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Development of Early Vocal Production Pattern and rehabilitation format in Korean Normal Hearing Infants

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The purpose of this study was to analyze pre-linguistic vocalization patterns in Korean infants with normal hearing (NH), ranged from birth to 18 months, and to develop a rehabilitation program for the Korean infants having difficulties in the vocalization development due to hearing loss. The vocalization during the first two years of life is generally considered as a foundation for the phonological development, coordination of the articulation mechanism, and the meaningful speech. Twenty NH infants ranged from 1 to 18 months of age. The participants were divided into the 6 groups based on their ages; 0~2 months, 3~5 months, 6~8 months, 9~12 months, 13~15 months, and 16~18 months. Data were recorded with 3 video cameras (Sony, model SOC-HDR-XP100, SOC-HDR_XR150, SOC-HDR-XR300) transcribed by the research of pediatric audiology laboratory then compared with the Stark Assessment of Early Vocal Development-Revised (SAEVD-R). In order to elicit representative vocalization, four recording situations were applied including free play with parent and/or toys, a feeding period, solitary play, and etc. The results showed that early vocal development of 1~18 months infants with normal hearing produced a little higher level of SAEVD-R such as vowels, consonants, and monosyllables as the age increased. When the consonants produced by the NH infants were classified according to the place of articulation, the bilabial sounds appeared first followed by labiodental and velar sounds. Specially, the unique /ŋ/ sound, which means 'yes' in Korean, was appeared between 7 to 8 months of age. Based on the results of this study, a structured aural rehabilitation program for Korean infants were presented. This program will include 'Short Fun Stimulation for Inducing Imitation (SFSII)' and Korean traditional child care method 'Dan Dong Sip Hun'. Further, more normal and hearing impaired infant's data should be included for more systematic plans of aural rehabilitation of that age.

The Stark assessment of early vocal development - Revised (SAEVD-R

Level	Vocalization Type
Level 1. Reflexive (0–2 months)	VEG(vegetative sounds), CR, Q(quasi-Resonant nuclei), Q2
Level 2. Control of Phonation (1–4 months)	F(Fully-Resonant Nuclei), F2,cv,cv2,CH
Level 3: Expansion (3–8 months)	V(vowel), V2, Vg(Vowel Glide), IN, SQ, MB(marginal babling)
Level 4: Basic Canonical Syllables (5–10 months)	CV, CB, WH,CV-C, CVCV
Level 5: Advanced Forms (9–18 months)	CMPX, JN(jargon), DP(diphongs)

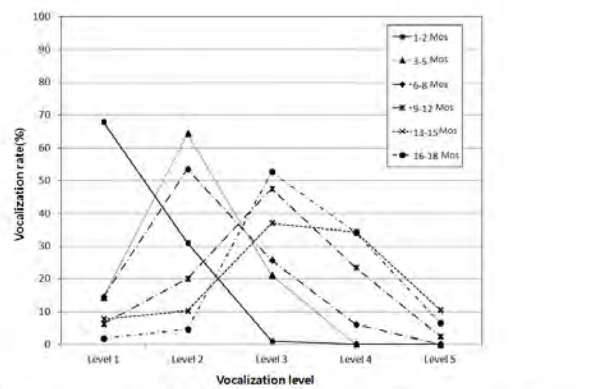

Figure1. Mean proportion of speech-like and non speech-like utterances across ages

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Healthy People 2020 Hearing and Other Sensory or Communication Disorders: Methods, Data Resources, and Prevalence Estimates for Measuring Progress towards Achieving Objectives

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Introduction

Healthy People (HP), sponsored by the U.S. Office of the Assistant Secretary for Health, provides a national health agenda based on quantifiable objectives to improve the Nation's health. Only objectives tracked using reliable national data sets are included. Nine goals to improve hearing health were included in the HP 2010 Chapter 28--Vision and Hearing Health. HP 2020 retained these original nine hearing health objectives but expanded the topic area to include health objectives for other communication disorders, adding targets for tinnitus, balance (vestibular), smell, taste, voice (swallowing), speech and language.

Objective

Report on HP 2020 objectives and describe innovative assessment procedures for tracking objectives in the "Hearing and Other Sensory or Communication Disorders" topic area.

Methods
Hearing healthcare goals include assessing rates of: newborn hearing screening, evaluation, and intervention; use of hearing aids, assistive listening devices, and cochlear implants; timely hearing evaluations; and use of hearing protection to guard against noise-induced hearing loss. Some objectives required setting up new databases (CDC EHDI Program), while others relied on innovative design of new questions for the National Health Interview Survey (NHIS), including combining NHIS questions with hearing exam data from the National Health and Nutrition Examination Survey (NHANES); still others required extracting information from the Healthcare Cost and Utilization Project (HCUP) in order to track annual cochlear implant (CI) surgeries.

Results
CI surgeries nearly doubled from 2001–2010. The largest increase and highest prevalence for CI surgeries was for severe-to-profound hearing-impaired preschool-aged children, increasing from 9.0% in 2001 to 13.0% in 2009. Hearing aid use among older adults (aged 70+ years) with hearing loss of moderate or greater severity increased from 25.2% to 30.1%, 2001–2012. Among younger adults (20–69 years) with moderate or greater hearing loss, prevalence remained unchanged around 16%. Baseline estimates of adults (aged 20–69 years) having a hearing examination in the past 5 years are 28.6%, and for older adults (70+ years) 38.5%. Ever use of hearing protective devices for adults with noise exposure history is estimated as 53.1%, while noise-induced hearing loss among adolescents is estimated as 4.1%, increasing to 10.9% among working-age adults.

Conclusion
The goal of HP is to redirect U.S. health policy towards prevention and health promotion based on the “new” public health, a.k.a. the “third epidemiological revolution”. This report describes new methods, baseline measures, and resulting estimates that are being used to track HP 2020 objectives for hearing and other sensory or communication disorders,

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One Possible Electrophysiological Method for TEN Test: A Preliminary Report of acoustic Change Complex (ACC) and Threshold-Equalizing Noise (TEN)

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Background
Damage to the inner hair cells and/or spiral ganglion neurons results in hearing loss with poor speech discrimination, where is called the cochlear dead region (CDR). If a hearing-impaired person has CDR(s), amplification with hearing aid may not be beneficial to the patient. Recently, a pure-tone test in the presence of threshold-equalized noise (TEN) was introduced to identify CDR. However, this subjective and behavioral method cannot be used for uncooperative persons, so there is a need to develop the objective measurement of the cochlear dead region. The acoustic change complex (ACC) is an evoked potential elicited by changes in an ongoing sound. In this study, we developed TEN-ACC test aimed to present preliminary TEN-ACC data and to evaluate the use of TEN-ACC as an objective tool for detection of CDR.

Methods
Thirty normal-hearing subjects participated in this study. The tests were approved by the Samsung Medical Center Institutional Review Board. The acoustic stimulus, i.e., the first 1 s consisted of only TEN, while the next 1 s consisted of TEN and 1- or 4-kHz pure tone, was provided via an inserted earphone. The pure-tone level was varied from 0–15 dB SNR in 3 dB steps in order to identify the TEN-ACC threshold. The ACC was recorded from Cz and averaged at 120-repeated responses. The behavioral TEN test based on the study by Moore et al (2012) was performed to get the detection thresholds of pure tones over the TEN noise. Then, these two thresholds, behavioral (B) and electrophysiological (EP), were compared.

Results
Robust TEN-ACCs could be collected in all 30 patients. As the pure-tone level over the TEN noise increased, the ACC amplitude increased and the ACC latency decreased. The mean thresholds of 1- and 4-kHz TEN-ACC were 5.9 and 8.1 dB SNR, while those of the behavioral TEN tests were -0.2 and -0.93 dB SNR, respectively. The results demonstrate a positive correlation between the behavioral and electrophysiological thresholds.

Conclusion
Although thresholds of two different measurements were not quite similar (EP thresholds > B thresholds), a significant correlation was found. With these preliminary results, it is assumed that TEN-ACC in the cochlear dead region detection would be possible. Increased validation with hearing-impaired participants is further required.

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Tone-Language Speakers Show Hemispheric Specialization and Differential Cortical Processing of Contour and Interval Cues for Pitch

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Electrophysiological studies demonstrate that the neural coding of pitch is modulated by language experience and the linguistic relevance of the auditory input; both rightward and leftward asymmetries have been observed in the hemispheric specialization for pitch. In music, pitch is encoded using two primary features: contour (patterns of rises and falls) and interval (frequency separation between tones) cues. Recent evoked potential studies demonstrate that these “global” and “local” aspects of pitch are processed automatically (but bi-

Association for Research in Otolaryngology

38TH Annual MidWinter Meeting

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Wednesday, February 25, 2015

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