

APPLICATION OF CEREBRAL STATE INDEX AND BISPECTRAL INDEX DURING THE MEASUREMENT OF THE ELECTROENCEPHALOGRAPHIC EFFECT OF ANESTHETIC AGENTS

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ABSTRACT

Assessment of depth of anesthesia is still one of the major, and largely unsolved, concerns in the anesthesiologist's clinical practice. Hypnosis is the pharmacodynamic target of anesthetic drugs and, thus, the introduction of devices able to directly measure the activity of the brain has undoubtedly improved the ability to assess the degree of sedation and to detect and, hopefully, avoid undesired states of awareness.

Electroencephalography has, thus, become the foundation of a long array of techniques, developed to give to anaesthesiologist a quick and easy way to assess Central Nervous System functions. The output of these devices is, usually, a numeric index that is derived from raw EEG recordings by means of an algorithm and gives an estimate of cortical neuron activity, which in turn should, theoretically, correlate with the level of consciousness.

Nowadays the most widely used method to assess cortical brain activity during anesthesia is the Bispectral Index (BIS[®]). This index stems from the analysis of EEG signals recorded by electrodes which mainly sample the activity of the frontal lobes of the patient. These signals are then processed by an algorithm that incorporates similar recordings taken from more than 5000 patients undergoing different anesthetic techniques.

A more recent device to monitor the level of consciousness during anaesthesia is the Cerebral State Monitor (CSM[®]). Similar to BIS[®] and with the same clinical meaning, it generates a numeric value, the Cerebral State Index (CSI), ranging from 0 to 100. The CSI derives from the analysis of four EEG sub-parameters incorporated in a signal analysis procedure that follows "fuzzy logic" rules and gives a different relevance to each sub-parameter depending on clinical and electroencephalographic context.

The aim of this lecture is to discuss and compare the performances of BIS and CSM in different clinical settings, such as propofol- induced anaesthesia and balanced general anaesthesia.