CLINICAL NOTE

PURE TONE AUDIOMETRY

Technique for Determining Thresholds of Hearing for Pure Tones

The following notes, prepared jointly by the Medical Research Council Committees on Medical and Surgical Problems of Diseases of the Ear and on Electro-Acoustics, are intended for the guidance both of designers and users of pure tone audiometers.

The Audiometer

In order to achieve uniformity both of performance and of the test procedure, the general design and layout of audiometers should be as closely standardized as possible. This applies particularly to the mode of operation and to the relative positions of the different controls.

For general work a series of fixed frequencies is to be preferred to a continuous sweep frequency, and the following should be provided: 250, 500, 1000, 2000, 3000, 4000, 6000, 8000 cycles per second.

An " on " switch should be included which can be either held or locked in the " on " position.

It should be possible to test hearing for pure tones by air and by bone conduction. There should be a masking device and twin headphones should be available and so arranged that when the test tone is delivered to one ear a masking sound can be delivered to the other. All controls should be silent in operation.

Finally, the standard of threshold on which the calibration of the audiometer is based should be clearly stated both on the audiometer and on the audiogram.

The Test Room

Noise must be excluded as far as possible from the test room. If the ambient noise level is greater than 40 db. as measured on a sound level meter conforming with the American Standard Specification, the room should not be regarded as quiet enough for accurate threshold tests, and this fact should be recorded on the audiogram. For ears having nearly normal hearing a sound level of 40 db. may well be excessive for accurate determination of threshold. The test should be carried out in a room separate from the general clinic, and the room should be large enough to contain both subject and tester. For a successful and reliable test a quiet room free from visible as well as audible distractions is necessary.

The Subject

The subject should be comfortably seated, and unable to see the face of the audiometer and any movements of the controls.

The Tester

The tester must of course be familiar with the audiometer in use, and the accuracy of the instrument must be frequently checked.

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The Test

With the possible exception of screening tests the pure tone audiometer test should only be carried out after an otological examination. The subject must clearly understand what to expect, and it may sometimes be necessary for a printed card to be available for the subject to read before the test. The following test has been found to be helpful.

" Hearing Test "

" In order to test your hearing you will be asked to listen through headphones to a series of simple tones. Each ear will be tested separately and every time that you hear a tone, no matter how loud or soft it may be, you are to say ' YES ' (or press the signal button or raise the hand).

" There may be a continuous hum or buzzing noise in one ear : this is to prevent that ear hearing test tones. Ignore the buzzing sound, fixing your attention on the test tone and say ' YES ' or give a signal only when you hear the test tone."

It is customary to test all tones in one ear before starting on the other.

Each test tone should be presented to the subject by switching the sound on two or three times for half to one second, with a similar interval between the sounds. At first with each tone the intensity should be well above the estimated threshold, and if heard should be sounded again with the intensity reduced by 5 to 10 decibels. This should be continued until the sound is no longer heard. The threshold of each tone should be noted as the lowest level at which the tone is heard, the steps of intensity being arranged at 5 decibel intervals.

Should the difference in hearing loss between the two ears at any frequency be greater than 40 decibels, the test should be repeated on the less sensitive ear while the more sensitive ear is masked by a suitable continuous masking noise. If known the intensity and nature of the masking noise should be noted on the audiogram. As each tone is tested the threshold should be noted on the audiogram, and the subject should be warned when the test with a new tone is about to begin.

Audiometry for bone conduction is in an early stage of development and investigations to determine most suitable apparatus and techniques are still proceeding. Pending the results of these investigations it is recommended that, when testing for bone conduction the ear under test should not be occluded or covered in any way, as any external obstruction may appreciably influence the result of the test. During the test the untested ear must be masked using, for example, one of the headphones provided. The bone conduction receiver should be placed just behind the auricle on a level with the external meatus being tested, the receiver being held in position by a springy headband. The tones to be used should include 250, 500, 1000, and 2000 cycles per second.

At the end of the test the audiogram should be signed by the tester, and a clear indication of the meaning of the symbols, date of test and name and age of the subject added, together with any remarks about masking, conditions of the test room, and any doubt about the accuracy of the subject's responses.

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