Auditory Brain-stem Evoked Response and Efferent Action*

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The assumption that the action of the efferent system innervating the outer hair cells is to increase the loudness of the post-adapted test tone is supported by many studies.

This loudness gain can be determined by using ABR audiometry. It is observed in the form of an increase in absolute amplitude and a reduction in absolute latency.

In the present study the efferent action of monaural stimulation on the periphery of the contralateral auditory system was determined using ABR audiometry.

Binaural interaction causes a loudness gain when the continuous tone is at a low intensity level.

Fourteen normal hearing subjects within the age range from 18 years to 25 years were tested. BSER were determined using an Electric Response Audiometer TA-1000. Logon stimuli of 80 dB HL were used. Then a continuous tone of 60 dB HL was presented in the contralateral ear. The tone was presented through the right earphone using a Maico MA-27 portable audiometer. The tone was presented for 7 minutes.

Even after 7 minutes the tone was continued. During the 7 to 9 minutes period (*i.e.,* in the presence of the continuous tone) BSERs were again recorded. Logon stimuli of 80 dB HL were used. The frequency of the Logon stimuli was same as the frequency of the continuous tone, The test was carried out at 2 KHz and at 4 KHz. In all subjects the left ear was the test ear and continuous tone was presented in the right ear.

Loudness gain was observed in wave-I for most of the subjects, *i.e.,* there was loudness gain at the auditory nerve.

From the present study, one can conclude that binaural interaction takes place at the level of the auditory nerve. Monaural stimulation of low intensity causes a loudness gain in the contralateral ear.

Loudness gain was also observed in wave-VI, *i.e.,* at the level of the medial geniculate nucleus. The results of the present study agree with the results observed by Gerken 1984. He reports enhancement of response amplitude in the medial geniculate nucleus to continuous tone. He observed these findings in a conscious cat.

* Master's Dissertation, University of Myscre, 1985.

In the present study enhancement of response amplitude in the medial geniculate nucleus to continuous tone was observed in humans.

Loudness gain was observed in terms of increase in the amplitudes of peaks I and VI for frequencies 2 **KHz** and 4 KHz.

Another experiment was carried out, where loudness gain was observed when a continuous tone was presented in the ipsilateral ear.

Four normals in the age range of 18 to 25 years were tested. BSERs were determined using an Electric Response Audimeter TA-1000.

Stimuli used was Logon stimuli of 80 dB HL. Continuous tone was then presented *via* a BC transducer using GSI-10 Bekcsy Audiometer. The tone was of 55 dB HL and it was presented for 7 minutes ipsilaterally. Then without switching off the tone, in its presence, BSER were determined. Logon stimuli of 80 dB HL was used. The test was only carried out at 2 KHz.

Loudness gain was only observed in the VI peak.

Continuous tone presented ipsilaterally causes loudness gain only in the medial geniculate nucleus.

Limitations of the Study

(1) The size of the sample was small.

(2) The age range of the subjects was limited.

Recommendations

(1) To carry out the study on a larger population.

(2) To carry out the study on subjects with a wider age range and determine if loudness gain varies with age.

(3) To study if binaural interaction is present when the continuous tone is of a different frequency from that of the test stimulus.

(4) To study if loudness gain is present when the continuous tone is of a high intensity (80 dB HL).

(5) To study if loudness gain is present in wave-I of BSER in the presence of continuous tone (contralateral ear) in cases with cochlear pathology.