Despite the impoverished auditory signal cochlear implantation provides in comparison to the normal hearing, remarkable outcomes are testimony to the importance of the brain. Neuroplasticity underlies the ability of all implant recipients to benefit from this technology. In order for deaf children to achieve age-appropriate speech and language, early implantation that minimizes the period of auditory deprivation is necessary. Implantation of younger children whose brains are more plastic and not dominated by non-auditory input is critical to optimizing outcomes, as is effective listening (brain) training. Surprising outcomes of early cochlear implantation, including complex children with other disabilities and eighth nerve deficiency, are possible and will be illustrated. Results of a study to predict the outcomes of pediatric cochlear implantation based on brain neuroanatomy as determined by pre-surgical magnetic resonance imaging will be presented. The long-term goal of this research is to develop precision therapy to optimize outcome based on an individual child’s brain structure and function.

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