

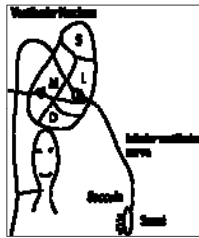
## Vestibular Evoked Myogenic Potential (VEMP) Testing

### VEMP testing basics

- Exciting new evoked potential test – of Vestibulo-Collic Reflex (VCR)
- Present loud tone bursts in one ear
- Record from contracted neck or other muscles

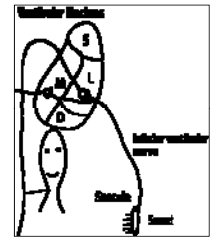
### VEMP central dogma

- Tone bursts excite saccule
- Saccule excites LVN
- VN inhibits muscle tone in postural muscles via VST
- Response triggered averaging picks up inhibition

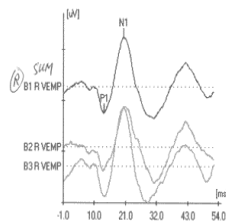
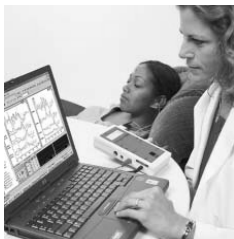


### VEMP Recording Method

- SCM . activated through contraction
- high-level acoustic stimulus (500 hz tone burst) presented 5/sec
- Surface EMG is averaged for 200 presentations (40 seconds)

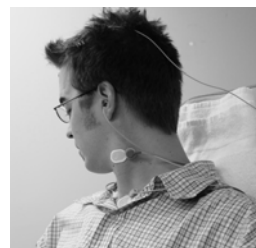


### VEMP in practice About 1 min to get a VEMP



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### Typical Electrode Array



- Non-inverting electrode at the midpoint of the SCM .
- Inverting electrode at sternoclavicular junction
- Switching inv/non-inv inverts polarity.
- Ground electrode on forehead

## Bilateral SCM m. Activation

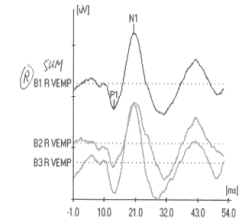
Better and safer than head-turn method

1. Bilateral recording/monaural stimulation
2. Same SCM activation both sides – 2 channel makes sense !
3. Tone bursts at 500 Hz
4. 1 run with head resting, 2 runs each side head lifted

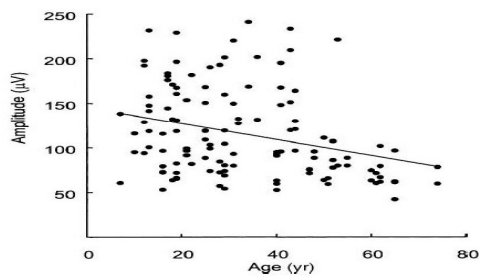


## VEMP measurements

- Amplitude ratio (use same formula as for calorics)
- Latency of p1 8-18 (check just to be sure you really have a VEMP)
- Norms for amplitude:
  - Lower limit > 70
  - No upper limit (usually < 600)
  - Asymmetry < 33 %



## VEMP amplitude is reduced with age

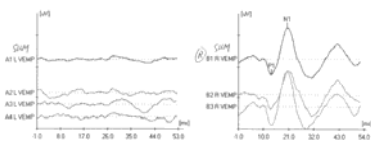


VEMP amplitude to clicks, as a function of age, from Su et al (2004).

## VEMP utility in diagnosis

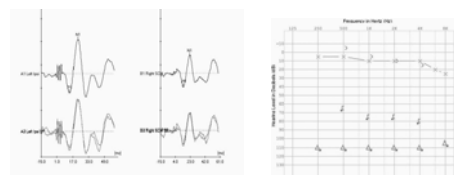
- Hearing loss – distinguishes between conductive, sensorineural
  - Conductive -- obliterated
  - Sensorineural -- preserved
- Vestibular loss
  - UL – usually normal
  - Bilateral – obliterated in gentamicin
- SCD - usually increased
- Menieres disease – sometimes up, sometimes down.

## Abnormal VEMP in Conductive Hearing loss (absent one side)



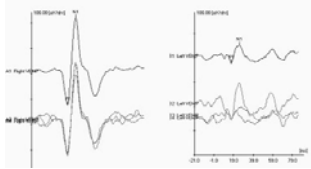
- Corollary – mixed hearing loss should obliterate VEMP, conductive hearing malingers should have VEMP

## VEMP in Sensory hearing loss (modestly reduced)



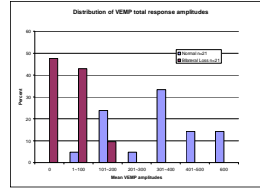
- Corollary – sensory hearing loss should have VEMP, does not help with malingering.

## Abnormal VEMP in Vestibular neuritis (Ramsay Hunt)



- Don't rely on this – this is an exception.
- Poor correlation between Caloric and VEMP.
- VN – usually superior division ?

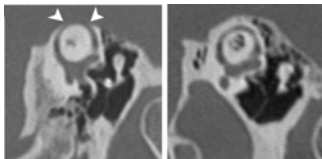
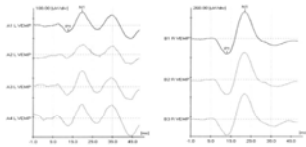
## Abnormal VEMP in Bilateral Vestibular Loss



The mean VEMP amplitude (left+right/2) in 21 patients with bilateral loss of all causes was 29 +/- 46.8 uV (range 0-168.8) compared to 341 +/- 154 uV (73.4-628.4) in normal subjects (p<0.0001, t-test). In the subset of 11 patients with gentamicin ototoxicity, the mean amplitude was 20 +/- 28.1 uV (range 0-74), p<0.001 vs. normal subjects

- Reliable method of detecting gentamicin ototoxicity
- Hain et al, ANA meeting, 2007

Superior canal dehiscence (giant on one side). Both potentials should be at least normal in amplitude.



## VEMP: Bottom Line

- New test of vestibular function. Adds one more receptor (sacculle)
- Hearing
  - Sensitive to conductive hearing loss
  - Insensitive to sensory hearing loss
- Vestibular
  - Good test for bilateral vestibular loss
  - Bad test for vestibular neuritis (because inferior nerve not affected in most VN)
- Good test for Superior canal dehiscence