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SOME EXPERIENCES IN INVESTIGATING OCCUPATIONAL DEAFNESS CLAIMS

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INTRODUCTION

A professional expert witness may find himself employed by either the claimant, that is the injured employee, or the defendant, that is the employer or his insurance company. Either way, his report, conclusions and evidence should be honest and unbiased. Most of the people encountered in investigating a claim will be fundamentally honest, but, by definition, they will be on one side or the other, and mild exaggeration or colouring of the truth inevitably occurs from time to time.

The basic tool of the acoustic engineer is the sound level meter and of the medical consultant it is the audiometer. Both can be mis-used, but this is unlikely in experienced hands. The greatest scope for divergence lies in the interpretation of the results. "Opinions" should always be founded on hard scientific fact.

NOISE MEASUREMENT

The results of the joint Medical Research Council and National Physical Survey, which were reported as long ago as 1970, showed that hearing damage, after allowing for age effects, was related to a measure of noise energy which Burns and Robinson called noise immission. Tables derived from this data have been published by the National Physical Laboratory (Robinson and Shipton 1973) which enabled the proportion of a normal population of any age likely to have sustained a given hearing loss as a result of a specified noise level to be estimated. Quite clearly there should be a reasonable statistical probability in an individual case, although it should be remembered that claims are more likely from the more susceptible individuals, as the less sensitive people will not have sustained losses of handicapping proportions.

Noise immission is a function of equivalent continuous noise level (L_{eq}) and exposure duration. There are several ways of measuring L_{eq}, and these have been reviewed by the Department of Employment (1972) and Noise Advisory Council (1978). One of the most convenient is the noise average meter which copes with fluctuating as well as impulse noise, although ordinary sound level meters are quite adequate for more or less steady noise levels. Regretably cheap noise survey meters are still encountered which do not comply with any recognised performance standards. The level of impulse noise in one recent encounter was estimated from the "kick" of the needle on one of these instruments, and the L_{eq} derived by applying an arbitrary and excessive duration factor to give the desired result. This was a most unsatisfacotry state of affairs.

Claimants and their colleagues quite naturally assume that the expert of whichever side wishes to measure some noise. It is easy to be led on a "whistle stop tour" of noisy locations in a factory in a manner which is quite untypical of a normal working day. Noisy work may be deliberately saved until a visit in the

mistaken belief that this was wanted. A little explanation is usually all that is required in these cases.

Sometimes, noise is deliberately made. Hammering demonstrations are common, but after a short while boredom leads to a resumption of normal work. Extra effort in production work such as drop forging can be compensated by timing the prevailing rate and applying the following correction to the results:-

$$-10 \log \frac{\text{prevailing production rate}}{\text{average production rate}} \text{ dB.}$$

Occasionally, the exaggeration is more insidious; for example a hollow ingot which should have been scrapped was passed through a rolling mill. The expert must rely on experience in such situations, and demand a more typical situation.

The "you should have heard the noise yesterday" comment is so frequent that if it were true industry would now be reduced to a hushed whisper! Unless a large proportion of machinery is idle, the prevailing situation is probably more or less typical, bearing in mind that every doubling of energy only represents an increase of 3 dB. Experience is again invaluable in assessing this situation. But there may be substance in statements of this type sometimes. Working practices, and hence noise levels, have changed in some industries. For example, riveting was the most common method of fabrication until twenty or so years ago. Average noise levels of over 120 dB(A) were usual. This was replaced by welding, but pneumatic chipping or caulking was retained. The operator of the pneumatic hammer still sustained the same noise exposure, whilst his workmates who were pursuing the ostensibly quiet welding occupation, experienced 110 dB(A) or thereabouts. Advances in the last ten years have made even more pneumatic hammers redundant, and fabricators are rarely exposed to much above 90 dB(A) nowadays.

THE ONSET OF HEARING LOSS AND HANDICAP

The likely progression of noise-induced hearing loss may be plotted using the N.P.L. tables provided that reliable estimates can be made of noise levels through-

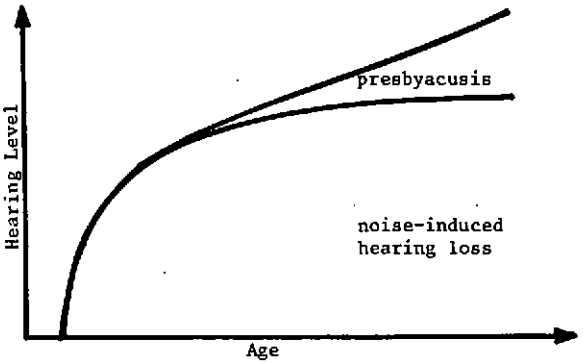

FIGURE
General progression of noise-induced hearing loss with time and age.

out the period in question. The progression follows an exponential curve, with the effects of presbyacusis or natural hearing loss due to advancing age superimposed. The general form is shown by the Figure.

It is difficult to decide from examination of the figure just when hearing handicap began in time because of the flattening of the curve. The additive effects of presbyacusis might tip the scales in the case of an older person, especially where presbyacusis is above average. But most claimants say that they only began to notice their hearing loss relatively recently. The answer probably lies in social reasons. Experience in parts of the country where tightly knit communities exist around a staple industry indicates that hearing loss does not matter when nearly everyone is affected to some degree. With improved housing and greater mobility, these communities are becoming fewer. A person with hearing loss becomes the "odd man out", and this matters socially. Some event, such as acquiring a telephone or a grandchild may have brought awareness of a hearing defect. Also, the media have made people aware of handicap and disability in general, and that they may be able to claim against their employers for industrial injury.

There may be worry in a claimant's mind that his former employer has gone out of business or that he will be too late to claim if he admits to past awareness of his condition. The 1963 Limitation Act only permitted plaintiffs to bring actions after three years from the date of injury provided that they were unaware of "material facts of a decisive character" relating to their claim. The 1975 Limitation Act allows judges to exercise discretion in favour of the plaintiff on this point, and in practice they have usually done so.

Sometimes a recent noisy event is blamed. The contribution of such an event may be assessed by calculating partial noise immission levels. More often than not, this turns out to be unimportant compared with long term factory or plant noise levels. The real significance of such an event has been in drawing attention to the causal link between noise and hearing loss.

Claims from industries with a tradition of casual or "lump" employment are noticeably sparse. The reasons are not difficult to imagine, but it is not for lack of noise exposure. In one case, no less than 156 separate periods of employment have been identified and the claim was made against an employer who accounted for less than 3 months of the working lifetime!

BEWARE THE "IPSO FACTO" DIAGNOSIS

The worst pitfall for both medical and acoustic consultants is to make an "ipso facto" diagnosis. A hearing loss is not automatically noise-induced in origin because a claimant says he has worked in noise, or because a level over 90 dB(A) was measured. A plaintiff must be able to demonstrate on the balance of probabilities that a causative link existed between his noise exposure and loss of hearing for his claim to succeed in court. Some of the major points to be satisfied may be summarised as follows:-

There must have been sufficient noise exposure. The N.P.L. tables may be used to draw a statistical correlation between noise immission and hearing loss.

The hearing loss must be of a sensori-neural type as indicated by agreement between air- and bone-conduction audiometric tests.

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The audiogram must have the right shape as exemplified by the National Physical Laboratory data. A dip of 4kHz is merely indicative of cochlear hearing damage of which noise is only one, albeit a common, cause.

Tinnitus or noises in the ears may be present, and if so it must be associated with the noise exposure.

There must be no other competing diagnostic possibilities. Although sensorineural hearing loss and tinnitus may be associated with noise damage, dizziness or vertigo cannot. This triad of symptoms often appears in noise claims, but is indicative of disorders involving the vestibular organs often referred to as Ménière's syndrome. This is not related to noise exposure.

MALINGERING AND EXAGGERATION

Outright malingering is rare, but there is often an element of "making sure" or even deliberate exaggeration in audiometric responses. The incidence of exaggeration seems to be increasing, and it often occurs in geographical areas. Unfortunately exaggeration often passes undetected by ear, nose and throat consultants who are accustomed to dealing with fully co-operative patients, and they do not suspect otherwise.

There are a number of indications of exaggeration, such as apparently fluctuating audiometric thresholds, lack of agreement between audiograms taken on separate occasions, and a flatter audiometric configuration than expected. In the two most common forms of exaggeration, the subject either attempts to respond at a constant stimulus level across all frequencies, or he adds a constant factor above true threshold to all his responses. This factor adds to his apparent hearing loss at lower frequencies, but because of the effects of loudness recruitment, a lesser amount is added in practice at those frequencies most susceptible to noise damage. Thus, a 20 dB subjective addition to the patient's responses may only be registered as an actual 5 dB increment on the recorded audiogram at 4kHz. This gives a low frequency bias to the audiogram.

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