Recent Improvements and New Directions for Cochlear Implants

By Chad Ruffin, M.D.

Recent improvements in cochlear implants (CIs) and new directions in CI research are topics about which I frequently am asked.

First, a review: CIs are neurostimulators that are surgically inserted into the inner ear of people who have severe or profound hearing loss. Sound captured from the environment by microphone(s) is converted to electricity and transmitted to electrodes implanted in the cochlea (inner ear). The electrical impulses bypass the damaged structures of hearing to directly stimulate the hearing nerve and create a sensation of sound.

CIs have been around for 40 years. The improvements in hearing outcomes since then are centered around: (1) CI candidacy, (2) device size, (3) adapting hearing aid technology to CIs, (4) electrode array improvements, and (5) increasing information transfer to the hearing nerve.

1) Criteria for identifying who is a candidate for a CI have expanded over the years, but understanding which patients make the best CI candidates remains a key to success. Implants are great...
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Look for the international symbol of access for hearing loss...

...or for this symbol, which indicates that a hearing loop system is installed.

Remembering Wes Brosman
By Warren Weissman, Sound Waves Editor

Wes Brosman, a longstanding HLAA member and former HLAA-WA Trustee, passed away on August 29, 2019, at the age of 82.

Born in 1937 in the Depression-era San Joaquin Valley of California, Wes faced the challenge of severe hearing loss from an early age. His struggle to overcome challenges is recounted in “No Place Else,” his memoir published in 2008. Late in life, Wes and his wife Jana moved to Aberdeen, WA, and he became involved with HLAA-WA.

Past HLAA-WA President Karen Utter said, “Wes was a gifted writer who had many short articles published in Hearing Healthcare Magazine, as well as early SHHH/HLAA magazines. There, he recounted his early life experiences as a severely hard of hearing boy living in a family that was struggling financially.”

She added, “Those stories evolved into his book, which is a delight to read. It recounts a bygone era and the inner strength of a boy living with near deafness. Wes was a delightful addition to our organization and friend to all who were fortunate to know and work with him.”

Among his friends and colleagues at HLAA-WA, Wes is best known for his vigorous advocacy work on behalf of people with hearing loss and other people with disabilities.

In the Winter 2014 issue of Sound Waves, Wes wrote about his advocacy work in relation to the Americans with Disabilities Act (ADA).

His article, entitled “Advocating for Change,” described how he would call venue and event managers, or go visit them, and inform them that their venue or event was required by the ADA to offer accommodations to people with disabilities. If appropriate accommodations and proper signage were not available, he would explain the requirements of the ADA.

Wes would subsequently follow up, and if no action had been taken, he would file a complaint with the U.S. Department of Justice and advise the offending venue or event that he had done so.

If nothing happened, he would then file a Freedom of Information request to obtain a list of grants received or requested by the offending entity. He would advise the entity’s management that he would be communicating with all of the grantors to advise them that the offending entity was out of compliance with federal law. And he would note that disbursing funds to

cont. on page 3
Seen and Heard

Hearing Loop Presentation at Panorama in Lacey

Juliëtte Sterkens, Au.D., HLAA’s national hearing loop advocate, spoke at the Panorama senior living community in Lacey, WA, on August 5, 2019. The event, organized by HLAA member and Panorama resident Carolyn Odio, was attended by more than 40 people. It was part of a series of monthly presentations to the Panorama hearing loss support group that Carolyn leads.

Sterkens spoke about the benefits and limitations of hearing aids and cochlear implants, and why assistive listening systems are a necessary complement to personal devices. She highlighted the great importance and benefits of hearing loop systems, and why having and understanding how to use telecoils in hearing aids and cochlear implants is key to maximizing the value of these devices to their users.

Spencer Norby of HearingLoop NW supplied a temporary hearing loop for the large room used for Juliëtte’s presentation. This enabled attendees to experience the stark difference between trying to hear and understand Juliëtte with only their hearing device microphones, versus using the telecoils in their devices to receive amplified sound from the PA system.

For some attendees, this was the first time they had experienced hearing and understanding through a hearing loop and telecoil, leading to expressions of great and pleasant surprise.

Sterkens Presentation at HLAA-WA Annual Meeting

Juliëtte Sterkens also was the guest speaker at the HLAA-WA Annual Meeting on October 26, 2019. At the meeting, held in the looped Evergreen Universalist Unitarian Fellowship in Marysville, Juliëtte gave a presentation focusing on advocacy work related to hearing loops. She described how she initially worked to benefit, through hearing loops, the clients of her audiology practice, and how she has continued and expanded.

Wes Brosman  cont. from page 2

an out-of-compliance entity might be illegal.

I recall Wes telling me about his advocacy tactics and saying that some might see him as overly aggressive.

But the hint of a smile on his face communicated his pleasure at getting results. He couldn’t resist enjoying the quick change of heart that typically occurred when, calmly but firmly, he informed venue or event managers about their failings before the ADA and how that would affect them with their grantors.

When I talked with Wes, or edited the article he wrote in 2014, I mentally admitted to myself that I probably wouldn’t have the guts and persistence to tackle ADA non-compliance like Wes did. All of us would benefit from having more people like Wes looking out for people with disabilities.

HLAA is honored to offer complimentary membership for United States veterans

Please visit: https://www.hearingloss.org/hearing-help/communities/veterans/
Local HLAA Meetings & Resources
Information, Education, Advocacy, and Support

Meeting times may change. Visitors, friends, family members and healthcare professionals are always welcome at any of our meetings. Please note that some of the groups do not meet during July and August. We suggest sending an e-mail to be sure the group is meeting when you plan to visit. See www.hearingloss-wa.org for more information.

RENTON— 2nd Friday 12:30 pm
Renton Senior Activity Center,
211 Burnett Ave. N., Renton
Hearing assistance: amplification, FM system, induction (hearing) loop.
Glenda: philiofam@gmail.com or 253-631-2345 (evenings)

SOUTH SOUND COCHLEAR IMPLANT SUPPORT GROUP—
2nd Saturday, 10:00 am
Meets Jan, Mar, May, Jul, Sep, Nov
TACID, 6315 S. 19th St. Tacoma
Hearing assistance: amplification, FM system, CART (real-time captioning).
Christine: Christine@cs-dhhrs.com or 253-256-4690

WHATCOM CO.— 3rd Saturday 9:30 am
Christ the Servant Lutheran Church,
2600 Lakeway Dr., Bellingham
Hearing assistance: amplification, FM, and TypeWell (real-time captioning) and induction (hearing) loop.
Larry: 360-656-6457 or lwonnacott@symmetryfunds.com
Website: www.hearingloss-whatcom.org

Get News and Information from HLAA-WA

Our E-news e-mails, delivered twice a month to your inbox, contain information and resources for people with hearing loss. By subscribing to “E-News from HLAA-WA,” you will be informed about news related to HLAA and to hearing loss, and you will be aware of hearing accessible events in our area.

Please inform us of any upcoming accessible events as early as possible so we may add them to this resource.


Online Resources to Keep Informed

Bookmark the HLAA-WA website, a great resource for people with hearing loss, at www.hearingloss-wa.org

Information about HLAA’s national Get in the Hearing Loop campaign is available at www.hearingloss.org/programs-events/get-hearing-loop/.

Find out which Washington State venues are looped for your entertainment, and get news and information about the Let’s Loop Seattle campaign at www.loopseattle.org.

HLAA national convention information at www.hearingloss.org/programs-events/convention/.

Like the HLAA Facebook page at www.facebook.com/HearingLossAssociation.

HLAA Hearing Life magazine summaries online at www.hearingloss.org/news-media/hearing-life/.


Looking for a meeting?

Please contact us if you are interested in attending a meeting or if you’d like to start a chapter in your area: info@hearingloss-wa.org

Share This Newsletter

Please share this newsletter after reading it.

Doctors’ offices, dentists’ offices, hospitals and many other public places you visit may be appropriate locations for you to “recycle” this newsletter.

Many thanks!
Donating Hearing Aids  cont. from page 1

Please consider donating your or your family’s still usable hearing devices or assistive equipment.

Perhaps the first place to inquire is your own hearing instrument specialist, audiologist or ENT. They may be able to refurbish and reprogram your donated aid(s) and loan or transfer them to someone who can’t afford new ones.

Some other good options:


- In Seattle, used hearing aid donations are accepted by the University of Washington’s Speech and Hearing Clinic (https://sphsc.washington.edu/clinic), Tel. 206-616-1185, or shclinic@uw.edu.

- The Hearing Speech & Deaf Center (www.HSDC.org) accepts hearing aid donations. You can drop off hearing aids, assistive listening devices, and related supplies in person at any of their three offices in Seattle, Tacoma, and Bellingham. Or you can mail your donation by packing it securely and sending it to their Seattle office at HSDC, c/o Audiology, 1625 19th Ave. Seattle, WA 98122.

- Western Washington University in Bellingham accepts used hearing aids for its Hearing Aid Bank. Donated aids are refurbished, thereby serving as a learning tool for students in the Doctorate in Audiology program, and donated to qualified clients. See https://chss.wwu.edu/csd/hearing-aid-bank for more information.

- Starkey Hearing Foundation, established by Starkey Hearing Technologies founder William Austin, also has an extensive hearing aid donation program. See https://www.starkeyhearingfoundation.org/hearing-aid-recycling.

There are other organizations and programs accepting used hearing aid donations around the country. The resources listed here are those I consider most relevant to western Washington State.

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- Bluetooth hearing aids
- Auditory processing disorder testing
- Childhood hearing evaluations
Senior Lobby cont. from page 1

questions about hearing loss, hearing assistive equipment and HLAA membership benefits. HLAA-WA Board members Cheri Perazzoli, Cynthia Stewart, Warren Weissman and Larry Wonnacott attended the conference, as did HLAA-WA Agency Liaison Diana Thompson.

HLAA and HLAA-WA also figured prominently on the conference agenda. HLAA’s national looping advocate, Juliëtte Sterkens, gave an extensive presentation about hearing loss and hearing assistive equipment and systems, focusing on the benefits of hearing loops.

Attendees in the large conference meeting room benefited from the temporary hearing loop installed by Spencer Norby of Hearing Loop NW, who explained the benefits and functioning of the loop. HLAA-WA placed loop receivers and headphones on tables throughout the meeting room, enabling attendees to experience the amplification and clarity of sound transmitted through the hearing loop, versus the distant sound and reverberation from the PA system loudspeakers.

Representative Laurie Dolan, principal sponsor of the House bill that ultimately passed the legislature as SB 5210 in 2019 and was enacted into law, also spoke at the conference. The bill requires that hearing health professionals inform consumers regarding the uses, benefits and limitations of hearing assistive technology prior to the initial fitting and purchase of hearing instruments, particularly hearing aids.

Representative Dolan described why, when approached by HLAA-WA President Cynthia Stewart about such a bill, she quickly became interested and worked persistently to see the bill pass. She spoke about her own personal experiences with hearing loss and about incomplete information from audiologists regarding hearing assistive technology. Cynthia Stewart then explained the current status of the development of regulations deriving from SB 5210 (see status update below).

It was also very gratifying to hear Governor Jay Inslee, the Fall Conference’s lunchtime speaker, relay his satisfaction in having signed SB 5210 into law. He also noted that Washington’s Medicaid program covers hearing aids for adults as of 2019, following the enactment into law in 2018 of SB 5179 (see our article in the Spring 2018 edition of Sound Waves).

Given the extensive advocacy undertaken by HLAA-WA in cont. on page 7
support of both bills, hearing the Governor’s comments at the top of his remarks was very welcome.

Also speaking at the conference was State Senator Karen Keiser, well known for her support of health-related initiatives and legislation during her long career in the State Senate and House.

She also commented very approvingly about the coverage of hearing aids for adults under Medicaid and about the new regulatory requirement that hearing health professionals properly inform consumers about the uses, benefits and limitations of hearing assistive technology.

**Status of Senate Bill 5210 Implementation**

As previously reported in *Sound Waves* (see the Spring 2019 issue), SB 5210 calls for the State’s Department of Health (DOH) to draft the related regulations. The regulations, to be approved by the State’s Board of Hearing and Speech, would indicate what information should be provided to consumers by hearing health professionals prior to the fitting and purchase of hearing instruments.

The new law also calls for the State’s Office of the Deaf and Hard of Hearing (ODHH) to develop educational materials that would be distributed by hearing health professionals to consumers. HLAA-WA representatives attended the August 2, 2019, meeting of the Board of Hearing and Speech, where staff briefed the Board members on the nature of the legislation. HLAA-WA offered its support to the development of the regulations, in its capacity as an organization representing the needs of consumers with hearing loss.

HLAA-WA was also present at the November 1, 2019, meeting of the Board of Hearing and Speech, where the Board began its deliberations about the regulations. HLAA-WA was invited to submit specific comments which will be discussed at the Board’s February meeting.

DOH will publish proposed regulations during 2020 and request public comment.

HLAA-WA also has been collaborating with ODHH in drafting literature about hearing assistive technology, drawing on various publications of HLAA, HLAA-WA and the “Get in the Hearing Loop” campaign.

We will keep readers informed about the status of the regulations and will request that readers provide their individual comments to the DOH as appropriate.
CIs cont. from page 1

devices but not everyone does well with them.

We have no quick and easy way of predicting before surgery how well someone will do with an implant. Currently, the best performers tend to be kids implanted at a young age and adults who get implanted quickly after becoming deaf or before age-related cognitive decline sets in. For children, this is because their brains are biologically programmed to absorb language during their first few years of life. Implanting a CI as early as possible during this “critical period” for language development is essential to ensuring great long-term outcomes. For later-onset hearing loss, it is important to preserve nerve circuits since they atrophy without hearing input.

Electrical signals transmitted by CIs have lower resolution than natural sound impulses. Because of this, implantees must use more brain or cognitive resources to decipher the CI signal. This is likely the underlying reason that adults with cognitive difficulties can struggle to benefit from their CI.

Remember also that you hear with your brain. Hearing loss “quiets” the parts of the brain used for hearing. These unused brain parts may then be naturally repurposed for other functions. Since having the auditory brain available to interpret input from a CI is essential to success, it is likely that determining CI candidacy will soon include specialized brain scans.

Finally, we know that people with greater residual hearing do better with CIs. However, determining when to implant is a balancing act. CIs can damage residual hearing, so researchers are always re-calibrating what point during progressive hearing loss is the appropriate time to recommend a CI.

2) Device size: we’ve gone from large external processors to smaller behind-the-ear models, and to “on-the-head (off-the-ear)” models that combine all the external parts (microphone, processor, transmitter) into one unit, making the devices easier to use and more discreet. While there’s been some talk about totally implantable cochlear implants, this technology is likely another decade away.

3) How can we improve hearing in noise? Adapting hearing aid technology to CIs has been a key advance. One way to improve speech recognition in noise is to enable microphones to pick up the sound you want to hear, cont. on page 9
CIs cont. from page 8

most likely coming from a person who is in front of you. Hearing aids and CIs now have multiple microphones. These microphone arrays increase the directivity (ability to perceive sound arriving from different directions) of a CI. Based on the timing and sequence of sounds captured by the microphones, the CI determines which sound you are trying to hear and understand, and which sounds are background noise, enhancing the desired sound. When you have two cochlear implants, each ear sends microphone data to the other to further increase directivity.

For the future, I’m excited about the arrival of machine learning filtration to further remove the noise and enhance the quality of sound. This will probably arrive on processors in the next 5 years. With these noise reduction algorithms, you’ll be able to hear in a loud restaurant just like you do in a quiet room.

4) Electrode design: we’ve gone from “fat” electrodes that can damage the delicate internal structures of the cochlea to slimmer ones that cause less trauma. Because they fit closer to the hearing nerves, slimmer electrodes require less battery power and have more focused stimulation that improves hearing.

Future CIs will use small lasers to stimulate nerves instead of electricity, increasing efficiency (electricity spreads out inside the cochlea whereas lasers remain focused). Future CI electrodes will also be able to deliver drugs to encourage damaged nerves to regrow.

5) How we stimulate individual electrodes hasn’t functionally changed in 20 years. Different CI manufacturers have “HiRes Fidelity, ACE, and Fine Structure Processing” speech processing strategies. The reality is that none of these strategies overcome a key limitation of cochlear implants: the inability to efficiently transfer information to a nerve using electricity.

An exciting new study reports on attempts to overcome the bottleneck of electricity. The new strategy uses extra pulses to make the auditory nerve respond in a more graduated fashion. Each nerve cell becomes more independent and can carry more information. A few patients in this study improved their word recognition scores by 20%. We’ll see if similar results occur in large clinical trials. This study also highlights emerging research about applying different electrode stimulation patterns for differing types of hearing loss.

I hope you have found this review of CI technology and the future useful. I plan to continue writing about CI technology and other hearing-related topics in Sound Waves.

Editor’s note: Chad Ruffin, MD is an otolaryngologist (ENT) and cochlear implant surgeon who wears two cochlear implants. In addition to performing cochlear implant surgery, he researches CIs and is working on developing new CIs and other hearing technology. He has been deaf since birth, but advanced technology enables him to hear. He says he is passionate about helping people with hearing loss function better through his surgical practice and research. You can visit his website at www.chadruffinmd.com/ for more information.

STG Testing GalaPro Real-Time Captioning App

Seattle Theater Group (STG) is testing the GalaPro mobile device application at its Paramount Theatre in Seattle, as a way of increasing accessibility for people with disabilities.

The GalaPro application, downloadable to smartphones and other mobile devices, provides closed captioning of the full script of performances. It can provide automated multilingual subtitles, dubbing, audio descriptions, and amplification.

STG currently is testing the closed captioning feature.

Cont. on page 10
GalaPro enables users to view captions on their own mobile device. After downloading the GalaPro app, users log into the theater’s Wifi system and captions synchronized with the performance appear on the screen of the mobile device.

At the Paramount, patrons can benefit simultaneously from captioning on their mobile device and from an FM assistive listening system connected to the Theatre’s sound system.

STG has already purchased the equipment necessary to implement GalaPro and intends to make it available in all of its Seattle theaters (Paramount, Moore and Neptune). GalaPro is used extensively in New York’s Broadway theaters and in other locations.

HLAA members Maridee Garvey and Warren Weissman recently were invited by STG to test the GalaPro app at a performance of Miss Saigon at the Paramount Theater.

Maridee and Warren both report that the GalaPro app was very easy to use and greatly improved their appreciation of the musical. Maridee relied on her hearing aids and on the captions, while Warren used the captions and the FM system (connected to a neck loop which transmitted sound to the telecoils in his hearing aid).

Other than a brief interruption of the Wifi signal, the captions worked very well. The app permits customizing the size, brightness and color of the captions and background.

Bendable arms are available to hold the smartphone and avoid arm fatigue during a long performance. Similar to the bendable arms used for caption viewers in movie theaters, the arms attach to the armrests.

Maridee and Warren said some care was needed when adjusting the bendable arms, as the pressure-based attachment to the armrests may become dislodged. The arms also can make it somewhat harder for people to squeeze by in the relatively narrow space between seat rows.

See www.galapro.com/ for more information.

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We welcome articles, letters, and notices of coming events. We may abbreviate submissions due to space constraints. Any content may be reprinted or disseminated, as long as the author or this publication is credited. We encourage health and service professionals to make copies available to their clients. Submission deadlines are April 1, July 1, October 1 and February 1.

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To open the world of communication to people with hearing loss
by providing information, education, support and advocacy.

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See all the details at
www.hearingloss.org/programs-events/convention/

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