

sona: simplify your life



hearing:info

All about hearing, hearing loss, and hearing aids

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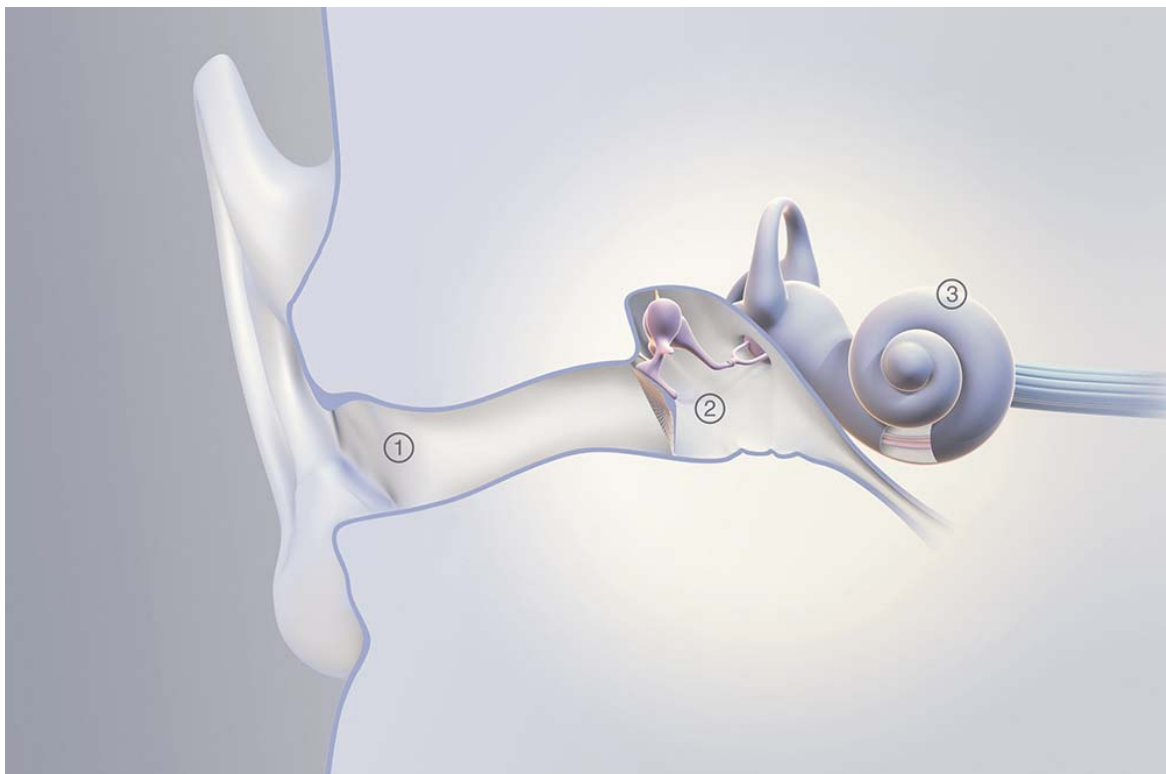
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1. The ear and hearing

Ears are extraordinary organs, and hearing is an extraordinary ability. Hearing is mostly a mechanical process and based on physical movement. The sound you hear are pressure waves travelling through the air producing vibration, responsible for the pitch (higher or lower sounds), and amplitude (louder or softer sounds).

The human ear



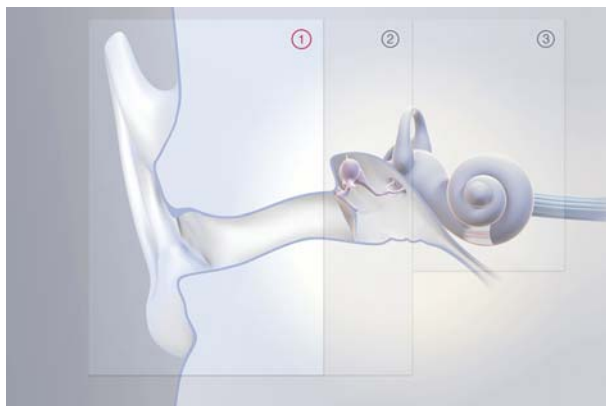
The human ear is composed of:

1. **The outer ear**, responsible for capturing and directing sound waves through the ear canal to the eardrum (tympanic membrane). The outer ear consists of the pinna and the auditory canal.
2. **The middle ear**, where the three ossicles (hammer, anvil and stirrup, the smallest bones in the human body) transfer the vibrations from the eardrum to the inner ear.
3. **The inner ear**, where the cochlea with its 15 000 hair cells transforms the mechanical waves into electrical signals which are processed by the brain.

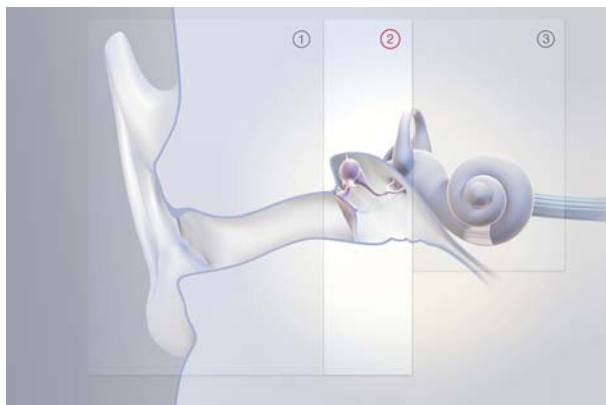
How the human hearing works

The ear directs sound waves down the auditory canal to the eardrum, causing it to vibrate slightly. The ossicles work together as a lever system; they amplify the vibrations and pass them on to the surface of the cochlea in the inner ear. This physical vibration creates compression waves within the fluid-filled spiral tube of the cochlea, which then move the tiny hair cells. At their base this movements create a motion which is changed into electrical signals. These can now be processed by the central auditory system and be interpreted as sounds like speech, music, or noise.

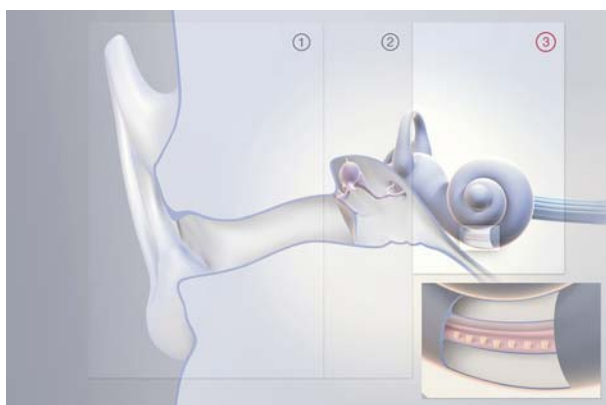
The hearing process



The pinna collects sound waves and directs them into the ear canal.



The sound waves create vibrations of the eardrum, which are amplified by the ossicles and passed on to the cochlea.



Sound enters the cochlea and moves the hair cells. At the base of hair cells, their movement creates a motion which is changed into electrical signals. These signals can now be processed by the brain.

2. Hearing loss

Hearing loss refers to conditions in which people are fully or partially unable to hear certain frequencies of sound. As hearing loss usually develops over a period of time, the changes are subtle. In most cases, hearing loss is a natural and age-related event.

The **severity** of hearing loss is ranked according to the loudness a sound must have before being detected, measured in decibels (dB):

- : **Mild hearing loss** (27 to 40 dB) – soft sounds are not heard, understanding speech is difficult in a loud environment
- : **Moderate hearing loss** (41 to 55 dB) – soft and moderately loud sounds are not heard, understanding speech becomes very difficult if background noise is present
- : **Moderately severe hearing loss** (56 to 70 dB) – between moderate and severe
- : **Severe hearing loss** (71 to 90 dB) – conversations have to be conducted loudly, group conversations are possible only with a lot of effort
- : **Profound hearing loss** (90 dB or greater) – some very loud noises are heard, but communication is no longer possible, even with intensive effort

Hearing sensitivity varies according to the frequency of sounds. To take this into account, hearing ability is measured over a range of frequencies, the result is plotted on an audiogram.

Causes

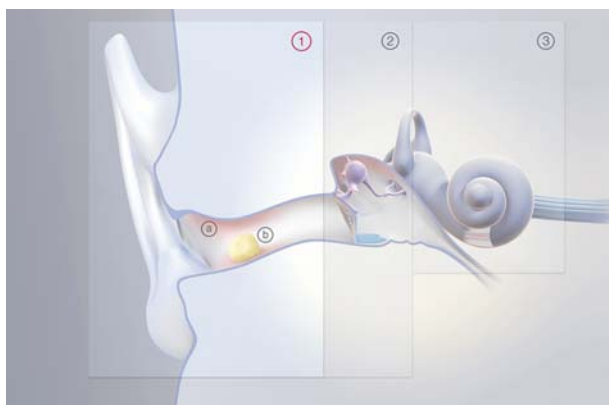
Sensorineural hearing loss

The most common cause for hearing loss is sensorineural, affecting the inner ear. It is usually caused by the natural ageing process: continuous impacts on the fine hair cells in the inner ear can over time affect the transmission of signals to the auditory nerves. Exposure to loud noise, some types of medication or skull fractures can also have an influence on the hair cells and damage them. Damages to the hair cells are irreparable and cannot be treated medically. A hearing aid, however, can correct these types of hearing loss in most cases.

Conductive hearing loss

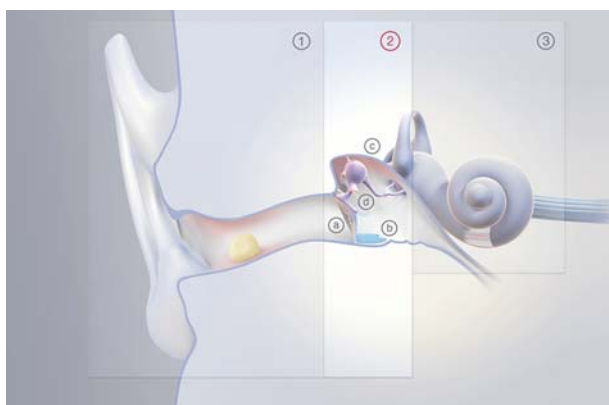
Wax plugs or infections of the auditory canal are typical problems related to the outer ear (conductive hearing loss). Common middle ear related problems are inflammation, fluid behind the eardrum, perforation of the eardrum or otosclerosis (a stiffening of the bones in the middle ear). Most outer and middle ear related problems are temporary and can usually be treated medically or surgically. A possibly resulting permanent hearing loss can be treated with a hearing aid.

Types of hearing loss



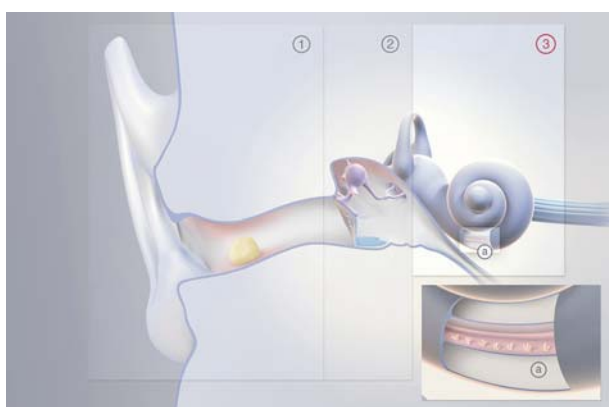
Outer ear related hearing loss

- a) Inflammation
- b) Wax plugs



Middle ear related hearing loss

- a) Injuries of the ear drum
- b) Liquid behind the ear drum
- c) Infections and inflammation
- d) Ossification



Inner ear related hearing loss

- a) Impaired hair cells

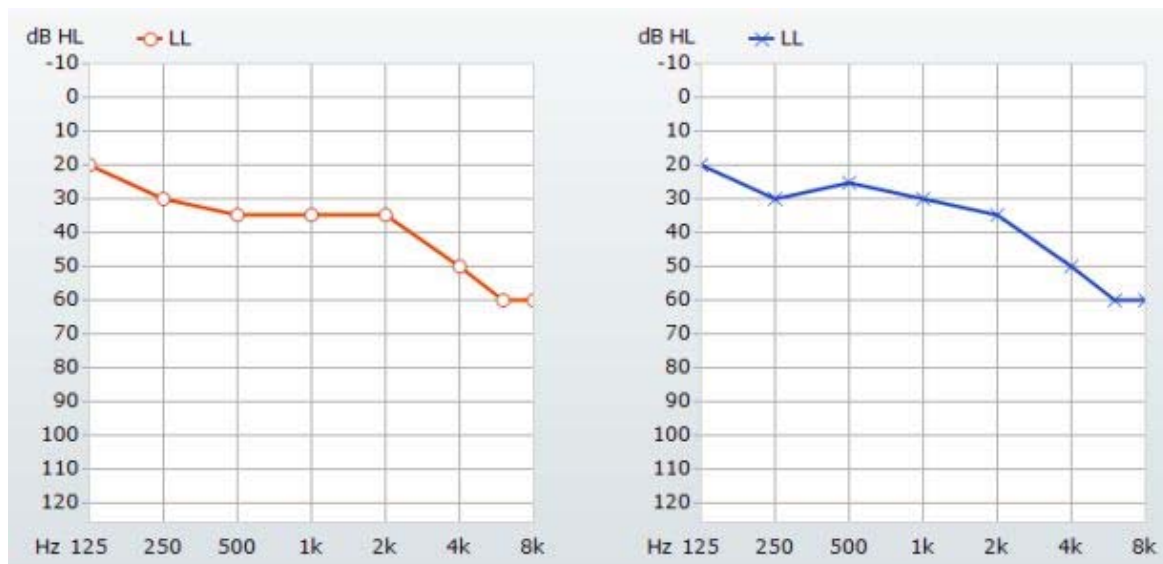
Measuring hearing loss

The audiogram

An audiogram is a graphic representation of your hearing ability. During a hearing test, your hearing is checked at different frequencies. The result is recorded as a characteristic audiogram curve.

The **frequencies**: The horizontal scale at the bottom indicates the different frequencies. The low frequencies (e.g. the humming sound of an engine) are located on the far left, the high sounds (e.g. the chirping of a bird) on the far right.

The **loudness level**: The vertical scale indicates the loudness level of the respective frequency, from soft (top) to loud (bottom). Values are given in decibels (dB). The healthy ear of a young person begins to perceive sounds starting at 0 dB and reaches the threshold of pain at approximately 110 dB.



Example of an audiogram

Hearing capability by age

Audiograms can change over time. Typically, a hearing loss starts at high frequencies (high pitch); it is very common that it increases with the age. The illustration shows the combination of typical audiograms with increasing age.

What you cannot hear with advancing hearing loss

Human speech consists of vowels and consonants which differ in loudness and frequency. They too can be plotted in the audiogram. Depending on the hearing loss, certain vowels and consonants cannot be heard anymore. This results in an incomplete understanding of speech: Hearing loss often affects the consonants **P, K, F, H**, and all **T, Sh, S, and Z** sounds.

3. Hearing aids

Modern hearing aids are small technical and digital works of art.

How hearing aids work

Most modern digital hearing aid have one or two microphones, a loudspeaker (often called “receiver”), a battery, and electronic circuitry. The “brain” of the hearing aid is a small but extremely powerful digital chip that processes and amplifies sounds picked up by the microphone which are then played back through the loudspeaker. This is how a hearing aid processes and amplifies sound:

- : The microphone picks up sound and converts it into an electrical signal that is transferred into the digital signal processor (DSP), where the electrical signals are transformed into a digital code (consisting of “0” and “1”).
- : The DSP executes a number of signal processing steps, like removing noise signals and increasing speech. The resulting digital output is transformed into an electrical signal and transferred to the loudspeaker.
- : The loudspeaker converts the electrical signal into audible sounds and feeds them into the ear.

The hearing care professional (HCP) programs the hearing aid with an external computer and can individually adjust it to the needs of the client. Digital hearing aids can be programmed with multiple programs that can operate automatically or be activated by the wearer (e.g. programs to adapt to loud or soft sound, speech or music, quiet or noisy environments) and feature feedback suppression, noise cancellation, etc.

The technology behind hearing aids has improved greatly in the last years. You might have not heard about it, though, since hearing loss related issues are still not much talked about. In order to close this gap, the following list provides you with information on the latest generation hearing aids:

Past generation hearing aids	New, state-of-the-art-hearing aids
Analog	Digital
All-over amplification	Specific amplification of sounds that are not audible anymore to the individual user, whereas loud sounds are not amplified. Amplification only in frequencies of individual hearing loss
Fixed program	Individual programming and fitting
Large and visible	Small and invisible
Beige colored, sitting on the pinna	Variable colors for invisible behind-the-ear hearing aids to match hair or skin color and dark colored in-the-ear models (matching the dark of the ear canal) and practically invisible
Stiff, heavy and uncomfortable	Slender build, lightweight and flexible

Most relevant features to look for in a hearing aid

There are many different models from various manufacturers available in the market. Ask for these features in order to make sure you get a state-of-the-art model:

Directional microphones

Directional microphones improve understanding of speech in noisy environments. They pick up speech coming from the front and reduce noise coming from the side or back.

Digital signal processing

Digital hearing aids can analyze the hearing situation you are in and react accordingly. They can distinguish between quiet situations, speech in noise situations, or music and apply an optimized setting for that very situation. A program for music should be included, because music differs greatly from other sounds.

Noise cancelers

To further improve the listening comfort, a hearing aid should at least feature cancelers for impulse noise (e.g. the clattering of plates), general noise, wind noise, and feedback.

4. The way to your hearing aids

The following guide helps you to decide whether a hearing aid would be helpful for you and what the steps are to get one.

Check your hearing

This short checklist helps you to quickly determine if you have problems in specific situations that might indicate a hearing problem:

Questions

1. Do you set the volume of a TV higher than others who are watching with you?
2. Do you often need to ask people to repeat themselves?
3. Does it often seem to you that other people are “mumbling” or speaking with muffled voices?
4. Do you have problems following a conversation in a noisy environment?
5. Do people ask you if you have a hearing problem?
6. Do you stay at home more than you used to because you feel uncomfortable with noise or do not understand others when you go out?
7. Do you often misunderstand what is being said?
8. Do you find long conversations more tiring lately?
9. Have you started sitting closer to speakers (e.g. at meetings or at a dinner)?
10. Have you noticed that you do not hear people talking to you unless you have eye contact?
11. Do you find it hard to find out which direction a sound comes from?

If you answered one or more of these questions with a “yes”, it might indicate you have a hearing problem.

Assess your needs

An individual and professional assessment of your hearing should be conducted by a hearing care professional (HCP); most of them offer a thorough hearing test for free.

The typical result of a hearing assessment will show your general hearing capability including the identification of the frequencies where your hearing loss is located and to what extent. Your HCP will then use your audiogram and other factors regarding your preferences and lifestyle to determine your need.

How does a typical first visit look like?

You can make an appointment with a hearing care professional without any obligation and risk. In many cases the assessment of your hearing and hearing needs is free of charge. Hearing care professionals even often offer the testing of a hearing aid without any obligation.

Typically, your first appointment with a hearing care professional (HCP) will include the following steps:

1. An interview

The HCP will ask questions regarding your general health, history of hearing problems in your family, medication, your exposure to loud noises in your job or leisure activities and other relevant topics.

2. An examination

The HCP conducts an examination in order to determine whether your hearing problems are caused by physical damage to your ear canal or ear drum. An otoscope will be used to visually inspect your outer ear.

3. A hearing test

Using a hearing test, the nature of your hearing loss is determined. A thorough hearing test can include an audiometric pure tone evaluation to measure your hearing at different frequencies, a speech evaluation to measure how well you hear speech at different volumes and in different sound situations, and a middle ear evaluation to measure the reaction of your ear drum to air pressure.

4. Your treatment options

Unless your hearing problem has to be addressed surgically, the HCP will now discuss your specific hearing needs and evaluate which hearing aid would cover your needs best.

Sona makes a difference

Usually, after the examination and testing, the hearing care professional will ask you questions regarding your lifestyle and preferences and then order a possibly suitable hearing aid for you. You will have to wait for a second appointment until you can actually try the hearing aid.

Sona hearing aids are programmed according to your individual hearing loss. Since most hearing care professionals have sona:vogue hearing aids on stock, you can immediately try them after your first visit, go shopping or drinking a coffee in a noisy sidewalk café to get a new hearing experience!

Choose product

Selecting the right type of product for you is the next step.

The general degree of your hearing loss, the affected frequencies, your expectations, and the structure of your ear are important indicators to determine the best solution for you. There are two basic models of hearing aids you can choose from: Aids that are worn behind the ear that transmit sound through a thin tube or wire into the ear canal, and aids that are worn in the ear. Both represent the same technology level. Important factors that need to be taken into consideration are:

- : Comfortable fit
- : Handling
- : Sport and leisure activities
- : Your use of telephone
- : Your use of headphones
- : Your typical sound environments

Your hearing care professional will discuss all suitable options for your needs and preferences in order to determine the right hearing aid which covers all your needs.

Costs – USA

Financing

In the USA, hearing aids are typically paid by the consumer. Medicare – the primary national insurance company for elderly people – and other private health insurance companies do not cover hearing aids.

However, there are some states with mandates for the coverage of hearing aids, and private organizations with programs for veterans, children, or people on low income.

Batteries and service

Batteries are paid for by the user. Service comes under normal customer and warranty terms.

What hearing aids can do

What you can expect

Digital hearing aids are designed to separate important sounds like speech from background noise. Your hearing aid should bring you the following benefits:

- : Improving your understanding of speech in general
- : Better understanding of speech in noisy environments
- : Hearing of soft voices again
- : Hearing aids should fit and be comfortable
- : Changing the battery should be easy

To consider

Consider that however technically advanced a hearing aid is, it can never fully restore normal hearing:

- : Hearing with hearing aids sounds different.
- : You can hear sounds again which you may not have heard for some time.
- : Your own voice may sound strange at first.
- : It may take some a few weeks to get acquainted to the feeling of wearing hearing aids.

To get the maximum benefit of hearing aids, your commitment is necessary; the more you wear your hearing aids, the sooner you will adjust.

5. sona:vogue hearing aids

Discreet hearing aids – small and sophisticated

sona:vogue digital hearing aids are much more than simple amplifiers. They can be adjusted to your individual hearing loss by your hearing professional to amplify only the necessary frequencies. In addition, sona:vogue hearing aids recognize the characteristics of the environment you are in and optimize their settings accordingly. Intelligent sound processing avoids whistling. And all this fully automatic.

sona:vogue hearing aids are so small they are practically invisible when worn. You have three attractive styles to choose from – your hearing care professional will be glad to help you with the right selection.

sona:vogue ric

sona:vogue ric is worn behind the ear with only a thin wire connecting to the speaker in the ear canal.

The color of sona:vogue ric hearing aids can be adjusted to your preferences. The following colors are available:

White metallic



Silver



Dark gray metallic



Brown metallic



Beige



Taupe metallic



sona:vogue micro

sona:vogue micro is a behind-the-ear hearing aid which practically disappears when worn. The color of sona:vogue micro hearing aids can be adjusted to your preferences. The following colors are available:

White metallic



Bright gray metallic



Dark gray metallic



Brown metallic



Beige metallic



Taupe metallic



sona:vogue intro



sona:vogue intro is worn in the ear where it is almost invisible. Its flexible architecture guarantees your comfort.

Technology should adapt to your needs – this is why sona:vogue hearing aids are engineered to be easy to use: Just switch them on.

Upgradeability

Your hearing needs may change over time. sona:vogue hearing aids can be adjusted to suit your lifestyle and requirements, and their features and functions can be upgraded at a later time. This ensures that you have the right solution – today, tomorrow and well into the future.

State-of-the-art technology – unique and individual

sona:vogue hearing aids are optimized for mild to severe hearing loss. The hearing aids provide cutting-edge features. They detect if you are in a quiet or noisy surrounding, or if you are listening to music, and adjust their settings automatically. They suppress unwanted noises like the clattering of dishes as well as reverberation (echo) and wind noise.

sona hearing aids are based on an “open fit” principal: Your ear canal is left as open as possible and only those sounds you do not hear well are amplified. All of this together ensures the highest level of hearing performance and comfort at all times. Your sona:vogue hearing aids will be programmed according to your individual needs.



Try sona:vogue now!

Choose sona:vogue and experience how easy better hearing can be. Many hearing care professionals have sona:vogue hearing aids available for immediate, no-obligation trial.

Simplicity. Sophistication. Satisfaction.