

### DW MRI of CHOLESTEATOMA

**CONCLUSIONS NON-EPI GROUP I:  
PRIMARY ACQUIRED OR CONGENITAL CHOLESTEATOMA**

- ✓ Primary examination tool: CT scan
- ✓ MRI in case of
  - Complications
    - Loss of tegmen delineation
    - Fistulisation LSCC
  - Undeterminate CT evaluation
  - Associated infection-inflammation
- ✓ MRI:
  - Size limit 2 mm !!
  - No susceptibility artifact !! No lesion distortion !!
- ✓ Cave:
  - False negative:
    - ✓ Auto-evacuation-Suction cleaning evacuation
    - ✓ Motion artifact
  - False positive:
    - ✓ Pus in abscess

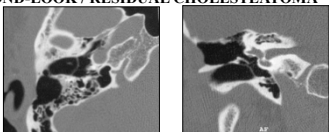
### DW MRI of CHOLESTEATOMA

**GROUP II: PRESECOND-LOOK / RESIDUAL CHOLESTEATOMA**

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**Empty cavity:  
no cholesteatoma**

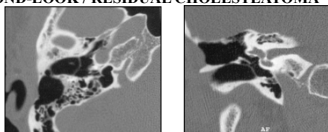


Courtesy by M. Williams, D. Ayache

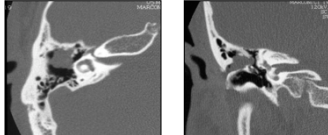
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**GROUP II: PRESECOND-LOOK / RESIDUAL CHOLESTEATOMA**

**Empty cavity:  
no cholesteatoma**



**Nodular lesion:  
highly suspicious  
for cholesteatoma**

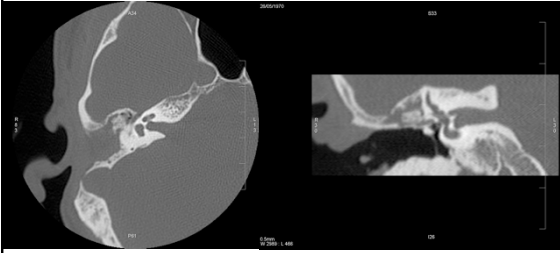
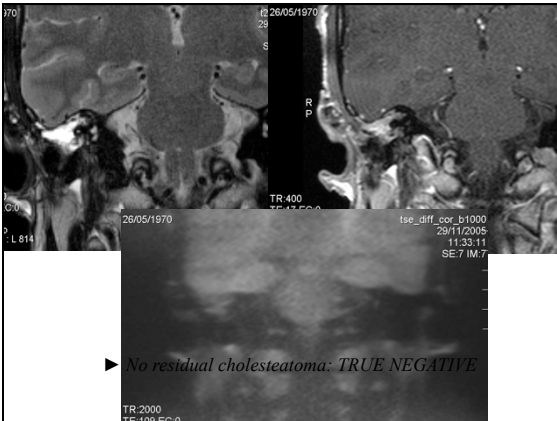


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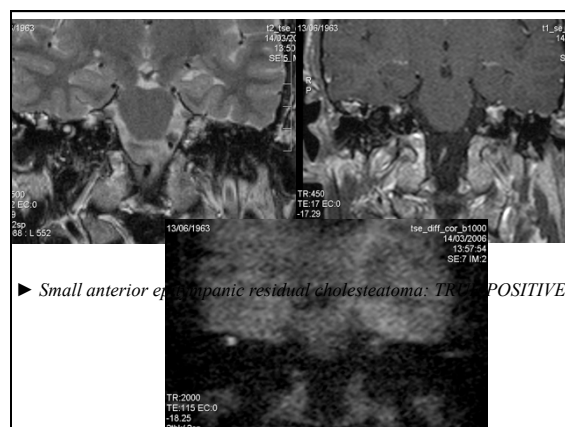
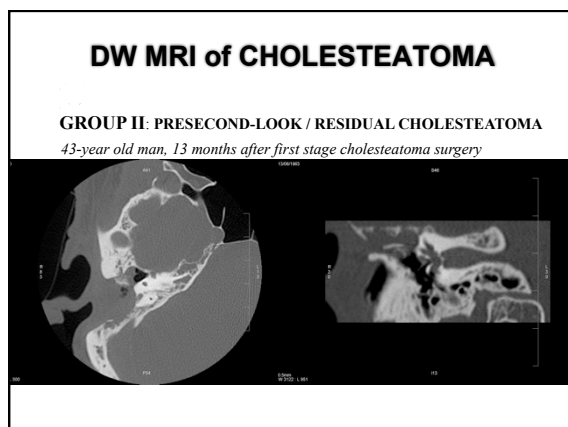
**GROUP II: PRESECOND-LOOK / RESIDUAL CHOLESTEATOMA**

*35-year old man, 14 months after first stage cholesteatoma surgery*

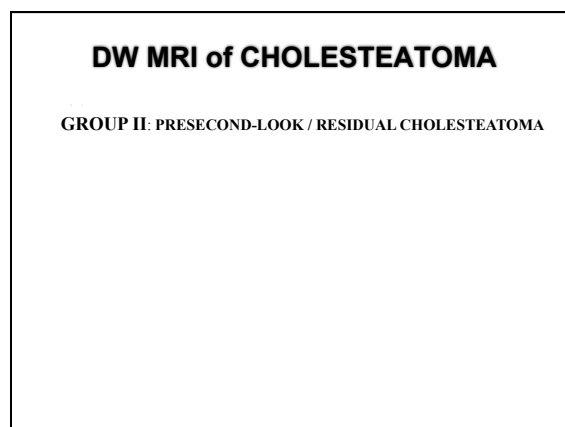



**No residual cholesteatoma: TRUE NEGATIVE**

TR:2000  
TE:109 EC:0



***CAN WE  
 REPLACE  
 SECOND LOOK  
 SURGERY BY  
 MRI ?  
 YES, WE CAN !***



**DW MRI of CHOLESTEATOMA**

**GROUP II: PRESECOND-LOOK / RESIDUAL CHOLESTEATOMA**

- ✓32 patients: evaluated by MRI 1 year after first stage surgery
- ✓decision to perform second look
  - ✓Based on first look
  - ✓Based on clinical examination - otoscopy –audiometry

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- ✓ 19 second look: 10 cholesteatoma
  - ✓9 true positives
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- ✓16 patients:
  - ✓16 true negatives based upon clinical follow-up

Detection of postoperative residual cholesteatoma with non echo-planar diffusion-weighted MRI  
B. De Foer, J-Ph Vercrussse et al. Otolaryngology and Neurology 2008;29:513-7

**DW MRI of CHOLESTEATOMA**

**CONCLUSIONS NON-EPI GROUP II:  
PRE-SECOND LOOK / RESIDUAL CHOLESTEATOMA**

	Pre-Second look Non- Epi (n = 32)	Pre-second look EPI (n = 45 )
Sensitivity (%)	90	12,5
Specificity (%)	100	100
Positive predictive value (%)	100	100
Negative predictive value (%)	96	84

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  - 2 mm delayed post – Gd T1 – NO UNENHANCED IMAGES
  - COR 2 mm TSE T2-weighted images
  - 3D TSE T2-weighted images
  - b0-b1000 –ADC map SS TSE DW or HASTE DIFFUSION
  - 25 minutes

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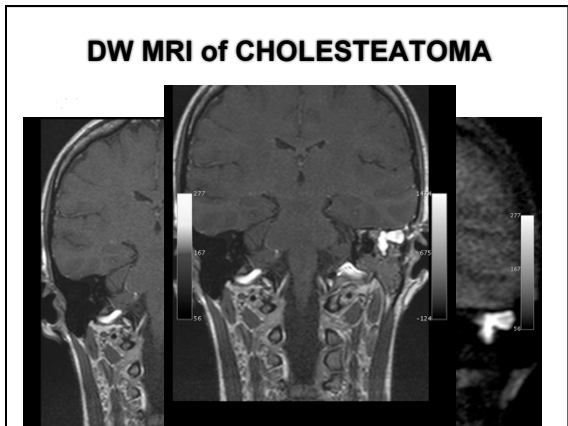
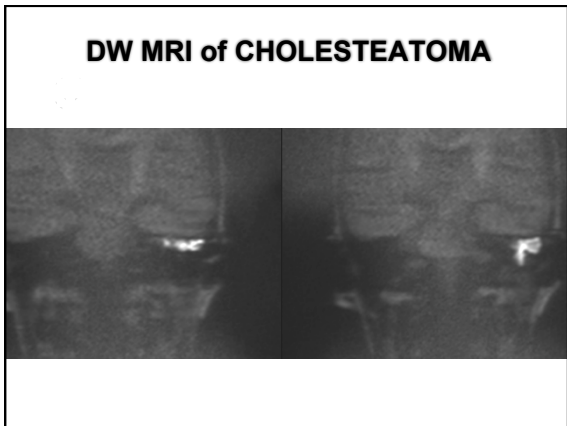
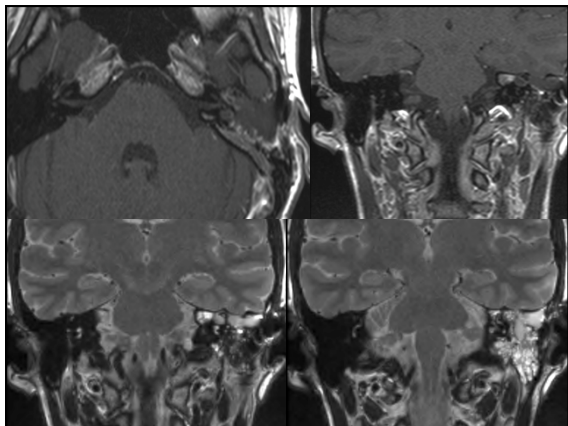
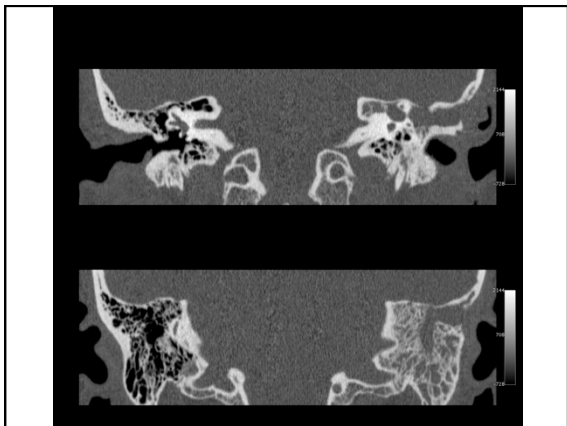
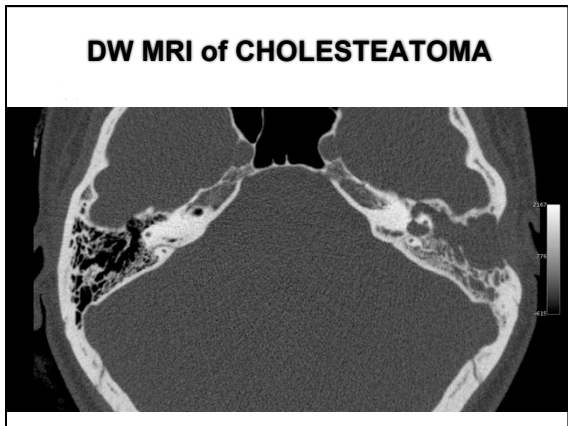
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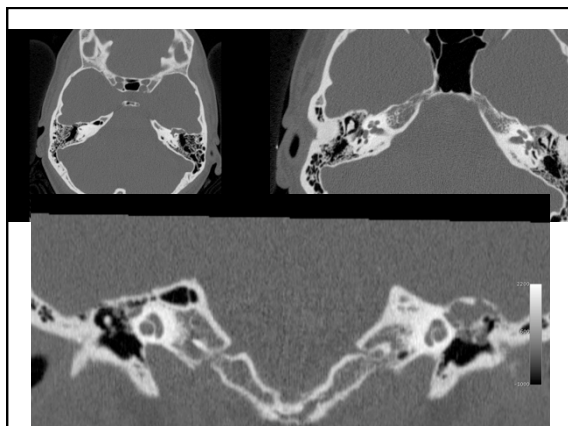
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- ✓ MRI:
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- ✓ CT:
  - Pre-operative evaluation
    - ✓ Anatomical variants
    - ✓ Ossicular chain
    - ✓ Localisation





### DW MRI of CHOLESTEATOMA

- *III. SS TSE DW MRI: CONCLUSIONS*

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  - CAN SELECT PATIENTS FOR SECOND LOOK

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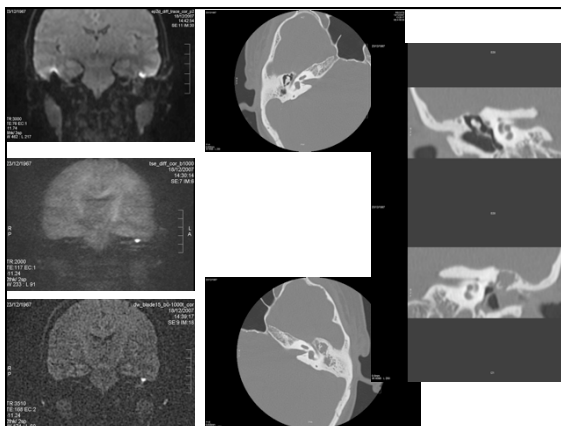
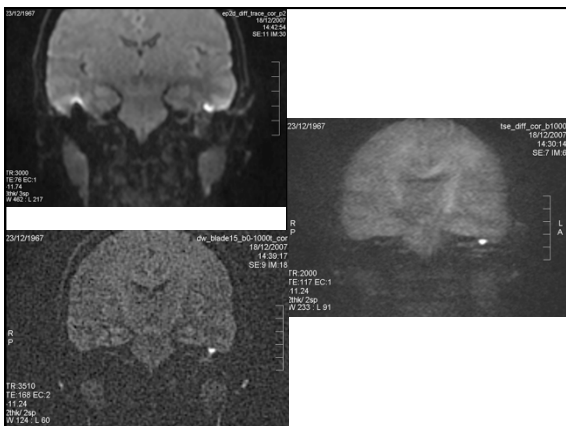
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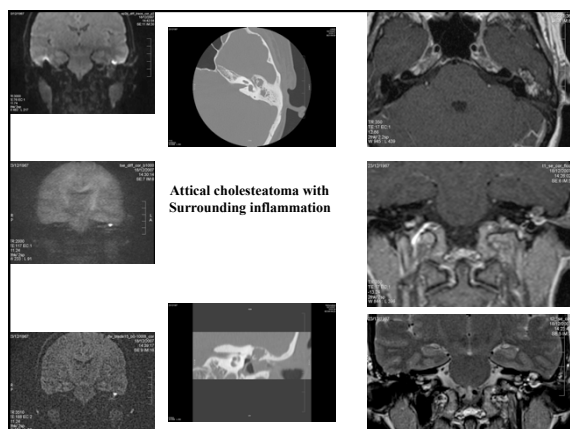
Siemens Avanto SS TSE DWI  
B. De Foor et al. AJNR 2006 27: 1480-1482  
Philips Multishot DWI fast SE  
Dubrulle et al. Radiology 2006 238: 604 - 610  
General Electric Diffusion Weighted Propeller: only axial  
Lehman et al AJNR 2009 30: 423-427

### DW MRI of CHOLESTEATOMA

**CASE 1**

- ✓40-year-old female
- ✓Chronic bad smelling ear discharge
- ✓Hearing loss
- ✓Polyp in EAC: evaluation of tympanic membrane difficult

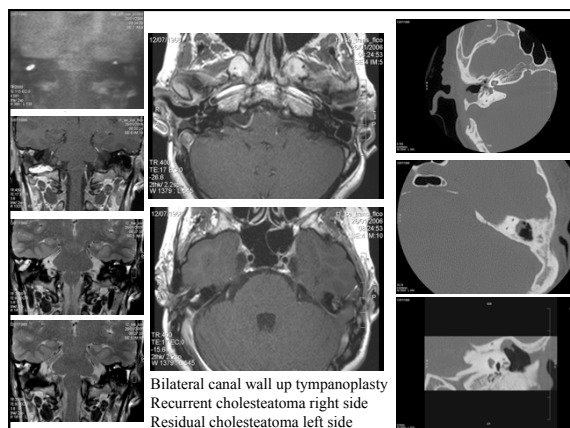
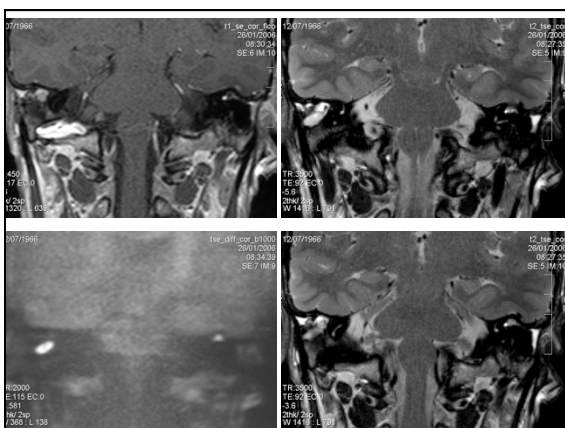




**DW MRI of CHOLESTEATOMA**

**CASE 2:**

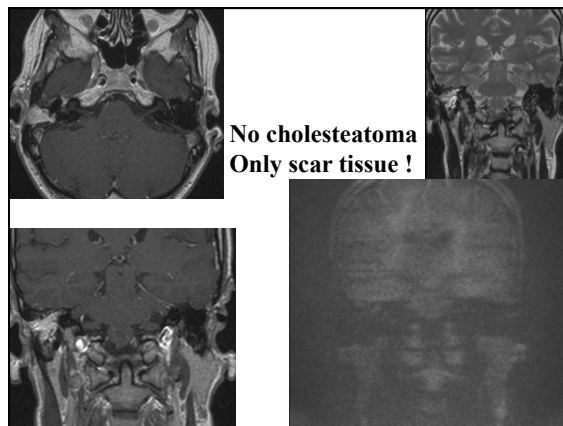
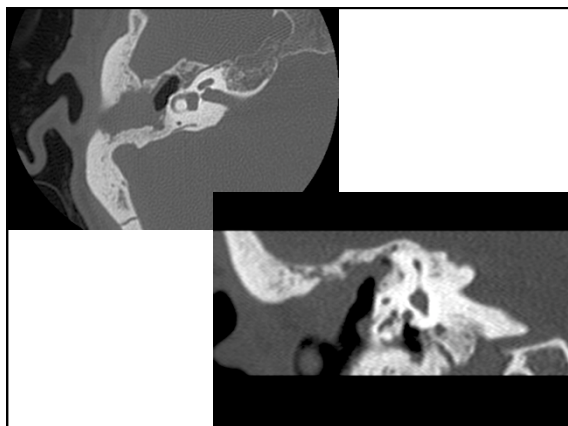
- ✓40-year-old girl (Turner Syndrome)
- ✓Prior surgery right side for cholesteatoma: 4 years ago: recurrent cholesteatoma ??
- ✓Prior surgery left side for cholesteatoma: 13 months ago: residual cholesteatoma ??
- ✓Presented for follow-up
- ✓No clinical symptoms



**DW MRI of CHOLESTEATOMA**

**CASE 3:**

- ✓52-year-old woman
- ✓Prior surgery for cholesteatoma right side.
- ✓No clinical symptoms



### DW MRI of CHOLESTEATOMA

- I. Introduction: DWI - cholesteatoma
- II. Echo Planar Diffusion-weighted MRI: EPI
- III. Single Shot Turbo Spin Echo Diffusion-weighted MRI: non-EPI
- IV. Non-EPI versus delayed post-Gd T1

### DW MRI of CHOLESTEATOMA

#### 1. NON-EPI >> DELAYED POST Gd T1 INTRODUCTION

### DW MRI of CHOLESTEATOMA

#### 1. NON-EPI >> DELAYED POST Gd T1 INTRODUCTION

	Nr	Positive MRI	Nr chol.	Sensitivity	Specificity	mm	Type DWI
<b>Acquired Cholesteatoma</b>							
Fitzek 2002 J Magn Reson Imaging	47	13	15	87%	94%	?	EPI DWI
Vercruyse 2006 Eur Radiol	55	40	49	81%	100%	5	EPI DWI
De Foer 2007 Neuroradiology	21	19	21	90%	100%	2	Non-EPI DWI

### DW MRI of CHOLESTEATOMA

#### 1. NON-EPI >> DELAYED POST Gd T1 INTRODUCTION

	N	Residual	Recurrent	Sensitivity	Specificity	mm	Type DWI
<b>Cholesteatoom Pre-Second look</b>							
Aikale 2003 AJR	22		x	77%	100%	5	EPI DWI
Williams 2003 Eur Radiol	18	x		85%	93%	3	Gd T1 Delayed
Stasolla 2004 O&NO	18	x	x	89%	100%	5	EPI DWI
Dubrule 2008 Radiology	24		x	100%	91%	5	Non-EPI DWI
Vercruyse 2005 Eur Radiol	45	x		12.5%	100%	5	EPI DWI
Jeunen 2008 O&NO	32	x	x	54.4%	90%	5	EPI DWI
De Foer 2008 O&NO	32	x		90/100%	100%	2	Non-EPI DWI
Vernal 2008 AJNR	31	x		60%	73%	3	EPI DWI
Vernal 2008 AJNR	31	x		90%	55%	2	Gd T1 Delayed
Dheprunorat 2009 O&NO	23	x	x	100%	100%	3	Non-EPI DWI



**DW MRI of CHOLESTEATOMA**

**2. NON-EPI<>DELAYED POST Gd T1:  
PURPOSE**

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**2. NON-EPI<>DELAYED POST Gd T1:  
PURPOSE**

✓To retrospectively compare non-EP DW imaging,  
delayed gadolinium enhanced T1-weighted MR  
imaging and the combination of both techniques in  
the evaluation of patients with cholesteatoma.