SEPTEMBER/OCTOBER 2020

hearing life

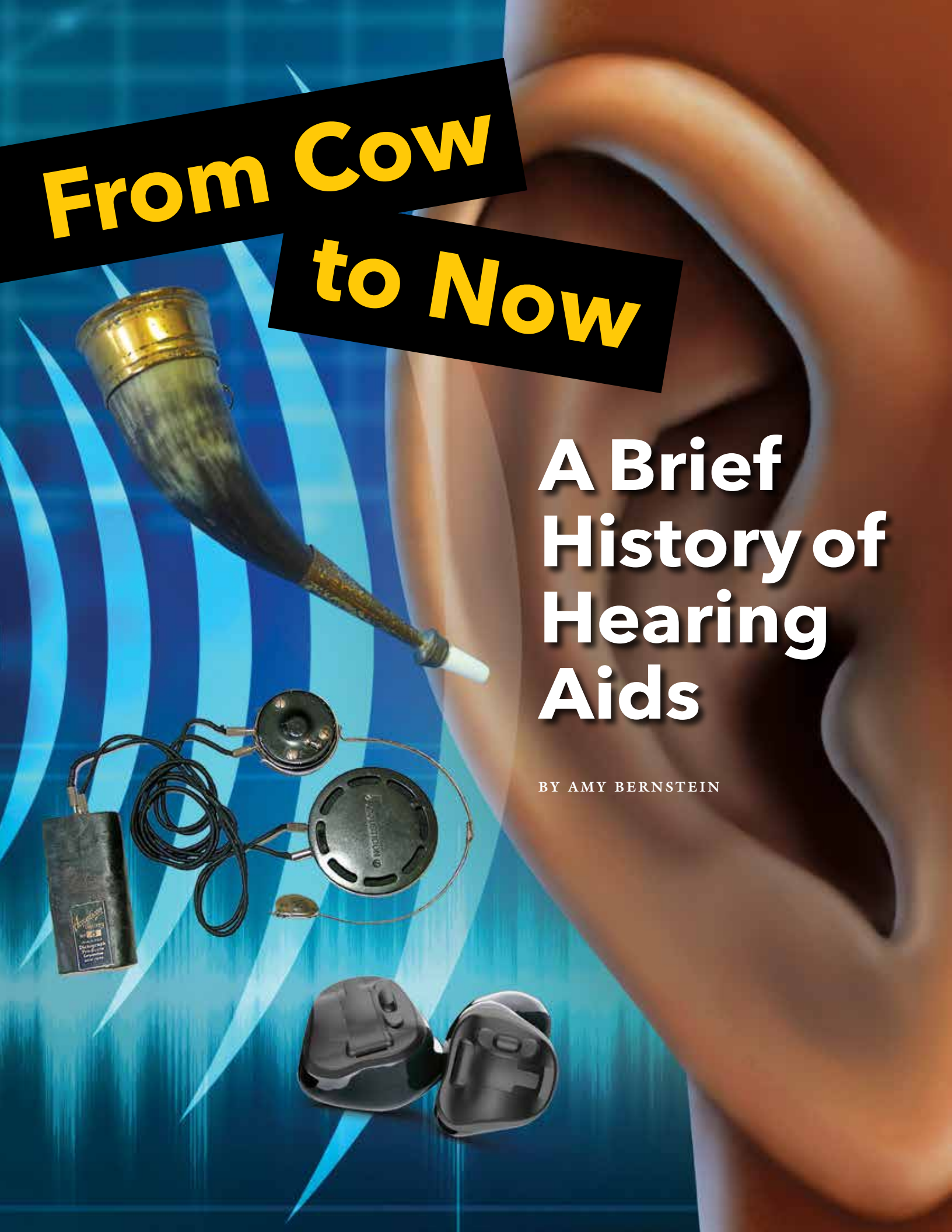
THE MAGAZINE FOR BETTER HEARING

Nowhere Man

Matt Hay

Finding My Life While Losing My Hearing

A PUBLICATION OF THE HEARING LOSS ASSOCIATION OF AMERICA



From Cow to Now

A Brief History of Hearing Aids

BY AMY BERNSTEIN

Functional, Fashionable and Fabulous

If your image of hearing aids is one of large, clunky or body-worn devices that constantly squeal, please allow me to bring you up to speed. Today's hearing aids are small, discreet, highly capable mini-computers that are worn in or on the ear. They feature sleek designs that often resemble wireless earphones. Bluetooth is becoming a standard feature in most hearing aids, and it enables users to stream the audio from phone calls, music and videos, just like a pair of wireless earphones. Many designs are also rechargeable and have become more reliable during the last few years.

Hearing aid design has historically been inspired by the technology that was available at the time. Although that is still true to some extent, there is now much more flexibility in color, shape, style and positioning on the ear. Some people prefer hearing aids that blend into their hair color; others choose a sleek black or glossy white color and a design that resembles a pair of earphones, while others opt for a standout color like cosmic blue or bright red.

Although nothing can fully replicate natural, normal hearing through a typical human ear and brain, hearing aids and their signal clarity have made tremendous strides in enabling people who have hearing loss to better access and engage with the world around them.

A Look at Early Hearing Aid Technology

Prior to the late 1800s, early forms of hearing aids were called ear trumpets, which were unpowered horns that were manually held at the ear (Bernard Becker Medical Library, Bauman). Depending on the shape of the horn, certain frequencies were emphasized.

Cow hearing horn (ca. 1850)

Alexander Graham Bell pioneered electrical hearing aid technology in the late 1800s when he researched carbon granules in an attempt to help his wife, who had hearing loss (Jerger, 2009). Although he was unsuccessful, he certainly put his research to good use when he invented the telephone (Jerger, 2009). Circa 1898, Miller Reese Hutchison and James H. Wilson relied on

Acousticon carbon hearing aid (1905)

Bell's research on carbon granules to successfully invent the first electric hearing aid (Bernard Becker Medical Library).

The next major advancement in hearing aid development was in 1920, when Earl C. Hanson patented a hearing aid called the "Vactuphone," which used vacuum tubes (Bernard Becker Medical Library, Bauman). Vacuum tube hearing aids were larger than the hearing aids that used carbon granule microphones, but they had superior sound quality (Radioear Staff, 1974). Years later, in 1937, Arthur "Art" Wengel used miniature vacuum tubes in his "Stanley Phone," a portable, body-worn hearing aid (Jerger, 2009; Bernard Becker Medical Library).

Vactuphone vacuum tube hearing aids (1920)

Sonotone Model 79 behind-the-ear (BTE) transistor hearing aid (1955)

In 1952, the refinement of the transistor revolutionized hearing aid design by enabling a much smaller battery to generate sufficient power. This made it possible to eliminate the body-worn battery pack and wear the entire hearing aid behind the ear (Jerger, 2009).

Then in the late 1980s and early 1990s, digital signal processing transformed the way hearing aids could analyze incoming signals, amplify at many individual frequencies and enable true customization of hearing aid settings, based on a person's audiogram (Jerger, 2009). This was a major turning point in hearing aid history.

Widex Senso completely-in-canal (CIC) digital hearing aid (1995)

Fast Forward to Modern, Digital Hearing Aids

Modern hearing aids are the result of about 30 years of research and development of digital signal processing. Hearing aids now have complex algorithms to determine where a sound source originates and which sounds should be made louder or softer.

Hearing aids take into account dynamic listening environments, and many also account for movement. They have features that target certain situations like wind noise; sudden, loud sounds, such as doors slamming or dishes crashing; and listening in the car versus listening to music. They also have specific programs for streaming from a phone, TV or any other Bluetooth-enabled device. These capabilities enable discernment between streaming speech and music, and they can often be initiated either automatically or manually, based on user preference.

Today, there are still other choices for those with hearing loss: they can choose a preferred style, such as in-the-ear (ITE) or its smaller version, in-the-canal (ITC), versus over-the-ear styles, such as behind-the-ear (BTE) or receiver-in-canal (RIC) hearing aids. Current ITE and ITC hearing aids are very similar to ITE Bluetooth wireless earphones.

Comparison of 2017 Bose SoundSport Free wireless earphones (left) to 2020 Phonak Virto M in-the-canal (ITC) digital hearing aids (above)

Current rechargeable RIC hearing aids are over-the-ear devices similar to a pair of sport headphones.

Comparison of 2019 JLab JBuds Air Sport earphones (left) to 2019 Signia Styletto Connect digital, rechargeable hearing aids (right)

Whatever the next advancements might be, hearing aids of the future will surely amaze us by becoming increasingly fashionable, technologically advanced and more functional in impressive ways.

Fortunately, the stigma surrounding hearing aids is disappearing. For example, it is now widely known that hearing aids are not just for old people, and they are more user-friendly than ever before and intended for people with any level of technological competency. Modern hearing aids are water- and dust-resistant, durable and physically designed to work with a body that is in motion. They are intended for all levels of social and physical activity and adjust according to the environment. Their capabilities are impressive: one moment, you can sit on your couch watching Netflix. In the next, you can run a marathon or go to a bar or concert, and your hearing aids will keep up with your changing surroundings.

In short, today's hearing aids are designed for both simple and complex listening environments and everything in between. They are intended for anyone with hearing loss—at any age and with any lifestyle—who wants to be an active part of the busy world and connected to his or her communication partners.

Imagining the Future of Hearing Aids

Hearing aid technology and size seem to cycle through a pattern over time: a new device is invented that is larger in size but equipped with better technology than its predecessor. Then the technology advances, enabling it to become smaller, until a new, revolutionary technology is discovered. That new technology is again larger than its predecessor, but superior in its performance and capabilities. Then the technology shrinks again.

The latest size-altering technology is the rechargeable battery, which enables easier use and handling. Older hearing aids were smaller, but used disposable zinc-air batteries. Today, we are seeing the miniaturization of the rechargeable, lithium-ion battery. In the future, we may see the release of environmentally friendly, fuel cell batteries (Widex, 2019) that will likely be larger in size than the smallest lithium-ion battery available. I would then expect the fuel cell battery to get smaller over time as well.

Whatever the next advancements might be, hearing aids of the future will surely amaze us by becoming increasingly fashionable, technologically advanced and more functional in impressive ways. HL

Sources

Bauman, N. (Curator). (2006-2020). The Hearing Aid Museum. Retrieved from hearingaidmuseum.com/

Bernard Becker Medical Library. Timeline of Hearing Devices and Early Deaf Education. (n.d.). Retrieved from beckerexhibits.wustl.edu/did/timeline/index.htm

Jerger, J. (2009). *Audiology in the USA*. San Diego: Plural Pub.

Radioear Staff. (1974). Radioear—Fiftieth Anniversary Year. *Hearing Instruments.*

Widex (2019, January 7). *Widex named as CES 2019 Best of Innovation Awards Honoree for the world's first battery-free hearing aid* [Press Release]. Retrieved from global.widex.com/en/news/ces%202019%20best%20of%20innovation%20awards%20honoree

*Amy Bernstein, Au.D., FAAA, is an audiologist at Lesner Hearing Center (*LesnerHearingCenter.com*) in Alexandria, VA. She graduated cum laude from the University of Maryland, earning her Bachelor of Arts degree in Hearing and Speech Sciences and later earned her Doctorate in Audiology at the University of Memphis. Dr. Bernstein is a native of Atlanta, but has resided in Northern Virginia since 2017.*

Dr. Bernstein specializes in personalizing hearing aid fittings for each individual using advanced, modern techniques to program hearing aids in ways that account for the individual's hearing loss, environment, lifestyle, and personal preferences. She takes pride in ensuring the satisfaction of her patients through open communication, verification, and family-centered care. She can be reached at amy@lesnerhearingcenter.com.

HLAA CHAPTERS & STATE ORGANIZATIONS

Join a Chapter

Learn that you're not alone in your hearing journey!

Find an HLAA Chapter near you by visiting **hearingloss.org/chapters-state-orgs/find-a-chapter/.**

For more information, including how to start a chapter, contact Carla Beyer-Smolin, national chapter and membership coordinator at HLAA, via email at **cbeyer-smolin@hearingloss.org**.

Sign Up for the Free Chapter Blogs for All the News From National

Go to **hearingloss.org**. Scroll down on any page (other than the homepage), and look on the right for the box that says, "Subscribe to receive HLAA News via email." When news is published, it goes right to your email–no need to log in.