SleepServices Australia Pty Ltd
Suite 108, 12 Cato Street, Hawthorn East, 3123 Ph 1300867533 or (03) 9832 2299 Fax (03) 9832 2295
Website: www.sleepservicesaustralia.com.au Email: bookings@sleepservicesaustralia.com.au

SAMPLE Diagnostic Report

Name:	John Smith		**Study Date:**	10/01/2008	**Medicare No:**	99999999999			
DOB:	17/11/1967	**Gender:**	Male	**Ht:**	179cm	**Wt:**	96kg	**BMI:**	30.0
Occupation:	Programmer	**ESS:**	14	**Smoking History:**	Non smoker				
Referring Physician:	Dr X. Smith			**Alcohol Consumption:**	Nil alcohol				
Indications for Study:	Hypertension								
Medications:	Diazepam, Fluoxetine, Lisinopril, Simvastin								

Scientific Report

Sleep study conditions: Diagnostic study.
Technical comments: Good quality study.
Sleep quality: The patient reported a good quality sleep which was better than usual. Sleep architecture shows multiple periods of stage two, several periods of stage two/three, one period of stage four and two REM periods (supine and non-supine REM sampled during both periods). Several short wake periods and one extended wake period were present.

Sleep Latency: *17.0min* Sleep Efficiency: *80.2%* Total Arousal Index *25.5/hr*

Sleep Quality is the description of the patient sleep architecture, the amount of NREM sleep (stages 1, 2, 3, 4), REM/dreaming sleep and the number of awakenings present during the study.
Normal sleep architecture should have **75-80%** as **NREM sleep** of which approximately 45% will be stage 2 sleep and 20% will be stages 3 and 4 sleep (also known as slow wave sleep). **REM sleep** should account for **20-25%** of total sleep and **5%** of the time available for sleep is spent **awake.** Also comments are made as to the body position the patient slept – supine or non-supine.
Normal values for

- **Sleep Latency** (time after lights out to the onset of sleep) **< 20minutes**
- **Sleep Efficiency** (amount of sleep time divided by the amount of time available for sleep as a percentage) **>80%**
- **Arousal Index** (number of awakenings or changes in brain wave frequency per hour) <**10/hr**

Respiratory events:
In-phase and anti-phase hypopnoeas were present during supine and non-supine REM and NREM. Isolated central apneas were seen during supine sleep. These events were associated with some arousals and oxygen desaturation.

Respiratory events has the description of the patients breathing during sleep. Sleep Services Australia uses the AASM (Chicago criteria) for the classification of sleep disordered breathing.
An **apnoea** is the complete absence of breathing for more than 10 seconds. Apnoeas are categorized as follows:

- Central – where no effort is made to breathe,
- Obstructive – where no breathing occurs despite repeated efforts to suck air into the lungs against a blocked upper airway.
- Mixed – where there is a combination of effort to breathe and no effort to breathe.

A **hypopnoea** is the partially or incomplete absence of breathing for 10 seconds, like apnoeas these maybe central or obstructive.
Comments are made if oxygen desaturation, snoring or arousals are present with the respiratory events.

	SpO2 Baseline:		Wake	*95*	%				
	SpO2 Baseline:		NREM	*93*	%	REM	*92*	%	
	Mean SpO2 Nadir:		NREM	*88*	%	REM	*92*	%	
	SpO2 Nadir:		NREM	*89*	%	REM	*89*	%	
AHI:	Total	*6.8* /hr	NREM	*5.7*	/hr	REM	*13.2*	/hr	

Oxygen saturation summary values and Apnoea and Hypopnoea Index (AHI)
SpO2 baseline values are given when awake, in NREM and REM sleep. In normal subjects a slight drop in values from wakefulness to sleep are seen in the order 1-2%.
Mean SpO2 Nadir – This is the average oxygen saturation value the patient drops to.
SpO2 Nadir – This is the lowest oxygen saturation value the patient drops to.
Total Apnoea and Hypopnoea Index is the number times per hour the patient has respiratory events regardless of the sleep stage. This is broken down into the 2 main sleep stage categories NREM and REM sleep, some patients will show a worsening of sleep disordered breathing when in REM sleep.
Normal values:
SpO2: Awake 92-98% Asleep (NREM or REM): 91-98%
Normal AHI: <5/hr
AHI indicating sleep apnoea:
Mild sleep apnoea: **5-15/hr**
Moderate sleep apnoea: **15-30/hr**
Severe sleep apnoea: **>30/hr**

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SAMPLE Diagnostic Report

(continued)

Periodic Leg movements: PLMs were present frequently throughout the study with associated arousals.

> **Periodic Leg Movements** , the muscle twitching condition which usually effects the legs manifesting in jerking of the legs during sleep. It is a common condition which affects about 10% of the population. It is defined by 4 or more movements of 0.5-5 seconds duration within a 5-90second period. A **normal PLM index <5 episodes/hr.**

Snoring: Snoring was present throughout the study.

ECG: The dominant rhythm is Sinus with an average heart rate of 76 bpm. No arrhythmias were present.
T. Smith **(Sleep Scientist) 17/01/08**

Physician Report

Conclusion: Mild Obstructive Sleep Apnoea which is predominantly supine based and worse in REM sleep associated with mild oxygen desaturation. Few events observed in non supine sleep. Moderate sleep fragmentation with respiratory and PLMS related arousals.

> **Conclusion** is the Respiratory and Sleep Physicians summary of the condition which has been diagnosed from the sleep study. It contains the comments of the severity of sleep disordered breathing and other conditions such as Periodic Leg movements

Clinical Recommendations:

1. **Optimise sleep hygiene, weight reduction and review nasal and upper airway patency.**
2. **Measures to minimise supine position during sleep should be associated with reduced severity of sleep disordered breathing.**
3. **Consider for treatment with mandibular advancement splint with follow up sleep study on treatment to assess benefit.**
4. **If splint is not tolerated or effective, nasal CPAP may be an alternate treatment option, with review.**

Dr *Linda Schachter* **(Sleep Physician) 17/01/2008**

> **The Clinical Recommendations** are the advised directives from the Respiratory Sleep Physician to the Referring Practitioner to follow with their patient. The list of clinical recommendations is in ranking order of treatment options that should be trialed/implemented.
> ***Please note: Our Respiratory Sleep Physicians are available to discuss the results and management with the Referring Practitioner.***

Staging and Scoring criteria

Staging analysis:	*EEG was recorded from Fp_1 – Right outercanthus placement.*
	Wake and NREM was staged according to Rechtschaffen and Kales.
	REM sleep: EMG unavailable, presence of REM sleep derived from EEG/EOG combined channel (low mixed frequency EEG in the presence of REM's)
Respiratory analysis:	*Respiratory effort was recorded from uncalibrated thoracic, abdominal respiratory inductive plethysomnography, nasal pressure and snore signal extracted from nasal pressure.*
	Hypopnoeas, Obstructive and Central Apnoeas and Respiratory Effort Related Arousals have been scored in accordance with Chicago Criteria, AASM Task Force Report. Sleep related breathing disorders in adults – Recommendations for syndrome definition and measurement techniques in clinical research. Sleep 1999:22(5):667-89
Leg movements:	*Uncalibrated piezo sensors*

Sleep data was acquired using Somte ambulatory device. Sleep and respiratory analysis was performed manually.

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Sample Diagnostic Report

Patient Name: J. Smith **Study Date:** 10/01/2008

Sleep Statistics

Recording Start Time:	21:00:00	Recording End Time:	09:00:01
Lights Out Time:	23:14:59	Lights On Time:	06:49:00
Time Available For Sleep:	7:34.0	Total Sleep Time:	6:4.0
Sleep Efficiency (%):	80.2	Sleep Onset Latency (min):	17.0
Stage REM Latency (min):	131.5		

Sleep Stage Table

Sleep Stage	Duration (min)	Sleep Time %
Stage NREM	314.0	86.3
Stage REM	50.0	13.7
Awake	64.0	

Arousals/hr Sleep

Event Type	NREM	REM	All Sleep
Spontaneous Arousals	6.1	33.6	9.9
Respiratory Arousals	3.8	3.6	3.8
Limb movement Arousals	12.8	6.0	11.9
		Total	25.5

Sleep Stages breakdown, the amount of time spent in NREM, REM sleep and awake.
Arousal breakdown stating the likely causes of the arousals/awakenings, that is, arousals post respiratory events (Apnoea or Hypopnoea), arousals post leg movements (PLMs) and arousals which can not be attributed to respiratory events or leg movements, referred to as spontaneous arousals.

Respiratory Events per hour

Even Type	NREM			REM			ALL SLEEP		
	Supine	Other	All	Supine	Other	All	Supine	Other	All
Time spent (min)	139.5	174.5	314.0	31.5	18.5	50.0	171.0	193.0	364.0
Hypopnoeas	9.9	2.1	5.5	15.2	6.5	12.0	10.9	2.5	6.4
Obstructive Apnoeas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mixed Apnoeas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central Apnoeas	0.4	0.0	0.2	1.9	0.0	1.2	0.7	0.0	0.3
RDI	10.3	2.1	5.7	17.1	6.5	13.2	11.6	2.5	**6.8**

Respiratory Events – Duration in seconds

	Apnoeas	Hypopnoeas
Longest Event (sec)	15.0	24.9
Average duration (sec)	12.8	16.9

Respiratory Event breakdown, Hypopnoeas and Apnoeas are separated, as are the different types of Apnoeas as mentioned on page 1, the average duration and longest duration of apnoeas and hypopnoeas

Desaturation Events/hr

	NREM	REM	All Sleep
Desaturations > 2%	5.7	12.0	6.6
Desaturations > 3%	2.5	3.6	2.6
Desaturations > 5%	0.6	1.2	0.7

Heart Rate Summary/min

Average Heart Rate Asleep	76
Average Heart Rate REM	73
Average Heart Rate NREM	76

Desaturation Events, the number of times the Sp02 values drops 2%, 3%, 5% from baseline per hour in sleep stages NREM, REM and in any stage of sleep.

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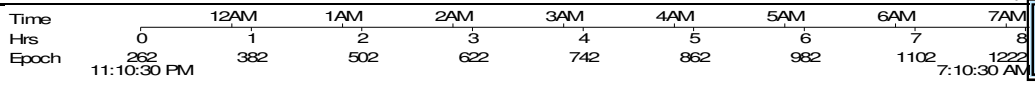
Sample Diagnostic Report

This section is commonly referred to as the **hypnogram page,** it shows graphs of the entire study and is excellent in exhibiting trends, for example, at a glance this patient has more hypopnoeas, dips in SpO2, snoring, when in the supine position.

Patient Name: J. Smith **Study Date:** 10/01/2008

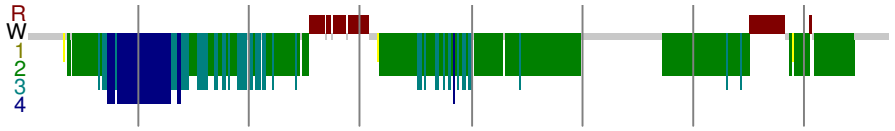


Time scale in hours and actual time the study was conducted

Light

Time available for sleep, reported from the patient, the time they switch off the light for sleep and turn it on/awoke in the morning

Hypnogram

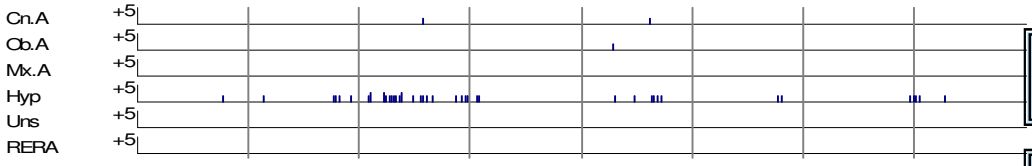


Breakdown of the different sleep stages, indicated by the different colours - see the key on the left side of the hypnogram

Arousal

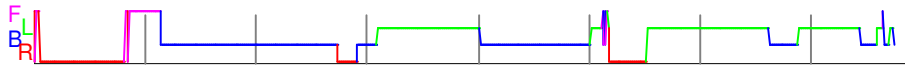
The graphical representation of quantity and timing of arousals

Respiratory events

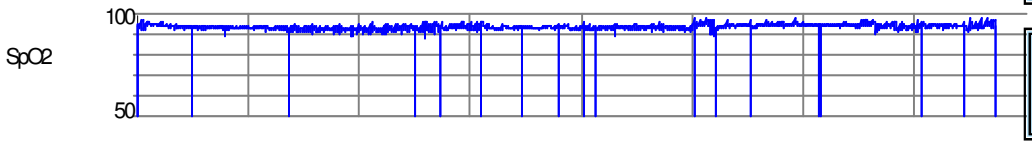


Breakdown of the different types of respiratory events

Body Position

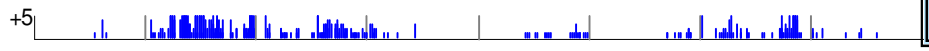


The body position slept in throughout the night.
F = Front
L = Left
B = Back
R = Right



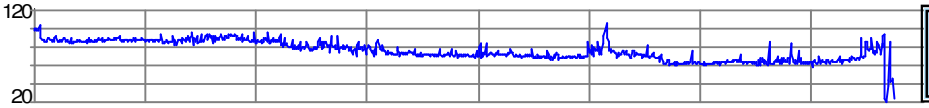
Graphical summary of the SpO2 values over the entire night, scale is 50-100%

Sound

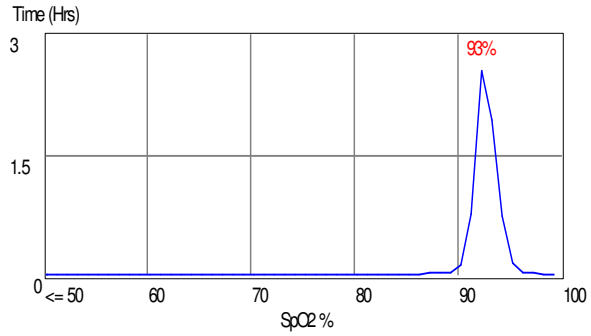


The quantity and timing of snoring throughout the night

Average Heart Rate



Average heart rate throughout the night, scale 20-120bpm



SpO2	Time
91-100	6.04
81-90	0.02
71-80	0
61-70	0
51-60	0
<= 50	0

Graphical expression of amount of time spent at a given SpO2 value
Scale
X Axis – 0-100%
Y Axis – 0-3hrs

Time v's SaO2