



# Acouphènes et Vertiges

## Explorations fonctionnelles et radiologiques

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*2. Inserm U583, Institut des Neurosciences de Montpellier.*

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*4. Cabinet libéral, 15 rue de la Figairasse, Montpellier.*

*Remerciements E. Ulmer*



# Les outils d'exploration

## Audio-vestibulaire

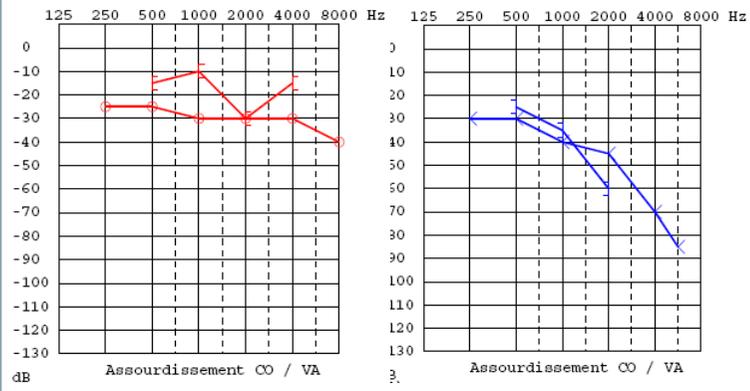




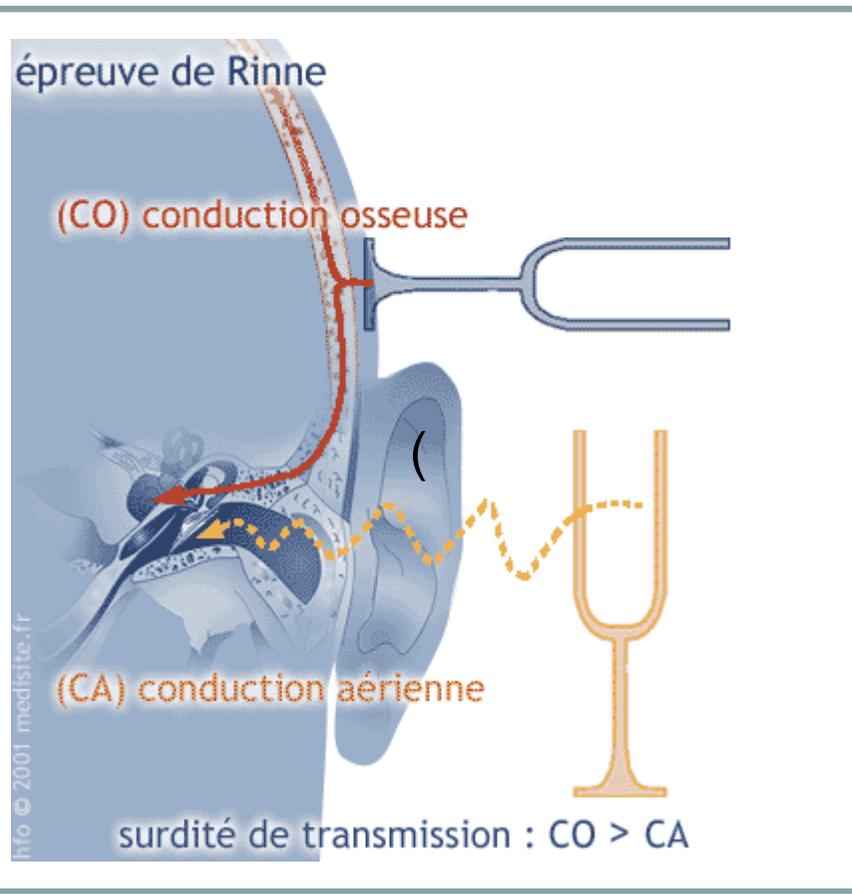
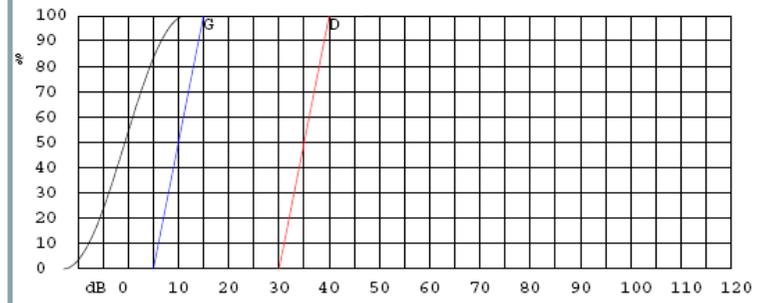
# Audiométrie



## Audiogramme tonal

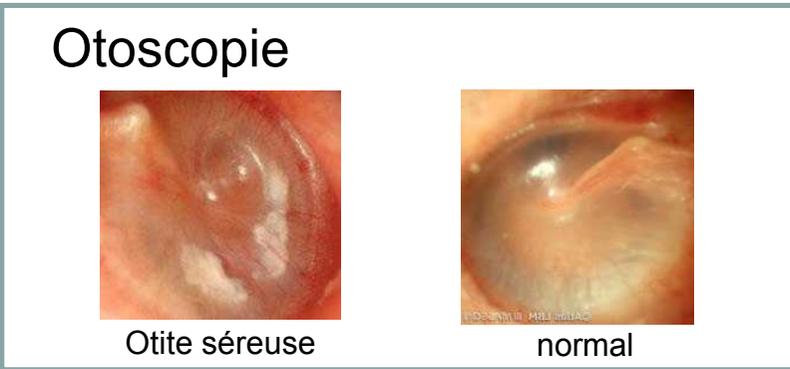
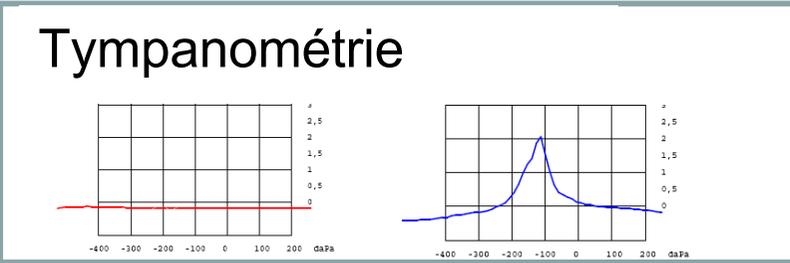
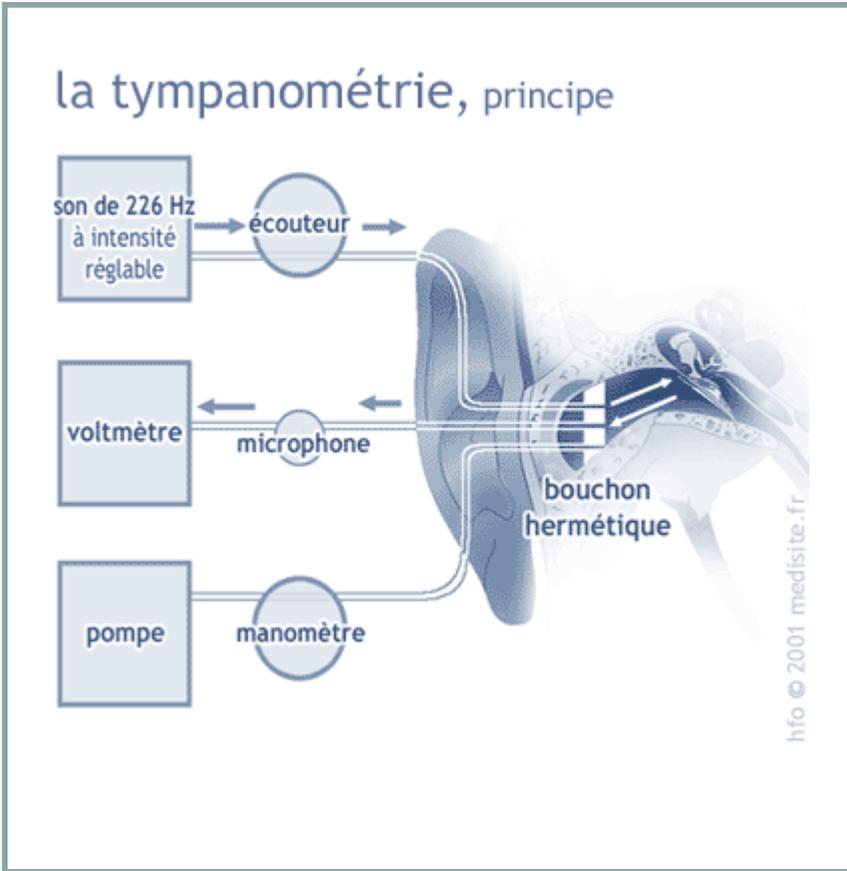


## Audiogramme vocal





# Tympanométrie

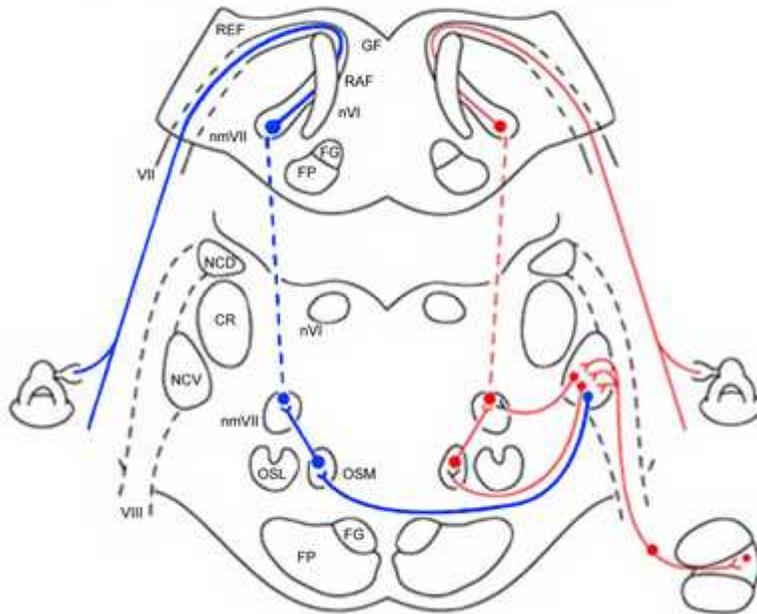




## Réflexes stapédiens

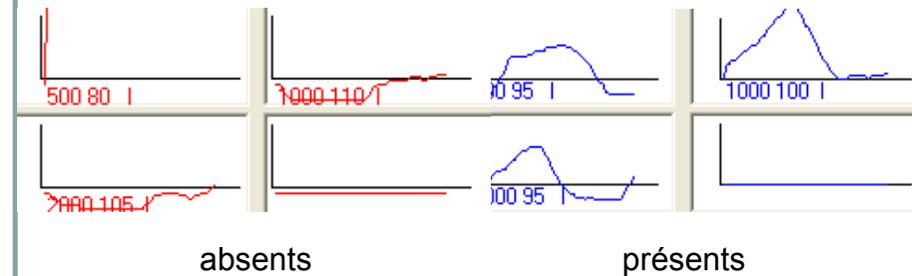


Voies nerveuses **ipsilatérale** et **controlatérale** du réflexe stapédien



Coupe transversale de la région bulbo-protubérantielle

## Réflexes stapédiens



### - Réflexes présents :

- Si ST : pas liée à un blocage ossiculaire
- Si SP : endocochléaire

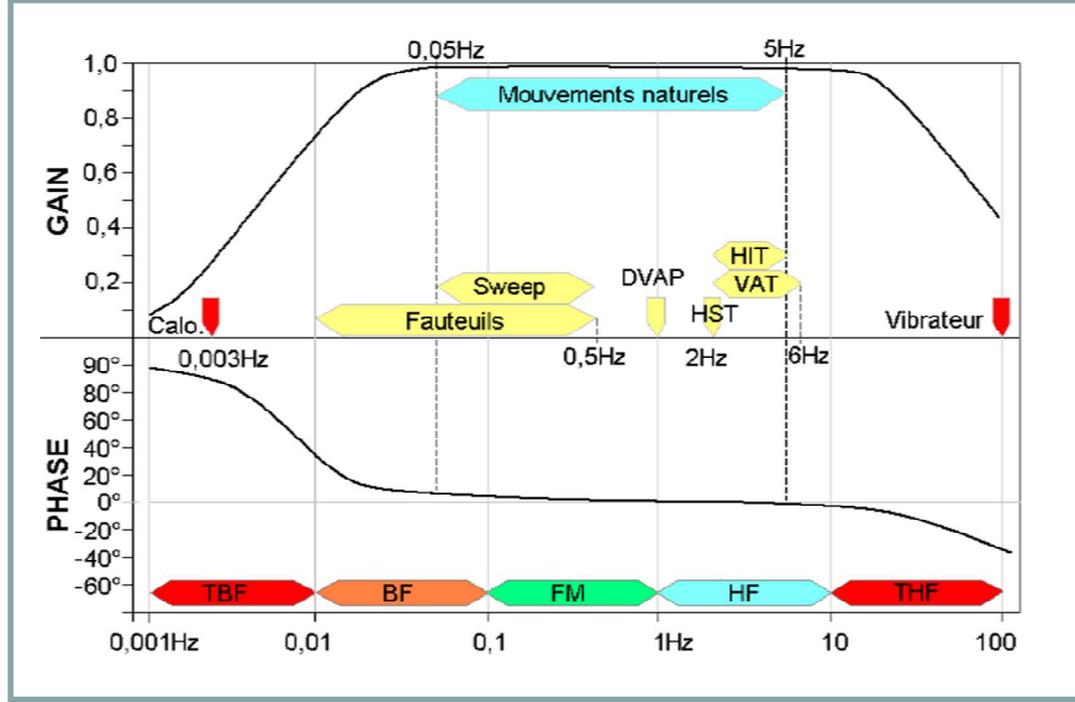
### - Réflexes absents :

- Si ST : blocage ossiculaire
- Si SP : rétrocochléaire



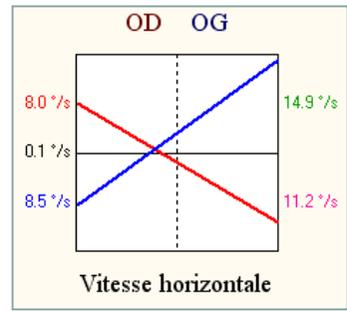
# Vestibulogramme

Stimulations vestibulaires bi-caloriques / Vidéo-Head Impulse Test (VHIT)

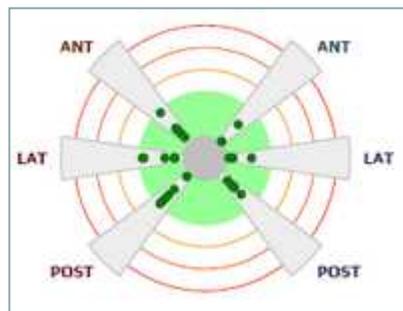


Reflexe vestibulo-oculaire

## Caloriques

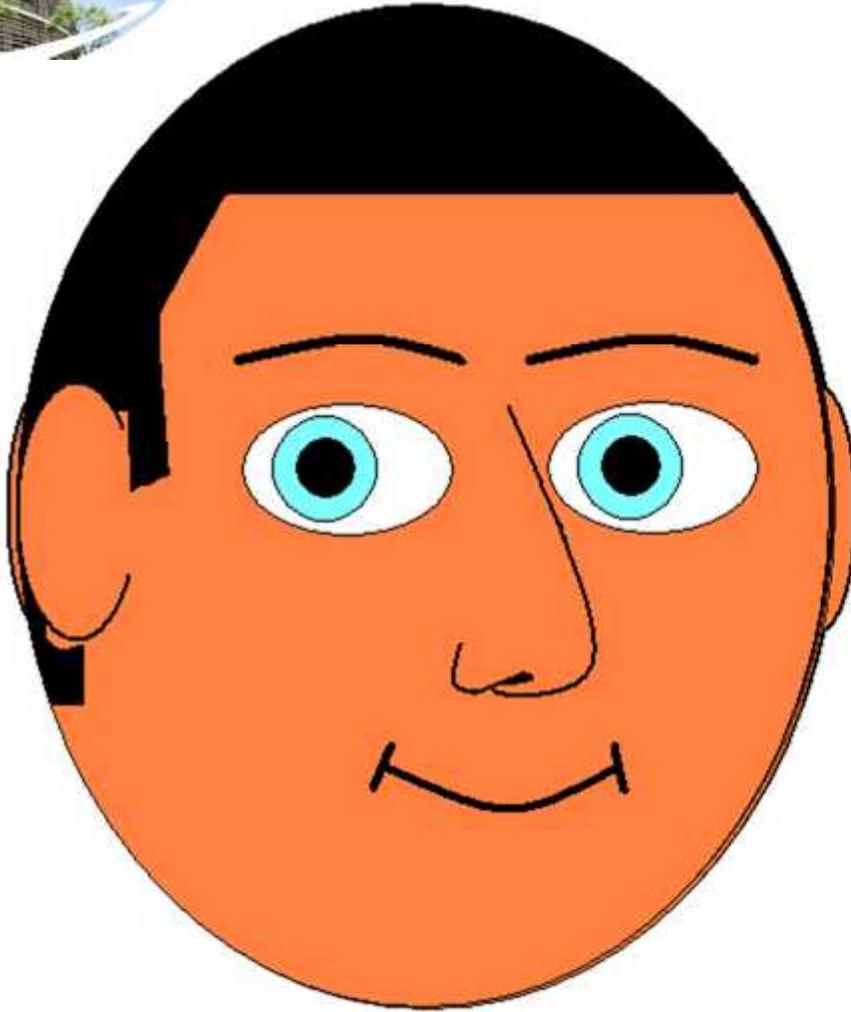


## VHIT

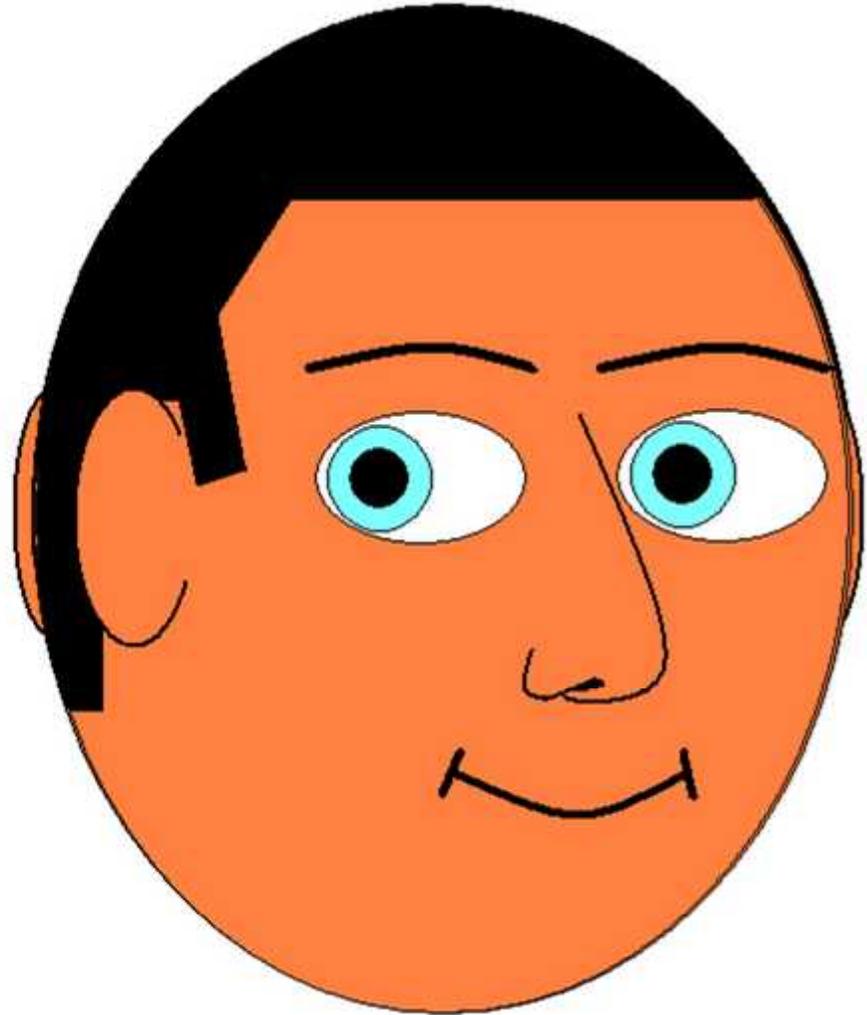




## Head Impulse Test (HIT)



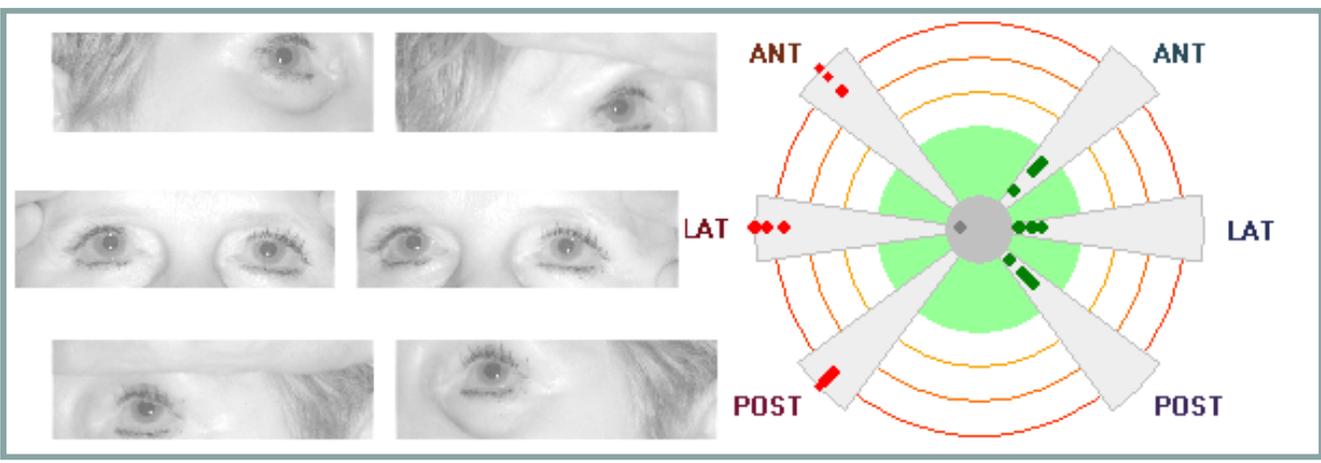
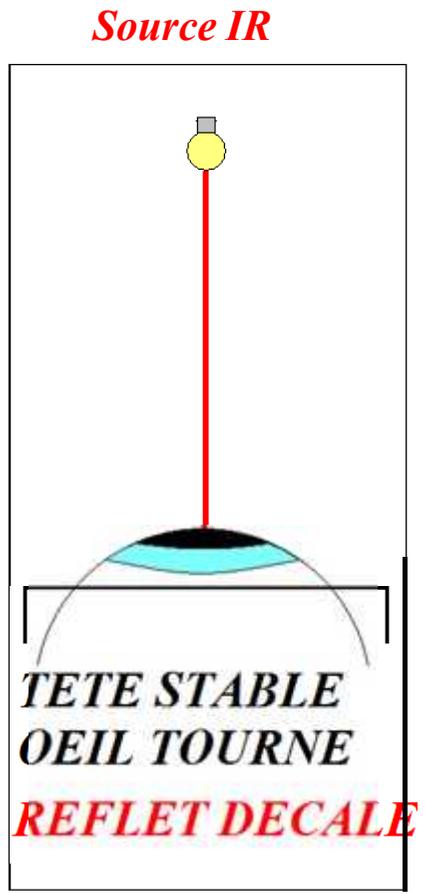
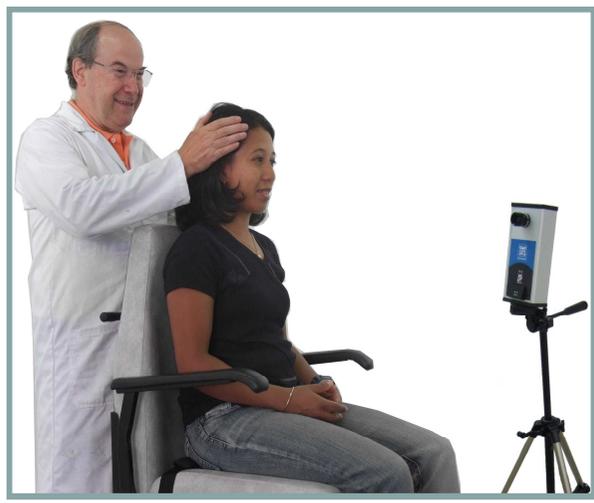
NORMAL



PATHOLOGIQUE



# Vidéo-Head Impulse Test (VHIT)



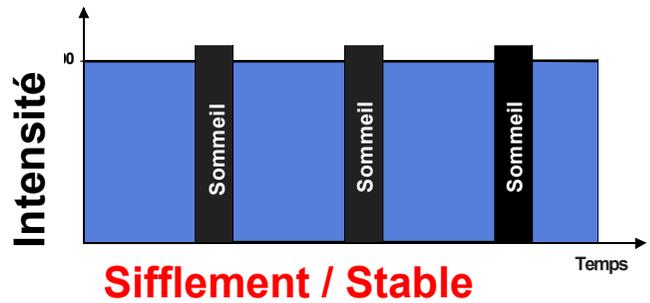
Reffet cornet

Maintenir d'une cible visuelle stable lors des mouvements rapides



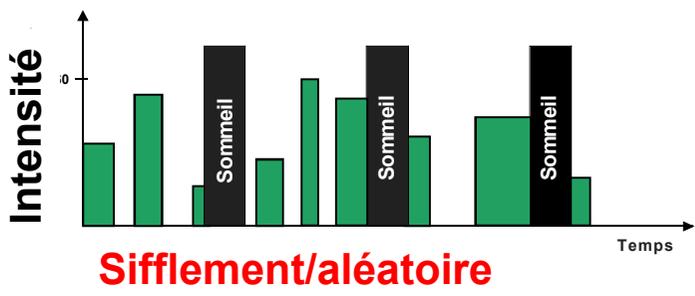
# Phénotypes Acouphènes

Endocochléaire (> 80%)	Dysfonctionnel	Lésionnel
Fréquence de l'acouphène	Bourdonnement	Sifflement
Intensité de l'acouphène	Fluctuant	Stable
Surdit� de perception	Grave	Aigu
Diagnostic	Meni�re	Vieillissement



**Sifflement / Stable**

Lésionnel / Endocochléaire



**Sifflement/aléatoire**

Atypique / Rétrocochléaire ?



Pulsatile



Centraux

**Voix - Musique**



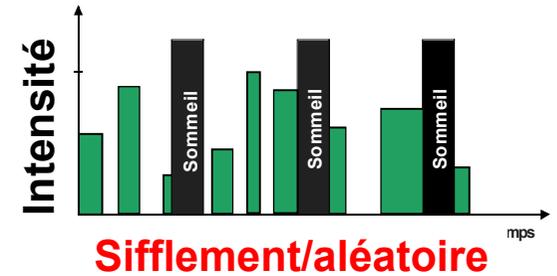
# Phénotype

## Acouphènes atypiques

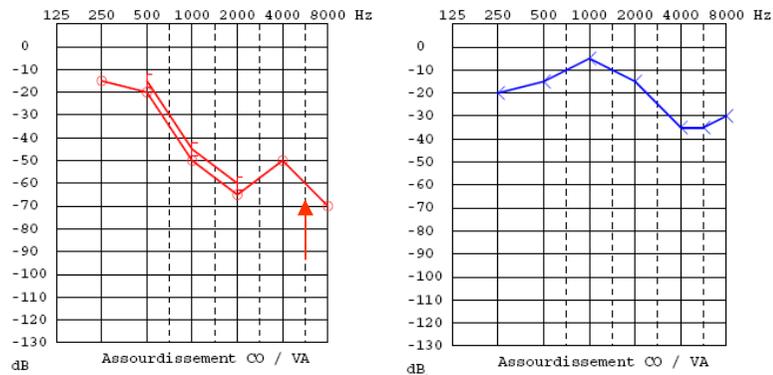




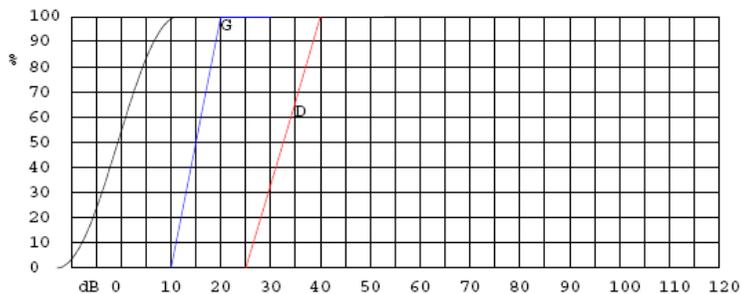
Jean B, 53 ans  
Jardinier



### Audiogramme tonal



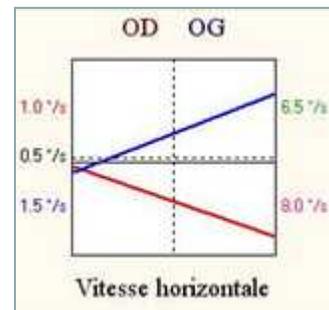
### Audiogramme vocal



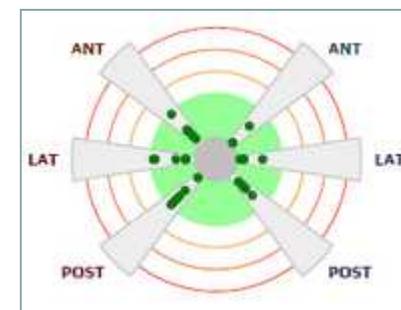
### Examen clinique

Début progressif, il y a 5 ans  
 Trouble de la discrimination  
**Attention au traumatisme sonore : IRM !!**  
 Instabilité il y a 2 ans pendant 3 mois.  
 Nystagmus provoqué G

### Caloriques

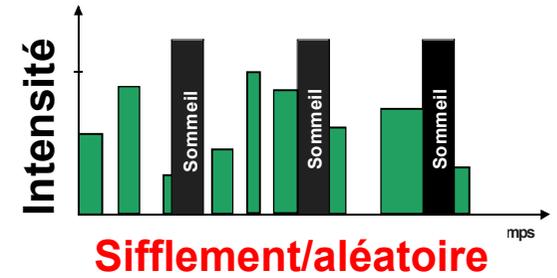


### VHIT

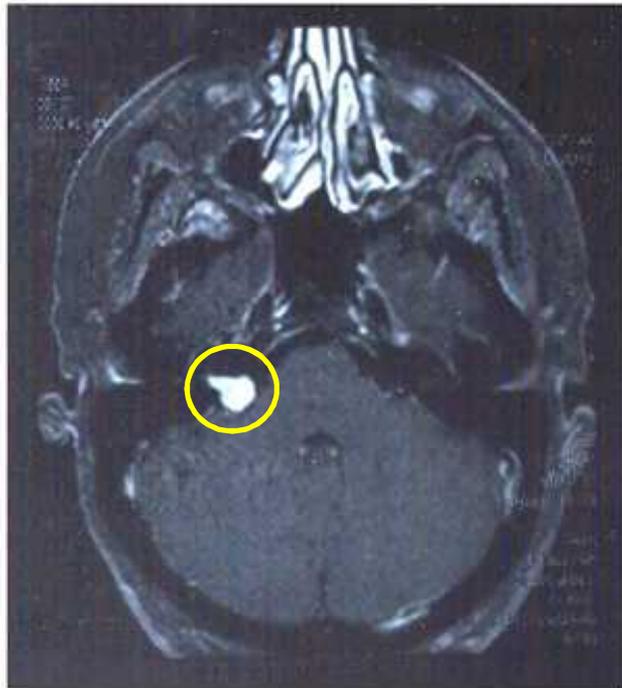




Jean B, 53 ans  
Jardinier



IRM T1 gadolinium



## Examen clinique

Début progressif, il y a 5 ans

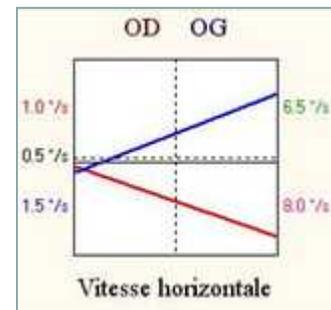
Trouble de la discrimination

**Attention au traumatisme sonore : IRM !!**

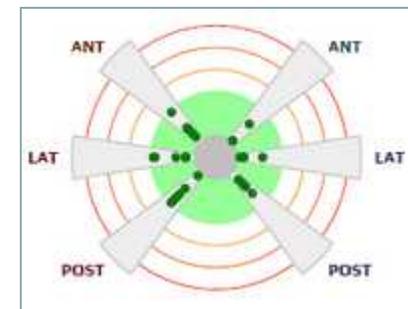
Instabilité il y a 2 ans pendant 3 mois.

Nystagmus provoqué G

## Caloriques



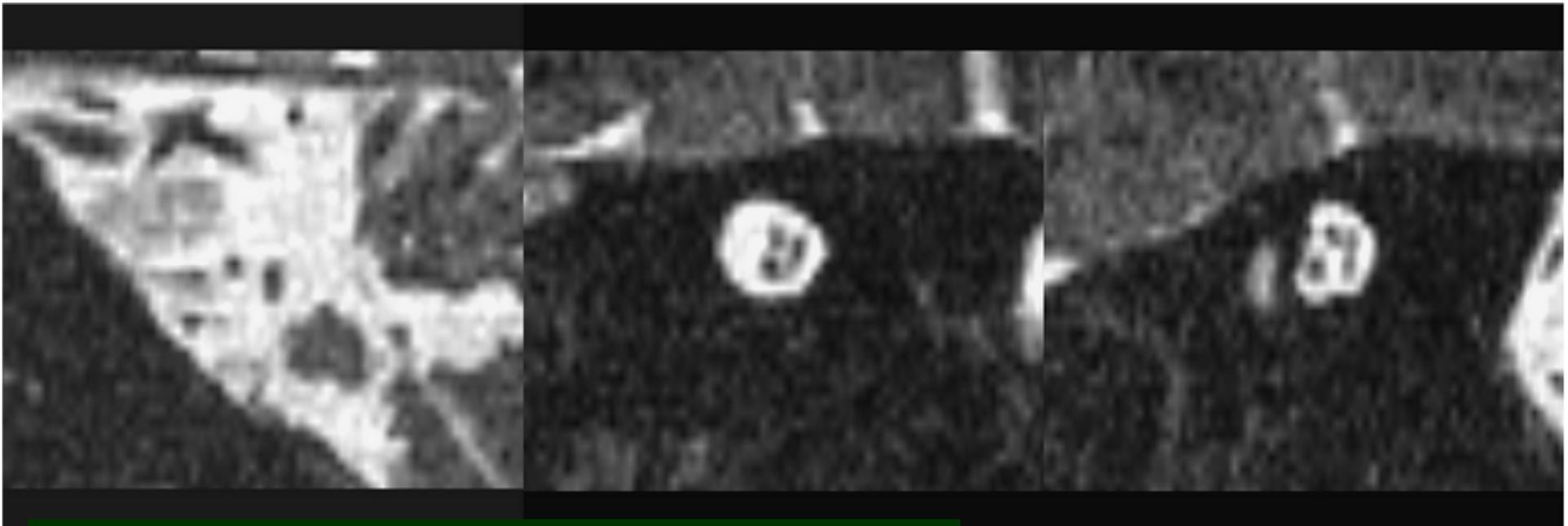
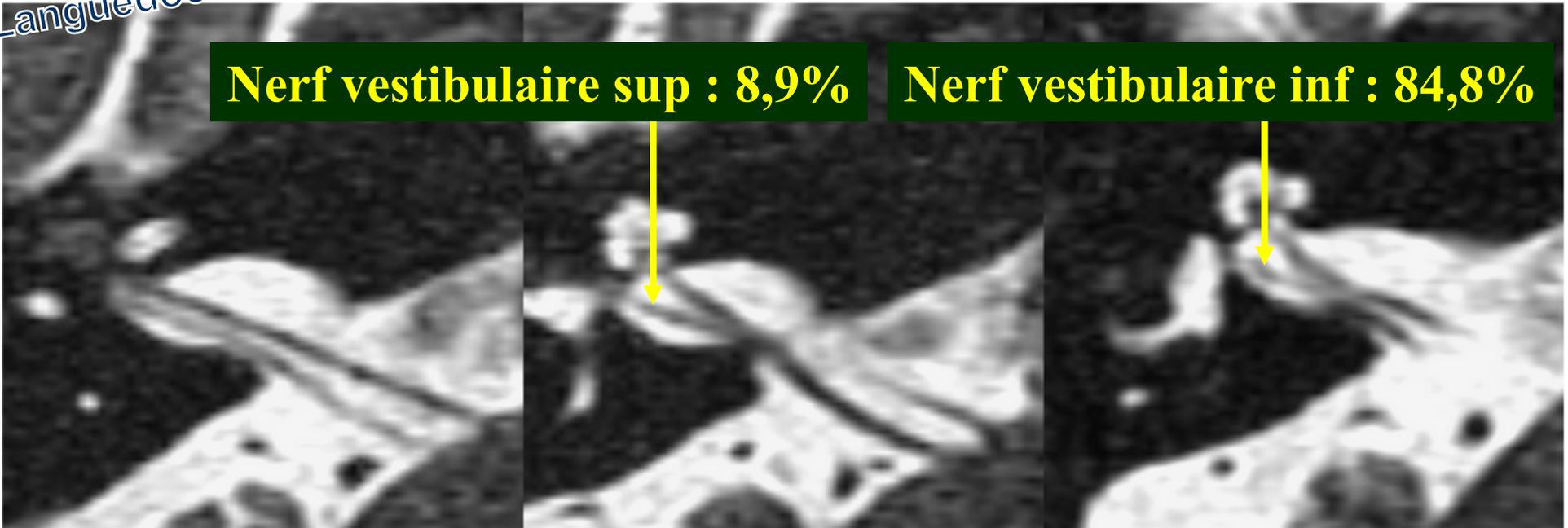
## VHIT



**Schwannome droit**

**Nerf vestibulaire sup : 8,9%**

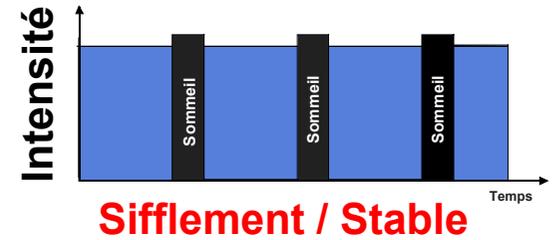
**Nerf vestibulaire inf : 84,8%**



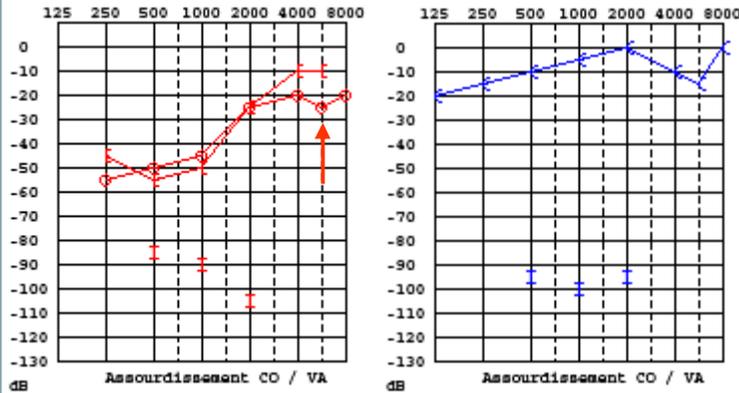
***J Laryngol Otol 2001 May; 115 (5): 376-9***



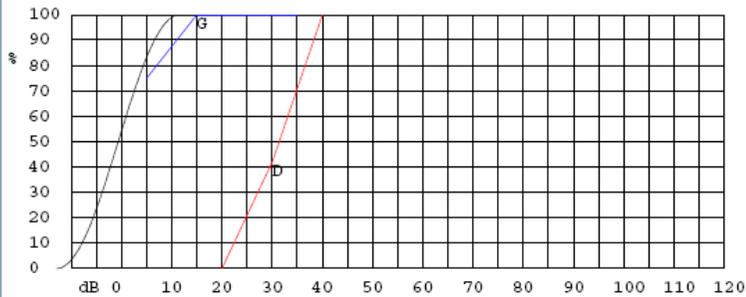
Jérôme A., 28 ans  
Commercial



### Audiogramme tonal



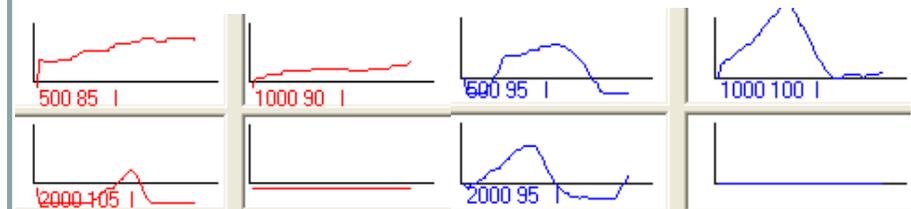
### Audiogramme vocal



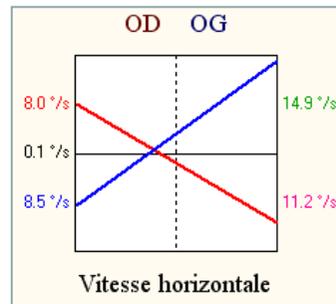
### Examen clinique

**2008** : Surdité lésionnelle endocochléaire grave, atteinte vestibulaire. IRM  
**2009** : Dr Ulmer : Aréflexie canalaire haute fréquence.

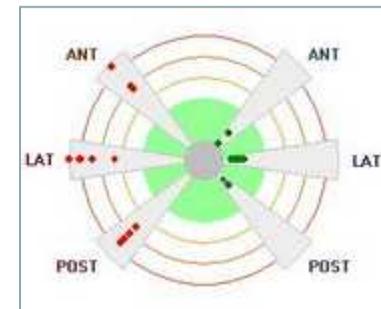
### Réflexes stapédiens



### Caloriques

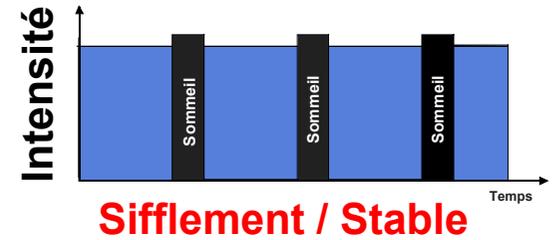


### VHIT Dr ULMER

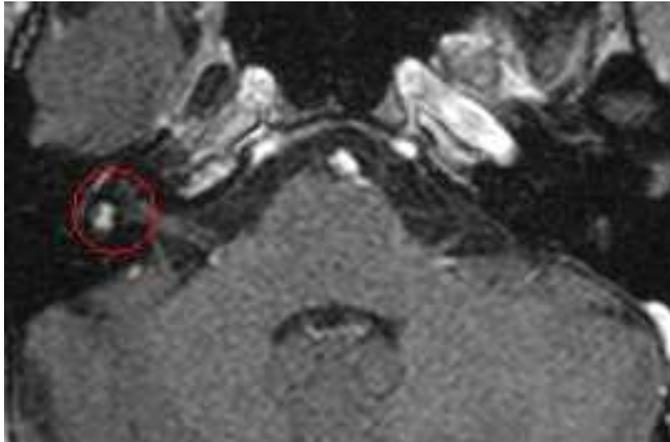




Jérôme A., 28 ans  
Commercial



T1 Gado. : hyper signal



T2 : hypo signal

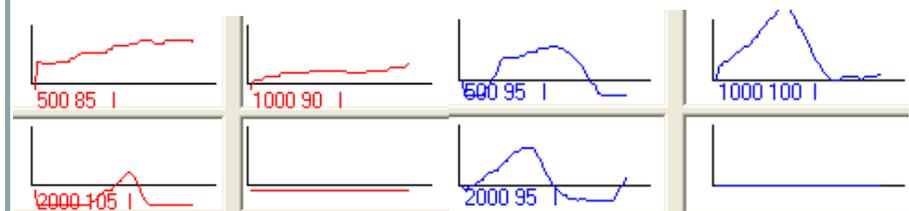


## Examen clinique

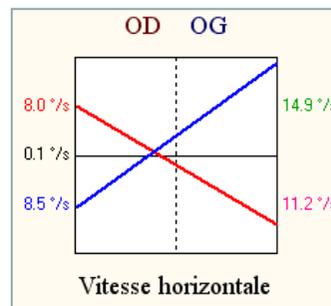
**2008** : Surdit e l sionnelle endocochl aire sur les graves, atteinte vestibulaire. IRM

**2009** : Dr Ulmer : Ar flexie canalaire haute fr quence. Relecture IRM.

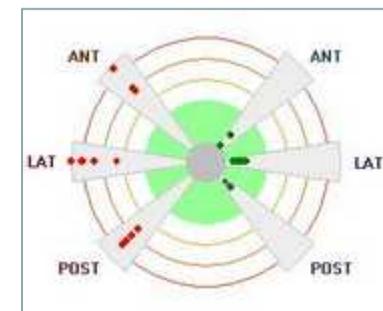
## R flexes stap diens



## Caloriques



## VHIT Dr ULMER



*Schwannome intra-labyrinthique*



## Schwannomes intralabyrinthiques

- 10% des schwannomes vestibulaires
- N vestibulaire ou N cochléaire (80%)
- Tours basal et moyen (scala tympani)
- Hyperintense T1, T1Gd+, hypointense T2
- Diagnostic différentiel: labyrinthite
- Augmentation de taille (50%)
- Cochlée → tour apical → vestibule
- Vestibule antérieur → cochlée ↔ CSSC

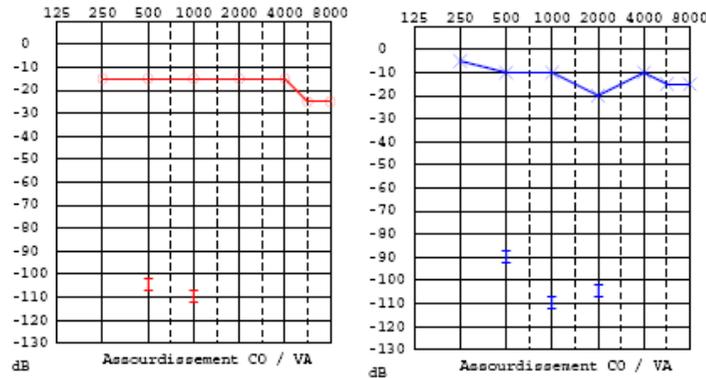


Danielle D., 50 ans

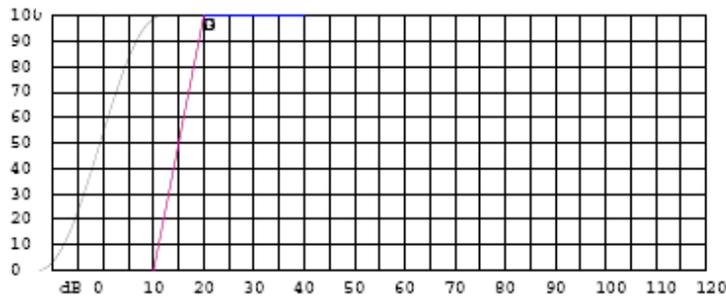


Pulsatile OD

### Audiogramme tonal



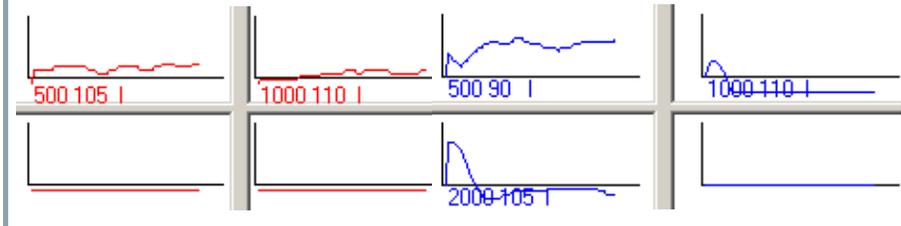
### Audiogramme vocal



### Examen clinique

Crise de vertige de quelques heures puis  
Instabilité

### Réflexes stapédiens



Pas de surdité

Mais lésion rétrocochléaire supposée

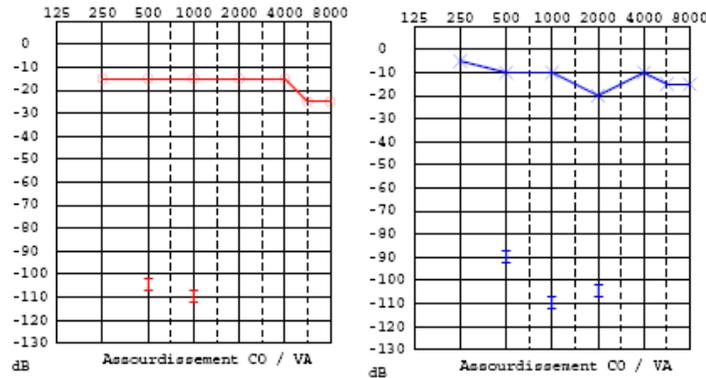


Danielle D., 50 ans

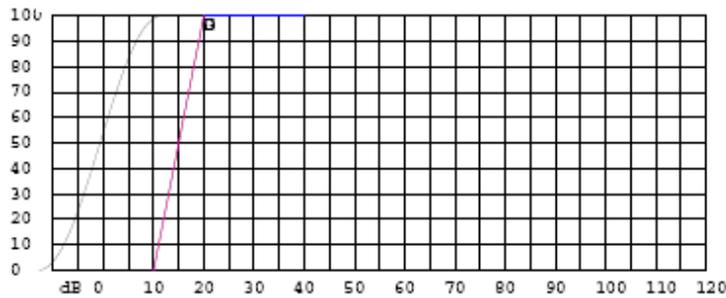


Pulsatile OD

### Audiogramme tonal



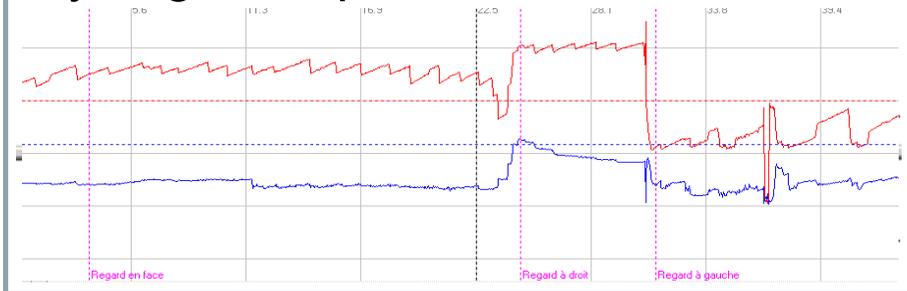
### Audiogramme vocal



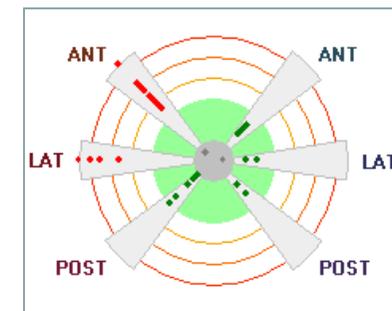
### Examen clinique

Crise de vertige de quelques heures puis  
Instabilité

### Nystagmus spontané



### VHIT



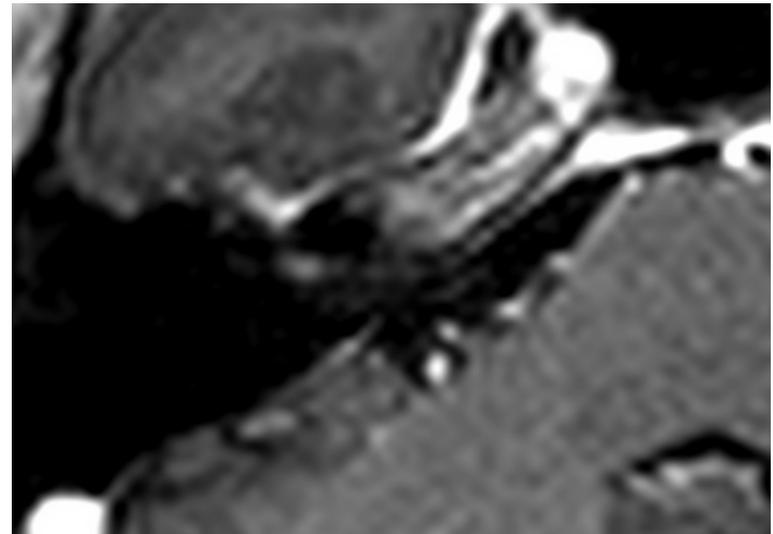
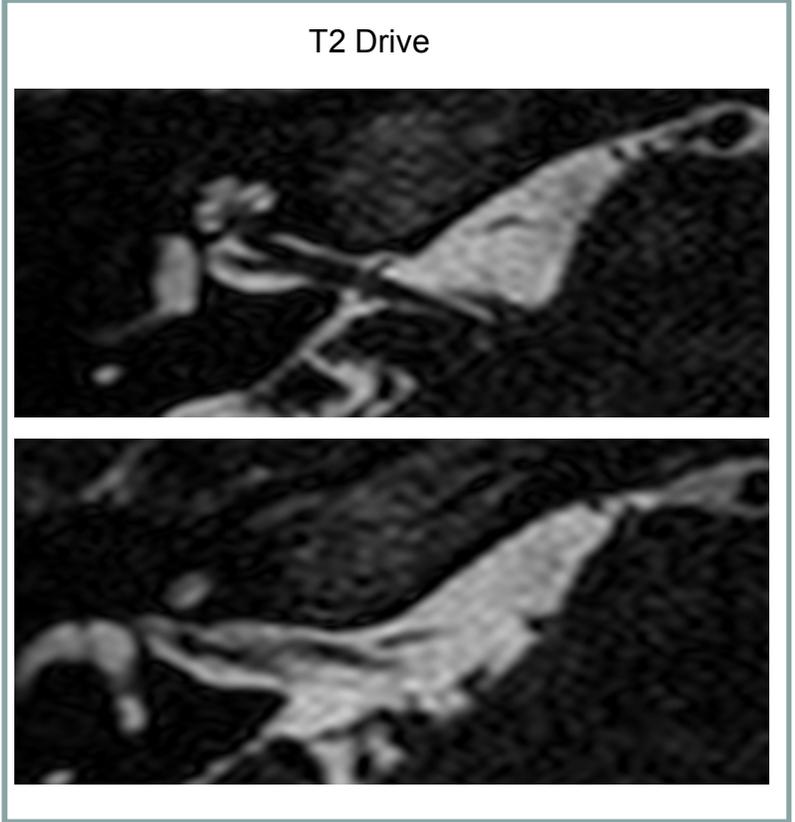
Atteinte N. vestibulaire supérieur droit



Danielle D., 50 ans



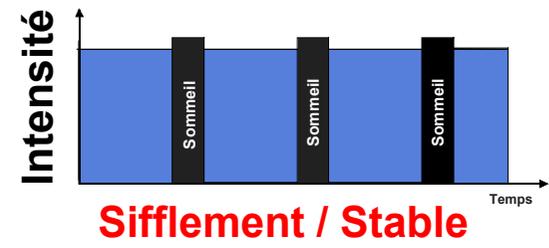
Pulsatile OD



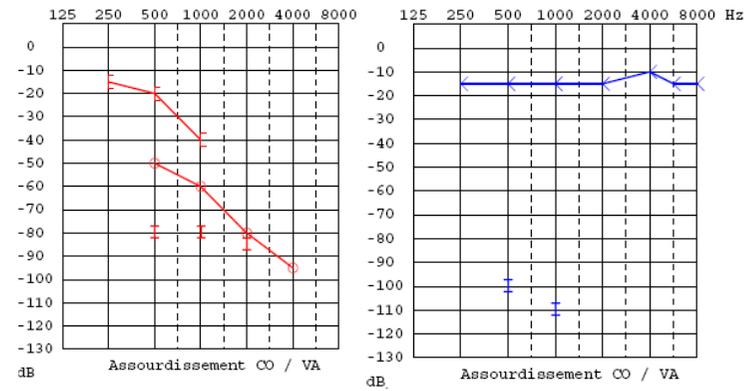
Schwannome vestibulaire supérieur D



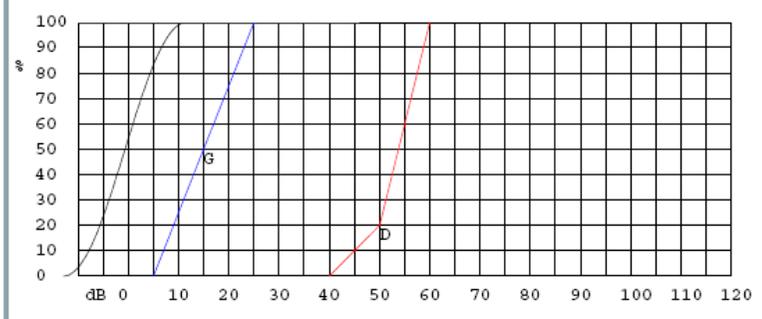
Henri C., 6 ans



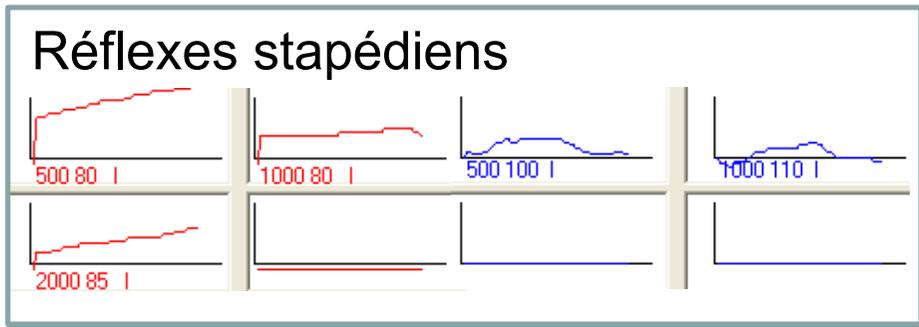
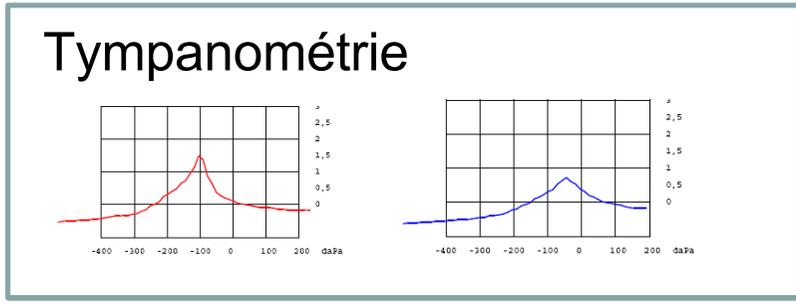
### Audiogramme tonal



### Audiogramme vocal

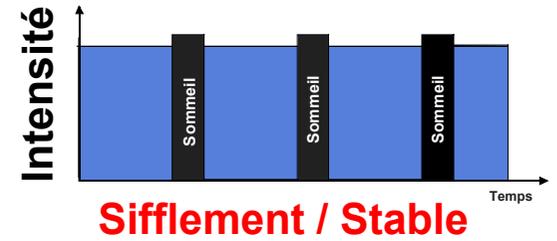


Examen clinique  
Pas de trouble de l'équilibre

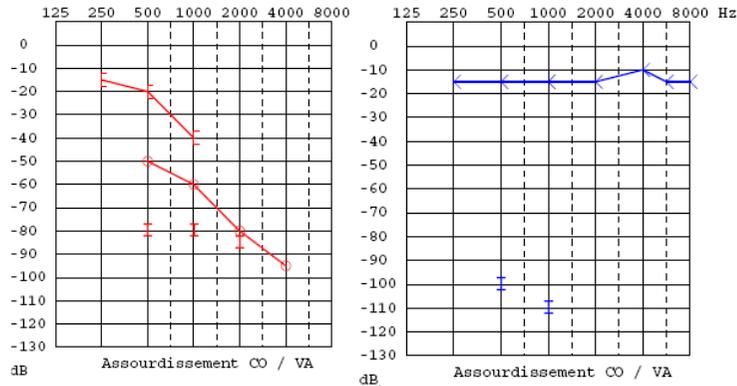




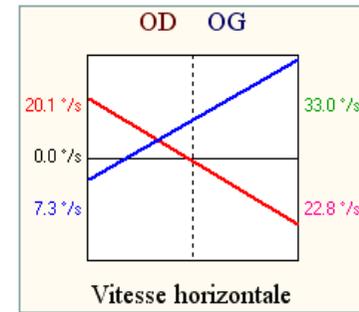
Henri C., 6 ans



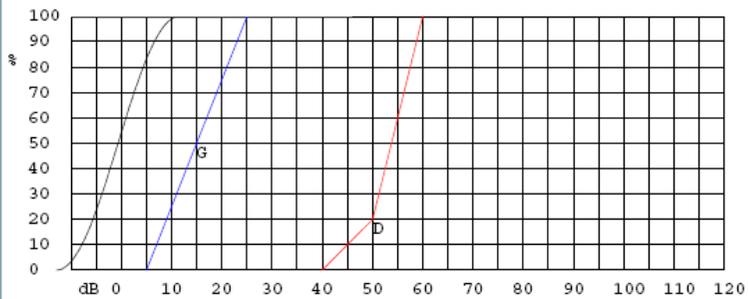
### Audiogramme tonal



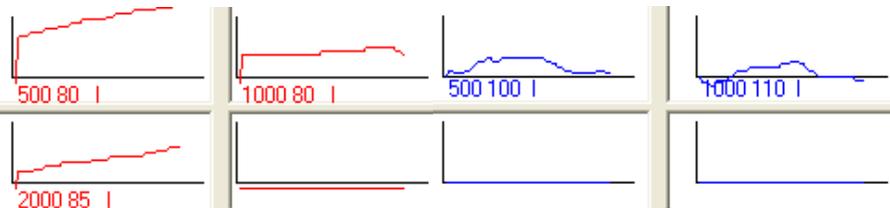
### Caloriques



### Audiogramme vocal



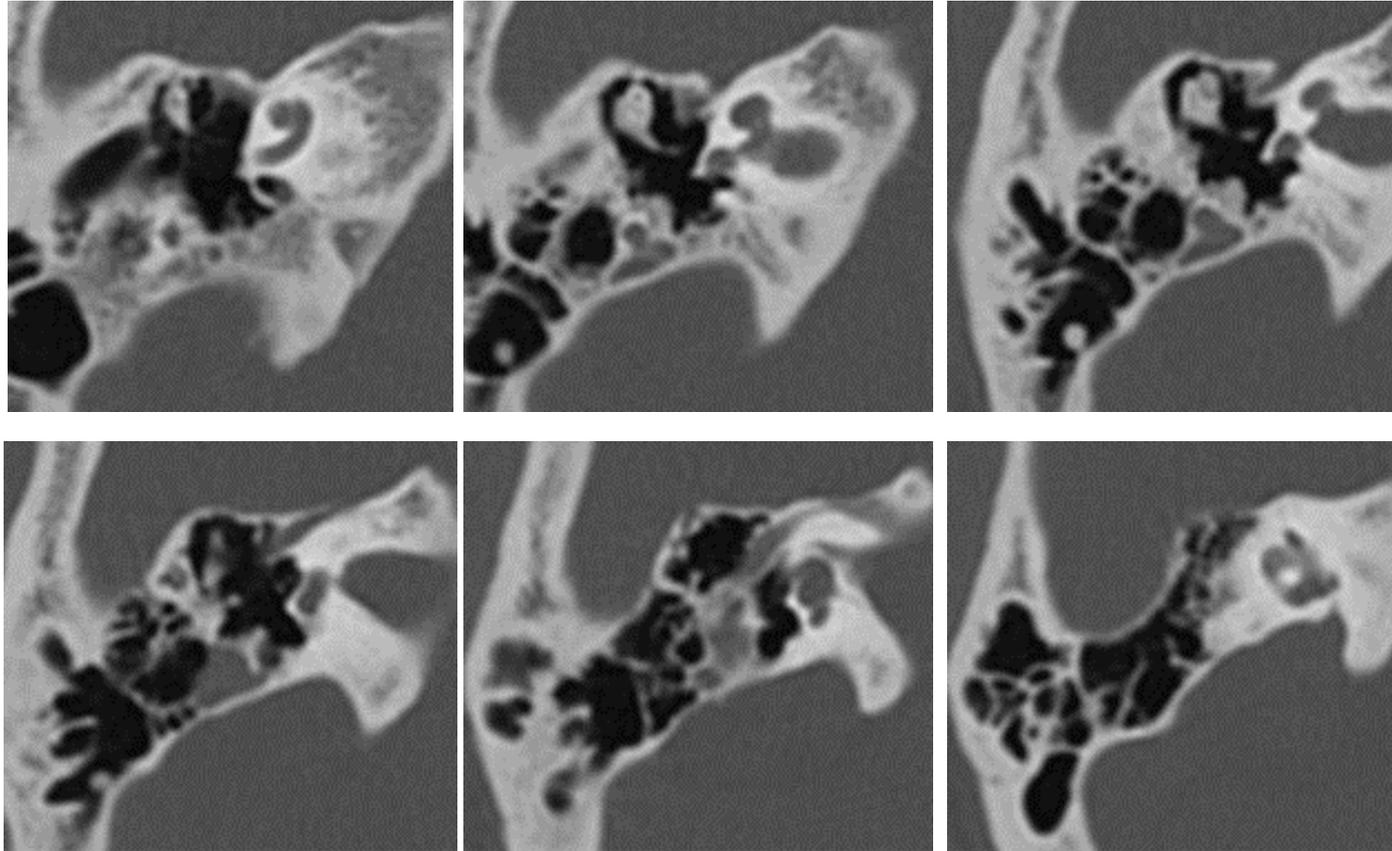
### Réflexes stapédiens



Surdit  de transmission de l'oreille interne : Malformation OI?



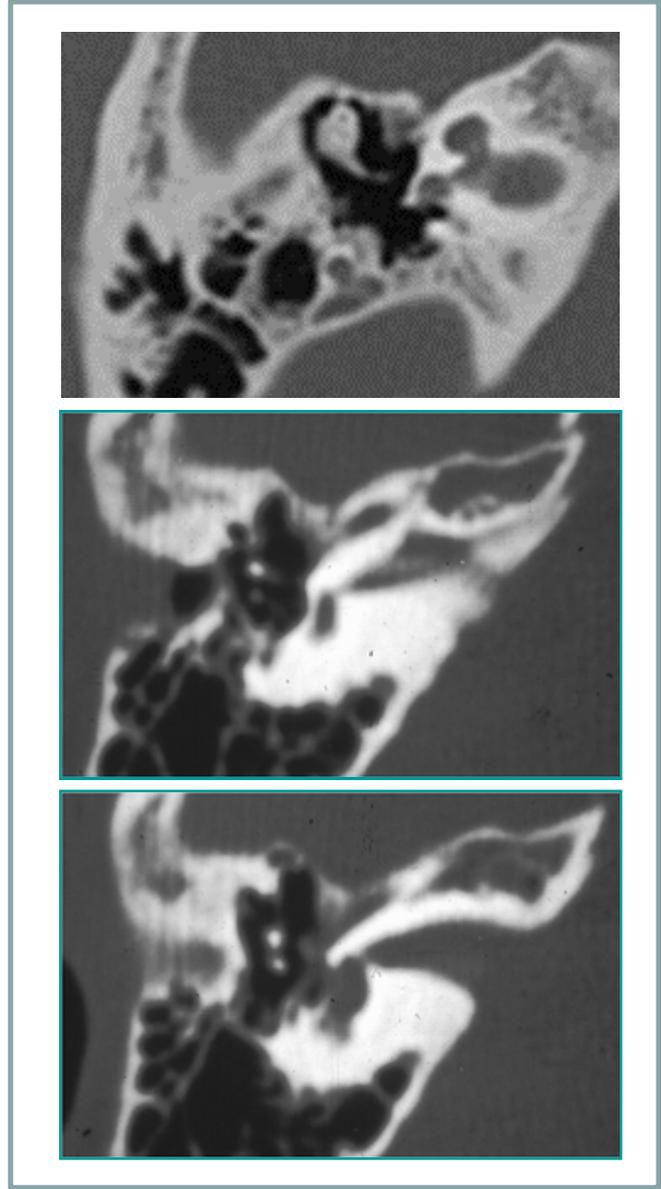
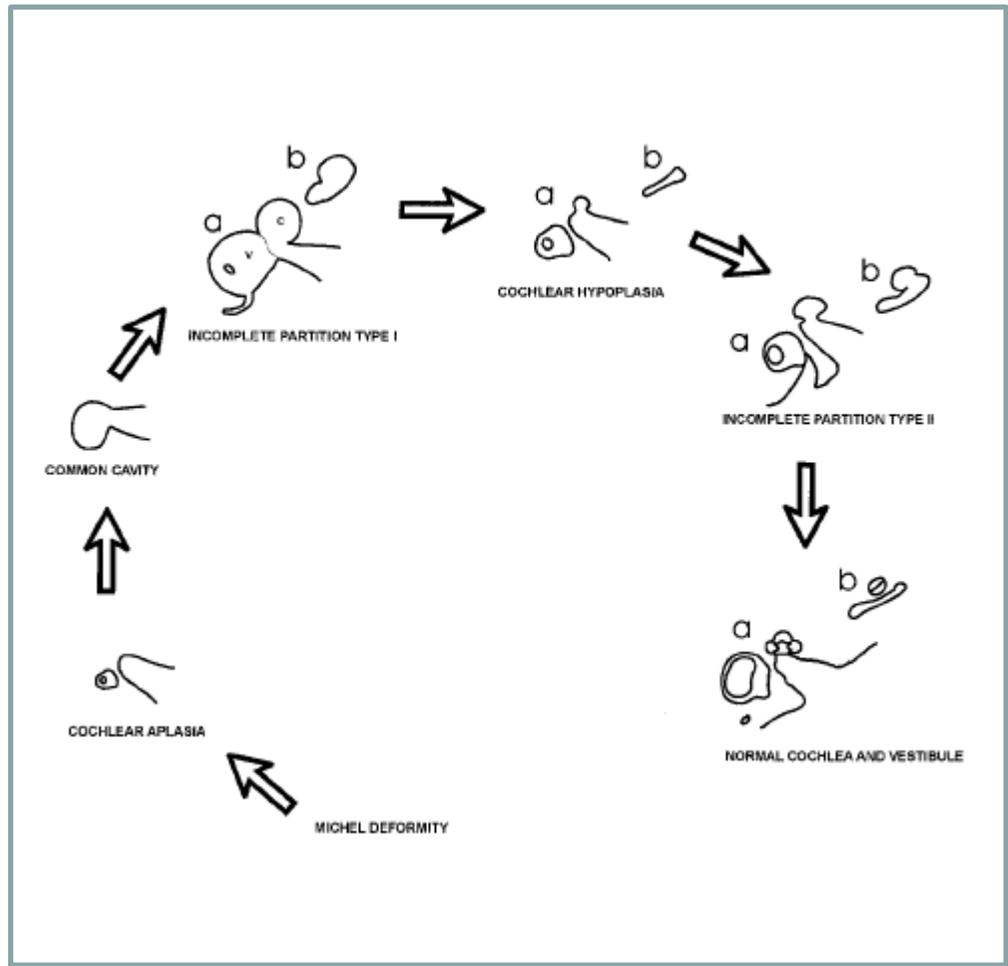
## Partition incomplète de type II



- Partition incomplète du labyrinthe antérieur avec tour basal conservé
- Pouvant s'associer à une anomalie de développement du labyrinthe postérieur
- Dilatation de aqueduc du vestibule (partie juxta-labyrinthique)
- Anomalie du modiolus, communication entre le LCR et l'OI



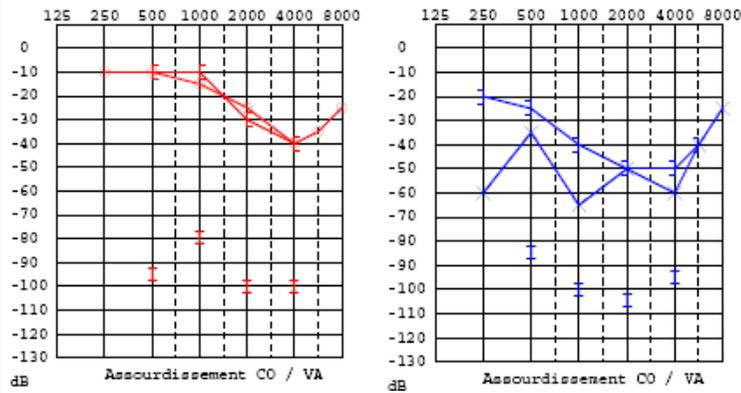
# Malformations de la cochlée



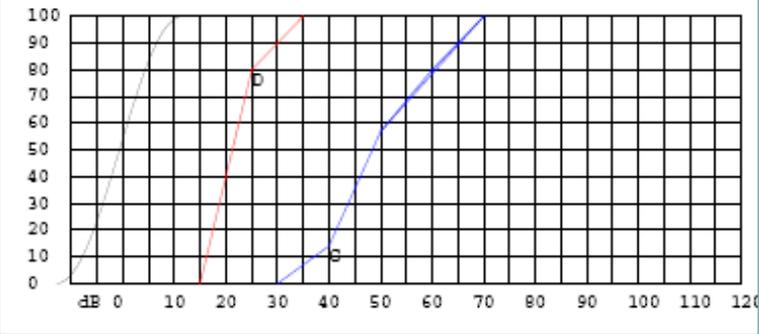


Gérard D., 49 ans  
Agent d'entretien

### Audiogramme tonal



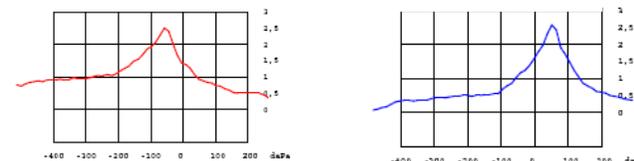
### Audiogramme vocal



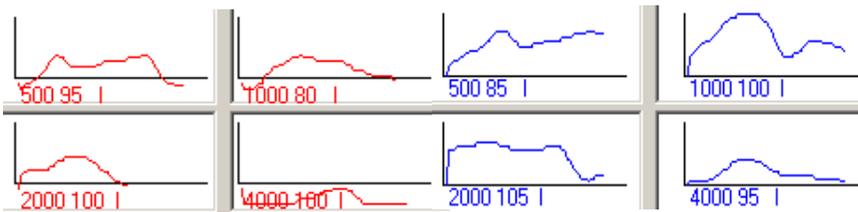
### Examen clinique

**Oct 2009** : Traumatisme crânien  
**Nov 2009** : Instabilité brève à l'effort, Tullio  
**Surdité mixte endocochléaire.**

### Tympanométrie



### Réflexes stapédiens

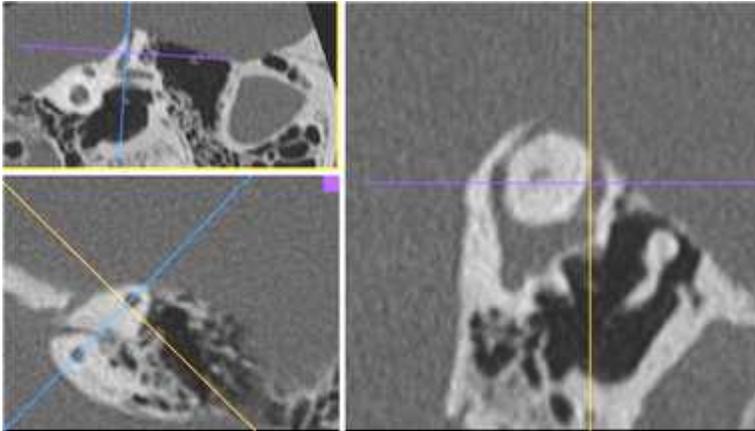


*Syndrome de Minor*



Gérard D., 49 ans  
Agent d'entretien

## Scanner



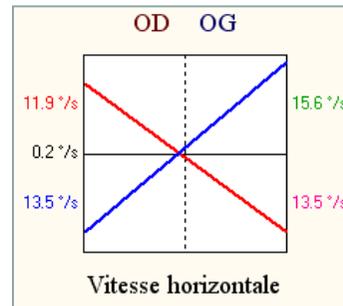
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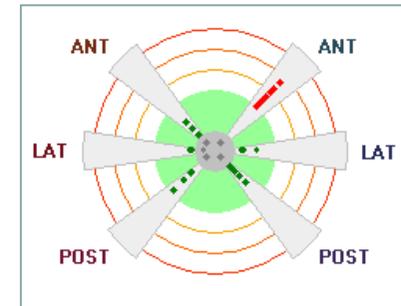
**Nov 2009** : Instabilité brève à l'effort, Tullio

**Surdité mixte endocochléaire.**

## Caloriques



## VHIT



*Syndrome de Minor*



Déhiscence = radiologie  
Syndrome de Minor = clinique

Interrogatoire :

- **Vertiges** déclenchés par la toux et les éternuements
- Vertige déclenchés par des **sons à forte intensité = TULLIO**
- **Oscillopsies**
- Instabilité, trouble de l'équilibre
- Acouphène, Hypoacousie

Clinique

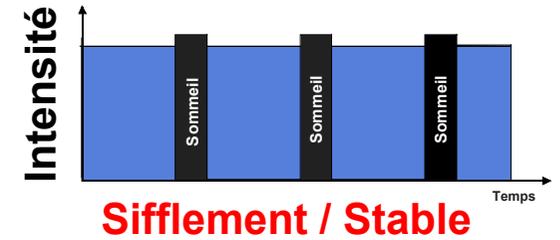
- **Surdité mixte avec conservation des stapédiens**
- Déficit vestibulaire canalaire supérieur

Radiologique :

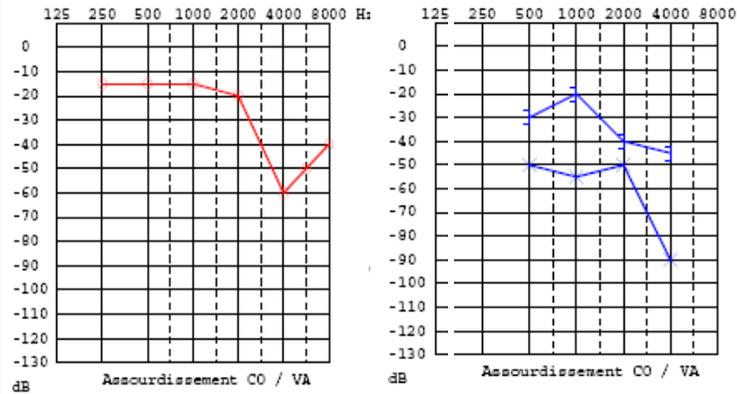
- Déhiscences > 2,5 mm sont généralement symptomatiques (sd de Minor)
- **Déhiscence asymptomatique**, étude autopsique : 0,67 %, bilatéral dans 2/3 des cas.
- Topographie variable : sommet du CSCS, partie postérieure du CSCS au niveau du sinus pétreux supérieur, partie antérieure du CSCS.



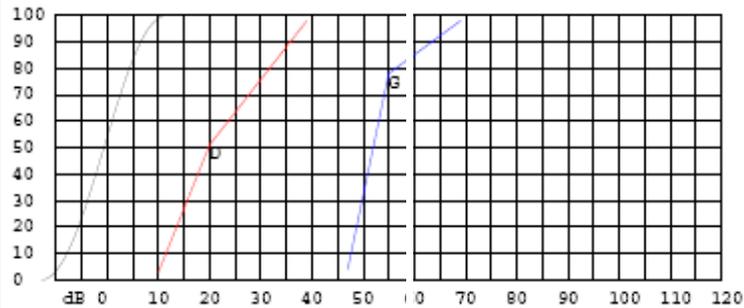
José A., 63 ans  
Retraité, Menuisier, Musicien



### Audiogramme tonal



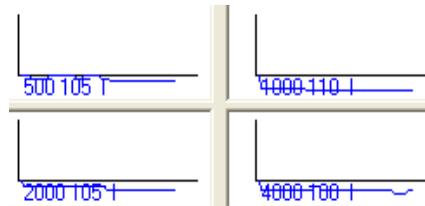
### Audiogramme vocal



### Examen clinique

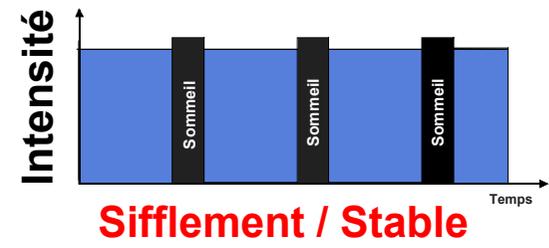
- 2010** : Acouphène lésionnel OG
- 1984** : tympanoplasie cholestéatome
- 1986** : ossiculoplastie (échec)
- 2004** : ossiculoplastie (échec)

### Réflexes stapédiens

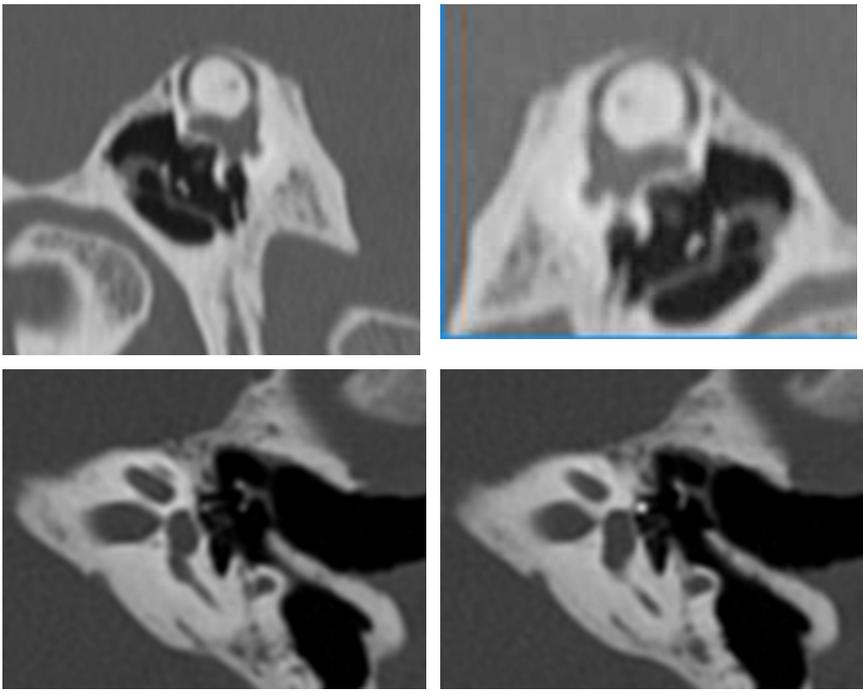




José A., 63 ans  
Retraité, Menuisier, Musicien



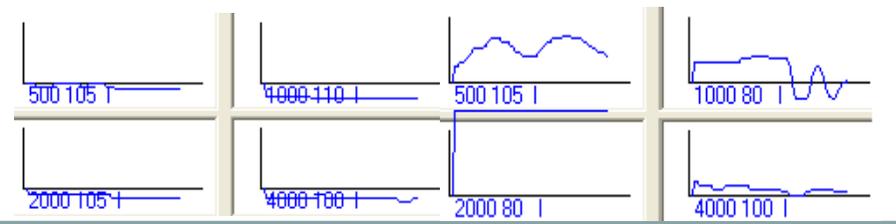
### Scanner



### Examen clinique

- 2010 : Acouphène lésionnel OG
- 1984 : tympanoplasie cholestéatome
- 1986 : ossiculoplastie (échec)
- 2004 : ossiculoplastie (échec)

### Réflexes stapédiens



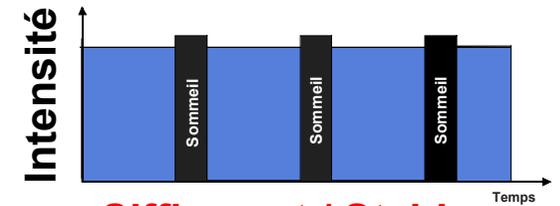
*Surdité de transmission de l'OM et de l'OI*



Patrice B., 53 ans  
Professeur de physique

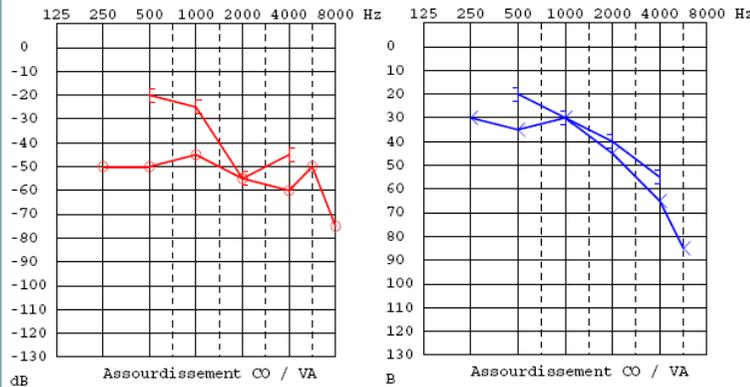


Voix - Musique

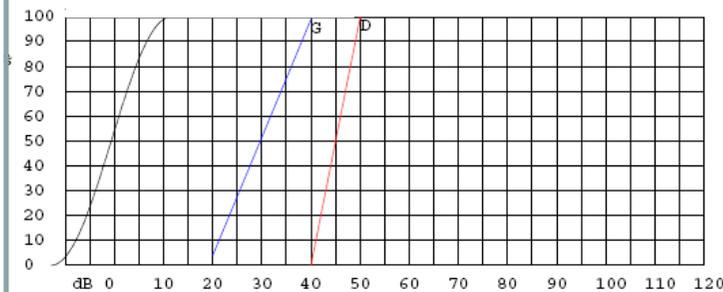


Sifflement / Stable

### Audiogramme tonal



### Audiogramme vocal



### Examen clinique

**1997** : Otospongiose, stapédoctomie OG

**2008** : Traumatisme sonore aigu

- Acouphène lésionnel gauche
- Acouphène central
- Diplacousie et hyperacousie bilatérale
- Syndrome dépressif pharmaco-résistant
- Troubles de la mémoire

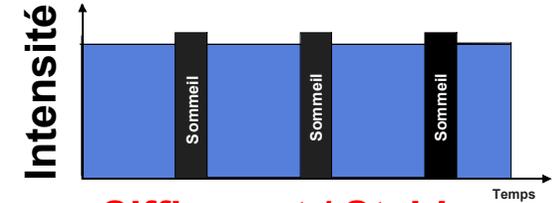
*Pathologie périphérique + centrale*



Patrice B., 53 ans  
Professeur de physique

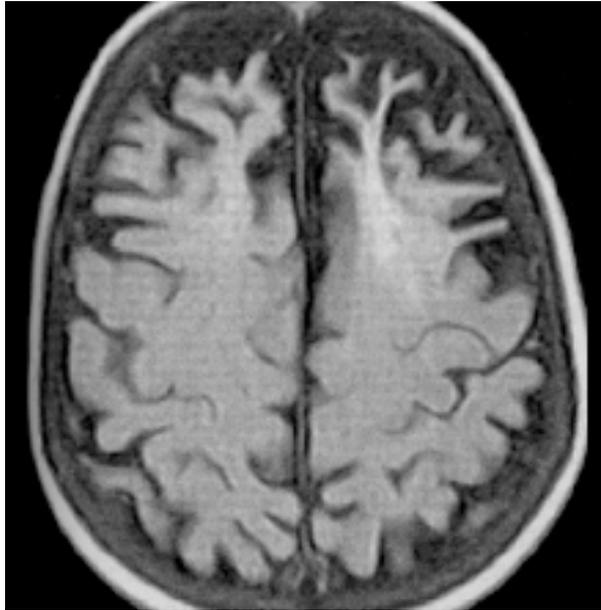


Voix - Musique



Sifflement / Stable

IRM : Atrophie frontale



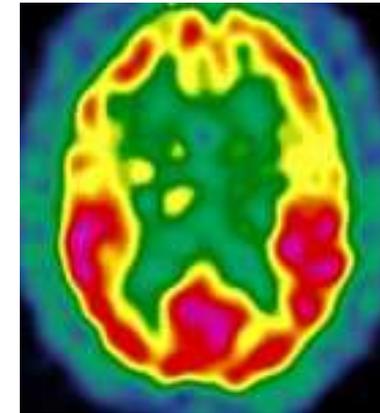
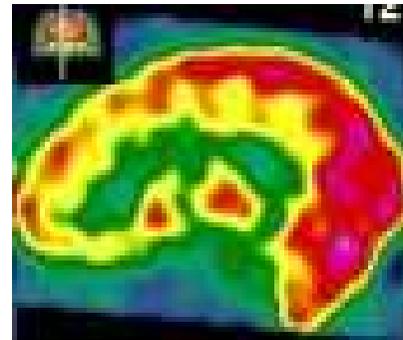
Examen clinique

**1997** : Otospongiose, stapéctomie OG

**2008** : Traumatisme sonore aigu

- Acouphène lésionnel gauche
- Acouphène central
- Diplacousie et hyperacousie bilatérale
- Syndrome dépressif pharmaco-résistant
- Troubles de la mémoire

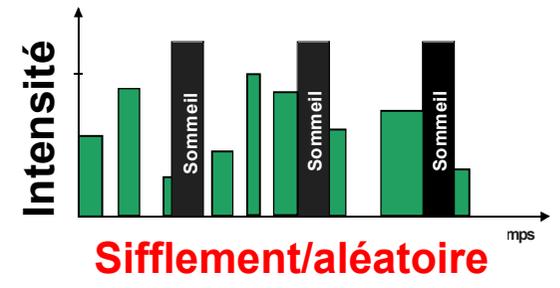
Scintigraphie



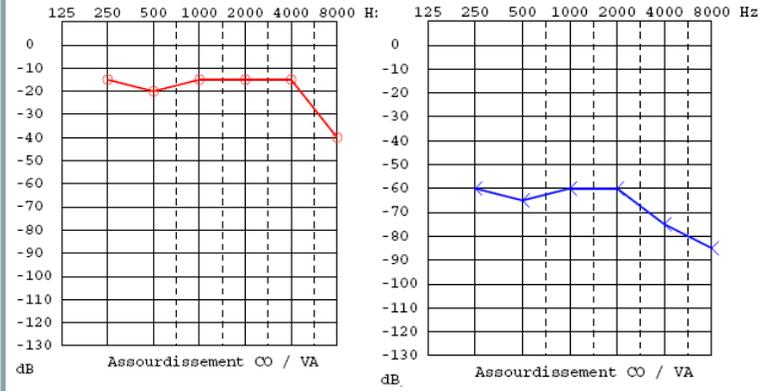
*Démence Fronto-Temporale*



Franck L., 43 ans  
Conseiller fiscal



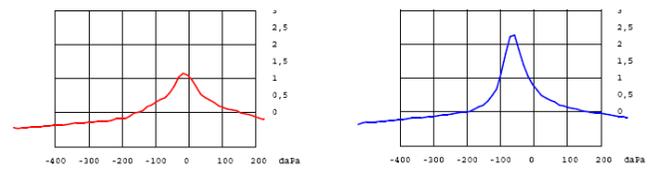
### Audiogramme tonal



### Examen clinique

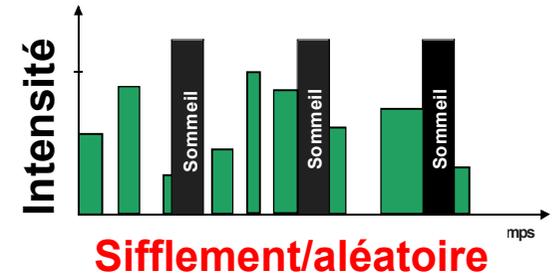
**2007** : Début spontané, acouphène gauche  
**2009** : Anxieux , IRM normale

### Tympanométrie

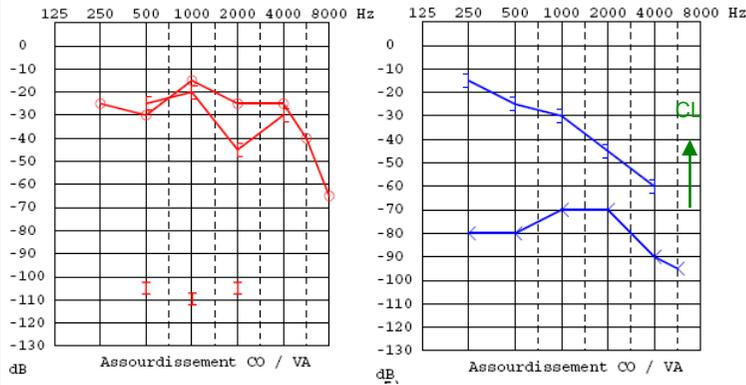




Franck L., 43 ans  
Conseiller fiscal

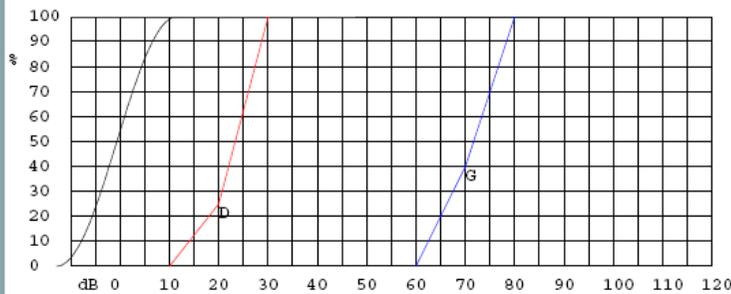


### Audiogramme tonal



G G G G G

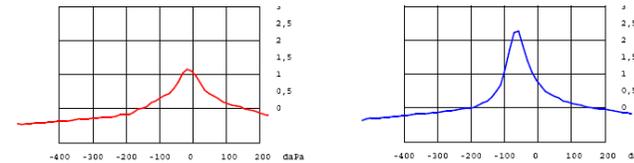
### Audiogramme vocal



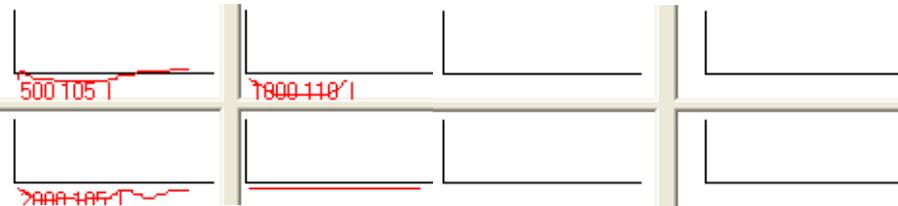
### Examen clinique

**2007** : Début spontané, acouphène gauche  
**2009** : Anxieux , IRM normale

### Tympanométrie

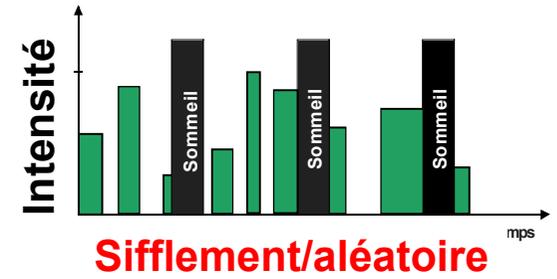


### Réflexes stapédiens

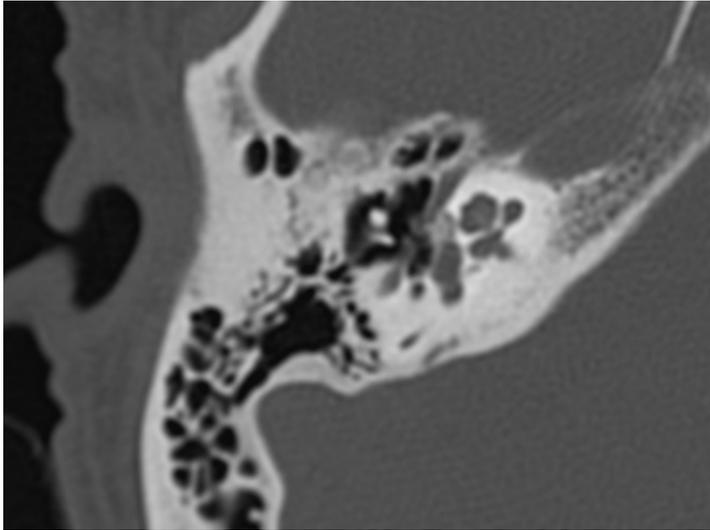




Franck L., 43 ans  
Conseiller fiscal



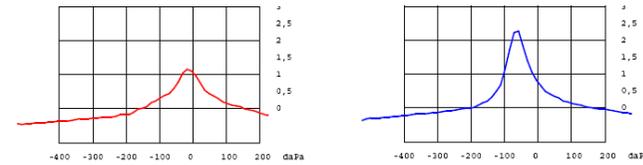
Scanner



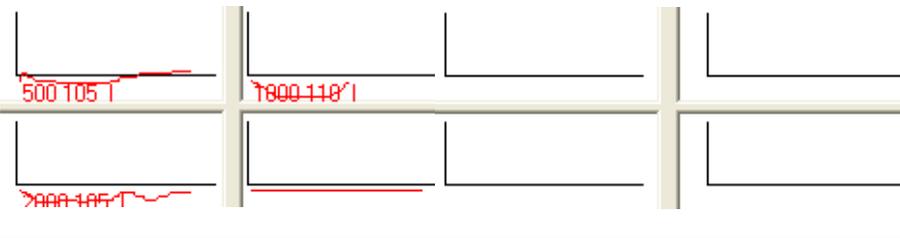
## Examen clinique

**2007** : Début spontané, acouphène gauche  
**2009** : Anxieux , IRM normale

## Tympanométrie



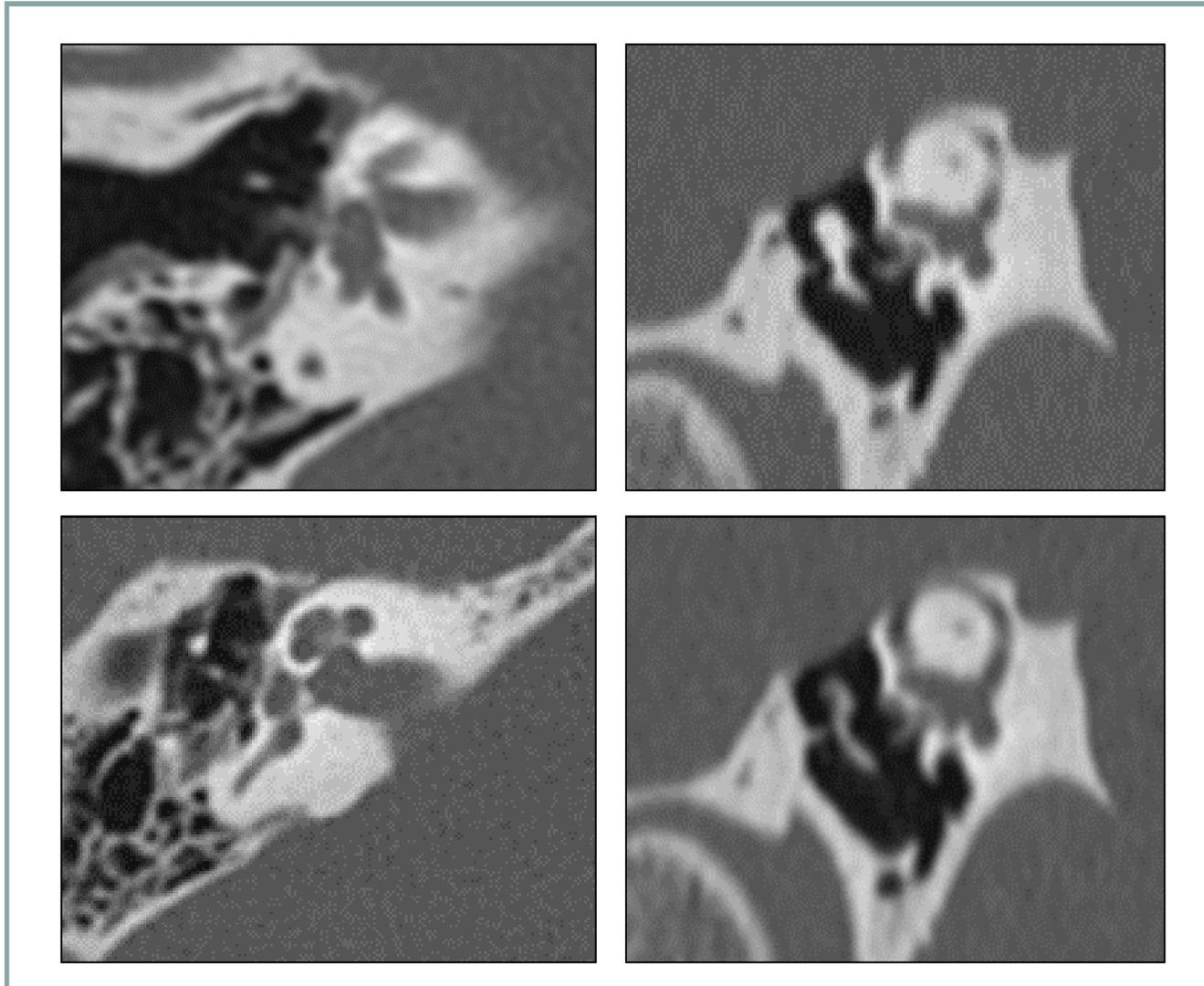
## Réflexes stapédiens



*Otospongiose*



## Otospongiose et déhiscence du CSC antérieur





## Fiabilité

	<b>Série de 2001*</b> <b>(474 patients)</b>	<b>Série de 2006</b> <b>(91 patients)</b>
<b>Scanners positifs</b>	84%	<b>92,5%</b>
<b>Scanners douteux</b>	-	4.5%
<b>Scanners négatifs</b>	16%	3%

\*Shin et al. Acta Otolaryngol 2001; 121:200-204



Céline M., 27 ans  
Sage femme

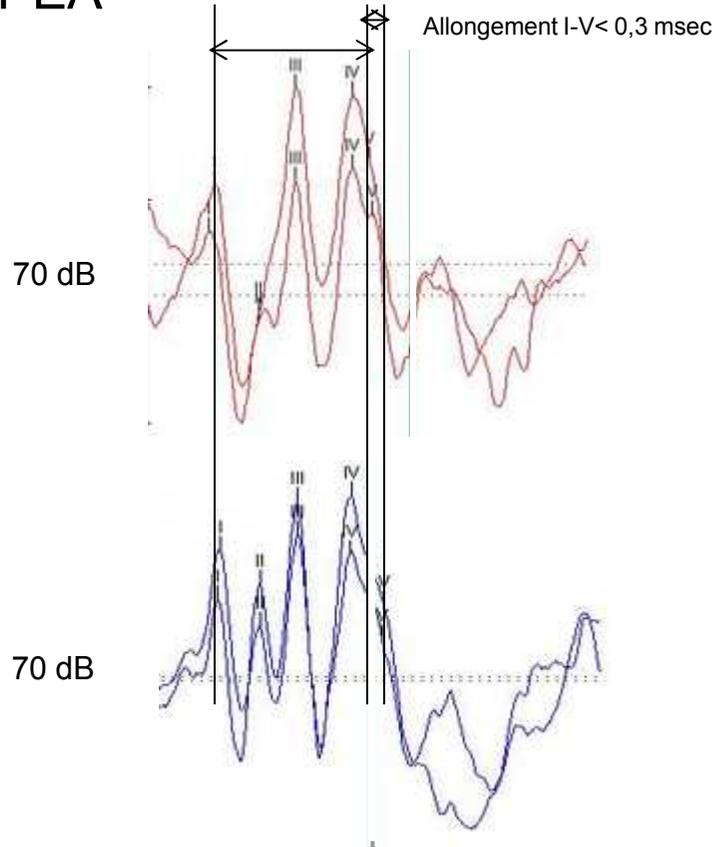


Pulsatile OG



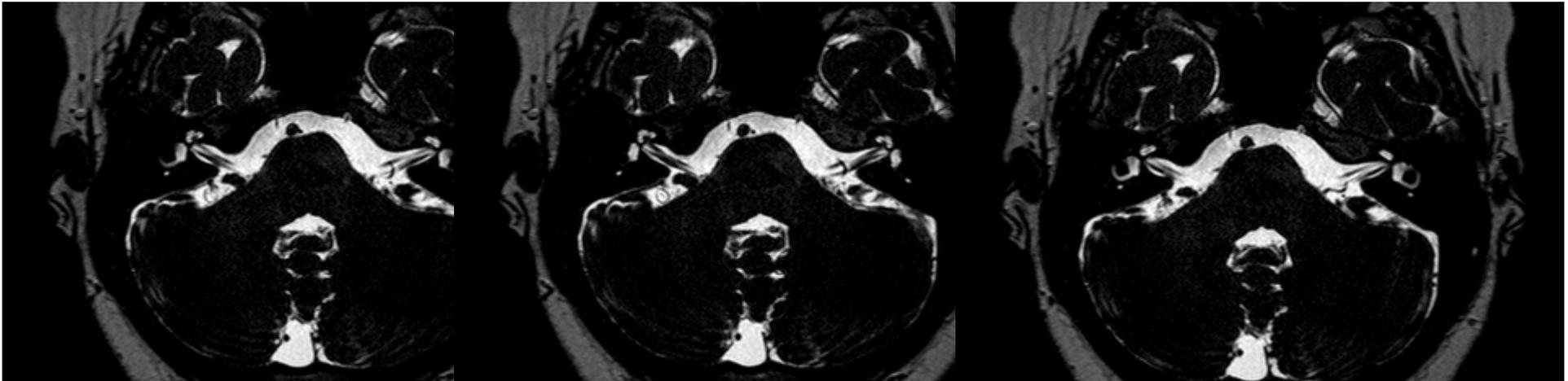
Sifflement / Stable

PEA



## Examen clinique

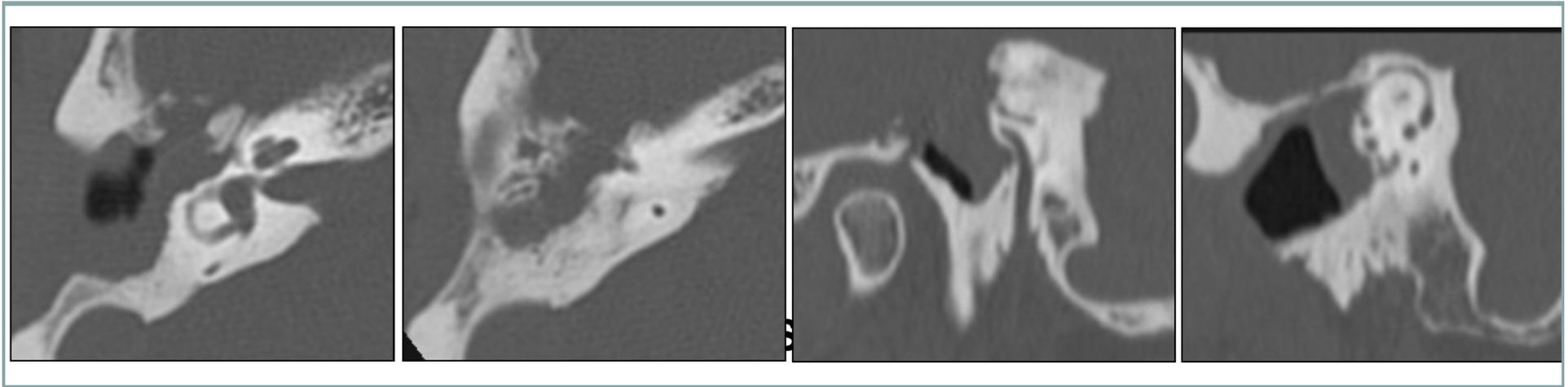
- 2007** : Acouphène pulsatile gauche inchangé
- 2009** : Acouphène lésionnel non latéralisé  
Modulé par le stress, intermittent, ATM ?
- 2010** : Bilan audio-vestibulaire normal.



*Boucle vasculaire, conflit neuro-vasculaire ?*



## Fistules et cholestéatomes invasifs

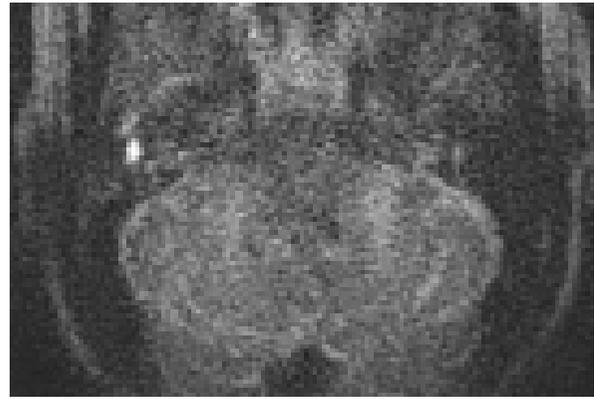


**Type I** : érosion superficielle de la capsule otique  
sans exposition du labyrinthe membraneux

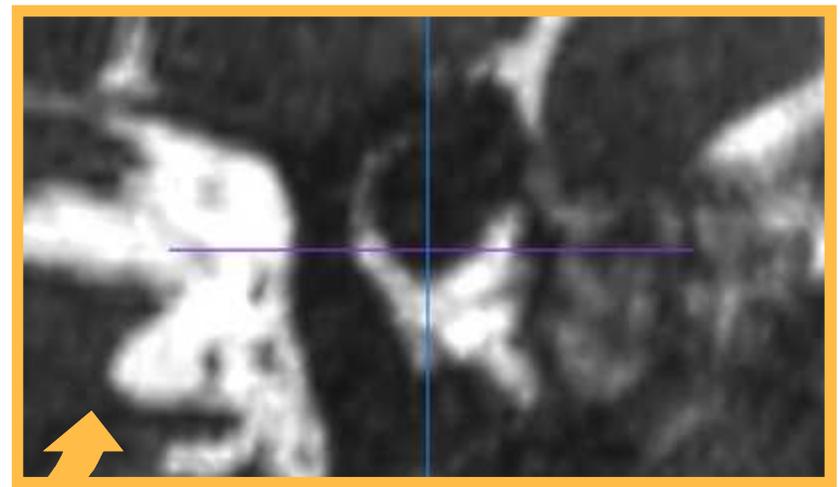
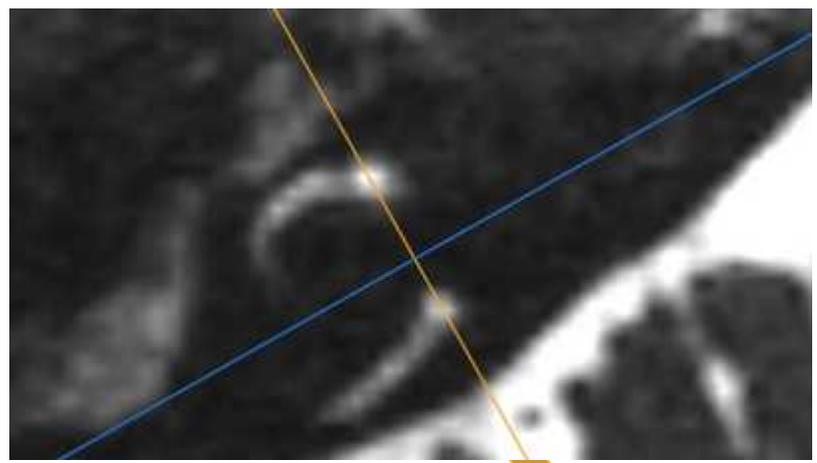
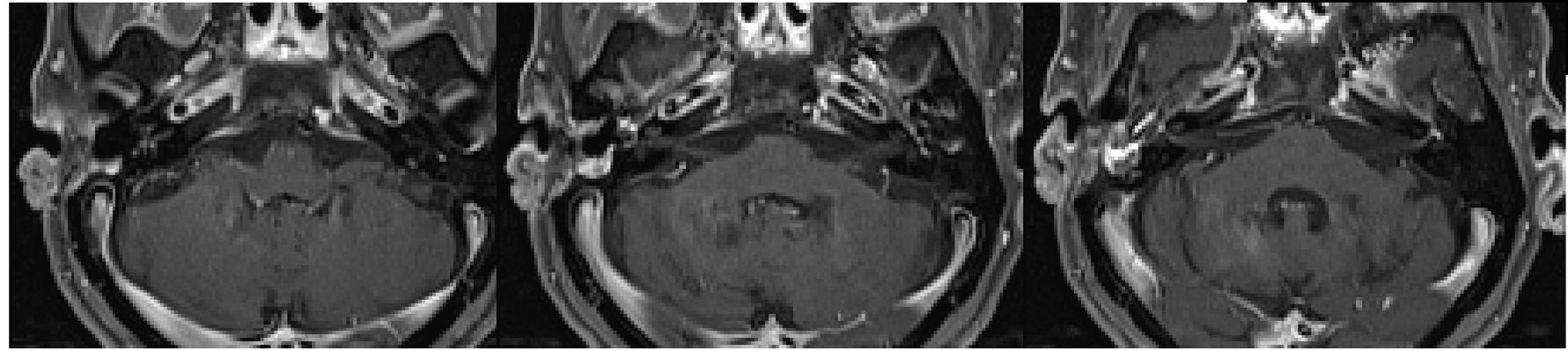
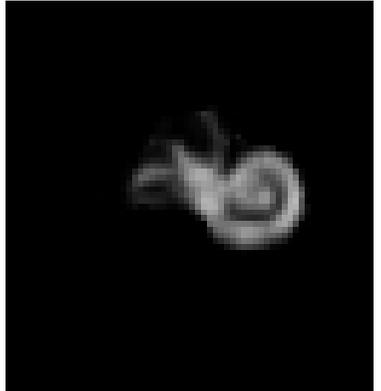
**Type II** : érosion profonde atteignant l'endoste

**Type III** : lyse osseuse complète de la capsule  
otique avec ouverture des espaces périlymphatiques

Vanclouster, 1997 : Fiabilité Dg : 89,5 %

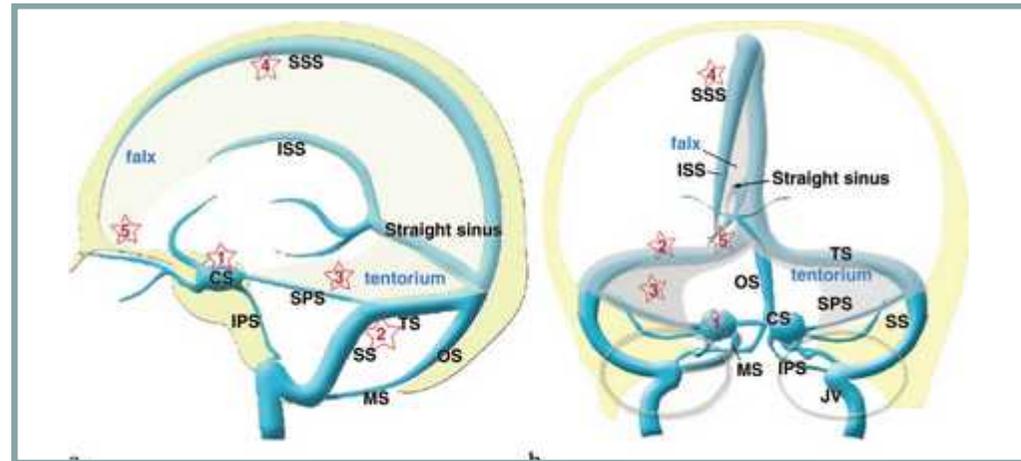


# FISTULE du CSC ANTERIEUR





## Fistule durale

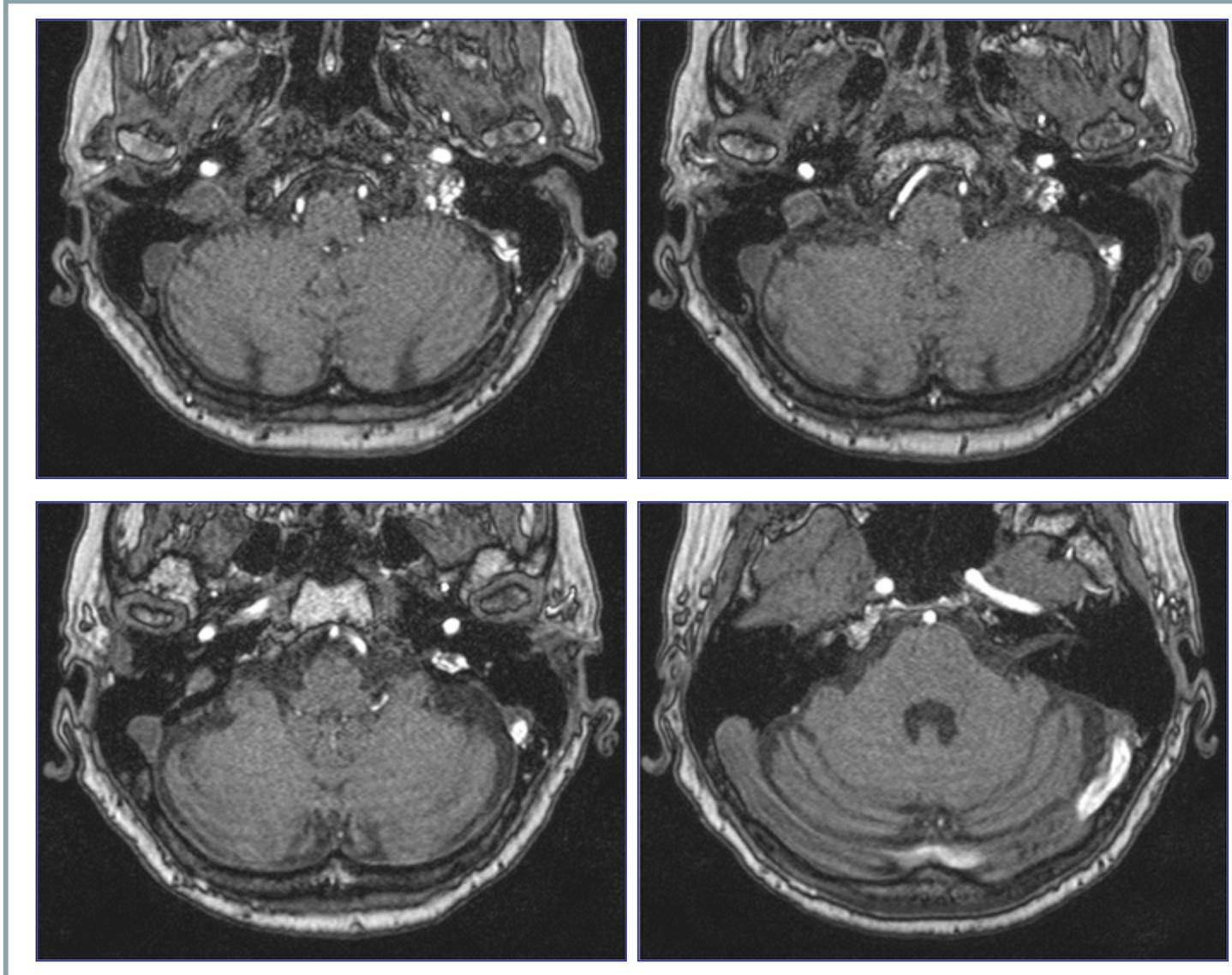


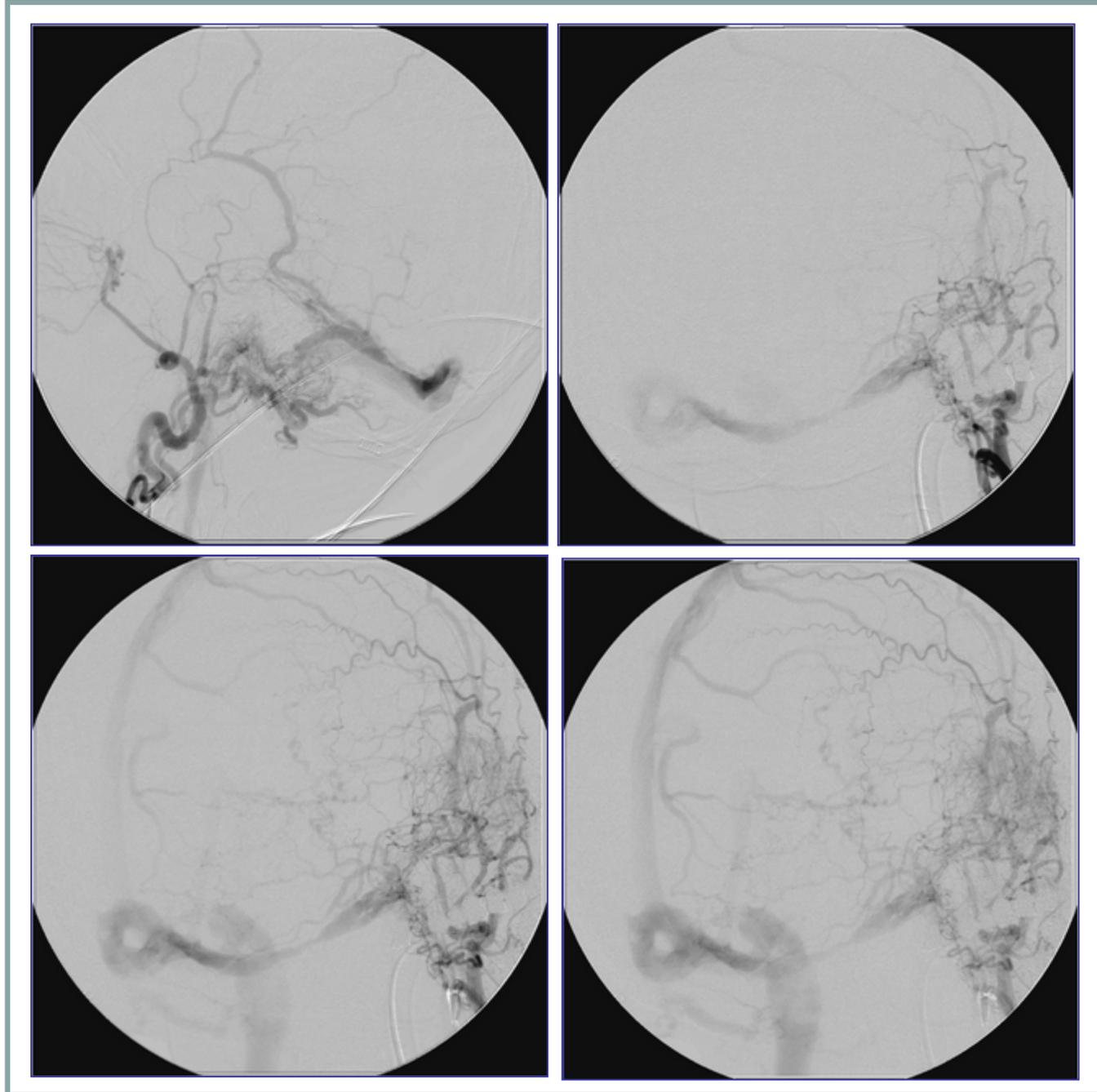
**Table 1**  
**Symptoms of Intracranial Dural AVFs**

Symptom	Location				
	Cavernous Sinus (%)	Transverse-Sigmoid Sinus (%)	Tentorium (%)	Superior Sagittal Sinus (%)	Anterior Fossa (%)
Ocular symptoms	80–97	...	...	...	...
Cranial nerve deficits	44–77	7–12	14–17	...	...
Bruit, tinnitus	40–50	40–42	70–88	...	...
Headache	...	46–76	8–24	50	12–15
Visual symptoms	28–38	12–28	...	...	...
Central nerve deficits	3	10–20	23–42	29	5–33
Intracranial hemorrhage	Rare	15–28	60–74	23	44–84
Dementia	...	Rare	...	5	...



## Fistule du sinus latéral type II b







**Table 2**  
**Classification of Venous Drainage**

Type	Classification System	
	Cognard et al (3)	Borden et al (8)
I	Antegrade sinus drainage	Sinus or meningeal venous drainage
II	Insufficient antegrade sinus drainage	Sinus drainage with CVR
IIa	Retrograde sinus drainage only	...
IIb	Retrograde CVR only	...
IIa + IIb	Retrograde sinus drainage and CVR	...
III	CVR only without venous ectasia	CVR only
IV	CVR only with venous ectasia	...
V	Spinal venous drainage	...

Note.—CVR = cortical venous reflux.

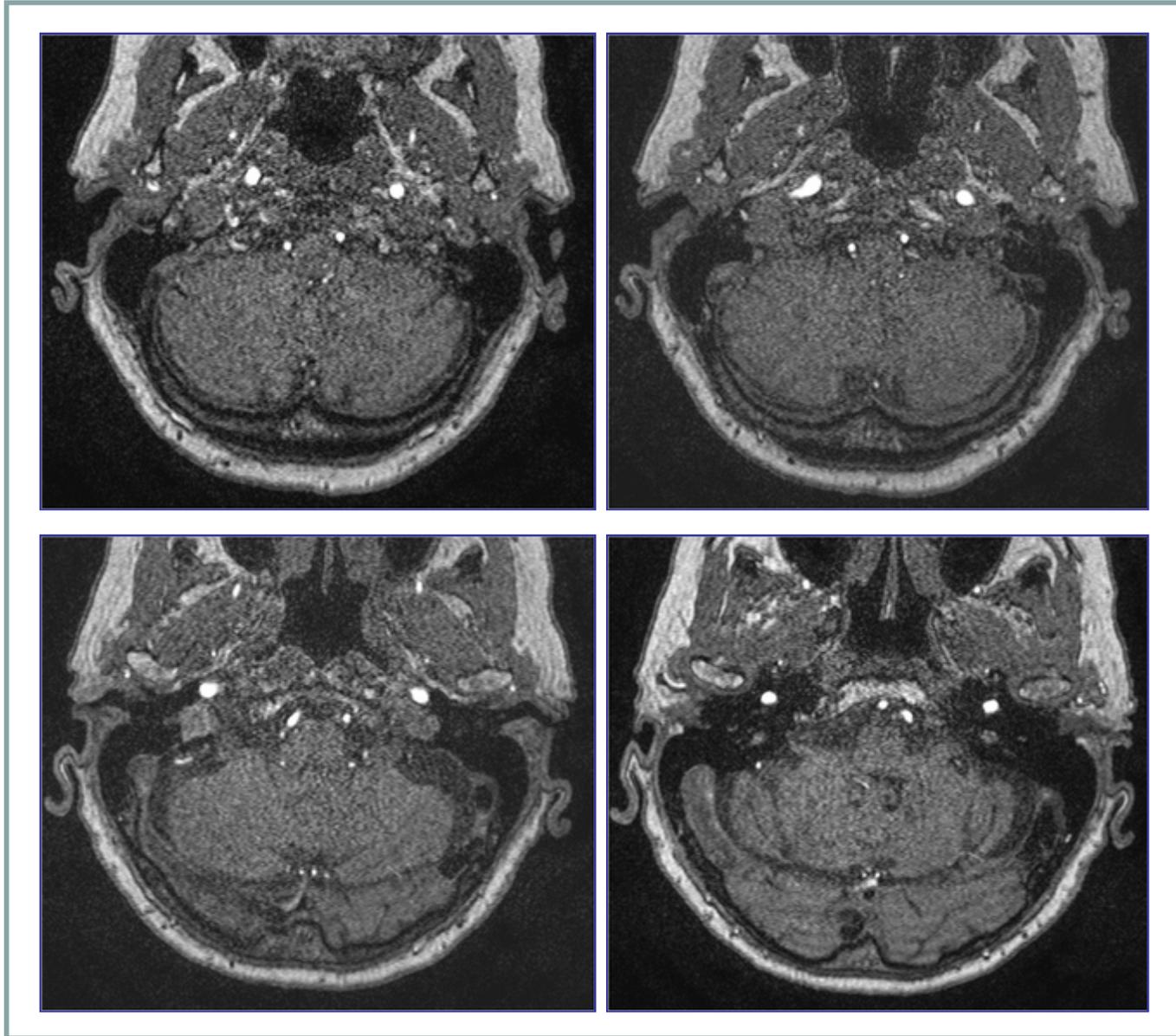
**Table 3**  
**Frequency of Intracranial Hemorrhage and Aggressive Symptoms in Various Types of Venous Drainage**

Type	Intracranial Hemorrhage (%)	Aggressive Symptoms (%)
Cognard types I–IIa, Borden type I	0	2
Cognard types II and IIa + IIb, Borden type II	11	39
Cognard types III–V, Borden type III	48	79

Sources.—References 3 and 8.



## Fistule du sinus latéral type II b

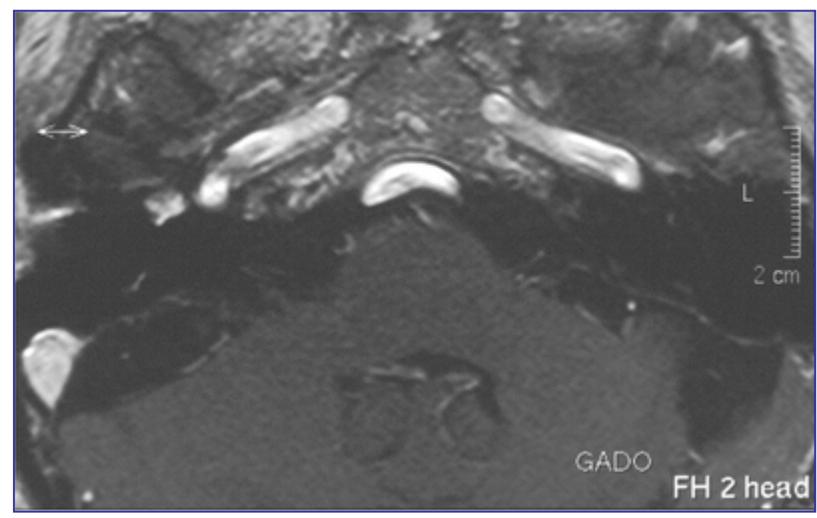
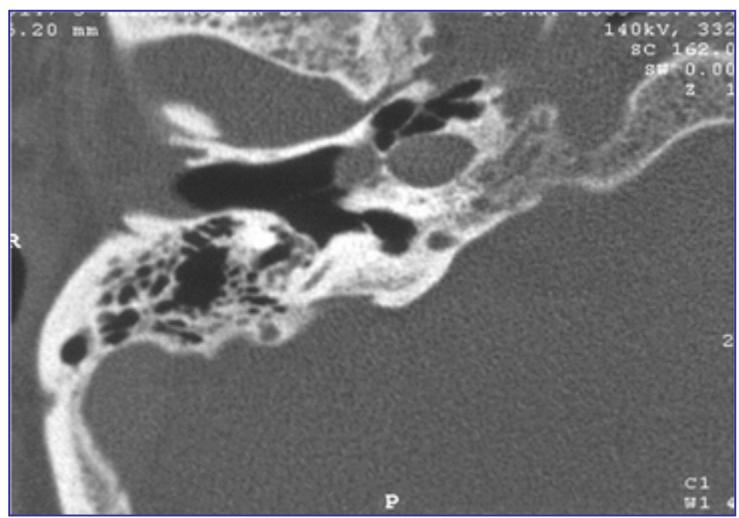
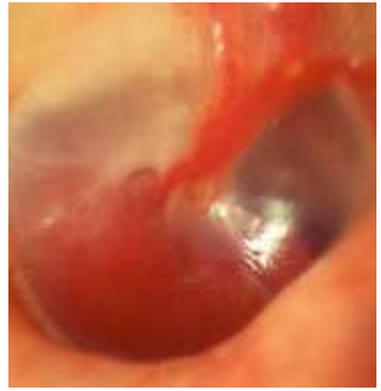




Marie-Louise M., 66 ans

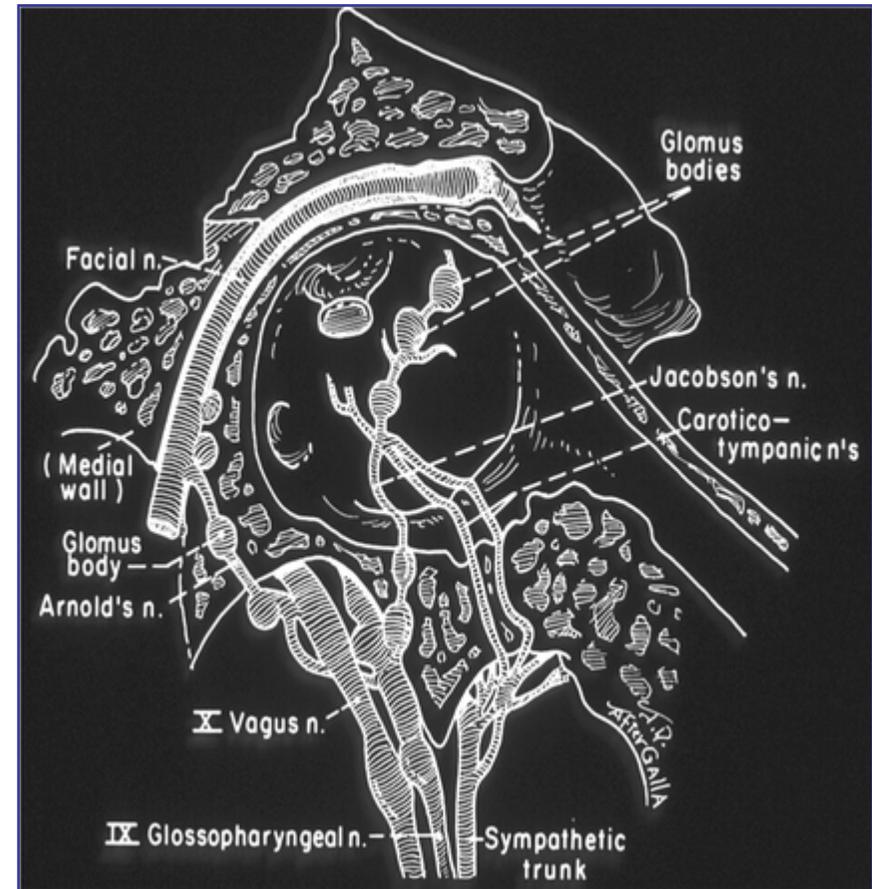


Pulsatile OD



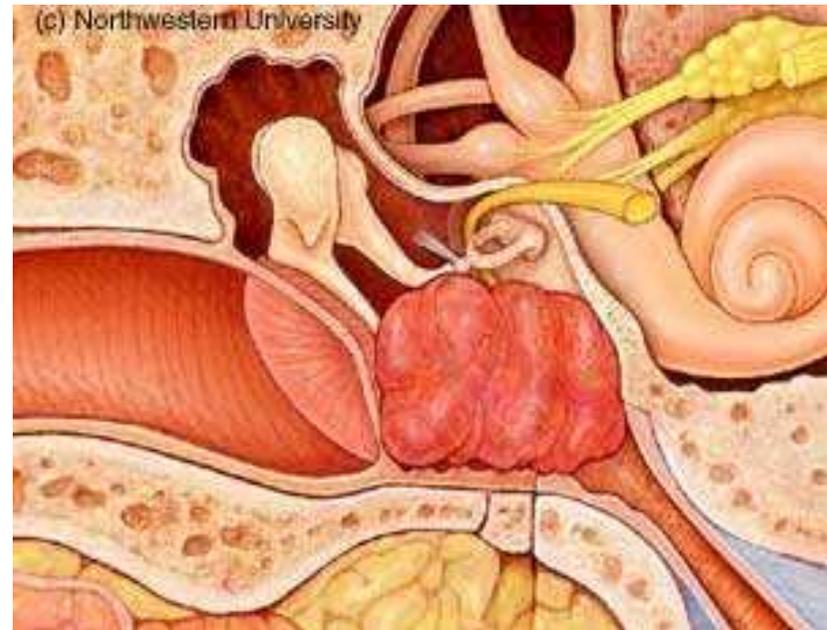
## PARAGANGLIOMES JUGULO-TYMPANIQUES

Origine	Siège
•Nerf de Jacobson(IX)	•Glomus tympanique
•Adventice du golfe VJI	•Glomus jugulaire
•Nerf d'Arnold (X)	•Glomus du facial



## PGL JUGULO-TYMPANIQUES CLASSIFICATION DE U. FISCH

- Type A** : Tumeur hypotympanique
- Type B** : Tumeur glomus tympanique  
avec extension infralabyrinthique
- Type C** : Tumeur tympano-jugulaire  
avec extension au canal carotidien et  
à l'apex pétreux
- Type D** : Tumeur tympano-jugulaire  
avec extension intracrânienne extra  
(D1) ou intradurale (D2)

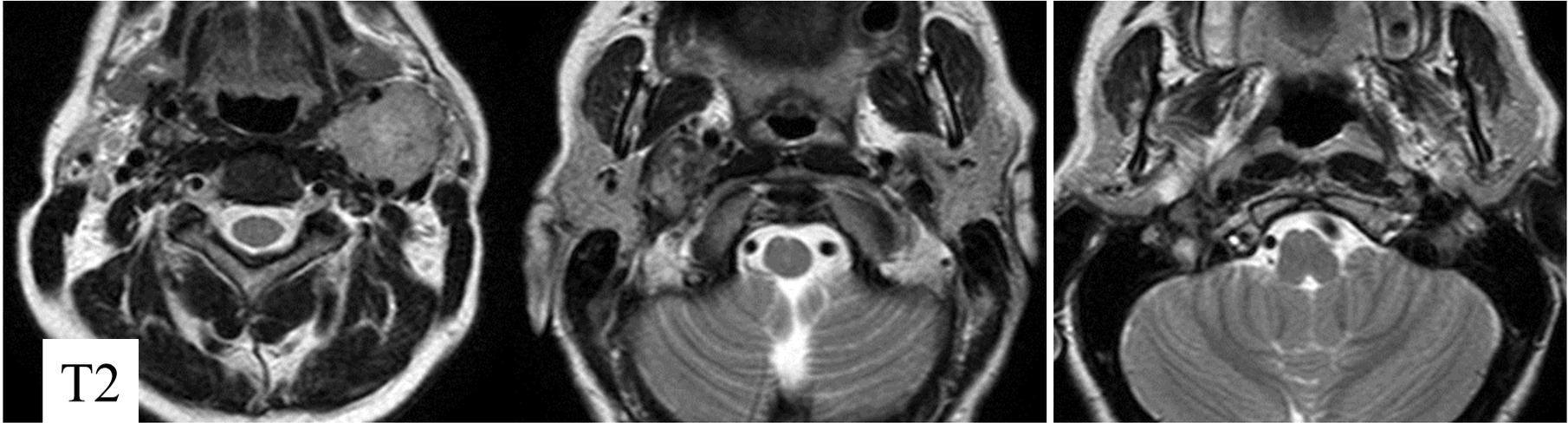


# PGL TYMPANO-JUGULAIRES

- PGL TYMPANIQUE
  - Tumeur OM
  - Hypotympan infrastructure osseuse respectée
  - Agrandissement du canal tympanique inf.
- PGL JUGULAIRE : DOME VJI
  - **Extension** : OM, mastoïde, espace rétrostylien, fosse postérieure; sinus latéral
  - **Signes osseux** : lésions érosives ou perméatives, foramen jugulaire( épine occipitale), cellules infra-labyrinthiques, canal du facial, mastoïde.

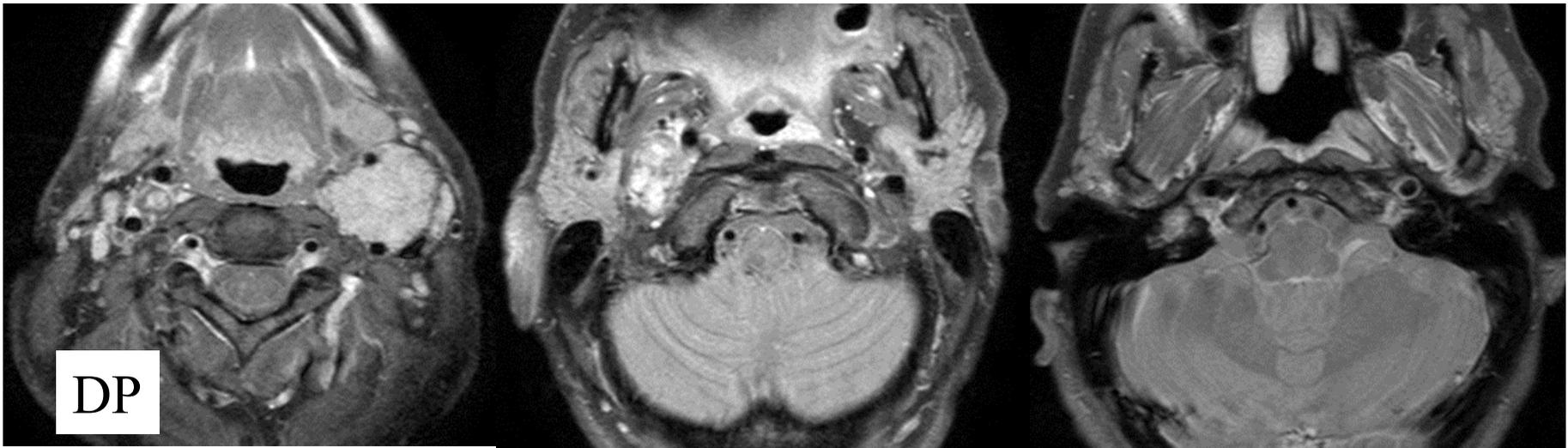
# PROTOCOLE IRM/ PGL

- Exploration en coupes axiales fines de la base du cou à la base du crâne
  - T1SE
  - T2FSE
  - **ARM 3DTOF APRES INJECTION DE Gd**
  - T1 Gd + FAT SAT
  - Dose: 0.1 mol/kg ( 0.2cc/kg)

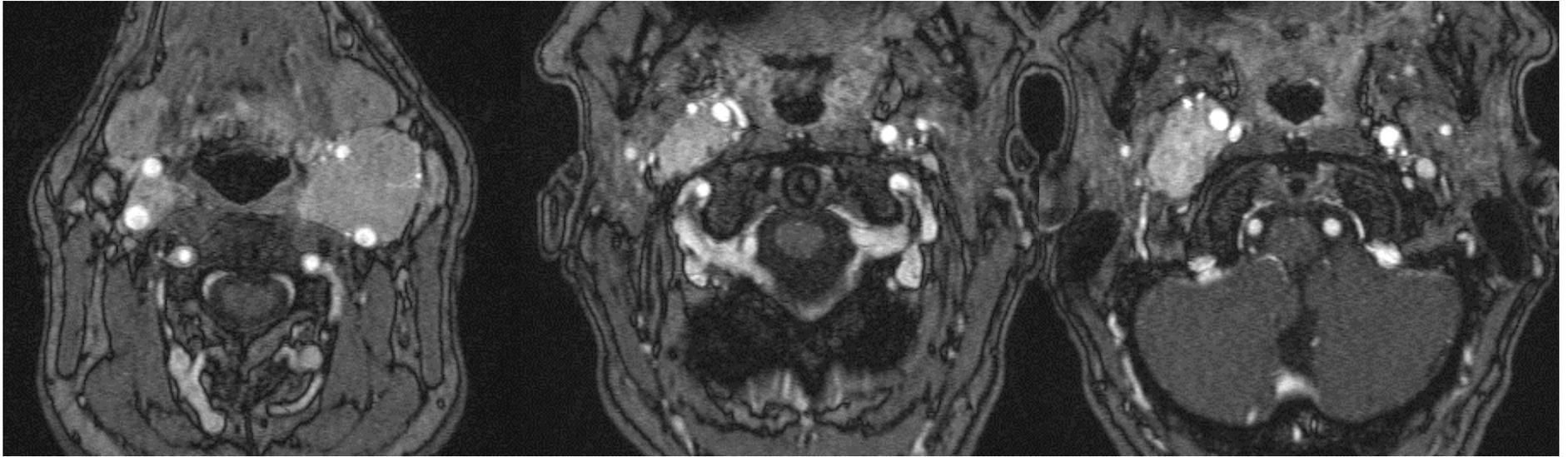


T2

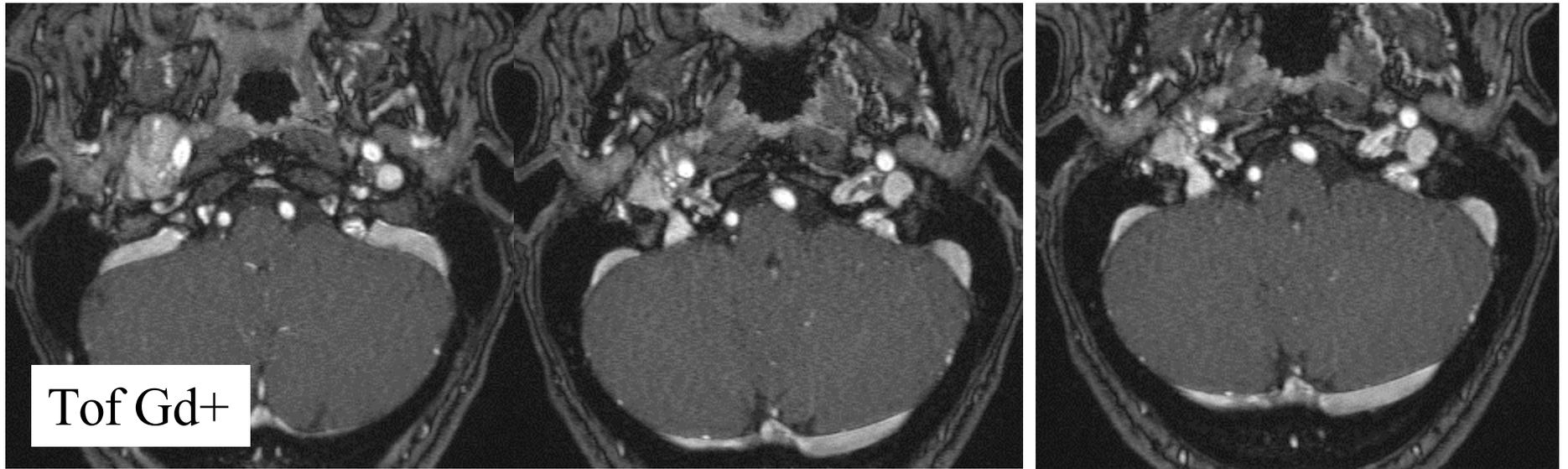
PGL MULTIPLES



DP



PGL MULTIPLES



Tof Gd+



# Orientation diagnostique

