# Phonak solutions for pediatric unilateral hearing loss

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“With infants being identified with UHL at a very early age, it is time for clinicians to consider all intervention avenues available and take the opportunity to positively impact the development of children with UHL to help them reach their maximum potential.”[1]

# What is unilateral hearing loss (UHL) and why do we need to act?

UHL is a condition where a child has normal hearing in one ear and a hearing loss in the other. This hearing loss can range from mild to profound. The hearing-impaired ear may be aidable but not in all cases. This has major implications for the choice of hearing solution.

It is essential that UHL is identified and intervention provided as early as possible to help manage the risk of potential adverse outcomes, including developmental, academic and psychosocial problems. As a physician you can play an essential role in helping children with UHL and their parents or carers understand the need for fitting a suitable device, tailored to their needs and preferences, to make sure they are ready to succeed.

Phonak has a range of technologies developed specifically for children with unilateral hearing loss, to ensure that they have the right tools to engage with all that life has to offer with minimal impact of their hearing loss.

# One ear is not sufficient: challenges of UHL

When a child has normal hearing in only one ear, they experience a variety of difficulties.

### Working out the direction from which a sound comes

In this case, the child will have an increased reliance on visual cues. Localization of sound sources is important for safety, e.g. when crossing the road.

### Understanding what a person says unless they are in close physical proximity

Two normal hearing ears help us to filter out noise to better hear speech.

### Hearing and responding to a person when they speak on the side with impaired hearing

Sounds are heard more softly when only heard in one ear and therefore more difficult to interpret.

### Hearing in noisy environments

Having one normal hearing ear is not enough to hear well when presented with difficult situations, e.g. in classrooms, playgrounds, and during sports.

# Consequences of UHL

**If a child cannot hear well, there can be serious implications for their developing speech, language and communications skills.**

Unlike adults, children with UHL lack strategies to adapt to impaired hearing. These potential problems are not just limited to spoken language. Not hearing well with both ears puts a child at risk of:[2, 3, 4]

- Speech and language delay
- General communication difficulties
- Psycholinguistic dysfunction
- Social and emotional problems

These can ultimately result in both academic and behavioral difficulties.[3, 4, 5]

**1 in 1000** newborn infants are identified with UHL.[6] **3 in 100** school-aged children have UHL, with diagnosis occuring on average between 3 and 5 years of age.[2]

Compared to children with normal, binaural hearing, those with UHL are:[2, 3, 4]

- **10 times more** likely to need to repeat a year of school
- **5 times more** likely to need support services

Recent meta-analyses reveal additional problems experienced by children with UHL:

- Lower IQ scores[7]
- Impaired quality of life[8]

**The risks of adverse outcomes in UHL cannot be ignored. Proactive management is essential to ensure that children with UHL are ready for success in school and beyond. As a physician you can ensure that all children and parents understand the importance of early intervention to address the difficulties from UHL.**

# Taking action against UHL: getting ready for success

**Addressing UHL is recommended by the American Academy of Audiology (AAA). Intervention methods need to be specific to each child and their situation.**

### Heterogeneous population

Children will have differing types of hearing loss on the impaired ear, from mild to profound, aidable to unaidable. Therefore, solutions need to be tailored to the child and their circumstances, including age, family situation and communication goals.

### Dealing with noisy situation

Whatever the choice of solutions, special consideration needs to be given to noisy situations, e.g. the classroom, where a remote wireless technology is recommended for best performance. In this case, Roger Focus is the easy single choice. Alternatively, the Roger system can be used together with other UHL solutions, the Phonak CROS II system, a hearing aid or an osseointegrated hearing device.

### AAA recommendations for UHL

- Assistive technology in classroom
- Bone conduction hearing aid
- CROS or BiCROS
- FM/Roger receiver coupled to the good ear – may be preferred in classroom settings
- Monaural fitting for aidable unilateral loss
- Transcranial CROS

# Taking action against UHL: expert guidelines for pediatric amplification

## The American Academy of Audiology (AAA) offers guidance on technology usage for UHL.

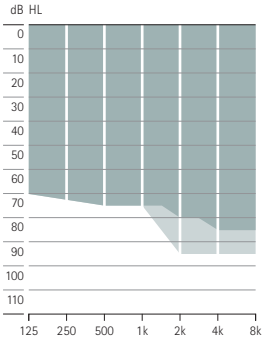
"Contralateral Routing of Signal (CROS) and Bilateral Routing of Signal (BICROS) fittings are specially designed for patients having either unilateral hearing loss or bilateral asymmetrical hearing loss where one ear is unaidable, respectively. Currently, wired and wireless configurations are available. For the child with unilateral deafness, an FM system* with the wireless remote microphone receiver portion coupled to the open, good ear may be preferable in classroom situations to the CROS arrangement to give the benefit of increased signal to noise ratio, a benefit in a noisy classroom. The transcranial CROS is an option for individuals who have no auditory response in one ear. In this configuration, a powerful hearing aid is fit to the non-responsive ear so interaural attenuation is overcome and sound is perceived by the functioning cochlea. This is not a common fitting for children and again, an appropriately fit assistive listening device may be a better communication solution in the classroom. The osseointegrated hearing device [...] also can be used as an implanted transcranial CROS; evidence supporting benefit of this arrangement in children is limited."

"If the unilateral hearing loss is aidable then a monaural fitting would be considered."[9]

*Replaced by digital wireless technology such as Phonak Roger

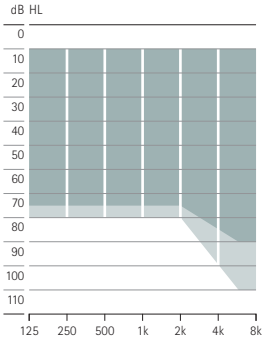
# Phonak Sky™ V: the choice when impairment is aidable

Sky V-M



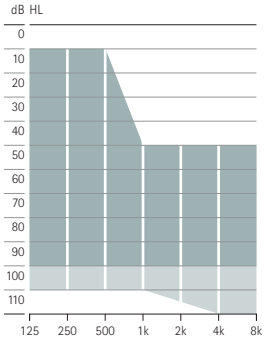

Mild to moderately severe hearing loss, all audiometric configurations.

Sky V-P



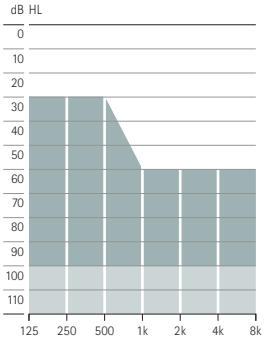

Mild to severe hearing loss, all audiometric configurations.

Sky V-SP



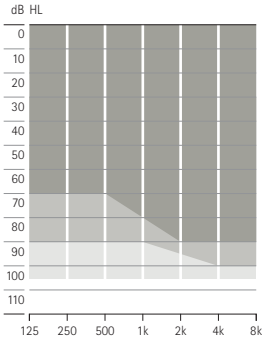

Mild to profound hearing loss, all audiometric configurations.

Sky V-UP




Moderate to profound hearing loss, all audiometric configurations.

Sky V-RIC




Moderate to profound hearing loss, all audiometric configurations.

SlimTube HE | Hook / mini hook | xS receiver | xP receiver | xUP receiver

## Sky V was made with children in mind

Phonak Sky V is the latest addition to the Phonak pediatric portfolio. Sky V hearing aids offer ground-breaking features and technologies, specifically optimized to address kids' and teens' diverse communication needs.

## Robust solutions

- Tamperproof – increased safety for our youngest users.
- 5 water-resistant and dust-tight models.
- New, light-weight, composite materials make Sky V housings significantly more robust than previous housings.
- Indicator light clearly shows the status of the hearing aid.

## SoundRecover2: giving children access to the broadest range of sounds essential for speech and language development

Clinical studies of SoundRecover2, Phonak's new frequency-lowering algorithm, show improved audibility of high-frequency information compared with the original SoundRecover, while maintaining low and mid frequency sounds.[10, 11] By creating an optimal listening experience, SoundRecover2 enables more children to hear and communicate with confidence than ever before. Children already using SoundRecover may be able to switch to SoundRecover2 without a long period of acclimatization, so the benefits of upgrading to the new platform can be experienced as soon as possible.

## AutoSense Sky OS: listening made easy

Phonak's AutoSense Sky OS is based on the successful AutoSense OS operating system. It has been specifically designed to ensure that children have an optimal listening experience whether they are in the classroom or playground, listening to music or spending time with the family.

By accurately capturing and analyzing a child's environment in real time, AutoSense Sky OS always selects the right blend of programs and settings to optimize a child's listening and understanding (Figure 1). The new automatic program and feature selector in AutoSense Sky OS is up to 30% more precise for noisier classrooms and 39% more accurate in recognizing yelling and shouting as unwanted noise compared to the adult system.[12] With no manual interaction required, children can focus on more of life's great adventures and let their hearing aids do the work.

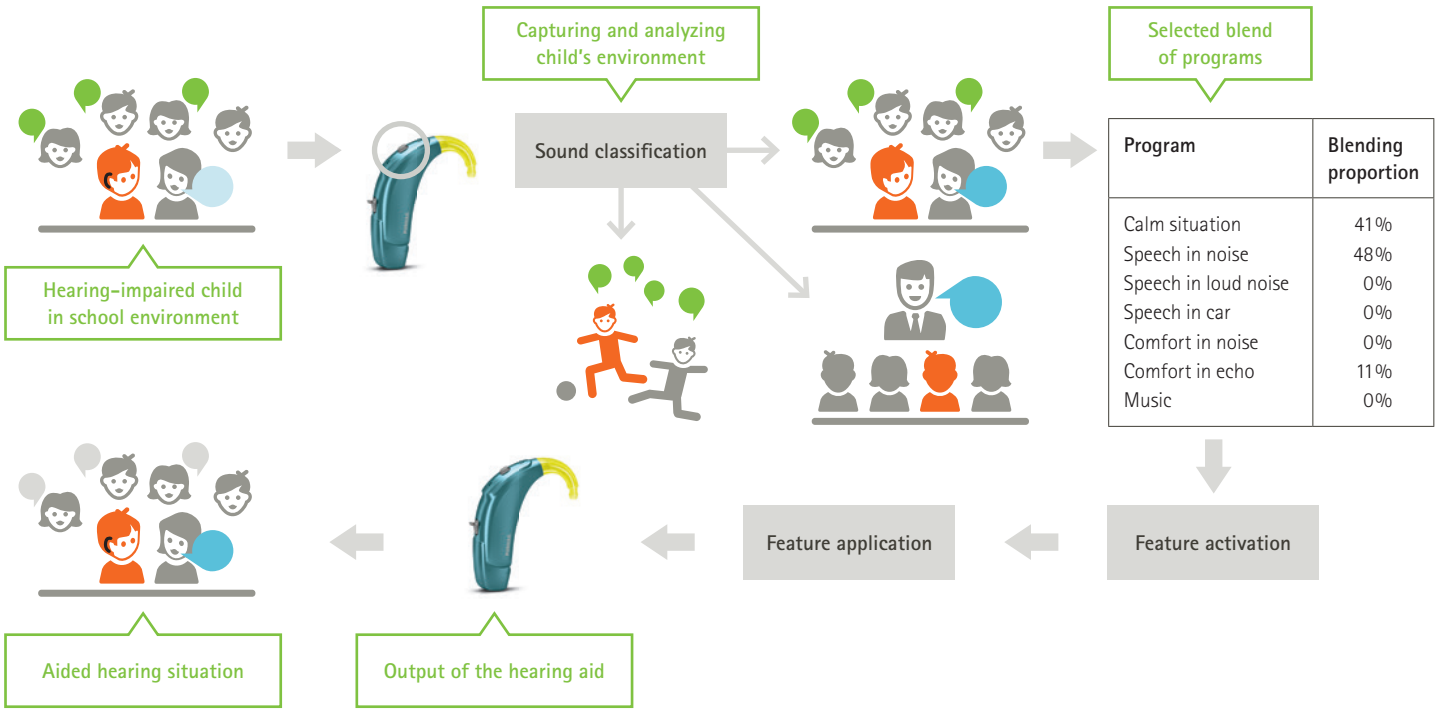



Figure 1. **Illustration of the pediatric operating system, AutoSense Sky OS.**

# Roger plus Sky V: a powerful combination

**Adding Roger technology to Sky V hearing aids can boost hearing with maximum ease and efficiency, in noise and over distance.**

### RogerReady: ready to go

Adding a Roger receiver is now easier than ever.

- Any Roger ear-level receiver coupled to a Sky V device will automatically detect the signal from a Roger microphone and activate the 'Roger + Mic' program. This is all that is needed to receive the Roger signal.*
- Automatic detection ensures that children have access to the Roger signal with unparalleled signal-to-noise ratio whenever a Roger microphone is in use.**
- There is no additional programming of the hearing aids by the audiologist, giving access to improved hearing quickly and simply.

### Roger + Mic: a choice of customizable modes

Available in Phonak Target 4.3 software and higher, 'Roger + Mic' now offers a choice of three Sky V microphone modes customizable by the fitter.

- Omnidirectional
- Real Ear Sound
- Automatically activated fixed directional

roger

*Not available on Sky V-M
**Not available on Sky V 30 level

# Roger™ wireless microphones

**There are several Roger microphone options, providing a solution for every listener, whatever hearing technology they currently use.**

## Roger Touchscreen Mic

Roger Touchscreen Mic features a new user-friendly interface for use in the classroom. With an automatic microphone function, it conveniently switches from an individual talker to a small-group interaction mode, depending on its placement.

## Roger Pass-around

The Roger Pass-around microphone is designed to enhance classroom discussions so that not only teachers, but all students are heard clearly. With an appealing design it is the optimal size for kids and teens to hold and fully control.

## Roger Multimedia Hub

This versatile transmitter used in a Roger network features audio mixing which allows a teacher's voice to be heard simultaneously with an audio signal. Used as a stand-alone device, it can be connected to an audiobook or tablet for individual listening.

## Roger Pen

The Roger Pen offers state-of-the-art wireless technology with superior Speech-in-noise and over-distance performance. Packed in a discreet design, its features include fully automated or manual microphone settings and Bluetooth® connectivity, providing an all-inclusive listening experience.

## Roger Clip-On Mic

The Roger Clip-On Mic, worn on a shirt, is a small and lightweight microphone. Perfect for parents and family members, multiple Roger Clip-On Mics can be used together, allowing a child to hear everyone.

# Phonak CROS II: when there is no usable hearing on the impaired side

**Some children may have no usable hearing on the impaired side due to profound loss. This is often referred to as single-sided deafness (SSD), a subgroup of UHL, and in these cases a hearing aid alone cannot provide enough benefit.**


CROS II-13 with CROS Hook*


CROS II-13 with SlimTube


CROS II-312 with SlimTube


CROS II-312 with CROS Tip

For children with an unaidable hearing loss on one side and normal hearing in the other ear, Phonak now offers a new, discreet CROS transmitter (Contralateral Routing of Signal). Featuring the unique Phonak Binaural VoiceStream Technology™, CROS II wirelessly transmits sound from the unaidable ear to the Sky V hearing aid on the better hearing ear.

When competing noise is presented from the side, our CROS II system is designed to provide front facing speech with an 18 dB advantage.[13] The benefit of separating speech and noise helps children to focus on the person talking in front of them.

The Phonak CROS II portfolio consists of cosmetically attractive wireless transmitters that are suitable for children with SSD.

- Cable free – 100% wireless audio transmission
- Risk free – no surgery needed
- Flexible – range of styles, retention options and attractive colors
- Convenient – quick and easy fitting

* This solution also meets the IEC standards for use around small children when used with the optional tamperproof battery door. Only available on the CROS II-13 model.

# Phonak CROS II and Phonak Sky V: a powerful combination

In cases of SSD, it is important to provide a powerful solution that can help children detect sound sources, understand people when they talk on the side of the impaired ear and hear speech in noise.

**Binaural VoiceStream Technology™ (BVST):**
CROS II and Sky V use the latest in BVST to stream sound from the impaired side to the normal-hearing ear.

**Automatic activation of the Roger program when using CROS II and Sky V with a Roger receiver.**
In high noise situations, like a classroom, Roger wireless technology is used to improve the signal-to-noise ratio for better speech understanding.

# Roger™ Focus: focus on performance

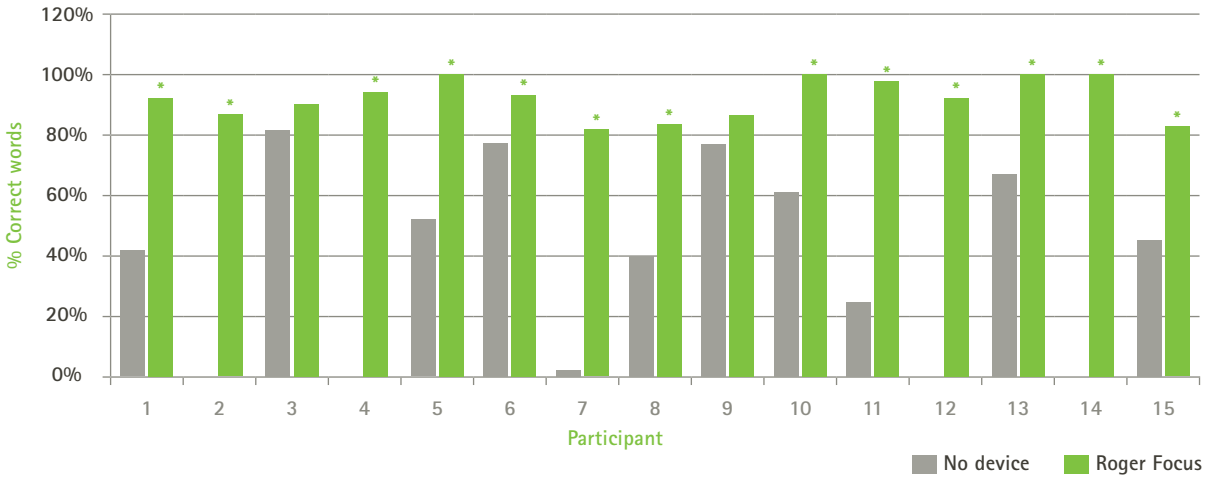



Figure 2. **Speech-in-noise results for 15 children using Roger Focus vs no device.**

Roger Focus is a discreet and highly comfortable behind-the-ear receiver, which the AAA recommends should be fitted to the normal hearing ear of children with UHL. When there is no usable hearing on the impaired ear, Roger Focus provides hearing in noise and over distance.

Speech-in-noise testing revealed an average improvement of 53% with Roger Focus compared to no Roger (Figure 2), using BKB-SIN word lists, with speech presented at 60 dBSPL and noise at 65 dBSPL.[13] Note that participants 2, 4, 12 and 14 achieved almost perfect scores when Roger Focus was introduced versus 0% with 'no device.'[14]

Roger Focus features a SlimTube, a volume control, and uses a 312 battery. The perfect companion for active explorers, it is also resistant to water, sweat and dust.

- Highly discreet
- Extremely light
- Usable out of the box (no programming required)
- One-tap microphone connection
- Volume control
- Water and dust resistant
- 17 color options
- Customizable with 4 SlimTubes and 3 open dome sizes


Roger Focus

# Summary and references

**UHL is a condition where a child has normal hearing in one ear and a mild to profound hearing loss in the other.**

**UHL can result in a range of potentially serious developmental, academic and psychosocial problems.**

**It is therefore essential that UHL is identified and treated as early as possible to avoid potential adverse outcomes.**

**As a physician, you can play an essential role in helping children with UHL and their parents or carers understand the need for fitting a suitable device, tailored to their needs and preferences, to make sure they are ready to succeed.**

**Phonak has a portfolio of technologies and devices developed to help children with UHL be ready for success:**

- Sky V hearing aids with SoundRecover2 algorithm and AutoSense Sky OS when the impaired ear is aidable.
- Sky V coupled with CROS II and Roger when the impaired ear is unaidable.
- Roger Focus receiver to improve hearing in noise, accompanied by a range of Roger microphones to suit preferences and needs.

**Our portfolio works together to meet the precise needs of the child with UHL to help them be ready for success.**

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1 Krishnan, L.A., Van Hyfte, S. (2016). International Journal of Pediatric Otorhinolaryngology. 88, 63–73.

2 Bess, F.H., Dodd-Murphy, J. & Parker, R.A. (1998). Children with minimal sensorineural hearing loss: Prevalence, educational performance, and functional status. Ear & Hearing, 9, 339–354.

3 Bess, F.H., Tharpe, A.M. (1984). Unilateral hearing impairment in children. Pediatrics. 74 (2). 206–216.

4 Bovo, R. et al (1988). Auditory and academic performance of children with unilateral hearing loss. Scand Audiol Suppl. 30. 71–74.

5 Oyler, R.F., Oyler, A.L., Matkin, N.D. (1988). Unilateral hearing loss: demographics and educational impact. Language, Speech, and Hearing Services in Schools.19, 201–210.

6 Prieve, B., Dalzell, L., Berg, A., Bradley, M., Cacace, A., Campbell, D. et al. (2000). The New York State universal newborn hearing screening demonstration project: Outpatient outcome measures. Ear & Hearing. 21 (2), 104–117.

7 Purcell, P.L. et al (2016). Children with unilateral hearing loss may have lower intelligence quotient scores: A meta-analysis. Laryngoscope. 126 (3). 746–754.

8 Roland, L. et al (2016). Quality of Life in Children with Hearing Impairment: Systematic Review and Meta-analysis. Otolaryngol Head Neck Surg. 155 (2). 208–219.

9 American Academy of Audiology. (2013) American Academy of Audiology Clinical Practice Guidelines on Pediatric Amplification.

10 Wolfe, J. et al. Evaluation of a novel non-linear frequency compression scheme for use in children. Int J Audiol (in press, 2015).

11 SoundRecover2 for Pediatrics: Improving audibility where it matters most. Phonak Field Study News (2016).

12 Automatic and Directional for Kids. Phonak Insight (2016).

13 Phonak CROS II – Electroacoustic measurements look at key performance aspects of two wireless CROS systems. Phonak Field Study News (2015).

14 Roger Focus for school children. Phonak Field Study News (2014)

## Life is on

At Phonak, we believe that hearing well is essential to living life to the fullest. For more than 70 years, we remain true to our mission by developing pioneering hearing solutions that change people's lives to thrive socially and emotionally. Life is on.

www.phonakpro.com/UHL



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