Though physically small, earbuds are an important part of an open hearing aid fitting. Earbuds must be comfortable for the patient, provide retention in the ear and simultaneously serve as the first line of defense against dirt, debris and cerumen. Additionally, whether the goal is a traditional open fitting or to extend the range of the fitting without the need for a custom earmold, earbuds must provide appropriate acoustics. Achieving all these goals can prove to be difficult since earbuds are a standard product and must accommodate a variety of ear canal shapes and sizes. Given this difficult balance, many earbuds may not consistently provide an optimal combination of comfort, acoustics, retention and protection.

Comfort: One of the most important aspects of an earbud is comfort. An earbud must be comfortable for extended periods of wear time as well as daily insertions and removals, or it will be rejected by the patient.

Acoustics: The acoustic properties of the earbud used in a hearing aid fitting are also extremely important. “Open” earbuds must provide appropriate acoustic openness to the ear to reduce or eliminate the patient’s sensation of occlusion. In contrast, “occluded” earbuds must balance the need for added fitting gain with the feeling of occlusion. Furthermore, both types of earbuds need to provide acoustic consistency, such that the acoustic properties of the fitting do not change between wears due to variable placement in the ear by the patient. Acoustic consistency can be difficult to achieve given the wide variability in the size and shape of individual ear canals, as well as inconsistency in patient placement in the ear. Existing earbuds may pucker or fold in the ear canal upon insertion due to the aforementioned factors. A study revealed that previous Starkey Hearing Technologies occluded earbuds may fail to extend the fitting range for most patients, and that the acoustic variability between patients and placements is high (Coburn, Rosenthal, & Jensen, 2014). These findings indicate the need for greater acoustic consistency in Starkey Hearing Technologies earbuds.

Retention: Earbuds must also provide retention in two ways:

1. They must help to retain the receiver cable or thin tube in the patient’s ear.
2. They must be secure on the hearing aid receiver and/or thin tube to prevent the earbud from becoming decoupled during hearing aid insertions and removals.

Despite this, the earbud must be easy for the professional and patient to remove, clean and replace as needed. The design of the earbud must strike a delicate balance between these two competing needs. In general, Starkey Hearing Technologies’ current earbuds retain well on the receiver and in the ear; this factor is important to maintain in future earbud designs.

Protection: As the first line of defense, earbuds must withstand exposure to the elements. Specifically, the earbud must protect the receiver or thin tube from cerumen, moisture and other debris in the ear canal. Furthermore, the earbud must be able to be inserted without becoming clogged, or the sound quality of the hearing aid fitting can be severely compromised. Thus, earbuds...
must be designed to provide sufficient amounts of protection while in the ear.

**Consistency:** As mentioned above, consistency is key. The earbud must be able to consistently provide comfort, optimal acoustics, retention and protection for all patients who are candidates for an open hearing aid fitting. Without consistency in each of the aforementioned factors, the patient’s experience may be compromised.

Starkey Hearing Technologies engineers had each of these factors at the forefront of their minds when designing the Comfort Bud. The overall goal of the Comfort Bud design was to create an earbud that could consistently provide proper comfort, acoustics, retention and protection for patients. The various design elements of the Comfort Bud contribute directly to this goal.

As previously mentioned, patient comfort was a top priority in the design of the Comfort Bud; the unique contour of the earbud provides patients with consistent, long-term comfort. Whereas many earbuds touch only certain parts of the ear canal wall, causing an unequal feeling or pressure points in the ear, the Comfort Bud was designed to create uniform radial pressure against the ear canal wall for a variety of ear canal shapes and sizes (Figure 1). The equal and sturdy wall sections of the Comfort Bud help to eliminate hot spots, providing consistent patient comfort.

Not only does the uniform contour of the earbud aid in maximizing patient comfort, but the occluded Comfort Bud also provides consistent occlusion when needed to extend the fitting range. Unlike other earbuds that may fold or irregularly bend upon insertion into the ear, reducing the acoustic seal of the earbud, the Comfort Bud has a retaining ring that helps it to resist puckering even when the earbud is being constricted (Figure 2). Achieved occlusion with other earbud designs may differ greatly depending upon earbud position or placement; with the occluded Comfort Bud, a more consistent fit can be achieved with each insertion.

Additionally, the open Comfort Bud was designed to provide comfort and maximum acoustic openness. The vents on the open Comfort Bud are positioned to reduce contact with the ear canal wall, which reduces itchiness and pressure points and helps to maintain the desired openness for comfort and acoustics.

**Figure 1.** The Comfort Bud family in various sizes.

**Figure 2:** A. The retaining ring allows the Comfort Bud to resist puckering and uneven folding even when constricted. B. The Comfort Bud does not use internal support ribs, allowing the earbud to conform to the ear canal like a balloon.

**Figure 3:** This traditional earbud requires internal support ribs (as shown), causing it to be inflexible and increasing the potential for pain points in the ear canal.

**Figure 4:** The wax bridge deflects dirt and debris away from the acoustic port, particularly during hearing aid insertions.
The unique design of the Comfort Bud also allows it to provide consistent retention in the ear. It is designed to wrap around the first bend of the ear canal in order to achieve greater retention. Due to its unique contour, internal support ribs are unnecessary; this allows the free-floating cross-section to equalize constrictive pressures, and thus, comfortably conform to the ear canal like a balloon (Figures 2 and 3). Unlike other earbuds, which may press against the bend of the ear or fold up against the ear canal wall, the Comfort Bud was designed to adapt to ear canal irregularities for secure retention.

Finally, the Comfort Bud is a strong barrier between the patient’s ear and the hearing aid receiver. The wax bridge deflects dirt and debris to protect the acoustic port (Figure 4), and its flexible design allows it to move and bend, thereby preventing cerumen and dirt from being scooped into unwanted areas during hearing aid insertions and removals.

Though it is just one component of an open hearing aid fitting, there are many factors to consider when selecting the appropriate earbud for a patient. The Comfort Bud was designed with your patients in mind. Above all else, the Comfort Bud provides consistency for the patient and for the professional. Whether you’re concerned with patient comfort, fitting acoustics, earbud retention, or protection from dirt and debris, you can depend on the Comfort Bud for reliable results.

Reference: