



# Your Sleep Study Results

Dear [REDACTED]

Thank you for completing your **Nox A1S** home sleep study. Here is a simple breakdown of what we found, also for your primary care doctor, **Dr Lee Chuen Peng**.

## How Long We Monitored

The device recorded for a **Total Study Time** of **9h 44m** (from the moment you turned it on until you took it off). However, we are most interested in your **Total Sleep Time**, which was **5h 0m**. For most adults, 7-9 hours is considered a normal amount of sleep.

## Key Findings: Breathing and Oxygen

This section looks at how often your breathing was disrupted during the night and what happened to your oxygen levels.

### Apnea-Hypopnea Index (AHI)

- **Your Score: 35.6/h**
- **What this means:** This score is the average number of times per hour your breathing was partially or completely blocked during sleep.
  - An **apnea** is a complete, 10-second-or-longer pause in breathing.
  - A **hypopnea** is a partial blockage of breathing.
- **Normal Range: 5 or lower** is considered normal. A higher score suggests a sleep breathing disorder, like **Sleep Apnea**.

### Oxygen Desaturation Index (ODI)

- **Your Score: 34.4/h**
- **What this means:** This is the average number of times per hour your blood oxygen level dropped by 3% or more. When your oxygen drops, your **heart has to work harder** to compensate.
- **Normal Range: 5 or lower** is considered a healthy range.



## Looking at Your Deep Sleep

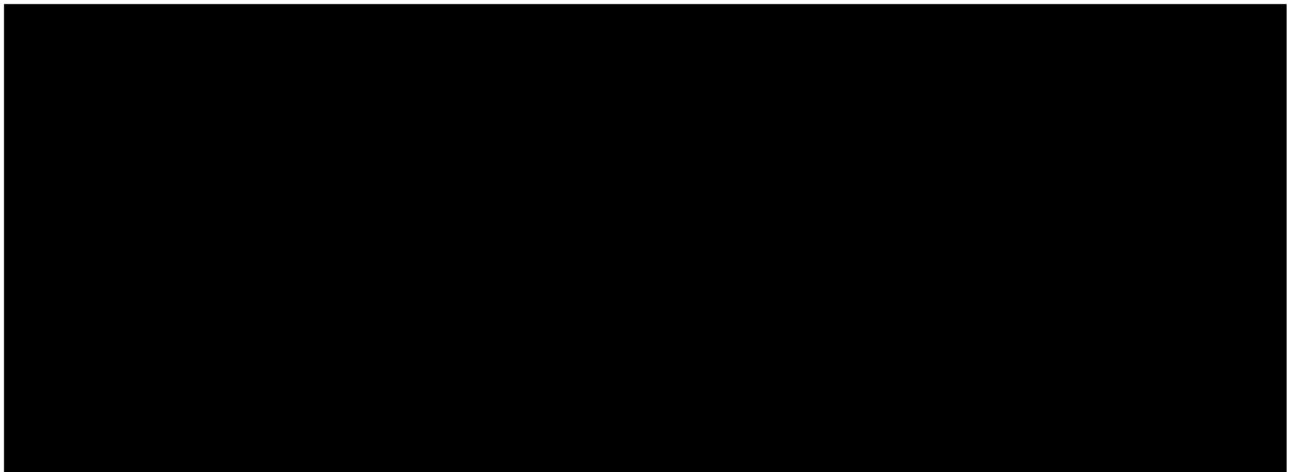
### REM Sleep Percentage

- **Your Percentage: 17.3%**
- **What this means: REM** stands for **Rapid Eye Movement**. This is a critical stage of sleep where we typically **dream**, and it's essential for your body and mind to be refreshed and restored.
- **Normal Range:** We look for this to be between **15% and 30%** of your total sleep time, depending on other health factors.

**Please note:** This is an abbreviated summary. Your doctor will review with you the rest of the details and full clinical implications not stated in this short report.

If you have any questions or would like to discuss these results further, please contact my front desk to schedule a follow-up appointment.

Regards,





## PSG Report

### Patient Details

|                                                                |        |                        |          |              |      |
|----------------------------------------------------------------|--------|------------------------|----------|--------------|------|
| Name :                                                         |        | NRIC :                 |          | Study Date : |      |
| DOB :                                                          |        | Age :                  |          | Gender :     | Male |
| Height :                                                       | 173 cm | Weight :               | 67 kg    | BMI :        | 22.4 |
| BP :                                                           |        | EQ5D :                 | 11111/80 |              |      |
| ISI :                                                          | 5      | ESS :                  | 6        |              |      |
| STOPBANG :                                                     |        | PLATO-11 :             |          |              |      |
| Pre-Diagnosis : ICD9-Obstructive Sleep Apnea Syndrome 780.53-0 |        |                        |          |              |      |
| Referring Doctor :                                             |        | Acquiring Technician : |          |              |      |
| Reporting Doctor :                                             |        | Scoring Technologist : |          |              |      |

### Recording Information

|                 |          |                                   |          |
|-----------------|----------|-----------------------------------|----------|
| Recording Date: | 9/6/2026 | Analysis Duration (TRT):          | 9h 44m   |
| Recording Tags: |          | Analysis Start Time (Lights out): | 10:00 pm |
| Device Type:    | A1S      | Analysis Stop Time (Lights on):   | 7:44 am  |

### Summary

|                                      |         |                     |         |
|--------------------------------------|---------|---------------------|---------|
| Total Sleep Time (TST):              | 5h 0m   | Sleep Latency (SL): | 53.4 m  |
| Sleep Efficiency (TST/TRT*100):      | 51.3 %  | REM Latency:        | 285.5 m |
| Wake After Sleep Onset (TRT-SL-TST): | 230.8 m |                     |         |

AHI:

35.6

ODI:

34.4

Snore %:

3.8

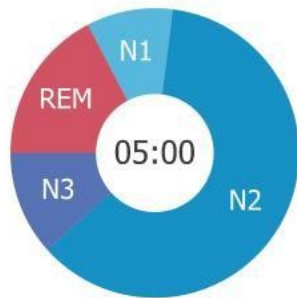
PLMS Index:

0.0

### Sleep Parameters



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- REM: 17.3%
- N1: 9.7%
- N2: 61.3%
- N3: 11.7%

|      | Percentage | Duration |
|------|------------|----------|
| REM: | 17.3 %     | 52 m     |
| N1:  | 9.7 %      | 29 m     |
| N2:  | 61.3 %     | 184 m    |
| N3:  | 11.7 %     | 35 m     |

### Arousals

|                        | All | Respiratory | RERAs | PLM | Spontaneous | LM  |
|------------------------|-----|-------------|-------|-----|-------------|-----|
| Arousal index in TST:  | 3/h | 0/h         | 0/h   | 0/h | 0/h         | 0/h |
| Arousal count in TST:  | 15  | 0           | 0     | 0   | 0           | 0   |
| Arousal count in Wake: | 16  | 0           | 0     | 0   | 0           | 0   |

### Respiratory Parameters

|                                            | Index   |         |            |         |          | Count |
|--------------------------------------------|---------|---------|------------|---------|----------|-------|
|                                            | Total   | Supine  | Non-Supine | REM     | Non- REM |       |
| Apneas + Hypopneas (AH):                   | 35.6 /h | 36.8 /h | 5.3 /h     | 46.2 /h | 33.4 /h  | 178   |
| Apneas:                                    | 7.2 /h  | 7.5 /h  | 0 /h       | 8.1 /h  | 7 /h     | 36    |
| Obstructive (OA):                          | 4.6 /h  | 4.8 /h  | 0 /h       | 6.9 /h  | 4.1 /h   | 23    |
| Mixed (MA):                                | 0 /h    | 0 /h    | 0 /h       | 0 /h    | 0 /h     | 0     |
| Central (CA):                              | 2.6 /h  | 2.7 /h  | 0 /h       | 1.2 /h  | 2.9 /h   | 13    |
| Hypopneas:                                 | 28.4 /h | 29.3 /h | 5.3 /h     | 38.1 /h | 26.4 /h  | 142   |
| Obstructive (OH):                          | 0 /h    | 0 /h    | 0 /h       | 0 /h    | 0 /h     | 0     |
| Central (CH):                              | 0 /h    | 0 /h    | 0 /h       | 0 /h    | 0 /h     | 0     |
| Obstructive Apnea Hypopnea (OA + MA + OH): | 4.6 /h  | 4.8 /h  | 0 /h       | 6.9 /h  | 4.1 /h   | 23    |
| Central Apnea Hypopnea (CA + CH):          | 2.6 /h  | 2.7 /h  | 0 /h       | 1.2 /h  | 2.9 /h   | 13    |
| RDI (A+H+RERAs)                            | 35.6 /h | 36.8 /h | 5.3 /h     | 46.2 /h | 33.4 /h  | 178   |
| Hypoventilation:                           | 0 /h    | 0 /h    | 0 /h       | 0 /h    | 0 /h     | 0     |
| Respiration Rate (per m):                  | 13.6 /m | 13.6 /m | 13.2 /m    | 13.6 /m | 13.6 /m  |       |
| REM                                        |         | 46.2 /h | /h         |         |          |       |



|                          | Percentage of Sleep |        |            |        |         | Duration |
|--------------------------|---------------------|--------|------------|--------|---------|----------|
|                          | Total               | Supine | Non-Supine | REM    | Non-REM |          |
| Snore:                   | 3.8 %               | 4 %    | 0 %        | 5.3 %  | 3.5 %   | 11.5 m   |
| Flow Limitation:         | 5.7 %               | 5.8 %  | 2.1 %      | 4.4 %  | 6 %     | 6 m      |
| Cheyne-Stokes Breathing: | 0 %                 | 0 %    | 0 %        | 0 %    | 0 %     | 0 m      |
| Paradoxical Breathing:   | 7.6 %               | 8 %    | 0 %        | 10.3 % | 7.1 %   | 22.9 m   |

### Oxygen Saturation (SpO2)

|                                  | Total   | Supine  | Non-Supine | REM     | Non-REM | Duration |
|----------------------------------|---------|---------|------------|---------|---------|----------|
| Oxygen Desaturation Index (ODI): | 34.4 /h | 35.6 /h | 10.5 /h    | 49.6 /h | 31.2 /h |          |
| Average SpO2 (Awake)             | 93.9 %  | 93.8 %  | 93.7 %     |         |         |          |
| Average SpO2:                    | 92.8 %  | 92.7 %  | 93.7 %     | 92.2 %  | 92.9 %  |          |
| Minimum SpO2:                    | 84 %    | 84 %    | 88 %       | 85 %    | 84 %    |          |
| SpO2 Duration < 90%              | 5.9 %   | 6.1 %   | 1.6 %      | 11 %    | 4.8 %   | 17.6 m   |
| SpO2 Duration ≤ 88%              | 2.7 %   | 2.8 %   | 1.5 %      | 6.1 %   | 2 %     | 8.2 m    |
| SpO2 Duration < 85%              | 0.1 %   | 0.1 %   | 0 %        | 0 %     | 0.1 %   | 0.2 m    |
| Average Desat Drop:              | 4.5 %   | 4.5 %   | 4 %        | 4.8 %   | 4.3 %   |          |

### Hypoxic Burden

The hypoxic burden was determined to be 119.1 %min/hr.

### PLMS (Periodic Limb Movements in Sleep)

|                  | Count | Index | Duration |     |     |
|------------------|-------|-------|----------|-----|-----|
|                  |       |       | Average  | Min | Max |
| PLMS:            | 0     | 0 /h  | s        | s   | s   |
| PLM during Wake: | 0     | 0 /h  | s        | s   | s   |
| PLMS in N1:      | 0     | 0 /h  | s        | s   | s   |
| PLMS in N2:      | 0     | 0 /h  | s        | s   | s   |
| PLMS in N3:      | 0     | 0 /h  | s        | s   | s   |
| PLMS in REM:     | 0     | 0 /h  | s        | s   | s   |
| PLMS Supine:     | 0     | 0 /h  | s        | s   | s   |
| PLMS Non-supine: | 0     | 0 /h  | s        | s   | s   |
| PLMS Arousals:   | 0     | 0 /h  |          |     |     |

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|             |   |      |   |   |   |
|-------------|---|------|---|---|---|
| PLM Series: | 0 | 0 /h | s | s | s |
|-------------|---|------|---|---|---|

**Position & Analysis Time**

|                      | Count | Duration | Percentage |                          | Duration | Percentage |
|----------------------|-------|----------|------------|--------------------------|----------|------------|
| Supine (in TST):     | 10    | 286.6 m  | 95.5 %     | Movement (in TST):       | 9.2 m    | 3.1 %      |
| Non-Supine (in TST): | 7     | 11.4 m   | 3.8 %      | Invalid Data (Excluded): | 0 m      | 0 %        |
| Left (in TST):       | 4     | 0.8 m    | 0.3 %      |                          |          |            |
| Prone (in TST):      | 0     | 0 m      | 0 %        |                          |          |            |
| Right (in TST):      | 3     | 10.6 m   | 3.5 %      |                          |          |            |
| Unknown (in TST):    | 0     | 0 m      | 0 %        |                          |          |            |
| Upright (in TRT):    | 21    | 20.2 m   | 3.5 %      |                          |          |            |

**Pulse**

|                   | Bpm  |
|-------------------|------|
| Average (in TST): | 61.3 |
| Max (in TST):     | 96   |
| Max (in TRT):     | 96   |
| Min (in TST):     | 49   |

|                     | Minutes |
|---------------------|---------|
| Duration < 40 bpm:  | 0       |
| Duration > 100 bpm: | 0       |
| Duration > 90 bpm:  | 0.3     |
|                     |         |

**Cardiac Events**

|             | Index | Count |
|-------------|-------|-------|
| Bradycardia | 0 /h  | 0     |
| Asystole    | 0 /h  | 0     |

|                     | Index | Count |
|---------------------|-------|-------|
| Tachycardia         | 0 /h  | 0     |
| Atrial Fibrillation | 0 /h  | 0     |

**Signal Quality**

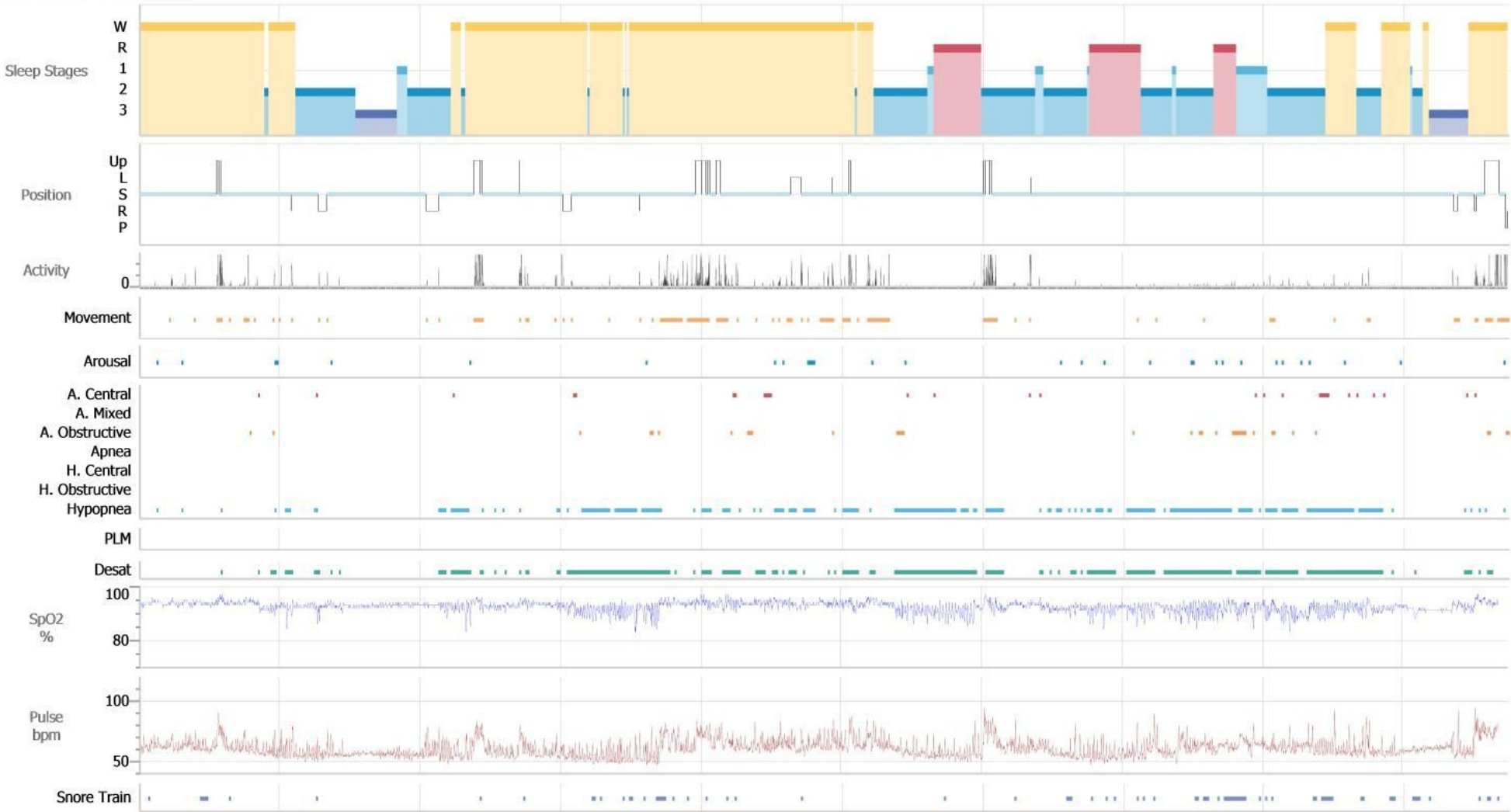
|           | Percentage |
|-----------|------------|
| Oximeter: | 99.2 %     |
| Airflow:  | 99.2 %     |

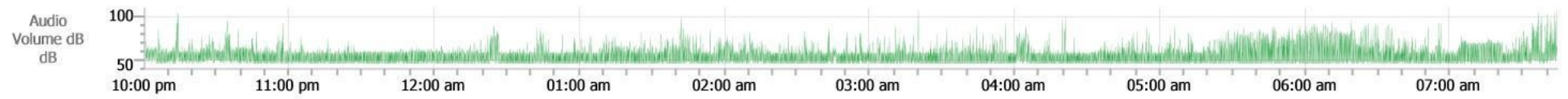
|              | Percentage |
|--------------|------------|
| Abdomen RIP: | 99.4 %     |
| Thorax RIP:  | 99.4 %     |



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Trend Overview







# PSG Report Interpretation Notes

## Patient Details

|                                                                |        |                        |          |              |      |
|----------------------------------------------------------------|--------|------------------------|----------|--------------|------|
| Name :                                                         |        | NRIC :                 |          | Study Date : |      |
| DOB :                                                          |        | Age :                  |          | Gender :     | Male |
| Height :                                                       | 173 cm | Weight :               | 67 kg    | BMI :        | 22.4 |
| BP :                                                           |        | EQ5D :                 | 11111/80 |              |      |
| ISI :                                                          | 5      | ESS :                  | 6        |              |      |
| STOPBANG :                                                     |        | PLATO-11 :             |          |              |      |
| Pre-Diagnosis : ICD9-Obstructive Sleep Apnea Syndrome 780.53-0 |        |                        |          |              |      |
| Referring Doctor :                                             |        | Acquiring Technician : |          |              |      |
| Reporting Doctor :                                             |        | Scoring Technologist : |          |              |      |

## 1. Study Information

The sleep study was conducted using the Nox A1s PSG device. The acquisition monitored frontal, central, and occipital EEG and electrooculogram (EOG) for sleep staging, alongside submental EMG and anterior tibialis EMG for muscle tone and movement analysis. Respiratory function was assessed via nasal/oral airflow and thoracic/abdominal inductance plethysmography for effort. Oxygen saturation SpO<sub>2</sub> and electrocardiogram (ECG) were also monitored.

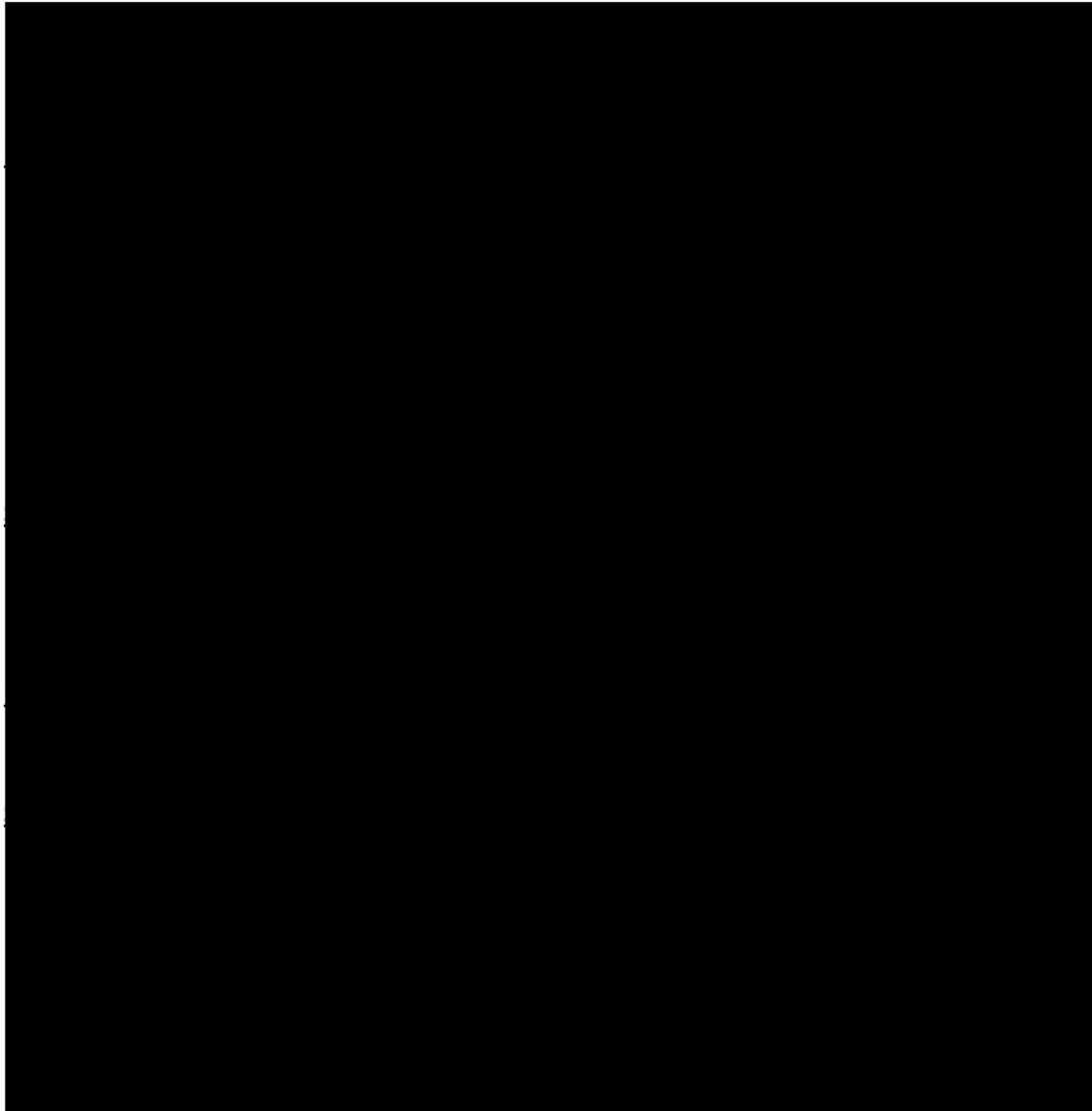
## 2. Sleep Technologist's notes

### Medication

- § No medication was taken
- § Patient's usual medications were taken which included

### Sleep Quality

- § Patient's perception of sleep quality during sleep study: poor, which was worse than usual
- § Sleep architecture: 2 episodes of SWS, 3 episodes of REM, 3 episodes of supine REM, 16 episodes of wakefulness
- § Poor sleep efficiency. Prolonged sleep Latency.  
Prolonged REM latency
- § Amount of deep sleep was inadequate. Amount of REM sleep was inadequate
- § Fragmented sleep architecture



## 2. Scoring Information

- § AASM Scoring Manual Version 3 (released February 2023)
- § The tracing was scored using 30-second epochs, with hypopneas scored per AASM 3% desaturation rule.

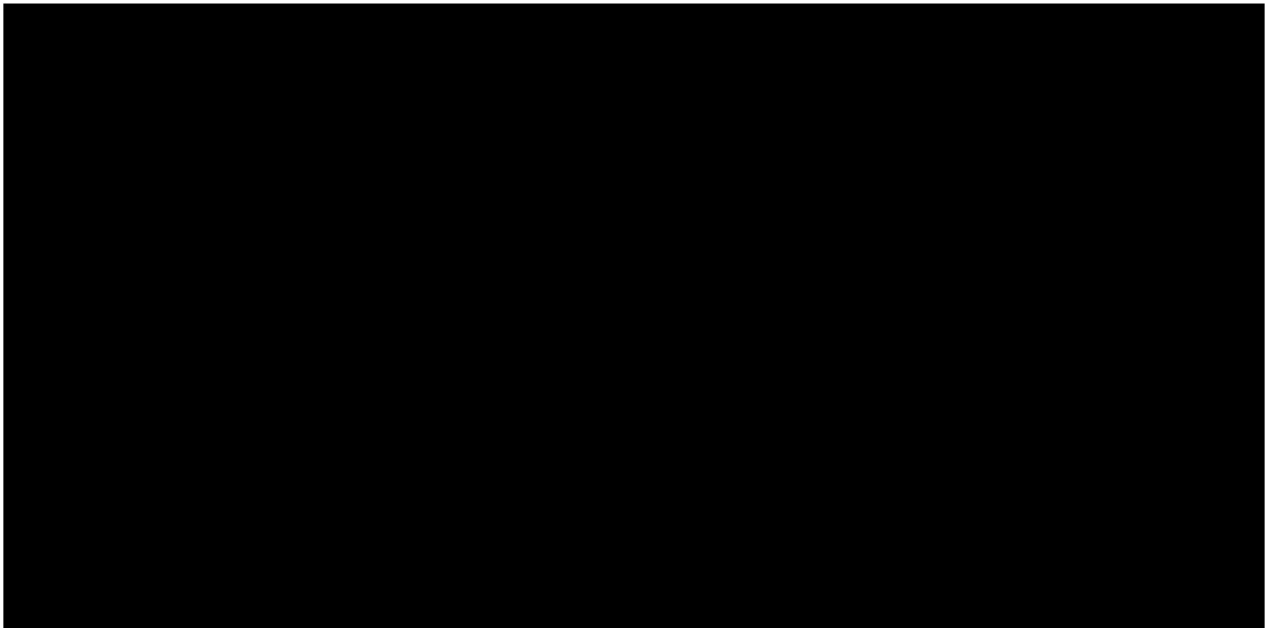
## 3. Physician's Interpretation





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#### 4. Physician's Recommendations





## Glossary

**American Academy of Sleep Medicine (AASM):** The principal professional society in the US for sleep medicine, responsible for publishing diagnostic and scoring criteria for sleep disorders, including sleep apnea.<sup>[1]</sup>

**Apnea:** Complete cessation of airflow for  $\geq 10$  seconds during sleep. In obstructive apnea, respiratory effort persists; in central apnea, effort is absent.<sup>[2][3]</sup>

**Apnea-Hypopnea Index (AHI):** The number of apneas plus hypopneas per hour of sleep, used to classify sleep apnea severity:  $< 5$  (normal), 5–14.9 (mild), 15–29.9 (moderate),  $\geq 30$  (severe).<sup>[2][3][4]</sup> Scored per AASM criteria.

**Oxygen Desaturation:** A drop in arterial oxygen saturation, typically  $\geq 3\%$  or  $4\%$ , associated with respiratory events during sleep.<sup>[3][5]</sup> Severe oxygen desaturation has been classified as an oxygen saturation  $< 85\%$  for more than  $2\%$  of the total PSG sleep time. Minimal or no desaturation has been classified as no PSG sleep saturation less than  $90\%$ .

**Hypoxic Burden:** The cumulative degree and duration of oxygen desaturation during sleep, reflecting the severity of intermittent hypoxia in sleep-disordered breathing.<sup>[2][3]</sup>

**Flow Limitations:** Partial reductions in airflow due to increased upper airway resistance, not meeting criteria for apnea or hypopnea, but may cause sleep fragmentation.<sup>[1]</sup>

**Respiratory Effort-Related Arousals (RERAs):** Events characterized by increased respiratory effort leading to arousal from sleep, without meeting criteria for apnea or hypopnea. Included in the Respiratory Disturbance Index (RDI) per AASM.<sup>[1][6]</sup>

**Paradoxical Breathing:** Out-of-phase movement of the thorax and abdomen during obstructive events, indicating persistent respiratory effort against a closed airway.<sup>[4]</sup>

**Arousal:** Abrupt shift in EEG frequency indicating transition to lighter sleep or wakefulness, often terminating respiratory events.<sup>[2][4]</sup>

**Central Apnea:** Cessation of airflow for  $\geq 10$  seconds due to absent ventilatory effort, typically defined as  $> 50\%$  of events being central.<sup>[2][7]</sup>

**Cheyne-Stokes Respiration:** A form of central sleep apnea with cyclic crescendo-decrescendo breathing and periodic apneas, often seen in heart failure.<sup>[7][2]</sup>

**Continuous Positive Airway Pressure (CPAP):** First-line therapy for obstructive sleep apnea, delivering constant air pressure to maintain airway patency during sleep.<sup>[3][6]</sup>

**Hypopnea:** Partial reduction in airflow ( $\geq 30\%$ ) for  $\geq 10$  seconds, associated with  $\geq 3\%$  or  $4\%$  oxygen



desaturation or arousal.<sup>[3][5]</sup>

**Obstructive Sleep Apnea (OSA):** Recurrent episodes of partial or complete upper airway collapse during sleep, resulting in apneas or hypopneas, diagnosed by AHI criteria.<sup>[2][4][5]</sup>

**Periodic Leg Movements:** Repetitive, stereotyped limb movements during sleep, often detected by anterior tibialis EMG in polysomnography.<sup>[6]</sup>

**Respiratory Disturbance Index (RDI):** Number of apneas, hypopneas, and RERAs per hour of sleep.<sup>[1]</sup>

**Positional Obstructive Sleep Apnea:** OSA predominantly occurring in the supine position, with AHI significantly higher when supine.<sup>[6]</sup>

**Rapid Eye Movement-Related Obstructive Sleep Apnea:** OSA events predominantly occurring during REM sleep, often with greater severity in this stage.<sup>[6]</sup>

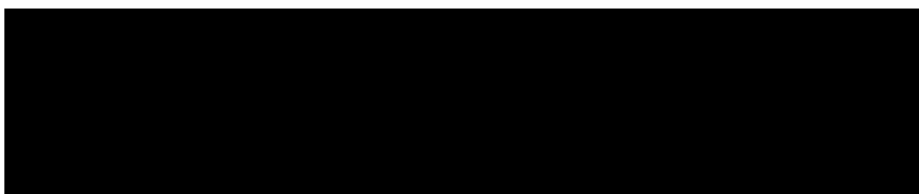
**Hypoventilation,** as defined by the American Academy of Sleep Medicine (AASM) scoring manual, is present during sleep if either of the following criteria are met: (1) there is a PaCO<sub>2</sub> (or validated surrogate such as transcutaneous or end-tidal PCO<sub>2</sub>) >55 mm Hg for at least 10 minutes, or (2) there is an increase in PaCO<sub>2</sub> (or surrogate) of >10 mm Hg from the awake supine value to a value exceeding 50 mm Hg for at least 10 minutes.<sup>[8]</sup>



## References

1. [Polysomnography for Obstructive Sleep Apnea Should Include Arousal-Based Scoring: An American Academy of Sleep Medicine Position Statement](#). Malhotra RK, Kirsch DB, Kristo DA, et al. Journal of Clinical Sleep Medicine : JCSM : Official Publication of the American Academy of Sleep Medicine. 2018;14(7):1245-1247. doi:10.5664/jcsm.7234.
2. [Sleep Apnoea and Ischaemic Stroke: Current Knowledge and Future Directions](#). Baillieux S, Dekkers M, Brill AK, et al. The Lancet. Neurology. 2022;21(1):78-88. doi:10.1016/S1474-4422(21)00321-5.
3. [Obstructive Sleep Apnea in Adults](#). Veasey SC, Rosen IM. The New England Journal of Medicine. 2019;380(15):1442-1449. doi:10.1056/NEJMcp1816152.
4. [Diagnosis and Management of Obstructive Sleep Apnea: A Review](#). Gottlieb DJ, Punjabi NM. JAMA. 2020;323(14):1389-1400. doi:10.1001/jama.2020.3514.
5. [Diagnostic and Statistical Manual of Mental Disorders](#). Dilip V. Jeste, Jeffrey A. Lieberman, David Fassler, et al. American Psychiatric Association (2022).
6. [Adult Obstructive Sleep Apnoea](#). Jordan AS, McSharry DG, Malhotra A. Lancet (London, England). 2014;383(9918):736-47. doi:10.1016/S0140-6736(13)60734-5.
7. [Sleep-Disordered Breathing and Cardiac Arrhythmias in Adults: Mechanistic Insights and Clinical Implications: A Scientific Statement From the American Heart Association](#). Mehra R, Chung MK, Olshansky B, et al. Circulation. 2022;146(9):e119-e136. doi:10.1161/CIR.0000000000001082.
8. [Rules for Scoring Respiratory Events in Sleep: Update of the 2007 AASM Manual for the Scoring of Sleep and Associated Events. Deliberations of the Sleep Apnea Definitions Task Force of the American Academy of Sleep Medicine](#). Berry RB, Budhiraja R, Gottlieb DJ, et al. Journal of Clinical Sleep Medicine : JCSM : Official Publication of the American Academy of Sleep Medicine. 2012;8(5):597-619. doi:10.5664/jcsm.2172.

**Note:** In compliance with Ministry of Health's Medical Technology Advisory Committee (MTAC) recommendation, the raw data of this sleep study has been reviewed and scored by a qualified sleep technologist. The results have been interpreted and reported by a specialist trained in Sleep Medicine.





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