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## Confirmation of Right Cerebral Hemisphere Specialization by Brainstem Auditory Evoked Potential-An Electrophysiological Study

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### ABSTRACT

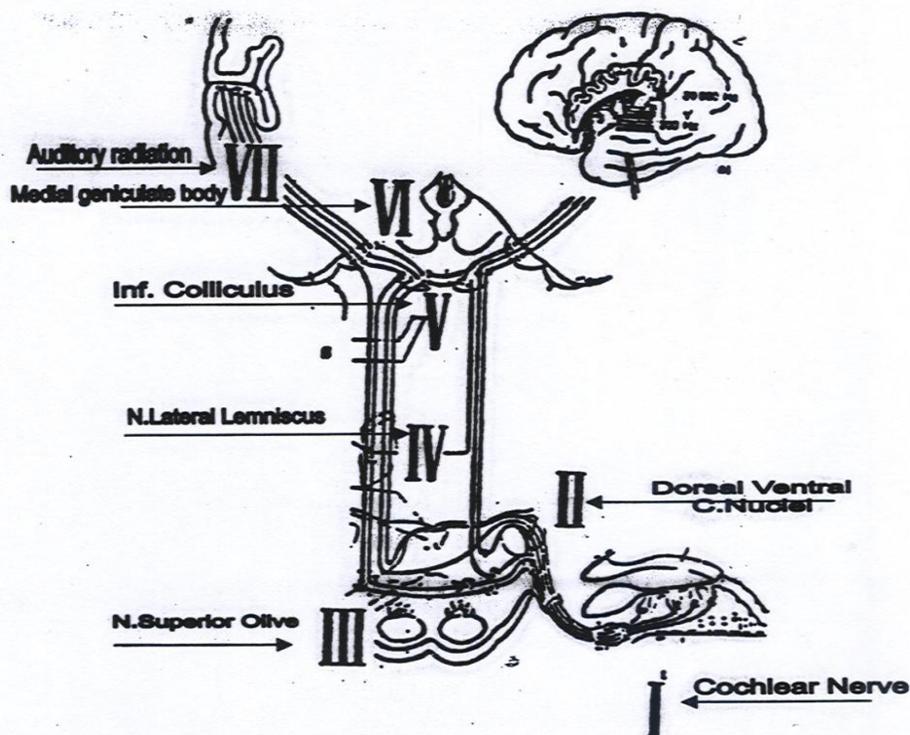
To confirm that right cerebral hemisphere specialization by brainstem auditory evoked potentials. 42 healthy male individuals voluntarily took part in our study. Height, weight and body mass index were not measured as they have no effect on auditory evoked potentials. We excluded subjects with deafness, hypertension, diabetes, endocrine pathology, central or peripheral neuronal disorders, smoking & drinking habit individuals. Auditory evoked potentials are recorded with RMS. Wave VI is recorded in 41/42 cases when the click stimuli is either in left or right ear. Wave VII is produced in 24/42 and 27/42 when the click is in right and left ear respectively. Wave VII is produced in 10/42 and 30/42 when the music is in right and left ear respectively. The mean latencies of VI and VII waves are 7.49 & 8.21 and 7.39 & 8.01 mille seconds when click and music are applied respectively in left ear. There is decrease in latency of wave VII when the music is in left ear which is statistically also significant. Increase in frequency of appearance of wave VII when the music is in left ear. Decrease in frequency of appearance & increase in latency of wave VII when the music is in right ear. Statistical analysis is done with paired t test. P value < 0.05 is considered as significant.

**Keywords:** BAER, CEREBRAL HEMISPHERES, EVOKED POTENTIALS, RMS

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## INTRODUCTION AND BACKGROUND

Right cerebral hemisphere is more sensitive in discriminating music and remembering spatial pattern [4]. Left hemisphere is more adoptive for speech. Evoked potentials are records of far field potentials [7]. Sometimes evoked potentials are more sensitive, more specific and more reliable than the present f MRI & PET scan. Dawson in 1954 introduced averaging techniques. Averaging technique procedures capacity was enhanced by filters which will eliminate the noise outside the pass band of evoked potentials. Digital filters are advisable than the analogue filters as analogue filters distort the wave form. In early 70's significant improvement were made in amplifiers. Females have shorter absolute and inter peak latencies than males. Amplitudes are greater in females. There is an increase in absolute and inter peak latencies with progressive lowering of body temperature [5]. No change in BAER with different levels of attention and consciousness. The signal to noise ratio for conventional evoked potential is 1:1 to 1:100 that is noise is much larger than the signal. Usually encountered noises are myogenic electrical activity, environmental electrical noise, electrical activity in heart and brain. Averaging technique will separate the signal from noise. Signal and noise will follow the Gaussian distribution pattern. When we repeat the process for a required number of times there is amplification of signal and cancellation of noise [3]. Generally signal to noise ratio will improve in proportion with square root of number of trails.



ORIGIN OF AUDOTORY BRAINSTEM EVOKED RESPONSE WAVES FROM DIFFERENT PARTS [6]

## MATERIALS AND METHODS

42 healthy male subjects with average age 22 yrs  $\pm$  2 are included as subjects after taking the consent form and also obtained the ethical clearance. Exclusion criteria-hearing difficulties, diabetes, hypertensives, endocrine pathology, neuronal disease patients, smokers and alcoholics. Recorded the evoked potentials by using RMS. Specifications of RMS: A/D convertor-14 bit analogue to digital convertor, channels-1, 2 or 4. Averager-averages per channel 9999. Auditory stimulator: headphone, rarefaction click<sup>2</sup> of 90 dB, single click polarity, music. Amplifiers and average controllers: amplification of 4-5 lakh filters 50-150 Hz low cutoff and 3000 Hz high cutoff i.e., normal audible range of sounds are allowed to pass. Channels to record-used bipolar i.e., ear lobe to vertex linkage as wave I amplitude is maximum at ear lobe than at mastoid process. Stimuli are repeated at rate of 2/second with higher rate of stimulation there is progressive loss in wave form. Electrodes are applied as per the convenience of E.E.G technique. Stimulus intensity is 90 Db as the resolution of wave form is poor with low intensity<sup>1</sup>. Monaural stimulation: 2000 stimuli are used. Running the test: the test is performed with the patient supine on a bed with pillow and towel for head propping to minimize the neck muscle tone. The room is quite and sound attenuated and also air conditioned. The use of hypnotics not rose as there was no muscle activity in the subjects. Even though the intensity of stimulus will not affect latencies of waves we used stimulus of constant intensity. Stimuli will travel to the contra lateral ear by bone and air conduction but 30-40 Db less than that delivered to ipsi lateral ear. When hearing is normal masking is not necessary as ipsi lateral ear potentials are earlier and of greater amplitude and inhibit the contra lateral impulse at cochlear nucleus. Artifact rejection is done with averaging system in the machine.

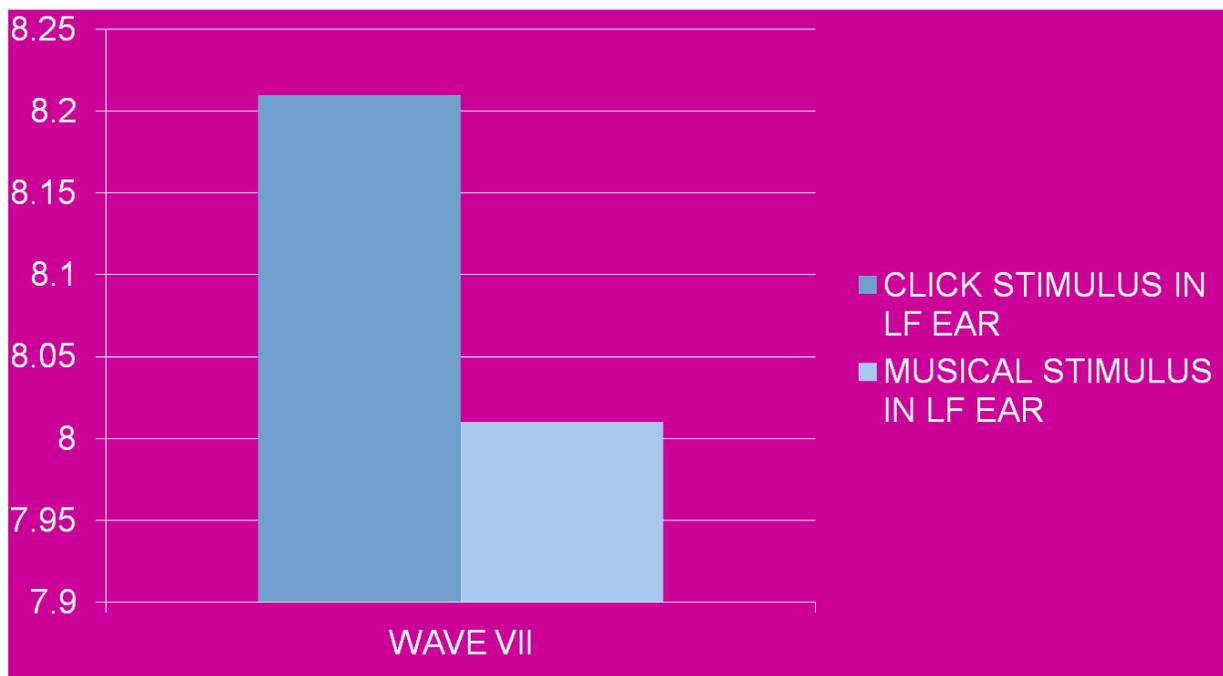
### STATISTICAL ANALYSIS:

Statistical analysis is done with paired t test. P value is significant if it is  $<0.05$ .

## RESULTS AND DISCUSSION

Wave VI is recorded in 41/42 cases when the click stimulus is either in left or right ear. Wave VII is produced in 24/42 and 27/42 when the click stimulus is in right and left ear respectively. The mean latencies of VI & VII waves are 7.49 & 8.21 and 7.39 & 8.01 mille seconds when the click and musical stimuli are applied respectively in left ear.

**GRAPH-1**



**LATENCIES OF WAVE VII WHEN CLICK & MUSICAL STIMULI ARE IN LEFT EAR  
P<0.001**

**TABLE-1: LATENCIES OF WAVE VI & VII WITH S.D., WHEN THE CLICK AND MUSICAL STIMULI ARE IN DIFFERENT EARS**

VARIABLES	CLICK IN RT EAR	MUSIC IN RT EAR	CLICK IN LEFT EAR	MUSIC IN LFT EAR
WAVE VI	7.57±0.55	7.60±0.49	7.49±0.53	7.39±0.57
WAVE VII	8.20±0.64	8.30±0.66	8.21±0.75	8.01±0.80

**CONCLUSION**

There is decrease in latency of wave VII when the music is in left ear which is statistically significant. Increase in frequency of appearance of wave VII when the music is in left ear. Decrease in frequency of appearance & increase in latency of wave VII when the music is in right ear.

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