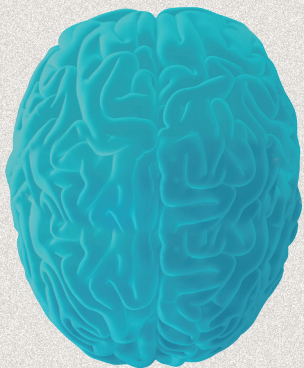


Quick Overview: Inium Sense BrainHearing™ Features



BrainHearing™ describes the approach that Oticon takes when creating solutions for those with hearing loss. It starts with the fundamental observation that speech understanding is a cognitive process – it happens in the brain.

► **BrainHearing™**

The brain can do an amazing job taking in information from the environment, allowing a person to know what is happening in the world around them. When it comes to auditory signals, the listener can decide who to listen to and what sounds to ignore. But, in order to do this, the brain needs the best possible information. Hearing loss compromises the quality and quantity of the sound coming from the peripheral auditory system.

Our BrainHearing™ approach puts the focus on managing sound so that we provide the brain with the most complete sound picture possible. Of course we want to create an excellent signal-to-noise ratio when that is possible, but we also want to provide a complete, natural sound picture.

The role of amplification is to feed the brain the very best information possible. At Oticon our goal is to preserve information in the details of the speech waveform and to provide a complete picture of where sound comes from. This provides the hearing instrument user with the most complete, most natural and most successful listening experience possible.

► **Speech Guard E**

All nonlinear hearing instruments change gain as the input level changes. However, the control over the timing of these changes is key. Historically, hearing care professionals have had to choose between slow acting and fast acting systems, invariably making compromises to the quality or clarity of the speech signal.

Traditional approaches to compression can cause some information in the speech signal to get lost or distorted. Speech Guard E controls the dynamic properties of Oticon's multichannel nonlinear hearing instruments, applying gain and compression in a way that is designed to fully preserve the details of the speech waveform.

Research has shown that Speech Guard E provides better speech understanding, especially in complex listening environments. The better we can preserve the details in the speech waveform, the easier it is for the brain to fully understand the speech signal.

Quick Overview: Inium Sense BrainHearing™ Features

► Spatial Sound

When the patient's two hearing instruments can exchange large amounts of data very quickly, new signal processing possibilities are opened up. Complex signal processing is only available when using a high speed communication link between instruments and is not feasible using Bluetooth or 2.4 GHz data transmission technologies.

Some manufacturers have chosen to use communication between instruments to create an artificial, situation specific, narrow directionality mode. In contrast, Oticon uses high speed data sharing to balance the gain and compression response between the two hearing instruments. This allows the instruments to preserve the on-going, ear-to-ear level differences in sound that are so vital to localization.

The better the patient is at identifying where sound comes from, the easier it is for the listener to distinguish where all the sources of sound in the environment are located. They can then choose which one to attend to and which ones to ignore. The auditory system is a binaural system and Spatial Sound is the first hearing instrument technology to fully support the natural localization process.

► Soft Speech Booster

Soft Speech Booster takes personalization to the next level. The Inium Sense platform allows for the provision of more soft gain. The improved processing power and more robust anti-feedback system provide an increase of at least 3 dB of soft gain to critical speech frequencies above 1.5 kHz for most patients.

Together, Soft Speech Booster and VAC+ account for individual variations in soft sound perception, allowing for up to 20% improved speech understanding.* Soft Speech Booster and VAC+ provide the ability to customize soft gain for a more personalized fitting that performs in a full range of everyday listening environments.

**Le Goff N, "Amplifying soft sounds—a personal matter." Whitepaper. Oticon, Inc. Feb. 2015.*

► Free Focus Directionality

The brain loves a good signal-to-noise ratio. Patients also prefer the sound quality of a device that does not put artificial restrictions on the sound that passes through. The key is to know when to apply directionality and when to allow a natural, full sound picture to be presented to the patient.

Research has shown that patients prefer directionality when it helps improve speech understanding, but they prefer an omni-directional response all other times. The intelligent decision making in our Free Focus directional system will automatically activate directionality when it can improve the signal-to-noise ratio for the patient. At all other times, it will provide the excellent sound quality of an omni-directional response. All of this happens automatically without the need to push a button to change settings.

In addition, Oticon pioneered the concept of Split Directionality, in which the low frequencies are kept in omni and the higher frequencies provide a directional response. This system allows directionality to be applied at much lower levels than most other systems in the marketplace. This mode provides both good sound quality but also the key benefit of improved speech understanding in moderate level, speech-in-noise situations.

Quick Overview: Inium Sense BrainHearing™ Features

▶ TriState Noise Management

Traditional approaches to noise reduction make predictions based on the incoming signal about whether or not to apply noise reduction in speech plus noise situations. The Oticon TriState Noise Management system uses a traditional approach to analyze the incoming signal for noise; however, a second proprietary analysis technology, VoiceFinder, is used to determine if speech is present in the environment.

This dual system allows Oticon to be much more confident about when to apply noise reduction: aggressive reductions when speech is not present to improve patient comfort, but guarded application of noise reduction when speech is present in order to give the brain access to more information. This allows the patient to extract important speech cues in challenging environments.

▶ Personalization

The only person who knows how sound sounds through a hearing devices is the user. Many different factors will affect the type of processing that any given patient wants and needs.

Oticon has developed a fitting approach that is designed to efficiently account for the natural variability from person to person. Our Personalization process affects many functions in the devices, including the aggressiveness of our noise reduction and directional systems, the extra protection provided for high level inputs, and the amount of access to softer sounds of speech. The sum total is a hearing system that fully reflects how each individual patient experiences sound.

To learn more about Oticon technologies that support BrainHearing™ visit www.oticon.com.