The Evolution and Innovation of Hearing Devices:

From Ear Trumpets to OTCs to Prescription Hearing Aids

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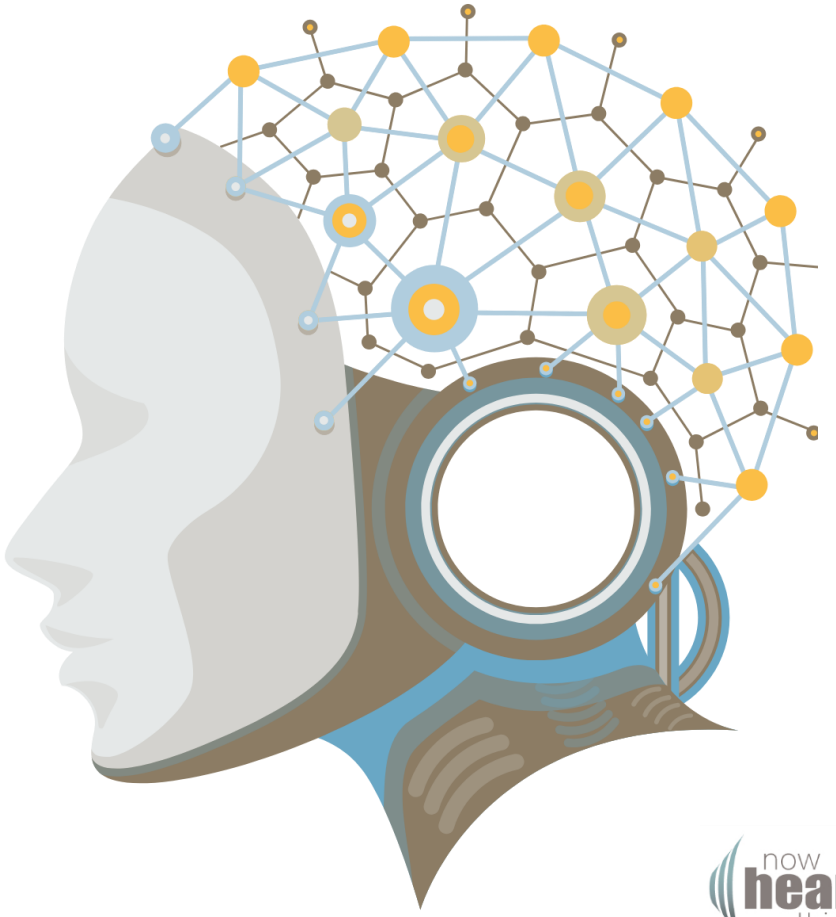
Services We Provide

- Hearing Evaluations & Advanced Testing
- Aural Rehabilitation
- Hearing Aid Services
- Refit of Existing Hearing Aids
- Tinnitus Treatments
- Bone Anchored Hearing Aids
- Referrals and recommendations for cochlear implants and auditory processing disorder

Introduction

- Overview of hearing loss and the importance of hearing assistance.
- Purpose: Explore the evolution, new technology, and options available today.



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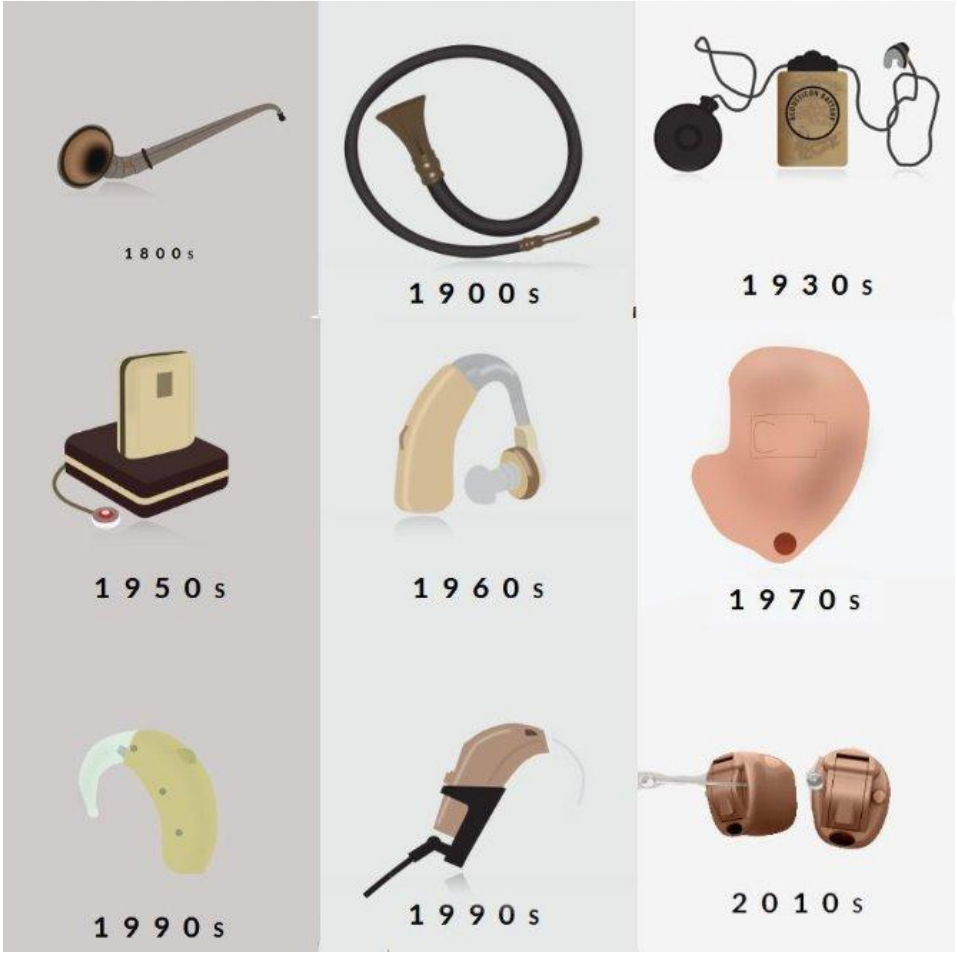
History of Hearing Aids



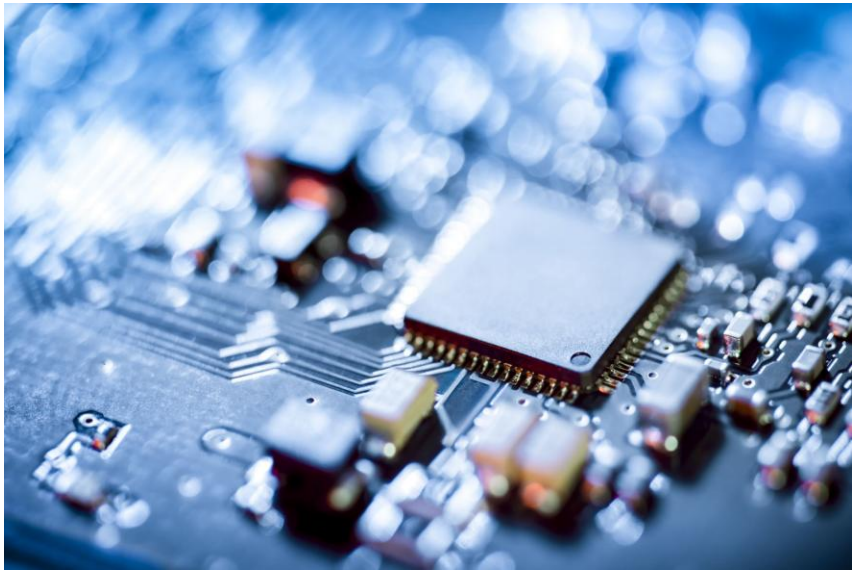
Hearing Aids | Sutori

History of Hearing Aids Cont.

- 1634: invention of ear trumpet
- 1898 the first electronic hearing aid
- 1920s-1950s: vacuum tube technology (convert into electrical signals, required wearing amplifier and batteries around your neck and holding microphone)
- 1948: transistor hearing aids (replaced vacuum tubes, better battery power)

Hearing Aid History: Ear Trumpets, European Royalty, & Earbuds — Hearing Health Foundation

History of Hearing Aids Cont.



- 1970s: microprocessor and compression hearing aids (allowed for multichannel amplitude compression)
- 1980s: high speech processors and microcomputers
- 1987 onward: fully digital hearing aids

How Do Hearing Aids Work?

- **Microphone**: captures sound waves
- **Computer Processor**: analyzes incoming sounds waves, tells amplifier which to amplify and other programming
- **Amplifier**: converts sound waves to electrical signals and sends it to the speaker
- **Speaker**: transmits sound into wearer's ear
- **Battery**: powers electrical device (either rechargeable or manual replacement)

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Styles of Hearing Aids

- Over the Ear- name varies by where technology is located
  - RIC (Receiver In the ear Canal)
  - BTE (Behind The Ear) ---------->

- Custom- name varies by size
  - IIC (Invisible In the Canal… smallest option)
  - CIC (Completely In the Canal)
  - ITC (In the canal)
  - ITE (In the ear… largest option)

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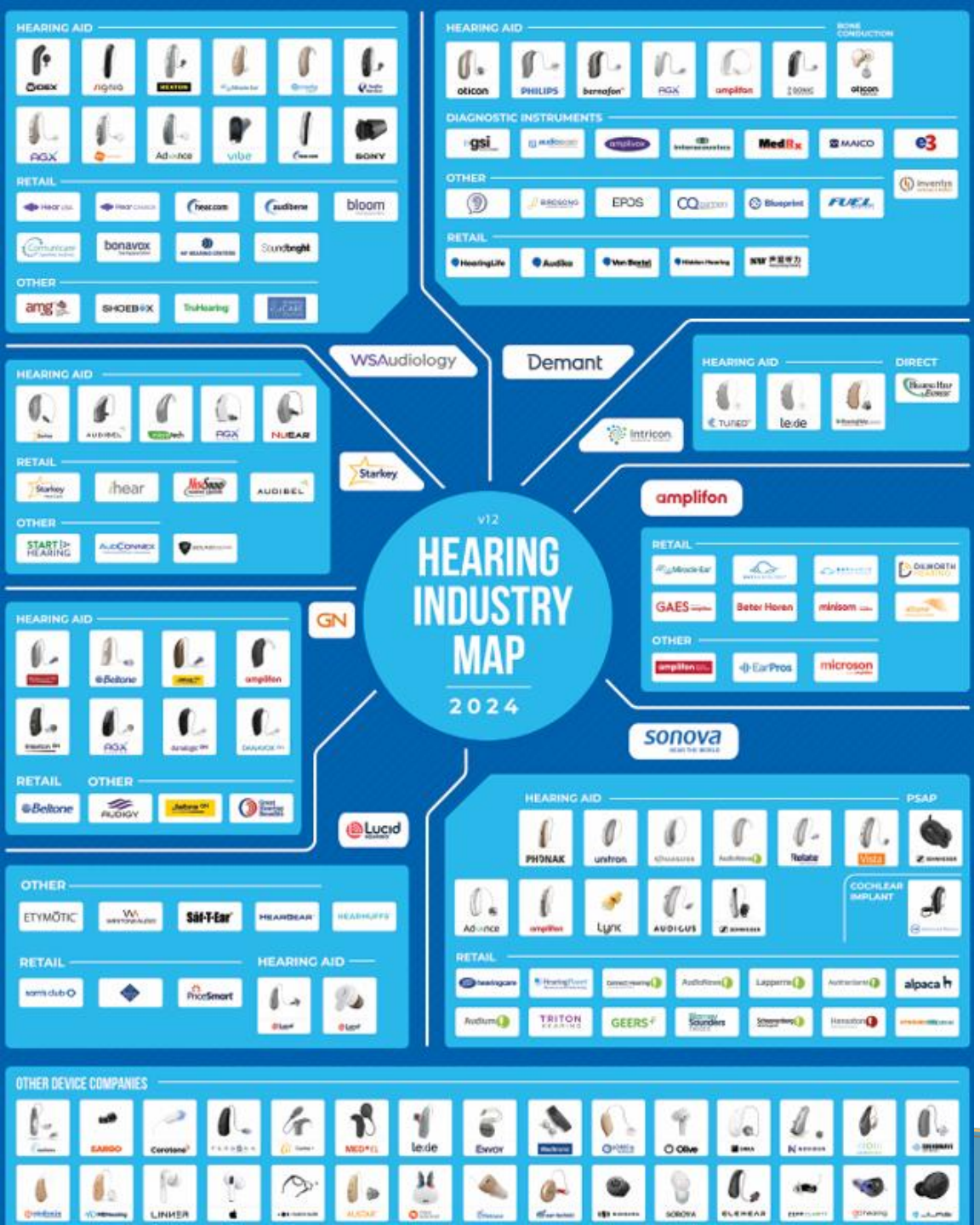

Top 7 Hearing Aid Manufacturers

1. Phonak
2. Oticon
3. Signia
4. ReSound
5. Unitron
6. Widex
7. Starkey

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Some Examples

- Widex- often recommended for musicians or those with highly tuned musical ears for their musical sound quality as a result of their expanded dynamic range
- Starkey- often recommended to those who have hearing loss significantly worse in one ear than the other for increased flexibility of programming in their software for this type of hearing loss
- Oticon- often recommended to first-time hearing aid users for their “natural” sound quality
- Phonak- often recommended to those who are often in noisy environments due to their advanced signal processing in background noise

Hearing Aid Technology

- Feedback suppression
- Artificial Intelligence (AI)
- Wireless connectivity
- Directional microphones
- Noise reduction
- Hearing aid programs
- Tinnitus Relief
- Telecoil / Auracast
- Smartphone apps
- Health tracking features
- Rechargeable technology

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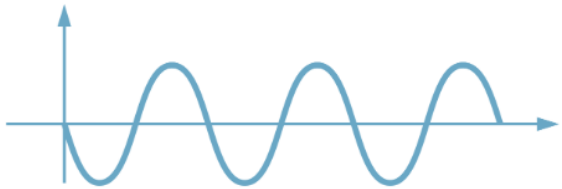
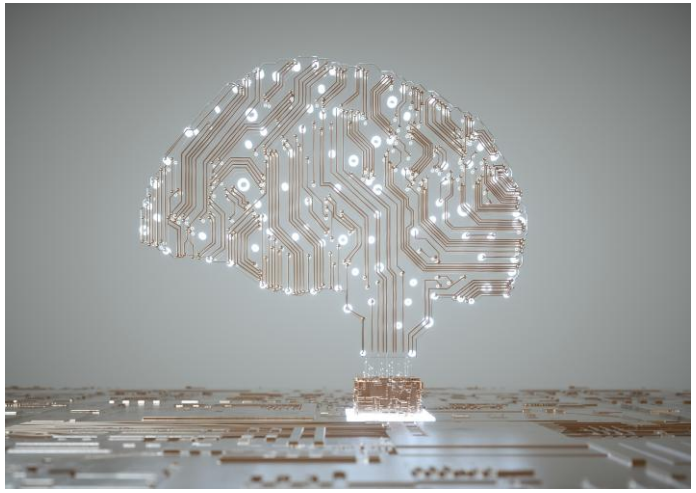
Feedback Suppression

- **Two main strategies**
- Feedback cancellation- where the feedback sound is picked up by the hearing aid and a reverse image of the signal is sent out to cancel the original sound (similar to noise cancelling headphones)
- Notch filtering- identifies the feedback sound and decreases gain at JUST that specific pitch
- Both strategies have become more efficient in recent years as hearing aid bandwidth and adjustments have become more precise



Hearing Aids and Artificial Intelligence



- AI technology "learns" based on patterns in data
- Hearing aid AI uses technology to make automatic adjustments to sound quality depending on environment
- Can improve speech understanding, reduce listening effort, and improve noise reduction

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Telecoil/Auracast

- Telecoil in hearing aids works by picking up magnetic signals from induction loop systems and converting them into sound without relying on the microphone, which reduces background noise.
- Auracast works with hearing aids by using Bluetooth Low Energy (LE) Audio to broadcast audio streams that compatible hearing aids can receive directly, enabling clear, wireless listening in public spaces like theaters or airports.

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Smartphone Apps

- Most hearing aids are compatible with both android and IOS phones for Bluetooth streaming and smartphone applications
- Apps vary widely by brand in what features they allow the user to adjust themselves

Wireless Accessories for Hearing Aids

- **Mini Microphones:**
  - Can make hands-free phone calls
  - Can listen to someone speaking at a distance using the remote mic feature
  - Chat over the computer via Skype, Zoom, etc.
- **Phonak Roger:**
  - Improves speech recognition in noise and at a distance by transmitting speech directly to the hearing aid
  - Reduces the distance between speaker and listener
  - Compensates for the effects of background noise and reverberation
- **TV Streamers:**
  - Streams TV directly to your hearing aids
  - Allows you to enjoy watching TV at your preferred volume, while the rest of the family can keep the volume at a level which suits them.

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OTC HEARING AIDS

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OTC vs Prescription Hearing Aids

- An Audiologist uses Real Ear Measures to program your hearing aids with the correct prescription of sound, and you get the hearing aid from their clinic.
- A big box store like best buy sells over-the-counter hearing aids that you can buy without getting tested or seeing an Audiologist.

OTC vs Prescription Hearing Aids

- OTC hearing aids are for a mild loss. They are basically the “reader” glasses of hearing aids
- OTC hearing aids cannot be programmed to your hearing loss prescription and are “one size fits all”
- A reputable hearing aid clinic will have prescription hearing aids similar in price to an OTC hearing aid that can be customized to your needs
- If you try an OTC hearing aid, make sure you keep an eye on the trial period because most people end up wanting to return them.

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NCOA, 1999, The Consequences of Untreated Hearing Loss in Older Persons. Washington, DC www.ncoa.org

	Prescription Hearing Aids	Over-The-Counter Hearing Aids
Selection Process/Hearing Loss Severity	Professional hearing evaluation. All degrees of hearing loss.	Online hearing test or no hearing test at all. Self perceived mild to moderate hearing loss.
Fit By	Fit by a Doctor of Audiology	Fit the device yourself
Price	~$1,000-$7,000/pair – varies based on what services or warranties are included in the cost	Estimated to be less than $1,500/pair – consult vendor or retailer for exact pricing
Design/Features	Highly sophisticated pieces of technology: speech clarity, background noise reduction, etc. Not limited by depth or design. Includes custom-molded and invisible in the canal options.	Offers hearing amplification only. One-size-fits most. Hearing aid must sit greater than 10mm from eardrum
Follow Ups	Ongoing adjustments and care to deliver best long term performance	No ongoing audiological care after initial purchase

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New Hearing Aids on the Market

Phonak Audeo Infinio Sphere:

- Powered by advanced AI to adapt to your surrounding and boost your speech understanding in noisy situations
- Has two chips:
  - 1: Spheric Speech Clarity 2.0. This chip enhances and integrates speech from any number of voices from any direction for unprecedented speech clarity in noise
  - 2: Deep Sonic DNN. This chip separates speech from noise in real time from any direction
- Up to 24 hours of battery life

New Hearing Aids on the Market Cont.

Oticon Intent:

- Has 4D sensor technology that detects head motion, body movement, conversation activity, and the acoustic environment
- Powered by Deep Neural Network (DNN 2.0) and MoreSound Intelligence 3.0 to enhance speech clarity, reduce background noise, and preserve natural sound quality
- 360 degrees sound access which delivers a full situational soundscape and prioritizes speech or ambient sounds as needed
- Up to 24 hours of battery life

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New Hearing Aids on the Market Cont.

Oticon Zeal:

- **The world's first discreet hearing aid** that has Bluetooth connectivity and rechargeability
- **Style:** CIC (completely in the canal)
- Can amplify for hearing losses up to 75 decibels
- Uses the same DNN chip that is in the Oticon Intent
- *20 hours of battery life*

*Has not launched yet, but coming soon in early 2026!

New Hearing Aids on the Market Cont.

Starkey Omega AI:

- **Uses a DNN (Deep Neural Network) chip** that analyzes and adapts to sound from all directions to optimize speech clarity and environmental awareness in real time
- **Health and wellness tracking**: can collect data on motion and steps and has a built-in fall detection
- *Up to 51 hours of battery life*
- *Waterproof and dust proof*

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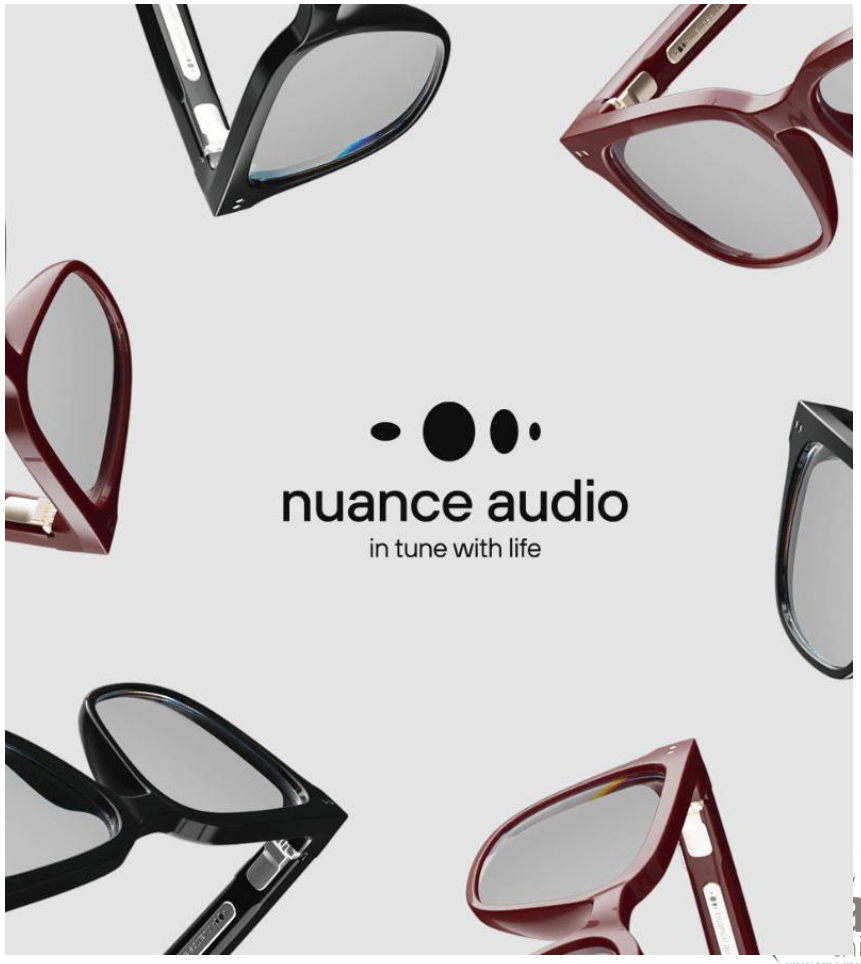
New Hearing Aids on the Market Cont.

Widex Allure:

- **Uses the W1 chip**, which offers significantly increased processing speed and memory compared to older Widex generations
- **Has PureSound technology** which delivers virtually no processing delay, resulting in distortion-free, natural sound
- **Speech Enhance Pro**: this helps enhance speech clarity while managing background noise more effectively, improving listening comfort in noise environments
- *Up to 25 hours of battery life*

The “New” Nuance Audio Glasses

- “New” because audio glasses were first used in the 1950s/60s
- These combine an OTC hearing aid with a prescription eyeglass
- The Nuance glasses use bone conduction which doesn’t transmit high frequencies well



Hearing Technology of the Future

- Biometric monitoring, real-time translation, machine learning.
- Focus on health integration and smarter connectivity.
- Auracast to become available in near future.
- Studies on regenerating the damaged hair cells may yield promising results in years to come.

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Summary

- History of Hearing Devices
- Prescription Hearing Aid Advancements
- New Technology on the Market
- OTCs

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Questions?

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