

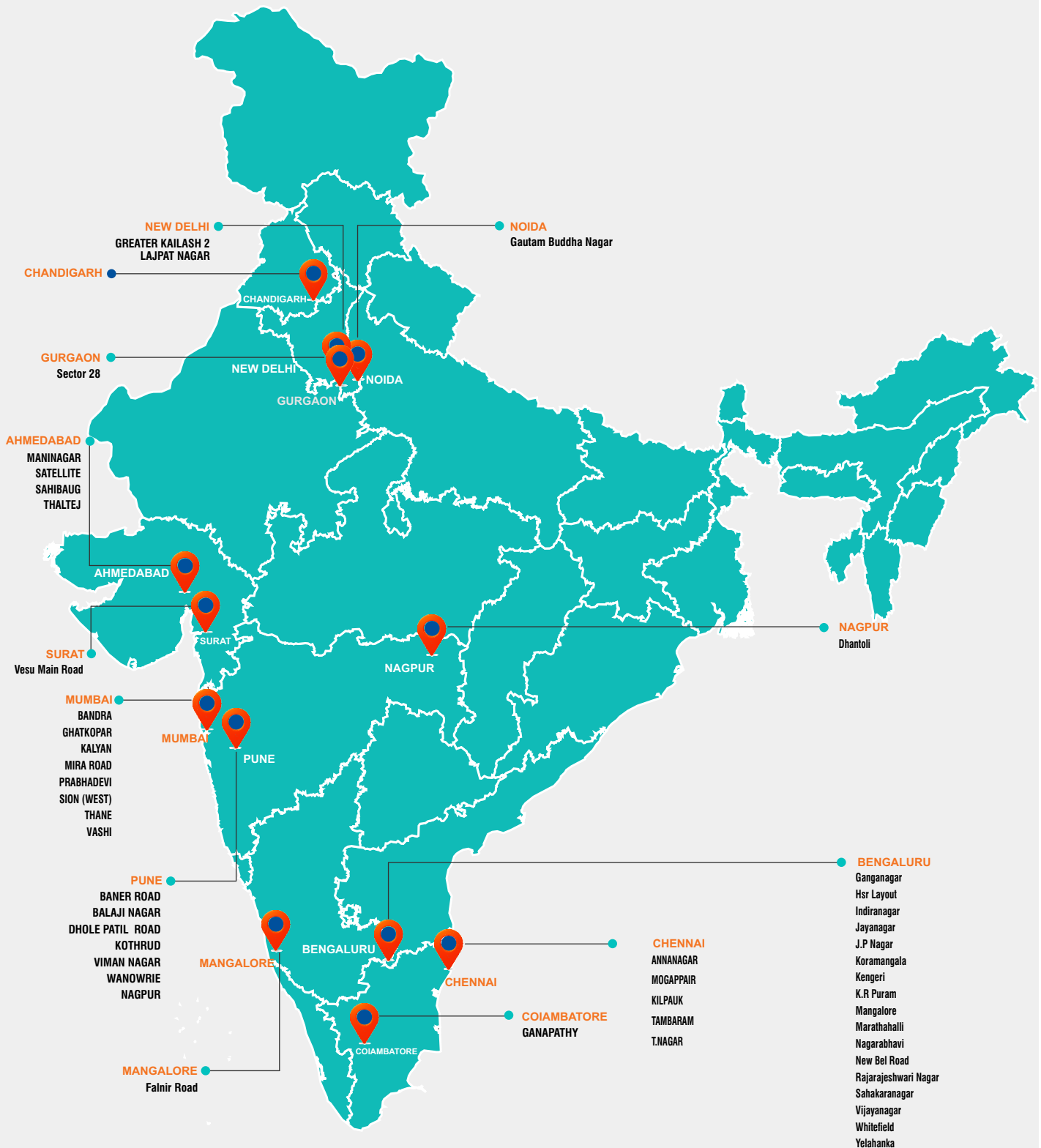


# COMPENDIUM OF DIABETES EAR



**AANVII HEARING SOLUTIONS PVT. LTD.**  
THE LARGEST CHAIN OF BESTSOUND CENTERS IN INDIA

## OUR BRANCHES





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# OUR VISION

Operate 100+ Touch points in all Major cities by 2025, serve 20000+ Patients every year to provide Creative Solutions & bring Sound of Joy into their lives...

# OUR MISSION

At Aanvii, we Add value to every Stakeholder., Clients, Employees, Vendors, Partners and ensure we Grow and Enrich every Relationship...

# VALUES

Aanvii Hearing will work with Values of Care, Compassion, Creative Solutions, Credibility and Co existence...



Hearing loss is the 2nd most prevalent health disorder in India. As per the latest WHO reports, 63 million of Indians suffer from hearing loss and this is a huge number.

When we started Aanvii Hearing Solutions in 2014, we had a vision in mind that we want to cater the best hearing solutions to a large mass of population in India. We always wanted to give the world class experience to the clients visiting our clinics by our products and services and bring joy to their lives. Our team of expert and professional audiologists take good care of our customers and help them connect back to their families

We started expansions from 2015 & we are at 57 clinics spread across 17 cities/9 states. We have successfully served over 2 lac customers by now and are racing towards reaching 5 lac+ customers by 2025. We are also on track to reach a count of 150 clinics by 2025 and be present in all major cities and towns of the country. We are India's largest chain of Best Sound Centers where the customers are guided into the most professional channel for hearing care in India & receive the best service available at all our clinics, as well as all the upcoming new clinics.

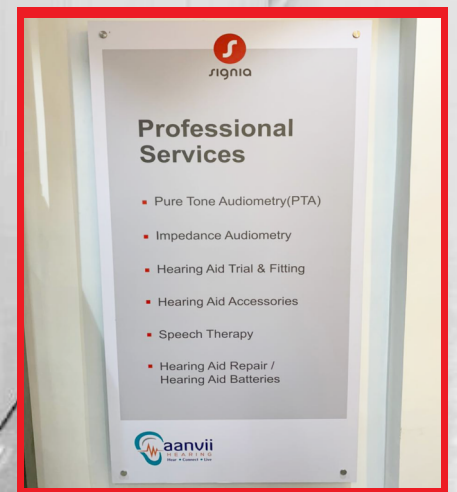
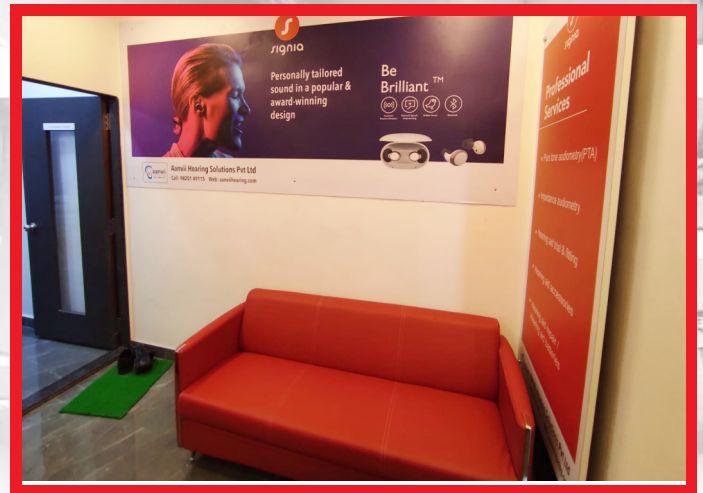
We at Aanvii are looking forward to leveraging the strength of our current India presence, latest technology and all the upcoming projects and tie ups to serve the customers visiting our clinics as well as offering solutions to the customers via tele-audiology & online consultations.

We thank you for all your support & assure that we will do everything possible to enhance your experience and improve our offerings in terms of products & services.



**VISHAL SHAH**  
CEO  
Aanvii Hearing Solutions Pvt Ltd







## ABOUT US

We Believe That The Ability To Hear Well Is Vital To Enjoying All That Life Has To Offer. We Offer A Wide Range Of Hearing Solutions To Ensure You Get The Most Out Of Life.

### **Aanvii Brings You Innovative Products From Signia!**

We are the authorized distributor of Signia hearing aids in India, and that gives us the opportunity to help our patients with all of Signia's latest innovations. When you step into our clinic You can be sure that you will find the product to perfectly go hand in hand with your day-to-day lifestyle



## INTRODUCTION



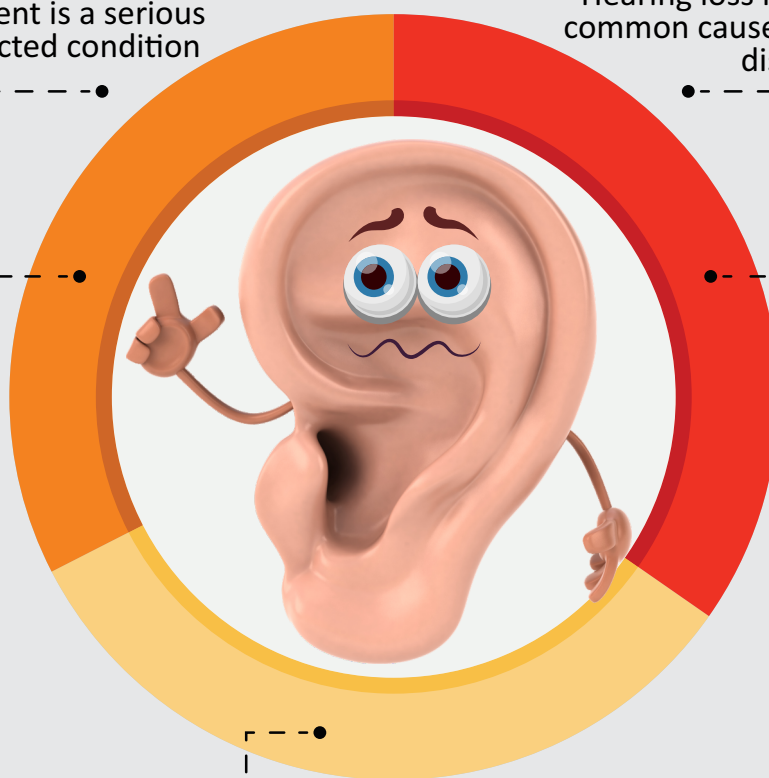
### WHAT?

Hearing loss is common and can negatively affect several aspects of a person's life when unaddressed or when communication needs are not supported.<sup>1</sup> It can result in serious consequences if it is left untreated. These include inability to interpret speech sounds, decreased ability to communicate, delay in language acquisition, economic and educational disadvantage, social isolation, and stigmatization.<sup>2</sup>

## Hearing Disability: A Major Concern In India<sup>2</sup>

Hearing impairment is a serious but largely neglected condition

Hearing loss is the second most common cause of years lived with disability



Increasing age, and low education were significantly associated with hearing loss

- 👂 The prevalence of hearing loss in India is higher compared to other countries
- 👂 This may be attributable to rising proportion of geriatric population in India, noise pollution, and exposure to ototoxic drugs and chemicals
- 👂 Rural population has higher prevalence of hearing loss than urban population
- 👂 This could be due to insanitary living conditions that result in infections, low level of awareness and poor practices for antenatal care and immunization



# PREVALENCE OF HEARING LOSS

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## How Common Is It?



An estimated 1.57 billion people had hearing loss in 2019 i.e., 1 in 5 people<sup>1</sup>

Of these, 403.3 million people had hearing loss that was moderate or higher in severity after adjusting for hearing aid use<sup>1</sup>



In India, 63 million people (6.3%) suffer from significant hearing loss<sup>2</sup>

As per a study by *Garg et al*, prevalence of hearing loss in Delhi was 25.1%<sup>2</sup>

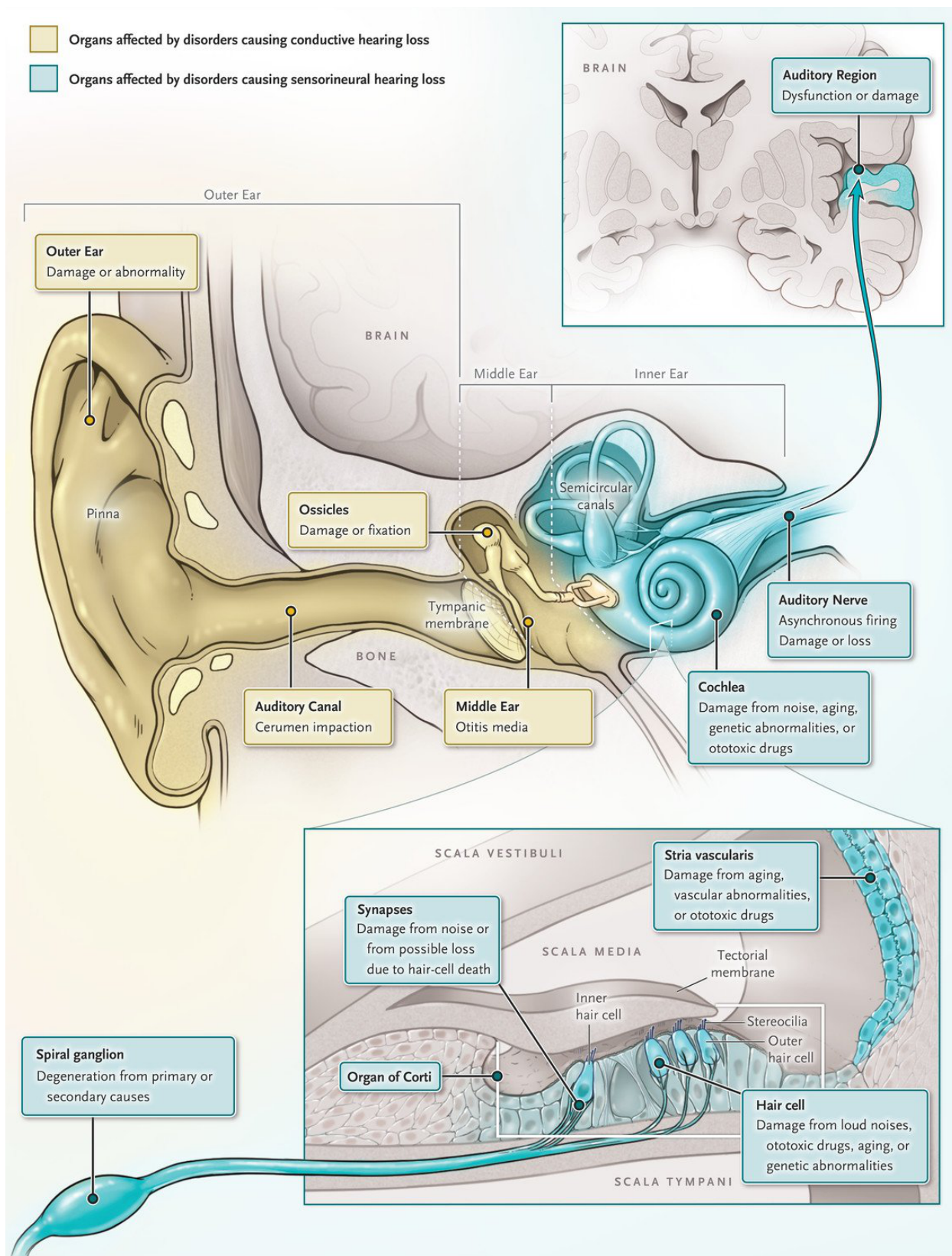
## Pathophysiological aspects of hearing loss

- 👂 Hearing loss happens when the sound transmission from the outer ear to the brain suffers a disruption<sup>3</sup>
- 👂 The disruption can occur at any stage, either before or after the cochlea<sup>3</sup>
- 👂 The hearing loss is conductive or sensorineural, respectively<sup>3</sup>
- 👂 If both sites, pre and post the cochlea, are affected, then the hearing loss is characterized as mixed<sup>3</sup>

## Structures involved in hearing loss<sup>4</sup>

- 👂 The peripheral auditory system comprises of the outer ear, the middle ear, and the inner ear (cochlea)
- 👂 The inner ear comprises of the mechanosensory hair cells that convert sound energy into neural signals (Figure 1)
- 👂 Cochlear hair cells are innervated by neurons of the spiral ganglion, which project centrally to auditory nuclei of the brain stem via auditory nerve
- 👂 Sensory hair cells are prone to damage from various stresses
- 👂 Since hair cells in the cochlea are not regenerated after they are lost, hearing loss is permanent

# Figure 1















## Diseases Affecting The Auditory System<sup>4</sup>

## What leads to hearing loss?

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The common causes of hearing loss include:

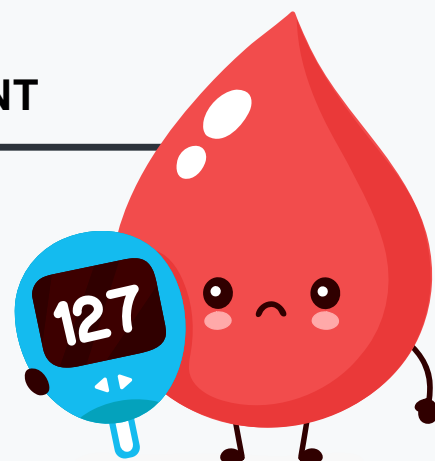
	Ageing <sup>4</sup>		Genetic factors (hereditary and non-hereditary hearing loss) <sup>5</sup>
	Chronic ear infections (chronic suppurative otitis media) <sup>5</sup>		Collection of fluid in the ear (chronic nonsuppurative otitis media) <sup>5</sup>
	Trauma to the ear or head <sup>5</sup>		Loud noise <sup>5</sup>
	Ototoxic medicines (like aminoglycoside antibiotics & cisplatin) <sup>4,5</sup>		Diabetes mellitus <sup>5</sup>
	Smoking <sup>5</sup>		Chronic diseases <sup>5</sup>
	Nutritional deficiencies <sup>5</sup>		Intrauterine infections like rubella and cytomegalovirus infection



# DIABETES MELLITUS & HEARING IMPAIRMENT

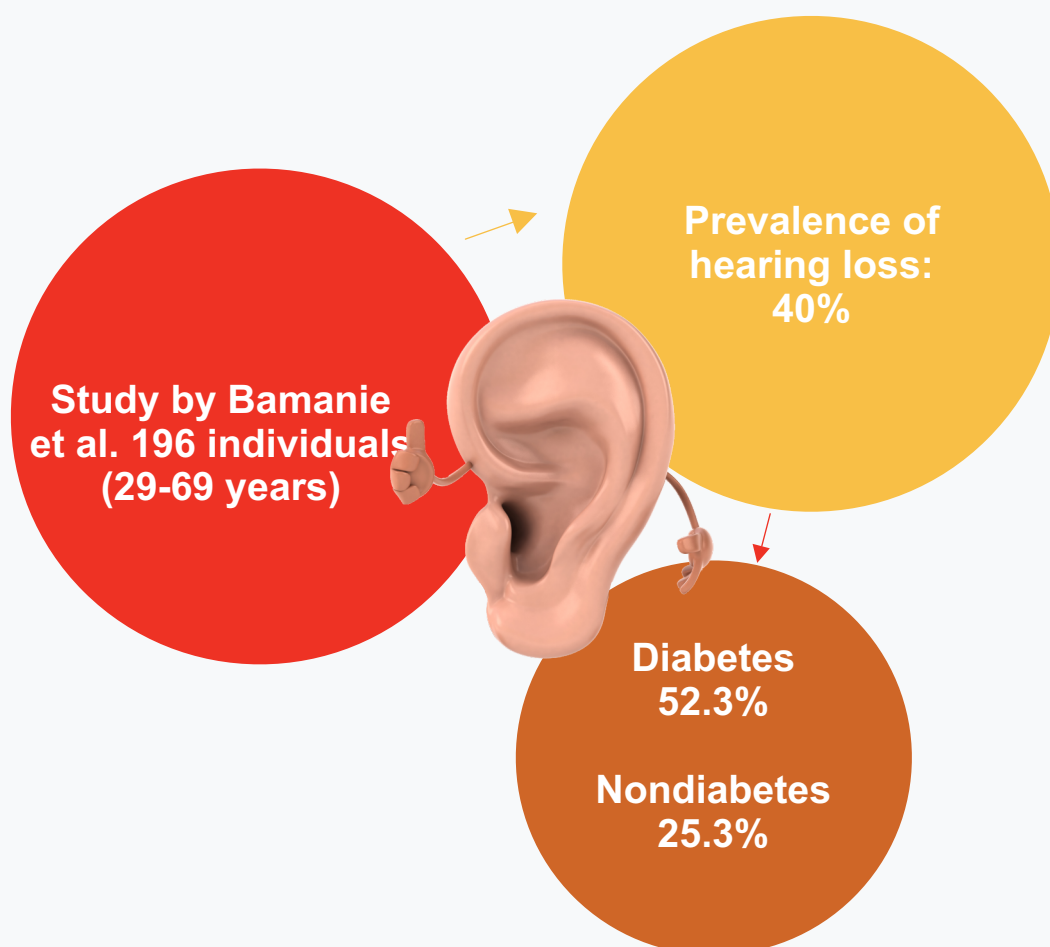
## Deciphering The Link

- 🔗 Diabetes mellitus (DM) is a common systemic metabolic disease with growing global prevalence<sup>6</sup>
- 🔗 DM is associated with many macro- and microvascular complications<sup>6</sup>
- 🔗 This includes thickening of the basal membrane of the stria vascularis capillaries on the lateral wall of the cochlea and other microvascular and neuropathic changes that could induce hearing loss<sup>6</sup>
- 🔗 Higher levels of HbA1c, representing higher long-term glucose levels and poor glycemic control, have been progressively associated with hearing-loss risk<sup>6</sup>
- 🔗 There is strong prospective evidence that hearing loss may be a consequence of DM, indicating that DM patients have a moderately increased risk of future hearing loss<sup>6</sup>



## Prevalence of hearing loss in DM

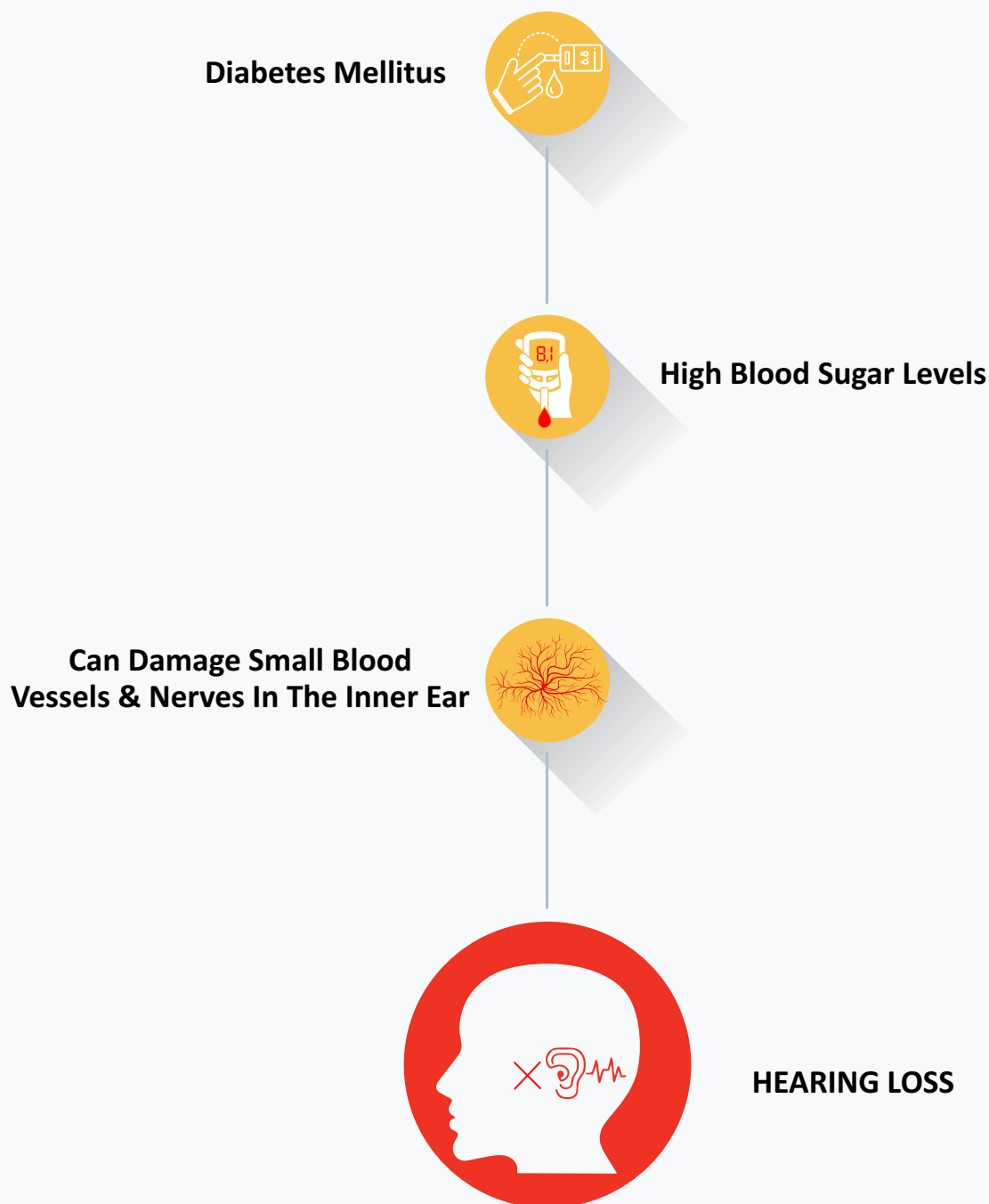
The following diagram illustrates the prevalence of hearing loss among diabetic versus nondiabetic individuals<sup>7</sup>



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## What is the connection between diabetes and hearing loss?<sup>8</sup>

- 👂 Hearing loss is twice as common in diabetic people as it is in people of the same age who are not diabetic
- 👂 Even people with prediabetes have a 30% higher rate of hearing loss compared to people with normal blood sugar levels
- 👂 Diabetes can lead to nerve damage that affects many parts of the body including ears



The complex relationship between diabetes and sensorineural hearing loss is summarized in figure 2.<sup>9</sup>

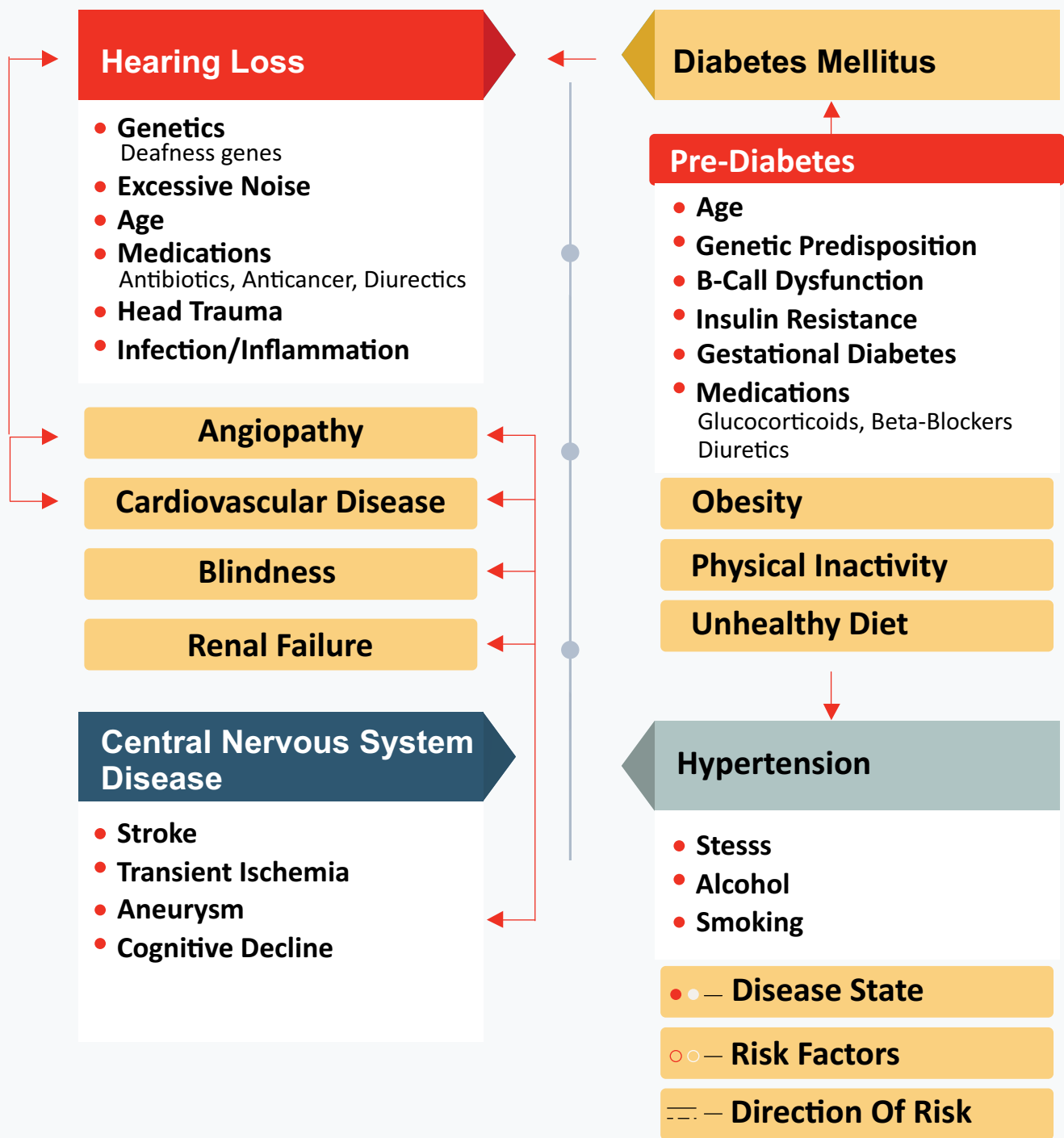


Figure 2. Schematic diagram of risk factors for DM and hearing loss. This scheme includes co-morbidities and end-stage diseases (in boxes).



## The World Health Organization’s hearing-impairment grading system

The WHO-proposed grades of hearing-impairment and presumed functional consequences are as follows:<sup>10</sup>

Grade and corresponding audiometric ISO value	Performance in Quiet and Noise
0-no Impairment, Better Than 20 Db	No or very slight hearing problems.
1-mild 20–34 DB	No problems in quiet but may have real difficulty following conversation in noise.
2-Moderate 35–49 DB	May have difficulty in quiet hearing a normal voice and has difficulty with conversation in noise.
3-Moderately severe 50–64 DB	Needs loud speech to hear in quiet and has great difficulty in noise.
4-Severe, 65–79 DB	In quiet, can hear loud speech directly in one’s ear, and, in noise, has very great difficulty.
5-Profound Impairment 80–94 DB	Unable to hear and understand even a shouted voice whether in quiet or noise.

ISO: International Organization for Standardization

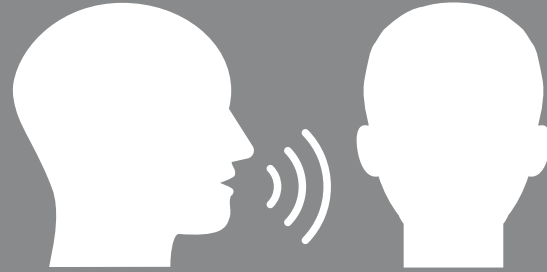
## IMPACT OF HEARING LOSS IN DAILY LIFE:

### Dealing with the challenges



#### QUALITY OF LIFE<sup>11</sup>

Hearing loss can have a profound impact on quality of life. The effects are small initially but progress as hearing loss worsens. Also, hearing loss is strongly associated with depression.



#### COMMUNICATION GAPS<sup>12</sup>

**Education:** In the educational setting, an individual with a hearing loss is most likely to have trouble hearing what is said.

**Employment status:** In cases of early onset of hearing loss, challenges for acquisition of spoken language, development of reading skills, and educational achievement lead to limited job opportunities.



#### PSYCHOSOCIAL IMPACT<sup>12</sup>

Since hearing loss tends to disturb interpersonal communication & interfere with perception of meaningful environmental sounds, some people experience significant levels of distress due to their hearing problems.



#### TINNITUS<sup>11</sup>

People with hearing loss commonly have tinnitus which is an annoying buzzing, rushing or ringing noise in the ears/head. Tinnitus can interrupt sleep and concentration, thereby increasing fatigue and affecting alertness. Similar to hearing loss, tinnitus can also influence mental health and is associated with depression and anxiety.

## EARLY DETECTION AND TREATMENT:

### Fundamentals of hearing loss<sup>13</sup>

- 👂 For the development of speech and language skills, auditory stimuli during the first 6 months of life are critical
- 👂 The critical period for learning language is within the first 36 months of life
- 👂 Hearing ability, degree of hearing impairment (mild to profound), age of identification of hearing loss, age of intervention, aided audibility, duration, consistency of hearing aid use, and characteristics of the child's language environment are influencing factors for normal development of speech and language skills which finally also will be a predictor for cognitive development in children



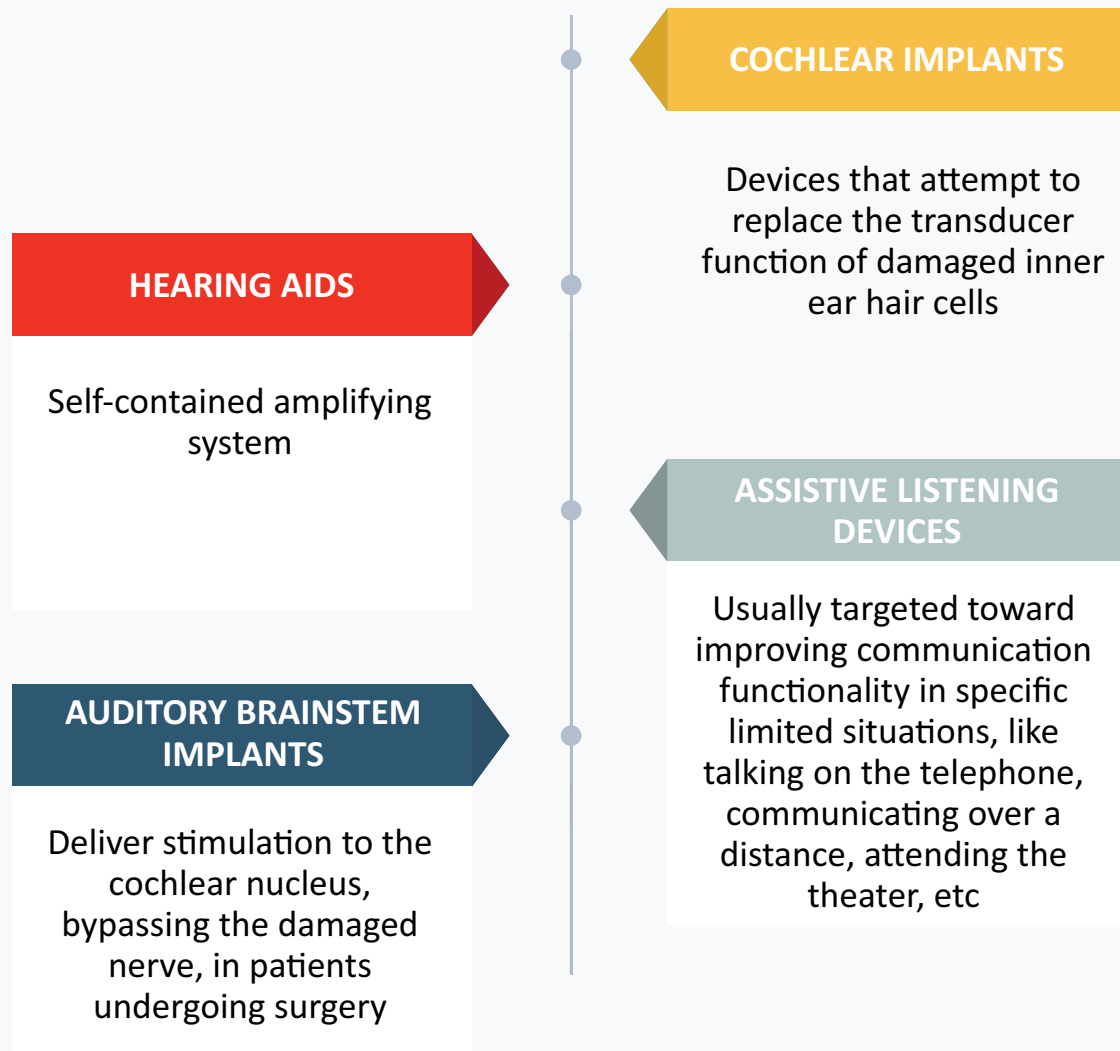
Early identification of hearing impairment along with timely and effective intervention is necessary to minimize its negative effects on the development of cognition, psychological, and verbal communication skills

- 👂 Evidence suggests that infants who receive intervention before 6 months of age have better school outcomes, improved language, and communication skills by the age of 2–5 years
- 👂 However, the average age at which a child who has a profound, bilateral sensorineural hearing loss is identified at approximately 24 months
- 👂 On the other hand, hearing impairment of lesser degrees is often identified at an average age of 48 months of age



## How can you ease your hearing?

- There are various devices that typically amend the effects of hearing loss which include wearable personal devices and ancillary devices:<sup>14</sup>

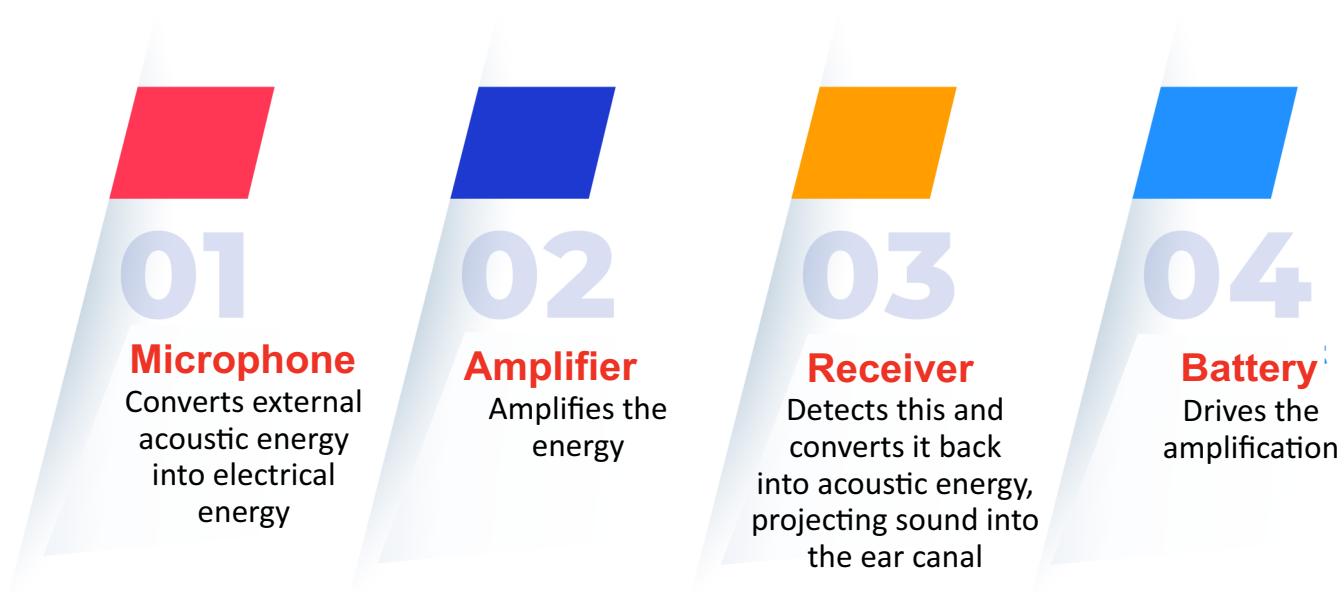


## Hearing Aid: A True Companion To Ease Your Hearing<sup>15</sup>

- Hearing aids are sound-amplifying devices that increase the user's ability to detect noise
- A non-invasive hearing aid broadly consists of:



## EARLY DETECTION AND TREATMENT:



- 👂 Hearing aids can be used to treat most of the hearing impairments
- 👂 Hearing aids must be offered to adults whose hearing loss affects their ability to communicate and hear, including awareness of warning sounds, their environment, and listening to music
- 👂 Thus, hearing aids may be indicated in several pathologies causing sensorineural hearing loss, conductive hearing loss, or single-sided hearing loss
- 👂 The selection of a hearing aid is not a 'one-size fits all' approach
- 👂 The selection is governed by factors like audiometric deficit (laterality, frequency, and degree of loss), cosmesis, and the patient's needs, lifestyle, and priorities





## AN OVERVIEW ON TYPES OF HEARING AIDS

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A few commonly used hearing aids along with their benefits and limitations have been described ahead.<sup>15</sup>

### Behind The Ear (BTE)<sup>15</sup>

- 🔊 These hearing aids sit behind the pinna
- 🔊 A plastic tube connects the hearing aid to an earmold or 'open' silicone ear tip as per the person's needs
- 🔊 They are commonly used due to the ability of various levels of amplification, and their power and performance can be modified relatively easily
- 🔊 They are robust, cheap, and easier to manipulate for patients with less dexterity
- 🔊 Patients who need amplification for moderate to profound hearing losses will need an ear mould, which could be less cosmetically appealing than the open fitting option

### Receiver In The Canal (RIC)<sup>15</sup>

- 🔊 These hearing aids are similar to the BTE, except the receiver is located at an 'open' silicone earpiece that sits in the canal
- 🔊 This set up enables higher amplification levels without the risk of sound escaping the canal and circling back through the hearing aid again
- 🔊 Thus, it is more suitable for patients with high frequency 'ski-slope' hearing losses and those who prioritize cosmetics of the device
- 🔊 They give a clearer and more natural sound, amplifying higher frequencies better, with less occlusion of low frequencies
- 🔊 The 'open' design is susceptible to sound distortion by ambient sound, especially in noisy environments
- 🔊 Individuals with less manual dexterity like elderly, pediatric, or arthritic patients may find them harder to use
- 🔊 They are also more prone to noise feedback and to bio-degradation as it is exposed to cerumen
- 🔊 Lastly, these are less suitable for patients with frequent ear infections

## In the ear (ITE), in the canal (ITC), and completely in the canal (CIC)<sup>15</sup>

- These are broadly grouped as custom-shape hearing aids
- They are the most discrete hearing aids
- They are beneficial in individuals who prefer an improved aesthetic
- They can be used in an array of hearing losses, and as the receiver is closer to the eardrum, there is improved amplification of high frequencies, vital for speech discrimination
- This is convenient in environments that have a high level of background noise and in patients with presbycusis (age-related hearing loss)
- However, custom-made hearing aids use smaller batteries and may not be suitable if large amounts of amplification are required



## Contralateral routing of signals (CROS) and bilateral contralateral routing of signals (BiCROS)<sup>16</sup>

- In cases where a conventional hearing aid gives little benefit, CROS and BiCROS are used for unilateral hearing loss and asymmetrical hearing loss, respectively
- A microphone is placed on the side of worse hearing, and the signal is transmitted to the better hearing ear, where this signal is amplified
- For BiCROS, used in cases of asymmetrical hearing loss like mild-moderate on one side and severe-profound on the other, there are two microphones, one on each ear, with sound from both microphones amplified into the better hearing ear

## Completely/Invisible-in-canal hearing aids (CIC and IIC)<sup>17</sup>

- CIC and IIC are hearing aids with the shell customized to fit the shape auditory canal
- They are superior in audible sound transmission, boasting high gains, less occlusion effect, better sound source localization, and improved fidelity
- There are comfortable and aesthetic, have high invisibility humanized design due to the small size and amazing immobility
- However, these devices are not recommended for people with severe hearing loss as the small size of casing and battery results in limited output power



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## Rechargeable hearing aids<sup>18</sup>

- 👂 In recent times, rechargeable solutions in hearing aids have been developed for supporting long-lasting wireless streaming
- 👂 Modern day rechargeable batteries are easy to charge and can last for longer duration with more reliability and durability
- 👂 Once charged overnight, these devices can be used longer than traditional zinc air batteries
- 👂 Rechargeability has become an important reason for hearing aid users to opt rechargeable hearing aids over traditional ones

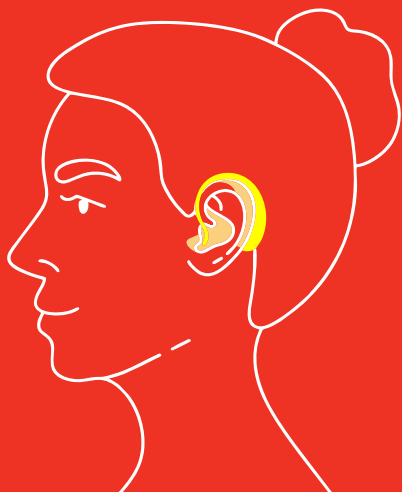
## Custom-made rechargeable ITC devices<sup>19</sup>

- 👂 Certain custom-made hearing aids offer brilliant hearing discreetly custom-made for the individual
- 👂 These devices are tailored to the individual shape of the ear canal to sit discreetly inside the ear



## STYLES OF HEARING AIDS

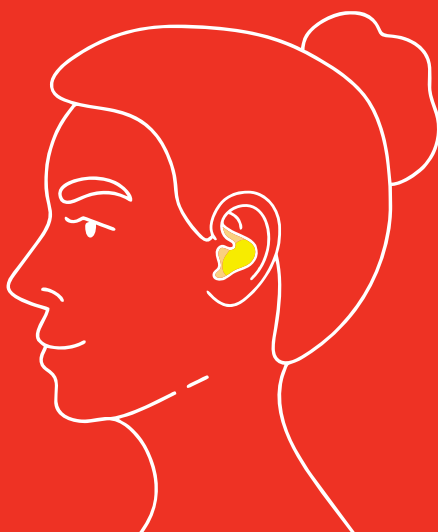
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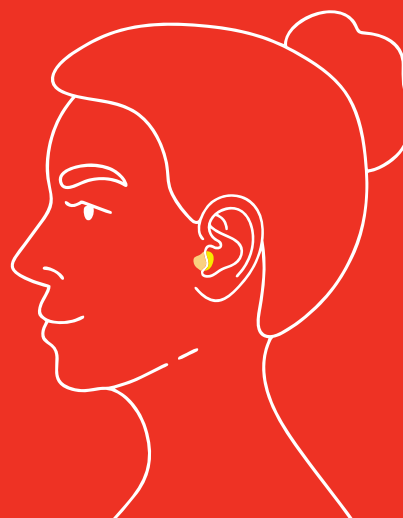
**BEHIND THE EAR(BTE)**



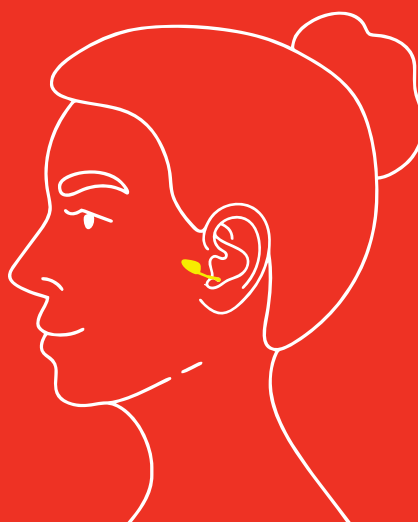
**RECEIVER IN EAR CANAL**



**IN THE EAR (ITE)**



**IN THE CANAL (ITC)**



**COMPLETELY IN CANAL (CIC)**

## ENHANCING COMPLIANCE WITH HEARING AIDS

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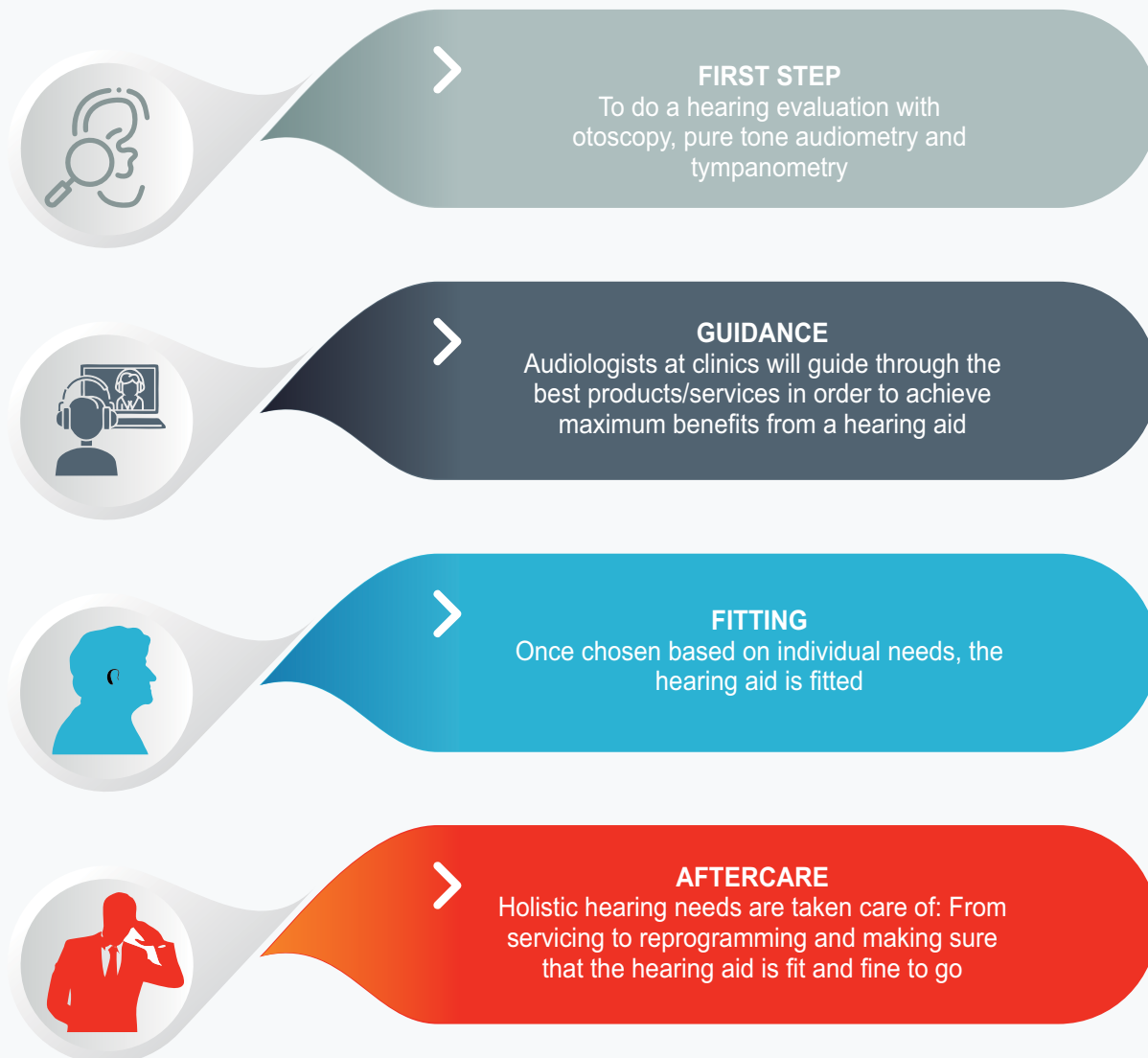
Patients must be informed very realistically about what can be achieved with hearing aids and where the limits are. Hearing and audio-therapy must optimally accompany hearing aid provision and train specific hearing situations with the hearing device.<sup>20</sup>

### The most important issues revolving around the use of hearing aids include: <sup>21</sup>

- 👂 Fit and comfort of the hearing aid
- 👂 Care and maintenance of hearing aid
- 👂 Financial factors (cost of repairs and batteries)
- 👂 Stigma of wearing hearing aids
- 👂 Cosmetic concerns
- 👂 Infection/ear problems (Tinnitus, external otitis and ear wax problem)
- 👂 Poor sound quality
- 👂 Side effects (rashes, itching)
- 👂 Psycho-social factors (Nuisance/hassle, forgetfulness to use it, losing it)

Identifying factors that affect hearing aid usage are essential for devising appropriate rehabilitation strategies to ensure greater use of hearing aids.<sup>21</sup>

## PROTOCOL OF CARE: AANVII HEARING<sup>19</sup>



### Essentials of care after hearing aid fitting<sup>23</sup>

👂 Conventionally, after the hearing aid fitting, a follow-up appointment is needed

#### The Follow-up Enables:





## INNOVATIVE HEARING AIDS<sup>22</sup>

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### ACTIVE PRO X

Enables you to experience the ultimate rechargeable hearing aids

### SIGNIA STYLETTO AX

Styletto AX Hearing Aid with Lithium-Ion Rechargeable is a stylish new hearing aid with up-to 4 days of battery life



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## OUR PRODUCTS



**AANVII HEARING SOLUTIONS PVT. LTD.**

**THE LARGEST CHAIN OF BESTSOUND CENTERS IN INDIA**

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