# Audiology Newsletter

**Bronwen Hofmeister Audiologist**
B.A.(Hons).,MClinAud
Ph. (07) 3720 9555
www.bhaudiologist.com.au

Christmas 2006
Issue 10

***Contents:***



## Loudness Discomfort

Most people do not like loud noise. But some people have particularly sensitive ears and cannot tolerate ordinary levels of noise. Hyper sensitive hearing is most commonly associated with hearing loss.

The *cochlea*—located in the inner ear—has over 10,000 hair cells and nerve fibres. Each hair cell and nerve fibre allows us to hear a specific pitch at a specific volume. For people with normal hearing, their 10,000 nerve fibres will be *recruited* to accommodate the loud sound and give the person sufficient warning time of the approaching loud sound. By contrast, people with a hearing loss have a significantly reduced warning time because they have a limited number of nerve fibres that can be recruited to accommodate the loud sound. Thus the phenomenon of people with hearing loss who have increased sensitivity to loud sounds is known as *recruitment*.

Modern, digital hearing aids use *compression* to compensate for the wearer's reduced dynamic listening range. That is, the hearing aid compresses loud sounds to fit within the wearer's hearing comfort zone. This also ensures that wearing hearing aids does not damage the wearer's hearing, because loud sounds are not amplified; in fact, they are squashed!

## Weather Effects

Ever since the time of Hippocrates, weather has been recognized as an important triggering factor for various illnesses, including asthma attacks, rheumatoid arthritis, hay fever and others. An interesting study was recently done to examine the association between weather conditions and the incidence of sudden onset sensorineural hearing loss (*permanent hearing loss due to hair cell damage in the inner ear—the most common type of hearing loss).* The study specifically focused on ambient temperature, relative humidity, atmospheric pressure, rainfall and total hours of sunshine. The study found no significant relationship between sudden sensorineural hearing loss and any of the climatic parameters. (*Audiology & Neurotology 2006;11:165-71).*

## Hormone Replacement Therapy & Hearing

New research has found that women taking the most common form of HRT—the hormones estrogen and progesterone—have accelerated hearing loss compared to women on estrogen alone or those not taking any hormones. On average, women who took progesterone had the hearing of women 5 to 10 years older. Women whose HRT included progesterone had hearing that was 10 to 30 percent worse than the other groups. (*Proceedings of the National Academy of Sciences USA 2006;103:14246-14249).* It is important to note the small sample size used in this study (124), and also to note that there is no definite consensus in the literature regarding HRT and hearing.

## Hearing Dogs

Hearing dogs have special skills to help people with hearing impairment do things that most of us take for granted. Hearing dogs go through an eight month training program that includes obedience, house training, social training and sound awareness. During sound awareness training dogs are taught to identify a variety of sounds and draw their owner's attention to the sound. These include crying, smoke alarms, alarm clocks, door bells or knocks, telephones, microwaves, kettles and other sounds that are important for everyday safety and independence. Most hearing dogs come from the RSPCA and are trained and placed with deaf or hearing-impaired people free of charge by the Lions Club of Australia.

# Audiology Newsletter

**Bronwen Hofmeister Audiologist**
B.A.(Hons).,MClinAud
Ph. (07) 3720 9555
www.bhaudiologist.com.au

Christmas 2006
Issue 10

## Beat goes on...and on...and on (Australian Financial Review 23rd June 2006)

Did you see *Mission Impossible III* earlier this year? If you did, then you're probably stuck with the movie's theme repeating again and again in your head. A study by the University of Cincinnati—*"Dissecting Earworms: Further Evidence on the 'Song-Stuck-In-Your-Head' Phenomenon*—found that at one time or another almost 99 per cent of people had had *earworms* - tunes they can't get out of their heads. The term 'earworm' is a translation of the German word ohrwurm, used to describe the "musical itch" of the brain. What triggers the retrieval of a particular song—making it come to mind and get stuck in the head—is not exactly known. It might be anything: a title, a thought or reminder of a past experience that somehow is connected to a melody. Earworms seem to be an interaction between properties of music (catchy songs are simple and repetitive), characteristics of individuals (levels of neuroticism) and properties of the context or situation (first thing in the morning, last thing at night or when people are under stress). Most of the time we do not pay much attention to our earworms—every moment of the day we are bombarded with fresh auditory information, so we are constantly distracted from concentrating on them. Still, people react differently to this stuck-song syndrome. Women are more susceptible to earworms than men, and musicians more than non-musicians, and for those more inclined to worry.

| TOP 10 EARWORMS | | ARTIST |
|---|---|---|
| 1. | **Can't Get You Out Of My Head** | ***Kylie Minogue*** |
| 2. | **You're Beautiful** | ***James Blunt*** |
| 3. | **Who Let the Dogs Out** | ***Baha Men*** |
| 4. | **Theme from Mission Impossible** | |
| 5. | **YMCA** | ***The Village People*** |
| 6. | **Theme from Happy Days** | |
| 7. | **Put Your Records On** | ***Corinne Bailey Rae*** |
| 8. | **Tom's Dinner** | ***Suzanne Vega*** |
| 9. | **The Lion Sleeps Tonight** | ***Tight Fit*** |
| 10. | **I Think We're Alone Now** | ***Tiffany*** |

## Garry McDonald (The Sydney Morning Herald, August 17, 2006)

Garry McDonald is best known for creating the legendary TV comic character, Norman Gunston, and for his role as the long-suffering son, Arthur Beare, in the ABC TV comedy *Mother and Son*. McDonald long suspected his hearing was amiss, however, it was not until 2004 when McDonald's hearing started to effect his working life that he did something about it. The solution was hearing aids in both ears. McDonald has now added advocating hearing rehabilitation to the public, along with his support for the national depression initiative, *Beyondblue*. McDonald says thanks to his new hearing aids, his hearing loss is no longer a liability. "They're very easy to wear - maybe if you've got arthritis you might have trouble fitting in the batteries all the time", McDonald pauses before laughing again, "I haven't got that yet. I'm working up to it. It's interesting getting old."

The final page describes a new tinnitus treatment pioneered by Paul Davis at Curtin University of Technology. The *Neuromonics* device is having tremendous success in Australia, New Zealand and the United States. The Australian Neuromonics biotech company recently won the NSW biofirst Commercialisation Award and will use this to build on its presence in Australia and the United States. Bronwen Hofmeister is now a registered provider of Neuromonics treatment, and tinnitus consultations and / or treatment are available at the clinic.

# Audiology Newsletter

**Bronwen Hofmeister Audiologist**
**B.A.(Hons).,MClinAud**
**Ph. (07) 3720 9555**
www.bhaudiologist.com.au

Christmas 2006
Issue 10

## Neuromonics Tinnitus Treatment

Tinnitus—which can range from annoying ringing in the ears to more debilitating forms that prevent enjoyment of life—is a neurological reaction to hearing loss. If our ability to hear external sounds deteriorates, we are able to hear internal (neurological) noise more easily. As we age our ability to hear high frequency sounds deteriorates. Regardless of our age and hearing, everybody has tinnitus because it is essentially neurological noise; if we didn't have neurological noise we would be 'brain dead'. However, some people are able to tune out from tinnitus whilst others cannot. Thus there is a significant psychological as well as audiological component to tinnitus. To understand this relationship we need to first look at the physical part of our hearing; the inner ear.

In the inner ear, the *cochlea* contains over 10,000 hair cells. Each hair cell allows us to hear a specific pitch at a specific volume. When a sound wave enters the inner ear, these hair cells bend and their movement changes the chemical balance in the ear. With this change in the chemical balance, electrical impulses are generated and it's these electrical impulses which can travel along the auditory (hearing) nerve up to the brain. If our hair cells for high frequency sounds have deteriorated, high pitch electrical impulses cannot be generated and thus the brain does not receive any high pitch auditory information.

Each frequency-specific area in the cochlea has a corresponding frequency-specific area in the auditory cortex of the brain. The auditory cortex represents our conscious processing or awareness of sound. Before sound is sent to the auditory cortex to give us the sensation of hearing, it is first sent to the brainstem for sorting or processing. The brainstem is our subconscious processor of sound. For example, if it is the sound of our name or an alarm then these sounds are sent to the conscious part of the auditory cortex, but if it is the sound of someone else's name or an environmental sound we regularly hear like the fridge generator then these sounds are sent to our sub-conscious level as they are deemed insignificant and our energy is not to be wasted on them.

Damaged hair cells in the cochlea prevent its corresponding area in the auditory cortex from receiving acoustic information it used to get. When this occurs the auditory cortex sends a message down to the brainstem telling it it is starved of certain sounds and the brainstem tries to provide it with sound. The sound sent to the conscious auditory cortex is neurological noise. This noise is perceived as tinnitus. Because the conscious auditory cortex interprets this neurological noise as a new and therefore potentially threatening noise, it keeps the noise rather than sending it back to our subconscious auditory cortex. Whenever we hear a new sound we automatically go into 'fight or flight' mode; if we are able to interpret the tinnitus for what it is and ignore it it will eventually go to the subconscious. If however we interpret it as a threat or something sinister like an increased chance of hearing deteriorating or a brain tumour then the tinnitus will be kept by our conscious auditory cortex. Ultimately this means our neurological pathways are remapped and it becomes increasingly harder to put the tinnitus into the subconscious. It is similar to 'phantom limb syndrome' - if a person has had an arm amputated they may still feel the sensation of that arm because the corresponding area in the brain to the arm registers it is suddenly deprived of any stimulation and sends a message to the brainstem asking for sensation; the brainstem sends neurological nerve sensations.

Stress makes tinnitus worse because our brainstem processing / sorting ability weakens and all sounds go to our cortical / conscious processing. Stress pumps everything up including our neurological noise floor and our cortical awareness of tinnitus. Thus relaxation is an important part of the new *Neuromonics (neuro meaning neurological and monics meaning harmonics or sound)* treatment.

The Neuromonics treatment involves wearing a device that looks like an iPod or Sony Walkman. The device has four music tracks that range from classical to relaxation music. This music is spectrally modified based on the wearer's hearing loss, and thus each device is custom made. What the 'music' is doing is feeding the auditory cortex with the exact frequencies it can no longer receive from the inner ear hair cells. If the exact sounds were provided without music it would be very disturbing to listen to, and thus music is used to ensure the brain is being fed in an enjoyable manner (that is, ensures it is a pleasant treatment for the wearer). It's a bit like cherry-flavoured cough syrup; the cherry flavour does nothing but it makes the cough syrup easy to swallow.

By giving the auditory cortex the exact sound it is asking for, messages to the brainstem asking for this sound eventually cease. This ability of the Neuromonics devise to re-wire the neurological pathways in the brain means tinnitus eventually gets less disturbing and intrusive because it loses its meaning and the tinnitus is then kept in the subconscious auditory cortex.

Re-mapping the neurological pathways takes time. The device needs to be worn for a minimum of two hours a day. The wearer gets about 50 per cent improvement after the first eight weeks, with complete improvement after an average of six months. After this the device need only be worn for two hours per week, in order to maintain the neurological remapping.

# Audiology Newsletter

**Bronwen Hofmeister Audiologist**
B.A.(Hons).,MClinAud
Ph. (07) 3720 9555
www.bhaudiologist.com.au

Christmas 2006
Issue 10

I wish you and your families a happy, safe and festive Christmas. I get such tremendous satisfaction from working with you. I very much value your loyalty and trust.

I look forward to seeing you all in the New Year.

Warmest Regards,

*Bronwen*

Please note, during the Christmas period the clinic will be closed from Wednesday 20th December through Friday 8th January.

Bronwen Hofmeister Audiologist
(B.A.(Hons).,MClinAud.,MAudSA

**SUITE 81 LEVEL 4 SANDFORD JACKSON BUILDING**
**WESLEY HOSPITAL**
**30 CHASELY STREET**
**AUCHENFLOWER QLD 4066**

**PH (07) 3720 9555**
**FAX (07) 3720 9099**
**EMAIL: BHOFMEISTER@WESLEY.COM.AU**
**WWW.BHAUDIOLOGIST.COM.AU**