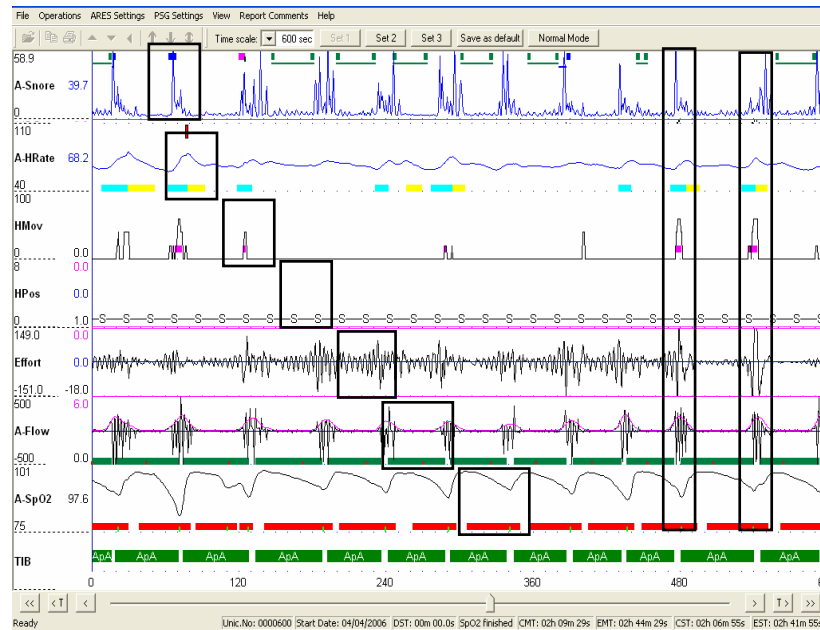


The Apnea Risk Evaluation System (ARES™) integrates physiological data acquired in-home with clinical history and anthropomorphic data to determine presence and severity of Obstructive Sleep Apnea (OSA). The ARES has been cleared by the United States Food and Drug Administration (FDA) and was validated in a large multi-site clinical study.



Technical Features:

- ❖ The ARES Unicorder is a single-site, small, comfortable, and easily and reliably self-applied device. It can be sent to the patient and returned by mail.
- ❖ Two to four full nights of data can be obtained. Obtaining recordings from multiple nights increases the likelihood that the measurements reflect a true profile of the patient's breathing during sleep and sleep positions in his/her normal environment.
- ❖ Snoring is recorded with a microphone so that the level of loudness can be precisely quantified. Changes in snoring patterns and crescendo snoring are automatically recognized and used as markers of a respiratory-related arousal.
- ❖ Limited smoothing of the pulse rate signal increase capability of the ARES Insight software to recognize brief changes in pulse rate (e.g., Brady-tachycardias). These changes in pulse rate are recognized markers of arousal.
- ❖ Head movement is measured using accelerometers similar to those used for actigraphy. Head movement is a unique signal identified by Advanced Brain Monitoring as a marker of respiratory related arousal.
- ❖ Head position indicates the position of the pharynx and is used to determine the positionality of obstructive events. Understanding the influence of position on the severity of the OSA is useful in making treatment decisions.

- ❖ Respiratory effort is obtained using a patent-pending approach that measures changes in forehead venous pressure using a combination of photoplethysmography, a forehead pressure transducer and actigraphy.
- ❖ Changes in airflow are measured with a pressure transducer connected to the nasal opening via a nasal cannula. Decreases and increases in flow of 50% or more are automatically identified and marked as apneas (10-sec cessation in flow) or hypopneas. The termination of the increase in flow is aligned with arousal indicators to confirm flow limitation events (FLEs).
- ❖ The reflectance optical signals from the ARES Unicorder are used to calculate oxyhemoglobin saturation. The ARES oximeter was designed specifically for use in the diagnosis of obstructive sleep apnea, which involves the detection and quantification of brief desaturations and resaturations. It measures oxyhemoglobin saturation in 0.1% rather than 1.0% increments, allowing identification of small but important changes in saturation that might otherwise be undetected. This is especially important in those living at or near sea level, where the baseline oxyhemoglobin saturation can be high and relatively insensitive to significant decreases in breathing.
- ❖ Validated automatic scoring of respiratory events saves time and thus cost. Importantly, it applies uniform scoring rules, eliminating the human scorer variability known to exist. Comparisons between AHIs derived from four desaturation criteria are automatically calculated.
- ❖ The ARES Insight software automatically identifies records that need expert review.
- ❖ Periods that are automatically detected and excluded from the time in bed and RDI calculation include:
 - Gross head movement
 - Poor or bad SpO₂ quality
 - Upright position
 - Poor or bad airflow quality (optional)
 - 30 seconds immediately after a position change
- ❖ Periods that can be manually excluded from the time in bed and RDI calculation include:
 - The start and end of the session as the patient begins to fall asleep (based on actigraph and snoring sounds)
 - Any period that the physician feels should be eliminated
- ❖ The full disclosure recording can be reviewed by a technician or physician and the automated events edited. The user can:
 - Adjust the desaturation/ resaturation parameters.
 - Add respiratory events not identified by the automated scoring that are included in the RDI.
 - Exclude respiratory events detected by the automated algorithms that should be excluded from the RDI.