

Phonak

Guide

Phonak direct connectivity hearing aids and amplified stethoscopes

Introduction

This document serves as a guide for how amplified stethoscopes can be configured with Phonak direct connectivity hearing aids for auscultation. An amplified stethoscope helps to compensate for hearing loss (HL) by amplifying bodily sounds. However, not every available amplified stethoscope will be an option for medical professionals with HL. In addition, there are no specification standards with amplified stethoscopes (Smith, 2019). Thus, take care of statements that suggests the stethoscope provides up to 100x, 40x, 60x, or 24x amplification, as it is not clear what level this amplification is relative to.

It is important for medical professionals with HL to be aware and counseled that heart and lung sounds may not be perceived the same when listening through hearing aids. It may be necessary to learn and practice what they need to listen for during auscultation, as well as demo an amplified stethoscope that would suit their listening needs most appropriately. For the purpose of this document, medical professionals with HL will be referred to as clients.

Auscultation

Auscultation is the act of using a stethoscope to listen to internal sounds of the body. Through auscultation, medical professionals can analyze heart and lung sounds for differential diagnosis (Smith, 2019). This can be a challenge for clients as heart and lung signals are considered very soft, low frequency (LF) sounds. Consequently, there is a limitation in hearing aids to achieve the LF bandwidth needed for auscultation as this falls well below the frequency region for speech understanding.

- Lung sounds may range from 70 Hz to 4 kHz with most signal detection falling below 2 kHz (Smith, 2019).
 - Critical lung sounds for differential diagnosis fall within the 200 Hz to 600 Hz range.
- Heart signals may range from 20 Hz to 650 Hz (Smith, 2019).
 - Critical heart sounds for differential diagnosis fall within the 70 Hz to 120 Hz range.

Below are recommendations for setup configurations, as well as programming suggestions for Phonak direct connectivity hearing aids. In addition, it is strongly recommended that clients practice and learn what they need to listen for as bodily sounds may be perceived differently via the hearing aids than without the hearing aids.

Amplified stethoscopes with headphones and hearing aids

Stethoscope earpieces are designed with an unoccluded ear canal in mind. Thus, the earpieces are competing for space that is occupied by a hearing aid (Smith, 2019). One consideration is to use an amplified stethoscope with over-the-ear or on-ear headphones. This allows the hearing aids to remain in the ears during auscultation.

Configurations for amplified stethoscopes with headphones:

- Hearing aids with open or large venting (clients have normal or near-normal LF hearing): on-ear headphones to allow auscultation signals to be transmitted via direct sound.
- Custom hearing aids: over-the-ear or on-ear headphones. Create a separate manual program with additional LF gain.
- BTEs or RICs with custom earmolds: over-the-ear headphones to cover the hearing aid microphones (mics). Create a separate manual program with additional LF gain.

Amplified stethoscopes and hearing aid streaming

It is possible to stream signals from a stethoscope to Phonak direct connectivity hearing aids. There are different configuration options depending on the chosen stethoscope. These include:

- Bluetooth® connectivity via a Bluetooth enabled stethoscope
- Bluetooth streaming via a Bluetooth transmitter plugged into the stethoscope
- RogerDirect™ streaming via a Roger™ microphone plugged into the stethoscope

Regardless of the chosen stethoscope, consider these hearing aid factors:

- **Coupling:** choose a custom earmold with minimal or no venting, or power dome. The more occluded the coupling, the lower the risk of LF leakage.
- **Receiver power:** select M receiver or greater.
- **LF gain:** a LF boost is provided by default within the streaming program. Approx. ~40 dB of additional LF gain can be achieved. The amount of gain and range of frequencies affected is dependent on the earmold vent and receiver power of the hearing aid.
- **Attenuation of the hearing aid mics:** consider how clients would like to hear their patients when performing auscultation and adjust the attenuation of the hearing aid mics in the streaming program accordingly.
 - Manually mute the hearing aid mics or reduce the microphone level while streaming. This can be configured in the fitting software.
- **MPO:** Reduce the MPO only if the client is experiencing distortion while streaming and performing auscultation. This would be most applicable for clients with an earmold vent. The larger the vent, the greater the risk for distortion.

In addition, consider these streaming factors:

- **Latency:** streaming via Bluetooth may have a slight delay in signal transmission compared to streaming via Roger.
- **Compression:** reduce the volume on the stethoscope if the client is experiencing distortion in the signal. Increasing the volume on the stethoscope may lead to clipping of the streaming signals in the hearing aid.
- **Ambient noise:** if the streaming device has external mics (i.e. Roger Select™), make sure they are muted while performing auscultation.
- **Ease of use:** the hearing aids automatically switch into the streaming program upon detection of a Bluetooth or Roger signal. If the client wishes to have manual control of when to enter / exit the streaming program, this can be configured for Roger only in the fitting software.

Amplified stethoscopes on the market

Please note there may be other options available on the market that are not listed below. For further information about each amplified stethoscope, please refer to their website.

	Thinklabs One	3M™ Littmann® CORE	Eko DUO	3M™ Littman® 3200	Cardionics E-Scope®	eKuore
Traditional ear tips and tubing	Comes with wired earbud headphones	Yes	Yes	Yes	Yes	Comes with wired earbud headphones
Audio jack to plug in Roger mic via audio accessory cable	Yes	No	Yes	No	Yes	Yes
Bluetooth connectivity to hearing aids	Yes*	Yes**	Yes**	No	No	Yes
Visual display option via software (app, PC, etc.)	Yes	Yes	Yes	Yes	No	Yes
Stream recorded playback via an app	Yes	Yes	Yes	No	No	Yes

*Must plug a Bluetooth transmitter into the stethoscope to establish a Bluetooth connection between the stethoscope and the hearing aids.

**Stethoscope and hearing aids must be paired to the same smartphone. The Eko App provides the option to route auscultation signals to the hearing aids to listen in real time.

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