

## **Reaching Higher: Hearing Assessment Reformulation Project (HARP)**

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Routine assessment of hearing function is limited to frequencies below 8 kHz, despite strong evidence that many auditory disorders first manifest at the highest audible frequencies. Practical difficulties in delivering accurate signals to the eardrum at extended high frequencies have perhaps been the most significant roadblock in the widespread adoption of hearing evaluation at extended high frequencies. The purpose of HARP is to develop and evaluate accurate tests of auditory function that cover the entire bandwidth of human hearing. The mission of HARP is to facilitate the adoption of these tests into clinical practice where appropriate. With funding from the National Institutes of Health and the Knowles Hearing Center, we have made significant strides towards these goals in the last five years. A prototype instrument capable of measuring hearing thresholds, otoacoustics emissions, and speech perception in noise using forward-pressure-based calibration has been used in two audiology clinics to record data from over 1500 subjects. With additional funding from the Office of Naval Research, portions of this prototype instrument are being developed into a research-grade device in partnership with Etymotic Research. Our journey from conception to the present day will be the backdrop to our presentation. The challenges of accurate calibration and our solutions will be discussed. Hearing thresholds, distortion product, and stimulus frequency otoacoustic emissions measured in subjects between the ages of 10 and 65 will be described. These data demonstrate the feasibility of making routine measurements across the entire bandwidth and dynamic range of human hearing. The data also demonstrate the sensitivity of hearing thresholds and otoacoustic emissions at high frequencies to aging related changes in the auditory system. Results that allow examination of the relative value of different tests of auditory function will be discussed as well. Although we are just getting started, we believe that it is already clear that assessment of the auditory system at the highest audible frequencies is ready for primetime. [Supported by the NIDCD and Northwestern University]