

*Quick
Reference
for:*

*Polysomnographic
Reports*

Page 1

1. **Lights Out Time**- Time that the patient has actually laid down and is attempting to fall asleep, including calibration time or acclimation time.
2. **Sleep Onset** – Actual Time that the patient has fallen asleep from lights out time.
3. **Stage 2 Onset** – The first epoch of Stage 2 entered by the patient from Lights Out Time.
4. **REM Onset** – First epoch of REM sleep from the sleep onset time. Early REM onset can indicate possible depression and/or a circadian rhythm disruption. A delayed REM Onset can mean circadian rhythm disruption and/or a disturbance causing a disruption in REM sleep, an example is a patient with severe obstructive sleep apnea may not have a normal REM onset. **Normal REM Onset** should be within 90 minutes of sleep onset.
5. **EEG** – Indicates any abnormalities seen during the sleep study. (Example: seizure activity, alpha intrusion, severe artifact from respiratory or cardiac intrusion.)
6. **Heart Rate** – Shows the highest and lowest heart rate seen during sleep.
7. **EKG** – This information contains any abnormalities found in the EKG, PVC, Bradycardia, Tachycardia, or other such abnormalities.
8. **Respiratory Rate** – Shows the highest and lowest respiratory rate throughout the night. A wide variation could depict hypo and hyperventilation due to respiratory events.
9. **Oxygen Saturation** – Highest, Lowest, and Baseline saturations seen throughout the night while the patient was sleeping. No weak data is included in this category. The lowest desaturation seen is usually due to a respiratory event, with the baseline saturation being the true baseline not just an average between the highest and lowest saturations throughout the night.

10. **All Respiratory Data** – Shows how many Obstructive Apneas, Mixed Apneas, Central Apneas, and Hypopneas were seen throughout the night. All respiratory events are required to be at least 10 seconds or longer. They must be accompanied by either a desaturation of 4% and/or an arousal.

- **Obstructive Apnea** is the collapse of the upper airway in which the patient's abdominal and thoracic efforts are attempting to move air; however, no airflow is seen.
- A **Mixed apnea** is a combination of a central and obstructive. The patient has a central event at which point his brain tells him not to breathe. Once the patient attempts to breathe the airflow signal remains flat-lined; however, the thoracic and/or abdominal efforts increase trying to force air through what has now become a blockage.
- A **Central Apnea** is the cessation of breathing in the airflow channel as well as the thoracic and abdominal efforts.
- A **Hypopnea** is a 50% or greater reduction in airflow with an increase in effort, usually followed by a desaturation and/or arousal. Hypopneas are sometimes considered partial obstructive apneas. A hypopnea, an obstructive apnea, and a mixed apnea are all considered obstructive events.
- The **REM RDI (REM-Respiratory Disturbance Index)** is the number of respiratory events seen in REM sleep. All other stages of sleep are not included in this index.
- The **Total Apnea and Hypopnea RDI (Respiratory Disturbance Index)** is how many respiratory events per hour from the beginning of the night to the end of the night including REM sleep. The REM RDI is sometimes higher due to the fact that during REM sleep paralysis from REM sleep allows the airway to collapse easier. The total RDI is usually lower due to the fact that it is accounting for all stages of sleep including REM.
- The **Snoring Scale** is the actual level of snoring as witnessed by the technician on duty.

11. **Periodic Leg Movements (PLM)** – This is the number of leg movements actually counted throughout the study. Periodic Leg Movements must follow a certain criteria. There must be four leg movements within a 90 second period, half a second in duration, no longer than 5 seconds long. Leg Movements sometimes cause arousals and sometimes do not. The PLM index is the number of periodic leg movements per hour of sleep.

12. **Spontaneous Arousals and Awakenings** – Spontaneous arousals are the micro-arousals seen following respiratory events, PLMs, upper airway resistance, and are sometimes caused for no known reason. A spontaneous arousal is greater than half a second and less than 15 seconds. Any thing over 15 seconds or longer is considered an awakening. The number of awakenings can be due to any number of reasons, such as pain, poor toleration to CPAP, respiratory events, etc. Awakenings are any where from 15 seconds long to an upwards of several hours.

13. **Estimated Sleep Efficiency** – The actual percent of the night spent asleep. It is calculated by taking the total recording time, which can be found at the top of test, and the total sleep time multiplied by 100%.

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Page 2 of the sleep study shows the patient values and the normal ranges for average patients.

Sleep percentages, such as: Stage 1, Stage 2, Stage Delta, and REM sleep can be indications of disrupted sleep.

Stage 1 - In Stage 1 an increase is usually accompanied by a decrease in a deeper level of sleep such as Delta and REM sleep. Patients suffering from Obstructive Sleep Apnea sometimes have an increase in their Stage 1 with decreases in other Stages.

Stage 2 - Considered by some to be the baseline stage of sleep. Most of the time asleep is in Stage 2.

Stage Delta - Delta sleep is the combination of Stages 3 and 4. A depth of sleep in which snoring is sometimes increased and fewer respiratory events are seen. Patients will usually rebound in either REM or Delta sleep during a CPAP Titration Study, in which obstructive events have been controlled.

Stage REM - REM sleep is a deeper stage of sleep than Stage 1 or 2; however, during REM sleep you are easily aroused. A decreased REM percentage can usually be associated with antidepressant medication, respiratory events, and/or periodic limb movements (PLMs), which are disturbing the patient from entering and maintaining REM sleep.

Total RDI and REM RDI – Refer to Page One.

Supine, Left Side, and Right Side RDI (Respiratory Disturbance Indexes) – These are noted so comparisons can be made to a patient's position versus their apnea severity. Most patients suffer from more severe apnea in the supine position versus left or right side; however, patients with a deviated septum can have a higher right versus left side RDI, which may be an indication of a deviation of their septum.

CPAP DATA TABLE

The CPAP Data Table is used with patients that are treated for obstructive sleep apnea with CPAP. The data contained on pages 1 and 2 is information that is seen throughout the entire study. No compensation is made for the increase or decrease of CPAP pressures throughout the night, therefore a CPAP Data Table is included to make a better comparison of the affect of CPAP settings.

Shown on the CPAP Data Table:

- CPAP settings
- Time at that setting
- Percentage of time spent at that setting asleep
- Percentage of REM and Delta sleep acquired
- Type of respiratory event (central apnea / obstructive apnea / mixed apnea)
- The RDI at that pressure
- Whether or not snoring was present
- Baseline SpO2 level at that pressure

Higher CPAP pressures sometimes cause an increase in central events due to the increase in their PCO2 threshold; this is usually seen in patients suffering with severe obstructive sleep apnea with severe desaturation. As the pressure is increased, the baseline saturation levels are increased, causing central apneas to appear.

Central Apneas usually dissipate over a two week period with continued home CPAP use.

Obstructive apneas are usually the *first* obstructive event to disappear as pressures are increased. Obstructive apneas occur on exhalation versus hypopneas which occur on the inhalation. Obstructive apneas are therefore usually alleviated at the lower pressures.

Higher pressures are needed to over come **hypopneas** due to the fact that they are an inhalation phenomenon.

BiPAP includes an inhalation and exhalation pressure, therefore inhalation pressures are usually 4 – 6 cmH2O pressure higher than exhalation pressures. (For example: BiPAP of 10 over 4. 10cmH2O pressure is for the inhalation and the 4 cmH2O pressure is utilized for exhalation.)

Mixed apneas follow the same guidelines as obstructive apneas during CPAP. The patient may have a central event due to an increased PCO2 threshold, but once the patient attempts to breathe they have become obstructed. A mixed apnea is usually the state at roughly the same time as obstructive apneas with increased CPAP pressures.