NOISE AND THE EAR

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This leaflet has been written to help you understand more about the effect of noise on your ears and the connection with tinnitus.

Introduction

We only have one pair of ears, and they have to last us a lifetime. They are remarkable organs that allow us to hear, and we must take care that the sounds that we expose ourselves to will not cause them harm.

This leaflet will discuss sounds that could potentially damage our hearing as loud noise. Such noise can be unwanted (for example, noise from loud machinery at work) or it could be desired (like listening to music with the volume turned up). You can be exposed to noise at work, or with leisure pursuits (eg loud music, motorcycling, DIY, pubs/clubs). It is important to identify which noise can be damaging to hearing, and how to go about reducing the risk of damage.

The ear

The ear consists of three parts:

1. **The outer ear.** This is the visible part of the ear on the side of the head (called the *pinna*) and the external ear canal that goes inside the head, ending at the eardrum. This part of the ear channels the sound vibrations into the ear and onto the eardrum.
2. **The middle ear.** This is composed of the eardrum and the three smallest bones in the human body (called the hammer or *malleus*, the anvil or *incus* and the stirrup or *stapes*), which are held in an air filled space in the head. The middle ear helps to boost the vibrations at the eardrum into stronger vibrations that can be better detected by the inner ear. The *stapedial reflex* causes one of the ligaments in the middle ear to tense which helps reduce the intensity of very loud sound.
3. **The inner ear.** The hearing part of the inner ear is called the *cochlea*. This is a fluid filled spiral structure that is pushed on by the stirrup or stapes of the middle ear. The vibrations that are delivered to it are turned into electrical signals by specialised cells called *hair cells*. These electrical signals are then sent along the cochlear nerve to the brain. One of the functions of the hair cells is to amplify quiet sounds. They also try to moderate the signal generated by loud sounds. However, if sounds are very loud, these hair cells can be overwhelmed and may