Use of narrow band noise to screen for cochlear dead regions

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According to Moore and Glasberg (1997), cochlear dead zones are regions where the inner hair cells and/or adjacent neurons are not functional. Thus, in these regions, the information generated by the basilar membrane vibration is not transmitted to the central nervous system. Nonetheless, a sound in a dead zone frequency, if intense enough, may be detected in places with functional neurons and inner hair cells, through apical or basal spread of the vibration pattern. This causes a difficulty in decoding the acoustic information and even information overload in one same region. Moore (2001) reported that hearing thresholds above 75-80 dB in low frequencies and above 90 dB in the high frequencies indicate a probable presence of dead zones in the cochlea. Cochlear dead zones can not be diagnosed based on the audiogram (Moore et al. 2000). Thus, Moore (Moore et al. 2000) created a test called TEN (Threshold Equalizing Noise), which is an efficient clinical test for the diagnosis of cochlear dead zones. But it requires some amount of clinical skill and time and cannot be administered for patients with greater degree of hearing loss. Moreover it can only be used to diagnose dead regions only till 4-6 kHz. Another diagnostic means is the psychophysical measure of tuning curves, described by Moore and Alcántara (2001) which may be useful and reliable to identify cochlear dead zones and to outline the region involved. However, it bears the disadvantage of being a long and complex test, making it unfeasible for routine clinical use. Eguti (2002) assessed cochlear dead zones using the technique proposed by Moore et al. (2000), however using the audiometers white noise and found reliable and conclusive results. Thus this current study was aimed at using narrow band noise at various center frequencies to screen for cochlear dead regions. Narrow Band Noise (NBN) thresholds at centre frequencies from 250-8000 Hz were established for a group of normal hearing and sensorineural hearing impaired individuals confirmed to have dead regions using the TEN test. These NBN thresholds were then compared with the pure tone thresholds at the respective frequencies in both these groups. The results indicated good correlation between both the procedures in screening dead regions. Although, not diagnostic NBN-pure tone threshold comparison may be used as a screening tool for identifying cochlear dead regions.

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