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Vahe Poghosyan

King Fahad Medical City, Saudi Arabia

Magnetoencephalography (MEG): A noninvasive alternative to invasive procedures

Invasive electrophysiological recordings and other invasive diagnostic procedures are routinely used in patients undergoing neurosurgeries, both intra- and extra-operatively. Invariably, these invasive approaches are associated with higher morbidity and their use should be minimized. While in certain cases invasive procedures are indispensable, the evidence suggests that in other cases, they may be substituted by non-invasive recordings. In this work, I will demonstrate that magnetoencephalography (MEG) can be used as a viable alternative and significant addition to a number of widely used invasive procedures. More specifically, it can be used to accurately localize the epileptic foci, potentially replacing intracranial electroencephalography (iEEG) in certain well-defined cases and significantly enhancing the clinic yield of iEEG in nearly all cases. MEG can be used to determine the hemispheric dominance for language, fully replacing the widely popular, but invasive Wada procedure. It can be used to effectively map the eloquent cortex of receptive and expressive language functions, visual, auditory and somatosensory functions, motor functions and central sulcus, potentially avoiding the need for invasive mapping of these brain areas.

MEG is the newest and most advanced method of functional neuroimaging and neurophysiology, which provides both high spatial (of the order of few millimeters) and excellent temporal (sub-milliseconds) resolution. MEG is non-invasive, painless and safe for all ages, with no injections, radioactivity or strong magnetic fields..

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, Dr. Poghosyan is the Head of MEG Laboratory and Consultant of Neuronavigation at King Fahad Medical City in Riyadh, KSA. He has published more than 20 research papers in the high-impact journals in the field of Neuroscience.

vpoghosyan@kfmc.med.sa

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