The American Otological Society

CLINICIAN SCIENTIST AWARD 2013-2014

“Spectral and Temporal Resolution in Infants with Cochlear Implants”

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AMOUNT AWARDED: $96,233

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PUBLICATIONS:

Noble AR, Halverson DM, Resnick J, Broncheau M, Rubinstein JT, **Horn DL**. Spectral Resolution and Speech Perception in Cochlear Implanted School-Aged Children. Otolaryngol Head Neck Surg. 2024 Jan;170(1):230-238. doi: 10.1002/ohn.408. Epub 2023 Jun 27. PubMed PMID: 37365946; PubMed Central PMCID: PMC10836047.

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Noble AR, Resnick J, Broncheau M, Werner LA, Rubinstein JTR, Werner L, **Horn DL,** Spectrotemporal Modulation Discrimination in Infants with normal hearing. Ear Hearing 2022 Oct 10.DOI: 10.1097/AUD.0000000000001277 PMID:36218270

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Jahn KN, Arenberg JG, **Horn DL**. Spectral Resolution Development in Children with Normal Hearing and with Cochlear Implants: A review of Behavioral Studies. Accepted to Ear and Hearing. J Speech Lang Hear Res.2022 Apr 4;65(4):1646-1658. PMID: 35201848 DOI: 10.1044/2021_JSLHR-21-00307

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Horn DL, Won JH, Jones G, Rubinstein JT, Werner LA (2017). Spectral ripple discrimination in normal hearing infants. Ear and Hearing. 38 (2):212-222.

RESEARCH SUMMARY: **The focus of my research is to understand how the ability to hear with a cochlear implant develops in prelingually-deaf infants. I utilize psychophysical tests of auditory discrimination that can be applied to infants as young as 3 months old. With the AOS funding, I was able to collect crucial pilot data on normal-hearing infants’ discrimination of spectrally-modulated noise. This led to successful K23 funding and, subsequently, to R01 funding. Currently, we are investigating how perception of acoustic modulation, an important factor for speech understanding, develops in CI infants and how it predicts later speech perception.**

OUTCOMES: **Infants with normal hearing have adult-like temporal and spectral resolution by 3-6 months of age. Infants with cochlear implants show similar spectral resolution by 3-6 months post activation. For school-age children implanted during infancy, spectral resolution is related to consonant identification in quiet and predicts transmission of place of articulation for consonant identification.**

FURTHER FUNDING HAS ENABLED US TO EXPAND OUR RESEARCH TO: **We are now using the psychophysical tests developed during the AOS funding period to study auditory phenotypes of children with different genetic etiologies.**

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LAY SUMMARY OF FINDINGS AND IMPLICATIONS OF THIS RESEARCH: **To learn to understand and communicate spoken language, infants must be able to perceive changes in sounds over time and across frequency. Our research suggests that these abilities are adult-like by 3-6 months of age. For infants who use a hearing device, like a cochlear implant, measuring these abilities might help clinicians understand how well the device is working. Our current research is studying how these hearing abilities develop after cochlear implant activation and whether they are related to later speech perception.**