In the other configurations AGC matching also increased bimodal benefit. Subjectively the AGC-matched HA was rated higher than the standard HA for the understanding of one person in quiet and noise and for sound quality. At study completion nine subjects preferred to keep the AGC-matched HA, one preferred the standard HA and five had no preference.

CONCLUSIONS

A HA with AGC matched to that of the CI processor resulted in better speech understanding in noise compared to a HA with standard AGC. When noise was presented from the HA side, the AGC matching resulted in a 1.9 dB benefit, even though the HA was at the least favorable signal to noise ratio side. This finding was supported by subjective ratings and user preference. These results encourage the use of a CI processor and HA with matched AGC characteristics for bimodal use.

OBJECTIVES

To evaluate the improvement of bimodal benefit in listeners using a CI and a HA in contralateral ears, by matching the input/output curves and time constants of the AGC of the HA to that of the CI.

METHODS

• Fifteen postlingually deaf adult subjects were included
• All subjects used the same CI sound processor (Advanced Bionics Harmony) in one ear and an acoustic HA (Phonak Naída S IX UP) in the other ear for two months before the start of the study.
• Three-visit cross-over design (four weeks between sessions)
• Performance measured using a HA
  − With standard AGC or
  − AGC adjusted to match that of the CI processor ➔ syllabic multichannel compression with 1ms attack time and 50ms release time vs. dual AGC broadband compression with 3 and 240ms attack time and 80 and 1500ms release time.
• The devices were loudness-balanced for soft and loud input in three frequency bands.
• Speech understanding (LIST test) was tested in free-field in quiet and noise in three configurations with speech always coming from the front and single-talker noise presented from the
  − CI side (SONCI)
  − HA side (SONHA)
  − From both sides (SON+/−90)
• Questionnaires were completed to assess subjective perception differences.

RESULTS

• The bimodal benefit was evaluated using the signal-to-noise ratio for 50% performance.
• Compared to the standard AGC, the matched AGC significantly improved speech understanding in single-talker noise by 1.9 dB when noise was presented from the HA side (SONHA).

KEY TAKE AWAY POINTS

• In current clinical practice, bimodal devices (hearing aid - HA and cochlear implant - CI) are often fitted separately, failing to ensure optimal perception of binaural cues. Matching some of the HA/CI parameters could be a way to optimize bimodal performance. This study investigates the effect of matching the Automatic Gain Control (AGC) of the two devices.
• Matching the AGC characteristics of the Phonak Naida S IX UP HA to the AGC of the Advanced Bionics CI processor in bimodal users resulted in higher bimodal benefit (up to 1.9 dB) compared to that obtained with a HA with standard AGC for speech understanding in noise.
• This study supports the implementation of a matched AGC to deliver improved bimodal fitting experience to professionals and bimodal hearing experience for bimodal listeners.

In May 2016, Advanced Bionics (AB) and Phonak introduced the first integrated hearing solution for bimodal listeners. The Naída™ Link hearing aid offers full-bandwidth bidirectional audio streaming with the Naída CI Q70 and Q90 sound processors. A new Target prescriptive fitting formula, Adaptive Phonak Digital Bimodal (APDB), optimizes the hearing aid’s frequency response and aligns loudness growth functions and automatic gain control (AGC) characteristics between the Naída Link and Naída CI processor.