

Neurology and Therapeutics

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Magnetoencephalography (MEG) in neurology

Magnetoencephalography (MEG) is a state-of-the-art, completely non-invasive functional neuroimaging technique that measures the minute magnetic fields produced by electrical activity in the brain. The first MEG measurements, including abnormal waveforms in a patient with epilepsy, were performed in 1972. However, only in the past two decades, with the development of commercial whole-head systems, as well as related methodologies and procedures, MEG sufficiently matured to be used in routine clinical applications. Currently, whole-head MEG systems with high number of sensors (~300) are regularly used in clinical practice and basic neuroscience research with great success. MEG positively stands out among other neuroimaging and neurophysiology techniques by providing high spatiotemporal accuracy and resolution. At present, MEG is the only non-invasive functional neuroimaging technique to offer both, high spatial (2-5 mm) and temporal (<1 ms) resolution. Thus, its main advantage over EEG is the ability to accurately localize brain sources of neurophysiological signals. MEG's advantage over the more common neuroimaging techniques, such as fMRI and PET, is its high temporal resolution. As such, MEG has wide ranging applications in neurology. Currently, its primary application is in pre-surgical evaluation of patients with epilepsy, brain tumors and vascular malformations, where MEG is used to estimate the loci of epileptogenic zones, and localize the eloquent cortex. It is also used to identify the brain mechanisms and clinical biomarkers for various neurological and neuropsychiatric disorders. In this presentation, I will introduce the key applications of MEG in neurology, its potential, and the most recent advances and important findings.

Biography

Vahe Poghosyan received his MSc in Mathematics (1997) from Yerevan State University and PhD in Neurophysiology (2000) from National Academy of Sciences of Armenia. He held positions of Research Scientist in RIKEN Brain Science Institute in Japan (2000-2007), and Senior Scientist (2007-2016) and Director of Research Training Program (2011-2016) at AAI Scientific Cultural Services Ltd. in Cyprus. Currently, he is the Head of MEG Laboratory and Consultant Neuronavigation at King Fahad Medical City in Riyadh, KSA.

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