Meniere's diseases

New trends in Diagnosis and Rehabilitation;

Audiologic Perspective

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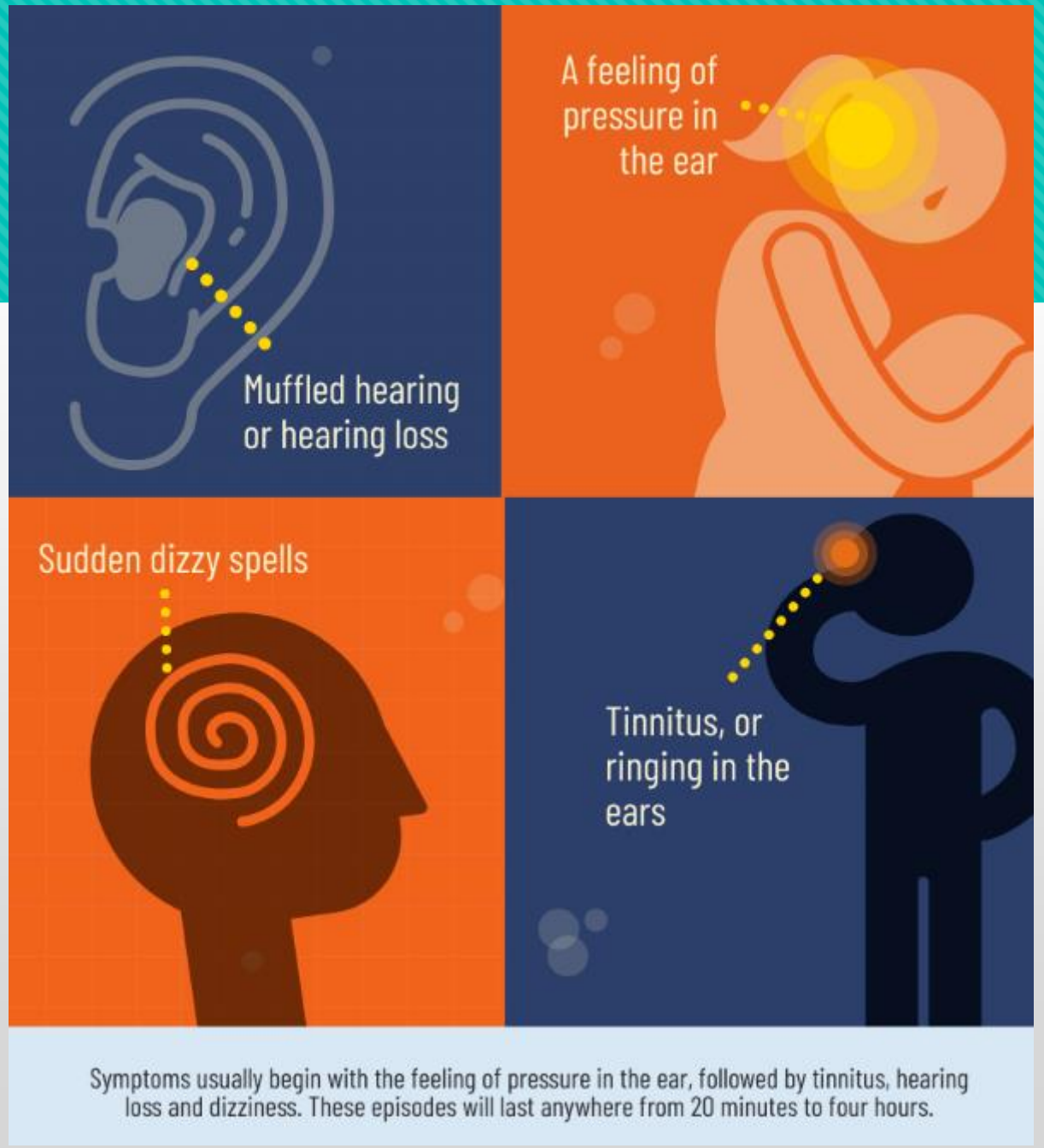
Symptoms And Patophysiolgy

Meniere's disease is characterized by episodic vertigo, sensorineural hearing loss that fluctuates during episodes, tinnitus, and ear fullness.

Most common histopathologic finding is "endolymphatic hydrops" but the exact pathology is unknown. The Committee on Hearing and Equilibrium of American Academy of Otolaryngology Head and Neck Surgery's (AAO-HNS) definition of certain Meniere's disease contains histopathologial confirmation of endolymphatic hydrops



Type of symptoms

Hearing loss

Fluctuating hearing loss, commonly in low frequencies, is the most common audiological finding. In some cases, hearing loss is progressive and is usually unilateral.

Vertigo

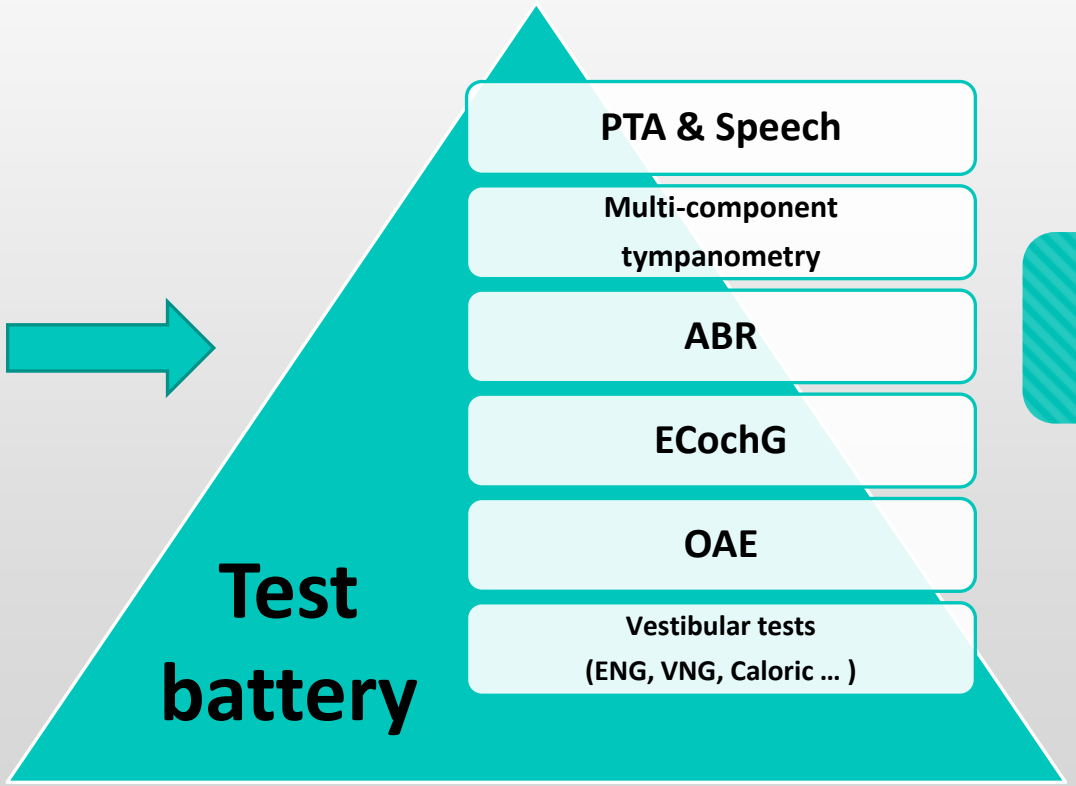
Spontaneous, rotational vertigo that last at least 20 minutes accompanied usually with nausea and vomiting which are the definitive spells of Meniere's disease. During the spell, horizontal or horizontal rotatory nystagmus is observed.

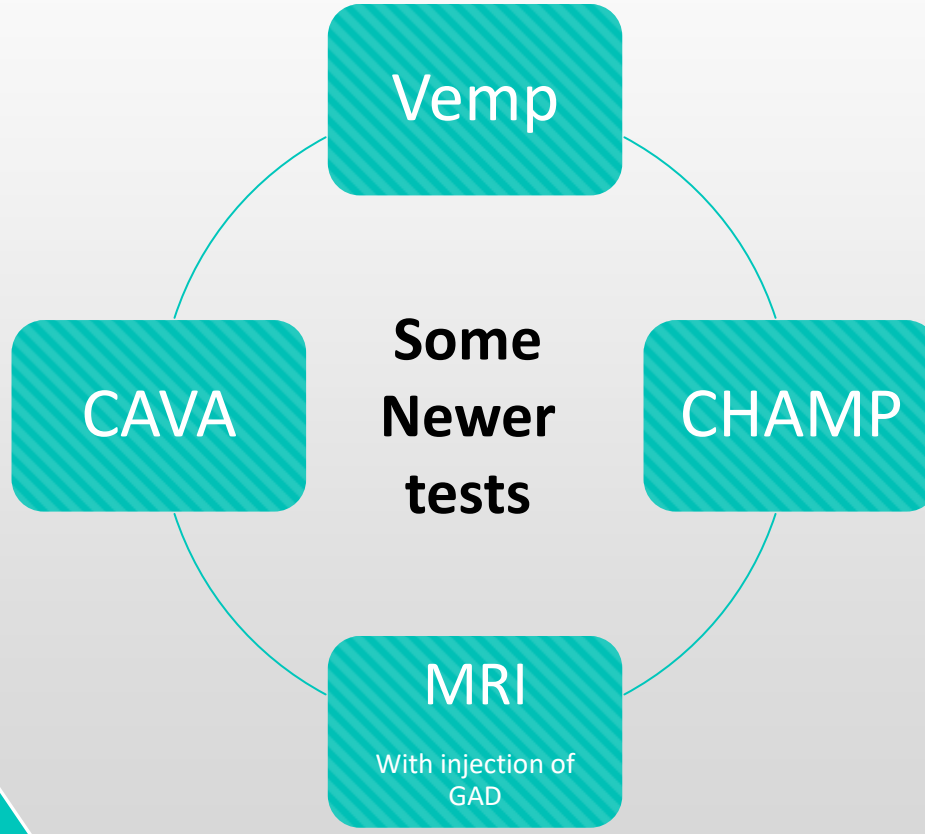
Tinnitus

Tinnitus is commonly of a low-frequency type Sometimes, patients describe it to be localized in affected ear or sense it in the whole head. Patients describe tinnitus differently from each other

Diagnosis

Medical History





Medical history and criteria

Certain Meniere's disease

- Definite Meniere's disease, plus histopathological confirmation

Definite Meniere's disease

- Two or more definitive spontaneous episodes of vertigo 20 minutes or longer
- audiometrically documented hearing loss on at least one occasion
- Tinnitus or aural fullness in the treated ear
- Other causes excluded

Probable Meniere's disease

- One definitive episode of vertigo
- Audiometrically documented hearing loss on at least one occasion
- Tinnitus or aural fullness in the treated ear
- Other causes excluded

Possible Meniere's disease

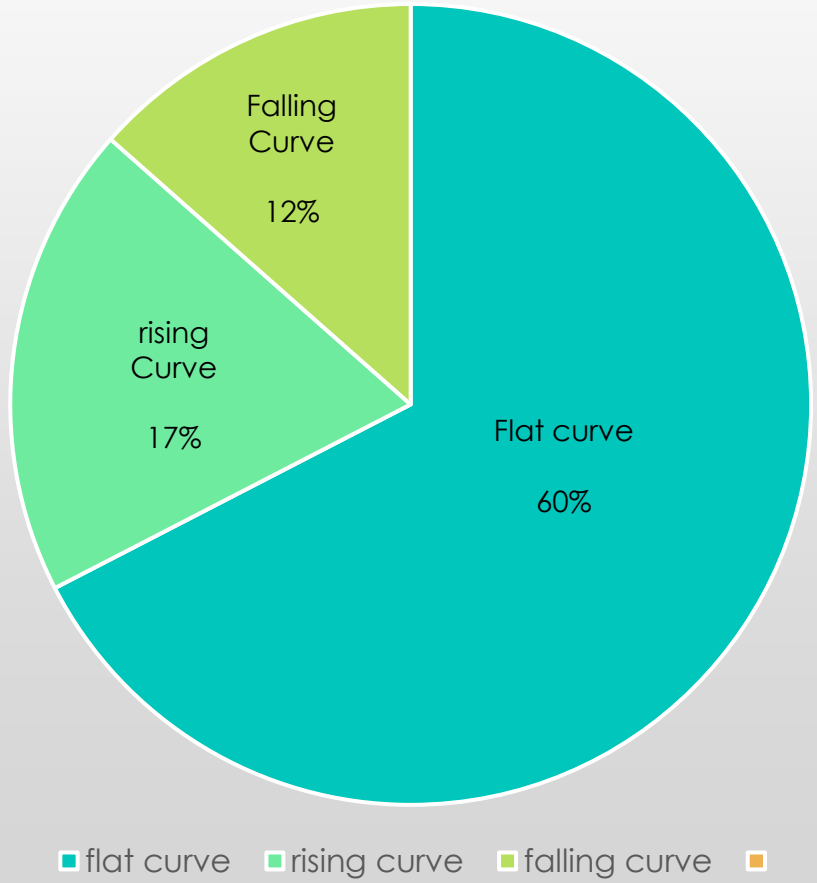
- Episodic vertigo of the Meniere's type without documented hearing loss, or
- Sensorineural hearing loss, fluctuating or fixed, with disequilibrium but without definitive episodes
- Other causes excluded

Test battery

Audiometry

Fluctuation of the auditory threshold was recorded with all types of curves, but was somewhat more common with rising and trough curves.

The average size of the recorded fluctuations was 20–30 dB, this being independent, on the whole, of the frequency range.

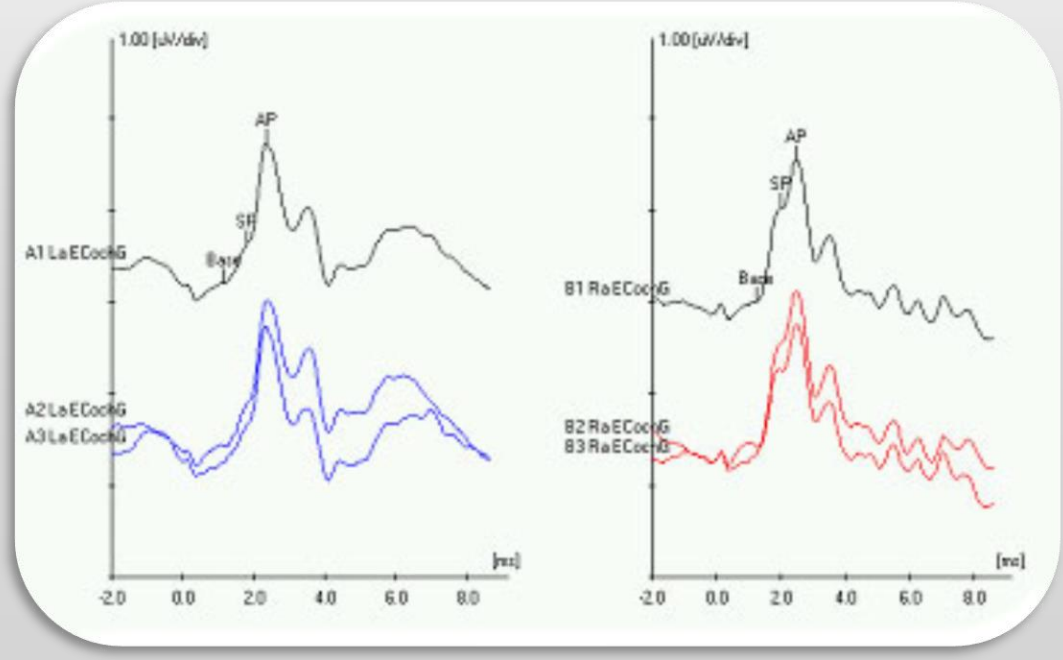


VideoNystagmoGraphy (VNG)

- Eye movements are observed after caloric or vestibular stimulation.
- Caloric response is found to decrease in 48–73.5% of the patients' affected ear, and complete absence is reported in 6–11% of patients

ElectroCochleoGraphy (ECochG)

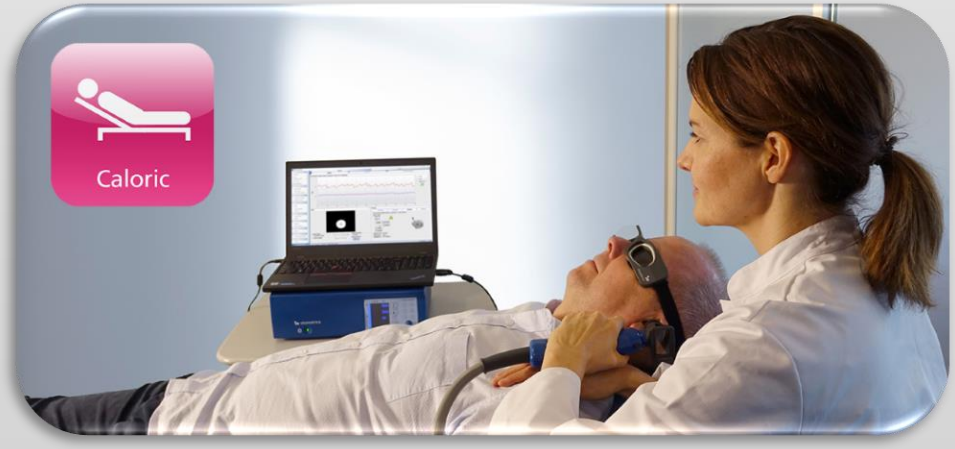
- Summation potentials are larger and more negative in Meniere's disease. Most valuable ratio is summation potential/action potential. SP/AP ratio is found to be increased in Meniere's disease. However, this is not definitive, and only 62% of patients with Meniere's disease have elevated ratios



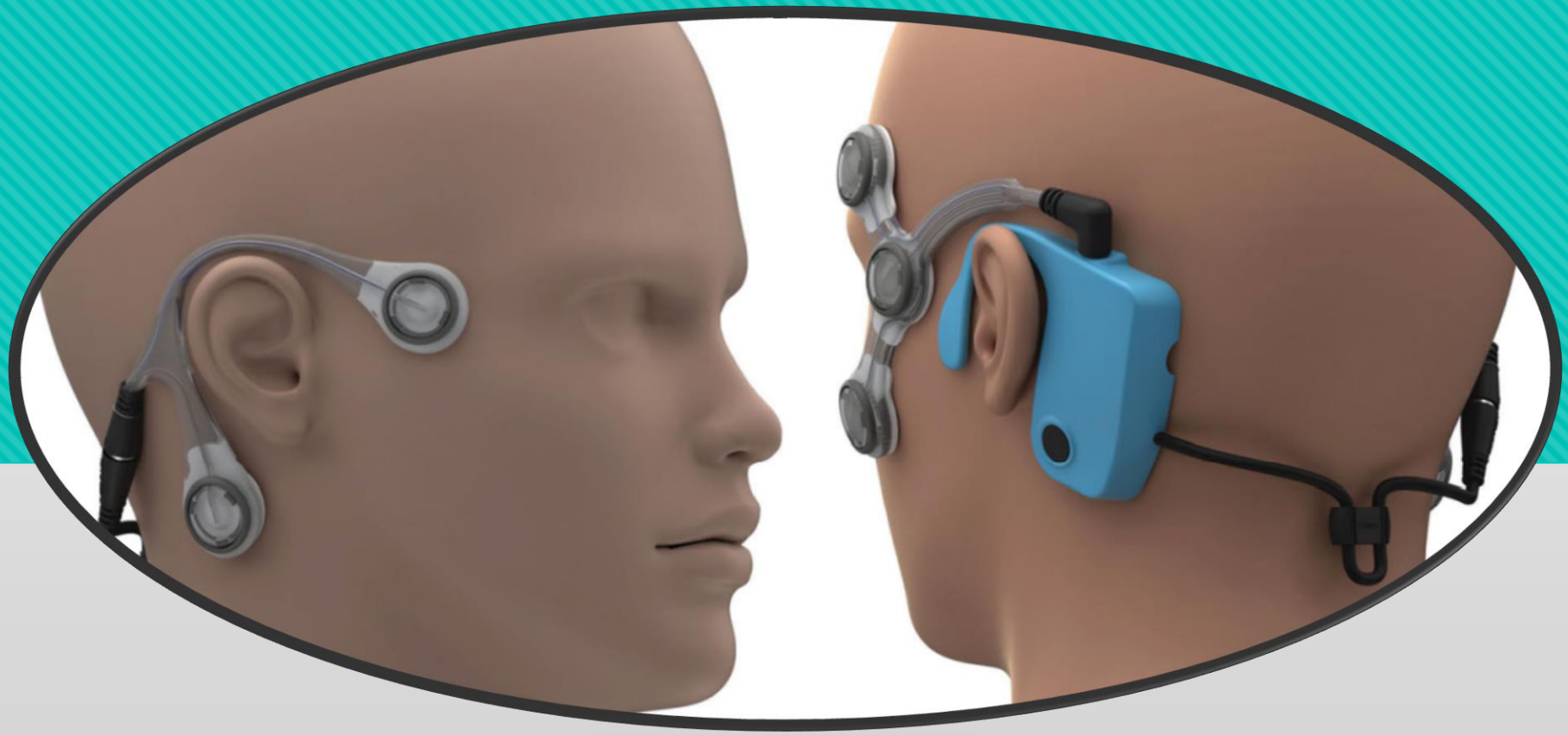
vHIT and Caloric

- The caloric test complements the vHIT in the assessment of vestibular disorders and is most useful in suspected endolymphatic hydrops.

- Asymmetric caloric function in the presence of normal horizontal head impulse tests is most commonly associated with Meniere's disease and may function as a diagnostic marker.



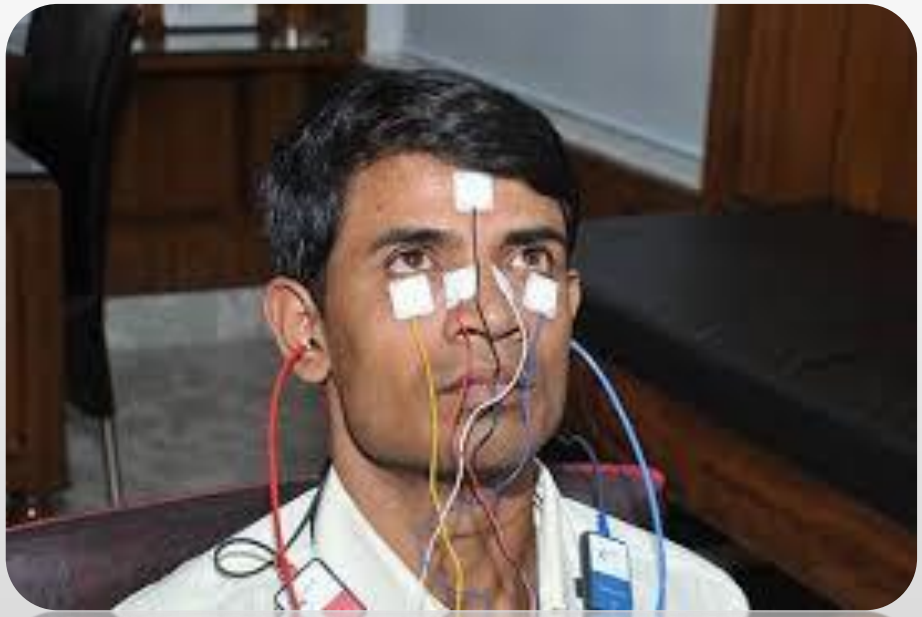
Newer Methods



VEMP

- The vestibular-evoked myogenic potential (VEMP) is a neuroelectrophysiological test that evaluates the otolithic organs of the utricle and saccule
- The addition of cVEMP and oVEMP to the already utilized inner ear testing battery of audiometry and caloric testing could provide a further understanding of the localization, progression, and prevalence of Meniere's disease
- However, VEMPs may also be reduced or absent in vestibular neuritis, benign paroxysmal positional vertigo, and vestibular schwannoma

Ocular VEMP (oVEMP)



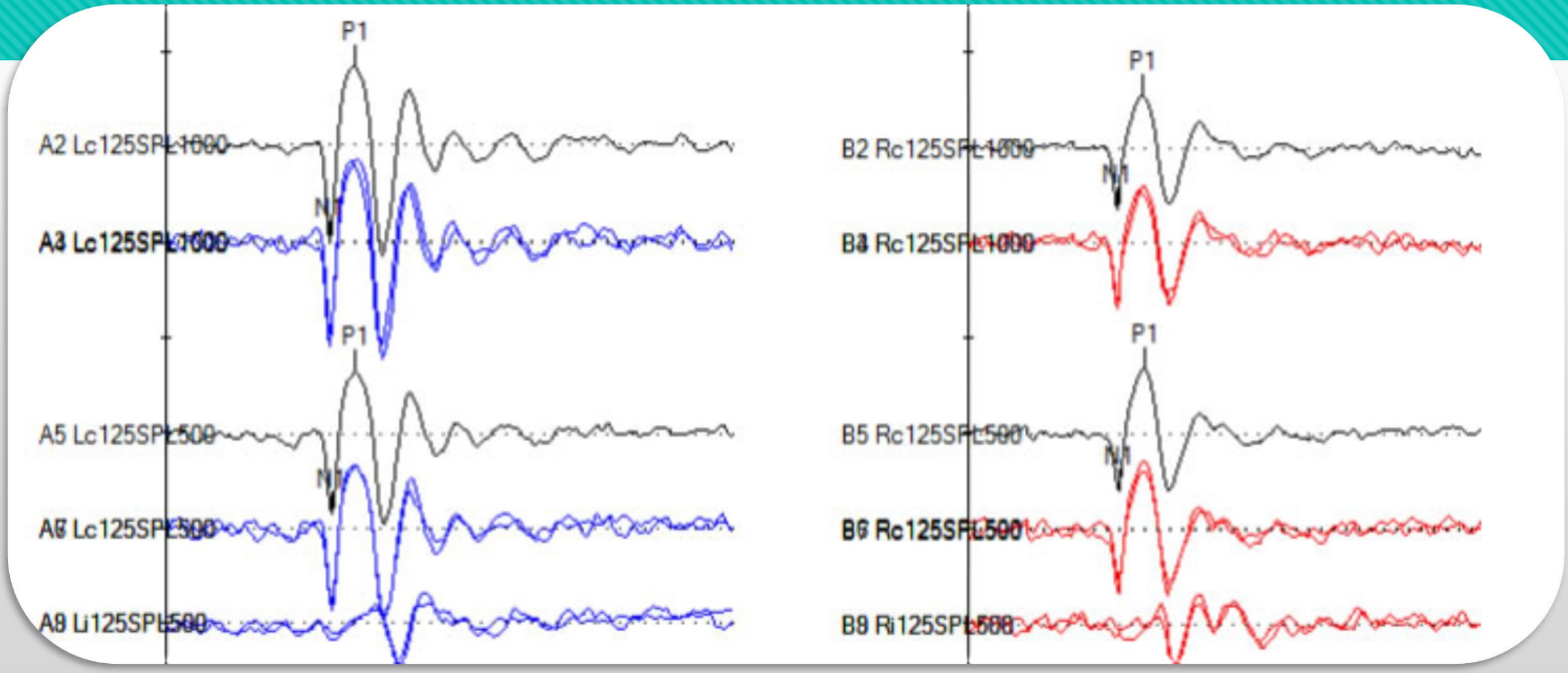
Cervical VEMP (cVEMP)

VEMP results in MD patients

- Winters et al (2011) reported lower amplitudes and thresholds in AC oVEMPs, in MD compared to normal controls. Johnson et al (2016) reported that Meniere's patients exhibit elevated thresholds in the affected ear compared with the unaffected ears, but not with controls. There were a number of other puzzling findings. Overall, they concluded that there was overlap in results from Meniere's patients compared to normal controls. This seems very reasonable.

- Winters et al (2011) suggested that oVEMP in Meniere's patients generally showed lower amplitudes and higher frequencies than normal subjects, and also that the best stimulus in MD patients was 1000 Hz.

- Their main role is to diagnose other illnesses that might be confused with Meniere's, and possibly to predict whether gentamicin injection for Meniere's was effective.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A5 Lc125SPL500
N1
A6 Lc125SPL500
A8 Li125SPL500
P1
B2 Rc125SPL1000
N1
B3 Rc125SPL1000
P1
B5 Rc125SPL500
N1
B6 Rc125SPL500
B8 Ri125SPL500

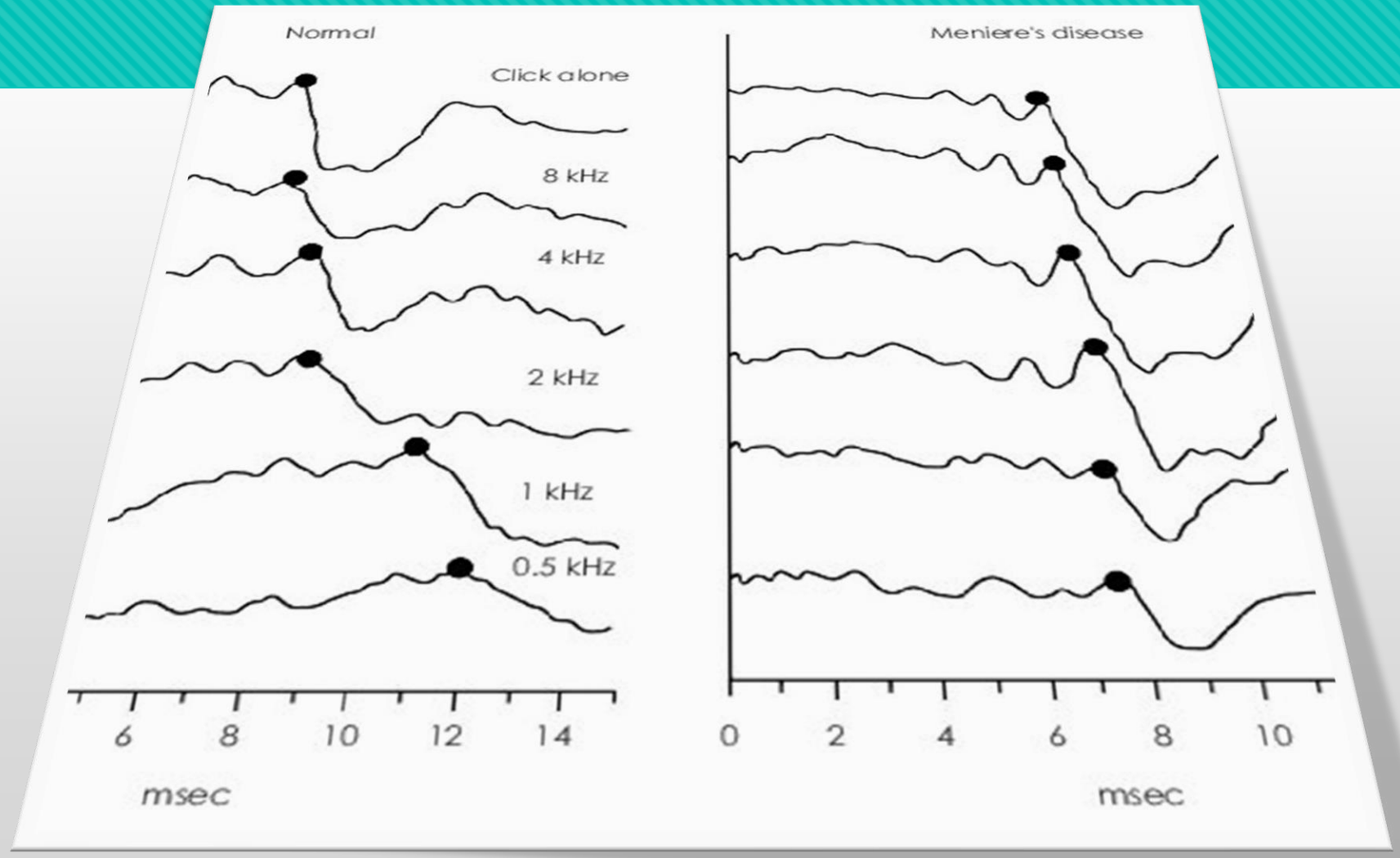
CHAMPs

cochlear hydrops analysis masking procedures

- CHAMP is an auditory brainstem response (ABR) test that is masked at different frequencies with high-pass noise masking. The latency of wave V of the ABR is used as the criteria to determine a normal or abnormal CHAMP result.

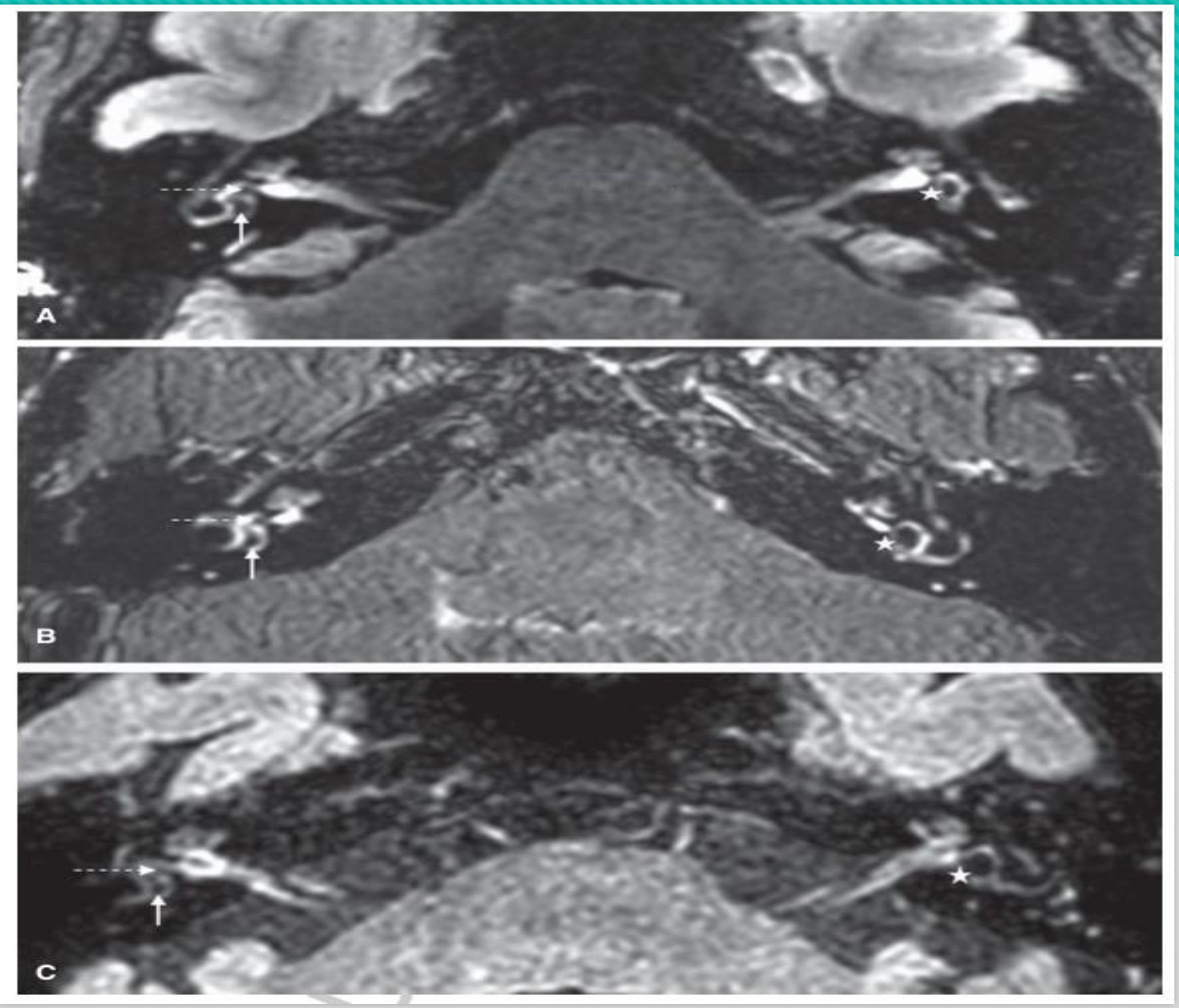
- Normal groups would display a prolonged latency delay in wave V, whereas Meniere's disease groups would display a shortened latency delay in wave V

Comparison between normal and MD patient cases

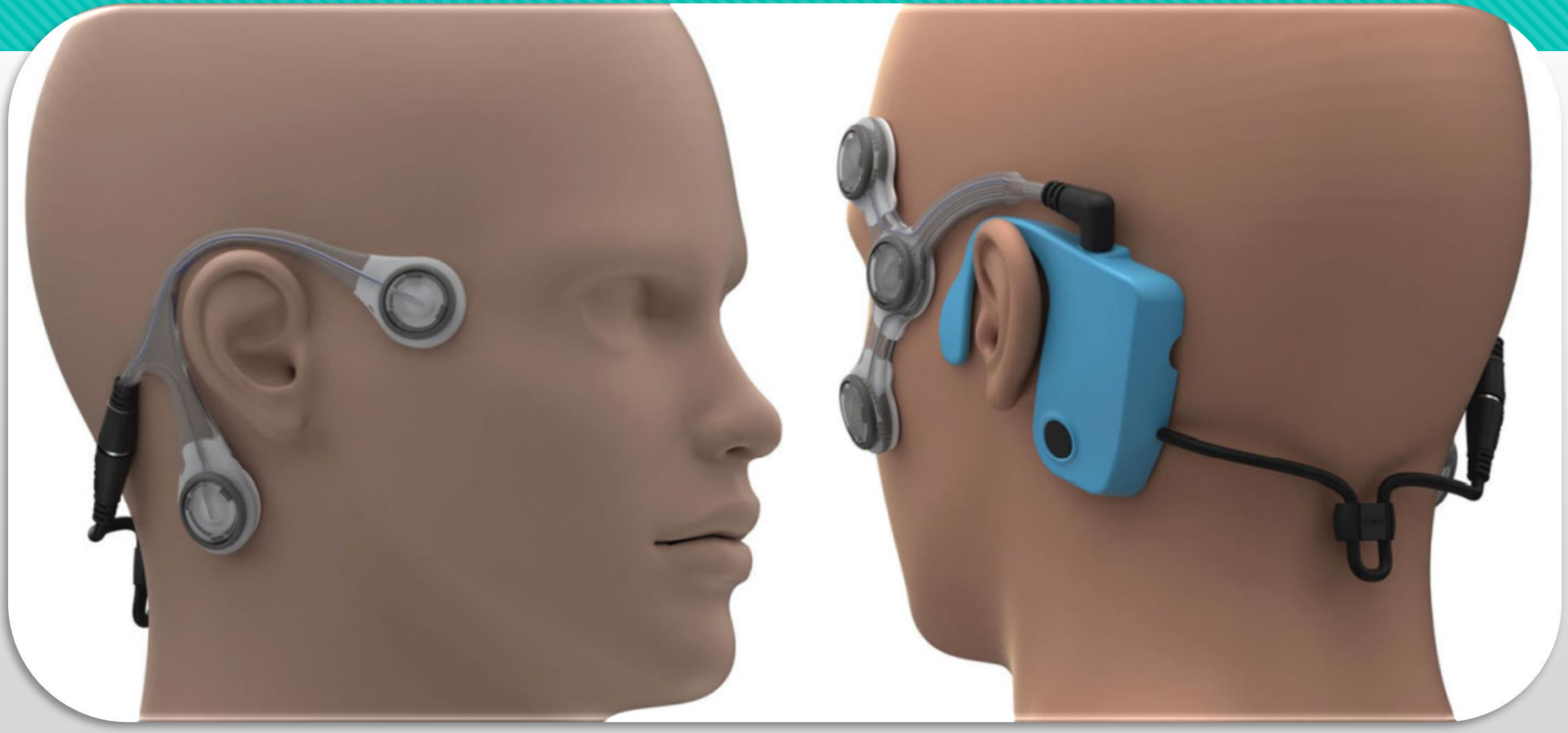


MRI with injection of Gadolinium

- Imaging studies such as MRI with gadolinium (Gad) contrast has been predominantly used in the past to exclude retro cochlear disorder, such as a vestibular schwannoma for symptoms of Meniere's disease.
- In the recent years, several published studies have shown reduced or absent perilymph enhancement in patients with Meniere's disease 24 h after intratympanic injection of Gad with three-dimensional fluid-attenuated inversion recovery (3D FLAIR) sequence MRI
- MRI with intratympanic injection of Gad was more sensitive at diagnosing Meniere's disease compared with ECochG.


A
B
C

CAVA system



- it is currently impossible to predict when an attack will occur and to put in place instrumentation to make appropriate measurements. The attack often doesn’t occur in visit time and doesn’t give opportunity to clinician for diagnosis.
- **There is recently a new device called CAVA that solved this problem**.

- The system is composed of a piece of wearable technology plus the algorithms necessary to assess the data recorded by the device. Further detailed information regarding the system is available elsewhere.
- the device uses electrooculography for near-continuous monitoring of horizontal and vertical eye movements and also records three-dimensional head accelerations.

- The device data showed clear evidence of nystagmus during the period indicated by the patient—see. We performed an automated computer analysis of the data collected by the device, which was then validated and corrected by a Consultant Clinical Scientist with a special interest in balance disorders.
- The data captured by our device has given us a unique insight into the mechanisms at play within the vestibular system during an acute Meniere's attack. The device captured the data from a full attack that took place in the patient's home: a clinician was not present during the attack.


4220
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Treatment and rehabilitation

Rehabilitation of Vertigo in MD

- The success of rehabilitation depends on the patient
- First step of a successful rehabilitation program is education of the patient
- Each patient is unique, and their characteristics, mental status, and understanding capacity differ between each other
- It is also important to correct the patient if they were misinformed

- Some protective advices should be given to the patient to be performed during the attack. Instead of panicking over symptoms, they should be advised to stay calm and sit or lie down in order to prevent themselves from further injuries.

- When the attack subdued, refractory effects could continue to debilitate the patient. The patient should be advised to avoid any sudden movements. In order to minimize the effects on their personal lifestyles, some modifications should be advised like performing daily activities, sitting instead of standing while cooking, dressing up, etc.
- In order to prevent patients' social isolation, patients should be encouraged about informing their social circle about their condition.

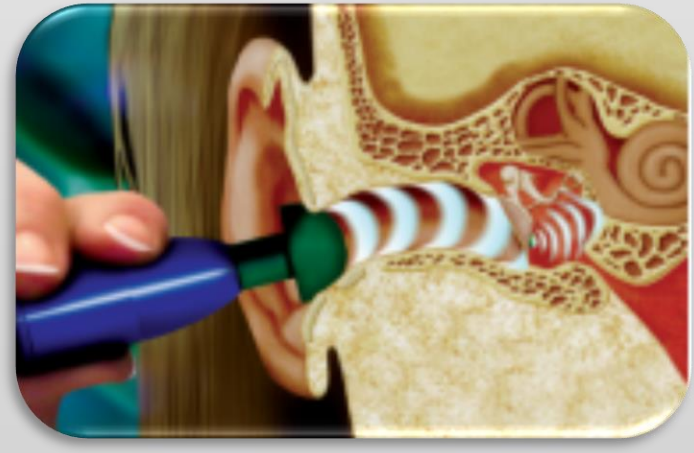
It helps patients to overcome their fear to be in public, helps them to use visual object to train their vestibulo-ocular system

Tinnitus

- treatment should focus on counseling, auditory stimulation and cognitive behavioral therapy
- cochlear implants have been indicated for alleviating tinnitus, with encouraging results
- One study evaluated the effects of cochlear implants in patients with severe sensorineural hearing loss and Meniere's disease.
- Tinnitus distress, evaluated by the Tinnitus Handicap Inventory (THI) questionnaire, was significantly reduced in patients with MD (14 points decrease 6 months after the implantation, $p = 0.002$)

Menniete Device

- The Meniette device is a minimally invasive form of therapy in which pressure pulses are delivered to the ear through a small device following placement of a tympanostomy tube in the tympanic membrane.
- These pressure changes are thought to help stimulate the flow of endolymph, which can result in a reduction of vertigo symptoms.
- Studies have shown that up to 67% of patients report an improvement in symptoms at 2 years, while longer term studies have shown a success rate of up to 58%.



Changes in Life Style

- A fairly high correlation of seasonal allergies exists in patients diagnosed with Meniere's disease, and studies have shown a significant decrease in vertigo symptoms for these patients after implementing allergy-avoidance behaviors and/or starting immunotherapy for allergies.

- Other lifestyle changes, such as limiting caffeine, chocolate, alcohol, and salt, have been effective in reducing vertigo attacks. Patients diagnosed with Meniere's disease are typically counseled to adopt a low-salt diet (1,500–2,000 mg per day), and some are also started on a diuretic

Hearing Aid and Tinnitus

- To improve thresholds in fluctuating hearing loss
- Rehabilitation of tinnitus

- advantages offered by digital signal processing
- using directional microphones and assistive listening devices to improve speech recognition in noise
- using wireless hearing aids as well as the bone anchored hearing aid
- counseling patients on the realistic expectations from amplification
- using multiple programs for patients with fluctuating hearing loss
- offering suggestions on programming the frequency-gain/output response for a rising configuration

Thanks For Your Attention

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شنوا

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