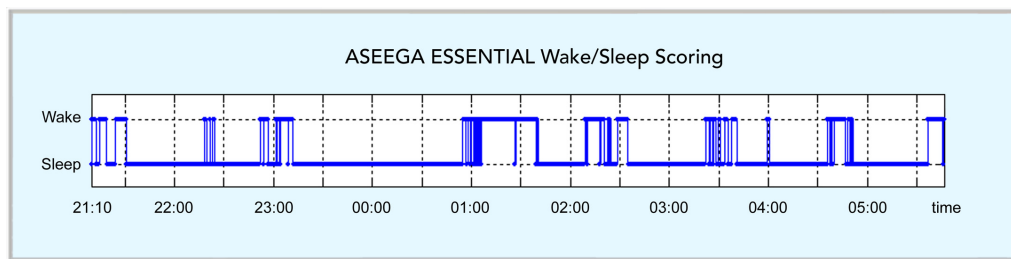


# Aseega Essential

*Sleep Diagnostic-Aid Software*



*Awake or asleep?*

- Wake/sleep scoring
- Fast scoring aid

Clinically validated

Highly reliable

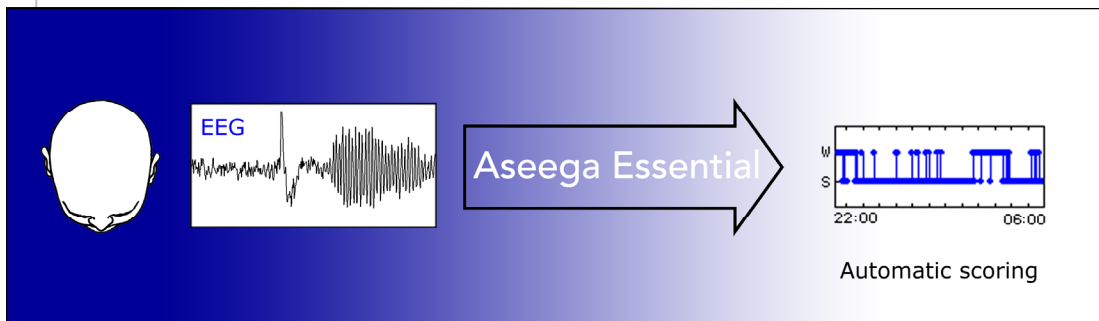
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*Physiological Signal Processing Research*

# Overview

- Reduces scorer workload
- Enhances apnea-hypopnea index (AHI)



Unsupervised wake/sleep scoring ●

Fast scoring-aid tool ●

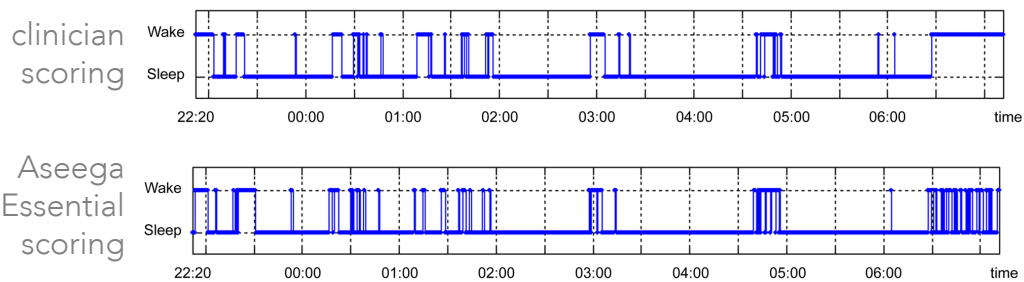
Based on 35 years of research ●

# Applications

- Sleep polygraphy studies with EEG add-on
- In-lab screening for sleep disordered breathing
- Telemedicine
- Obstructive Sleep Apnea (OSA) screening for transport industry

# Aseega technology

- EEG signal from a single EEG lead conveys sufficient information for automatic wake/sleep scoring, without EOG and EMG information
- ASEEGA autoadaptive algorithm combines multiple advanced signal processing technologies based on time-scale analysis and fuzzy logic



## Sleep studies

- **Aseega now used in sleep research**  
[Science 2009 Apr 24; 324 \(5926\):516-9](#)  
 Part of this neuroscience study involved sleep scoring. Aseega, used as a fully automated scoring tool, enabled the exclusion of a bias resulting from possible visual scoring subjectivity
- **Clinical validation on healthy subjects**  
 Berthomier et al. *Automatic Analysis of Single-Channel Sleep EEG: Validation in Healthy Individuals.* **Sleep 2007;30(11):1587-95**  

Scoring agreements	Wake / Sleep	: 96 %
	Wake / REM / NREM	: 92 %
	W / R / N1 / N2 / N3	: 83 %
- **Clinical validation on patients**  

Scoring agreements	Wake / Sleep	> 94 %
	Wake / REM / NREM	> 88 %

**Journal of Sleep Research 2006;15(Suppl 1):P295**
- **Studies on large volunteer cohort and on patients *in situ* underway**

# History

Aseega Technology is an extension of the work initiated by Odile Benoit and Jacques Prado (Le Roux 86, Bouard 86), who proposed a semi-automatic approach for the analysis of all-night sleep, based on a single EEG channel. At that time, this signal was recorded using a research prototype.

This semi-automatic method was routinely applied for 12 years by Benoit et al. to more than 500 recordings, including hypnotic pharmacological trials (Benoit 94, Daurat 97). Their work successfully demonstrated that scoring sleep from a single EEG channel is possible, although challenging.

This single channel method was used as a starting point for Christian Berthomier's PhD thesis in signal processing. His work, supervised by J. Prado in collaboration with Dr. O. Benoit, formed the basis of an automatic method to process sleep EEG recorded under laboratory conditions (Berthomier 99).

Since 2001, the research and development work carried out by the Physip Company, directed by C. Berthomier, has led to Aseega Technology. Aseega provides a fully automatic analysis of the EEG signal delivered by recording devices routinely used in sleep centers. The clinical validation of Aseega was successfully performed on 15 healthy subjects in 2005 and on 15 patients in 2006 (Berthomier 06, 07). The latest developments achieved real time scoring (Berthomier 08).

Aseega is now being used in sleep linked research domains (Schmidt 09, Van Beers 09).

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