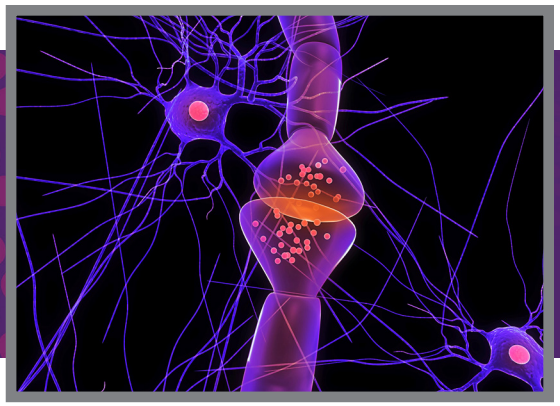
SLEEP DEPRIVATION



Pinnacle's **AUTOMATED SLEEP DEPRIVATION SYSTEM** offers a unique solution for sleep deprivation and sleep fragmentation studies. This "gentle handling" system is capable of sleep depriving mice and rats without direct human intervention while minimizing exercise. The system is sold as a **CORE SYSTEM** or can be upgraded to include Pinnacle's Sirenia® **FEEDBACK PRO SOFTWARE** and **EEG HARDWARE.** Adding Feedback Pro allows real-time EEG/EMG signals to be used to determine sleep/wake state and initiate deprivation as required.

SLEEP DEPRIVATION SYSTEM

SYSTEM FEATURES	CORE SYSTEM	+ FEEDBACK
Available for both mice and rats	✓	✓
Adjustable speed and motor control	✓	✓
Calendar-based scheduling	✓	✓
Suitable for short-term, long-term and chronic studies	✓	✓
Optional video recording	✓	✓
Real-time biopotential analysis and feedback		✓
Rule-based programming		✓
Yoked control functionality		✓
Requires Pinnacle's EEG/EMG system		✓
Compatible with third-party systems	✓	

COMMON USES

- AUTOMATED DEPRIVATION
- SLEEP FRAGMENTATION
- SIMULATED SHIFT WORK
- JETLAG PARADIGMS

ADVANTAGES

Simulates gentle handling

Limits unnecessary exercise

Minimizes resources compared to manual deprivation

Prevents sleep acclimation and habituation

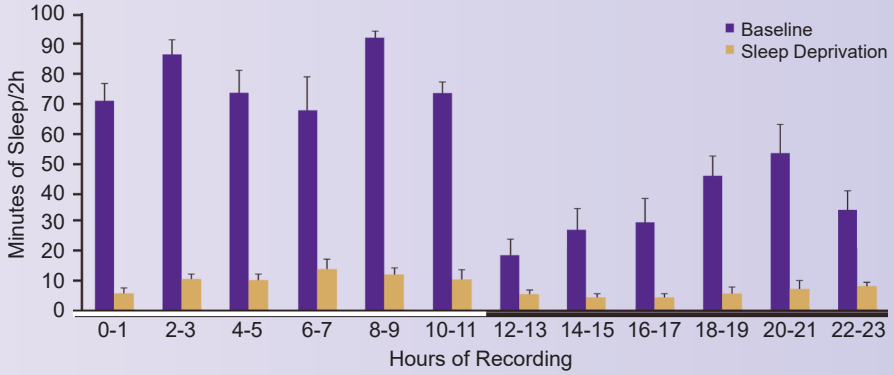
Accommodates water, food and bedding

Provides flexible scheduling controls

Saves schedules for future use

Integrates with synchronized video system

EFFECTIVENESS OF SLEEP DEPRIVATION IN MICE



The chart above shows a comparison of baseline sleep (purple bars) with a 24-hour sleep deprivation period (gold bars). Six mice (male, C57BL/6J) were maintained on a 12-hour lights-on (horizontal white line)/12-hour lights-off (horizontal black line) schedule. EEG and EMG activity were recorded for 24 hours (baseline). During the following 24 hours, each animal was sleep deprived by programming the system to rotate the bar within ten seconds of the mouse entering a sleep-like state, as determined by active EEG feedback. Vertical bars represent sleep time in 2-hour bins.

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SLEEP DEPRIVATION OPTIONS

HOW IT WORKS

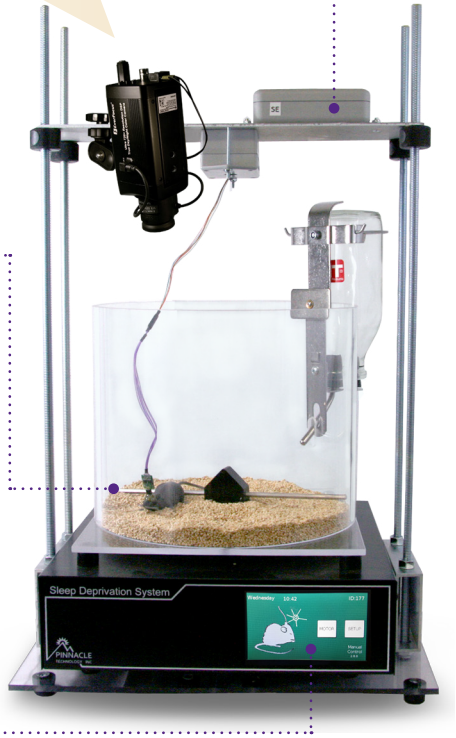
PINNACLE'S SLEEP DEPRIVATION SYSTEM is designed to gently restrict sleep without unnecessary exercise. This is achieved by a rotating bar placed a short distance above the cage floor, lightly nudging the animal from sleep and encouraging low levels of activity until the animal maintains wakefulness on its own. The speed, direction and duration of bar rotation are fully customizable.

OPTIONAL VIDEO SYSTEM

Integrated video recording provides a platform for synchronizing EEG and EMG changes with observable behavioral states. Captured video is displayed on screen and is synchronized with other recorded data in playback mode.

INTEGRATES WITH PINNACLE'S EEG/EMG SYSTEMS

A VARIETY OF CAGE SIZES ARE AVAILABLE



ROTATING BAR

The bar rotates at speeds between five and fifteen RPM and can be programmed to change directions to reduce acclimatization to the sleep deprivation environment.

MULTIPLE CONTROLS

The system can be controlled by a computer or by the programmable interface on the front panel of the device.

YOKED CONTROL

Add additional units to perform yoked control sleep studies. All units can be programmed to operate simultaneously under one schedule or set of rules. Sirenia® Feedback Pro is required for yoked control.

OPTION 1: CORE SYSTEM

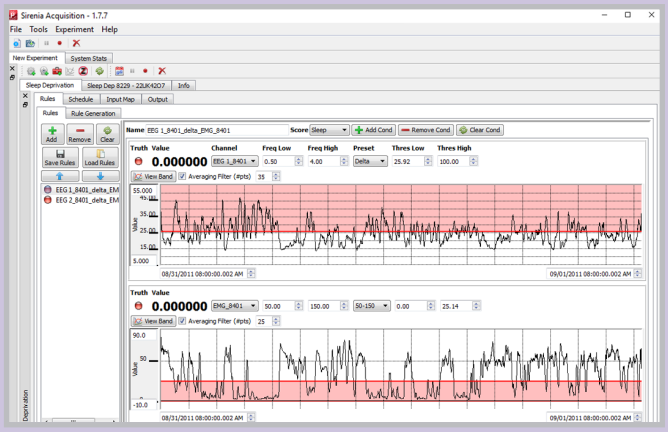
When using the core system, the bar is programmed to rotate at discrete intervals, ranging from a second-by-second basis to hourly, daily, weekly, or monthly intervals. The bar will randomly reverse direction to minimize acclimation. Programming using the LCD controls on the device eliminates the need for a computer connection. The system is compatible with most EEG/EMG hardware and physiological measurement systems.

OPTION 2: CORE SYSTEM + FEEDBACK

Adding Sirenia® Feedback Pro software enables real-time EEG/EMG monitoring, ensuring the bar rotates only when the animal enters a sleep-like state. Bar rotation starts and stops automatically based on user-established rule sets for the animal's sleep state, and users can easily incorporate delays, shifts in bar rotation and time restrictions into the experimental setup.

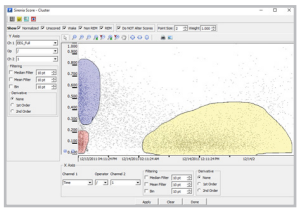
RULE-BASED PROGRAMMING

Sirenia® Feedback Pro uses EEG and EMG data to establish thresholds, or rule sets, for the animal's sleep patterns. Rule criteria can be easily adjusted by the researcher to target specific sleep behaviors.



OPTIONAL ANALYSIS SOFTWARE

Pinnacle's Sirenia® Sleep Pro software allows users to reduce scoring and analysis time by automating the process with tools such as cluster scoring, threshold scoring, hypnograms and spectral plots. The software's analysis features allow users to quickly compare scores, perform bout and sleep analyses, and customize high-quality charts and graphs.



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