INTRODUCTION

Auditory maturation
- The auditory system gradually matures from birth to adulthood.
- Developmental changes are observed in brain function and behavior.

Development of cortical auditory processing
- Cortical auditory evoked potentials (CAEPs) (Figure 1) are objective measures of cortical activity in response to sound.
- Amplitudes and latencies of CAEP obligatory components (P1, N1) index auditory maturational changes.
- P1 amplitude and latency decrease with development.
- N1 amplitude increases and N1 latency decreases with development.

Development of speech understanding ability
- Speech understanding in quiet and in noise develops gradually.
- Speech reception thresholds improve with age.

Questions
- Are there frequency specific differences in cortical auditory maturation?
- How is cortical maturation associated with speech understanding?

Study goals
- Investigate auditory development from childhood to young adulthood
- CAEPs in response to high- and low-frequency speech sounds.
- Speech understanding in quiet and in noisy conditions.
- Association between CAEPs and speech understanding.

METHODS

Study Design and Participants
- Study Design
- EEG Testing

Speech Understanding
- Four-alternative-forced choice task
- Speech reception threshold (SRT) point on psychometric function at 79.4% performance

EEG Testing
- CAEPs collected during passive listening
- Stimuli
- Naturally spoken /m/ & /s/ phonemes
- Monaural, 65 dB SPL
- 80 ms duration
- 150 trials each
- ISI=1000-2000ms

Analysis approach
- N1 and P1 peak amplitudes and latencies and SRTs in quiet and noise were examined
- Analyses were done with age as a continuous variable
- Participants were also grouped in the following categories for comparison
  - Ages 5-6, N=5
  - Ages 7-10, N=12
- Figure 2: Children’s Index of Speech Perception (CISP

RESULTS

Development in speech CAEPs

Correlations between CAEPs and SRTs

DISCUSSION

Maturational changes (reduced P1 and increased N1 amplitudes) were observed in cortical responses to both low- and high-frequency speech sounds

SpeECH cortical processing is moderately correlated with speech understanding in quiet and in noise

REFERENCES


This work was supported by NIH-NECD (R01DC00383, Litovsky) and NIH-NECD (R01DC00381, M. S. Litovsky, Hartley and Alexander). This study was supported in part by a core grant to the Waisman Center from the National Institute of Child Health and Human Development (P50HD010353). Special thanks to Stephanie Sellner, Molly Osborn, Amanda Lackner and other BHSL lab members for helping with data collection.