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Audiology Grand Rounds:

A Week at Henry Ford Hospital

Day 1: Diagnostics



Henry Ford Health System: The Institution



- Founded in 1915 by Henry Ford
- Over 18,000 employees
- 1,200 Medical Group Members
- 6 hospitals
- 25 outpatient centers
- Over 3.1 million outpatient visits annually
- Over 15,000 appointment slots per day
- 17 audiologists at 4 sites



Henry Ford Health System: History of the Audiology Program

RESULTS WITH THE CHISELS IN STAPES
MOBILIZATION.⁶

HAROLD F. SCHUKNECHT, M.D.,⁷
A. BRUCE GRAHAM, Ph.D.,^{8,9}
and
MARY ROSE COSTELLO, Ph.D.,^{9,9}
Detroit, Mich.



- History of clinical education
- History of research
- History of collaboration with otolaryngology
- History of ENT Residency training



Henry Ford Health System: Audiology Clinical Education

- Fellows/Externs since 1980s
- Wayne State U affiliation since 2010



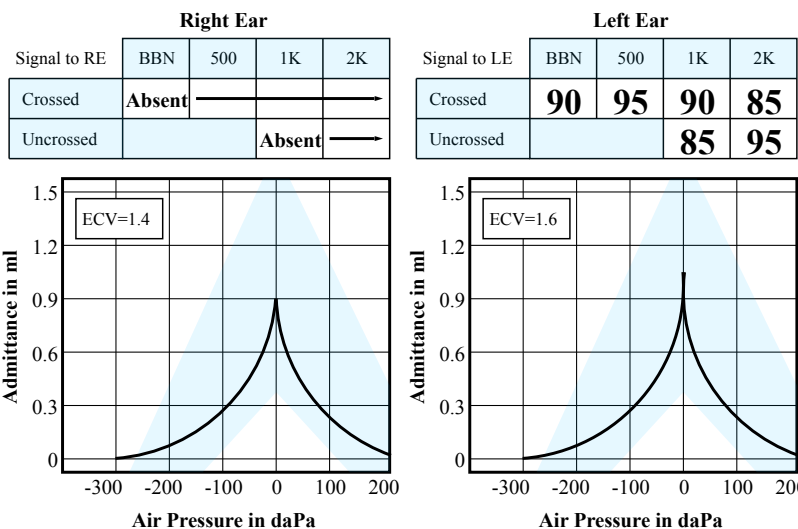
Report of a Case

Case: A

- Age: 34 years Sex: Male
- History:
 - 3 years prior
 - Right-ear tinnitus following mild head trauma
 - Numbness over helix
 - Symptoms diminished gradually
 - 2 weeks prior
 - Numbness over right ear
 - Slight, constant right ear tinnitus
 - Sudden, mild right ear hearing loss

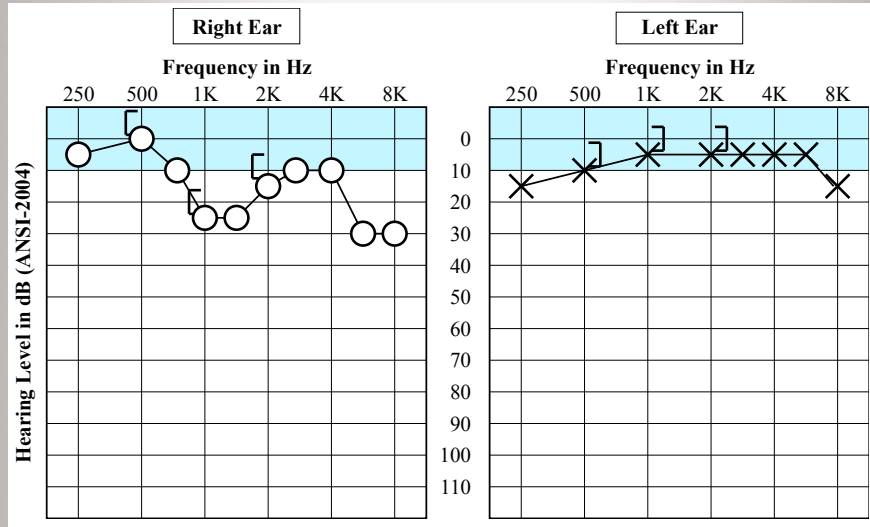


Case: A Age: 34 years Male



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Case: A Age: 34 years Male



Case: A Age: 34 years Male

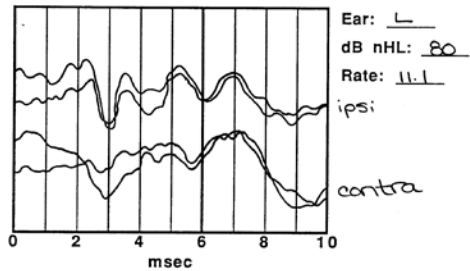
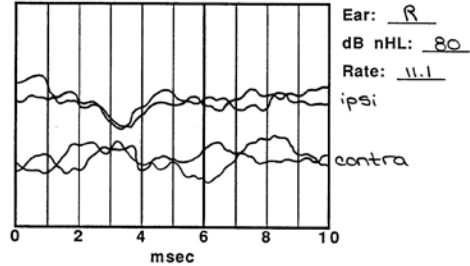
Word-Recognition Scores					
Right		Level	Left		
56	%	80 HL	96	%	
96	%	60 HL		%	
	%			%	

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Case: A
Age: 34 years
Male

AUDITORY BRAINSTEM RESPONSE

Subject: OT
Age: 34
Sex: M



Case: A Age: 34 years Male

Summary of Results at 80 dB nHL

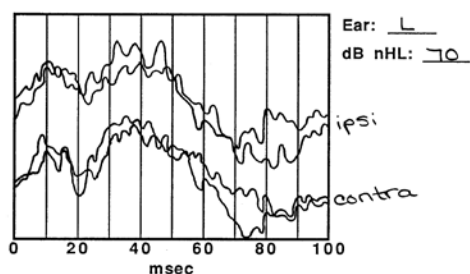
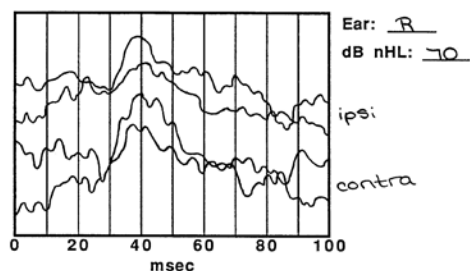
	Absolute Latency Wave V	Interwave Intervals		
		I-III	III-V	I-V
RE	CNE	CNE	CNE	CNE
LE	6.4	2.8	2.0	4.8

Case: A
Age: 34 years
Male



MIDDLE LATENCY RESPONSE

Subject: OT
Age: 34
Sex: M

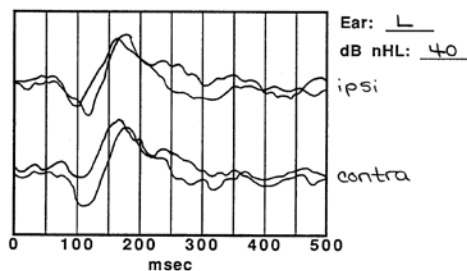
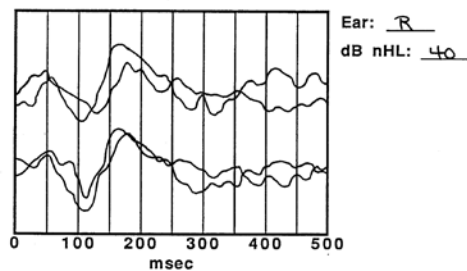


Case: A
Age: 34 years
Male

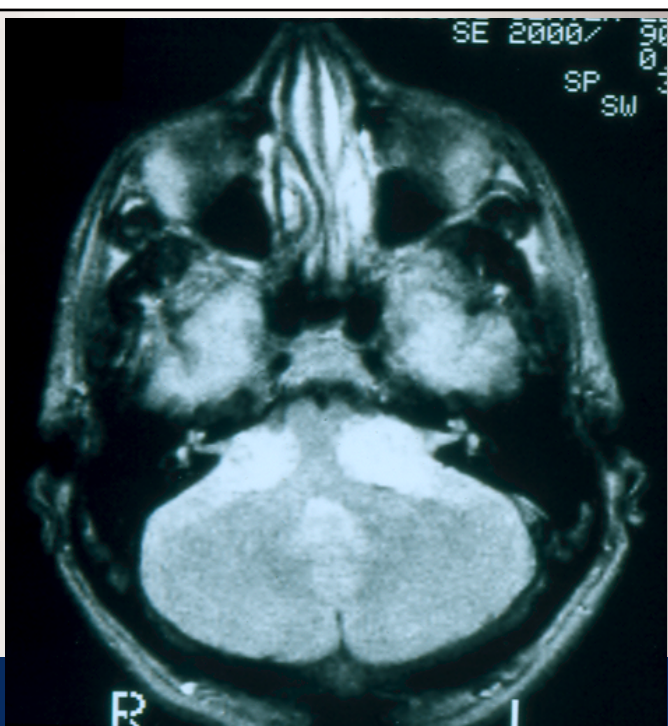


LATE VERTEX RESPONSE

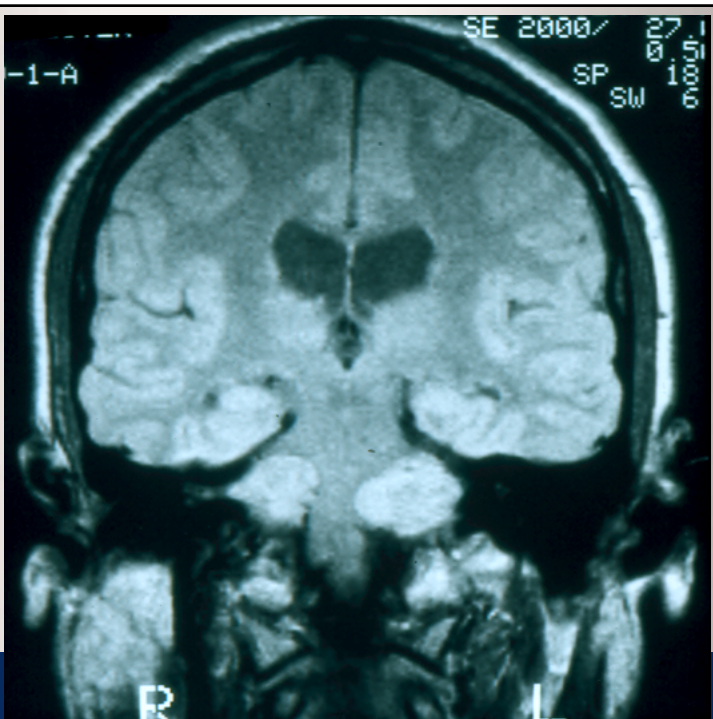
Subject: OT
Age: 34
Sex: M



Case: A

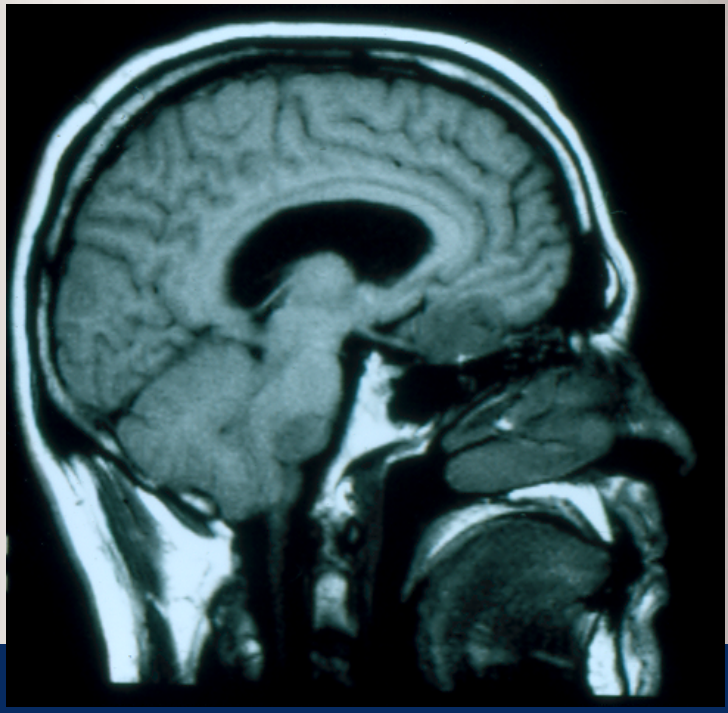


Case: A

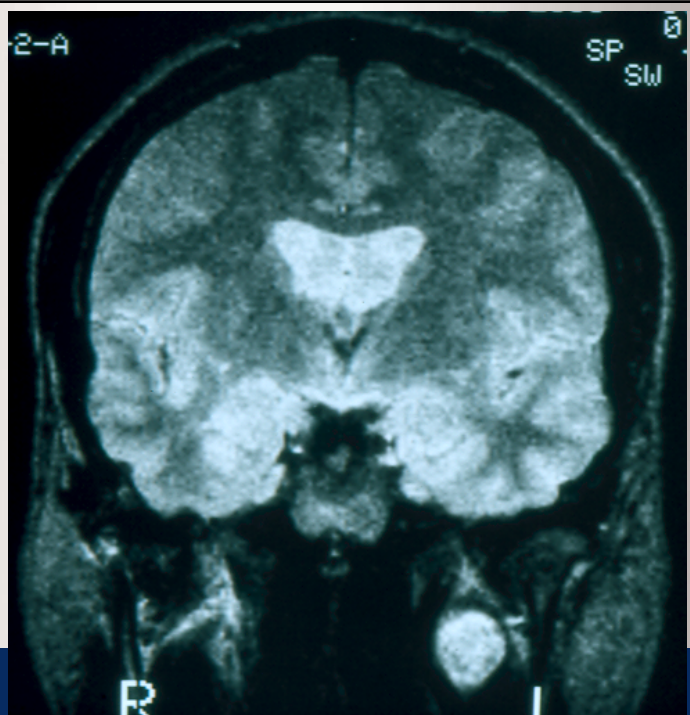


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Case: A



Case: A



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Final Diagnosis

Case: A

- Age: 34 years Sex: Male
- Lesions:
 - 2 cm right acoustic tumor
 - 2.5 cm left acoustic tumor
 - 2.2 cm right olfactory meningioma
 - 2.5 cm glomus jugularae tumor
- Diagnosis
 - Neurofibromatosis Type 2



Diagnostic Lessons

Case: A

- In VIIIth Nerve lesions:
 - Location is critical
 - Size and location interact
 - Structure and function can vary
 - Both primary and secondary effects on hearing



Primary/Secondary Effects

- Inner Ear Histopathology:
 - Harvard study
 - 11 cases of unoperated unilateral acoustic tumors
 - Studied cochlea and VIIIth nerve anatomy

Mahmud et al., Ann Otol Rhinol Laryngol, 112:979-986, 2003



Primary/Secondary Effects

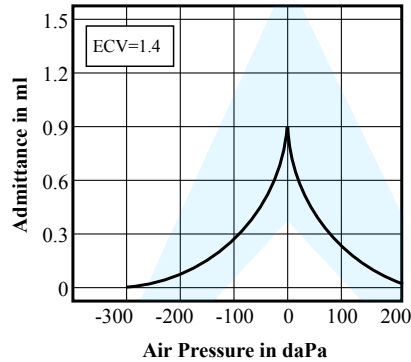
- Findings:
 - In ears with <50% WRS, significant degeneration of inner ear structures
 - Endolymphatic hydrops and eosinophilic precipitate found in 2 of 3 cases

Mahmud et al., Ann Otol Rhinol Laryngol, 112:979-986, 2003

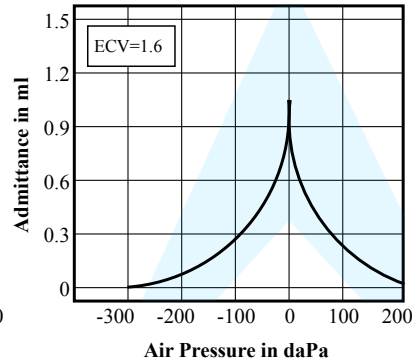


Case: A Age: 39 years Male

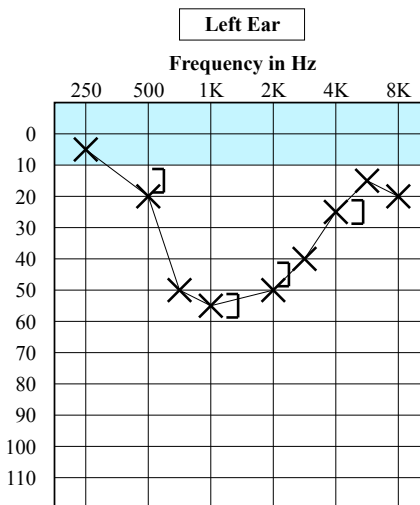
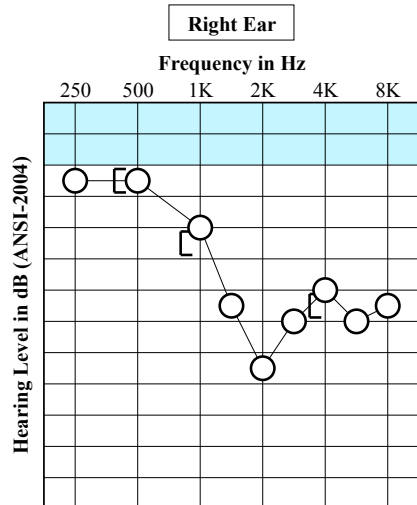
Right Ear				
Signal to RE	BBN	500	1K	2K
Crossed	Absent	—————→		
Uncrossed			Absent	—————→



Left Ear				
Signal to LE	BBN	500	1K	2K
Crossed	95	90	95	95
Uncrossed			Absent	—————→



Case: A Age: 39 years Male



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Case: A Age: 34 years Male

Word-Recognition Scores

Right

Level

Left

0 %

80 HL

70 %

0 %

60 HL

56 %

%

%



continued™

Report of a Case

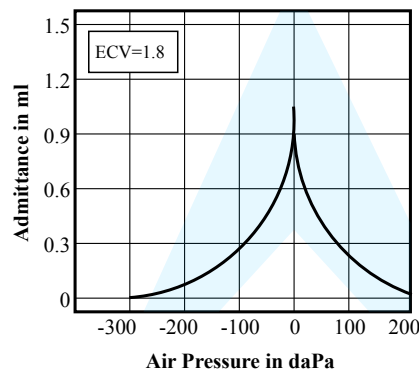
Case: B

- Age: 25 years Sex: Male
- History:
 - 2 month history of left lip and tongue numbness
 - Left adenoidectomy and tube at age 16 yrs
 - Occasional left tinnitus
 - Occasional dizziness

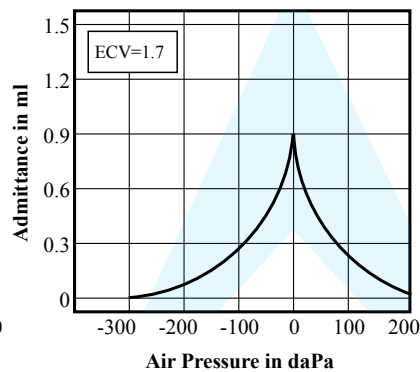


Case: B Age: 25 years Male

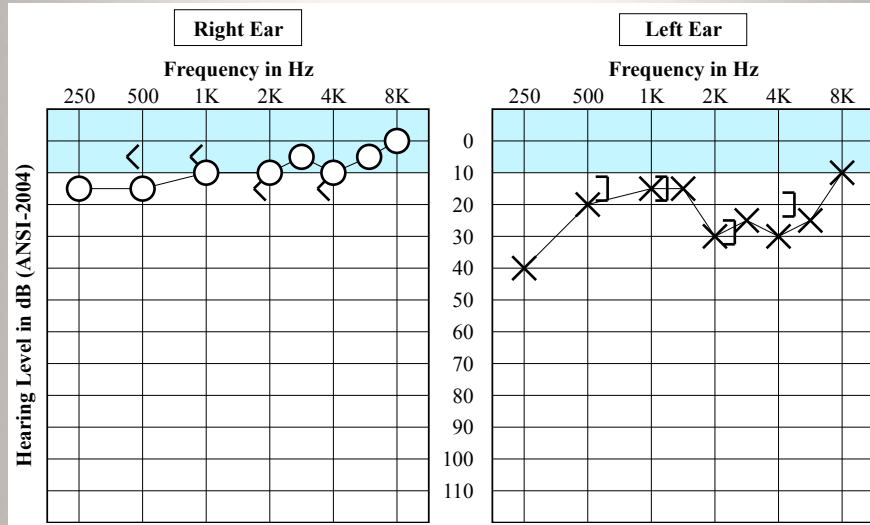
Right Ear				
Signal to RE	BBN	500	1K	2K
Crossed	80	90	90	85
Uncrossed			85	85



Left Ear				
Signal to LE	BBN	500	1K	2K
Crossed	Absent			
Uncrossed			Absent	



Case: B Age: 25 years Male



Case: B Age: 25 years Male

Word-Recognition Scores

Right		Level	Left	
100	%	80 HL	30	%
	%	70 HL	60	%

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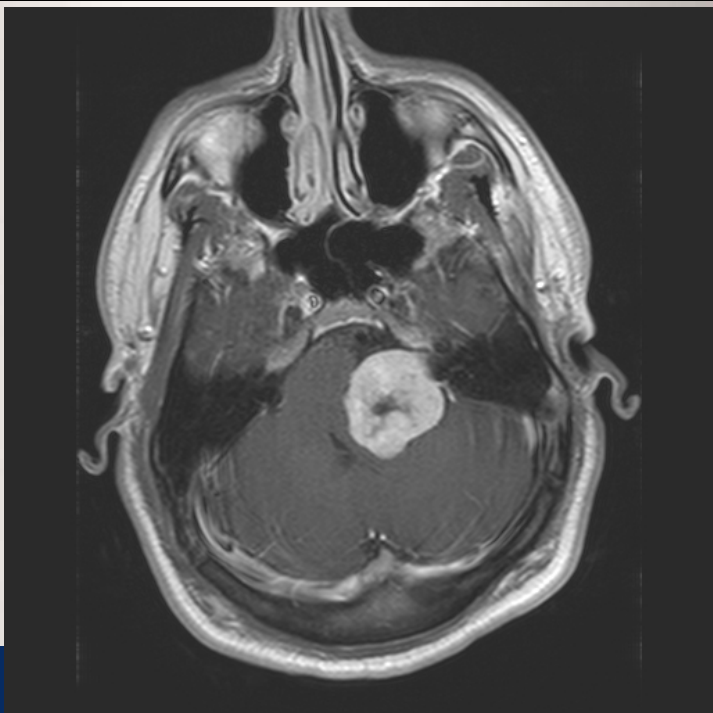
Final Diagnosis

Case: B

- CPA Tumor
 - 3.6 x 3.4 left CPA mass
 - Considerable mass effect on pons and left middle cerebellar peduncle
 - Some extension into the IAC

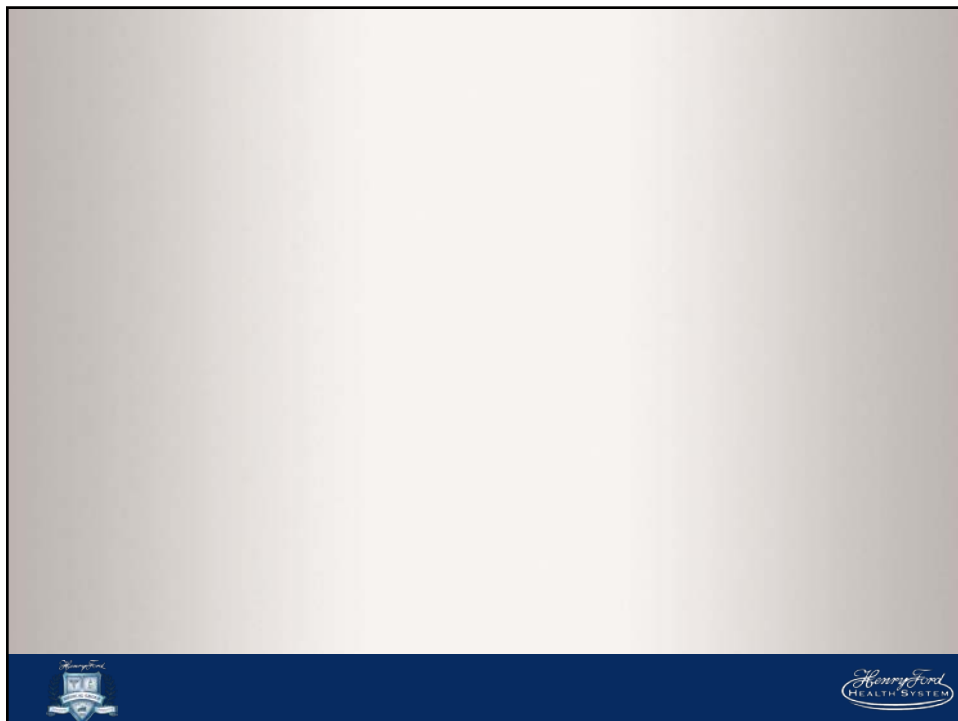
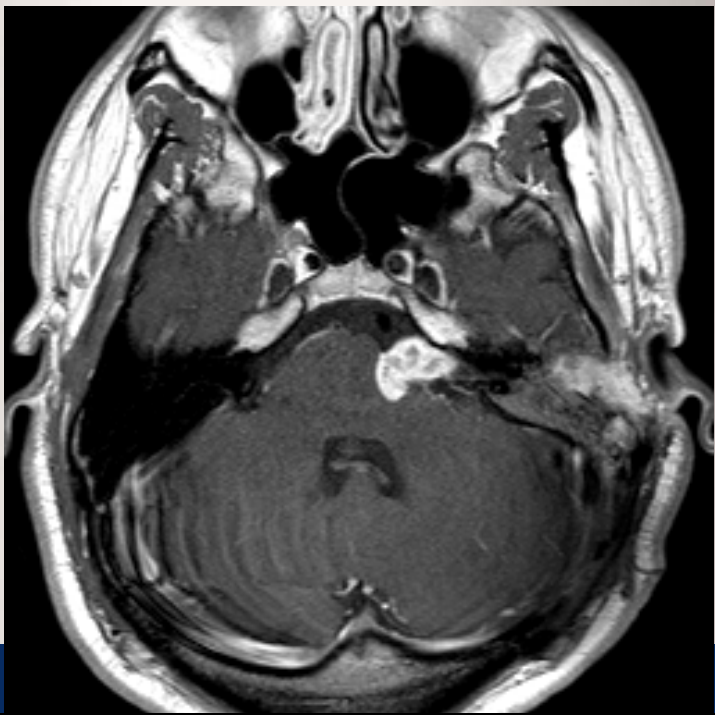


Case: B



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Case: B



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Report of a Case

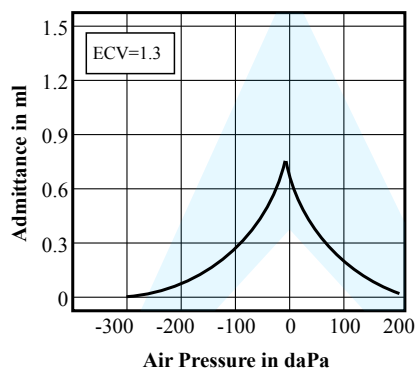
Case: C

- Age: 51 years Sex: Female
- History:
 - Non-English speaking from Bangladesh
 - Hearing has been decreasing gradually for a long time
 - Thinks that left ear might be worse than right
 - Family history of hearing loss
 - Tinnitus, left worse than right

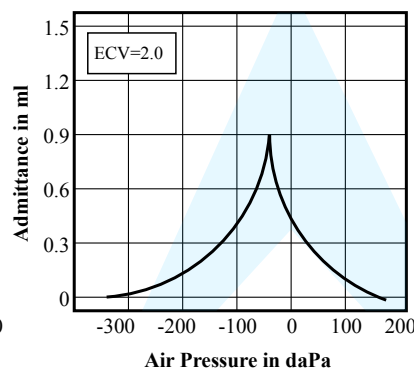


Case: C Age: 51 yrs Female

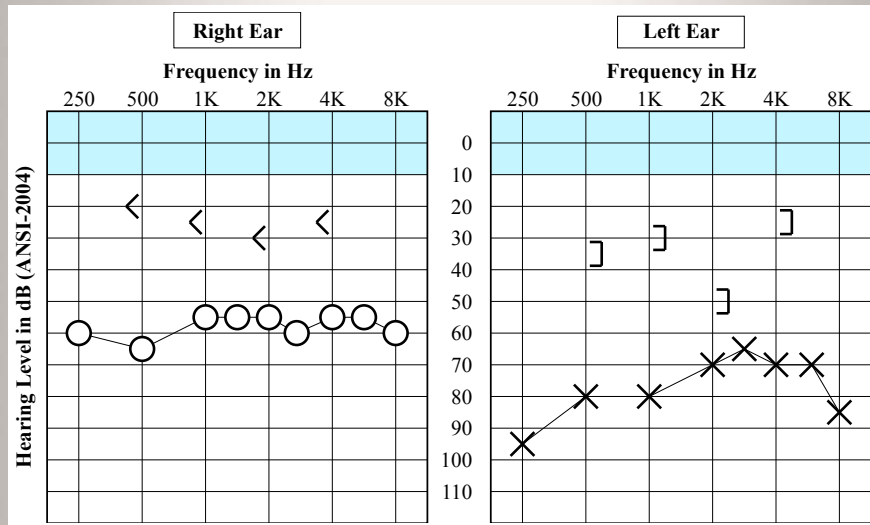
Right Ear				
Signal to RE	BBN	500	1K	2K
Crossed	Absent	→	→	→
Uncrossed			Absent	→



Left Ear				
Signal to LE	BBN	500	1K	2K
Crossed	Absent	→	→	→
Uncrossed			Absent	→



Case: C Age: 51 yrs Female



Final Diagnosis

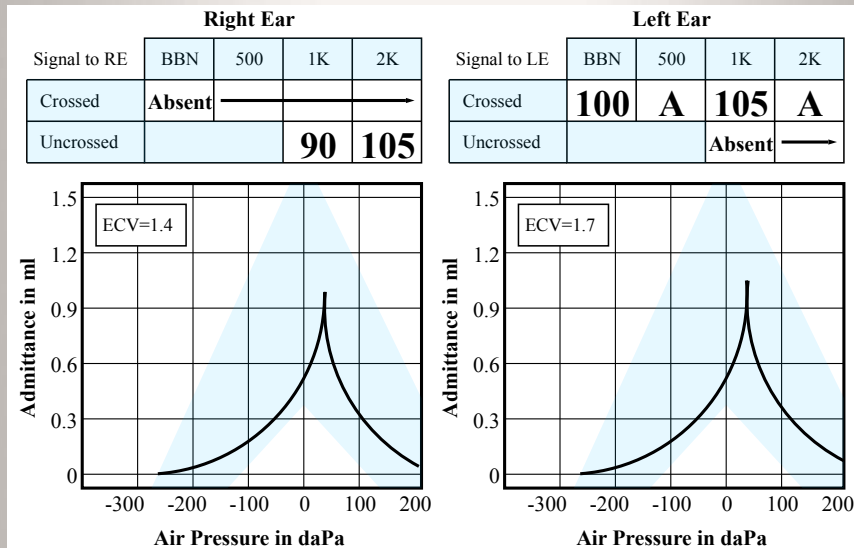
Case: C

- Bilateral severe mixed hearing loss
- Diagnosis
 - Otosclerosis

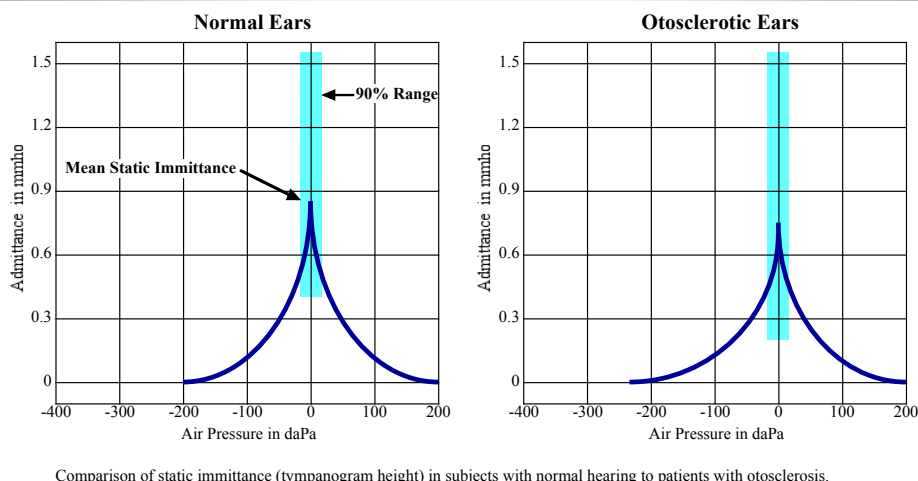
Son of Case: C

Age: 27 yrs

Male



A Thought About Shallow Tympanograms

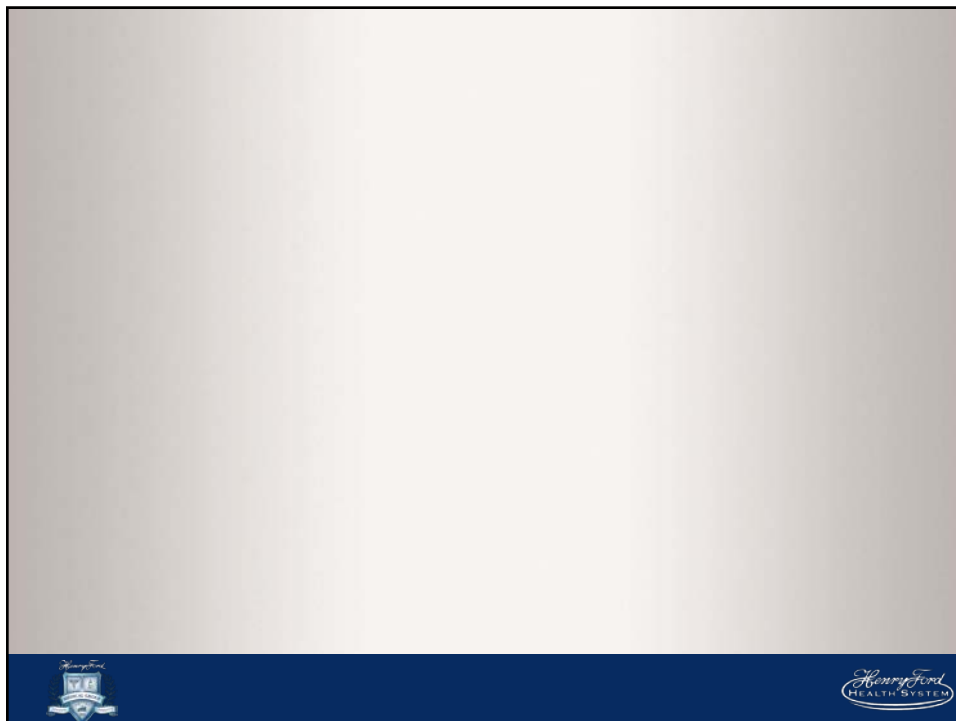
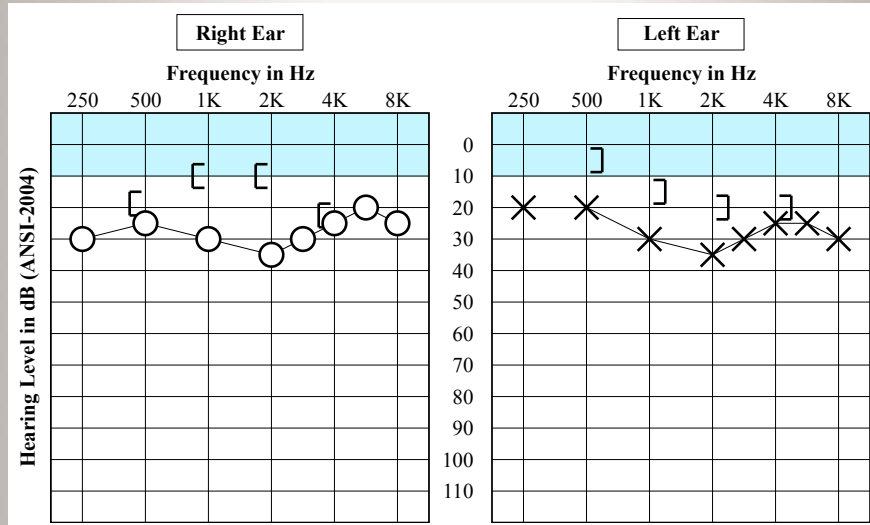


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Son of Case: C

Age: 27 yrs

Male



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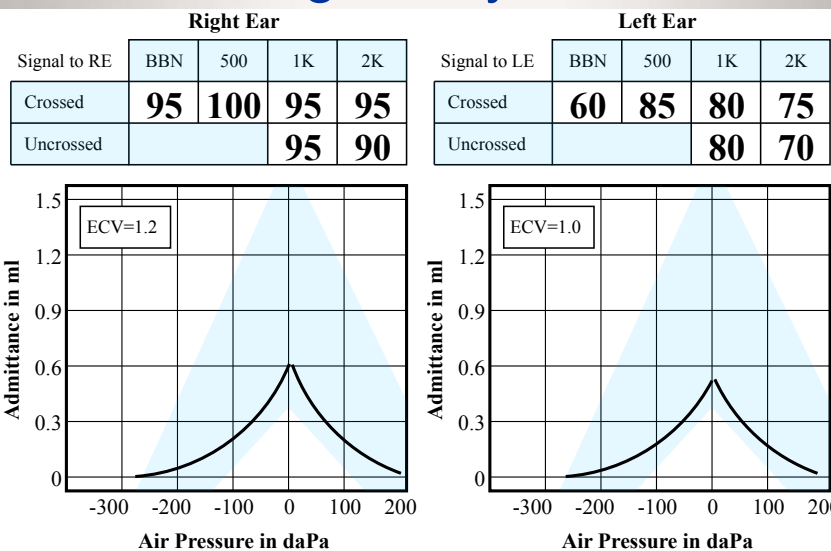
Report of a Case

Case: D

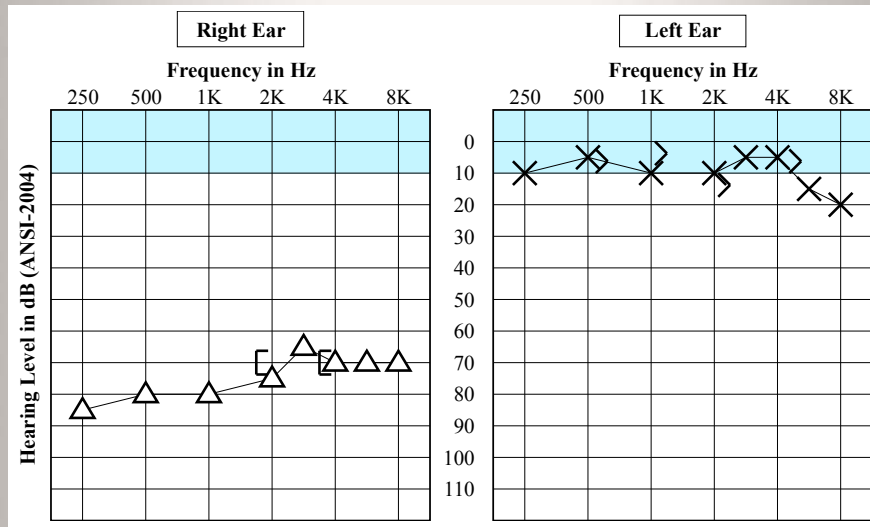
- Age: 64 years Sex: Female
- History:
 - 7 days prior
 - Attended fireworks display
 - Reported very loud noise exposure in close proximity
 - 6 days prior
 - Next morning developed right hearing loss and ringing/hissing tinnitus
 - Associated with fullness on right side of face



Case: D Age: 64 yrs Female



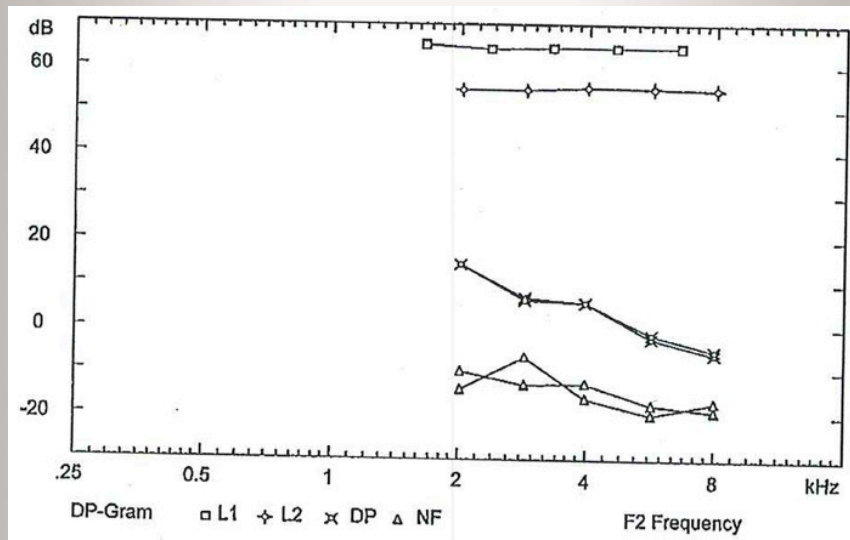
Case: D Age: 64 yrs Female



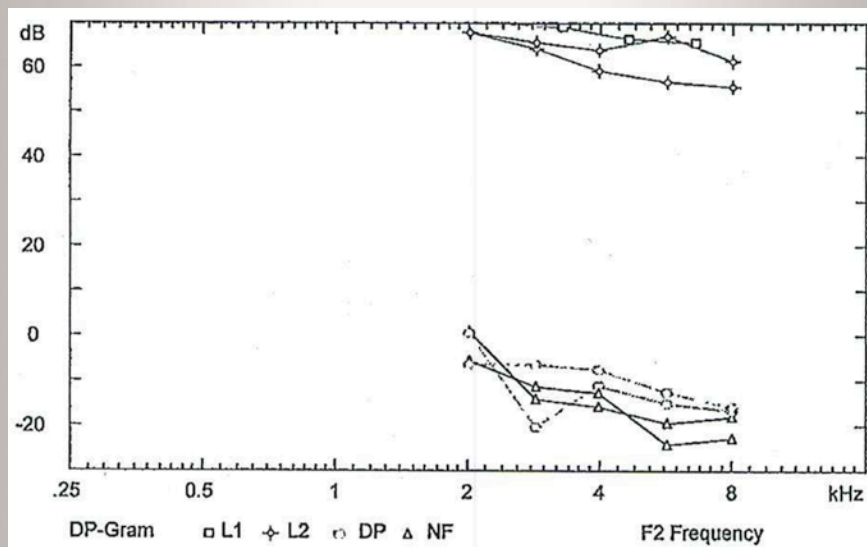
Case: D Age: 64 yrs Female

Word-Recognition Scores					
Right		Level	Left		
2	%	95 HL			%
	%	80 HL	100		%

Case: D Left-ear OAEs



Case: D Right-ear OAEs



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Final Diagnosis

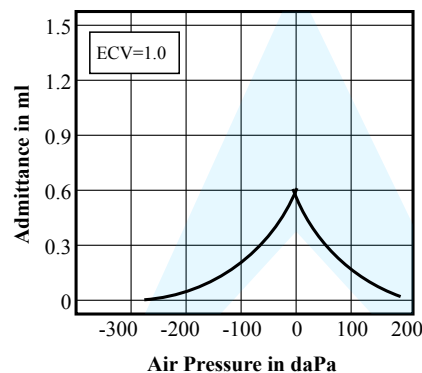
Case: D

- Sudden idiopathic sensorineural hearing loss
- Treated with high-dose steroids
- Scheduled for return visit 10 days later

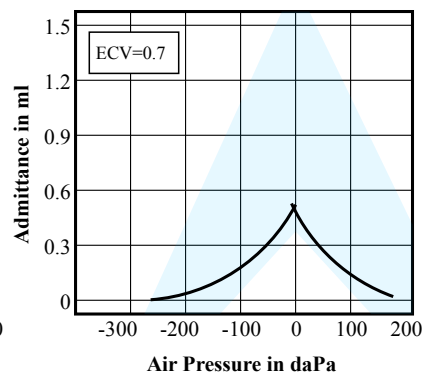


Case: D Age: 64 yrs Female

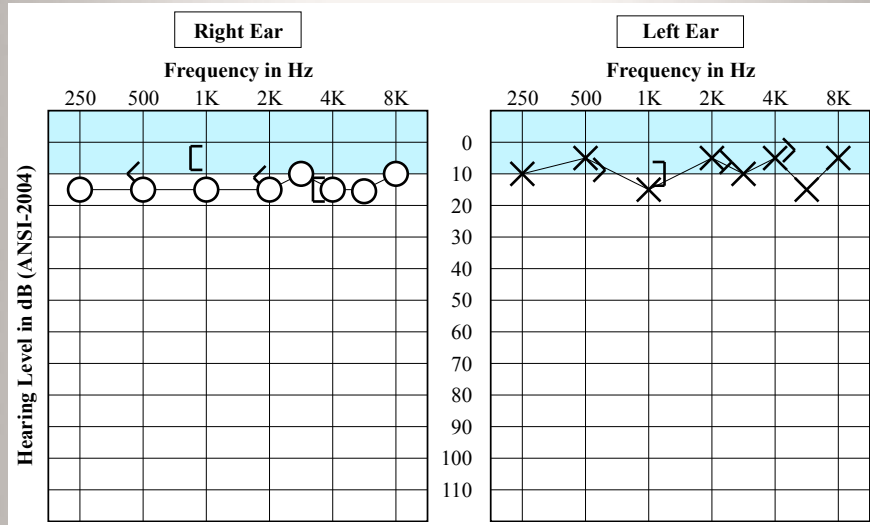
Right Ear				
Signal to RE	BBN	500	1K	2K
Crossed	70	100	90	80
Uncrossed			85	80



Left Ear				
Signal to LE	BBN	500	1K	2K
Crossed	65	80	85	75
Uncrossed			90	80



Case: D Age: 64 yrs Female

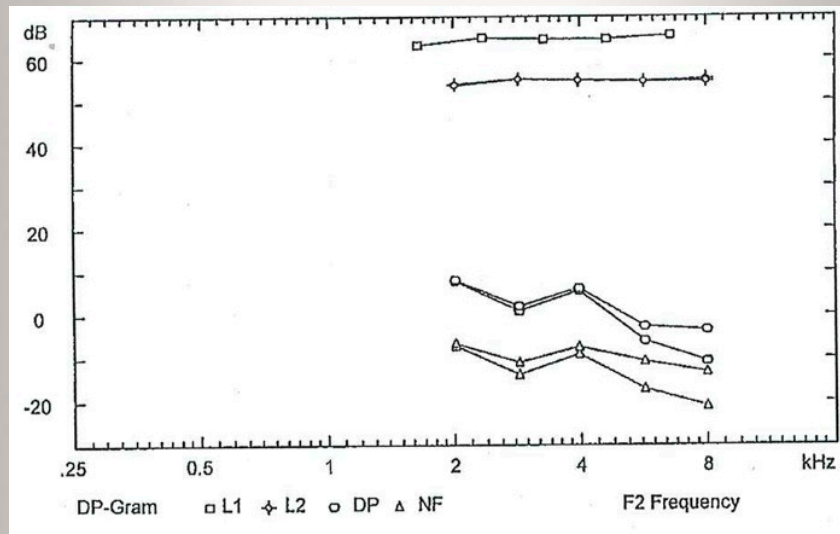


Case: D Age: 64 yrs Female

Word-Recognition Scores

Right	Level	Left
100 %	80 HL	100 %
%	70 HL	%

Case: D Right-ear OAEs



A Thought About Steroids

Patient code	Frequency regions	Baseline (dB)	Improvement (dB) at 90 d
Prednisolone group			
009	Low	45	50
040	Low	80	85
112	Low	38	35
124	Low	35	33
178	Low	32	32
211	Low	38	48
001	Mid	32	30
023	Mid	68	68
090	Mid	53	50
092	Mid	78	76
102	Mid	80	73
108	Mid	52	50
113	Mid	75	73
125	Mid	90	87
207	Mid	63	54
003	High	58	50
027	High	85	87
192	"Flat loss"	72	81
Mean ± SD		59.7 ± 20	59 ± 19.8
Patient code	Frequency regions	Baseline (dB)	Improvement (dB) at 90 d
Placebo group			
010	Low	68	70
012	Low	47	42
029	Low	80	72
083	Low	33	29
153	Low	38	38
213	Low	40	38
241	Low	45	37
016	Mid	84	84
026	Mid	78	75
035	Mid	68	65
036	Mid	47	45
058	Mid	63	63
084	Mid	72	70
154	Mid	68	65
193	Mid	78	80
215	Mid	75	68
236	Mid	65	60
121	High	47	40
Mean ± SD		60.1 ± 16.5	57.8 ± 17

Patients with total recovery (from Nosrati-Zarenou & Hultcrantz, 2012)



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