

The LAFS (Los Angeles Anesthesia Friendliness Scale)

1	TIVA (Total intravenous anesthesia)	<p><u>Good recording conditions.</u></p> <ul style="list-style-type: none"> • Recommended when cortical SSEP's or myogenic transcranial MEP are to be monitored. • minimal interference with cortical SSEP. Typical response amplitudes: 2-4 μV.
2	≤ 0.5 MAC of any inhalational agent, either nitrous oxide or halogenated anesthetic	<p><u>Fair-to-Good recording conditions.</u></p> <ul style="list-style-type: none"> • Some effect on cortical responses, but still <u>relatively favorable recording conditions.</u> • Cortical SSEP and even transcranial MEP can usually be monitored. Response amplitudes often in the 1μV range.
3	1.0 MAC halogenated agent (without nitrous oxide)	<p><u>Fair-to-Poor recording conditions.</u></p> <ul style="list-style-type: none"> • Cortical SSEP amplitudes reduced by 50% or more. In the absence of neuropathy, radiculopathy, or myelopathy, SSEP's can usually be monitored, but reliability and promptness of monitoring feedback are significantly reduced. For effective monitoring, cortical SSEP amplitudes should be at least .5μV. • Transcranial Electrical Motor Evoked Potentials cannot be monitored at this and higher levels of inhaled anesthesia.
4	1.5 MAC	<p><u>Poor recording conditions.</u></p> <ul style="list-style-type: none"> • Mixed nerve SSEP's can sometimes be monitored in the absence of pathology; • Single nerve root ("dermatomal") SSEP's cannot be monitored; • Reliability and promptness of feedback greatly reduced.
5	> 1.5 MAC	<u>No cortical SSEP's can be recorded.</u>
<p><u>NITROUS OXIDE is not recommended for use in combination with halogenated agents, when TCeMEP or cortical SSEP's are to be monitored,</u> due to its unpredictable additive and synergistic effects with potent gases.</p>		

Copyright 2001, 2004 Jerry Larson, D. ABNM. (jerry@neuromon.com, www.neuromon.com). May be distributed if no fee is charged and this copyright notice is included. The most current version of this guideline can be found at www.neuromon.com/neuro/lafs.html.

Modified 5/17/04

Comments:

- 1) **Compatibility of a given anesthetic protocol with SSEP or MEP monitoring is not all-or-nothing; it is a continuum**, and depends on other factors, particularly the signal-to-noise ratio (SNR). The same anesthetic protocol may not work with all patients. When noise is reduced to the minimum, the only way to improve SNR is to maximize the response, principally by using optimum anesthesia. When the responses are robust and stable, higher anesthetic levels may be tolerable; when they are low in amplitude, a more favorable anesthetic regime may be required.
- 2) **For practical purposes, ALL intravenous agents have negligible effect on cortical SSEP's**, except for etomidate and ketamine, which can actually increase amplitude. Propofol, in concentrations sufficient to induce a burst/suppression EEG pattern, will abolish later cortical responses, but not the primary cortical responses (N20/P22 for median nerve, P40/N45 for tibial nerve), which are used for monitoring. Propofol, in very high dosage, can also affect TCeMEP, but MEP can usually be recorded with concentrations of propofol sufficient to induce EEG burst/suppression.
- 3) **Subcortical responses are essentially unaffected by anesthesia.** For auditory brainstem response monitoring, or in a spine case where subcortical responses are sufficiently robust that cortical responses are not needed, higher levels of inhaled anesthetics can be used. EMG is essentially unaffected by anesthesia, but TCeMEP is even more sensitive to anesthesia than SSEP.
- 4) **Muscle relaxants do not affect SSEP's**; in fact, SSEP recordings can be more easily obtained with muscle relaxants, which suppress EMG activity. However, when EMG or myogenic MEP are to be recorded, muscle relaxants are contraindicated.
- 5) **Changes in levels of inhalant anesthetics, temperature, and blood pressure levels affect interpretations of cortical SSEP's.** Nitrous oxide effects amplitude; halogenated anesthetics affect both amplitude and latency. Whenever the concentrations of gases are altered, or one agent is replaced by another, small changes in latency and amplitude occur, and the neurophysiologist has to determine whether the change was caused by surgical maneuvers or anesthesia. **Consequently, levels of blood pressure, temperature, and inhaled anesthetics should be kept constant as much as possible.** Pain relievers can often be used to avoid the necessity of increasing anesthetics during more painful parts of the procedure.
- 6) **Surgical injuries never, or almost never, affect SSEP latency alone.** There is always a change in amplitude, and sometimes a change in latency as well; hence, latency is not useful for interpreting intraoperative changes. Also, anesthetic effects on amplitude can make monitoring difficult or impossible, whereas latency effects do not interfere with monitoring.
- 7) **With myogenic MEP recordings, amplitude is no longer the issue;** MEP amplitudes are much greater than those of SSEP, in the millivolt range as compared to the microvolt range. With MEP, the issue is response threshold, and presence or absence of the response. High anesthetic concentrations tend to increase the required stimulus level or completely abolish the response.