Sleep Analysis Software for Animal Sleep Research

a report by
Kissei America

Introduction

The number of people who are suffering from sleep disorders in modern society is much larger than one might expect, and the number of people who suffer from sleep disorders such as sleep apnoea syndrome (SAS) is increasing year by year. However, since the reasons for this increase and the brain's functions in sleeping and waking are still unsolved, various research and experiments with rats and mice are being done.

Since animals, unlike humans, do not have a fixed time for sleep, it tends to take more than 24 hours to record the data. Biological signals of 24 hours, can reach up to 2,880 pages on a recording sheet (30 seconds per page). In experiments, multiple animals are always needed for data collection to minimise differences in individual animals, and the mean value for those data needs to be calculated. Thus, an extremely large amount of time is required to deal with the data.

Kissei America have developed SleepSign® for animal software with the goal of improving the quality of sleep research based on the strong conviction that, through simplification of the work process, processing time could be reduced, burdens on researchers lessened and opportunities to approach newly devised research could be maximised – all contributing greatly to research on sleep in animals.

Data Acquisition

SleepSign® has a data acquisition function. When this function is activated, one can keep continuous analogue signals of about a week from the amplifier as a file in the computer.

Since up to 32 channels can be used for filing, one can input various signals such as blood pressure, brain temperature and electrocardiogram (ECG), in addition to electroencephalogram (EEG) and electromyogram (EMG). It is also possible to make files for a multiple number of animals at one time.

The data acquisition function of SleepSign® does not depend on hardware such as an amplifier since A/D boards already on the market are used. What's more, this function can be enjoyed with a fairly inexpensive investment without change to the hardware already in use because it is possible to input signals that are output within ±5V as analogue signals.

Data Analysis

SleepSign for Animal drastically reduces the time and labour spent on stage scoring with its auto-scoring function and many other useful functions to assist manual scoring. SleepSign for Animal scores sleep stages automatically based on EEG and EMG signal recognising particular waveform such as delta, theta and spindle wave. The criterion of auto-scoring is quite configurable so that it satisfies each scorer's own visual scoring criteria.

In addition, SleepSign for Animal enables one to generate various types of reports that are required as standard in the basic sleep research field with a few key strokes. Those reports generated with SleepSign for Animal reflect sleep quantity and sleep quality showing the total duration of each sleep stage or various EEG frequency spectrum parameter. These report functions enable one to grasp transition of sleep quality and sleep quantity very easily.

Conclusion

With all these unique and powerful features, one can carry out effective sleep research, which previously required a great amount of time. This leads to efficiency of total research time, not only through minimising scoring time by using auto scoring of sleep stages, but by performing various kinds of analysis that researchers commonly calculate as a result of their research. ■