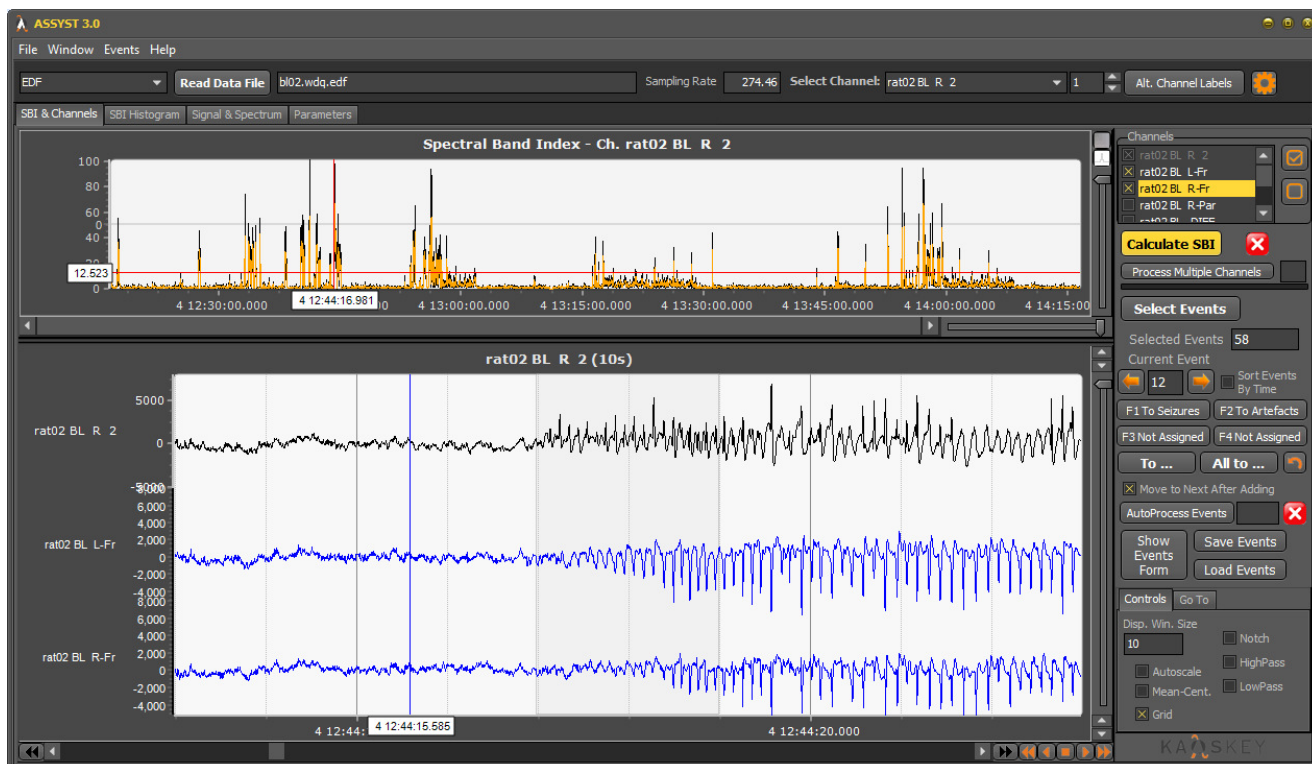


Rodent Seizure Detection Software

for reliable and time-saving seizure detection in rat and mouse models of genetic and acquired epilepsies in preclinical research



FEATURES & BENEFITS

- ~20 mins to process & classify >7 days continuous multi-channel EEG data
- Single or multiple EEG channels processed
- Finds seizures and other epileptiform events (eg: spikes, SWD, HFO)
- Powerful tools for fast user review / classification of identified events
- Validated in many rat and mouse models
- >99% sensitivity

ASSYST is a novel and versatile interactive application aimed to automate the process of **identification of seizures** and/or other epileptiform events (SWD, spikes, HFO) in **rodent EEG** recordings, in off-line operation mode.

ASSYST **saves 90-98% of time** to review pre-clinical EEG compared to manual video-EEG seizure screening.

ASSYST has been validated in many spontaneously seizing, chronic epilepsy rat and mouse models. Long-term recordings from > 200 rats and mice contained ~ 19 500 seizures. All events were successfully identified in a blind analysis with ASSYST.

ASSYST was developed and validated in partnership with the neurosciences group at Monash University, Melbourne, headed by Prof. Terence O'Brien - the President of the Epilepsy Society of Australia and one of the world's leading scientists in the field of epilepsy and translational research.

The validation results were published in *Epilepsia* in 2019⁽¹⁾

ASSYST was launched in 2018 and is now globally used by major research groups. Results of studies that used the ASSYST application are already published in two papers.

Features & Benefits

- The ASSYST is able to read, display, process the rodent EEG recordings, and save the processed results (the times of identified seizures and/or other events).
- ASSYST needs only a single EEG channel for seizure detection.
- ASSYST can process multiple channels of recorded EEG data at once.
- ASSYST not only finds the seizures or other epileptiform activity, but also allows the user to classify the identified epileptiform events into different user-defined categories (e.g., short or long seizures, spike-wave discharges (SWD), interictal spikes, etc.). The classified events can be saved into a text or Excel file.
- ASSYST may be used not only for seizure, SWD or other epileptiform activity detection, but also for detection of various oscillations, including high-frequency oscillations (HFO).
- ASSYST typically takes 20 minutes to process and classify >7 days of continuous multi-channel rodent EEG recordings.
- ASSYST has been validated in many rat and mouse models with >99% sensitivity.
- ASSYST is interactive: the user can intervene and make adjustments at different stages of processing to achieve the desired results.
- ASSYST is powered with an algorithm for fully automatic identification of events with regular repetitive structure, such as SWDs.
- ASSYST provides unparalleled flexibility in processing depending on particular data and user needs, from automatic with minimum influence from user to a semi-automated inspection of every event, large or small.
- ASSYST allows easy control and adjustment of the parameters: it has several preset parameter sets for detection of different types of epileptiform activity (e.g., seizures or SWDs) in different rodent models of epilepsy. For every client we can prepare specific customized parameter sets depending on animal model used and types of events to be detected.

The ASSYST Method

- The ASSYST algorithm uses an advanced time-frequency analysis technique to reveal the EEG segments with excessive activity in a certain frequency band.

- We have found that electrographic seizures and SWDs in rats and mice contain specific frequency component that is not present in the normal, interictal EEG. This finding formed the basis of our method for identifying epileptiform activity in the EEG. Powered by our advanced algorithm for precise calculation of short-term Fourier transform with high frequency resolution, effective and reliable performance of the software is ensured.

ASSYST Performance Validation

MODEL	No of Animals	No of Seizures	
		Annotated	Detected
Rat models (4 different models)	183	10590	10600
Mouse models (5 different models)	33	8871	8871
Total (rats and mice)	216	19461	19471

Kaoskey

Kaoskey's core expertise is in the development and application of digital processing methods for nonlinear signal and systems analysis of non-stationary biomedical signals produced by the chaotic dynamics of the underlying sources. This allows higher resolution signal analysis in both time and frequency domains, opening up new insights into the signal's content. Kaoskey's first commercial application of this expertise is for automated seizure detection in archived vEEG data, starting with rodents – our new ASSYST product.

Kaoskey is based in Sydney, Australia.

References

⁽¹⁾ Casillas-Espinosa PM, Sargsyan A, Melkonian D, O'Brien TJ. A universal automated tool for reliable detection of seizures in rodent models of acquired and genetic epilepsy. *Epilepsia*. 2019 Apr;60(4):783-791. doi: 10.1111/epi.14691.

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