

Learn more about the science that proves  
performance

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hear Hear Your Best

Advanced Bionics





performance



AB

# Hear Your Best

Just as athletes train hard to achieve their best time on race day, **AB works hard to deliver performance**, so that you may hear your best from moment to moment, every day.

Selecting the right cochlear implant  
to go the distance with you or your child is a  
big decision.

While the look of a cochlear implant system is important, when it comes to something as valuable as your ability to hear your best—as close to normal hearing as possible—there's nothing more critical than reliability and performance. Choose the only cochlear implant system that brings you the highest reliability and best performance in the world—the Harmony™ HiResolution™ Bionic Ear System (Harmony) from Advanced Bionics.

Five important independent studies conducted by leading research scientists show that you or your child may *hear your best with AB in quiet, noise, on the phone, and for developing language*<sup>1-5</sup>—*the everyday listening experiences when your hearing really matters*. And a multicenter study sponsored by AB proved that *Harmony recipients have the best experience listening to music*.<sup>6,7</sup>

# Number One in System Reliability

If any part of your cochlear implant system requires repair or replacement, you'll lose your ability to hear during that downtime. While part of your child's cochlear implant system is repaired or replaced, language skills are delayed and your words of encouragement won't be heard. You need a cochlear implant that you can rely on, so when choosing one, you should know its "Total System Reliability"—the reliability of both the internal and external components combined—in order to make the right decision.

By selecting the Harmony™ System, not only will you experience the highest reliability of internal components, you'll also benefit from the highest reliability of external components, which means you can count on the Harmony System to keep you hearing your best day after day.

AB recognizes the need to improve the recipient's experience with reliability. Over its 17-year history, AB has remained focused on making significant advancements in the reliability of its cochlear implant systems. Dramatic improvements have been achieved, positioning today's AB cochlear implant system as number one in Total System Reliability. While researching reliability, make certain you have the most current data available.

## Highest Internal Reliability

Made to last, AB cochlear implants implanted today demonstrate the industry's leading reliability with a **99.6%** two-year cumulative survival rate (CSR),<sup>8</sup> a measure that defines the likelihood of a device continuing to function over time. You can rest assured that an AB cochlear implant will continue to work so that you may always hear your best.

## Highest External Reliability

Built to survive real-world conditions, including rain, perspiration, and moisture, Harmony's sound processors are more than **99%** reliable based on a three-month average failure rate of less than **1%**,<sup>8</sup> which means that you will hear longer without interruption.

## Guaranteed Water Protection

The Harmony processor features advanced water protection with a Xylex™ case that resists water penetration and a special coating on the internal electronics that provides a waterproof barrier. AB backs this water protection with a three-year warranty.

**AB reports and publicizes sound processor reliability data. Ask your audiologist about the external reliability rates of other cochlear implant manufacturers and how poor external reliability can impact your hearing experience.**

# Know the Total System Reliability Before Making a Decision

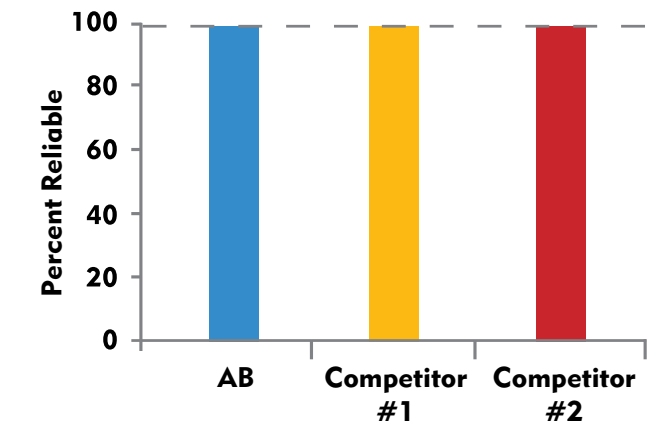
## Why Reliability Matters Most

With an Advanced Bionics cochlear implant system, you'll have peace of mind knowing that you or your child can count on your internal device every day for better hearing at work, school, or play. You'll also experience fewer interruptions in hearing because AB offers the highest system reliability. From your baby's giggle to a cat's purr, you won't miss the special details of life when you choose a reliable cochlear implant system you can really depend on—Harmony, only from AB.



Harmony Sound Processor Internal Electronics Feature Advanced Water Protection that Resists Water Penetration and a Special Coating that Provides a Waterproof Barrier

AB adheres to the **highest reliability** standards in the medical device industry.



All three manufacturers report **over 99.5%** reliability for their **internal** devices<sup>8,9,10</sup> but **real** reliability is when you can count on the **entire system** to hear your best.



AB's **external** processor has the lowest average 3-month failure rate of **less than 1%**<sup>8</sup>



# Hear Your Best Today & Always



## Why Performance Matters

Along with reliability, performance is the **most important consideration** when it comes to selecting the right cochlear implant for you or your child. As an adult recipient, you want to easily participate in conversations that take place in noisy settings and on the telephone. You also want to **hear all the details that make the world of sound so rich**—the nuances of conversation, the complexities of a musical composition, and so much more. Children need to hear the words, inflections, and patterns essential for developing strong speech skills without having to remember to adjust their sound processors. **With Harmony's unequalled technology and performance, you or your child may hear your best.**

*"Emily's above grade level for all of her subjects, including her reading and comprehension. Her teachers don't have to mess with switching out programs...Emily knows how to do everything with it...It's an easy system to use, so kids can start early, taking care of it themselves."*

—Helen Cartwright, mother of Emily, implanted at age 13 months, bilaterally implanted at age 6

## The World's Best Hearing Performance

Harmony features the world's most sophisticated technology to bring you clear, high-resolution sound. While most cochlear implants on the market were designed to perform best in quiet, clinic-like conditions, Harmony is designed to help you hear well in everyday settings like busy offices, noisy classrooms, and bustling restaurants. ***In fact, important comparative studies conducted by leading independent researchers show that AB surpasses other cochlear implant manufacturers with better hearing performance in real-world situations.***<sup>1,2</sup>

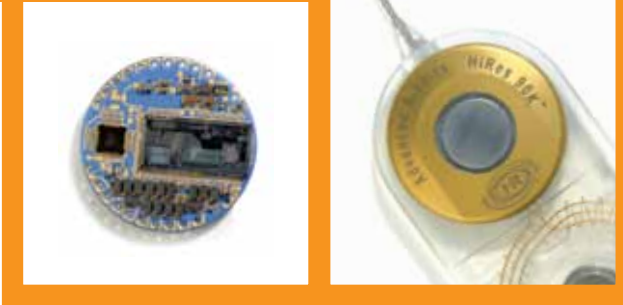
Only AB delivers the best performance by offering the Harmony Advantage—the industry's most advanced technology. No other cochlear implant manufacturer offers this technology.

- **HiResolution™ (HiRes) Sound**—*the clearest, most accurate sound* with five times more resolution than any other cochlear implant system
- **AutoSound™**—*automatically adapts to your surroundings*, just like a normal-hearing ear, so there's no fumbling with dials, switches, or remote controls to continually make adjustments for changing sound environments
- **T-Mic™ Microphone**—*the only microphone placed naturally* at the opening of the ear for highly focused hearing while providing wireless connectivity to cell phones, MP3 players, and more



The Harmony Advantage, only from AB, lets you hear your best anytime, anywhere.

# It's What's Inside that Counts



**HiRes 90K™ circuitry** (shown left) provides nearly unlimited ways to deliver stimulation—including ways not invented yet. It is the **only device with 16 current sources**.

Every cochlear implant manufacturer is working on smaller sound processors, but AB is also focusing on what matters most for your hearing: **Performance**. Make your choice for the right reason—hearing your best.

Since 1993, AB has decreased the weight of its sound processors by 94% and will continue to develop smaller external components that support the world's most advanced cochlear implant technology. A thin processor that is thin on performance will not allow you to hear your best. It's important to choose a cochlear implant system that offers the world's most superior performance today and upgradeability for your hearing tomorrow. Remember that how your sound processor looks will undoubtedly change over time—what matters more than its appearance and size is the technology inside that delivers the best hearing experience to you or your child.

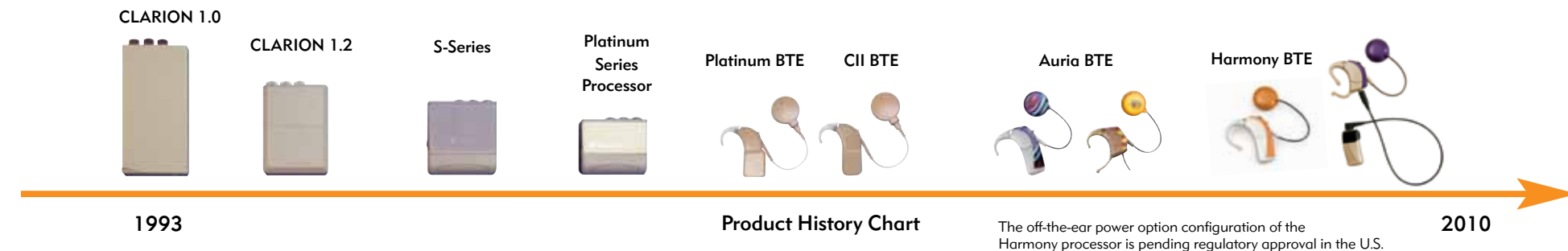
## Why the Technology Inside Matters

The size and outward appearance of your cochlear implant system won't help you or your child hear any better. **To hear your best, you need what's best on the inside.** When you choose a cochlear implant system from AB, you benefit from superior internal technology now and external upgradeability for the future so that your hearing advances as the technology does—without the need for surgery. **You can count on new innovations from AB to improve your quality of life.**

*"The Bionic Ear appeared to offer more potential for being upgraded in the future as new and better coding strategies and software became available so that I could conceivably have more and better hearing."*

—Michael Chorost, implanted at age 37

Processors get smaller over time and implant changes require surgery, so what you want is the best implant available today.



Throughout its 17-year history, AB has consistently made the industry's leading technological hearing advancements, including superior temporal resolution, spectral resolution, dynamic range, and stimulation flexibility designed to be the most like normal hearing.

	AB's Harmony System	Cochlear's Nucleus Freedom System	Cochlear's Nucleus 5 System	Med-El's Maestro System	Why this Matters
<b>Temporal Resolution</b> (Stimulation Rate, pulses per second or pps)	Up to 83,000 pps	Up to 32,000 pps	Up to 31,500 pps	Up to 50,000 pps	The faster the stimulation rate, the more accurate the timing of sound.
<b>Spectral Resolution</b> (Spectral Bands)	Up to 120	Up to 22	Up to 22	Up to 12	The higher the resolution, the more detailed sound you hear.
<b>Potential Pitch Percepts</b>	460*	161*	161*	Data not available	The more pitch percepts, the better the opportunity you have to differentiate sounds.
<b>Input Dynamic Range (IDR)</b> (Decibels or dB)	Up to 80 dB	45 dB	45 dB	55 dB	The wider the range, the more sounds you hear.
<b>Current Sources</b>	Multiple	Single	Single	Multiple	Multiple current sources allow unique sound processing strategies. AB has 16. Cochlear has 1.
<b>Simultaneous Stimulation Channels</b>	4	0	0	0	Simultaneous channel stimulation is required for current steering, which delivers a fuller musical experience.
<b>Sound Coding Strategies</b>	HiRes 120-S, HiRes 120-P, HiRes-S, HiRes-P, CIS, MPS	ACE, CIS, SPEAK	ACE	FSP, HP-CIS	Every ear is different, so the more sound strategies offered, the more options you have for hearing your best.
<b>Listening Modes</b>	BTE Mic, Telecoil, T-Mic	BTE Mic, Telecoil	BTE Mic, Telecoil	BTE Mic, Telecoil	Connect to audio devices like normal-hearing people do; enjoy natural, focused listening.
<b>Case Impact Resistance</b>	Up to 6 joules	Up to 1 joule	Up to 2.5 joules	Data not available	The more joules your cochlear implant can resist, the more impact it can take without affecting performance. From flying soccer balls to falling off a bike, you can have peace of mind knowing that AB implants are built kid tough.
<b>Moisture Resistance</b>	Yes	Yes	Yes	Yes	Backed by a three-year warranty, AB's advanced water protection is guaranteed to keep water where it belongs—on the outside of your sound processor.

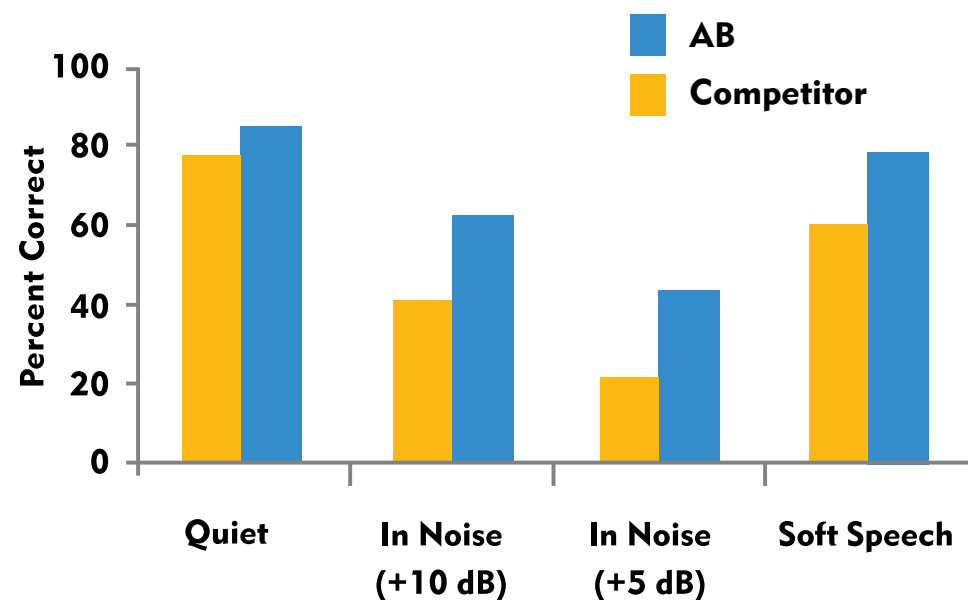
\* Capability representative of software that is not commercially available from any cochlear implant manufacturer

# Hear Your Best

*in Everyday Situations*

## Real Science

In an independent study by experts Spahr, Dorman, and Loiselle, AB outperformed the competition on tests of everyday listening.<sup>1</sup>



Mean sentence scores in quiet, noise, and at a soft level for 13 AB users and 13 competitor users. AB users hear better than competitor users in noise and when speech is soft.

## Why this Study Matters

This independent study shows that **Harmony outperforms the competition** in three common hearing situations: quiet environments like libraries, noisy settings like restaurants, and when speech is as soft as a whisper. The Harmony System's high spectral resolution helps you hear in these real-world settings. And unlike competitor devices, **with AB cochlear implant systems, there's no need to fumble with dials, switches, or remote controls** every time you move from quiet to loud listening environments. So whether a professor calls on you in a loud lecture hall or your spouse whispers, "I love you," with AB's Harmony System, you'll hear the incredible sounds that enrich your life and relationships.

*"Advanced Bionics technology allowed for a variety of performance strategies. It could be adjusted to take into account each child's unique hearing response to the implant."*

—Debbie Brillong, mother of Samantha, implanted at age 16; and Jonathan, implanted at age 6



## What is Spectral Resolution?

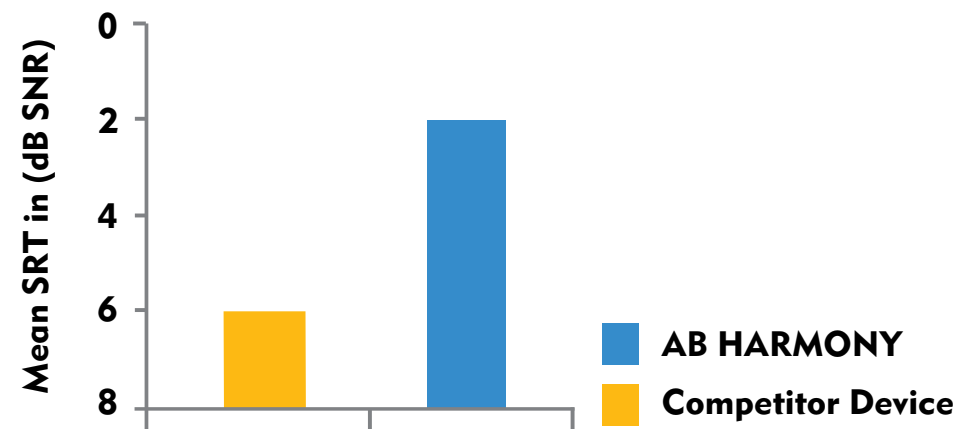
Spectral resolution refers to how well the cochlear implant delivers frequency, or "pitch" information, to the inner ear. Typically, cochlear implant recipients hear different pitches when different electrodes are stimulated and when the rate of the stimulation varies. The better the spectral resolution, the better you can hear these pitches. **High spectral resolution is especially important for listening in noisy situations and for hearing and appreciating music.** For unsurpassed spectral resolution, HiRes 120™ sound processing from AB allows current to be "steered" between electrodes giving Harmony recipients 120 spectral bands for hearing and **delivering five times more sound than any other cochlear implant system.**



# Hear Your Best in Real-World Settings

## Real Science

Independent research by Haumann, Büchner, and Lenarz concluded that AB recipients hear speech better in noise and everyday life situations than recipients of competitor devices.<sup>2</sup>



Results given as signal-to-noise ratio (SNR). Smaller SNR values mean better results. On this decibel scale, the scores with AB Harmony are 150% better than with the competition.

## Why this Study Matters

Whether you're in a meeting at the office or your child is reading aloud in the classroom, **hearing speech is crucial to fully participate.** This independent study proves that Harmony recipients hear speech better in noisy situations and group gatherings. **AB's unique AutoSound™ technology automatically adapts to changing listening environments** so that you hear your best in everyday settings. For your child's language development, the best way to learn how to speak is to hear people speak, which is why it's important to **choose a cochlear implant system that allows them to hear speech in a variety of real-world settings** from classrooms, playgrounds, to school plays, not just in silent sound booths in clinics.

*"I had, for the longest time, dreamed that Brandyn would be like any other kid. And, today, at age seven, he very much is."*

—Melissa Li, mother of Brandyn, implanted at 16 months of age



With AB's superior technology, your child can develop language skills in noisy classrooms, or at a busy playground, just like their normal-hearing peers.

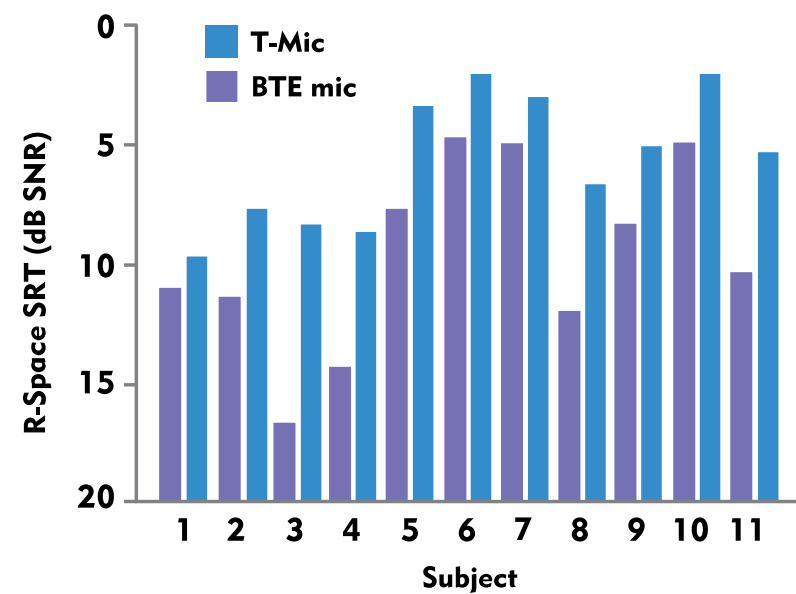


Brandyn Li, implanted at 16 months of age

# Hear Your Best in Noisy Surroundings

## Real Science

Gifford showed that 11 out of 11 recipients understood more sentences in noise with Harmony's unique T-Mic™ than with a behind-the-ear (BTE) microphone.<sup>3</sup>



Individual sentence reception thresholds (SRTs) for 11 Harmony recipients using the BTE microphone and the T-Mic, only from AB. A smaller SRT is better and means that the listeners can hear the same sentences in more noise. Scores for the T-Mic were better for all subjects.

## Why this Study Matters

Hearing in noise is a common challenge for everyone, but especially for people with hearing loss. Whether you're at a dinner party, wedding, or networking event, you want to easily participate in the lively discussions that take place—not struggle to keep up with the conversation, so it's important to choose the cochlear implant system that performs well in these challenging settings. This study shows that in noisy situations, AB helps you hear more of your world.

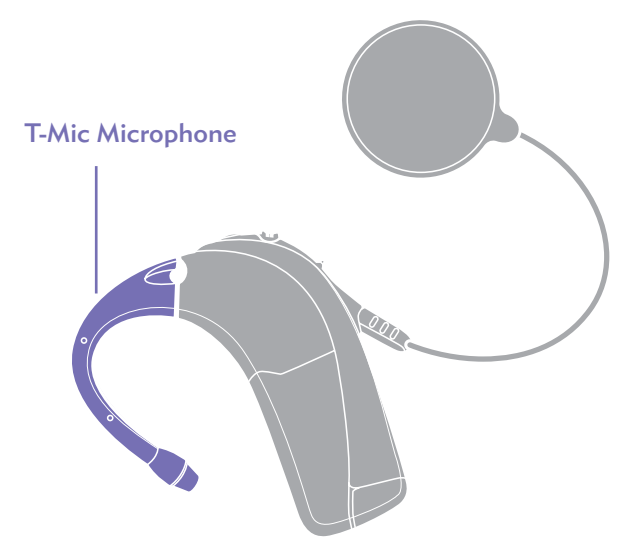
*"It's pretty awesome anywhere I go. If I'm in a noisy restaurant, a nightclub, or a raceway, I have no trouble hearing people talk. I never thought this would be possible for me."*

—Jaki Scheckter, works in Formula One racing, bilaterally implanted at age 31



## T-Coil vs. T-Mic

All cochlear implant systems offer a built-in T-coil, which picks up sound if you have a compatible telephone, neckloop, or other accessory. **The T-Mic™ Microphone, only from AB, lets you enjoy effortless listening by providing wireless connectivity with cell phones, MP3 players, and other audio devices without the need for any wires, cables, special adapters, or connectors. With the T-Mic, you can use the most popular audio devices just like people with normal hearing do.**

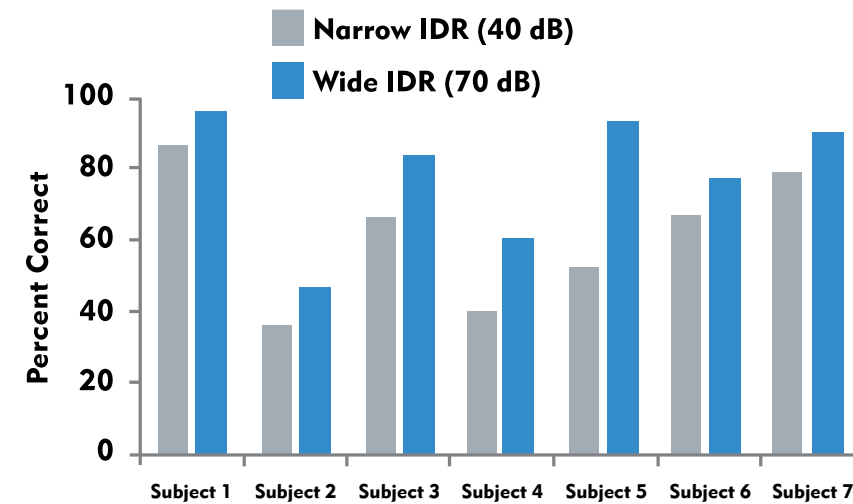


# Hear Your Best

while Listening to Soft Speech

## Real Science

An independent study conducted by Wolfe and Mears shows that 7 out of 7 Harmony recipients hear better with Harmony's wide Input Dynamic Range, only available from AB.<sup>4</sup>



AzBio sentence recognition scores for 7 adult Harmony users when speech was presented at a low level using narrow (40 dB) and wide (70 dB) IDRs. All listeners understood soft speech better with the wide IDR than with a narrow IDR (programmed like competitor systems).

## Why this Study Matters

This study demonstrates that Harmony's wide Input Dynamic Range (IDR) makes it easier to hear in the real world. Harmony users understand soft speech much better with a wide IDR than a narrow IDR. They're also able to hear sounds that alert you—such as telephone rings, car horns, doorbells, and alarm clocks—much better with Harmony's wide IDR.<sup>4</sup> In the same study, Harmony recipients preferred a wide IDR over a narrow IDR for listening to music.<sup>4</sup> The competition provides a narrower IDR than AB does.

*"Our family is loving being on this journey to hearing with Cole and incredibly thankful for the technology Advanced Bionics has developed so that our son can hear our voices and even music since it is such an integral part of our family's life!"*

—Danice Burdett, mother of Cole, bilaterally implanted at age 15 months



## What is IDR?

**Input Dynamic Range (IDR)** is the range of the softest to loudest sounds that are detected by a sound processor. **The wider the range, the more sounds you hear.** Harmony's AutoSound™ technology captures and delivers the widest range of sound of any cochlear implant system. With this wide range, you hear closest to the way normal-hearing people do, from a whisper to a shout.



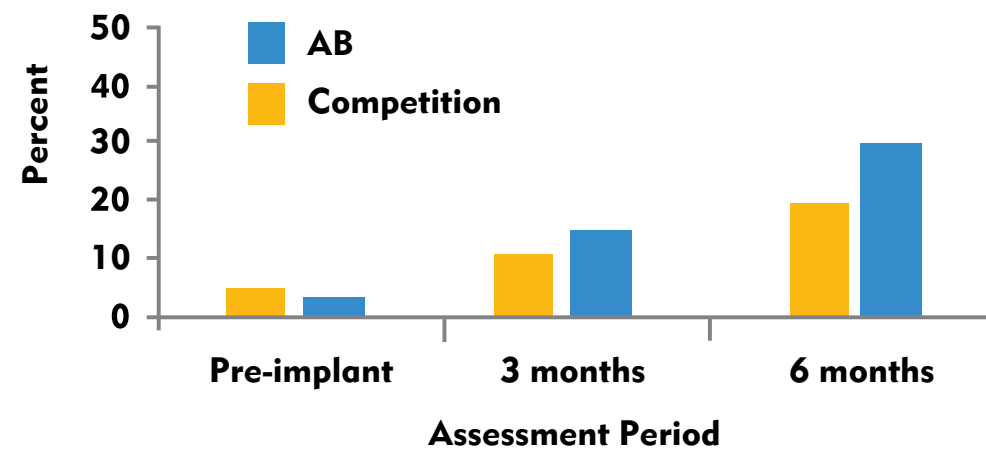
The Burdett family

# Hear Your Best

for Speech Development

## Real Science

An independent study by Bevilacqua et al. concluded that children with AB outperformed children with competitor devices on tests of auditory and oral language skills during the first six months of implantation.<sup>5</sup>



Mean scores for the MUSS (Meaningful Use of Speech Scale) over time for children.

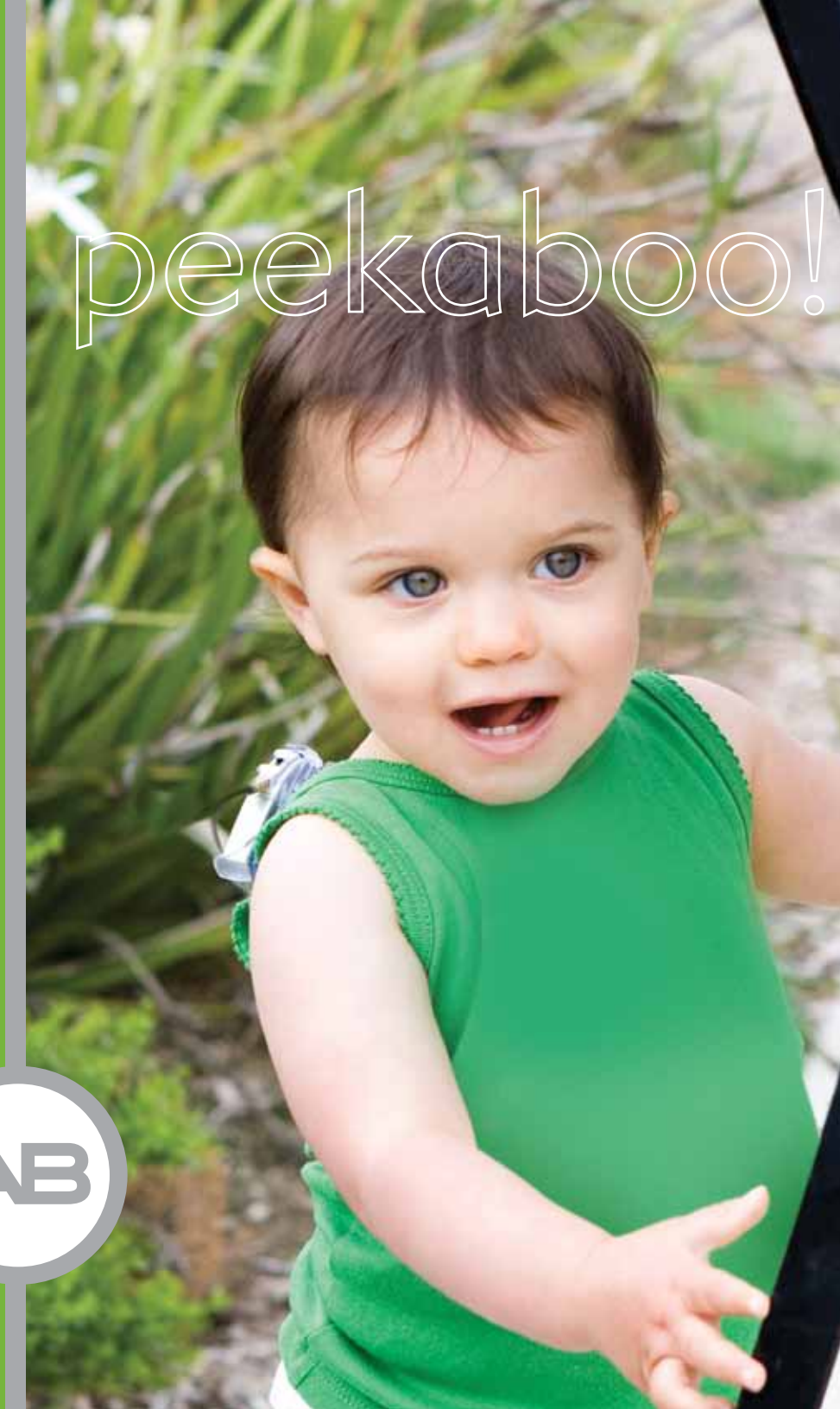
## Why this Study Matters

You want to give your child the best chance at reaching every goal, surpassing every challenge, and achieving every dream. To see your hopes fulfilled, it's crucial that your child begins to hear and speak as soon as possible. This independent study shows that during the initial six months of implant use, children with AB devices outperform children with competitor devices in developing both the listening and speaking abilities needed to succeed in life. That means you can expect to hear "I love you, mommy" sooner when you choose AB for your child instead of the competition.

As your child grows with AB, they'll have an opportunity to hear their best during those critical years of language development right alongside their normal-hearing classmates in a mainstream school setting. So whether your child is competing in a spelling bee or performing in a school play, you can give your child the brightest possible future with the Harmony System from AB.

*"You want your child to have a fair chance in this world, and I feel like she now has the opportunities we always intended her to have. We look forward to her being included in the hearing world, which to us is as simple as participating in family conversations, playing with our friends' children, and attending neighborhood schools."*

—Lisa Cunningham, mother of Liliانا, bilaterally implanted by age 13 months



With Harmony's unique technology, children can understand their teacher's questions and answer aloud when called on, just like their normal-hearing peers.



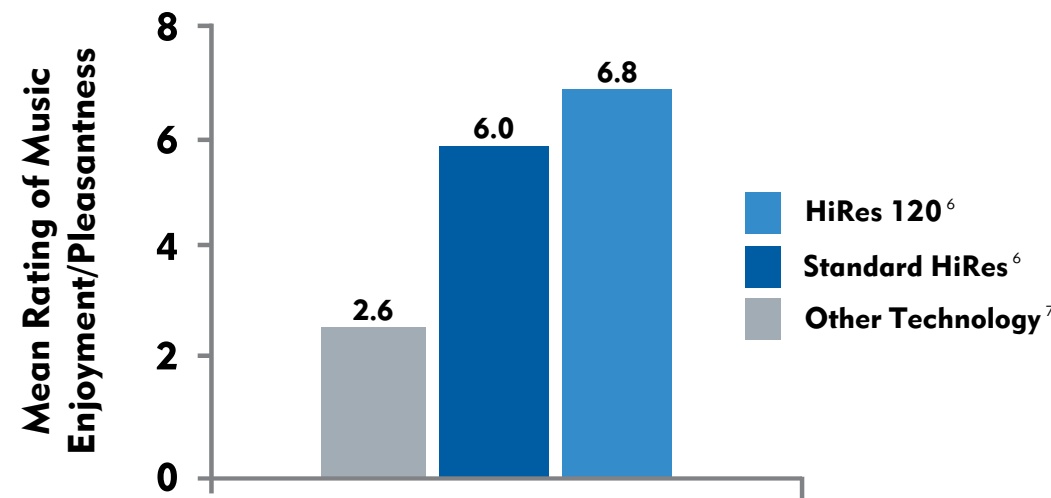
This off-the-ear power option configuration of the Harmony processor is pending regulatory approval in the U.S.

# Hear Your Best

*while Listening to Music*

## Real Science

In a multicenter study sponsored by AB, researchers demonstrated that Harmony recipients listen to music more frequently and enjoy the music-listening experience more than recipients of other cochlear implant systems.<sup>6,7</sup>



## Why this Study Matters

Whether you're singing your baby to sleep or listening to a chart-topping single, **music is an integral part of experiencing the richness of life.** Unfortunately, hearing and appreciating music remains one of the biggest challenges for cochlear implant recipients. But **with the Harmony System, you can enjoy the melodies, harmonies, and rhythms of your favorite songs and performers.** This important study proves that Harmony recipients have the opportunity to hear and enjoy music better than ever before.

Harmony's HiRes Fidelity 120™\*\* sound processing is **the only strategy that can implement simultaneous current steering** to deliver the dimensions of music (loudness, pitch, timing) for a full musical experience. AutoSound's™ programmable wide Input Dynamic Range (IDR) and automatic volume control adjust automatically so that you don't miss a note. And the naturally placed T-Mic™ Microphone makes it effortless to use your MP3 player. ***This advanced technology only from AB works in concert so that you can hear your best.***

*"Current steering [HiRes Fidelity 120]...represents arguably the most exciting development in sound-processing strategies since the introduction of the multichannel implant...the ability to perceive music is being increasingly viewed as a pinnacle of achievement that may be possible through cochlear implants."*

—Charles J. Limb, MD; Associate Professor, Department of Otolaryngology, Johns Hopkins Hospital; from *Current Opinion in Otolaryngology-Head and Neck Surgery*, 14:337–340, 2006.<sup>11</sup>

\*This strategy is not approved for pediatric use in the U.S.



play

## What is Current Steering?

Current steering is the process of using **multiple current sources to stimulate two electrodes** at the same time so that recipients hear additional pitches compared to when either electrode is stimulated alone. The **industry's innovation leader, AB** offers HiRes Fidelity 120, a breakthrough in sound-processing technology that uses current steering to increase the number of pitches heard. This is not available with commercial approved software. Studies have shown that compared to using other sound-processing strategies, **AB recipients using HiRes Fidelity 120 hear speech better in noise and experience improvements in music and sound quality.**<sup>13-15</sup>



Illustration showing electrode array stimulating nerves in the cochlea using current steering

AB delivers the **highest** total system **reliability**  
for uninterrupted hearing you can count on.

AB's advanced technology provides an  
**unmatched performance** allowing a superior  
hearing experience that devices from other manufacturers cannot deliver.

Independent research shows that Harmony  
**outperforms** the **competition** in real-world  
situations, including the most challenging listening environments like in  
noisy places and during telephone conversations.

Harmony offer you the most **complete**  
music-listening **experience**.



The choice is clear  
hear your best with AB

Now you know that you may hear your best with Harmony, take the next step by contacting the Bionic Ear Association (BEA) to speak with a cochlear implant recipient who can answer your questions about the journey to hearing with AB.

Contact the BEA today.

Call **866.844.HEAR (4327)**

Email [hear@AdvancedBionics.com](mailto:hear@AdvancedBionics.com)

Visit [AdvancedBionics.com](http://AdvancedBionics.com)