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# Research Study in Magnetoencephalography

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**ABSTRACT:** Magnetoencephalography (MEG) is a neuro imaging technique that uses an array of sensors positioned over the scalp that are extremely sensitive to minuscule change in the magnetic field produced by a small change in the electric activity within the brain. It is, therefore, a direct measurement of neural activity. MEG as technique for investigating neural function in the brain is not new but was originally pioneered in the late 1960's with the introduction of high-density (200+) detector grid covering the whole head, that the full potential of MEG has begun to be realized. At the present time, MEG has grown to be a significant neuroimaging technique, with an increasing number of user and with the number of scientific papers utilize MEG increasing year on year. The great strength of neurophysiological method, MEG.

MEG is a technique of measuring the magnetic field generated by brain activity, and was pioneered by Cohen (1968). An important feature of MEG\EEG is ability to record varying signals generated by the brain in relation to state of activity, whether determined by intrinsic process

**KEYWORDS:** Magnetic field, current, Neuron, physiology, notation neuroimaging, sensors.

## I. INTRODUCTION

MEG provides information about the dynamics of the activities of a population of neurons of the cerebral cortex. The time resolution capabilities of MEG and EEG are unrivalled. Nevertheless, MEG like EEG has a basic illimitation in that the neuronal signals are only recorded from the scalp. Consequently, there is no unique solution to the problem of reconstructing where exactly the sources of these signals are localized within the brain. This problem is commonly referred to as the inverse problem. The Standard approach to overcome the non-uniqueness of the inverse problem in MEG is to introduce constraints on the possible solution, in order to exclude all solution except the one that is most suitable to describe the data. Thus, the functional localization of brain sources of MEG\EEG signals depends to some degree on the models used and on the corresponding assumption, and therefore will have some degree of uncertainty.

This contrast with spatial accuracy of MRI Brain images, where the MRI technology affords a 3-dimensional reconstruction. It explains partly why the development of clinical application of MEG has been slow, since the research on how to optimize estimate of the solution of the inverse problem has been arduous, and has only recently reached a stage where consensual strategies are emerging. These inherent difficulties, along with the fact that MEG needs rather costly facilities, account for the hesitation of hospital administrators in supporting the necessary investment in material and human resources. Nonetheless, MEG has proven a most valuable tool in research, not only of neurocognitive processes but also in clinical setting.

## II. RELATED WORK

Magnetoencephalography provides a completely noninvasive tool to probe into the real-time operation of the human brain in experimental conditions that are suitable for studying sensory and cognitive brain functions as well as their disturbances.

In evaluating the future role of MEG in cognitive brain research, it is to be borne in mind that MEG and EEG are the only noninvasive methodologies that provide precise temporal information about the brain activation patterns in its interaction with the environment. Further, of these two methodologies, MEG locates sources considerably more accurately. Of course, this advantage of MEG over EEG only applies to the currents that are visible to MEG, i.e., to those that are not fully radial and not located very deep from the head surface. These limitations, however, should be seen as a strength rather than a weakness of the method, for they could enable one (a) to separately measure a single brain process rather than an amalgamate of multiple temporally overlapping processes which cannot be unequivocally disentangled on the basis of location or orientation, and (b) then, by using this process-specific information, to disambiguate ERP data recorded from the same experimental situation. Therefore, the combined use of the two methodologies is strongly recommended in research aiming at an accurate description of the spatio-temporal activation patterns underlying the brain's cognitive operations. The use of both MEG and EEG, anticipated also in the current



developments of the recording systems, will certainly not be made useless or redundant by further developments of EEG signal-analysis techniques which, because of inherent limitations of EEG methodology, cannot challenge the superiority of the combined use. On the contrary, important developments can be made in the field of signal analysis, especially in view of this combined use of the two methodologies, to make their combination especially powerful and an attractive tool of cognitive brain research, which cannot be replaced by any other methodology in the foreseeable future.[1]

The MEG signals could interfere with magnetic fields from external sources such as earth's magnetic field. To prevent this interference, laboratory settings providing effective attenuation and shielding from such induced electromagnetic interferences due to external sources are required.[2]

**METHODOLOGY:**

We took an online survey with the help of Google Form. The link of the form was circulated in social media platform. The questionnaires in the form were designed to test the proposed hypothesis and result.

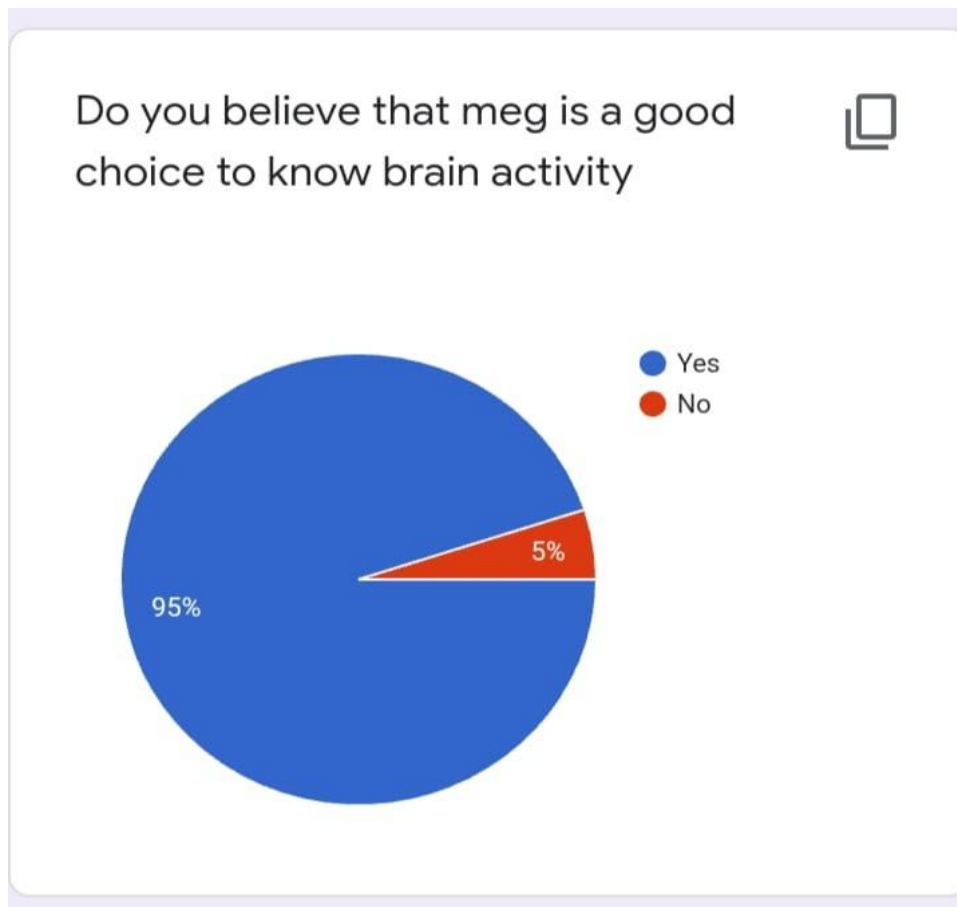
**HYPOTHESIS:**

- 1)MEG is secure and reliable for a patient.
- 2)MEG reads the magnetic field produced by neurons activity.

**A. Data collection:**

Total of 35 participants data was collected from different cities. All the 35 participants in which 58% are male and 42% are female. The research concludes that MEG is secure for patients. This is an online survey where 35 doctors are involved and they think that MEG is secure for patients as well as it firstly records the magnetic field and reads it and they think that MEG is a good product and we have a good future ahead for MEG.

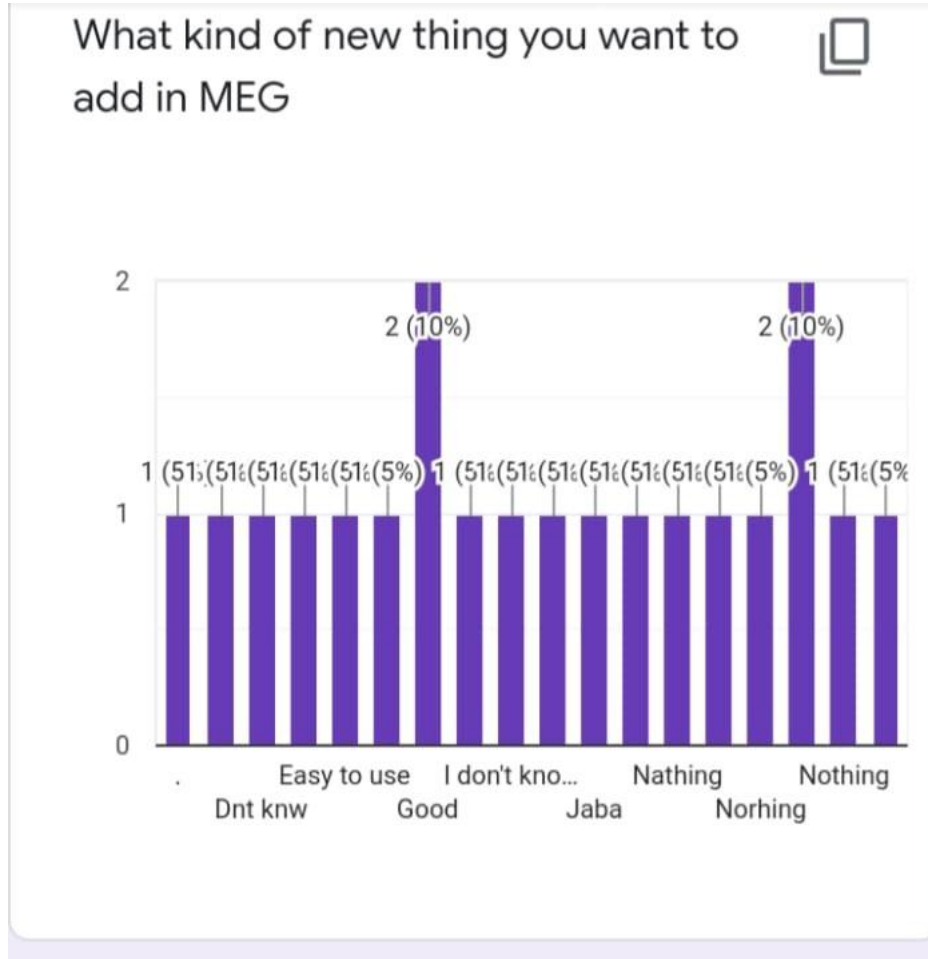
**III. EXPERIMENTAL RESULT**



Fig(a)

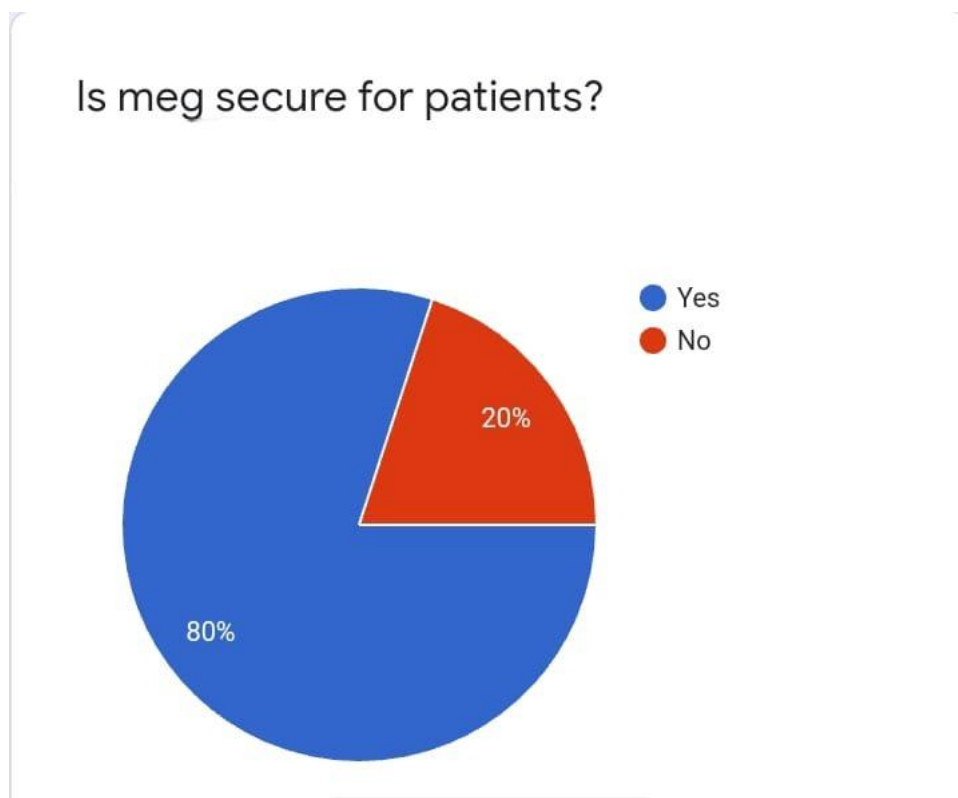


Above figure explains that 95% doctors are believed that meg as good choice to know about brain activity.



Fig(b)

In fig(b) many of people don't know to what new thing we should add in MEG but someone replies that in meg if we add punctuation marks then it will be easily understand.



Fig(C)

In above figure we can see that 80% people think meg as a secure for patient.

#### IV. CONCLUSION

We can say that MEG is a good choice as well as it is a good choice and secure . **Magnetoencephalography (MEG)** is a [functional neuroimaging](#) technique for mapping brain activity by recording [magnetic fields](#) produced by [electrical currents](#) occurring naturally in the [brain](#), using very sensitive [magnetometers](#). Arrays of [SQUIDs](#) (superconducting quantum interference devices) are currently the most common magnetometer, while the [SERF](#) (spin exchange relaxation-free) magnetometer is being investigated for future machines. Applications of MEG include basic research into perceptual and cognitive brain processes, localizing regions affected by pathology before surgical removal, determining the function of various parts of the brain, and [neurofeedback](#). This can be applied in a clinical setting to find locations of abnormalities as well as in an experimental setting to simply measure brain activity.

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