

와우이식 I

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장 선 오 · 이 효 정

Cochlear Implantation I

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서 론

0.44%

40 dB , 0.1%

43,000 80 dB

가

1,000 1

2001

가 60 1 600

가

1988

1,000

1)

60,000

가

와우이식 대상환자의 선정

가

: , 110 - 799 28

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가 , 가
가

:

Table 1. Cochlear 사의 Nucleus 24 contour 적응기준

12 - 24	(90 dB)
2 - 5	MLNT (Multisyllable Lexical Neighborhood Test) 30% (70 dB)
5 - 18	LNT (Lexical Neighborhood Test) 30% (70 dB)
18	HINT (Hearing in Noise Test) 60% (40 dB, 50%, 90 dB)

Table 2. Advanced bionic사의 Clarion 적응기준

12 - 4	3 - 6 *	(90 dB)	MLNT 20%
4 - 18	3 - 6	(90 dB)	PBK (Phonetically Balanced-Kindergarten Test)
	12% HINT 30%		
18		(70 dB)	HINT 50%

* : 12-23 ; 3 , 2-17 ; 6 .

가

가

가 100 dB ,
70 dB

0%

30%

18

내이기형

1
Nucleus Contour FDA 12 6 CT 가 MRI -
가 Table 2²⁾ CISS (Promontory stimu-
Table lation test), Mondini (EABR)
(EVAS) 가 가 가³⁾⁴⁾
가 가 가

악우 골화

가⁵⁾ 가

가 가 8~10 mm 청력검사

가 가 가⁶⁾⁷⁾ (pure tone audiometry), (auditory
가 가 가 brainstem response test), (speech au-
diometry)
2~3 , (conductive hearing impairment)가

3 가 가 12 3~4 (play
가 가 가⁸⁾ audiometry) 가

가 가 CT , 12 가⁹⁾ 가

중후군질환자, 인지능력/운동능력 발달 이상 등 다중신체 장애자 가

가 가 3 6

가 가 가 가

가 가 가¹⁰⁾ (prelingual)

수술전 검사

병력 및 전신검사

언어평가 가

가 가

가 .

가
(closed - set speech perception test) , , 가

가
(open - set speech perception test) . 가

가 .

가 가 가

가 .

가 .

정신의학적 검사

가 .

신경전도로의 확인

가

뇌수막염 예방접종

(transtympanic promontory electric stimulation test) 10 2002 10 FDA 17

(transtympanic electrically evoked ABR) 가 . 91 56 가 Advanced Bionics , 33 가 Nuclues , 1 가 Med - EI . 52

영상검사

(HRCT) 18 84 , 33 (63%)가

가 . 7 . 24 6 , 2/3

(high jugular bulb) , 1 , . 23 Streptococcus

. Mondini , EVAS pneumoniae가 16 , Hemophilus influenzae가 4 , Streptococcus viridans가 2 , Escherichia coli가 1

MRI - CISS

8 가

(cochlear patency) , , 5

, MRI , , ,

T2 - weighted image가 . Advanced Bionic

가 Clarion Positioner

가 가 가

Table 3. 와우이식 대상자의 예방접종 (CDC), Oct 2002¹¹⁾

Pneumococcal vaccination	
<2 years	1) 7-valent pneumococcal conjugate vaccine (Pneumovax® ; PCV7) : 2, 4, 6, 12 to 15 months
	2) 2 가 23-valent pneumococcal polysaccharide vaccine (Pneumovax®23 or Pneumune®23 ; PPV23) 1
2 - 5 years	1) PCV7 : PPV23 1 . PCV7 2
	2) PCV7 : PCV7 2 PPV23 1 2 2
>5 years	PPV23 1
Hib (Hemophilus influenza type b) vaccination	
<15 months	2, 4, 6, 12 to 15 months
15 months - 5 years	1

Table 4. 와우이식대상자의 예방접종. Advisory Committee on Immunization Practices, 2003¹²⁾

Age at first PCV7 dose (mos)*	PCV7 primary series	PCV7 additional dose	PPV23 dose
2 - 6	3 doses, 2 months apart†	1 dose at 12 - 15 months of age‡	Indicated at 24 months of age
7 - 11	2 doses, 2 months apart†	1 dose at 12 - 15 months of age‡	Indicated at 24 months of age
12 - 23	2 doses, 2 months apart**	Not indicated	Indicated at 24 months of age
24 - 59	2 doses, 2 months apart**	Not indicated	Indicated
60	Not indicated	Not indicated	Indicated

* : A schedule with a reduced number of total 7-valent pneumococcal conjugate vaccine (PCV7) doses is indicated if children start late or are incompletely vaccinated. Children with a lapse in vaccination should be vaccinated according to the catch-up schedule (CDC. Pneumococcal conjugate vaccine shortage resolved. MMWR 2003 ; 52 : 446 - 7)

† : For children vaccinated at age <1 year, minimum interval between doses is 4 weeks

‡ : The additional dose should be administered 8 weeks after the primary series has been completed

CDC(Centers for Disease Control and Prevention) National Immunization Program

와우이식 방향의 선택

Table 3 Table 4 가 , 10

Strentococcus pneumonia

가 2 Haemophilus influenzae가 가

2

(transtympnic promontory electric stimulation test)

와우이식기의 구조와 종류

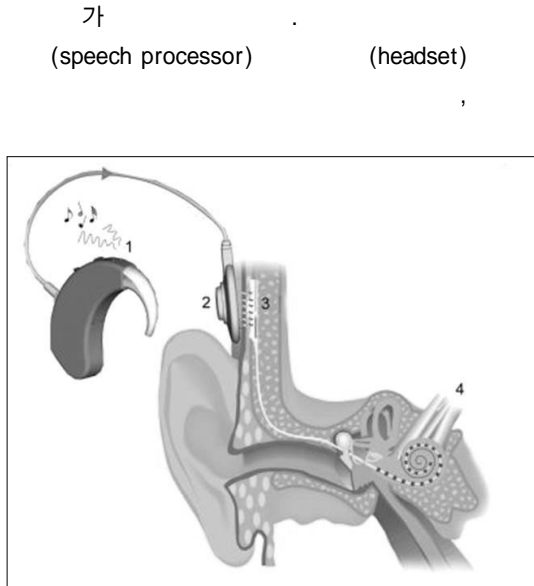


Fig. 1. Cochlear implant with BTE (behind the ear) type speech processor. 1 : The microphone combined with the ear-level speech processor 2 : Antenna, 3 : Receiver/stimulator, 4. Intracochlear electrodes.

가 (speech processor) (headset) (outer device) (microphone), (speech processor), (antenna), (receiver/stimulator) (inner device) / (electrode) (microphone) 가 (speech processor) 가 (receiver/stimulator) / (electrode) (Fig. 1). 20 가 Cochlear Nucleus 24 series, Advanced Bionic

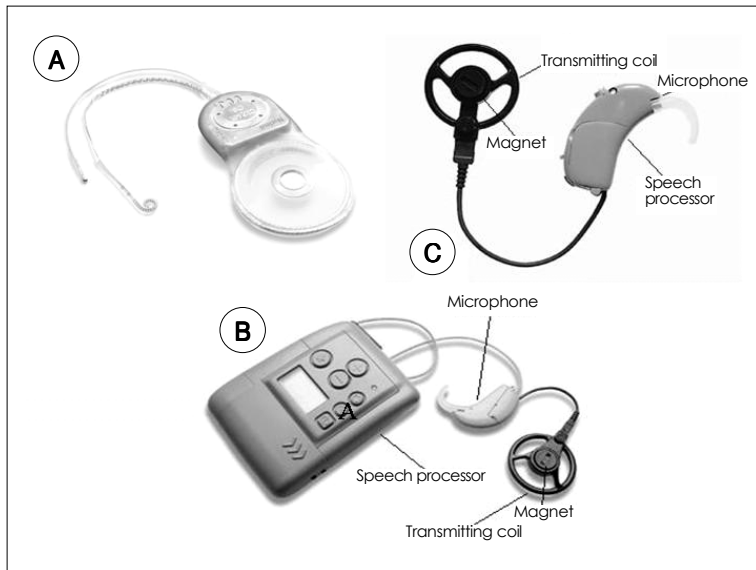


Fig. 2. Nucleus® 3 system. A : Internal device (Nucleus 24 Contour™), B : Body-worn type speech processor (SPrint™), C : Ear-level speech processor (ESPrif 3G™).

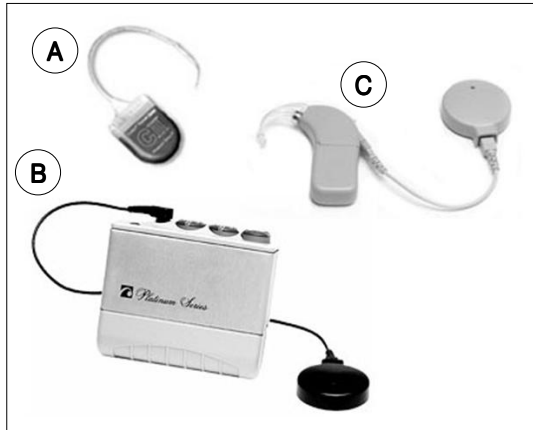


Fig. 3. The Clarion® C Bionic Ear™ system. A : Internal device (C Bionic Ear™), B : Body-worn type speech processor (Platinum Sound Processor™), C : Ear-level speech processor (C BTE™).

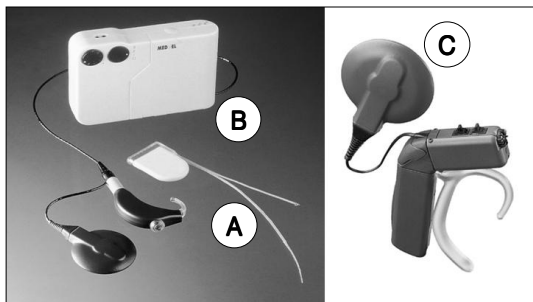


Fig. 4. Med-EI COMBI40/40+ system. A : Internal device (COMBI40/40+™), B : Body-worn type speech processor (CIS PRO+™), C : Ear-level speech processor (TEMPO+™).

Clarion series, Med - EI COMBI40/
40+ series . Nucleus 22 1982
2000 11
FDA Nucleus 24 contour가 12
. 1999
(BTE) 가 Nucleus 24
ESPrIt3G
(Fig. 2). Clarion 1993
2000 11 18
FDA . Positioner
가
2002 가
Positioner

. Clarion 가
가 (body -
worn type) 가 .
가 C Bionic ear system

(Fig. 3). Med - EI

1976

1991

COMBI40+ series 2003

3 12

FDA

TEMPO+

(Fig. 4).

중심 단어 :

REFERENCES

- 1) Park KH. *History and ideal system of CI in Korea. The 9th Ajou otology symposium;2003. p.3-4.*
- 2) Arts HA, Garber A, Zwolan TA. *Cochlear implants in young children. Otolaryngol Clin North Am 2002;35(4):925-43.*
- 3) Luntz M, Balkany T, Hodges AV, Teslische FFI. *Cochlear implants in children with congenital inner ear malformations. Arch Otolaryngol Head Neck Surg 1997;123:974-7.*
- 4) Molter DW, Pate BR, McElveen JT. *Cochlear implantation in the congenitally malformed ear. Otolaryngol Head Neck Surg 1993;108(2):174-7.*
- 5) Balkany T, Gantz BJ, Steenerson RL, Cohen NL. *Systematic approach to electrode insertion in the ossified cochlea. Otolaryngol Head Neck Surg 1996;114:4-11.*
- 6) Rauch SD, Herrmann BS, Davis LA, Nadol JB. *Nucleus 22 cochlear implantation results in postmeningitic deafness. Laryngoscope 1997;107:1606-9.*
- 7) Kim CS, Chans SO, Oh SH, Koo JW, Hwang CH, Lee HJ, et al. *Outcome of cochlear implantation in postmeningitic children. Korean J Otolaryngol 2002;45:13-7.*
- 8) Nabili V, Brodie HA, Neverov NI, Tinling SP. *Chronology of labyrinthitis ossificans induced by Streptococcus pneumoniae meningitis. Laryngoscope 1999;109(6):931-5.*
- 9) Axon PR, Temple RH, Saeed SR, Ramsden RT. *Cochlear ossification after meningitis. Am J Otol 1998;19(6):724-9.*
- 10) Waltzman SB, Scalchunes V, Cohen NL. *Performance of multiply handicapped children using cochlear implants. Am J Otol 2000;21(3):329-35.*
- 11) FDA Public Health Web Notification. *Cochlear implant recipients may be at greater risk for meningitis. Updated Oct 17;2002.*
- 12) CDC. *Pneumococcal vaccination for cochlear implant candidates and recipients: updated recommendations of the advisory committee on immunization practices. MMWR Morb Mortal Wkly Rep 2003 Aug 8;52(31):739-40.*
- 13) Balkany TJ, Hodges AV, Eshraghi AA, Butts S, Bricher K, Lingvai J, et al. *Cochlear implant in children-A review. Acta Otolaryngol 2002;122:356-62.*