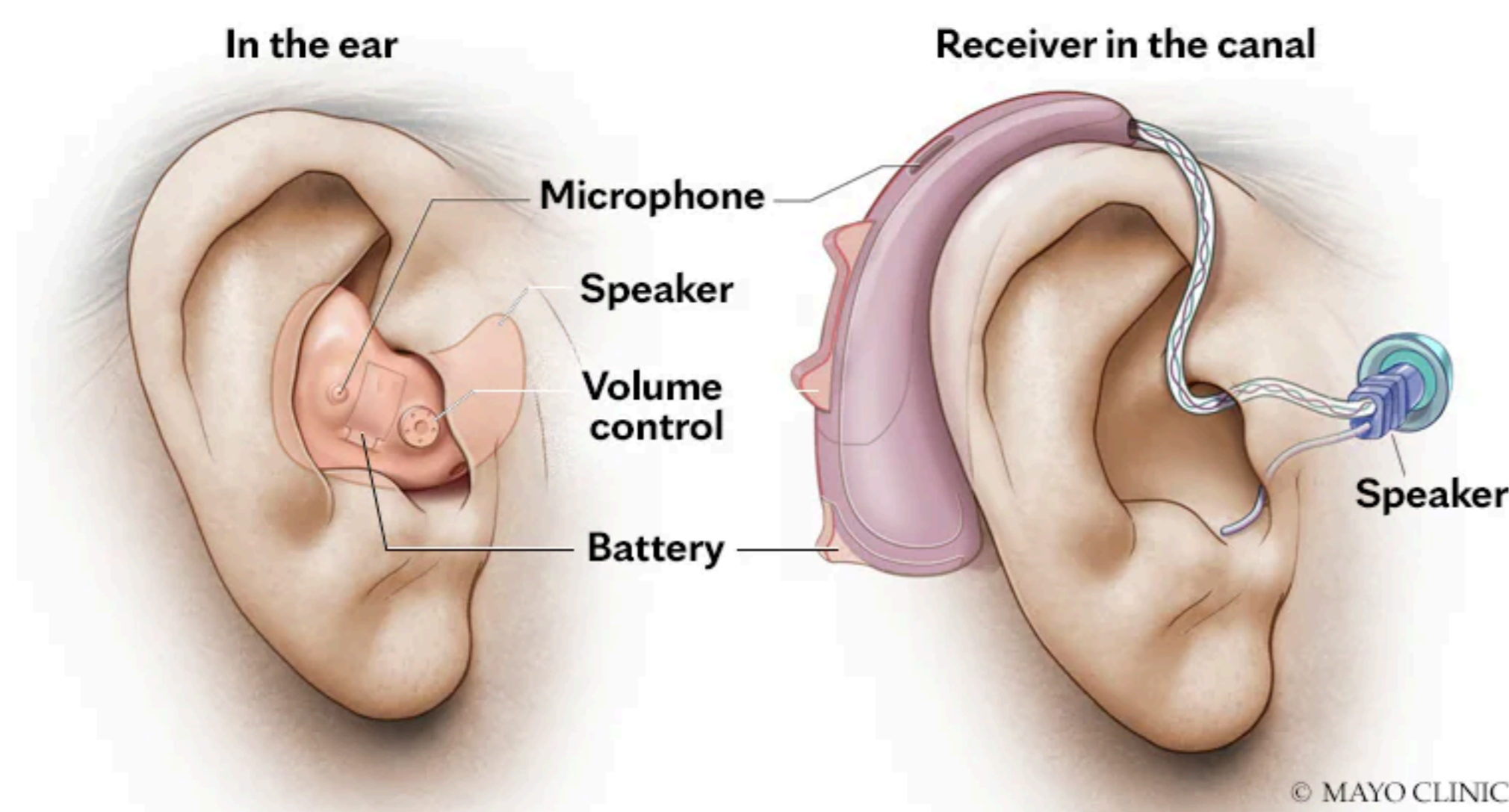


Reimagining the power of hearing aids with enhanced ear-to-ear communication and AI technology

Oct. 31, 2025

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Over the past decade, hearing aid modifications, such as Bluetooth connectivity and rechargeable batteries, have increased convenience for patients. But more recent technology, such as artificial intelligence (AI) and enhanced ear-to-ear communication, is changing how sounds are recognized and isolated, creating a higher quality hearing experience.

"Ultimately, the goal of these technological advances is to remove some of the responsibility and heavy lifting from the brain and ears," says Courtney C. Luffler, Au.D., an audiologist at Mayo Clinic in Jacksonville, Florida. "Hearing aids can now pinpoint what the sound is, where it's coming from and its relative importance. When the sound gets to the brain, the signal is easier to understand."

Innovations in hearing aid technology do not change the fact that choosing and fitting hearing aids to patients need to be individualized. However, knowing how new technology is improving hearing aids may influence a patient's willingness and likelihood to use them.

How hearing aids incorporate AI

"The use of AI is the fastest developing and most impactful advance in hearing aid technology," says Dr. Luffler. "No hearing aids have true AI that learns the patient's behaviors and environments. However, AI is changing the processing strategy within the device."

Most newly manufactured hearing aids use some form of deep neural network, a type of AI that mimics the way the brain learns. The digital processors inside hearing aids use sample noises to learn sounds and recognize them quickly. Eventually, hearing aids balance and prioritize sounds automatically.

"Hearing aids are programmed using millions of sound samples," says Dr. Luffler. "As a result, the computer chip inside constantly monitors the environment, separates speech from noise, and adjusts independently for the right and left ears. The program is automatic and adapts to the patient's setting without any input from the wearer."

Mayo Clinic may soon be partnering with hearing aid companies to perform research focused on the impact of AI and deep neural networks. Specifically, Dr. Luffler says these companies want to learn how AI affects people in noisy situations and whether it significantly improves the ability to understand speech in those environments.

Improving noise management with ear-to-ear communication

Left and right hearing aids have always talked to each other. However, the way hearing aids gather sounds and process them is changing the impact of ear-to-ear communication.

"Hearing aids work like a filter, sorting out sounds including speech, background noise and music," says Dr. Luffler. "Newer developments enable a pair of hearing aids to function independently and together to identify and isolate noise before sending it through the filtration system."

The ability to process sounds in both ears simultaneously, known as binaural signal processing, also is improved in newer hearing aids. When both hearing aids process sounds and seamlessly communicate with each other, it helps locate the source of the noise, pick up different pitches or tones, and enable a more natural listening capability. New hearing aids focus on detecting sounds from all around the wearer to identify and amplify the most important speech signals.

"Historically, hearing aids assumed that whatever you were looking at was what you wanted to hear the best," says Dr. Luffler. "But if the majority of your communication happens behind you — if you're a rideshare driver, for instance — the 360 program enables you to hear what someone is saying to your back."

Enhanced Bluetooth integration in hearing aids

Bluetooth connectivity is not essential for hearing aids to function, but it can be beneficial, especially as technology continues advancing. In many cases, patients can now control AI features through an app on their phones. For example, they can customize and save sound profiles for specific locations. Different manufacturers provide varying levels of control and flexibility.

The most recent improvements to Bluetooth integration involve the pairing between the phone and hearing aids.

"Some companies pair the sound from the phone to only one hearing aid. The information is then sent to the other hearing aid via ear-to-ear communication," says Dr. Luffler. "Other manufacturers pair both hearing aids together." The connection of the phone to the hearing aids allows for a more natural listening experience and improves spatial awareness for the wearer.

Helping patients adjust to advanced hearing aid technology

Adjusting to any new hearing aid can take 2 to 3 weeks. For patients who have worn hearing aids for decades, adjusting to newer ones with AI and ear-to-ear communication can take longer. The biggest challenge? Waiting for the hearing aid to adjust to the environment as it modifies the volume to prioritize certain sounds.

"Hearing aids are not miracle devices, and they don't give back normal hearing," says Dr. Luffler. "We just try to set up our patients for success."

Mayo Clinic does that by performing real ear measurements, the gold standard for fitting a hearing aid. Audiologists verify all hearing aids by running tests to ensure the devices amplify sounds appropriately for each patient's hearing loss. Audiologists also work closely with ENT and neurology specialists if they see red flags during the fitting, such as hearing asymmetry, ear pain, dizziness or unusual draining.

"Our priority is making sure that our patients are healthy and can tolerate the recommended prescription," says Dr. Luffler. "We make whatever adjustments necessary to fit the patient's lifestyle — regardless of the newest technology — because the best hearing aid is the one that the patient is going to wear."

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