Masking in pure tone audiometry
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Purpose of the test
The technique of masking is used in order to isolate the test ear and ensure that results obtained are the true thresholds of the test ear.

In pure tone audiometry for both air conduction and bone conduction it is possible that responses obtained are those of the non-test ear.

Rationale
To establish the true threshold of detectability for air and bone conduction.

Air conduction pure tone audiometry
It is possible for sounds introduced into the test ear via headphones to be carried by bone conduction across the skull and stimulate the cochlea of the non-test ear. The amount of sound energy that is lost as it crosses the skull is known as transcranial attenuation. It varies in individuals between 40 and 85 dB. It is accepted that if the difference in thresholds between the air conduction results at any frequency is 40dBBHL or greater then it is possible that the response is due to stimulus of the non-test ear.

When there is this difference of at least 40dBHL then masking is introduced in order to isolate the test ear and obtain true thresholds.

In masking a narrow band noise centred around the test frequency is introduced into the non-test ear. This noise “occupies” the non-test ear and allows the test ear to respond at its true threshold. Pure tones are presented into the test ear in the usual way until a true threshold can be recorded.

Masking procedure in air conduction testing  (This is known as Hood’s technique)
- The procedure uses conventional headphones.
- The adult/child is asked to listen to the narrow band noise in the non-test ear and indicate when it is just audible. Increase the level by 20dB. Instruct the adult/child to ignore this noise and listen for the signal.
- Using the usual 10 down 5 up method, re-measure the threshold of the test ear.
- Increase the masking level by 10dB.
- Re-measure the threshold.
- Repeat the process until for two successive increases in masking level the threshold does not change.
- This gives the true air conduction threshold of the test ear.
- This technique is not recommended for very young children as they can find it difficult to understand what to do. Generally it can be done at around age seven.
Figure 1 gives an example of masking being required for air conduction.

The unmasked results show responses on the right at around 50dBHL and on the left around 10dBHL. As there is a difference of 40dB it is possible that the original responses recorded for the right are in fact the left cochlea responding.

Masking is required to determine the true threshold on the right.

**Bone conduction pure tone audiometry**

In bone conduction pure tone audiometry masking for bone conduction assessment is required when there is a gap at any frequency of 15dB or more between the unmasked bone conduction result and the air conduction threshold. This is known as the air-bone gap.

Figure 2 shows an example of bone conduction results that require masking.

Air conduction results show a mild hearing loss in both ears. The unmasked bone indicates normal cochlea function in at least one cochlea. With this result it is not possible to know if the right, left or both cochlea are giving this response. Masking is required to determine the response of each cochlea.

**Masking in bone conduction testing**

- The same method is used as for air conduction.
- The bone conduction vibrator is placed on the mastoid process of the test ear.
- Masking noise is introduced to the non-test ear through an insert earphone which is placed in the ear canal and held in place by a hook over the pinna. The tone is introduced via headphone into the test ear.