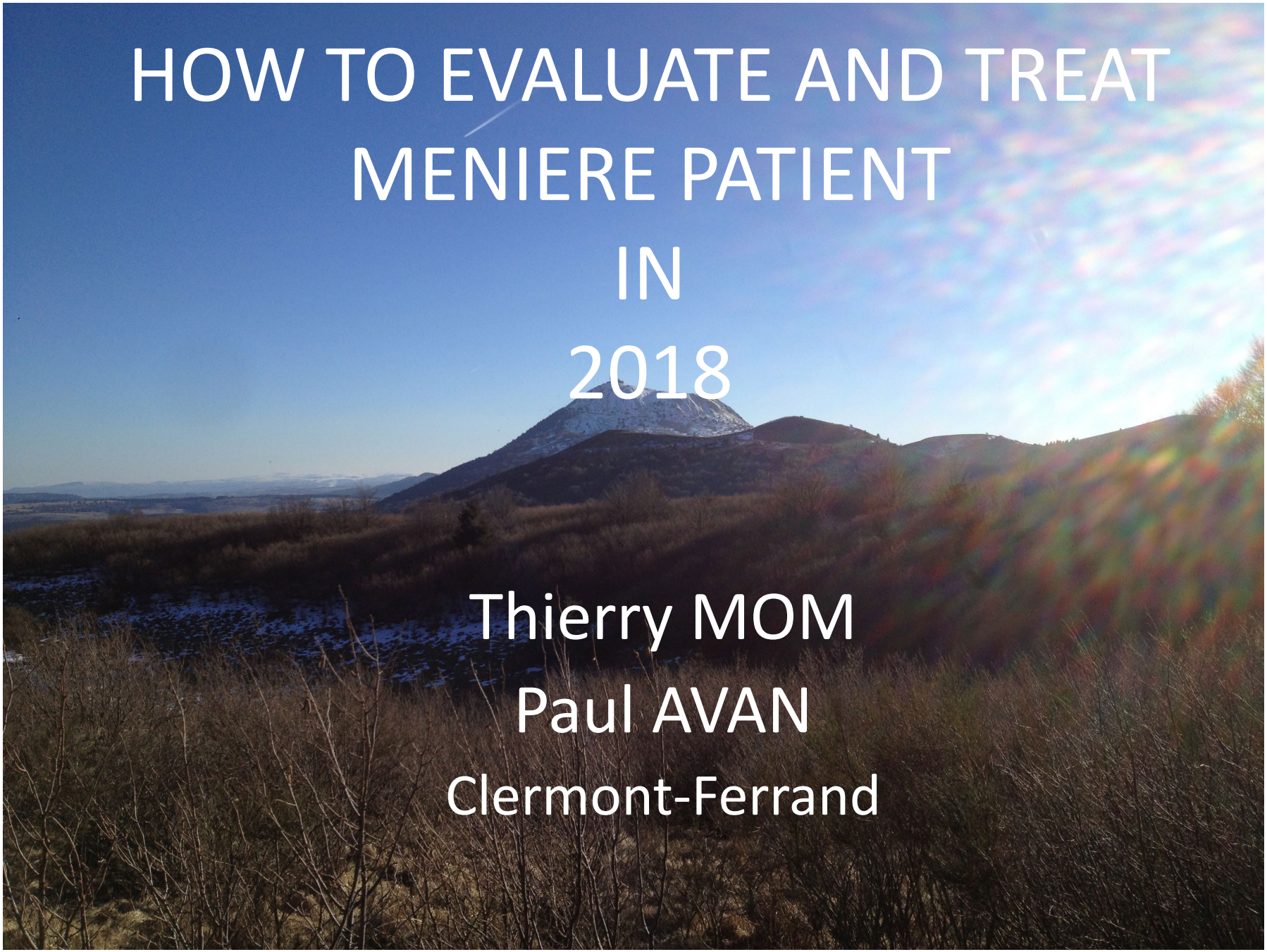


HOW TO EVALUATE AND TREAT MENIERE PATIENT IN 2018

Thierry MOM
Paul AVAN
Clermont-Ferrand

Barany Society, AAO-HNS, EAONO, Korean Balance Society, Japan Society for Equilibrium Research 2015

DEFINITE	PROBABLE
- >2 crises (20min or more or Tumarkin) -SNHL on 2 frequences <2kHz (30 dB in BC or 35 dB if bilateral) with fluctuation of otologic symptoms (tinnitus, SNHL, aural fulness) - No other causes	->2 crises (20min or more - with fluctuation of otologic symptoms (tinnitus, SNHL, aural fulness) -- No other causes

FIRST: TO BE SURE OF DIAGNOSIS

- It is not always obvious:
  - When clinical presentation is uncomplete, at the beginning of the disease: probable disease for example
  - When patient has a slight hearing alteration together with headache

Menière ‘s Disease vs vestibular Migraine

VESTIBULAR MIGRAINE

- A- At least 5 episodes with vestibular symptoms of moderate or severe intensity lasting from 5 min - 72 hours
- B- History of migraine with or without aura according to the international classification (ICHD)
- C- One or several symptoms of migraine associated with at least 50% of vestibular episodes :
  - Headache with at least two following symptoms: lateralisation, pulsatility, moderate or severe pain, worsened by routine physical activity
  - Photophobia and phonophobia
  - Visual, gustative, Aura
- D- Clinical presentation not accounting for another diagnosis of vestibular disorder or from the classification of ICHD

Differences of symptoms between Menière's disease and vestibular Migraine (10 VM/1 MD; 448/100 000 H ≈HTA)

MD	VM
Episodic Vertigo	Episodic Vertigo
Unilateral tinnitus	***Bilateral*** tinnitus
Long- term severe to progound hearing loss	***No long-term hearing alteration***
spontaneous spells	***Factors triggering the crisis (visual, food***…)
Auditory Aura	gustatory or visual Aura
Clear in between crises	***Persistant postural perceptional dizziness*** (3PD)
No excessive motion intolerance	Important motion intolerance ***since chidhood***

So : How to make the diagnosis?

- Only clinical criteria because no objective markers exist
- But what about cases with uncomplete clinical presentation? or associated with headache?
- Can we early detect anomalies of endolymphatic pressure, of hydrops?

Definition of Menière's disease

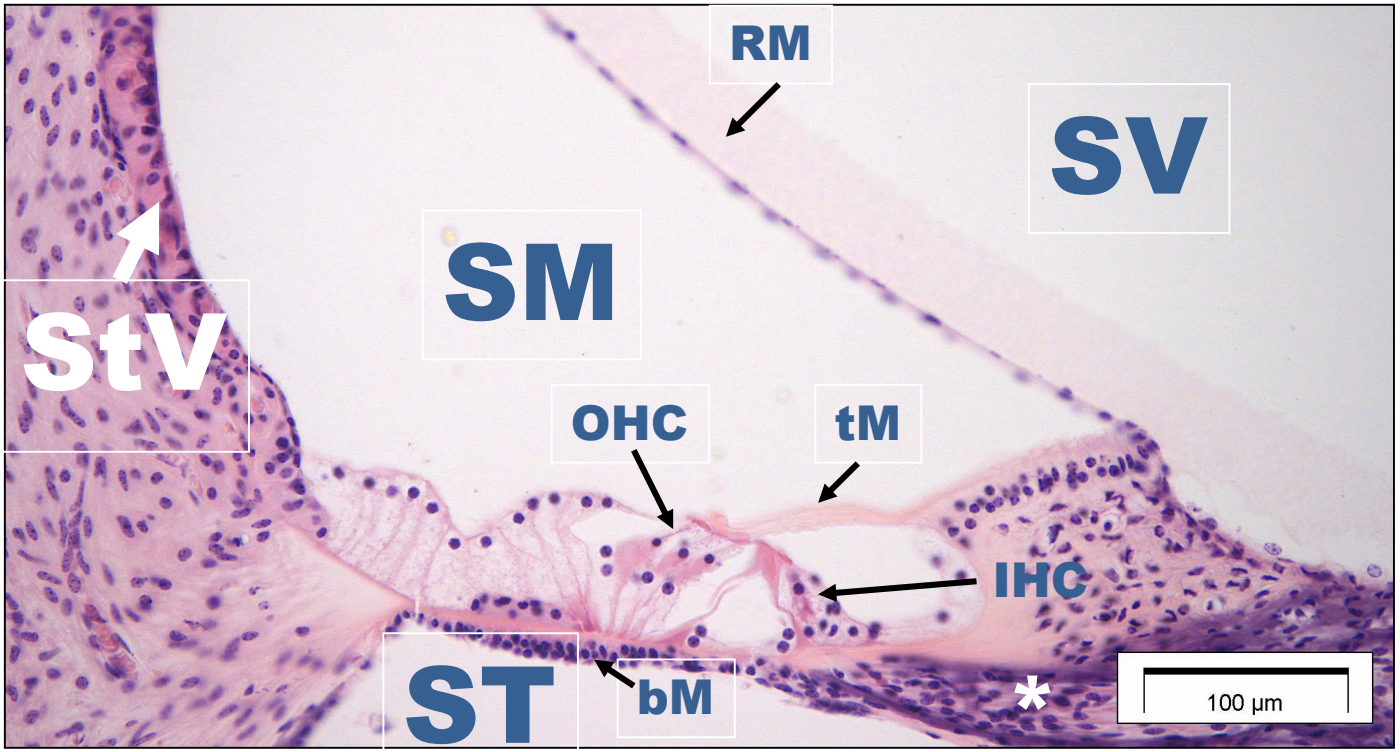
- It all relies on endolymphatic hydrops.
- Post mortem preparation of cochleas (e.g. Paparella) showing this phenomenon
- The hydrops is most likely fluctuating at least at the beginning of disease.
- So the current effort is to reveal hydrops when present but still fluctuant

Recent advances in exploring Menière's disease

- The acoustic phase shift (Clermont –Ferrand-FRANCE)
- Multifrequential admittancemetry (Bordeaux-FRANCE)
- Noninvasive Electrocochleography (EcoG)

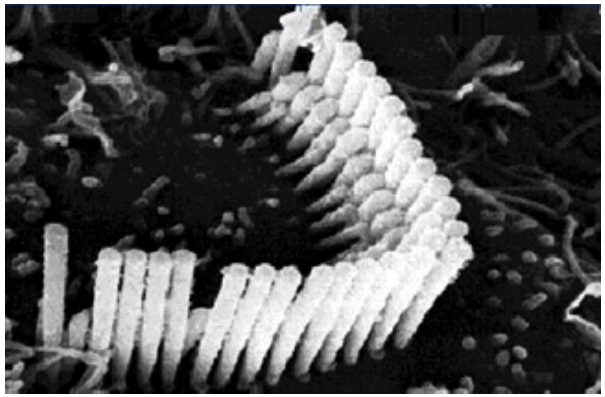
The acoustic phase shift

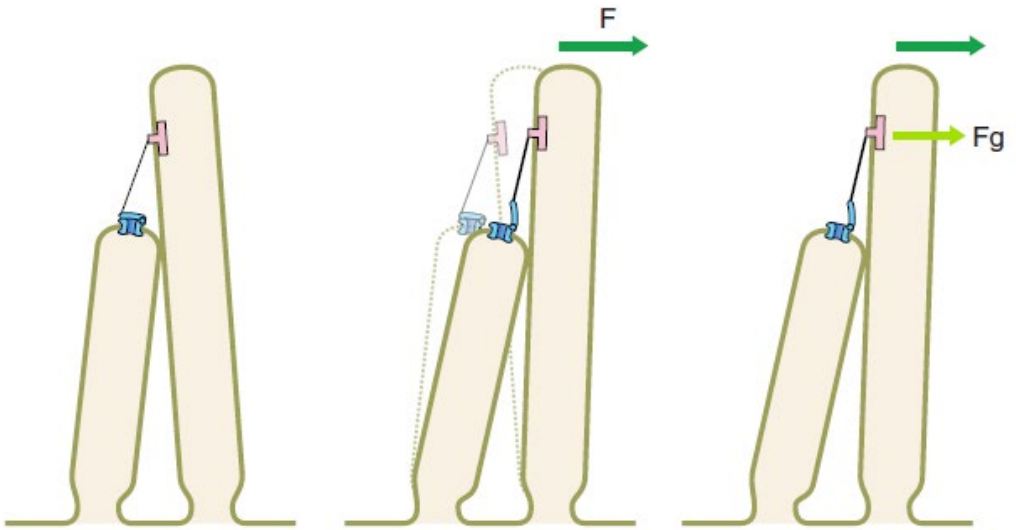
direct action of hydrops on OHCs' stereocilia



The organ of Corti

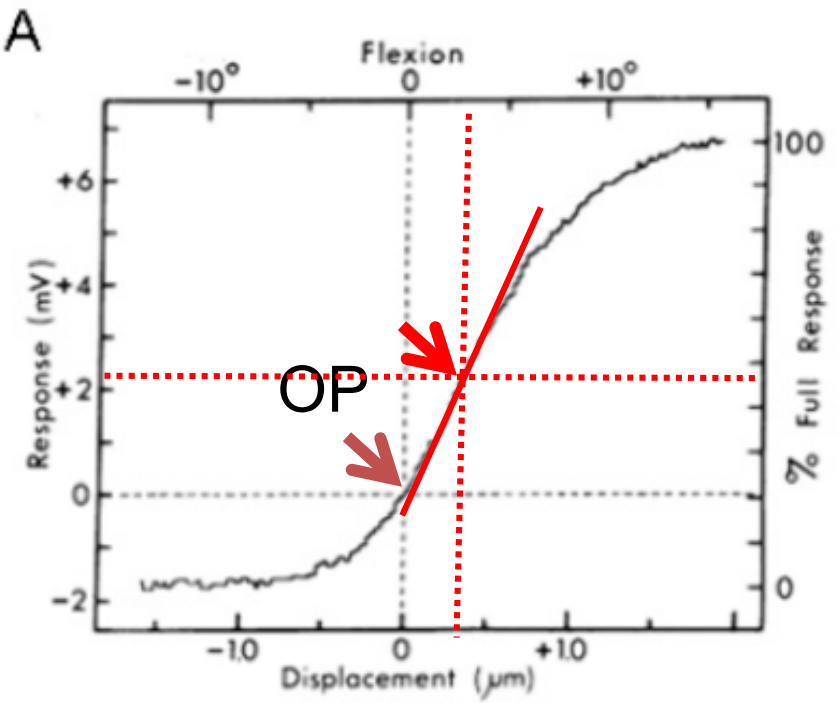
Homeostasis and operating point of hair cells



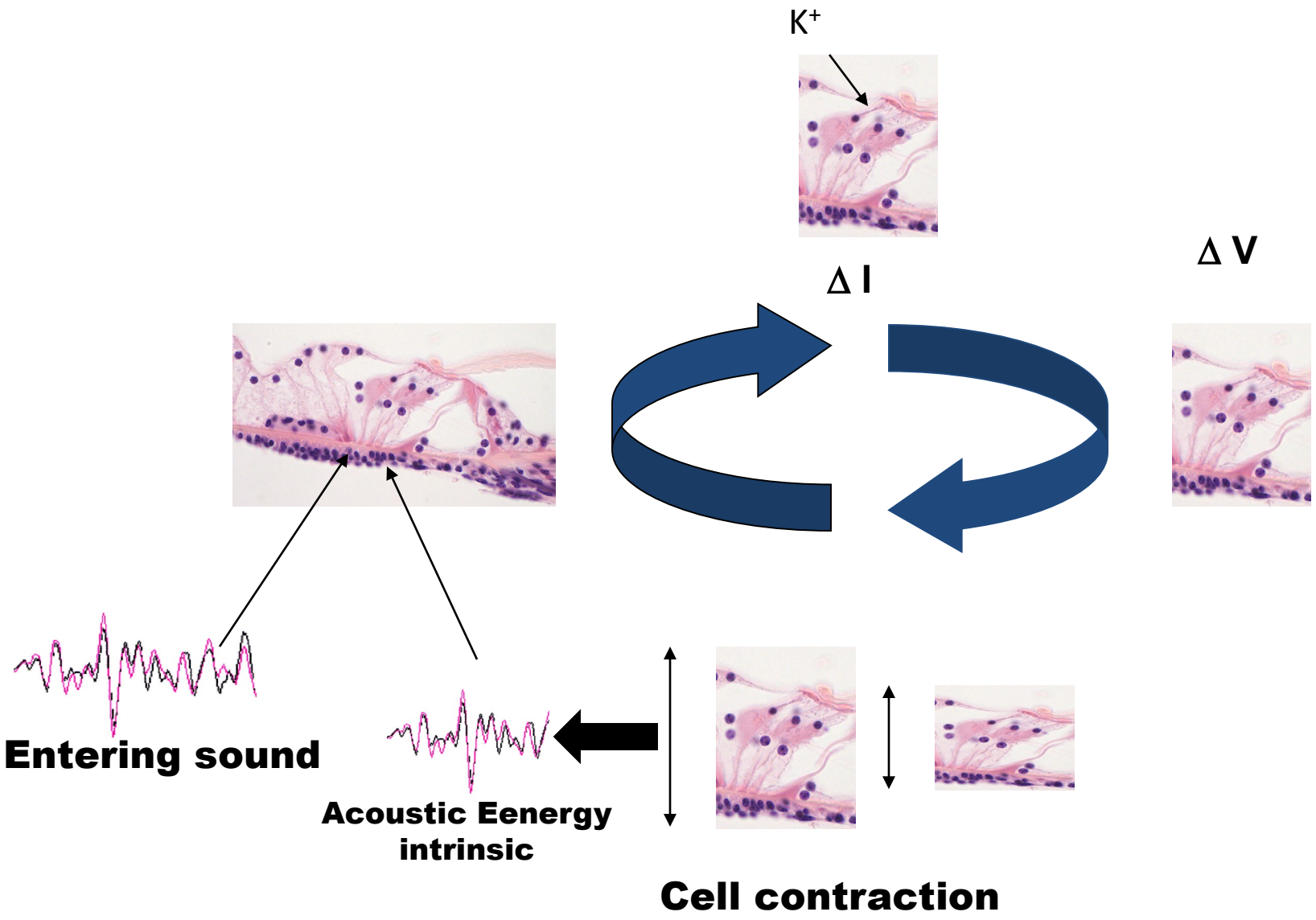


The probability of opening of OHCs' transduction chanels is a sigmoid curve (Boltzmann)

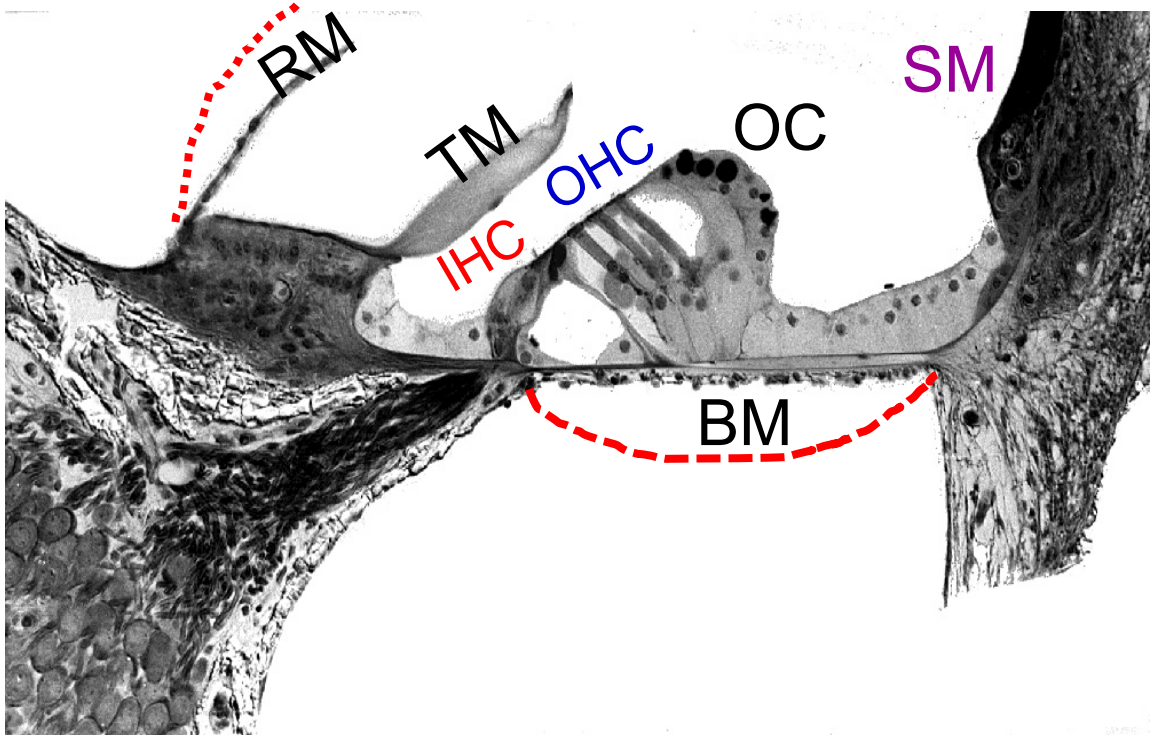
OHCs' work is max when OP is centered (opening probability: 50%)



The cochlear feed-back loop



2. typical mechanical disruption of cochlear l'homeostasis: endolymphatic hydrops



pressure ➔increase of mechanical impédance, phase shift of the responses

organe of Corti deformed with perturbation of OHCs' stereocilia bundle ➔ **acoustic phase shift**

Buki et al. Hear Res 1996: Acoustic phase shift in case of elevation of ICP

The same in supine position in MD: Reveal the limits of pressure control

European Annals of Otorhinolaryngology, Head and Neck diseases (2012) 129, e17—e21

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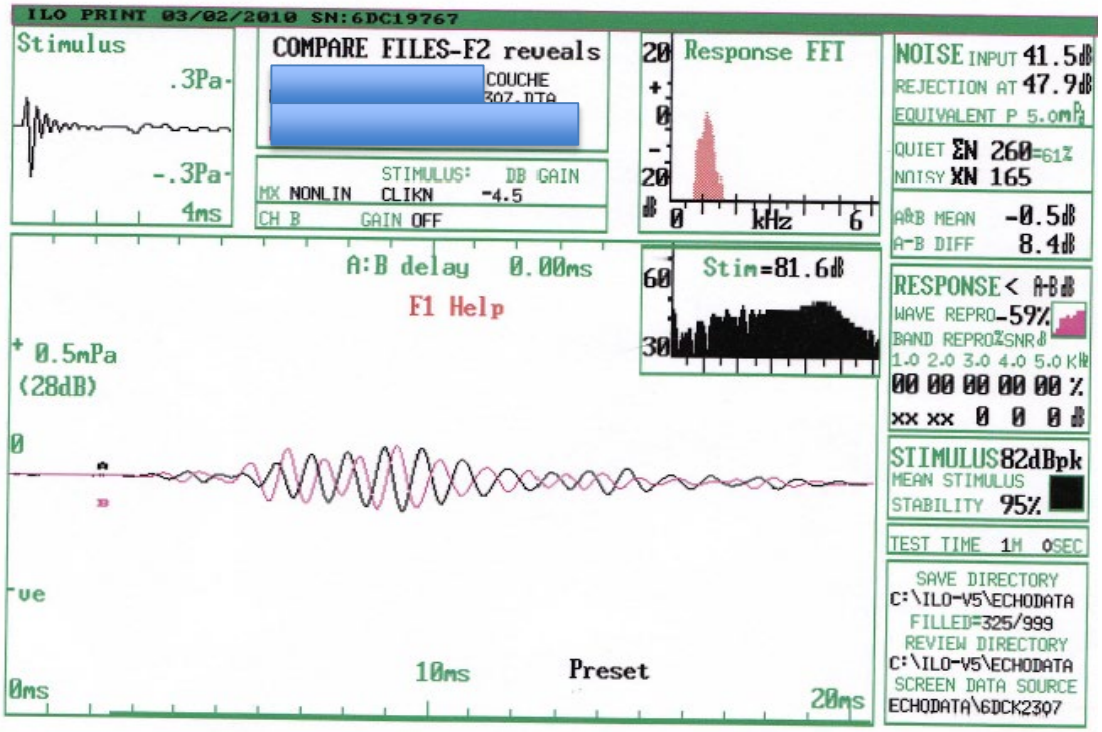
ORIGINAL ARTICLE

Acoustic phase shift: Objective evidence for intralabyrinthine pressure disturbance in Menière's disease provided by otoacoustic emissions

T. Mom[a,*,b], A. Montalban[a,b], A. Bascoul[a,b], L. Gilain[a,b], P. Avan[a,b]



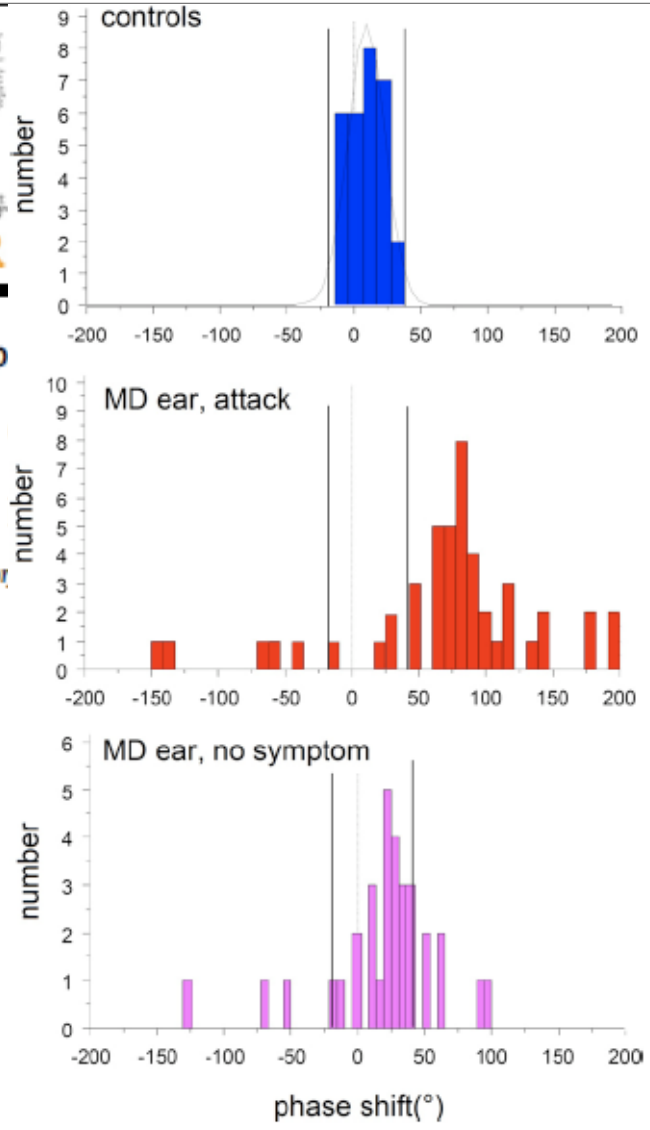
Distortion product- otoacoustic emissions (DPOAEs)

Still present when altered PTA

Real time visualization of DPOAE phase

No Conflict of interest

Hearing Research 277 (2011) 88–95



vailable at ScienceDirect

ng Research

vw.elsevier.com/locate/heares

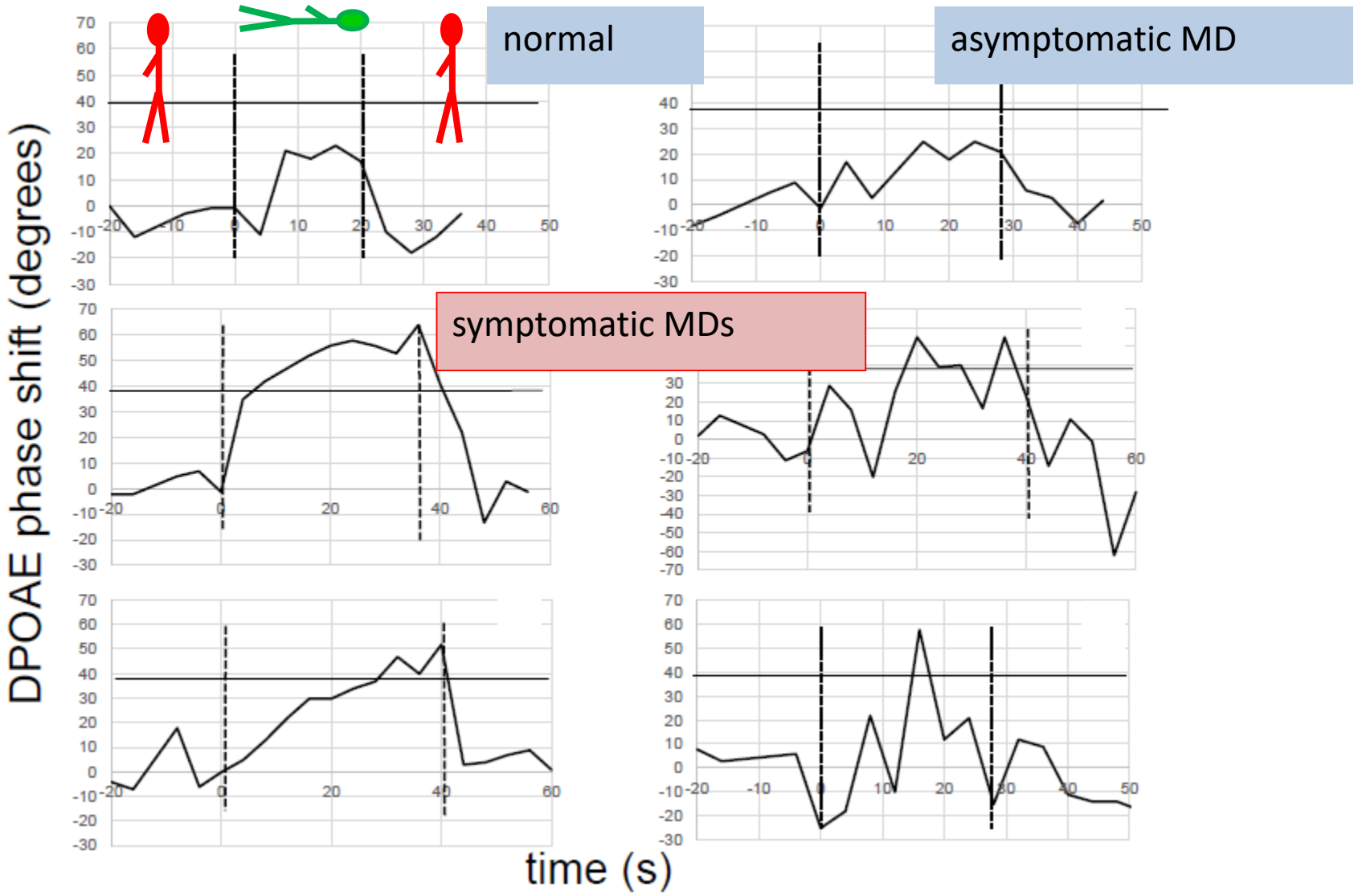
Research pap

Unstable tic emission phase in Menière's disease

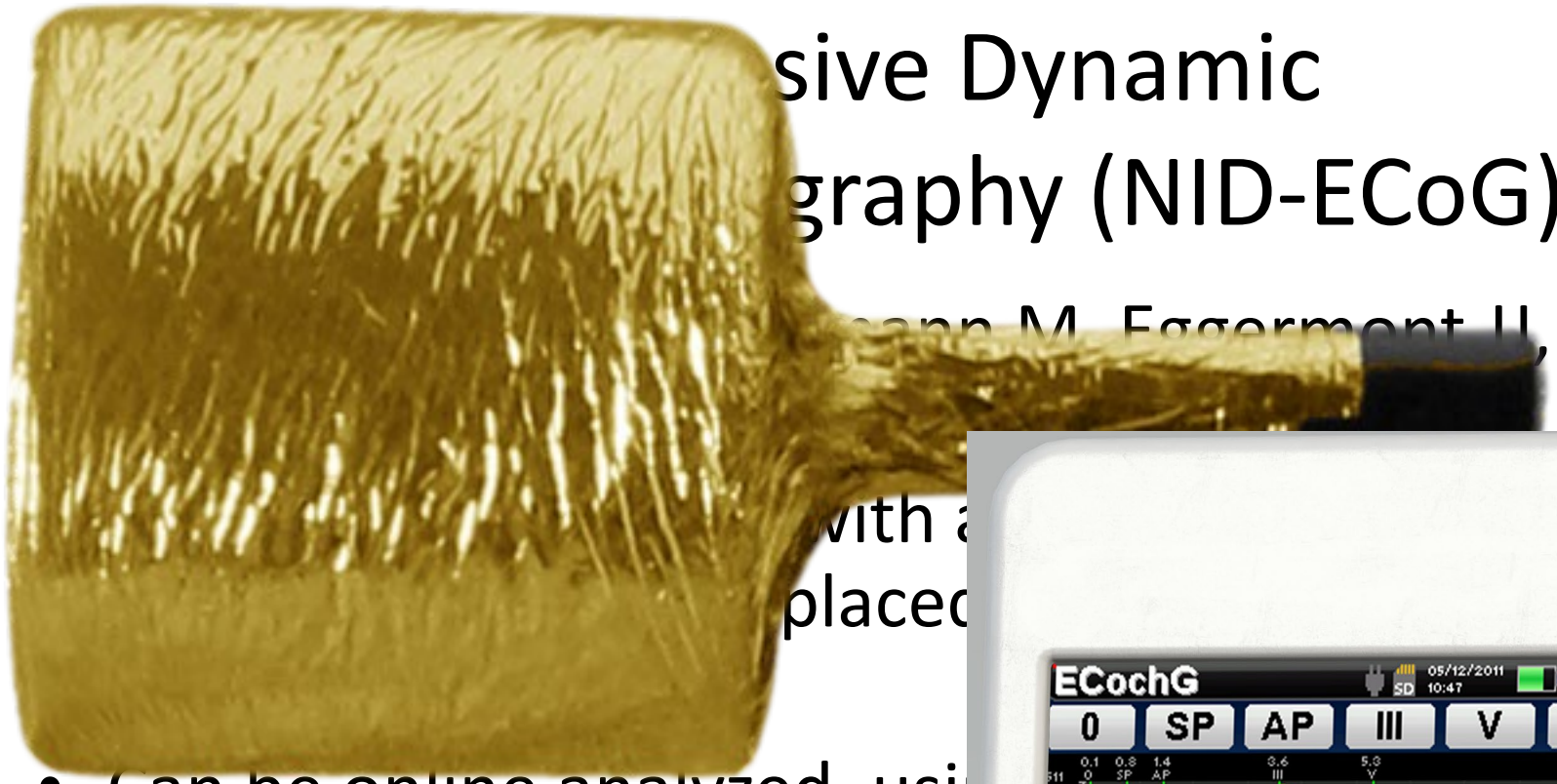
Paul Avan*, , Laurent Gilain, Thierry Mom

Laboratory of Sensor rgne, 63000 Clermont-Ferrand, France

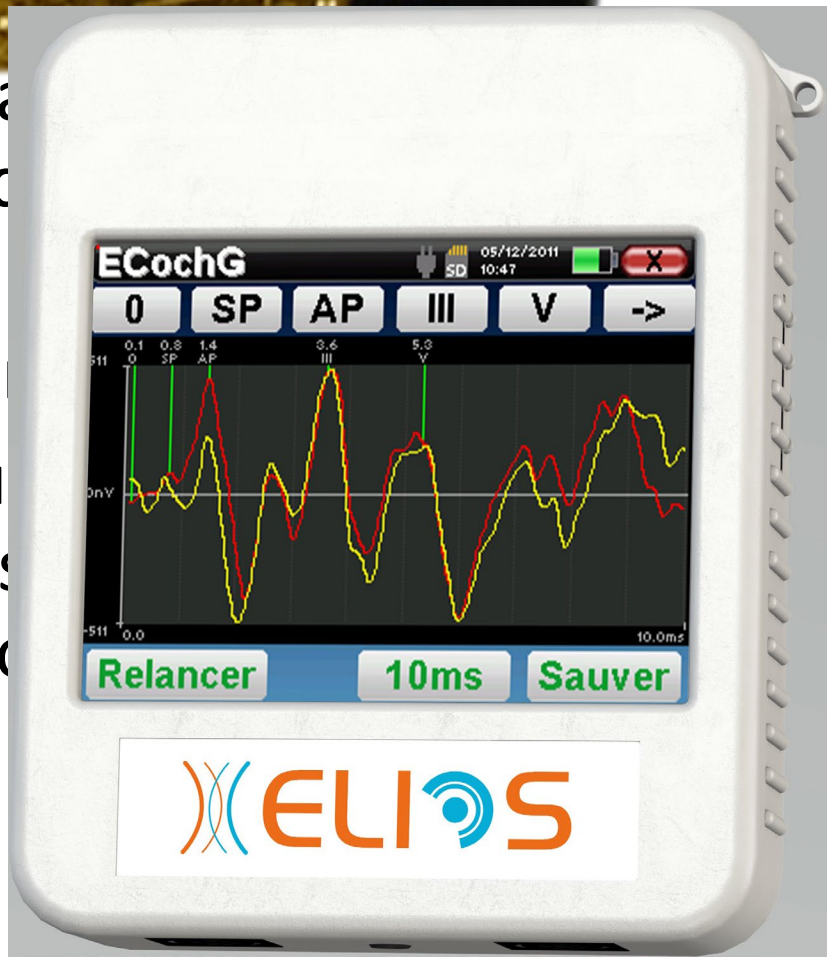
DPOAE phase shifts



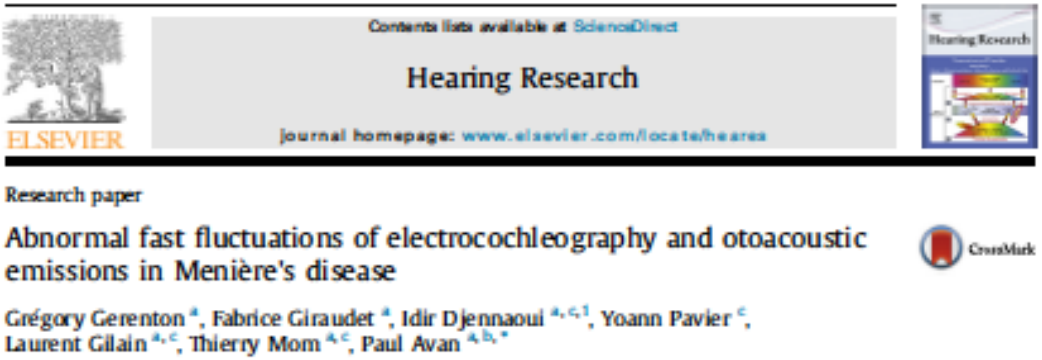
sive Dynamic
graphy (NID-ECoG)



- Can be online analyzed, usi
- The two techniques (Acou
  EcoG) can detect transient s
  postural- induced changes
  due to hydrops



Combination of acoustic phase shift And ECoG With online analysis



Contents lists available at ScienceDirect

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Research paper

Abnormal fast fluctuations of electrocochleography and otoacoustic emissions in Menière's disease

Grégory Gerenton [a], Fabrice Giraudet [a], Idir Djennaoui [a, c, 1], Yoann Pavier [c], Laurent Gilain [a, c], Thierry Mom [a, c], Paul Avan [a, b, *]

Patients during a MD crisis

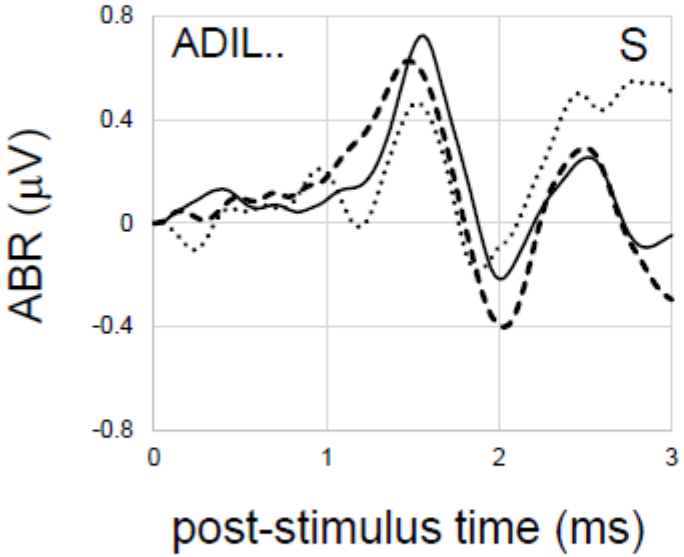
n = 73,
Definite disease

➔ DPOAE / postural test

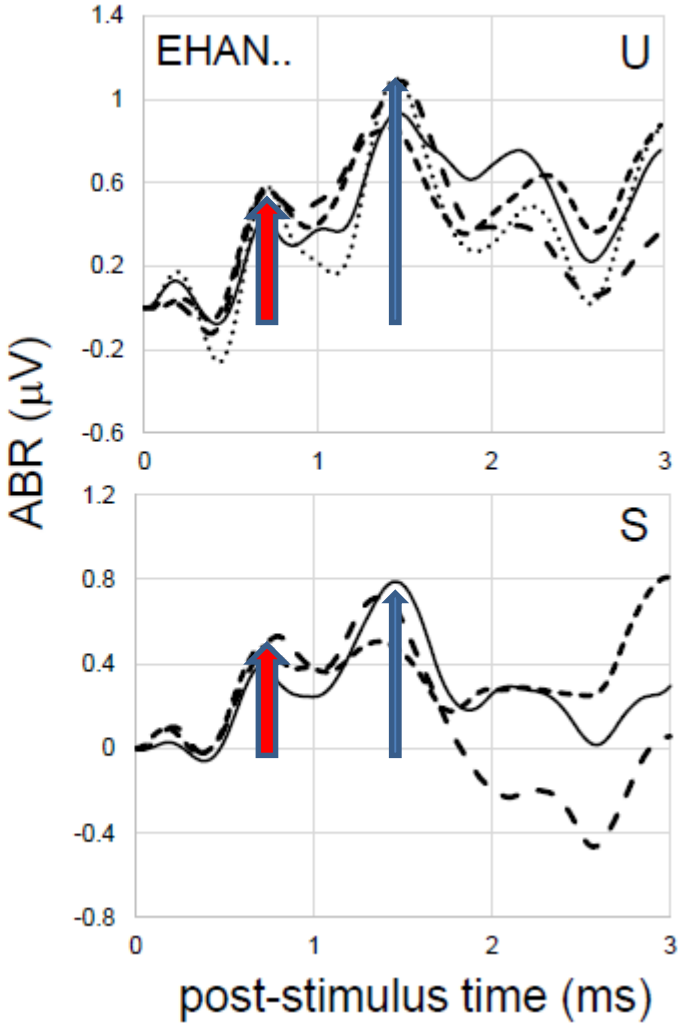
➔ ECoG intrameatal electrode / postural test

SP/AP
(500 clics, 17/s)

control



In crisis



symptomatic ears (n=40)		DPOAE phase shifts		
		stable normal (n = 10)	stable excessive (n = 14)	**unstable** (n = 16)
ECoG (SP/AP)	stable normal (n = 16)	2	7	**7**
	stable excessive (n = 11)	3	5	**3**
	unstable (n = 13)	**5**	**2**	**6**

unstable = switching from normal to excessive or back

short-term instability (23 of 40 ears)
Increase the sensitivity

Multifrequencial Admittancemetry V. Darrouzet et V. Franco-Vidal (Bordeaux)

- AMF: global change of hydraulic pressure modifying the impedance of the system: tympanic membrane-ossicular chain-inner ear

- AMF: Can be collected even in case of severe to profound hearing loss, if middle ear and tympanic membranes are healthy (no tubes)]
- Admittance, inverse of acoustic impedance, reflects the ability of the system to be mobilized by an acoustic pressure
- Two componants: susceptance B (middle ear) and conductance G (cochlea). At 2 kHz, B = 0

Increase of the width of G at 2 kHz (From Franco-Vidal et al 2005)

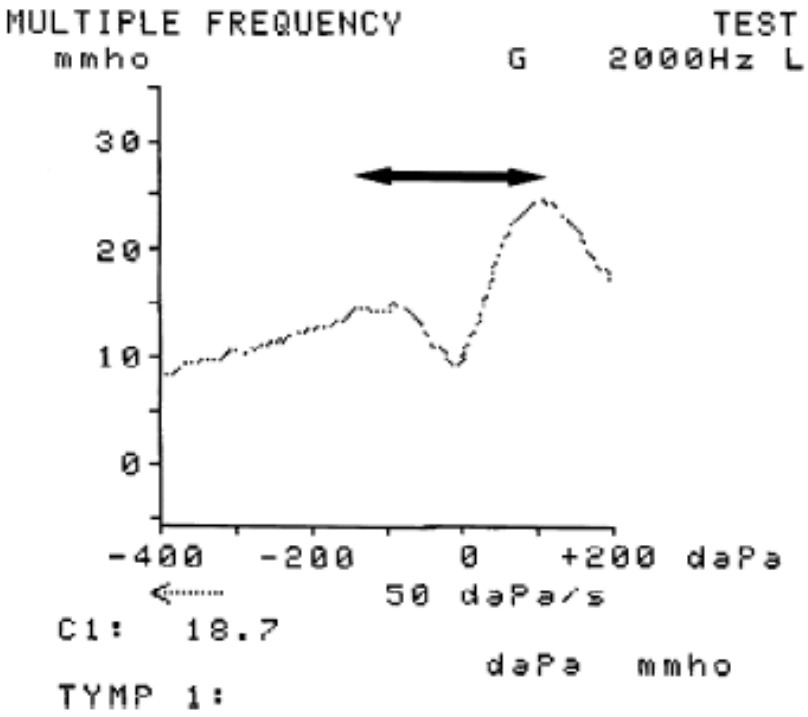


FIG. 4. Positive finding on test of conductance width at 2 kHz with values greater than 235 daPa.

Otology & Neurotology, Vol. 26, No. 4, 2005

SUMMARY
Diagnosis of Menière's disease

- Above all Clinical
- MRI mandatory to rule out tumoral process or central nervous system disease
- In some selected cases, MRI can show a chronic organized hydrops
- When symptoms are lacking: specific tests, i.e. acoustic phase shift, NID- EcoG, admittancemetry

TREATMENT OF MENIERE'S DISEASE

- The recommendation is to **change the lifestyle**, to use the vestibular rehabilitation in the intercritic period and to propose psychotherapy. As a conservative medical treatment of first line, the authors recommend to use **diuretics and Betahistine** or **local pressure therapy**.
- When medical treatment fails, the recommendation is to use a second line treatment, which consists in the **intratympanic injection of steroids.**

PORE AGRESSIVE TREATMENTS AFTER FAILURE OF CONSERVATIVE STRATEGY

- Then as a third line treatment, depending on the hearing function, could be either the **endolymphatic sac surgery** (when hearing is worth being preserved) or the **intratympanic injection of gentamicin** (with higher risks of hearing loss).

- The very last option is the destructive surgical treatment **labyrinthectomy,** associated or not to cochlear implantation or **vestibular nerve section** (when hearing is worth being preserved), which is the most frequent option.

Handicap scale mandatory before decison of treatment (AAO-HNS 1995)

Regarding my current state of overal function, not just during an attack:

1- My dizziness has no effect on my activities at all

2- When I am dizzy I have to stop what I am doing for a while, but it soon Passes,and I can resume activities. I continue to work, drive and engage In any activity I choose without restriction. I have not changed any plans or activities to accomodate my dizziness

3- When I am dizzy, I have to stop what I am doing for a while, but it does pass and I can resume activities.I continue to work, drive , and engage in most activities I choose, but I have had to change some plans, and make some allowance for my dizziness

4- I am able to work, drive, travel, take care of a family, or in engage in most essential activities, but I must exert a great deal of efforts to do so, I must constantly make adjustment in my activities and budget my energy. I am barely making it

5- I am unable to woek drive, or take care of a family. I am unable to do most of the active things that I used to. Even essential activities must be limited. I am disabled

6- I have been disabled for one year or longer and/or and / or I receive compensaton (money) because of my dizziness or balance probem

Change of lifestyle

- Diet
  - Avoid salt, and exciting beverages (Tea, coffee)
  - Sleep well
  - Relax, MBSR
  - Do physical exercise
- More recently:
  - psychotherapy : lower anxiety, improve vestibular readaptation
  - Prescrible vestibular rehabilitation (out of crises)

Conservative treatment

- Bétahistine: High doses (up to 100 mg:j) if possible (stomachacke)
- Diurétics:
  - Low doses
  - Beware of contraindications
- Ventilation tubes +/- MENIETT:

TransTympanic -steroids

- Corticoïdes:
  - Dexamethasone (4mg/mL ou méthyl prednisolone 62,5 mg/mL): DXM is the more used
  - Aimed at releving the intralabyrinthic cause of the disease Should be effective on all symptoms theoretically
  - Non ototoxic

TT – steroids (TT-S)

- Garduno Anaya MA et al. 2005: clinical prospective randomized controlled trial. 5 d TT-S vs placebo.
  - best control on vertigo at 2 years with DXM.
  - Lower hearing loss
- Boleas Aguirre et al. 2008: 91% of control on vertigo with TT-S
  - 37% of cases: 1 injection
  - 20% of cases : 2 injections
  - 14 % of cases : 3 injections
  - 8 % of cases : 4 injections
  - 21 % of cases : >4 injections

Sac surgery

- It is not a suppressive treatment from a functional standpoint
- But it is surgery, that is , invasive procedure.
- Can be really effective
- Very difficult to prove.
- Different techniques: sac decompression, sac opening +/- silastic sheeting, +/- injection of DXM, recently, sac exclusion (Saliba et al, 2015)

Suppressive treatment (High level of evidence)

- TT - gentamycin: very effective on vertigo
  - Mostly irreversible
  - Some patients are refractory
  - Dangerous for hearing
- Evolution towards low-dose protocols protocoles (low-dose, on demand): The ail is not the destruction of labyrinth but the improvement of symptoms

Suppressive treatment (High level of evidence)

- Vestibular neurectomy : very effective on vertigo
  - Irreversibvle
  - Preserves hearing
- Surgical Labyrinthectomy : very effective on vertigo
  - Irreversibvle
  - Postoperative Deafness

Obliteration of lateral semicircular canal
Gentine et al, 2010 Otol Neurotol

- Exclusion of lateral semicircular canal latéral
- Effect on horizontal vertigo
- No relief of aural fullness or other auditory symptoms
- When patients only descrive horizontal vertigo always in the same direction: very effective

CONCLUSIONS

- DIAGNOSIS:
  - FLUCTUATION OF INTRALABYRINTHIN PRESSURE: can be revealed by functional explorations: Acoustic phase shift, NID-ECOG, admittancemetry
  - BE AWARE OF VESTIBULAR MIGRAINE
  - MRI is mandatory to rule out tumors or other intracranial disease
  - Visualizing l'hydrops (MRI)? Beginning but the fluctuations in the first stages of the disease is a main problem

CONCLUSIONS

- TREATMENT:
  - SUPPRESSIVE THERAPY AT THE END/ CHECK CONTRALETRAL STATUS
  - Progressive strategy
    - Lifestyle, psychotherapy
    - Diuretics and betahistine
    - TT-S
    - Sac surgery: vestibular duct blockage interesting
    - Labyrinthectomy and neurectomy when precedent treatments failed, BUT CHECK CONTALATERAL EAR BEFORE