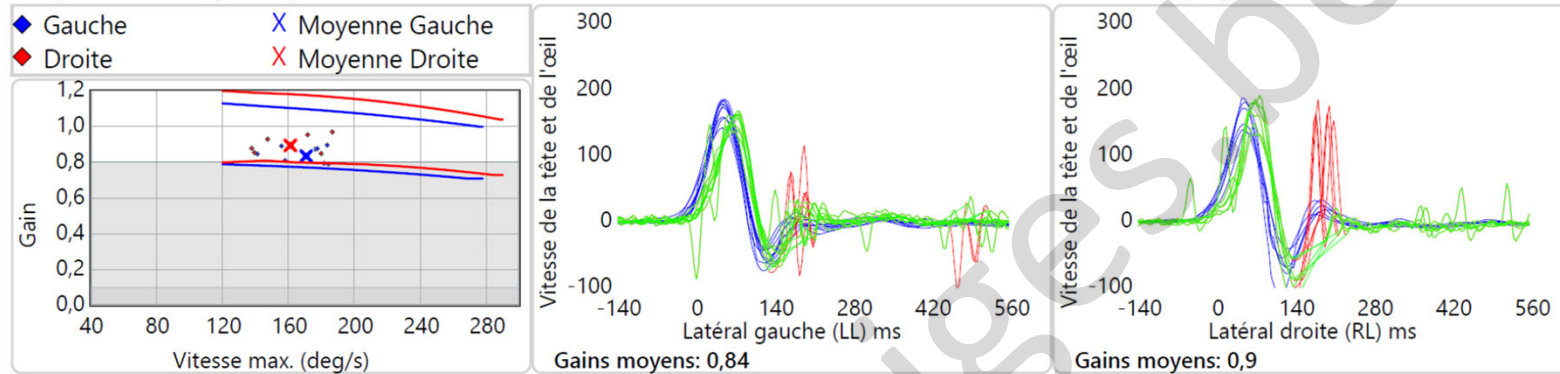
Gain = 0.90

## Analyse des saccades de rattrapage

	LL	RL
<b>Total %</b>	100	80
<b>Score PR global (%)</b>	36	28
<b>Classification</b>	●	●
<b>Tête</b>		
Latence (ms)	48	48
Amplitude (°/s)	220	211
<b>Covert</b>		
%	0	10
Latence (ms)	NA	72
Amplitude (°/s)	NA	12
Score PR (%)	NA	NA
<b>Overt ?</b>		
%	100	80
Latence (ms)	259	196
Amplitude (°/s)	88	84
Score PR (%)	36	28



# Le VHIT normal ou pathologique ?



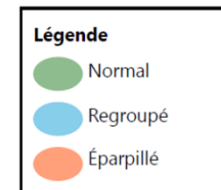
Gain = 0.84

Gain = 0.94

P.J. 82 ans

## Analyse des saccades de rattrapage

	LL	RL
<b>Total %</b>	44	100
<b>Score PR global (%)</b>	14	14
<b>Classification</b>		
<b>Tête</b>		
Latence (ms)	48	48
Amplitude (°/s)	170	160
<b>Covert</b>		
%	0	0
Latence (ms)	NA	NA
Amplitude (°/s)	NA	NA
Score PR (%)	NA	NA
<b>Overt ?</b>		
%	44	100
Latence (ms)	161	187
Amplitude (°/s)	76	196
Score PR (%)	14	14



# Normes Gain RVO horizontal VHIT

Perez-Fernandez N et al. Acta Otorrinolaringol Esp. 2012;63(6):429–435.	> 0,6
MacDougall HG et al. Otol Neurotol. 2013;34(6): 974–979.	>0,7
Eusebi Matino-Soler et al. Otol Neurotol 00:00Y00, 2014	> 0,92
Tranter-Entwistle I et al. Acta Otolaryngol. 2016;136(11):1110–1114.	> 0,8
Michael Struppa et al. Journal of Vestibular Research 27 (2017) 177–189.	> 0,6
Tuğba Emekci et al. Acta Oto-Laryngologica, 2020	> 0,76
Anders Hansson et al. Europ. Arch. of Oto-Rhino-Laryngology (2021) 278:2619–2624	> 0.77



# Normes VHIT vHIT Otometrics ICS Impulse

**n = 100**

Table 2. Statistics of VOR gain values by ear side.

VOR gains	All ears	Left ear	Right ear	p-Value	
Lateral	0.96 (± 0.103)	0.92 (± 0.104)	1.00 (± 0.089)	.000*	→ 2sd : > <b>0,77</b>
Anterior	0.89 (± 0.167)	0.94 (± 0.158)	0.84 (± 0.163)	.000*	→ 2sd : > <b>0,56</b>
Posterior	0.87 (± 0.164)	0.87 (± 0.122)	0.86 (± 0.198)	.390	→ 2sd : > <b>0,54</b>

\* $p > .05$  is statistically significant.

Asymmetry values	femmes	hommes	
Lateral	8.02% (± 5.305)	7.24% (± 4.312)	.531 → + 2sd ≈ < <b>18 %</b>
Anterior	16.64% (± 13.323)	17.88% (± 12.419)	.519 → + 2sd ≈ < <b>42 %</b>
Posterior	17.90% (± 13.168)	16.73% (± 9.535)	.878 → + 2sd ≈ < <b>44 %</b>

Normative values for semicircular canal function with the video head impulse test (vHIT) in healthy adolescents

Tuğba Emekci , Kadriye Şerife Uğur , Deniz Uğur Cengiz & Fatma Men Kılınc

Published online: 05 Nov 2020.  
Acta Oto-Laryngologica

Asymétrie des gains horizontaux =  $2.39 \pm 1.96\%$ ,  
non modifiée significativement avec l'âge.

+ 2sd ≈ < **6,5 %**



Quantitative analysis of gains and catch-up saccades of video-head-impulse testing by age in normal subjects Clin. Otolaryngol. 2016, 41, 532–538  
Yang, C.J.,\* Lee, J.Y.,\* Kang, B.C.,\* Lee, H.S.,\* Yoo, M.H.† & Park, H.J.\*



# Normes VHIT

Ulmer Synapsys vHIT II system software version 14.1

n=88

## Bilateral Horizontal

Valid canals<sup>a</sup>

n = 167

Gain, mean (SD)

0.95 (0.09) → 2sd : > **0,77**

Median (range) gain asymmetry

1.5 (0–37.4)

N (%) canals with gain below cut-off<sup>b</sup>

10/167 (6.0) → cut off < 0.81 by manufacturer

N (%) canals with saccades

28/167 (16.8) → **16,8 % Catch-up saccades**

## Anterior canals

Valid canals<sup>c</sup>

n = 168

Gain, mean (SD)

0.95 (0.14) → 2sd : > **0,67**

N (%) canals with gain below cut-off<sup>d</sup>

10/168 (6.0) → cut off < 0.71 by manufacturer

N (%) canals with saccades

29/168 (17.3) → **17,3 % Catch-up saccades**

## Posterior canals

Valid canals<sup>c</sup>

n = 170

Gain, mean (SD)

0.84 (0.15) → 2sd : > **0,54**

N (%) canals with gain below cut-off<sup>d</sup>

23/170 (13.5) → cut off < 0.71 by manufacturer

N (%) canals with saccades

34/170 (20.0) → **20 % Catch-up saccades**

LARP

Median (range) gain asymmetry

5.4 (0–91.8)

RALP

Median (range) gain asymmetry

5.7 (0–138.5)

**Normative video head impulse test data in subjects with and without vascular risk factors**

Anders Hansson<sup>1</sup> · Jonatan Salzer

European Archives of Oto-Rhino-Laryngology (2021) 278:2619–2624

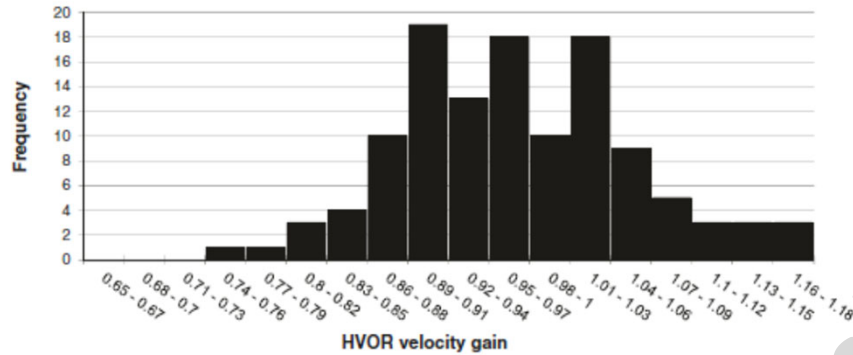




# Normes VHIT (EyeSeeCam HIT)

## Canaux Horizontaux

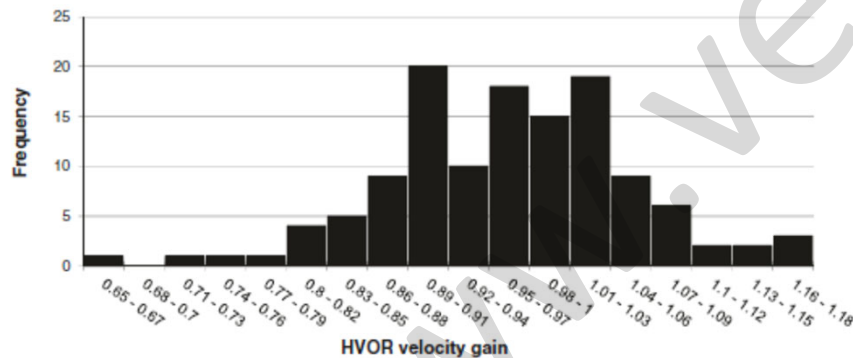
a) Frequency of normal HVOR velocity gain at 80 ms in 60 subjects (n=120)



n = 60

→ 2sd : > 0,79  
à 80 mSec.

b) Frequency of normal HVOR velocity gain at 60 ms in 60 subjects (n=120)



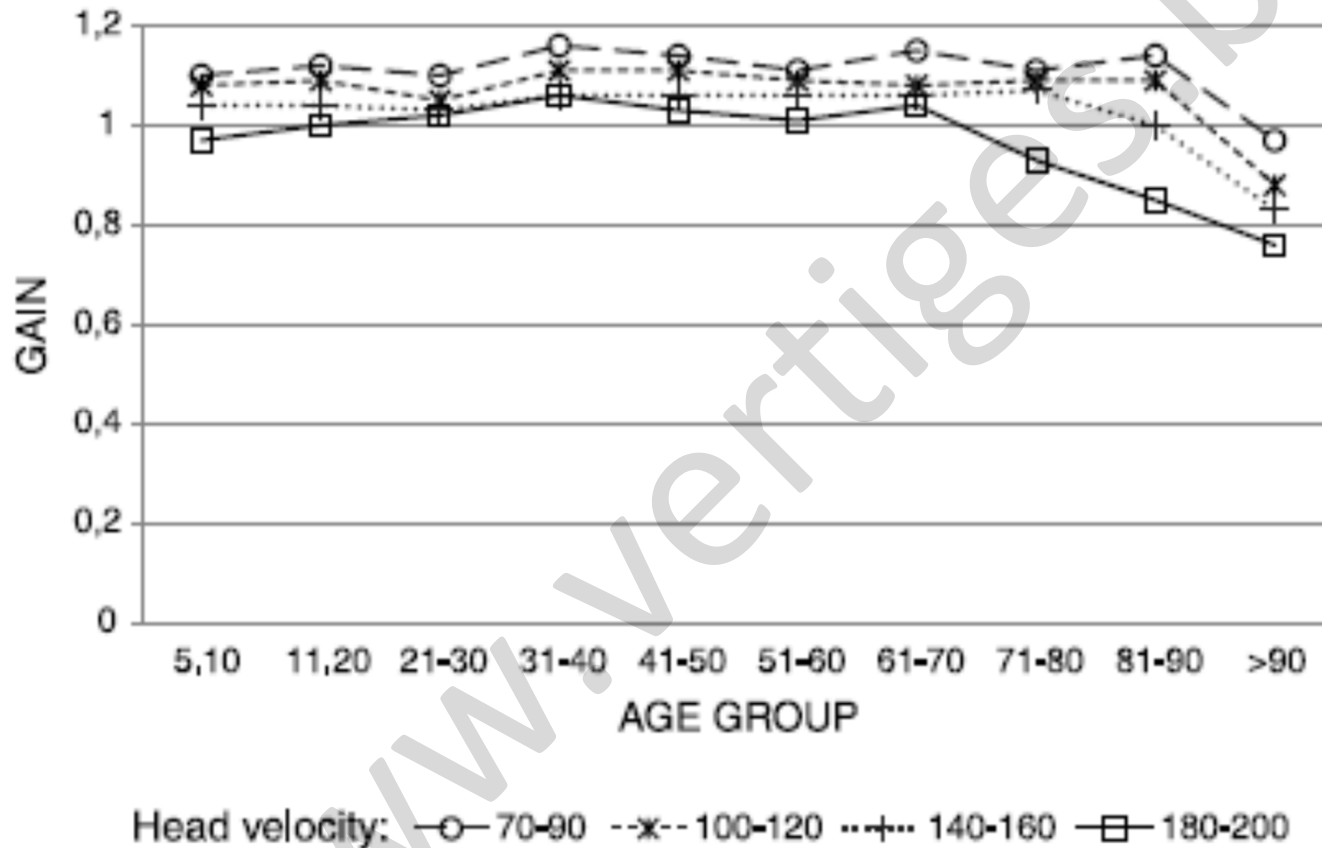
→ 2sd : > 0,75  
à 60 mSec.

Age dependent normal horizontal VOR gain of head impulse test as measured with video-oculography

Mossman et al. *Journal of Otolaryngology - Head and Neck Surgery* (2015) 44:29



# Différence Gain Age / Sexe / Vitesse



Eusebi Matino-Soler et al.  
Otol Neurotol 00:00Y00, 2014

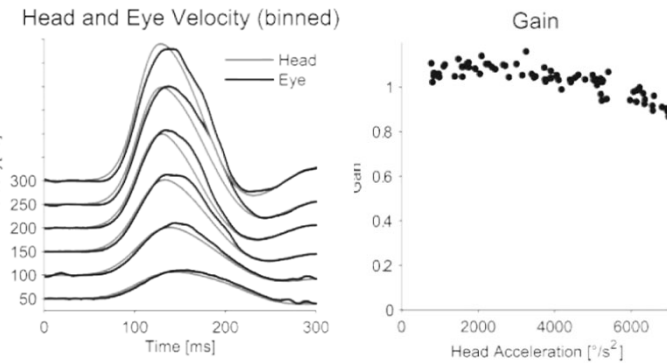




# Head impulse test in unilateral vestibular loss

Neurology® 2008;70:454-463

## Vestibulo-ocular reflex and catch-up saccades



Mean gain in normal subject  
 $0.98 \pm 0.063$  (mean  $\pm$  95%CI) at  $750 \text{ }^\circ/\text{sec}^2$   
 $1.02 \pm 0.062$  at  $1.717 \text{ }^\circ/\text{sec}^2$ ,  
 $0.84 \pm 0.055$  for acceleration of  $6.000 \text{ }^\circ/\text{sec}^2$

**A haute accélération, l'inhibition controlatérale est saturée**

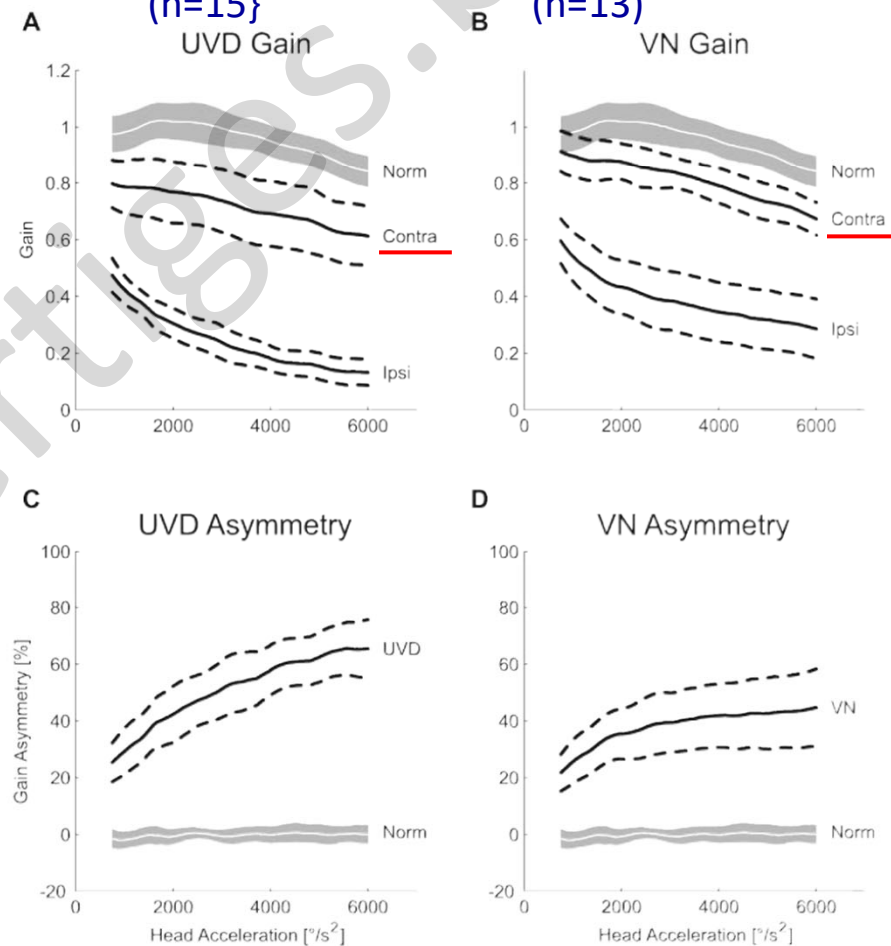
Search coils. Head impulses manually delivered.  
 Peak velocities from  $50 \text{ }^\circ/\text{sec}$  to  $300 \text{ }^\circ/\text{sec}$   
 corresponding to  $750$  to  $6,000 \text{ }^\circ/\text{sec}^2$   
 amplitudes of  $5$  to  $25^\circ$ .

K.P. Weber, MD  
 S.T. Aw, PhD  
 M.J. Todd,  
 MBIomedE

L.A. McGarvie,  
 MBIomedE  
 I.S. Curthoys, PhD  
 G.M. Halmagyi, MD

Neurectomy  
 (n=15)

Vestibular Neuritis  
 (n=13)



# Pourquoi le Gain « vHIT » n'est pas suffisant pour dissocier un RVO normal ou altéré ?

Degré variable d'exigences de la tâche et d'attention du sujet.

Condition d'enregistrement : luminosité, contraste

Imprécision de l'outil de mesure (algorithmes)  
= erreur métrologique

La présence de catch-up saccades traduit la perte d'efficacité du RVO.



# Le VHIT normal et pathologique

155 sujets avec déficit vestibulaire périphérique

**30 (19.4%) avec gains normaux bilatéralement au vHIT des canaux horizontaux.**

vHIT pathologique si:

Gain  $< 0.8$  (dans le plan horizontal)

**OU**

Présence de covert ou overt saccades

**Peripheral Vestibulopathy Presenting  
as Acute Vertigo and Spontaneous  
Nystagmus with Negative Video Head  
Impulse Test**

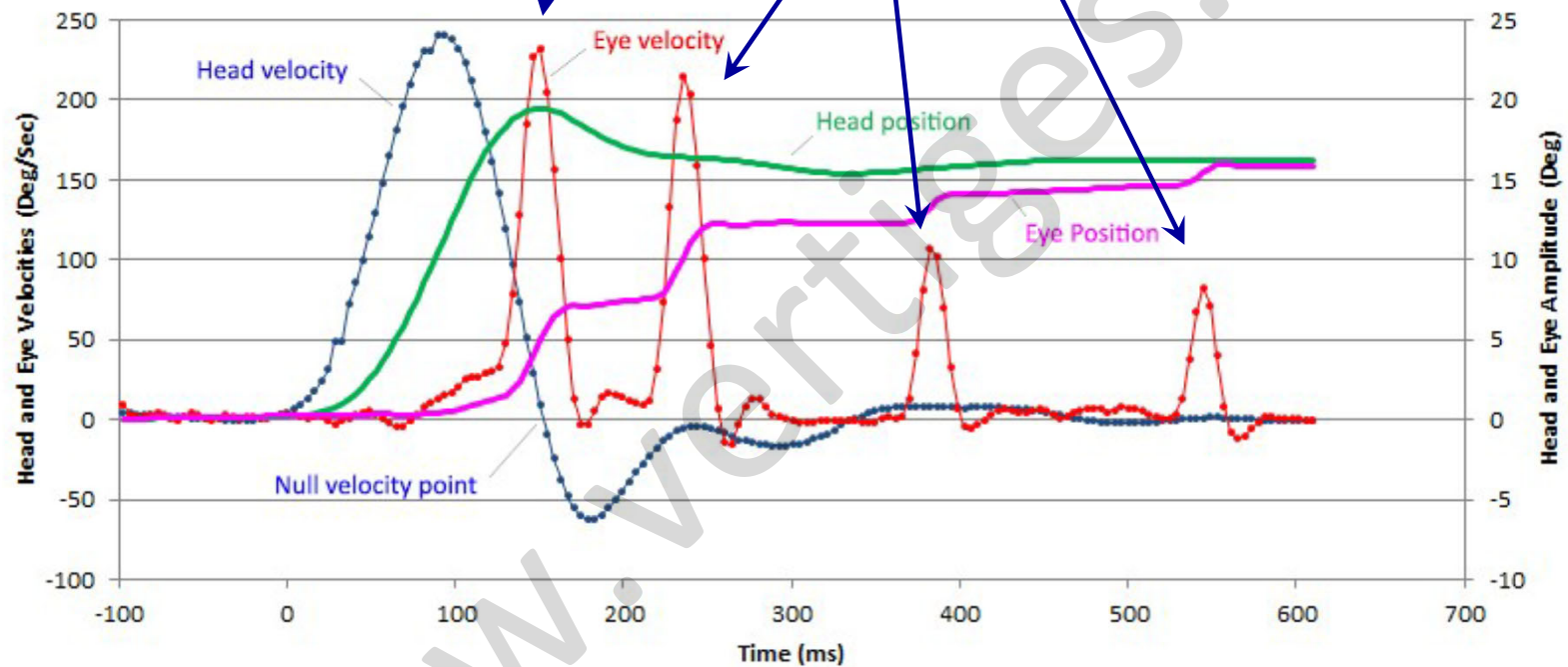
Otolaryngology–Head and Neck  
Surgery Foundation 2019

Jung-Yup Lee, MD<sup>1</sup>, Chang-Hee Kim, MD, PhD<sup>2</sup>, Jin Su Park, MD<sup>1</sup>,  
and Min-Beom Kim, MD, PhD<sup>1</sup>



## COVERT Saccades

## OVERT Saccades



Visual Input is the Main Trigger and Parametric Determinant for Catch-Up Saccades during Video Head Impulse Test in Bilateral Vestibular Loss.

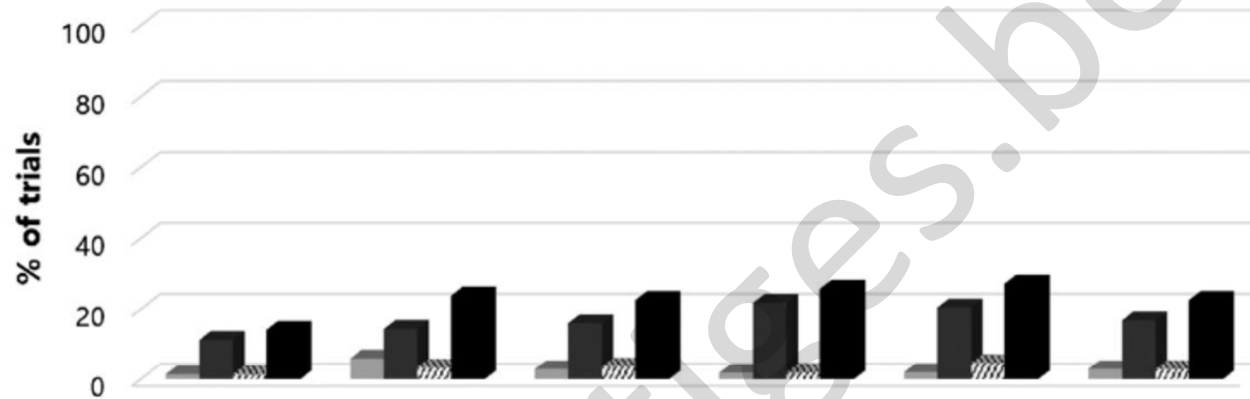
Christian Van Nechel<sup>1,2,3,4\*</sup>, Alionka Bostan<sup>1,2</sup>, Ulla Duquesne<sup>3,4</sup>, Charlotte Hautefort<sup>3,5</sup> and Michel Toupet<sup>3,6</sup>

frontiers  
in Neurology

ORIGINAL RESEARCH  
published: 04 January 2019  
doi: 10.3389/fneur.2018.01138



## Taux de Catch-up Saccades selon l'âge chez le sujet sain



	20's	30's	40's	50's	60's	Total	P-value*
■ Isolated covert CS	1.4	6.1	2.9	1.8	2.0	2.8	0.168
■ Isolated overt CS	11.3	14.4	16.0	21.8	20.5	16.8	0.134
▨ Combined covert & overt CS	1.4	3.4	3.7	2.0	4.7	3.0	0.816
■ Total	14.1	23.8	22.6	25.7	27.2	22.6	0.268

... suggest that the VOR system may be a **hypometric system** requiring small CSs to stabilise the gaze in some normal subjects.



# Le VHIT normal et pathologique

## Critères de Déficit

### Si gain < 0.78 = Déficit Vestibulaire

68% (45/66) des déficits vestibulaires avérés = **32% de faux négatifs**

1.5% (1/70) des témoins = **1.5% de faux positifs**

### Si gain > 0.78 + % saccades > 82% = Possible Déficit Vestibul.

11% (7/66) des déficits vestibulaires avérés

7% (5/70) des témoins

→ 78% (52/66) des déficits vestibulaires avérés = **22% de faux négatifs**  
8% (6/70) des témoins = **8% de faux positifs**

## Video head impulse test (vHIT): The role of corrective saccades in identifying patients with vestibular loss

Kristen L. Janky<sup>1</sup>, Jessie Patterson<sup>2</sup>, Neil Shepard<sup>3</sup>, Megan Thomas<sup>1</sup>, Kamran Barin<sup>4</sup>, Tom Creutz<sup>1</sup>, Kendra Schmid<sup>5</sup>, and Julie A. Honaker<sup>2,6</sup>

*Otol Neurotol.* 2018 April ; 39(4): 467–473. doi:10.1097/MAO.0000000000001751.



# Le VHIT normal et pathologique

## Migraines Vestibulaires

n=80

	Frequency	Percent
No saccades	59	73.8
Saccades with normal VOR gain	15	18.8
Saccades with low VOR gain	6	7.5

The rate of saccades is much more higher in the VM group compared to the healthy subject

## Video head impulse test (vHIT) in migraine dizziness

Mayada ElSherif<sup>a,\*</sup>, Mohamed Ihab Reda<sup>b</sup>, Horeya Saadallah<sup>c</sup>, Mona Mourad<sup>a</sup>

Otolaryngology Head and Neck Surgery. <https://doi.org/10.1016/j.joto.2017.12.002>

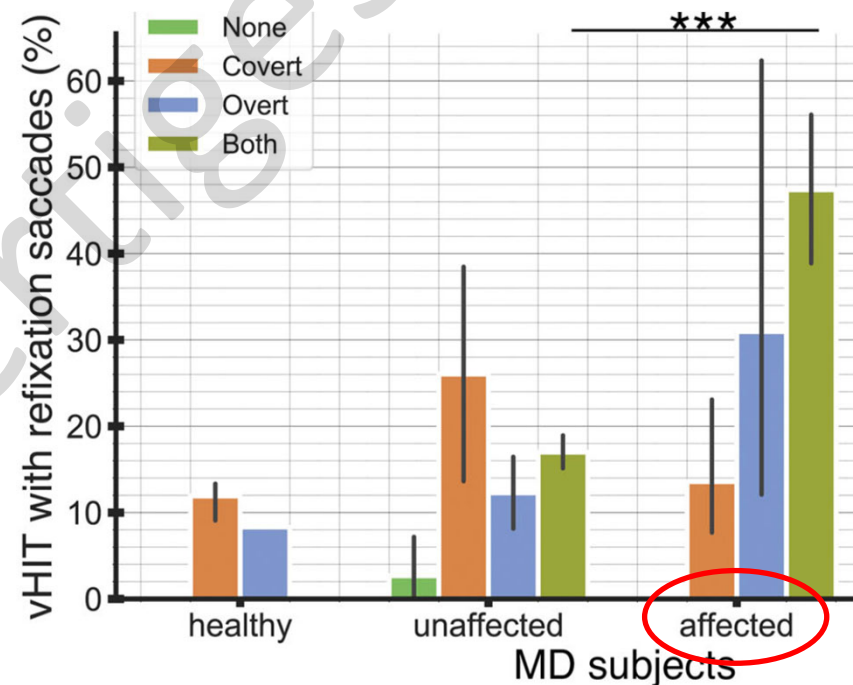
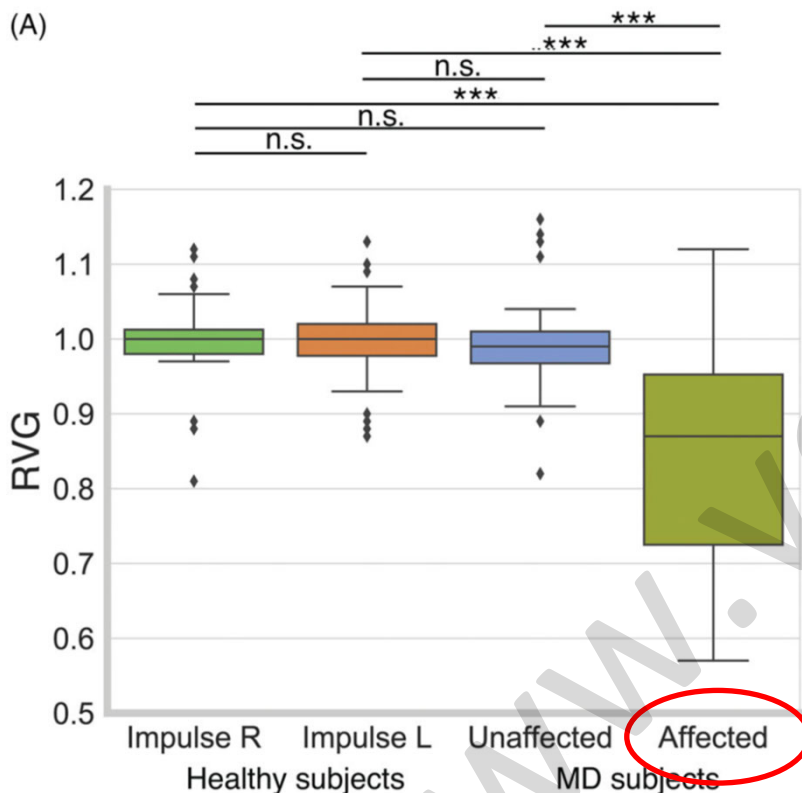
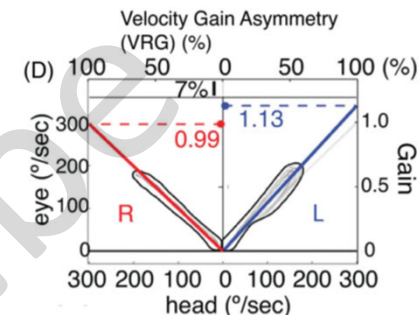




# Le VHIT normal et pathologique

## Maladie de Menière

n=40



Diagnostic value of refixation saccades in the Video Head Impulse Test (vHIT) in unilateral definite Meniere's disease

ACTA OTO-LARYNGOLOGICA  
<https://doi.org/10.1080/00016489.2020.1744720>

Shreyas Bharadwaj, Michelle R. Petrak, Cammy M. Bahner, Laurin E. Sharp, Sara F. Mosey-Claycomb & Akihiro J. Matsuoka

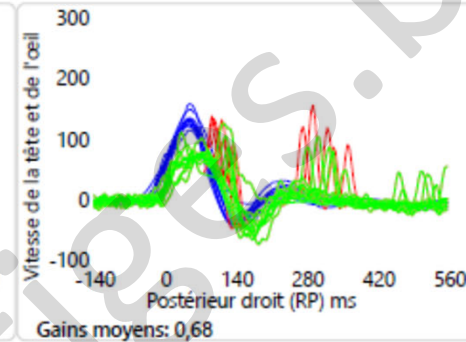
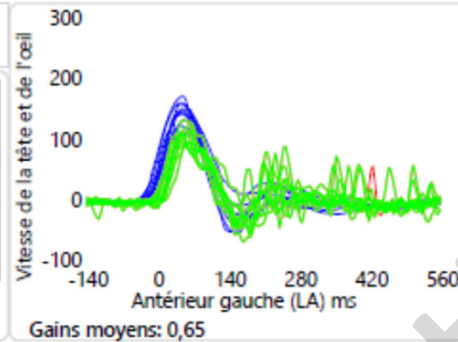
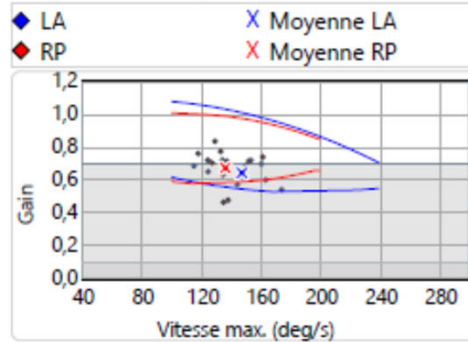




# Analyse des tracés VHIT

## Analyse par défaut

Fréquence d'image moyenne : 242



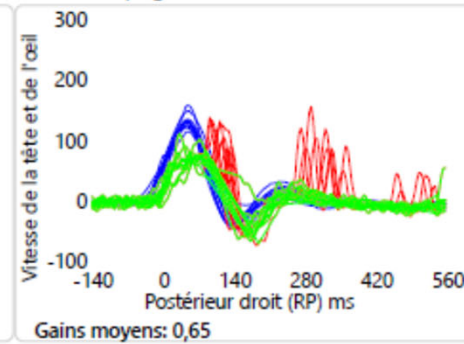
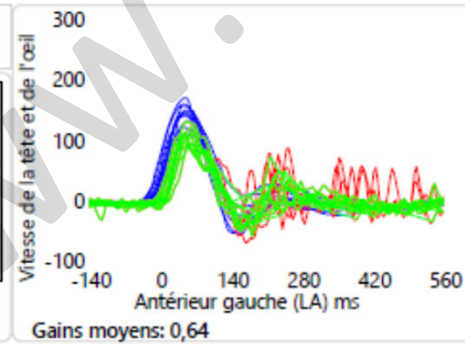
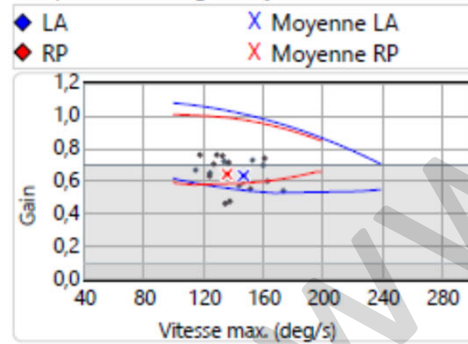
	LA	RP
Total %	10	72
Score PR global (%)	NA	100
Classification	●	●
<b>Tête</b>		
Latence (ms)	48	48
Amplitude (°/s)	146	135
<b>Covert %</b>	<b>0</b>	<b>36</b>
Latence (ms)	NA	100
Amplitude (°/s)	NA	93
Score PR (%)	NA	19
<b>Overt %</b>	<b>10</b>	<b>54</b>
Latence (ms)	420	219
Amplitude (°/s)	59	96
Score PR (%)	NA	96



## Réanalyse manuelle

Fréquence d'image moyenne : 242

Paramètres de saccades de rattrapage modifiés

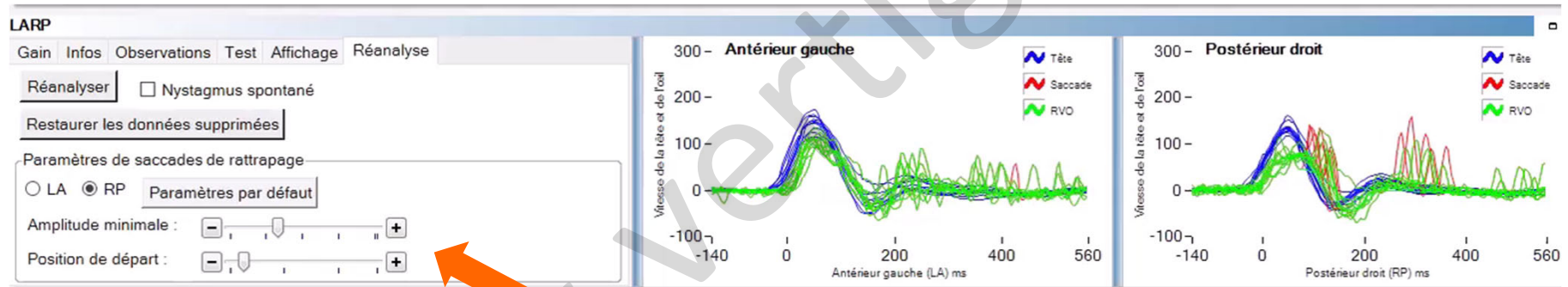


	LA	RP
Total %	100	100
Score PR global (%)	80	49
Classification	●	●
<b>Tête</b>		
Latence (ms)	48	48
Amplitude (°/s)	146	135
<b>Covert %</b>	<b>40</b>	<b>63</b>
Latence (ms)	102	99
Amplitude (°/s)	8	66
Score PR (%)	11	34
<b>Overt %</b>	<b>100</b>	<b>100</b>
Latence (ms)	200	209
Amplitude (°/s)	52	83
Score PR (%)	78	100

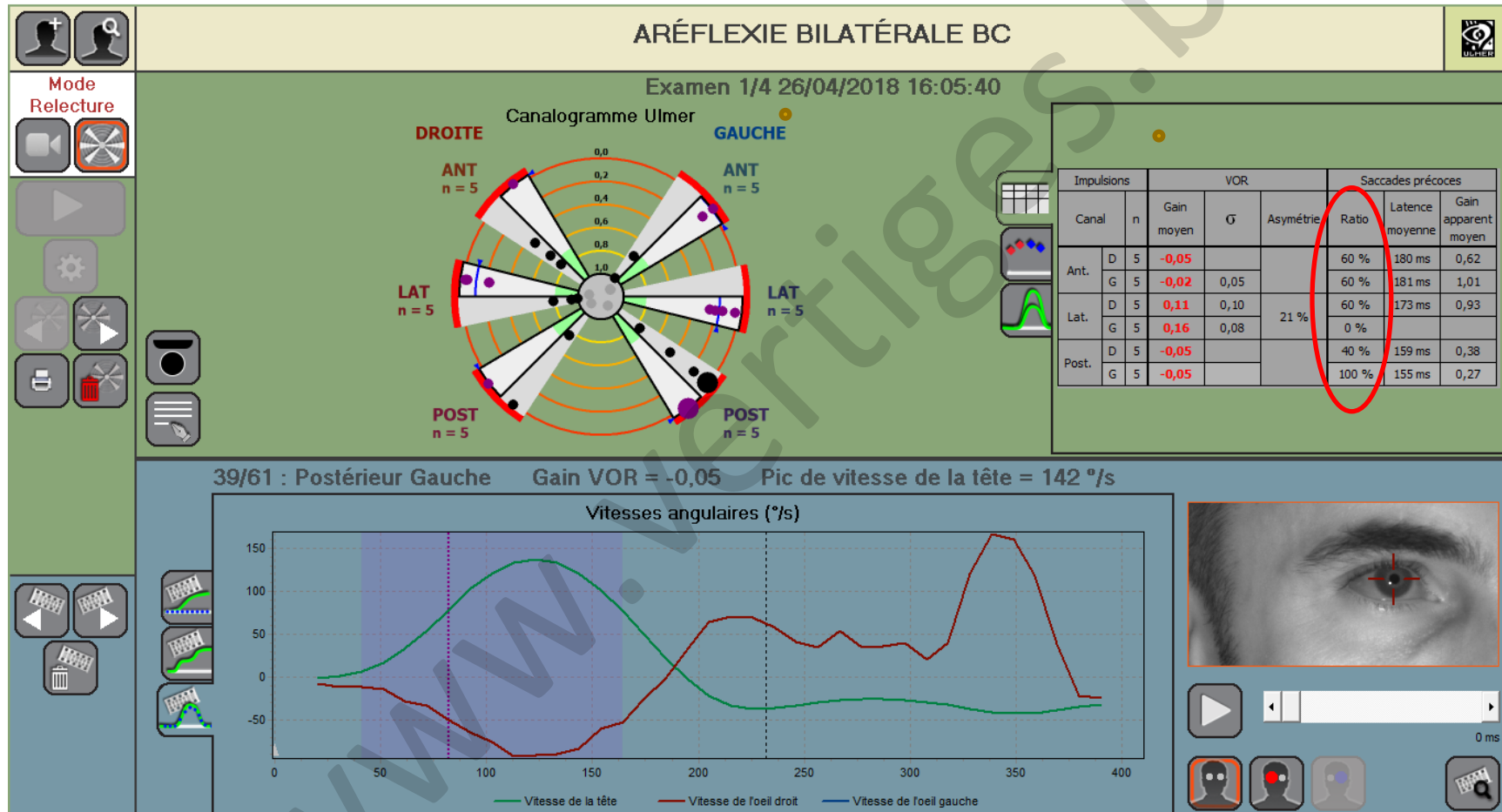


# Analyse des tracés VHIT

## Ajustement des curseurs de détection des saccades

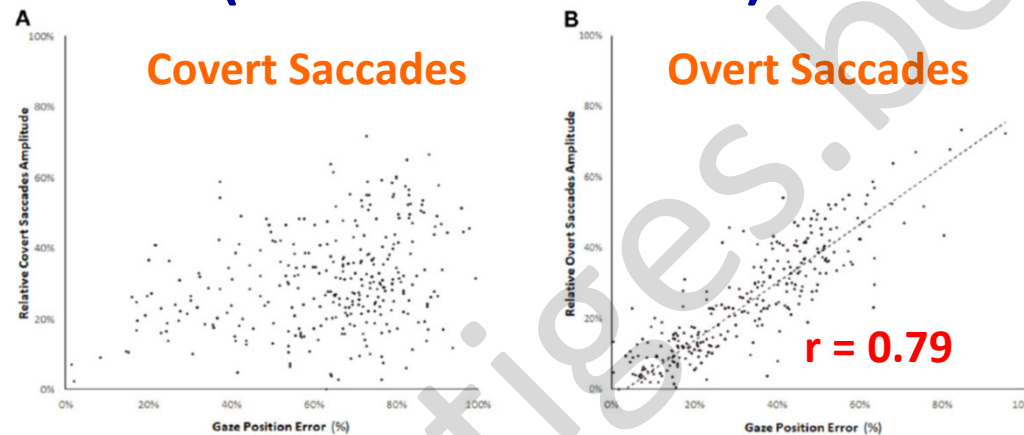


# vHIT SYNAPSYS



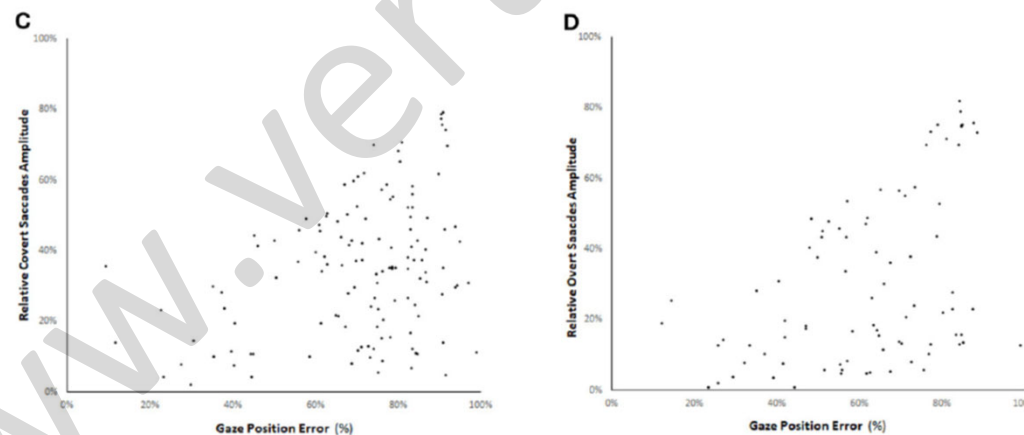
# Corrélation entre l'amplitude des Catch-Up saccades et l'écart résiduel de la cible (Gaze Position Error)

Cible visible



Sans cible visible  
(obscurité)

Réduction de  
62% des CUS

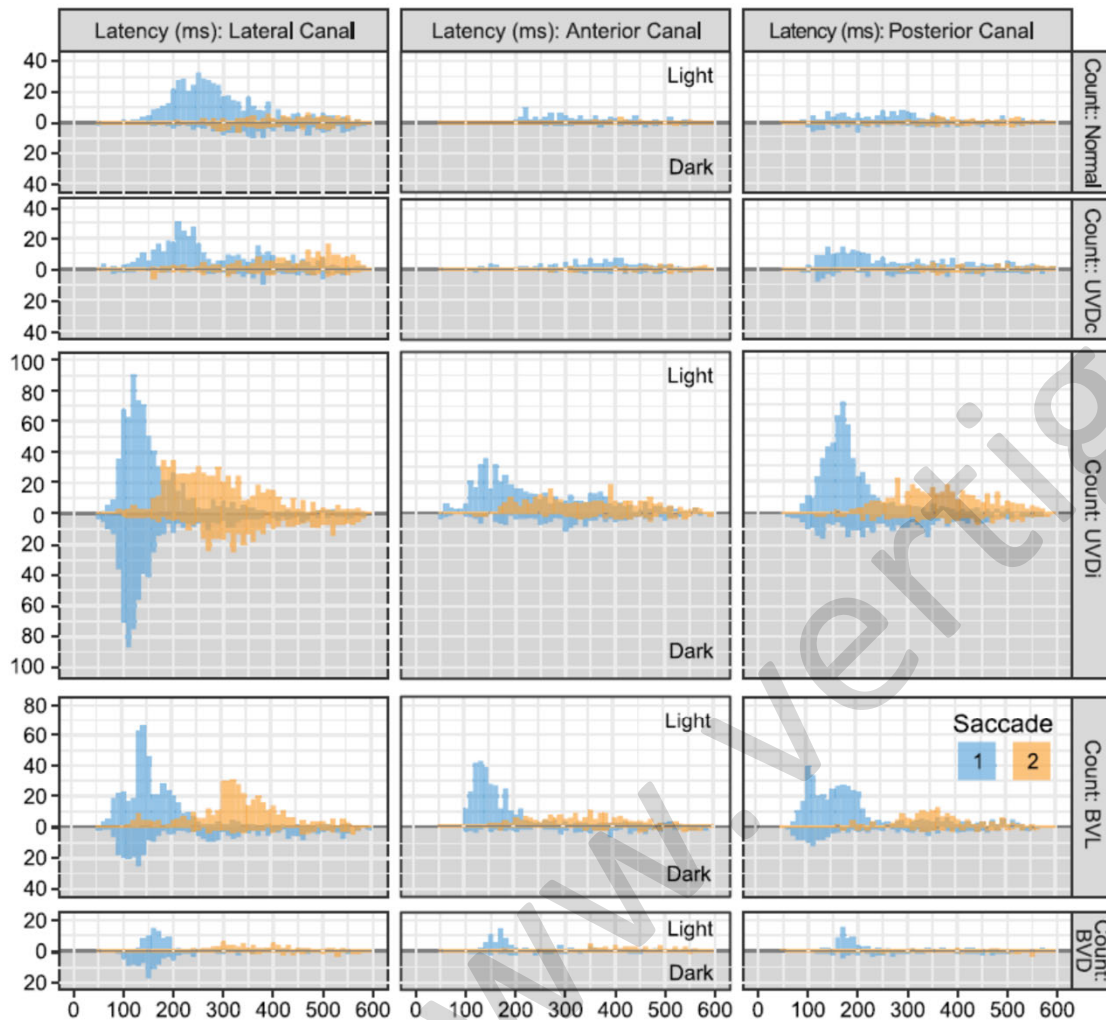


Visual Input Is the Main Trigger and Parametric Determinant for Catch-Up Saccades During Video Head Impulse Test in Bilateral Vestibular Loss

Christian Van Nechel<sup>1,2,3,4\*</sup>, Alionka Bostan<sup>1,2</sup>, Ulla Duquesne<sup>3,4</sup>, Charlotte Hautefort<sup>3,5</sup> and Michel Toupet<sup>3,6</sup>

frontiers  
in Neurology  
ORIGINAL RESEARCH  
published: 04 January 2019  
doi: 10.3389/fneur.2018.01138





Témoins

Déficit unilatéral

Déficit bilatéral

Head impulse compensatory saccades: Visual dependence is most evident in bilateral vestibular loss

PLOS ONE | January 15, 2020

Jacob M. Pogson<sup>1,2,3a</sup>, Rachael L. Taylor<sup>1,2,3b,c</sup>, Leigh A. McGarvie<sup>1,3</sup>, Andrew P. Bradshaw<sup>1</sup>, Mario D'Souza<sup>4</sup>, Sean Flanagan<sup>5,6</sup>, Jonathan Kong<sup>2,7,8</sup>, G. Michael Halmagyi<sup>1,2</sup>, Miriam S. Welgampola<sup>1,2\*</sup>



# Déterminisme des Catch-Up Saccades :

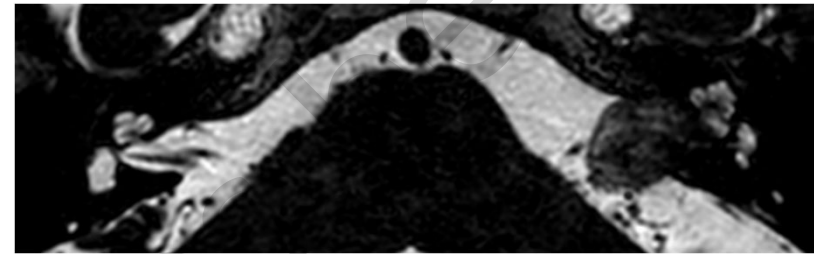
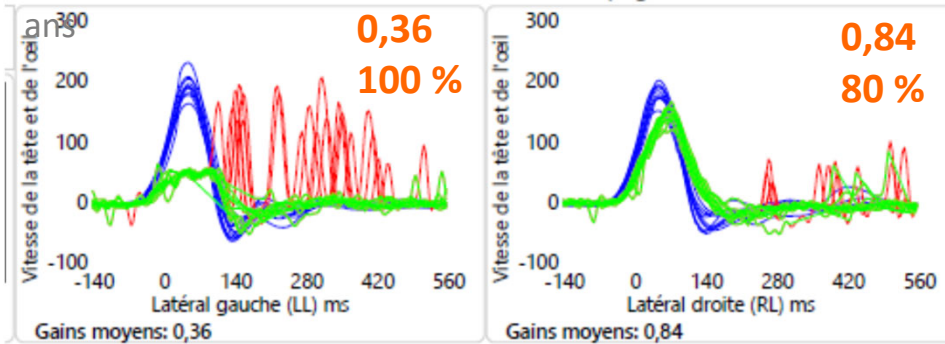
**OVERT Saccades : Visuel**

**COVERT Saccades : ?**

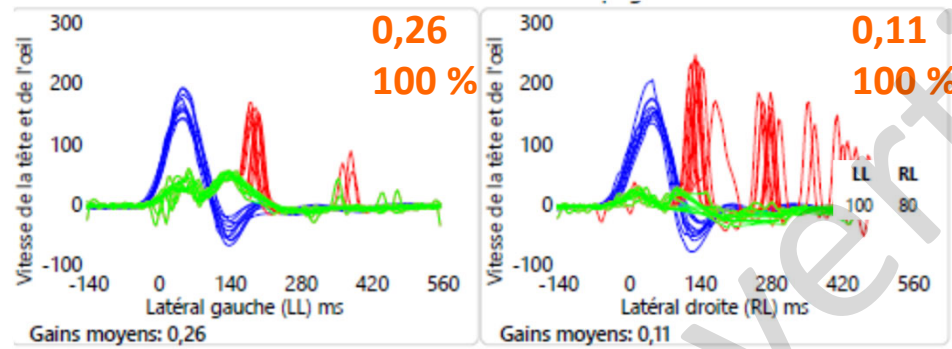




D.Claud. 86

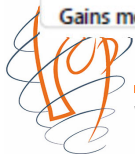
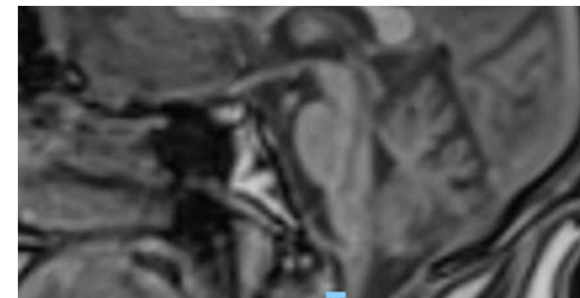
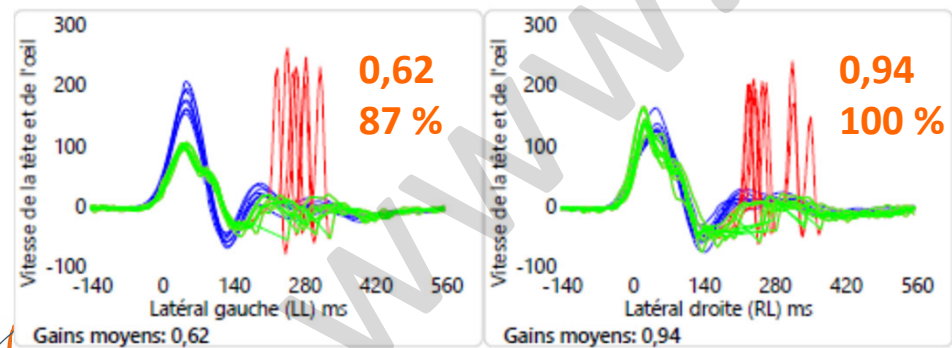


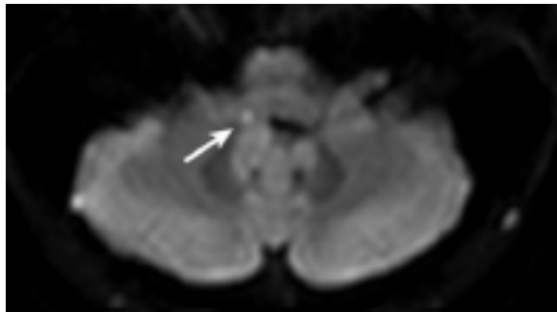
T.Dan. 79 ans



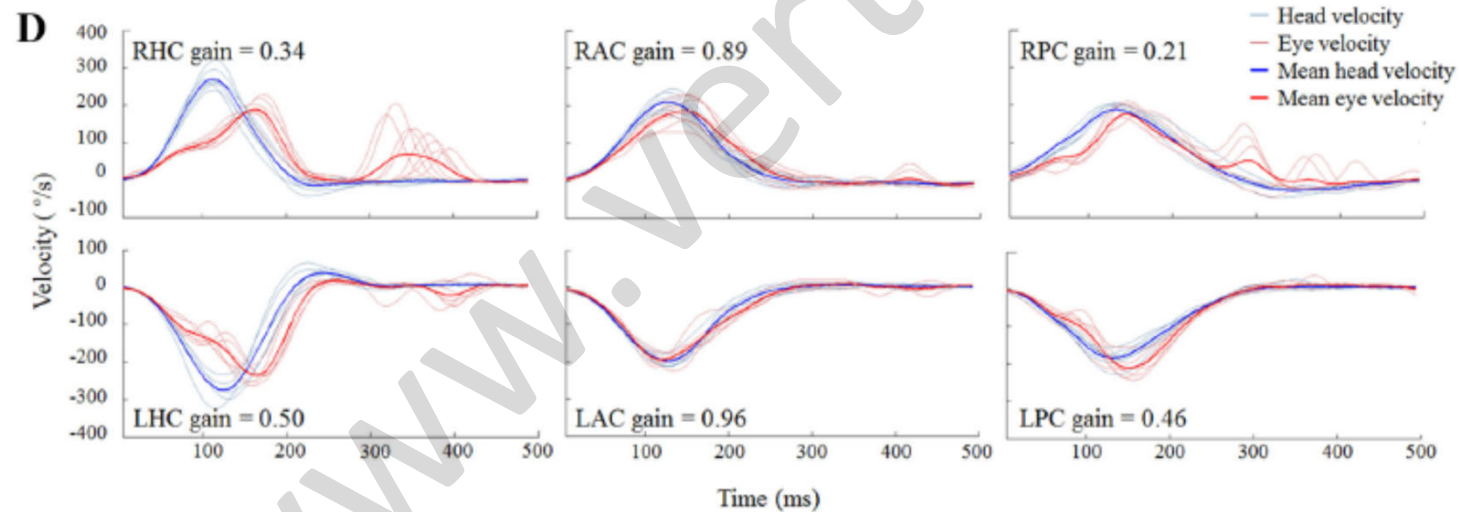
CANVAS

B.Chr. 53 ans





## Lésion du noyau vestibulaire médian droit



Isolated vestibular syndromes due to brainstem and cerebellar lesions  
Sung-Hee Kim<sup>1</sup> · Hyo Jung Kim<sup>2</sup> · Ji-Soo Kim<sup>3</sup>

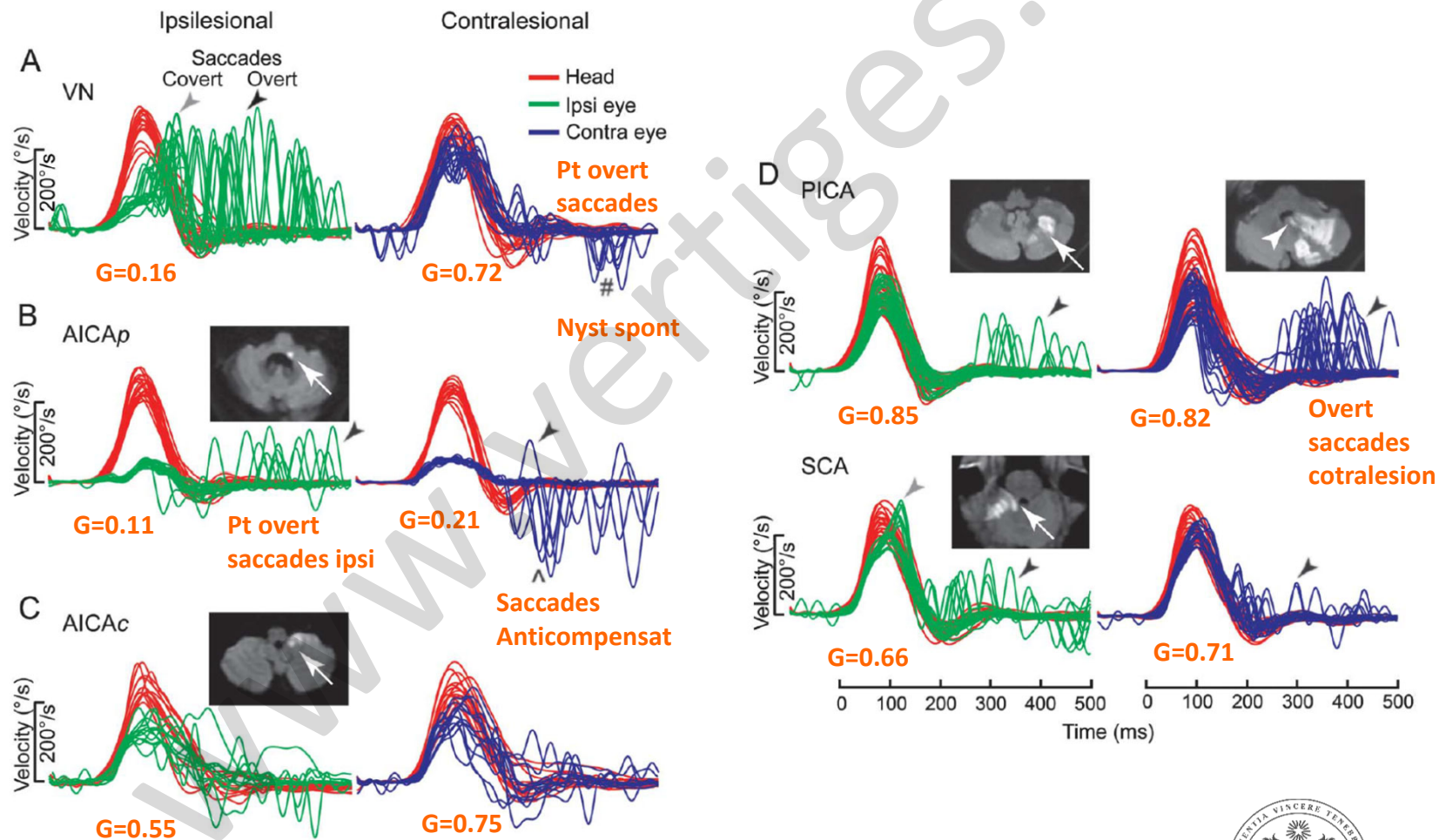
J Neurol  
DOI 10.1007/s00415-017-8455-6



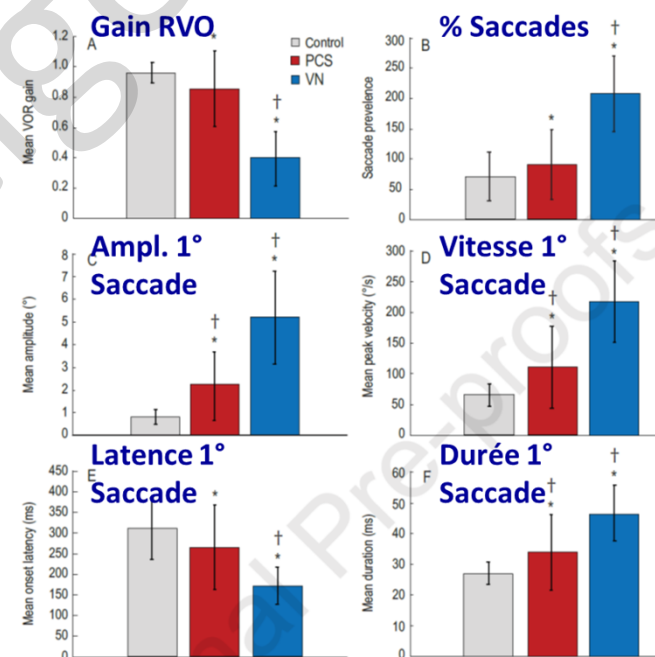
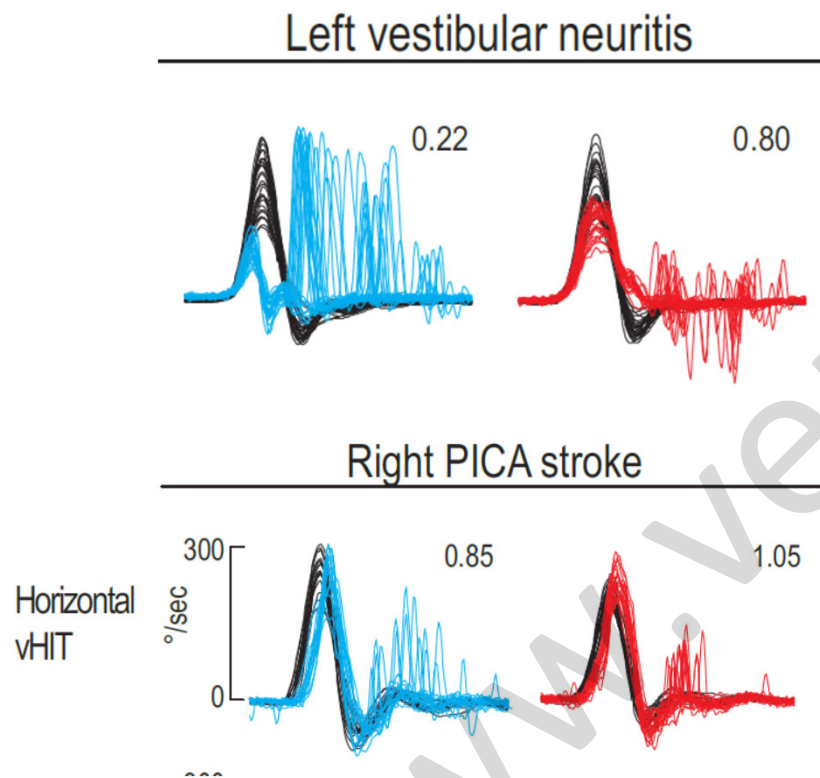


# Head impulse gain and saccade analysis in pontine-cerebellar stroke and vestibular neuritis

Luke Chen, MD  
 Michael Todd,  
 MBiomedE  
 Gabor M. Halmagyi, MD  
 Swee Aw, PhD  
 Neurology 83 October 21, 2014



# Le VHIT normal et pathologique



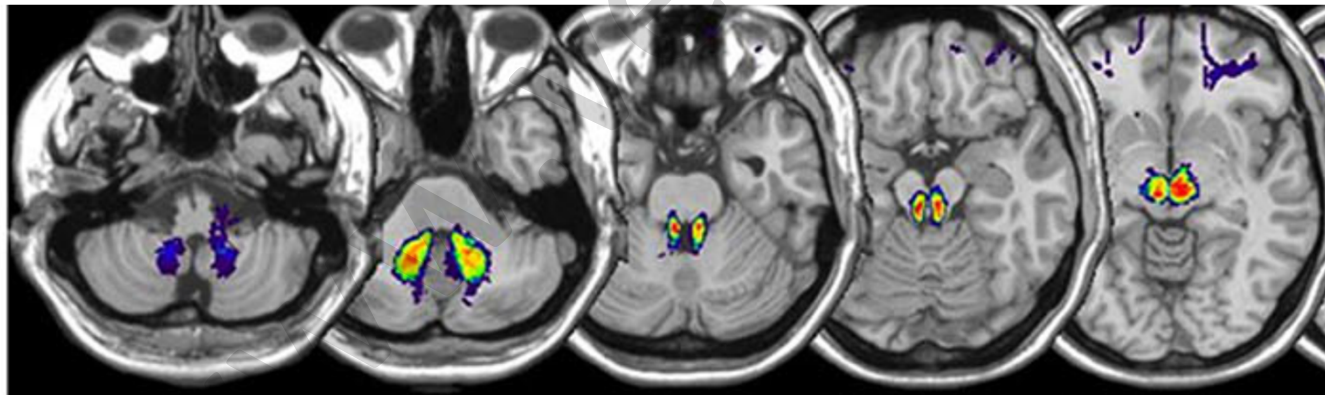
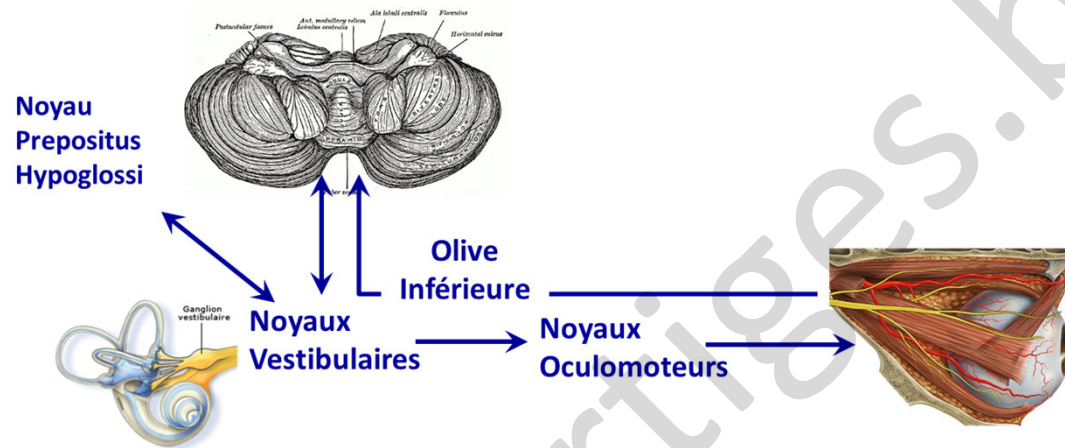
Separating posterior-circulation stroke from vestibular neuritis with quantitative vestibular testing

Zeljka Calic, Benjamin Nham, Andrew P. Bradshaw, Allison S. Young, ... Miriam S. Welgampola

Clinical Neurophysiology

Volume 131, Issue 8, August 2020, Pages 2047-2055





**Diffusion tensor imaging of the human cerebellar pathways and their interplay with cerebral macrostructure**

Zafer Keser<sup>1</sup>, Khader M. Hasan<sup>2\*</sup>, Benson I. Mwangi<sup>3</sup>, Arash Kamali<sup>4</sup>, Fehime Eymen Ucisik-Keser<sup>5</sup>, Roy F. Riascos<sup>2</sup>, Nuray Yozbatiran<sup>1</sup>, Gerard E. Francisco<sup>1</sup> and Ponnada A. Narayana<sup>2</sup>



# Déterminisme des Catch-Up Saccades :

**OVERT Saccades : Visuel**

**COVERT Saccades : Différence de vitesse ?**



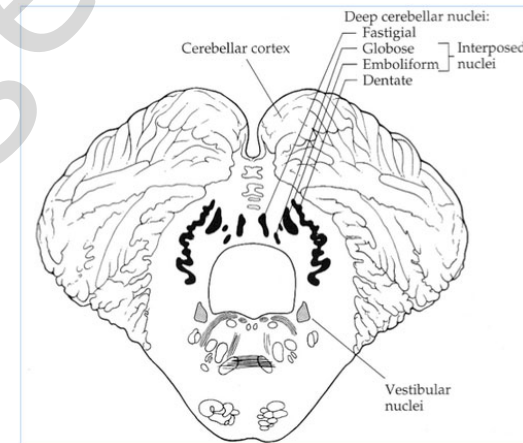
# COVERT Saccades : Différentiel de vitesses

## Vitesse de la tête (mouv. passif)

- Informations vestibulaires résiduelles
- Proprioception cervicale

Codage de la position de la tête dans l'espace par Noy. Fastigial

Jessica X. Brooks and Kathleen E. Cullen



## Vitesse de l'oeil (mouv. passif)

- Glissement rétinien (si image présente)
- Proprioception oculomotrice
- Copie d'efférence oculomotrice  
(mvt oculaire toujours actif)



## Proposition :

**Si gain anormal  
et/ou > 80% d'OVERT saccades  
sans COVERT saccades :**

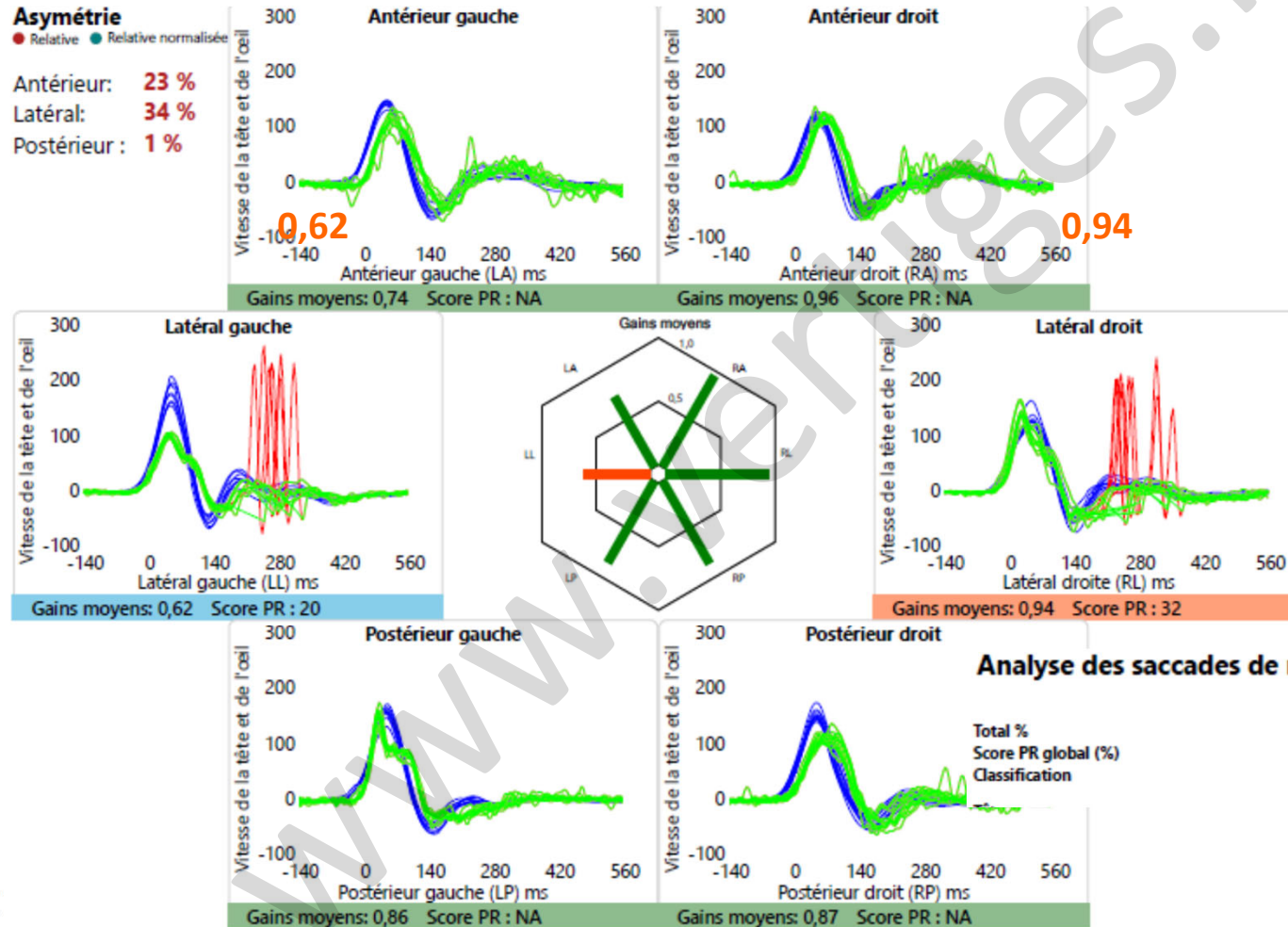
**Probabilité accrue d'une lésion  
neurologique**





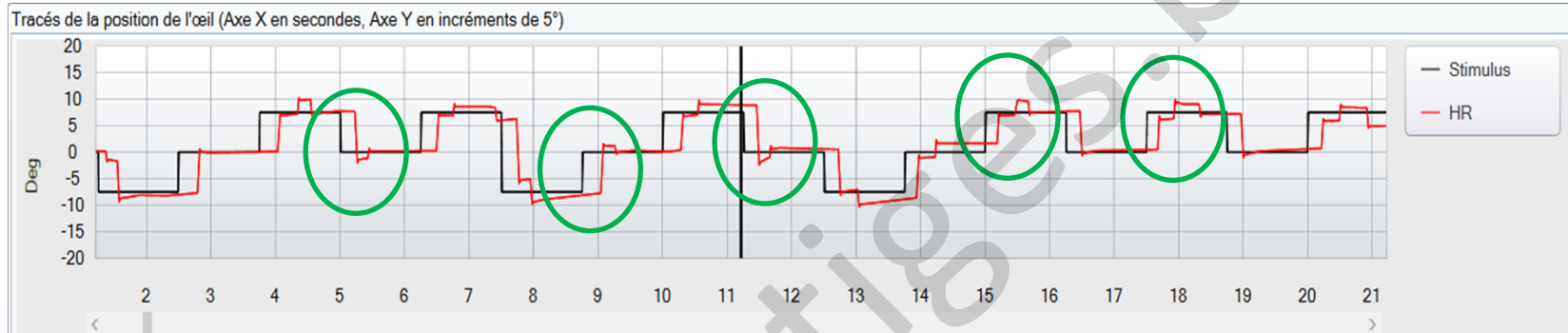
B.Chr. 53 ans

- **Instabilité surtout aux changements de direction**
- **Pas de nystagmus spontané en position primaire**

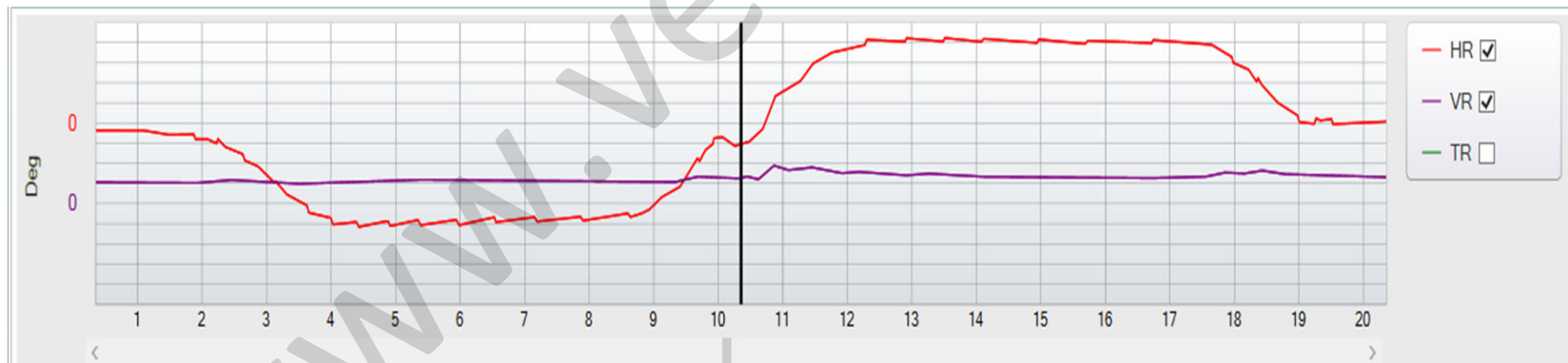


B.Chr. 53 ans

## Hypermétrie des saccades

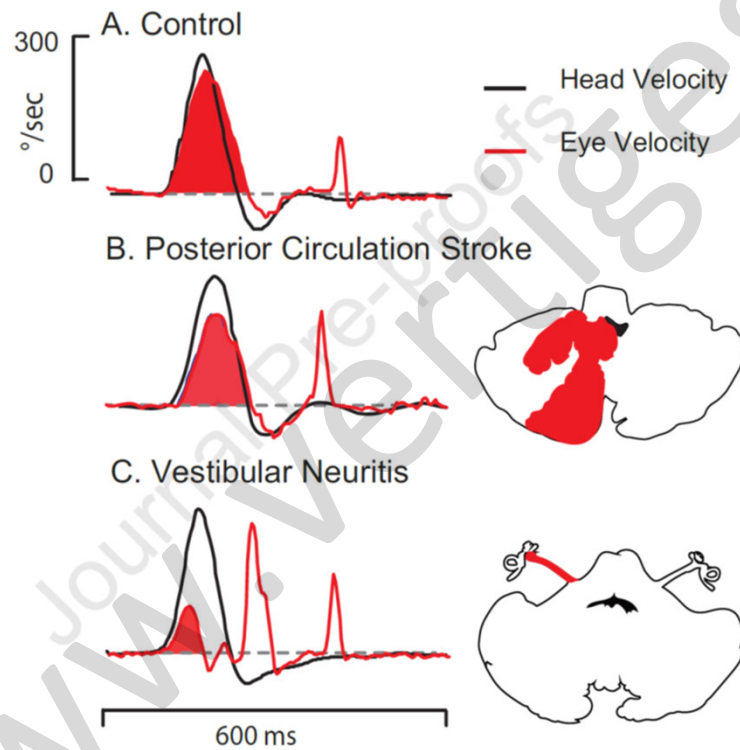


## Gaze Evoked Nystagmus



## Primary Autoimmune Cerebellar Ataxia





Separating posterior-circulation stroke from vestibular neuritis with quantitative vestibular

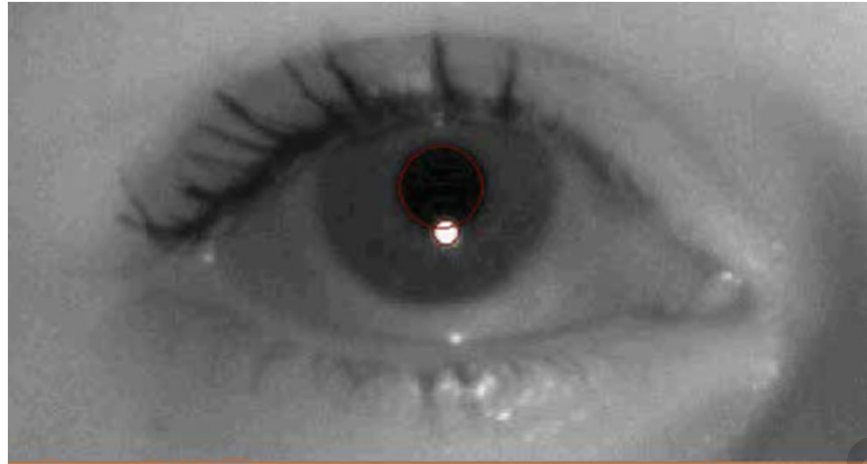
testin; Zeljka Calic, Benjamin Nham, Andrew P. Bradshaw, Allison S. Young, ... Miriam S. Welgampola

Clinical Neurophysiology

Volume 131, Issue 8, August 2020, Pages 2047-2055



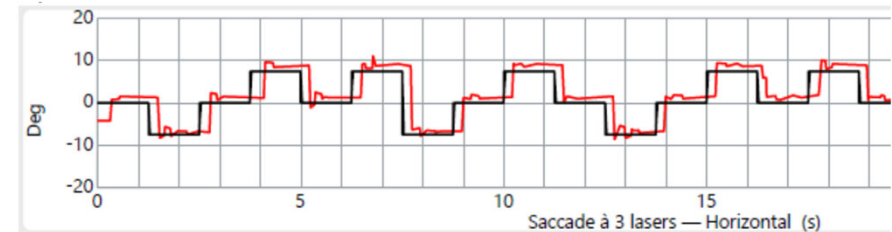
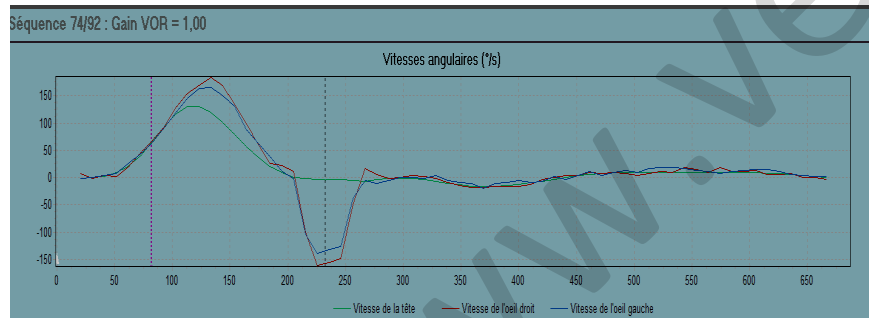
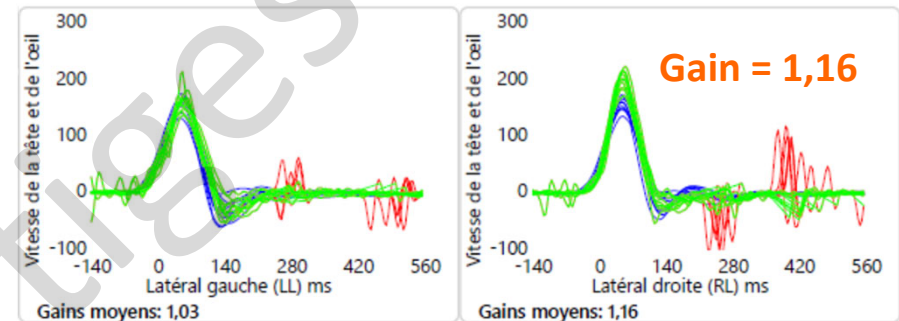
# Dysinhibition cérébelleuse



Vidéo du Dr HAUTEFORT

R.Christel 61 ans

**Cérébellopathie toxique**  
**Pas de nystagmus spontané**



## Reversed Corrective Saccades during Head Impulse Test in Acute Cerebellar Dysfunction

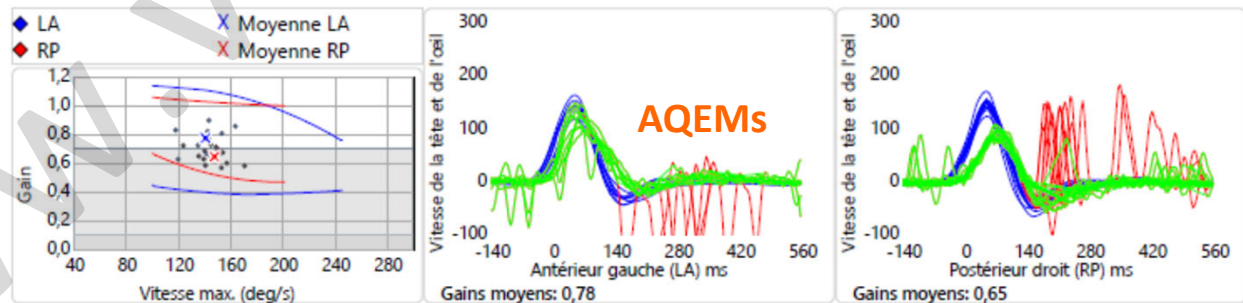
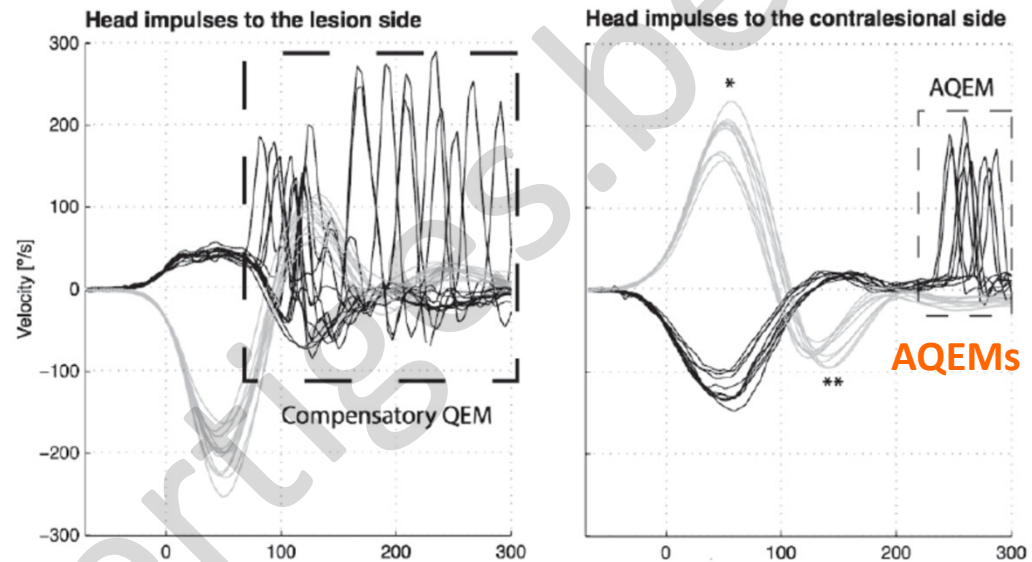
Jeong-Yoon Choi • Ji-Soo Kim • Jin-Man Jung •  
Do-Young Kwon • Moon Ho Park • Chulhan Kim •  
June Choi

Cerebellum  
DOI 10.1007/s12311-013-0535-2



# Anti-compensatory Quick Eye Movements AQEMs

Témoin d'une asymétrie vestibulaire d'origine périphérique.



Anticomensatory quick eye movements after head impulses: A peripheral vestibular sign in spontaneous nystagmus *Journal of Vestibular Research* 25 (2015) 267–271  
L. Luis<sup>a,b,c,1,\*</sup>, N. Lehen<sup>d,e,1</sup>, E. Muñoz<sup>f</sup>, M. de Carvalho<sup>b</sup>, E. Schneider<sup>d,g,h</sup>, J. Valls-Solé<sup>f</sup> and J. Costa<sup>b,f</sup>



## En Résumé : VHIT Pathologique

**Si uniquement gain horizontaux  $< \approx 0.8$**

**Si gain horizontaux  $> 0.8$  +  $> 80\%$  saccades**

**Si de plus : Gain anormal et/ou  
> 80% Overt Saccades sans Covert Saccades  
Possible lésion neurologique**

