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A Review of MEG in Parkinson's Disease

G. Aravindh[1]
[1]Asst Prof, Dept of ECE ,Karpagam Academy of Higher Education,India
aravinth.ts@kahedu.edu.in[1]

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Abstract: Parkinson's disease (PD) one of the movement disorder which occur in the neurological activities, but the diagnosis of disease is quite challenging. Sometimes the diagnosis methods are difficult at the time of considering a large number of motor and non-motor symptoms in PD patients. But it is highly risk to manage a PD patients in medical management. To enhance that lot of research are focused on PD for long term approaches. Further this paper contributes the reviews of Parkinson's disease and its treatment. Also it concluded with different ideas and limited drugs for continuoustreatment.

Keywords: *Parkinson's disease etc.*

I. INTRODUCTION

Magneto encephalography (MEG) is a non-invasive technique which is used to measure the neural activity of brain by recording the magnetic fields generated by electrical current. The MEG is combined with MRI to get an accurate structural perspective and resolution of neuronal activity. This combination is called as magnetic source imaging (MSI). The magnetic field used in magneto encephalography is to measure the brain which is in the range of femto –tesla to pico –tesla. The Parkinson's disease (PD) is a growing neurological disorder which cause serious disability and reduce the quality of life [1].The features of cardinal motor and the response to the dopaminergic therapy are the characteristic signs of PD. The neuro physiological characters related toParkinson's disease (PD) are studied within the motor system and the whole brain using magneto encephalography. The accuracy of clinical diagnosis is around 80 to 90 % [2]. In the analysations of MEG the aim of motor networks are spatially limited to the motor cortex which is performed usually in source space.MEG helps to investigate the underlying mechanisms of hallucinations in PD patients. The frequency-specific neural oscillations in PD patients are studied using MEG with unimodel Visual Hallucination (VH) and compared with multimodel hallucination and without hallucination PD patients. The MEG data of PD patients are recorded using 306 channels (102 magnetometers, 204 gradiometers) with the sample frequency range of 1250Hz [3]. The origin of MEG signals are shown in fig 1 which representing the depolarisation of intracellur and extracellur currents.

II. LITERATURE REVIEW

Abbasi et.al [4],proposes the measures of spectral analysis in unilateral DBS in (both 130 Hz and 340 Hz) that leads to a lowering of alpha and beta power over both sensorimotor cortices. These recordings took place the day after surgery with eyes closed and motor improvement was found without correlation. Luomaet.al[5],assigns the alpha lowering and beta band power during DBS

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ON, only during the resting state when the eyes were open. During eyes-closed or a motor task: No significant difference between ON and OFF stimulation. -Maximum CMC over sensorimotor area contralateral to extended hand.

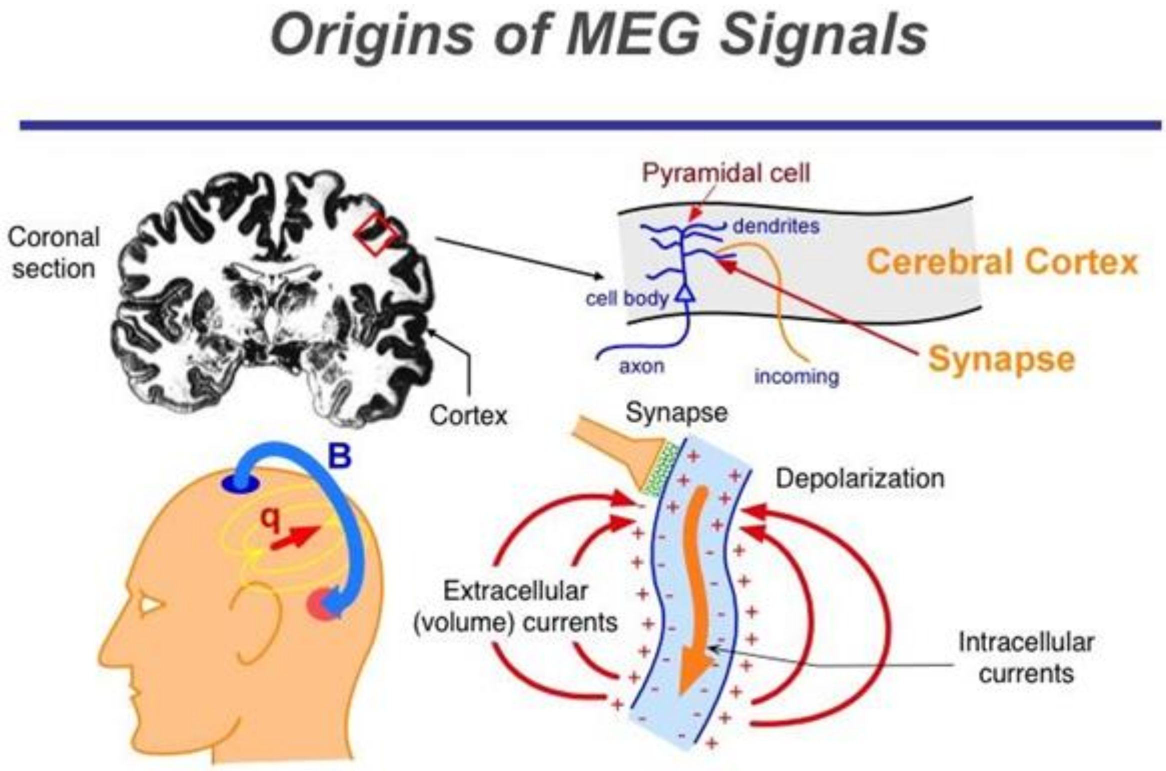

Fig.1. Origin of MEG signals

Airaksinen et.al[6], suggests the STN-DBS modified the coherence of CMC with large inter individual variability, correlation with motor improvement was inconsistent.Hall et.al[7], shows the contralateral M1 with resting-state beta power than ipsilateral M1 in PD. zolpidem normalized the ratio between left and right. Normalization correlated positively with improvement in UPDRS-III scores. M1 beta power differences during different phases of movement (a.o. PMBR), normalized after zolpidem.

Hirschmannet.al[8], cortical sources coherent with oscillations STN in PD DBS patients in the age of 11 to 26. It consists of two bands alpha band and beta band. In Alpha band Ipsilateral temporal regions are located, in beta band Ipsilateral sensorimotor and adjacent premotor cortex are located. HeinrichsGrahamet.al[9], proposes the PD (DRT OFF) vs controls with the help of spectral analysis significantly at lower beta band power in bilateral motor regions. After DRT, this largely normalizes. The FC Increased synchronicity between motor and cortices are partially normalized by DRT. HeinrichsGrahamet.al[10],suggests the amplitudes response which affects severely to the PD patients suffering from right-dominant disease.

Jha et.al [11], contributes the coherence between alpha and beta band at the age of 9 to 25. In Alpha band coherence between the PPN and posterior brain stem and cingulum. In Beta band coherence between PPN and medial frontal wall, SMA and primary motor cortex. Krause et al[12] , proposes

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the tACS of the motor cortex at beta frequency (20 Hz), but not at 10 Hz, attenuated beta band CMC during isometric contraction and reduced performance (amplitude variability) of a finger tapping task in PD, but not in controls. Further the performance of PD patients controls on motor task (motor sequence acquisition). During random presentation of the task there are no differences in beta band power. After learning a sequence the less training-related beta power suppression in motor cortex in PD versus HC. In addition, less training related theta activity in cortical motor regions, paralleling susceptibility to inference [13].

Oswal et.al[14], describe theAlpha band coherence between temporal cortical areas and the STN reduced following movement onset. The degree of suppression in is significantly greater ON DRT than OFF DRT.Oswalet.al [15],the DBS relatively selectively suppressed lower beta band synchronization of activity between STN and mesial premotor regions, including SMA. Then the motor cortical regions “driving” STN in beta band with different delays for lower and higher beta band.TeWoerd et.al, suggest PD patients have demonstrated comparable auditory entrainment as controls. Therefore the deficient entrainment in PD patients concerns the motor circuits only.

III. CONCLUSION

Parkinson's disease (PD) one of the movement disorderwhich occur in the neurological activities, but the diagnosis of disease is quite challenging. However, this paper represents the review on Parkinson’s disease using MEG signal and some of the challenging reviews also concluded.

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