

first half of pregnancy.<sup>18</sup> Severe handicaps were reported in five of 23 of the congenitally infected infants born to women infected in the first 27 weeks of pregnancy, whereas only one of the 12 infants born after maternal infection at 28 to 40 weeks developed a complication—and this was minor (hypoplastic dental enamel).<sup>18</sup> Unfortunately the numbers were too small for this difference to be statistically significant. Other studies have shown that serious defects may result from infection in both early and late pregnancy.<sup>6-8</sup>

Congenital infection may result from either primary or recurrent (due to reactivation of reinfection) infection in the mother. Although serious handicaps are more likely after primary rather than recurrent infection,<sup>2,19</sup> neurological damage and bilateral hearing loss have occasionally been reported in children whose mothers undoubtedly had recurrent infection.<sup>2,7,20</sup> More data are required from large prospective studies before the risk associated with recurrent infection can be determined.

There is no easy way to prevent the birth of babies damaged by cytomegalovirus. In contrast, congenital rubella can be prevented by vaccination of susceptible women, and women infected by rubella during pregnancy can often be identified and the pregnancy terminated, since congenital defects result only from infection in the first 16 weeks of pregnancy.<sup>21</sup> Although techniques may now be available to identify fetuses infected by cytomegalovirus,<sup>22-25</sup> only those infected in the first 16 weeks of pregnancy would be identified in time for termination. Furthermore, only 10% of the infected infants would be severely handicapped and many pregnancies might therefore be terminated unnecessarily.<sup>2,8,18</sup> Nor is an acceptable vaccine available. Attenuated vaccines have been used in patients who have had renal transplants<sup>26</sup> but are unlikely to be widely used since cytomegalovirus, a herpes virus, can remain latent and is potentially oncogenic. Genetically engineered vaccines, free of viral DNA, would overcome these problems.<sup>27</sup> Before such vaccines can be developed, however, we must identify the viral epitopes that induce protective antibodies and the cell mediated immune responses required to limit infection and prevent transmission of virus to the fetus.<sup>28</sup>

Perhaps women who transmit the virus to the fetus have defective immunological responses and are unable to limit replication of cytomegalovirus. Stern and colleagues have shown that lymphocytes from the mothers of infected babies failed to respond to cytomegalovirus antigen in lymphocyte transformation tests, whereas lymphocytes from mothers who did not transmit virus did respond.<sup>25</sup> Women whose lymphocytes did not respond were also shown to shed more virus. We must wait to see whether genetically engineered vaccines will be able to stimulate the necessary immune responses in such women.

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## The psychological side of tinnitus

The common and often distressing symptom of tinnitus is generally accepted not to have a psychogenic cause. But psychological factors determine how people react to the complaint, and doctors must therefore consider them carefully.

About 20-40% of the population have experienced tinnitus at some time.<sup>1,2</sup> Once established for several weeks it is likely to become chronic, which together with its common association with conditions such as presbycusis means that its prevalence increases with age. The sexes are roughly equally affected. In most instances tinnitus is associated with a hearing loss of known cause (usually noise, presbycusis, or middle ear disease), but about 13% of patients referred to specialists have either no hearing loss or minimal loss of unknown cause.<sup>3</sup>

How much patients are troubled by tinnitus varies widely. No study has yet considered what features of the tinnitus or the patient's behaviour determine if and when general practitioners refer patients for specialist opinions. The degree of distress may be important. One survey suggested that 5% of the adult British population have their sleep regularly disturbed by tinnitus.<sup>2</sup> A questionnaire inquiry of a tinnitus self help group unsurprisingly found that many respondents had problems with sleep, and 70% mentioned some emotional difficulties.<sup>4</sup>

Stress in hospital based samples has been measured using different instruments—for example, the Minnesota

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multiphasic personality inventory,<sup>5</sup> the general health questionnaire,<sup>3</sup> the Crown-Crisp experiential index,<sup>6</sup> and the Goldberg clinical interview schedule.<sup>3</sup> All found high levels of psychiatric morbidity, affecting a fifth to half of patients; usually patients had mild to moderate affective disorders. Similar studies have been criticised for giving spuriously high prevalences of psychiatric morbidity in physically ill patients,<sup>7</sup> but a more rigorous study that used Goldberg's standardised clinical interview schedule showed that 10% of patients with tinnitus were moderately to severely depressed and that a further third were mildly affected.<sup>3</sup> About a quarter of the patients used benzodiazepines regularly and 20-48% reported tension headaches.

Patients adjust to their tinnitus and their stress declines; but an appreciable minority continue to have difficulties. The important question is why some patients and not others have an affective disorder. Consequently, various studies have considered what factors are associated with increased distress in patients with tinnitus. Aetiology has recently emerged as possibly being important: in one study patients with idiopathic tinnitus (mostly women) showed significantly more psychological disability than patients with noise induced deafness and tinnitus (all men).<sup>3</sup> No other diagnostic category showed any significant difference. Overall, there was no difference in stress between the sexes, which was surprising as mild psychiatric morbidity is usually more common in women. A personal or family history of psychiatric illness has been related to increased depression in patients with tinnitus,<sup>3,4</sup> but neither tinnitus nor any associated distress appears to be linked with a particular personality type.<sup>3</sup>

Distressed patients rate their tinnitus as louder and more annoying than other less stressed sufferers. But studies using pitch matching and masking techniques to obtain a more objective measure of tinnitus loudness have not found an association between loudness and apparent distress, or between distress and the reported quality of the tinnitus.<sup>3,8</sup> Patients' predisposition to depression, their mood, and the cause of the tinnitus are more related to the annoyance and stress experienced than to the nature of the tinnitus itself. Like other chronic symptoms such as pain, tinnitus is related in a complex way to the psychological health of the sufferer.

Many patients are unconcerned by their tinnitus and others merely require reassurance. Only a few patients benefit from conventional audiological treatment with a hearing aid. Most will benefit from a tinnitus masker, but only a tiny minority will have their tinnitus abolished or

experience residual inhibition when not wearing the instrument. Tinnitus maskers are not nationally available on the NHS.

Doctors working with patients with tinnitus are struck by how some will go to great lengths to obtain relief. Hence acupuncture, relaxation techniques, biofeedback, cognitive behavioural approaches, and herbal remedies have all been tried. Few workers claim that their methods much affect the tinnitus itself, but most suggest they can improve the patient's ability to cope. Placebo controlled trials have suggested that contact with understanding professionals with time to listen is a powerful ameliorative force.

It requires a high index of suspicion to identify those patients with psychological problems. Some have serious problems and require psychiatric referral. Rarely patients develop isolated delusions about an external cause of their tinnitus. In others the tinnitus becomes the focus of emotional, family, and other difficulties; patients who somatise their problems in this way are difficult to help. Others become seriously and persistently depressed.

In many patients with tinnitus, management is complex and requires the skills of an otologist and audiologist combined with the ability to identify and manage the common coincidental psychiatric and psychological disturbances. Different management models are being considered, including "tinnitus clinics," hearing therapy, and lay counselling.<sup>3,8</sup>

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