Background

Spectral resolution improves with age and depends on FR of the implant. Spectral resolution is limited in adult CI listeners due to reduced FR of the implant.

The spectral modulation transfer function (SMTF) demonstrates the relationship between FR and SMS (Fig 7).

Spectral resolution is limited in adult CI listeners due to reduced FR of the implant. Children may be even more limited given their age.

Methods

Participants:
- 11 CI school-aged children (aged 5-16; mean 9.7, SD 3.5)
- 4 CI adults (aged 51-73; mean 59, SD 10)

Inclusion Criteria:
- Children implanted prior to age 2
- Monolingual CI listeners
- Regular / meaningful-use of CI

Tasks & Stimuli

Aim 1: Understand development of spectral resolution using SMRT:
- Computer task: "Click the sound that is different"
  - Stimuli are broadband noises with ripple spectral envelopes in ripples per octave (RPO)
  - Listeners are tested to find the first RPO stimulus they can distinguish from 20 RPO + ripple density thresholds

Aim 2: Compare SMRT to performance on speech tasks:
- Computer task: "Click the word you hear"
  - Preferred ear tested; other CI removed
  - Spoken words are presented in speech (male or female PNR voices, randomized)
  - If "NO" correct, words are presented in background noise with +10 dB signal-to-noise ratio (SNR)

Hypotheses:

1. All listeners will perform better at higher modulation depths.
2. CI children will perform worse on spectral resolution tasks than CI adults due to immature SMS.
3. Children will perform worse on speech ID tasks given immature SMS.

Results

Children and adults showed a significant effect of modulation depth on ripple density.

Children appear to perform as well or better than adults on SMRT.

Conclusions

Children appear to perform at least as well as if not better than adults on SMRT and speech ID tasks. This pattern of performance on SMRT was not shown when using the same task to test normal hearing children and adults nor has it been demonstrated in literature. Comparison of this study may yield different results.

Limitations

1. Comparing post-lingually deaf adults to pre-lingually deaf children adds additional variables.
2. Age of children may affect the ability to perform the task correctly (inattention, misunderstanding).
3. Small and unequal sample sizes preclude a better comparison of age effects.