

## Sensitivity of 98% in automatic seizure detection of neonatal amplitude-integrated EEG

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## Sensitivity of 98% in Automatic Seizure Detection of Neonatal Amplitude-Integrated Eeg.: 225

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### Background:

From clinical point of view it is important to detect all seizure activity in neonates. The cerebral function monitor (CFM) processes the electro encephalogram (EEG) into an amplitude-integrated EEG (aEEG) signal that is relatively easy to read and interpret compared to the classical EEG. So far seizures were defined based on the visual interpretation of a typical pattern.

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### Objective:

The objective of this study is to create a program for automatic detection of seizures in neonatal aEEG signals, based on a quantitative analysis. Seizures of a length of more than 60 seconds are included.

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### Method:

Since high cerebral activity corresponds with high amplitude in the aEEG signal, the program detects rises in amplitude

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of the lower margin, compared to the background signal. The lower margin is defined as a threshold value, where 95% of the aEEG samples are above this threshold. If this lower margin for a segment is significantly higher than the mean lower margin of the 6 minutes prior to the segment, and if this difference in height continues for at least 60 seconds, this pattern is marked as a seizure. Muscle artefacts are detected based on the frequency content of the EEG signal. Other artefacts are detected using the amplitudes of aEEG, EEG and impedance of the electrodes. Three signals were used to train the program.

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## Results:

Three CFM recordings of 9 hours from full-term newborns with different background patterns were used to evaluate the program. The signals were annotated by an expert in neonatal neurophysiology, who found in total 95 seizures. The program detected 101 patterns as seizures, with a sensitivity of 98% (93 true positives) and a positive predictive value of 92% (8 false positives).

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## Conclusion:

This study indicates that it is possible to automatically detect seizures of more than 60 seconds, using CFM recordings.

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