were as follows: Given the unknown acoustic effects of various stock earbud options, the purposes of this study (2) The fit of the earbud is acoustically consistent across multiple hearing aid fittings. (1) leakage is problematic, as the use of an occluded earbud to extend the fitting range of a hearing path may have a drastic negative impact on a hearing aid fitting.

...not fully characterized direct path of a sound source

canal (RIC) hearing aids are commonly coupled with stock earbuds in clinical

To characterize the relative acoustic leakage of stock earbud styles used in receiver

Introduction

Eight adults with normal hearing participated in this study (5 males, 3 females).

Methods

Eight adults with normal hearing participated in this study (5 males, 3 females).

- Two clinically experienced audiologists selected the appropriate earbud size for each participant’s left ear. Earbud options are displayed in Table 1. The audiologists were asked to select the earbud size based on otoscopic examination, judgment of the earbud fit in the ear canal, and clinical experience. The audiologists were blinded from each other’s size selections.

- Custom hole was drilled into each occluded and power earbud to allow the interaural probe microphone to be routed through the earbud without introducing additional acoustic leakage (Figure 3).

- Each of the 10 earbuds was selected for each participant’s left ear. The custom hole was either in each earbud to allow the probe microphone to be routed through the entire earbud (Figure 1) or was placed on the probe tube tip for the custom-sized hole to allow the probe microphone to be placed on the probe tube tip for the custom-sized hole to allow the probe microphone to be placed on the probe tube tip or probe tube tip for the custom-sized hole to allow the probe microphone to be placed on the probe tube tip or probe tube tip. Each probe tube (including those routed through occluded and power earbuds) was tested with the probe microphone in the ear, with probe tube insertion depth, with probe tube insertion depth of 2-

- The pathways of an acoustic signal to the tympanic membrane.

- Amplified Sound Path Measurements: A custom hole was drilled into each occluded and power earbud to allow the interaural probe microphone to be routed through the earbud without introducing additional acoustic leakage (Figure 3).

- Each participant was seated directly in front of the soundfield source, with approximately 29 inches from the center of each participant’s right ear. The interaural probe microphone was inserted into the participant’s left ear. Otoscopic examination verified proper insertion depth, with probe tube insertion depth of 2-

- The acoustic effects of occluded and power earbuds relative to the custom earmold condition. Relative to the custom earmold condition

- Results, continued

- Acoustic Leakage Across Earbud Conditions: To evaluate the variability in acoustic leakage across the three earbud conditions, a pairwise variance test between each earbud condition relative to the custom earmold condition. Relative to the custom earmold condition

- The acoustic effects of occluded and power earbuds should not be assumed between patient

- There was no significant difference in acoustic leakage between trials (p>.05), or effect of trial by condition (p>.05, ANOVA-F(1,7)=3.71, p=.09). There was no significant difference in acoustic leakage between trials (p>.05), or effect of trial by condition (p>.05, ANOVA-F(1,7)=3.71, p=.09).

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References


Summary and Conclusions

Results suggest that although the acoustic behavior of earbuds is consistent and is expected across individuals and across trials, the acoustic behavior of occluded and power earbuds is not predictable. Specifically:

- Power earbuds may achieve a substantially greater amount of occlusion in the ear canal relative to open and occluded earbuds. However, power earbuds may not necessarily be an equivalent substitute for a custom occluded mold in terms of achieved occlusion.

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