



# ***Early Detection: still a challenge ?***

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## ***Some milestones...***

- ***1978 OAE (Kemp)***
- ***1988 ILO88***
- ***1990 UNS (White)***
  
- ***1994 Joint Committee recommendation***
- ***1998 UNS Flanders***
- ***1998 European Consensus Statement (Grandori)***



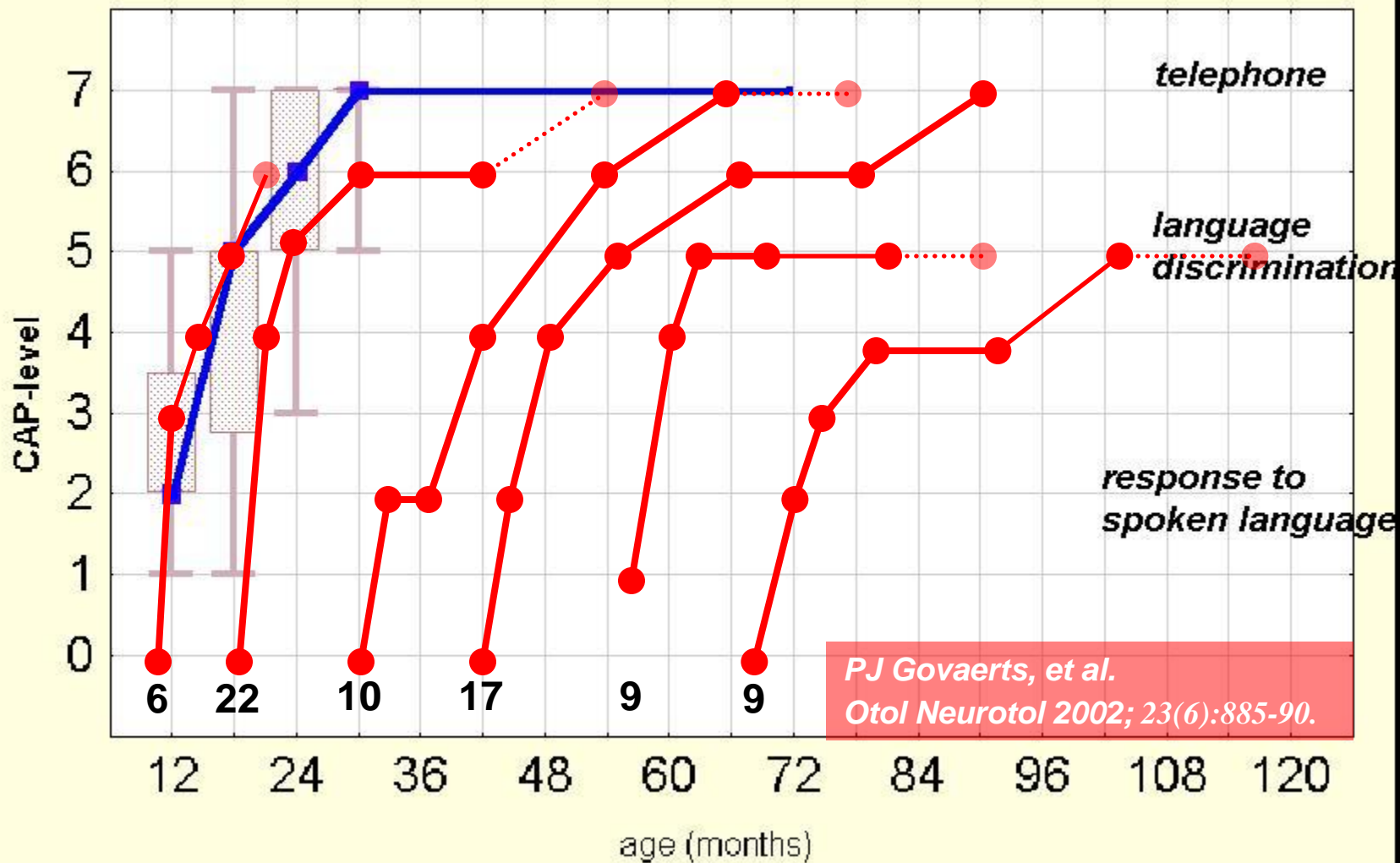
# ***Justification***

## ***I. Hearing & development***

- ***Early intervention***
- ***Critical/sensitive windows***
- ***Irreversible damage***
- ***Cochlear implant at young ages***

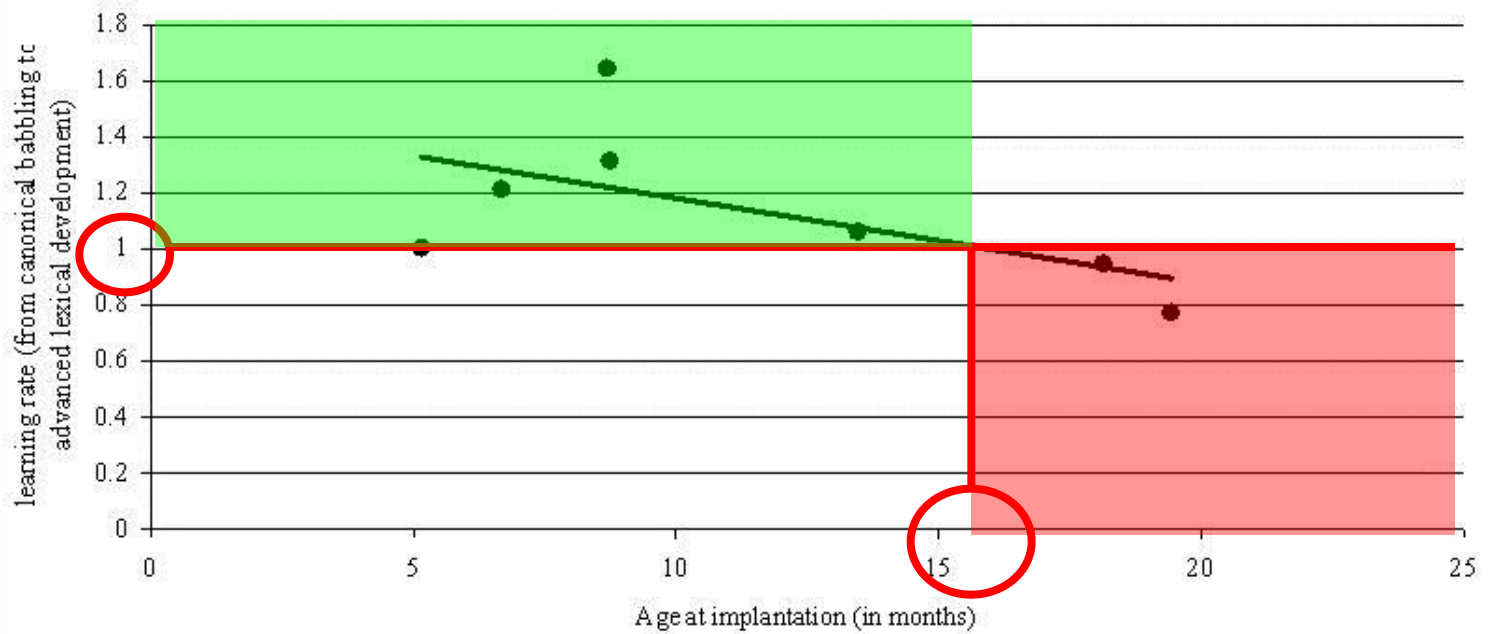


# Justification





Language growth as a function of age at implantation



*M Coene, et al.*

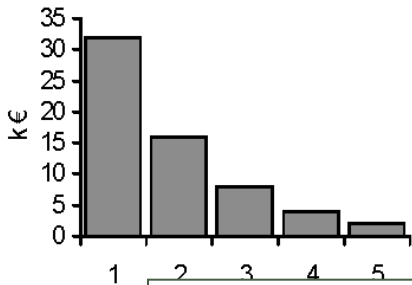
*Language and Cognitive Processes 2011; 26(8):1083-101.*



# Justification

## II. Cost-effectiveness

- 1998 European Consensus Statement (Grandori)



TABLE

TABLE 2. Comparative data of different screening programmes

	SNHL	Hypo- thyroid	PKU	Cystic Fibrosis	Sickle cell anaemia
Prevalence / 100.000	240	23	6	45	12
Cost per screen (€)	23	3	3	3	3
Cost per child detected (€)	9000	10000	37000	5500	21000

SNHL: sensorineural hearing loss; PKU: phenylketonuria

	test	Neonatal	Neonatal (OAE)	Neonatal (AABR)
Cost per child tested	37	109	18	25
Cost per 1000 births	30k	8k	20k	8k
Cost per child detected	135k	18k	7-25k	9-35k

FIGURE  
sand birth  
on the co

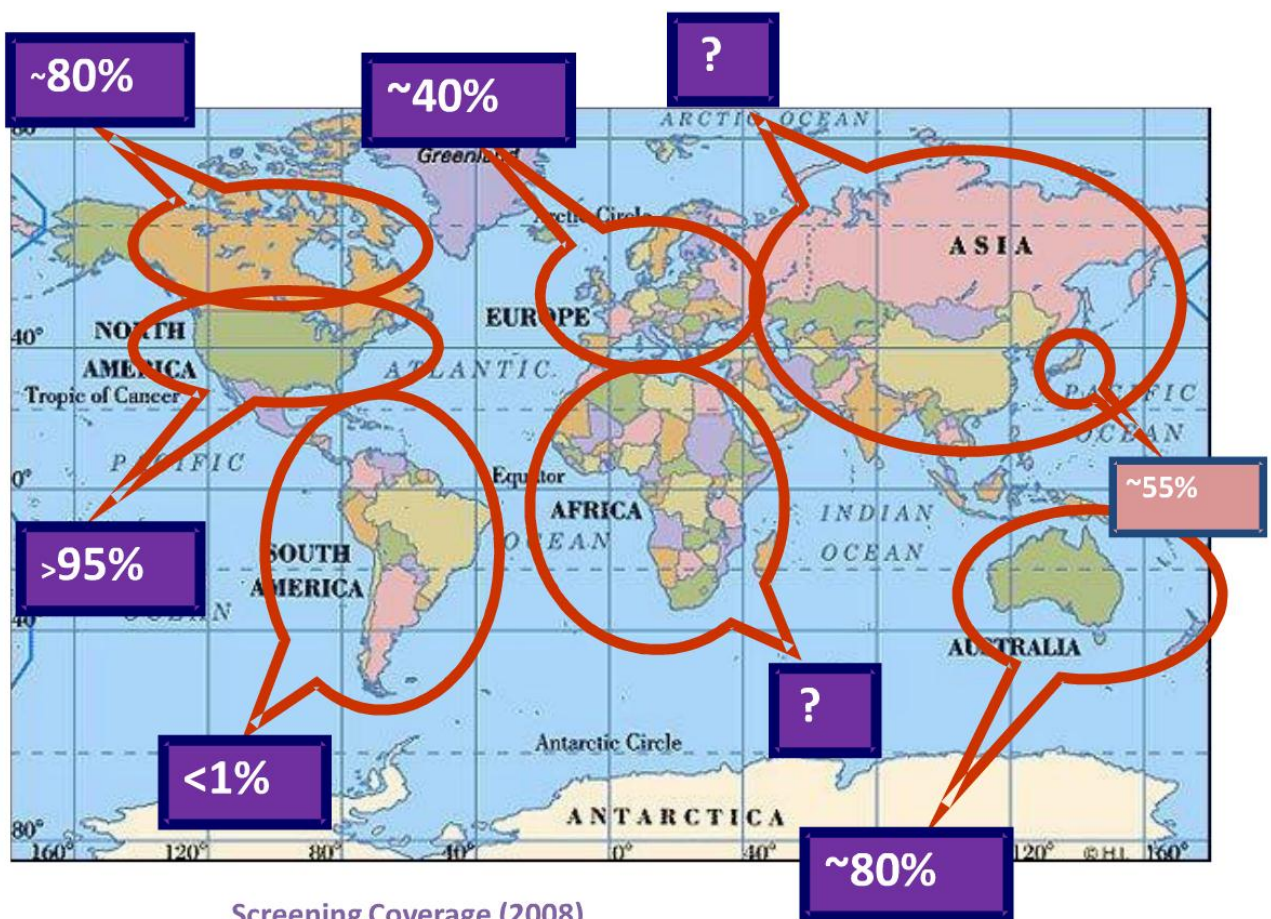


## ***Some milestones...***

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- ***2004 EHDI***



# UNS to date



Slide from M Lehnardt, 2009.

Source <http://www.slideshare.net/similei/neonatal-hearing-screening-2009-europe>

*the eargroup, Antwerp, Belgium*





# EHDI to date

## ■ Follow-up = key!

- 1 month
- 3 months
- 6 months

## ■ Intervention

- Family
- Technology
- Holistic

### Principles and Guidelines for Early Hearing Detection and Intervention Programs

From the Joint Committee on Infant Hearing, 2007

1. All infants should have access to hearing screening using a physiologic measure **before 1 month of age.**
2. All infants who do not pass the initial hearing screen and the subsequent rescreening should have appropriate audiologic and medical evaluations to confirm the presence of hearing loss **before 3 months of age.**
3. All infants with confirmed permanent hearing loss should receive intervention services **before 6 months of age.** A simplified, single point of entry into an intervention system appropriate to children with hearing loss is optimal.
4. The EHDI system should be family centered with infant and family rights and privacy guaranteed through informed choice, shared decision making, and parental consent. Families should have access to information about all intervention and treatment options and counseling regarding hearing loss.
5. The child and family should have immediate access to high-quality technology, including hearing aids, cochlear implants, and other assistive devices when appropriate.
6. All infants and children should be monitored for hearing loss in the medical home. Continued assessment of communication development should be provided by appropriate providers to all children with or without risk indicators for hearing loss.
7. Appropriate interdisciplinary intervention programs for deaf and hard-of-hearing infants and their families should be provided by professionals knowledgeable about childhood hearing loss. Intervention programs should recognize and build on strengths, informed choices, traditions, and cultural beliefs of the families.
8. Information systems should be designed to interface with electronic health records and should be used to measure outcomes and report the effectiveness of EHDI services at the community, state, and federal levels.



## ***EHDI to date***

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### ■ ***Intervention***

- *Family*
- *Technology*
- *Holistic*

## **Good Practice ?**

**EVERY** child > 6 months should have  
**SUFFICIENT** hearing at  
**OPTIMAL** cost/efficiency



## ***EHDI to date pitfalls***

### ***Diagnostic uncertainty & therapeutic hesitation***

UNS > 2 screens or > 1 month

Diagnostics: ABR under anaesthesia

Therapy: underamplification

Hesitate with CI

### ***Overmedicalization***

Unilateral pass = refer ??

Behavioural testing, ASSR, ...

Hearing aids for 35-40 dB

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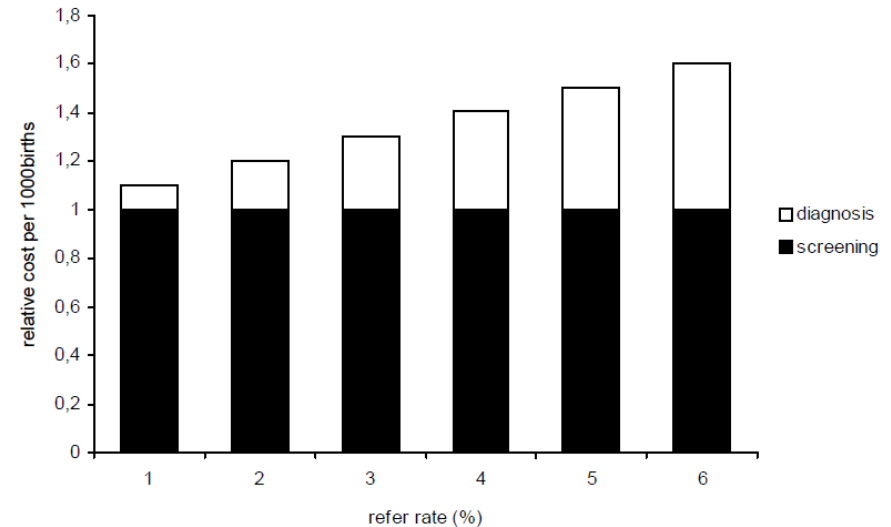
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**EVERY child > 6  
SUFFICIENT  
OPTIMAL**

## ***Overmedicalization***

Unilateral pass = refer ??



**FIGURE 2.** Effect of refer rate on the implementation cost of a screening program.



# ***EHDI to date hesitate with CI***

## ■ ***Follow-up = key!***

- *1 month*
- *3 months*
- *6 months*

## ■ ***Intervention***

- *Family*
- *Technology*
- *Holistic*

***10 months: audiological assessment***

**Audiometry (unaided / aided)  
Spectral Discrimination (A&E)**

**EVERY** child > 6 months should have  
**SUFFICIENT** hearing at  
**OPTIMAL** cost/efficiency

**A&E<sup>®</sup>**  
**2009**  
Psychoacoustic  
Test Suite

Auditory Speech Sound Evaluation

<http://otoconsult.com>



# EHDI to date

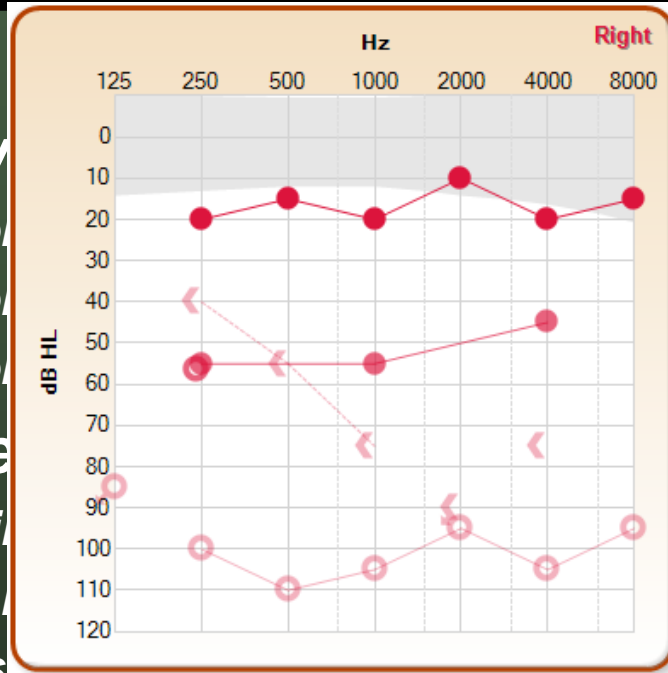
## hesitate with CI

### Follow

- 1 mo
- 3 mo
- 6 mo

### Interve

- Famil
- Tech
- Holis



Free Field  
6/12/2010  
(5y)



Free Field  
11/05/2010  
(5y)



Free Field  
30/12/2009  
(4y)

Phoneme Pair	6/12/2010 (5y)	11/05/2010 (5y)	30/12/2009 (4y)
a - r			
u - j			
u - a	Green	Green	Green
u - i	Green	Green	Green
i - a		Green	Green
o - a			
i - e			
m - z	Green	Green	Red
s - j	Green	Green	Green
e - a	Green		
u - o			
ə - a	Green		
ə - o			
ə - e	Green		
ə - i			
z - s	Green	Green	Red 75
v - z	Green	Green	Red 80
ə - u			
u - y	Green		
y - i	Green		

**EVERY** child > 6 months  
**SUFFICIENT** hearing  
**OPTIMAL** cost/eff



Auditory Speech Sound Evaluation  
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# ***EHDI to date***

## ***hesitate with CI***

### ■ ***Follow-up = key!***

- *1 month*
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### ■ ***Intervention***

- *Family*
- *Technology*
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***10 months: audiological assessment***



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- ***Implement UNS !!!***
- ***Define & Evaluate Good Clinical Practice***
  - *UNS*
  - *Diagnostic work-up*
  - *Hearing Aid fitting*
  - *Family guidance*
  - *CI selection & CI fitting*
- ***Be ware of pitfalls***
  - *Diagnostic uncertainty & Therapeutic hesitation*
  - *Overmedicalization*