



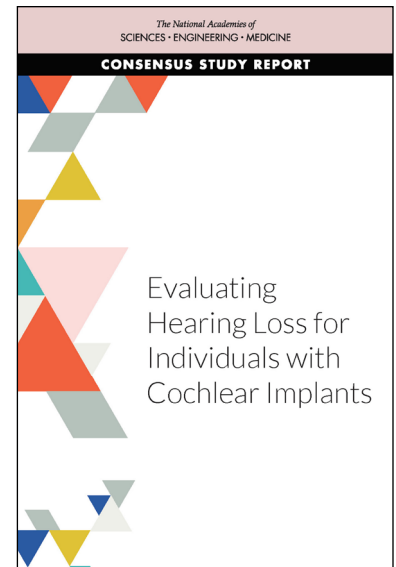
MARCH 2021

## Evaluating Hearing Loss for Individuals with Cochlear Implants

The U.S. Social Security Administration (SSA) administers programs that provide disability benefits to individuals who qualify due to a disability. Once SSA establishes the presence of a severe impairment, it determines whether the impairment meets the criteria in the Listing of Impairments (Listings) that qualify a candidate for disability benefits. The Listings are a preliminary screening step; if an individual does not meet a Listing, they could still qualify for disability benefits at a later step in the evaluation process. The evaluation of hearing loss is organized into two broad categories: (1) hearing loss not treated with cochlear implantation and (2) hearing loss treated with cochlear implantation. This report focuses on hearing loss in adults and children with cochlear implantation.

The current Listings that address hearing loss treated with cochlear implantation contain criteria that evaluate hearing ability through a speech recognition test called the **Hearing in Noise Test (HINT)**. The HINT measures sentence recognition and is standardized to be administered with background noise, although SSA uses the HINT sentences in a quiet environment. SSA seeks to generalize the Listings criteria to be evaluated with the results from hearing tests other than the HINT that have similar characteristics. Unlike the Listing for hearing loss in individuals with cochlear implants, the Listing for hearing loss not treated with cochlear implantation does not specify a test. Instead, it requires a “word recognition score of 40 percent or less in the better ear determined using a standardized list of phonetically balanced monosyllabic words.”

At the request of SSA, the National Academies of Sciences, Engineering, and Medicine convened a consensus study committee to **identify and recommend generalized testing procedures and criteria for evaluating the level of functional hearing ability needed to make a disability determination in adults and children after cochlear implantation**. The committee’s report details and supports its findings, conclusions, and recommendations based on published evidence and professional judgment.



## COCHLEAR IMPLANTS

Cochlear implants are small, surgically implanted electronic devices that help provide a sense of sound to individuals who are profoundly deaf or severely hard of hearing. They do not amplify sounds to improve normal hearing; rather, they give a representation of sounds in the environment, which helps with understanding speech. Cochlear implants work by replacing the function of the damaged cochlea (inner ear) and stimulating the auditory nerve directly.

The criteria to receive a cochlear implant changed over time as the safety and efficacy of cochlear implants were better understood. Traditionally, they were based on a sentence score for adults and on a word score for children. In 2019, the U.S. Food and Drug Administration (FDA) approved cochlear implant devices for children 5 years and older and for adults with single-sided deafness and asymmetric hearing loss. These approvals include indications that base candidacy on a word score for children and adults, representing **a trend toward the use of monosyllabic word measures with both children and adults.**

## THE HEARING IN NOISE TEST (HINT)

SSA currently uses the HINT, first published in 1994, to determine functional hearing ability in adults or children with hearing loss treated with cochlear implantation. While the HINT sentences were developed to be adapted according to response in order to minimize floor and ceiling effects, in clinical use the sentences are typically presented at a fixed level in a quiet environment. This, along with improvements in cochlear implant technology, has resulted in individuals with cochlear implants scoring consistently near the ceiling on the HINT. **Recent work has demonstrated that the HINT is limited not just by its ceiling effects when presented in quiet or fixed signal-to-noise ratios, but also by its administration, ecologic validity, and availability.** In addition, the HINT is no longer available for purchase and is difficult for clinics across the United States to obtain.

## CONCLUSIONS AND RECOMMENDATIONS

Since its development in 1994, the HINT has been widely used to measure cochlear implant candidacy and postoperative outcomes. However, the test characteristics, the state of cochlear implant technology, and the environment that made the HINT a common choice of assessment in 1994 are different in 2021. The HINT has several limitations in its characteristics and deviation from its intended use.

More recently, word recognition testing is being used in most audiology clinics. Monosyllabic word recognition is also the current standard for pediatric cochlear implant candidacy, and the field is moving toward this criterion for adult candidacy in the United States. Additionally, for more than two decades, monosyllabic word recognition has been used to characterize postoperative outcomes for both adult and pediatric cochlear implant recipients. Furthermore, SSA has been using monosyllabic words to determine initial and continued eligibility for SSA benefits for individuals with hearing loss who have not been treated with cochlear implantation.

The current use of the HINT sentences as criteria for cochlear implantation likely suffers from ceiling effects of the test materials. Speech assessment via sentences fundamentally differs from assessment via individual words because it offers context to the information, and such context may result in improved scores in speech understanding. Limitations of the HINT include difficulty of obtaining the test, the shift in the cochlear implant community toward using word tests, and the fact that SSA already uses word tests for individuals with hearing loss who do not have a cochlear implant. Thus, **the committee recommends the use of a monosyllabic word recognition test to assess hearing loss in individuals treated with cochlear implantation,** consistent with what SSA currently uses to determine disability in adults and children with hearing loss not treated with cochlear implantation. The administration of the word test should include a full word list that is standardized and phonetically or phonemically balanced.

Regarding generalized testing procedures and criteria for evaluating the level of functional hearing ability needed to make a disability determination in adults and children after cochlear implantation, **the committee recommends using the following presentation level and standardized test setup:**

- 60 dB SPL using hearing technology recommended for the individual that is functioning properly and adjusted to the individual's normal settings. In cases of single-sided deafness or asymmetric hearing loss, the non-implanted ear should not be occluded for testing;
- The level should be calibrated for sound field presentation;
- The test material should be recorded to ensure standardized administration;
- Testing should occur in quiet in a sound-treated booth; and
- The listener should be seated 1 meter from the loudspeaker at 0-degree azimuth.

Finally, **the committee recommends that SSA use the same cut-off criteria for evaluating hearing loss in individuals with cochlear implants as the current Listing for hearing loss in individuals without cochlear implants.** That cut-off (40 percent or less on a monosyllabic word) aligns with the criteria used in the most recent FDA clinical trials for cochlear implants.

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To read the full report, please visit  
<http://www.nationalacademies.org/SSAhearingloss>

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