



## ARTICLE OF THE MONTH

### Transcranial Motor Evoked Potentials during Anesthesia with Desflurane Versus Propofol - A Prospective Randomized Trial

Malcharek MJ<sup>1</sup>, Loeffler S2, Schiefer D<sup>2</sup>, Manceur MA<sup>3</sup>, Sablotzki A<sup>2</sup>, Gille J<sup>2</sup>, Pilge S<sup>4</sup>, Schneider G<sup>4</sup>.  
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In this installment of the SNACC Article of the Month, we examine an article (and other associated literature) dealing with intraoperative neuromonitoring, specifically anesthetic effects on transcranial motor evoked potentials (TcMEPs). Whether TIVA (total intravenous anesthesia) is a requirement for evoked potentials, especially TcMEPs, as opposed to a volatile- based anesthetic, is a hotly debated topic. Many practitioners (many of them non-anesthesiologists) have claimed that volatile-based anesthesia is more-or-less contraindicated in monitoring cases, for fear that they degrade the signals to a significant degree and make monitoring impossible. Others claim significant successful experience with volatile anesthetics up to 0.5 minimum alveolar concentration, in combination with other anesthetics given intravenously. This month, we are pleased to have a true expert on this topic lend us his expertise. Tod Sloan, MD, PhD, MBA, is a well-known authority on the topic of anesthetic effects on intraoperative neuromonitoring, and a former President of SNACC. His commentary helps us understand not only the article for this month, but puts this whole issue into perspective in a very meaningful way. Please enjoy this month's commentary and give us your thoughts on the [SNACC LinkedIn Feed](#).

~John F. Bebawy, MD

### Commentary

Tod B. Sloan, MD, PhD, MBA  
*Professor of Anesthesiology*

Four recent publications have challenged the oft cited view that total intravenous anesthesia (TIVA) is necessary for adequate intraoperative monitoring of transcranial motor evoked potentials (MEP). The article by Malcharek et. al. in *Clinical Neurophysiology* (doi.org/10.1016/j.clinph.2014.11.025) demonstrated that MEP could be recorded during anesthesia with propofol and remifentanil infusions supplemented with 3% Desflurane (DES) in 14 patients undergoing carotid endarterectomy. The patients with DES had a smaller amplitude, but recording and monitoring was successful none-the-less. Holdefer et.al. similarly demonstrated adequate recording in 25 children (*Childs Nerv Syst.* 12:2103, 2014). An article by Chong et.al. in the *Journal of Neurosurgical Anesthesiology* (26:306, 2014) demonstrated that MEP could be recorded in 14 patients using 0.5-0.7 MAC DES. They had lower amplitudes (but no statistical decrease at 0.3 MAC). They also found that the lower extremity responses were affected more and that sevoflurane reduced the amplitude to a greater extent than DES.

These studies suggest that Desflurane at 0.3-0.5 MAC can be used as a component of propofol/opioid anesthesia in some patients when MEP is used for intraoperative monitoring. However, since the amplitude of the responses is reduced (especially in the lower extremity), the possibility exists that the MEP responses may not be recordable in some patients where the responses are initially small, such as from neurological abnormality or where the patients were more sensitive to the effect. This was seen in the third article by Sloan et.al. in the *Journal of Clinical Monitoring and Computing* (29:77, 2015). In this study, 48 patients without significant clinical neurological compromise, did have recordable MEP with 3% DES, but there were three patients that did not have recordable responses. Two of these had responses when the DES was discontinued and propofol/opioid TIVA used, however one did not have responses under TIVA.

These studies suggest MEP can be successfully be monitored in some patients with anesthesia where 3% Desflurane is used to supplement propofol and opioids. It is unknown which patients will not have MEP during 3% DES and if the use increases the false positive loss of signals or changes the sensitivity for warning of neurological compromise due to surgical maneuvers. A recent uncontrolled observational study by Tamkus et.al. (*The Spine Journal* 14:1440, 2014) suggests this needs further study.