The EEG Compressed Spectral Array provides an easy way of monitoring the brain activity of your patient, giving you an important indicator of your patient's condition.

A patient's EEG varies with alterations in the metabolism and function (hypnotic state, presence of pain, dosage of sedative agents, etc.) of their brain. Monitoring EEG gives you an additional source of information to help identify changes in your patient's status, and to monitor the dosage of hypnotic drugs.

A conventional EEG enables the user to derive 16 or 32 EEG channels, but requires the exact placement of 21 electrodes, and a significant amount of training and expertise to interpret the information. However, for a general estimate of the patient's brain activity, to indicate the status of the patient's brain, only 5 electrodes are necessary, in a simple and symmetrical placement, and the user needs only basic skills in EEG interpretation. Even hemispheric localization of pathological EEG patterns can be recognized.

Such an approach turns EEG into a measurement that is easier to use for assessing coma, the level of sedation, status epilepticus, global ischemia, global seizures or the effects of drugs.

While it is important for the non-specialist clinical user to have the raw data available to control the quality of the signal, and to indicate typical patterns such as coma or generalized seizures, a convenient graphical presentation improves the ease of use and helps the interpretation of cerebral activity.

Philips' EEG module provides a trend of frequency and amplitude over time for both hemispheres to give you an easy-to-use EEG for daily practice and continuous application.

General Applications

The two channel EEG monitoring solution supplied by Philips can be useful for indicating overall brain function and brain oxygen supply in the OR or ICU.
**EEG Monitoring in the OR**

The integrated Philips EEG solution can be used in the OR during surgical procedures where the cerebral circulation is at risk, such as carotid endarterectomy or cardio-thoracic procedures with extra-corporeal circulation.

(Please note, that although this kind of simplified EEG can distinguish different sleep patterns, it cannot be used to evaluate the quality or level of the hypnotic state.)

**EEG Monitoring in the ICU and NICU**

In the ICU, Philips’ EEG monitoring solution can be used to monitor patients with neurological deficits (brain trauma or subdural hemorrhage) as well as during deep sedation with barbiturates, for the treatment of epileptic seizures or elevated intracranial pressure.

The EEG is also particularly useful in the NICU for detecting seizures - particularly silent seizures where the baby does not exhibit movement.

**The CSA**

To create a CSA the raw signal is sampled over a period of time, giving a snapshot of the amplitude of the power across the range of frequencies.

By arranging these ‘snapshots’ behind each other (according to selectable time intervals) the changes in the EEG power spectrum over time become visible.

The newest spectrum is shown at the bottom, and the previously obtained spectra are pushed progressively further to the back.

Numeric values are also available to support your interpretation. The more important numerics are Total Power and Spectral Edge Frequency. Other numerics include the percentages of the power in the delta, theta, alpha and beta frequency range and the frequencies of the Spectral Edge Power, Dominant Power and Peak Power.

The CSA and all chosen numerics are provided for each channel. The CSA for the left and right hemispheres are presented simultaneously, so that you can compare the symmetry and the overall level of activity for both hemispheres.

Because the EEG is unique for each patient, the important information is the change in the spectrum and the power, over time. Therefore CSA and the numerics cannot be used as an accurate, absolute measure of the brain’s status and activity.

The CSA is not an alternative to the traditional EEG, which provides detailed information about localised pathological electrical brain activity at a specific point in time. Instead, the CSA provides long-term, continuous, global feedback to help you guide your therapy for the brain conditions you encounter.
Practical Examples

Some examples\(^1\) should give you an idea of how Philips EEG monitoring can be used in practice.

**Carotid Endarterectomy**

Monitoring EEG during a carotid endarterectomy can help you prevent insufficient brain perfusion.

During a carotid endarterectomy the blood flow to one side of the brain may be reduced. A significant reduction will cause a drop in power and frequency on the respective hemisphere of the brain.

\(^1\) Depending on the configuration of your monitor, your screen might differ from the example shown.

When monitoring EEG, you should first check the raw EEG traces and if you are satisfied with the quality of the raw signal and electrode impedance you would note the normal spectral array for the patient.

As the operation progresses you should notice the decrease in signal strength and the shift to lower frequencies on both sides of the brain, with the stronger reaction in the hemisphere corresponding to the endarterectomy.

The monitor can also show you the spectral edge frequency on the CSA - which helps you track the frequency shift. In addition, the numerics for Total Power give you an indication of the overall signal strength for each hemisphere.

In the example shown the right carotid is clamped, and the right side of the brain exhibits a greater reduction in frequency and power.
**Barbiturate Titration**

Monitoring EEG lets you confirm the correct dosage when treating epileptic patients or patients with elevated intracranial pressure.

When administering barbiturates the activity in the brain becomes generally depressed with short, irregular bursts of activity. In this case the Spectral Edge Frequency on the trend helps you check for the bursts of activity and can also show you any crescendos in activity so you can react before seizures begin.

This CSA demonstrates a typical burst suppression pattern, with activity decreasing in both hemispheres.
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