

PRECISION HEARING

A Guide to the Management of Hearing Loss,
Tinnitus and Balance Disorders



Darlinghurst | St.Leonards | Kogarah
| Bondi Junction | Rose bay

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ABOUT PRECISION HEARING:

Precision Hearing is one of the leading providers of diagnostic testing for hearing and balance disorders. We are also providers of hearing-aid services, hearing aids, assistive listening devices, cochlear implants, and bone anchored hearing aids. However, it is not the services we provide that has been the key element in our longevity and excellent reputation, but rather the importance we place on client satisfaction. At Precision Hearing we like to see our clients walk out with a smile on their face.

Precision Hearing is a private company, which means we are not restricted to supplying a particular hearing aid manufacturer. We will discuss all the options suitable based on the Client's hearing loss and needs, and provide them with a trial period till they find the hearing aid that is most suitable for them.

Every member of our team here at Precision Hearing is fully accredited by the relevant professional bodies. We are well qualified and experienced in the treatment and evaluation of hearing and balance. Our staff members maintain their knowledge, skills and accreditation with continuous professional development activities. So, don't worry, our patients are in safe hands.

WHAT DOES PRECISION HEARING DO?

AUDIOLOGICAL ASSESSMENT AND REHABILITATION:

- Audiology (Pure tone audiometry, speech and impedance)
- Hearing aids assessments
- Tinnitus assessment and discussion
- Cochlear implant assessment and mapping
- Bone Anchored Hearing Aid assessment

DIAGNOSTIC ASSESSMENT:

- Otoacoustic Emissions (OAE)
- Auditory Brainstem Response (ABR)
- Cortical Evoked Response Audiometry (CERA)
- Videonystagmography (VNG/ENG)
- Vestibular Evoked Myogenic Potentials (VEMP)
- Electrocochleography (ECoChG)
- Perilymph Fistula (PLF)

VESTIBULAR REHABILITATION:

- Epley manoeuvre
- Balance therapy

OTHER:

- Musican earplugs
- Sleeping plugs
- Swimming plugs
- Hearsaver plug

THE IMPACT OF UNTREATED HEARING LOSS

Hearing loss is an invisible handicap and although it is more prevalent with age, individuals tend to ignore the diagnosis and treatment of it. According to a study conducted by Davis et. al (2007), individuals wait an average of 10 years or more following diagnosis of hearing loss before being fitted with hearing aids. The reason for the delay varies but untreated hearing loss can have a negative impact on the mental, emotional and social well-being of the individual. Hearing loss has been linked to feelings of depression, anxiety, frustration, social isolation and fatigue. Depriving the hearing nerves and the areas of the brain of stimulation can also lead to atrophy or weakening, this is called **auditory deprivation**.

From a study conducted by Dr. Frank Lin at Johns Hopkins University, **they have found positive correlation between the degree of hearing loss and the risk of developing dementia**. Individuals with mild hearing loss are twice as likely to develop dementia as those with normal hearing, those with moderate hearing loss were three times more likely, and those with severe hearing loss are five times the risk (Lin et al., 2011). The study showed that for every 10 decibels of hearing loss the risk of developing dementia increased by 20%. **It has been suggested that auditory deprivation is a possible contributor to the cognitive disorder**.

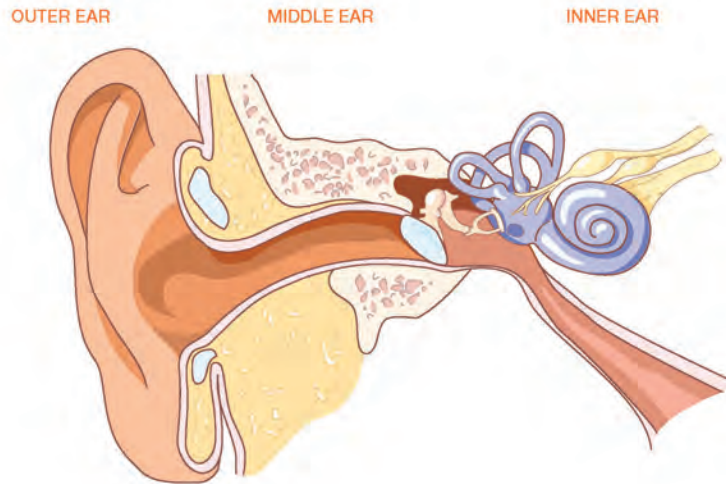


Whatever you don't use, you lose. So the best thing to do is to exercise the hearing nerve and the brain through adequate stimulation.

Davis, A., Smith, P., Ferguson, M., Stephens, D., & Gianopoulos, I. (2007). *Acceptability, benefit and costs of early screening for hearing disability: A study of potential screening tests and models*. Health Technology Assessment, 11, 1–294.

Lin, F. R., Metter, E. J., O'Brien, R. J., Resnick, S. M., Zonderman, A. B., & Ferrucci, L. (2011). *Hearing loss and incident dementia*. Archives of Neurology, 68, 214–220.

TYPES OF HEARING LOSS



CONDUCTIVE HEARING LOSS

Hearing loss that affects either the outer and/or the middle ear limiting the sounds to enter the inner ear or cochlea. It usually causes temporary hearing loss which can be addressed by prescribing medicines or performing surgery.

MIXED HEARING LOSS

Hearing loss that involves both the outer and/or external ear, and the inner ear. As the problem involves different parts of the ear, management may differ on a case by case basis. An ENT specialist and audiologist are essential in determining the most appropriate rehabilitation.

SENSORINEURAL HEARING LOSS

Hearing loss that affects the cochlea of the inner ear. As the cochlea is responsible for converting sounds into neural signals to the brain, any damage to the cochlea can cause permanent hearing loss. Unfortunately, damage to the cochlea cannot be treated with medicine or surgery.

NEURAL/RETRO COCHLEAR HEARING LOSS

Hearing loss that is brought about by the absence of or damage to the nerves that run from the inner ear towards the brain. The nerves serve as a passageway for neural signals to the brain and damage to these passage ways may result in hearing loss and/or difficulty understanding speech.



HOW IS HEARING LOSS DIAGNOSED?

PURE TONE AUDIOMETRY

A subjective behavioural test that involves the presentation of various pitches and level of tones to determine the softest level the individual can hear. It provides information regarding the degree, type and configuration of the hearing loss.

SPEECH AUDIOMETRY

Part of the hearing assessment that involves presentation of pre-recorded or live voice speech material to measure the ability of the patient to perceive speech signals.

IMPEDANCE AUDIOMETRY

An objective test of the middle ear function to assess the mobility of the eardrum and the conduction of the middle ear bones by creating variations of air pressure in the ear canal.

Hearing Loss

How do you deal with it?

MANAGEMENT OF HEARING LOSS

HEARING AID



An electro acoustic device which is designed to amplify sounds for the user with the aim to correct hearing impairment by improving speech clarity and intelligibility. Individuals who are eligible under the Australian Government Hearing Services program have access to a subsidy to cover the cost of the hearing aids. Rebates are also available to individuals who have cover for extras under their private health insurance.

ASSISTIVE LISTENING DEVICE (ALD)



These are devices that are recommended in particular listening situations where a hearing aid may not be optimal, to make the sound take precedent over the background noise, rather than making everything louder. Some ALD's can be used in place of hearing aids and some can be used with a hearing aid. Individuals who are eligible under the Australian Government Hearing Services program have access to a subsidy to cover the cost of an ALD. Rebates are also available to individuals who have cover for extras under their private health insurance.

BONE ANCHORED HEARING AID (BAHA)

A semi-implantable bone conduction hearing device that is attached to the skull by an osseointegrated titanium fixture. The system transmits the sound to the inner ear through bone conduction thereby bypassing the problems in the outer or middle ear. Individuals who suffer from a conductive, mixed or single-sided sensorineural hearing loss can benefit from the BAHA. Individuals who have private health insurance are covered for the cost of the BAHA system as long as the level of hospital cover includes surgically implanted prostheses and other items on the Federal Government's Protheses List. Limited public funding is available in Australia. Future BAHA adjustments are bulk-billed.



COCHLEAR IMPLANT (CI)

A surgically implantable electronic medical device that replaces the function of the inner ear by converting acoustic signals into electronic signals and sending the electronic signals to the brain. Individuals who have moderate to severe sensorineural hearing loss or worse and have little benefit from hearing aids are ideal candidates. Individuals who have private health insurance covering surgically prostheses are covered for the cost of the cochlear implant system. Coverage of the surgical procedure and hospital cost will depend on the level of private health fund. The state government funds a limited number of cochlear implants each year. Future Cochlear Implant adjustments are bulk-billed.



TINNITUS ASSESSMENT AND MANAGEMENT:



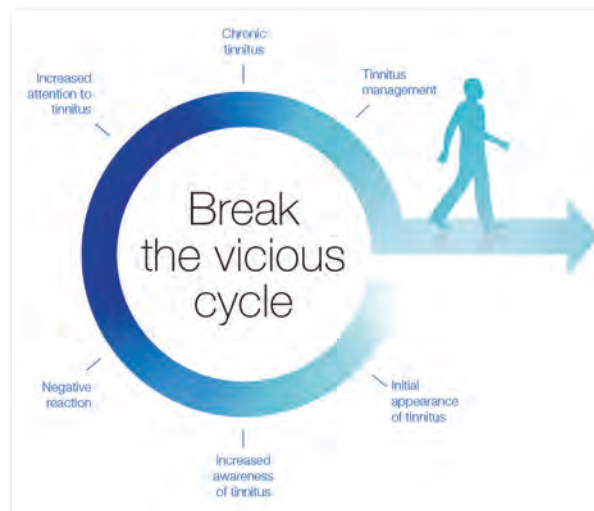
WHAT IS TINNITUS?

Tinnitus, often called ‘head noises’ or ‘ear-ringing’, occurs when one hears a sound when no external physical sound is present. Tinnitus is not a disease; it is a symptom of a malfunction of the auditory system. It can be constant, intermittent, temporary or permanent. Over 50 different sounds have been reported by people with tinnitus.

POSSIBLE CAUSES FOR TINNITUS:

An undiagnosed medical problem, noise exposure, ear problems, viral infections, certain drugs and hearing loss are just some of the causes, making each individual case unique.

TINNITUS ASSESSMENT:



Tinnitus characteristics and hearing thresholds vary among individuals. Therefore, a tinnitus reaction questionnaire (TRQ), audiological and tinnitus assessment is needed in order to gain a better understanding of the issue and help identify the most appropriate form of management. An audiological assessment identifies the degree of hearing

loss in one or both ears and a tinnitus assessment involves matching the pitch and volume of a pure tone presented through the audiometer to the patient’s perceived tinnitus.



FORMS OF MANAGEMENT:

- 1. Hearing aids:** One of the first things to consider is whether to fit one or two hearing aids. It has been found that aiding even a minimal hearing loss can help provide tinnitus relief.
- 2. Tinnitus maskers:** Some patients find a white noise generator useful as a masker to provide temporary symptomatic relief, i.e. comfort while the masking effect is taking place. The appearance of this masker is quite similar to an open fit behind the ear hearing aid.
- 3. Tinnitus Retraining Therapy (TRT):** This system believes that if a sensory system is repeatedly exposed to a non-threatening stimulus, the system will eventually habituate to it. There are two components to TRT:
 - a.) Providing counselling so that the patient is not afraid of the tinnitus
 - b.) Exposing the patient to low levels of background noise. It is believed that the low levels of background noise facilitate the habituation process.
- 4. Cognitive Behavioural Therapy (CBT):** CBT examines the patient's thought patterns, emotions and behaviours and how these affect their experiences with tinnitus. This form of therapy is used in combination with sound stimulation therapies. And work together to promote habitation.

5. **Neuromonics:** Neuromonics uses music for treatment of tinnitus in order to mask it.
6. **Noise generators:** This involves using an external machine that emits, for example, a white noise at a level that just masks the tinnitus. This can provide people with immediate relief. Noise generators are commonly used while sleeping to avoid being disturbed by the tinnitus.
7. **Diet:** Dietary regimes are occasionally helpful. This should start with careful questioning to detect possible tinnitogenic components (e.g. caffeine), drinks or medication, and be followed by dietary exclusion trials to confirm or disprove the potentials benefits for that individual.
8. **Hypnotherapy and Alternative medicine:** Hypnotherapeutic techniques can be of indirect help, by aiding relaxation. Methods of alternative medicine, including acupuncture and herbal preparations, only rarely seem to have any beneficial effect on tinnitus, but can be of worthwhile supportive value if the patient believes they are helping.
9. **Drugs:** Specific drugs for treatment of chronic tinnitus that are both frequently effective and non-toxic have yet to be developed, but research continues. However, sedatives or anti-depressants are quite often needed to treat the psychological state of the patient as a result of the tinnitus.

NOISE-INDUCED HEARING LOSS (NIHL) AND PREVENTION:

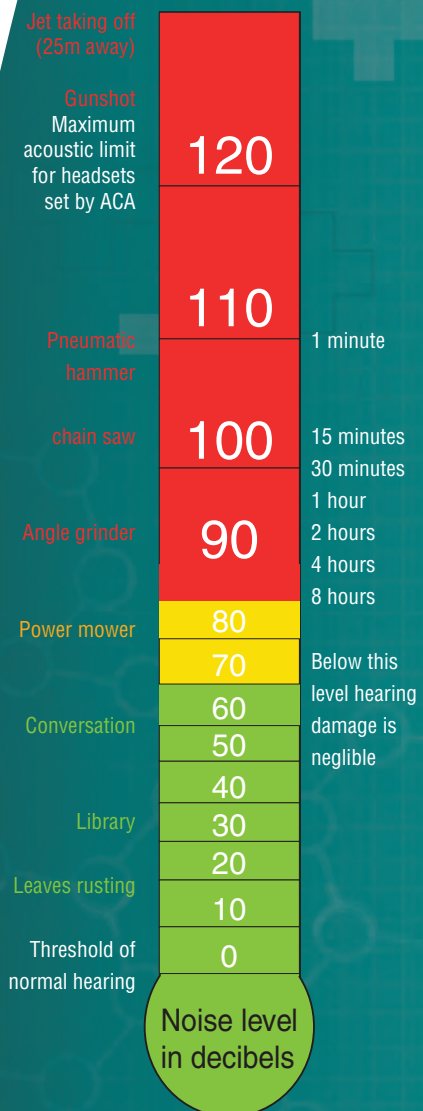
NIHL is hearing loss caused by loud sound. Evidences of NIHL includes a history of exposure to loud sound and a hearing loss in a narrow range of frequencies, such as those from gunfire, power tools, explosions and night club music.

NIHL is the consequence of overstimulation of the inner ear hair cells and supporting structures. Structural damage to hair cells (primarily the outer hair cells) will result in hearing loss that is characterised by an attenuation and distortion of incoming stimuli.

The ear can be exposed to short periods in excess of 120 dB without permanent harm; but long term exposure to sound levels over 80 dB can cause permanent hearing loss. There are two basic types of NIHL:

- 1. Acoustic trauma:** this refers to permanent cochlear damage from a one-time exposure to excessive sound pressure, such as an explosion.
- 2. Gradually developing NIHL:** refers to permanent cochlear damage from repeated exposure to loud sounds over a period of time, such as personal media players.

Loud noise will exacerbate tinnitus. If one must shout to make themselves heard by someone standing 1 – 1.5 meters of you, the noise level is considered excessive.



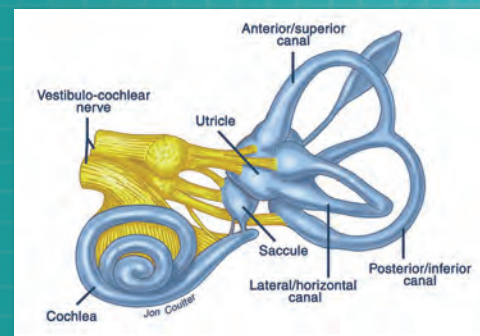
*** The above noise levels are approximate and should only be taken as a guide.

PREVENTION:

There are four main types of hearing protection, they are: Formable plugs, Pre-moulded plugs, Semi-aural devices and Ear muffs. Ear muffs or ear-plugs should be worn when activities such as mowing the lawn or using a chain saw are undertaken.

**BALANCE AND DIZZINESS:**

Vestibular disorders are a significant health problem, secondary only to lower back pain. One-third to one-half of the population over the age of 65 reports some difficulty with balance or ambulation. Dizziness has been reported to be the most common complaint in patients 75 years of age or older. (Tinetti et al. 2003, Horak & Mancini, 2010, Amedee et al 2009).

**INPUT FROM THE VESTIBULAR SYSTEM:**

Sensory information about motion, equilibrium, and spatial orientation is provided by the vestibular apparatus (labyrinth), which in each ear includes the utricle, saccule (otoliths) and semicircular canal. These apparatus are responsible for detecting vertical orientation and rotational movement. These organs sense movement and relay these messages to the brain. When the vestibular organs on both sides of the head are functioning properly, they send symmetrical impulses to the brain.

There are three vestibular reflexes that help keep us balanced. These include: The vestibulo-ocular reflex (VOR) which bring and sustains images onto the fovea, the Vestibulo-spinal reflex (VSR) which maintains stability of the head during torso movement and lastly, the Vestibulo-colic reflex (VCR) that helps stabilise position of the head in space.

A person can become disorientated if the sensory input received from their eyes, muscles, joints or vestibular organs conflict with one-another. Additional multifactorial components contribute to balance and dizziness disorders. Other possible causes of dizziness can include: Aging, psychiatric conditions, sensory deficits, neurological disorders, musculoskeletal disorders, recent hospitalization, recent surgery, other acute medical conditions, and being on more than 4 medications.

WHAT ARE THE SYMPTOMS OF A VESTIBULAR DISORDER?

If the vestibular system is damaged by disease, aging, or injury, vestibular disorders can result, and are often associated with one or more of these symptoms, among others:

- Vertigo and dizziness
- Imbalance and spatial disorientation
- Vision disturbances
- Hearing changes
- Cognitive and/or psychological changes and other symptoms

Not all symptoms will be experienced by every person with an inner ear disorder, and other symptoms are possible. An inner ear disorder may be present even in the absence of obvious or severe symptoms. It is important to note that most of these individual symptoms can also be caused by other unrelated conditions.

VESTIBULAR ASSESSMENT:

The inner ear's vestibular organs and associated nerves and brain centres serve many functions and can be affected by a number of outside systems. A comprehensive history is taken along with a selection of several different kinds of specialised tests which are carried out by a specialised audiologist. These include:

- **Dizziness questionnaire:** this helps identify frequency and severity of dizziness symptoms and associated lifestyle changes.
- **Hearing assessment:** This is an important part of vestibular diagnoses because of the close relationship of the inner ear hearing and balance organs. These assessments include: pure tone audiometry (PTA), speech discrimination testing and middle ear function testing (tympanometry and acoustic reflexes).
- **Electrocochleography (ECochG):** This is a technique of recording electrical potentials generated in the inner ear and auditory nerve in response to sound stimulation using an electrode placed in the ear canal or tympanic membrane. This test is used to detect elevated inner ear pressure or for the testing or monitoring of inner ear and auditory nerve during surgery
- **Vestibular evoked myogenic potentials (VEMP) assessment:** This test is used to evaluate whether the otolith organs (Saccule and Utricle) and vestibular nerves (Inferior and Superior) are intact and functioning normally.
- **Dix-Hallpike assessment:** This is a diagnostic manoeuvre used to identify Benign Paroxysmal Positional Vertigo (BPPV).
- **Videonystagmography (VNG):** This is the most common test administered to people with dizziness, vertigo and/or balance disorders. It is a group of eye movement tests that looks for signs of vestibular dysfunction or neurological problems. It measures nystagmus and other eye movements using an infrared video camera mounted inside goggles that the patient wears.

VESTIBULAR REHABILITATION THERAPY (VRT):

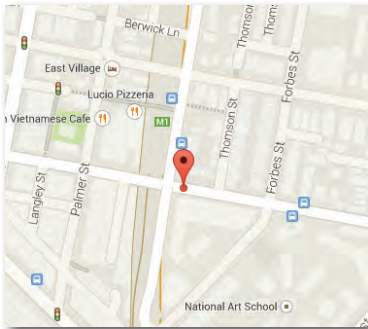
Vestibular rehabilitation is a specialised exercise-based form of therapy designed to alleviate both primary and secondary symptoms of vestibular disorders.



A common medical approach for managing such symptoms is to prescribe medication that suppresses vestibular function. While this approach may be necessary and effective for treating symptoms in the short-term, in the long term suppressants can interfere with a person's ability to make necessary adaptations. In addition, many of these medications cause drowsiness that may limit a person's ability to be active.

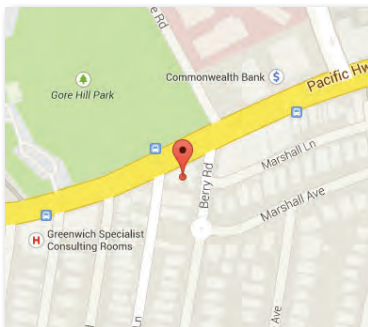
VRT is an alternative treatment involving specific exercise that can eliminate or significantly reduce symptoms by promoting central nervous compensation for inner-ear deficits. A specialised program created for the patient, is designed to achieve these goals.

CONTACT US AND LOCATIONS:



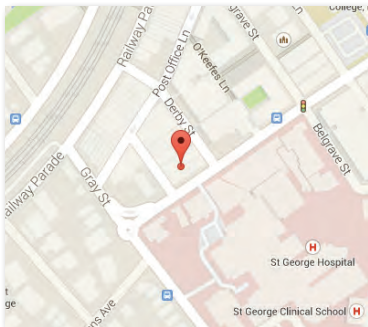
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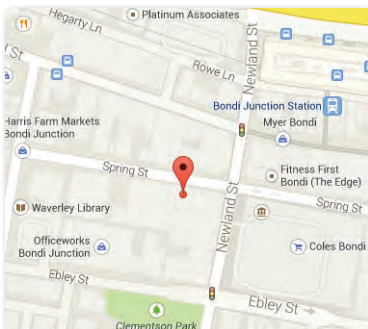
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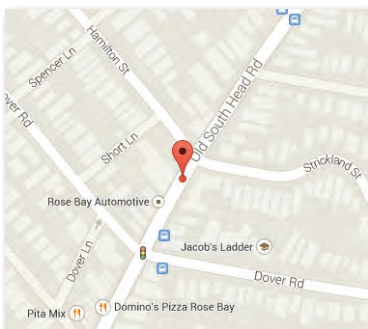
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