

Inhalation Anesthesia: EEG Monitoring for Individually Adapted Dosing

In clinical practice, inhalation anesthetics are often dosed based on concentrations in the ventilation air. However, individual requirements can be determined using an EEG (electroencephalogram).

Current literature suggests that dosing inhalation anesthetics based on end-tidal concentrations or the MAC (minimum alveolar concentration) value may result in over- or underdosing.

Variability of Hypnosis Depth with Inhalation Anesthesia

A study analyzed EEGs and the relevant MAC values from anesthetic courses where the anesthesia was guided by clinical appraisal and MAC and/or end-tidal concentration.

The inhalation anesthetic used was sevoflurane. The EEG was registered with Narcotrend-Compact M, in a blinded manner. The depth of hypnosis can be determined based on the waves representing the EEG.

It was seen that MAC values were associated with a broad dispersion of EEG index values (NI, Narcotrend Index). In the steady state, there were very flat, but also very deep anesthetic courses. The tendency towards very deep anesthetic courses in the overdosing range, characterized by burst-suppression EEG, increased with increasing age.

EEG monitoring of the inhalation anesthesia allows avoiding very flat hypnosis stages with an increased probability for awareness and too deep hypnosis stages in the overdosing range. MAC values and recommendations for end-tidal concentrations can be used as a general benchmark for dosing inhalation anesthetics, but they do not reflect individual dose requirements.

Using EEG for Sedation Monitoring

An important application for EEG monitoring of intensive-care patients is



Narcotrend-Compact M. Course of stages during anesthesia

Photo: Narcotrend

assessing the depth of sedation. Inhalation anesthetics are also used in intensive-care patients, partly in combination with intravenous hypnotics. In particular when combinations of various substances are administered, the EEG helps assess the cerebral effects and avoid too deep and too flat sedation stages.

A current study in which intensive-care patients received desflurane, isoflurane or sevoflurane at constant doses in line with age-adjusted MAC revealed a strong negative correlation between sedation time and Narcotrend Index. Over the 24-hour observation period, the depth of sedation increased markedly according to the EEG.

In intensive-care patients, the EEG can also be used to assess the cerebral effects of inhalation anesthetics. In addition, there are further indications. Detecting epileptiform activity is particularly important.

EEG Monitoring Using Narcotrend-Compact M

For intraoperative EEG monitoring, the OR version of the Narcotrend-Compact M can be used.

The illustration shows the course of an EEG over the stages.

For EEG monitoring of intensive-care

patients, the EEG monitor Narcotrend-Compact M is available in a special ICU Version that is adapted to the particular artifact situation in an ICU setting.

Either 1 or 2 EEG channels can be recorded, and the electrodes can be flexibly positioned. The EEG signal is automatically interpreted; the recognition of epileptiform EEG activity is supported by use of the parameter STI (Sharp Transient Intensity). What sets both versions of the Narcotrend-Compact M apart is that they perform EEG assessments adjusted for age, from newborns to old age.

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