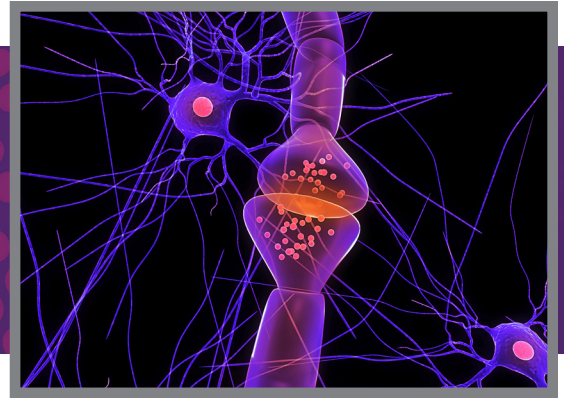




SLEEP DEPRIVATION



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. Operating at 3dB or less, its low-noise motor minimizes external stressors. 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 analysis to assess 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	✓	✓
Compatible with third-party systems	✓	
Real-time biopotential analysis and feedback		✓
Rule-based programming		✓
Yoked control functionality		✓
Requires Pinnacle's EEG/EMG system		✓

COMMON USES



AUTOMATED DEPRIVATION



SLEEP FRAGMENTATION



SIMULATED SHIFT WORK



JET LAG PARADIGMS

ADVANTAGES

Simulates gentle handling

Limits unnecessary exercise

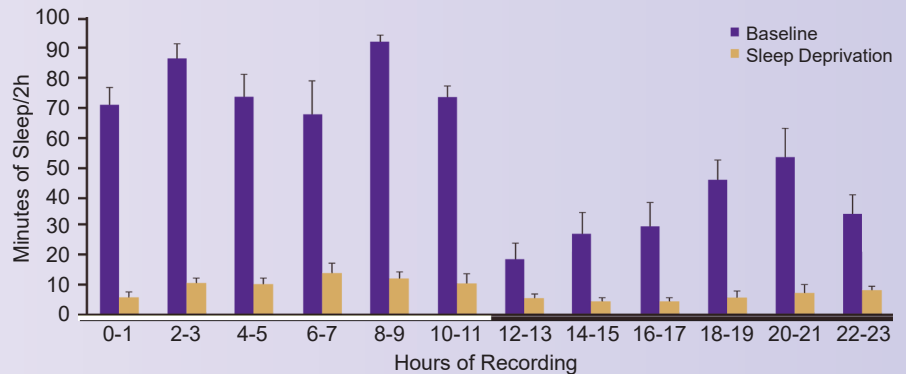
Minimizes resources compared to manual deprivation

Reduces unnecessary exercise

Low-noise motor operation at 3dB or less

Flexible, user-defined, and savable schedules

EFFECTIVENESS OF SLEEP DEPRIVATION ON 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.

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.

A VARIETY OF CAGE SIZES AVAILABLE

INTEGRATES WITH PINNACLE'S EEG/EMG SYSTEMS

ROTATING BAR
The bar rotates at 1-12 RPM and can change directions to minimize acclimation.

MULTIPLE CONTROLS
The system is controllable via computer or front panel interface.

OPTIONAL VIDEO SYSTEM

Integrated video synchronized with EEG, EMG, and observable behavioral. Video is displayed and synced with data in playback mode.



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

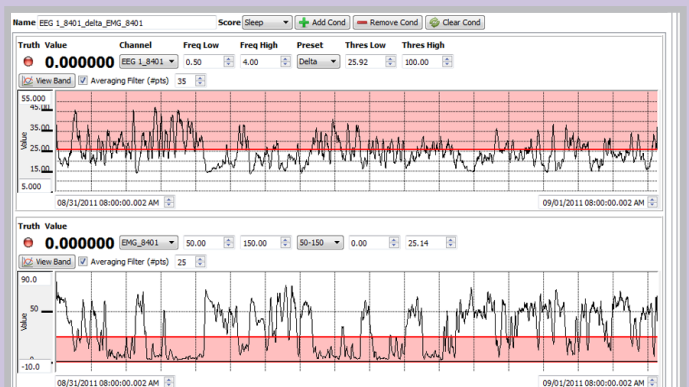
When using the core system, the bar can be programmed to rotate at intervals ranging from seconds to hours, days, weeks, or months. It randomly reverses direction to reduce acclimation. Control the system through the LCD interface or use a computer for more advanced options. The system is compatible with most EEG/EMG and physiological measurement hardware.

OPTION 2: CORE SYSTEM + FEEDBACK

Sirenia® Feedback Pro software adds real-time EEG/EMG feedback to ensure the bar rotates only when the animal enters a sleep-like state. Bar rotation starts and stops automatically based on user-defined rules, and users can easily incorporate delays, rotation shifts, and time restrictions into the experimental setup. Sirenia® Feedback Pro is compatible only with Pinnacle system hardware.

RULE-BASED PROGRAMMING

Sirenia® Feedback Pro uses EEG and EMG data to set thresholds or rule sets for the animal's sleep patterns. Researchers can easily adjust the criteria 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.

