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# 演講大綱

睡眠一般分為淺睡期及深睡期。淺睡期包括了快速動眼期或作夢期；深睡期包括了非快速動眼期或非作夢期。整個夜晚的睡眠都由這兩種形式交替出現，整晚差不多有四到五個循環。快速動眼睡眠和腦力恢復有關，而非快速動眼睡眠則和體力恢復有關，所以一個晚上必須有這兩種形式睡眠，缺一不可。

睡眠呼吸中止是指睡覺中會反覆發生停止呼吸，並且造成缺氧與睡眠中斷的狀態，其中八成的患者是屬於「阻塞型」，是睡眠呼吸中止最常見的型態，源自上呼吸道於睡眠時發生塌陷，氣流阻滯而造成呼吸中斷，患病率為男性4.1%，女性2.1%。

肥胖是阻塞性睡眠呼吸中止症最重要的危險因子。肥胖造成的脂肪組織容易堆積於上呼吸道，一方面壓迫上呼吸道管徑，另一方面上呼吸道軟組織變得比較鬆軟，容易塌陷；此外，肥胖也會鈍化上呼吸道神經與肌肉的代償反應，使得在發生呼吸中止時，擴張上呼吸道的肌肉群無法有效地作用，延長呼吸中止的時間，造成缺氧情況更為嚴重。再者，因為肥胖的關係，胸壁軟組織增加，使得肺部擴張受限，因牽引作用的影響，連帶造成上呼吸道也容易塌陷。

睡眠呼吸中止的症狀以習慣性打鼾最為常見，其他症狀包含：高血壓、白天過度嗜睡、夜尿等。若沒接受治療，容易引發心血管疾病、代謝性疾病、神經等系統造成很大的潛在傷害。

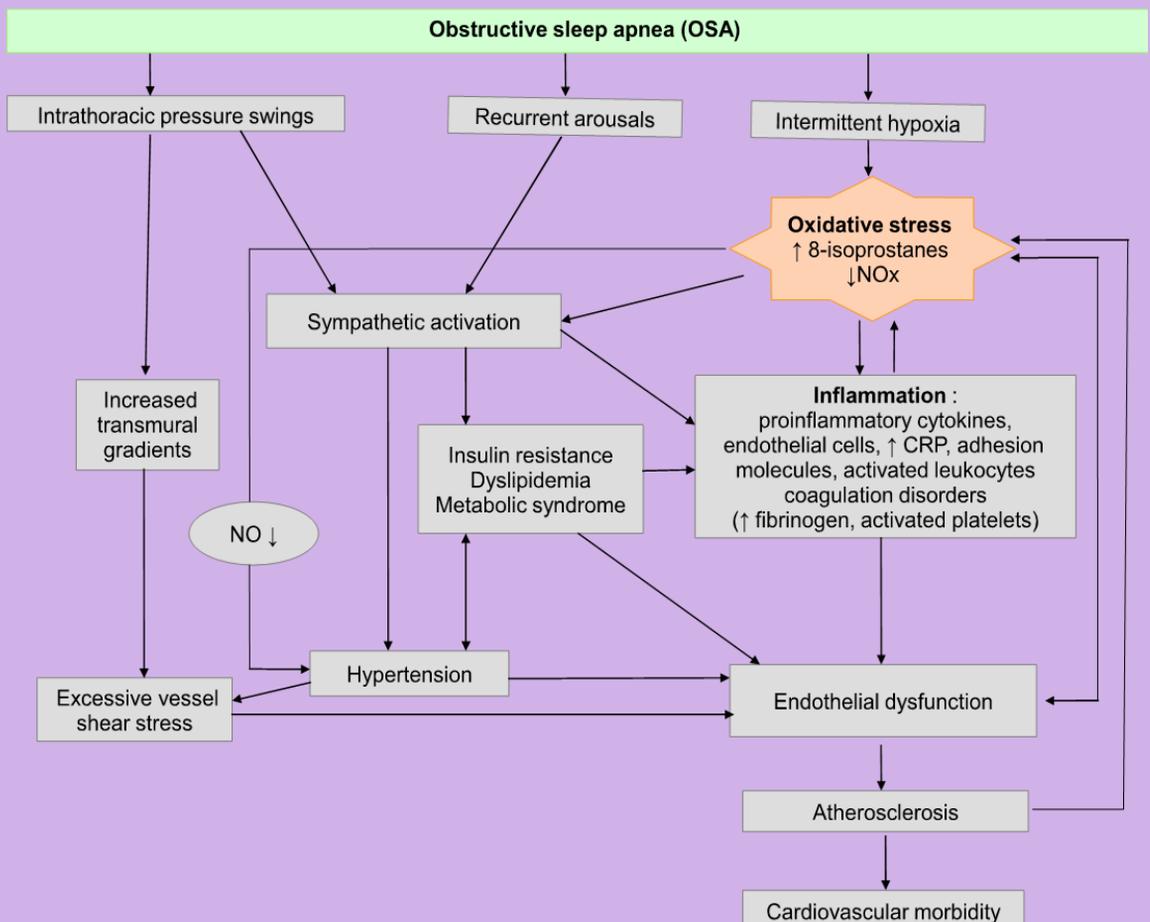
臨床上用來篩檢是否罹患睡眠呼吸中止的高危險群可使用問卷評估、身體檢查、睡眠檢查，調查相關的危險因子與臨床症狀後，做危險性的估計。常用的問卷有睡眠日誌、嗜睡量表、匹茲堡量表、STOP-Bang問卷，以及柏林問卷。睡眠檢查有整夜睡眠多項生理檢查(PSG)、陽壓呼吸器調整(CPAP titration)、日間多次入睡檢查(MSLT)、經皮二氧化碳(PtcCO<sub>2</sub>)、二十四小時血氧記錄，以及二十四小時腕動計(Actigraph)。

目前，標準診斷睡眠呼吸中止需要接受整夜睡眠多項生理檢查。嚴重度依呼吸中止或減弱指數(AHI，指睡眠中每小時呼吸發生中止或減弱的次數)而定，小於5次為正常、5-15次為輕度、15-30次為中度、大於30次為重度。

治療的方式有連續陽壓呼吸輔助器，是中度到重度和輕度到中度但有症狀的阻塞性睡眠呼吸中止的治療方法，一天約使用5.5-6小時才有效果；若有心血管疾病的患者則無效。另一種治療方式為口內矯正器，是藉由不同形式的矯正器將下顎舌頭及軟顎向前拉，打開呼吸道，以擴大呼吸道來減少呼吸阻塞。另外減重也可以降低睡眠呼吸中止的次數。不是所有人皆適合使用CPAP，有些需藉外科手術治療。懸壅顎咽整形術，移除喉部在睡眠時阻塞氣道的多餘組織。其他手術方法包括下顎骨前置術及上下顎骨前置術。

睡眠呼吸中止是種異質複雜的疾病，可能導致慢性間歇性缺氧和睡眠破碎，AHI是睡眠呼吸中止嚴重程度的替代指標，與疾病嚴重程度無關，治療上很重要，根據症狀、病人特異性去作單獨調整。

## Mechanism of OSA Consequence



# STOP-Bang 問卷

以下問題回答為「是」或「否」：

第1題：打鼾：是否您打鼾很大聲(比說話還大聲，或者大聲到關著房門都聽得見)？

第2題：疲倦：白天時，是否您時常感到疲倦或者容易打瞌睡？

第3題：觀察：有任何人曾觀察到您睡眠中會呼吸暫停嗎？

第4題：血壓：您是否有高血壓，或者正在服用高血壓藥物控制血壓？

第5題：身體質量指數BMI：BMI大於35kg/m<sup>2</sup>？

第6題：年齡：年紀大於50歲？

第7題：頸圍：頸圍大於40公分？

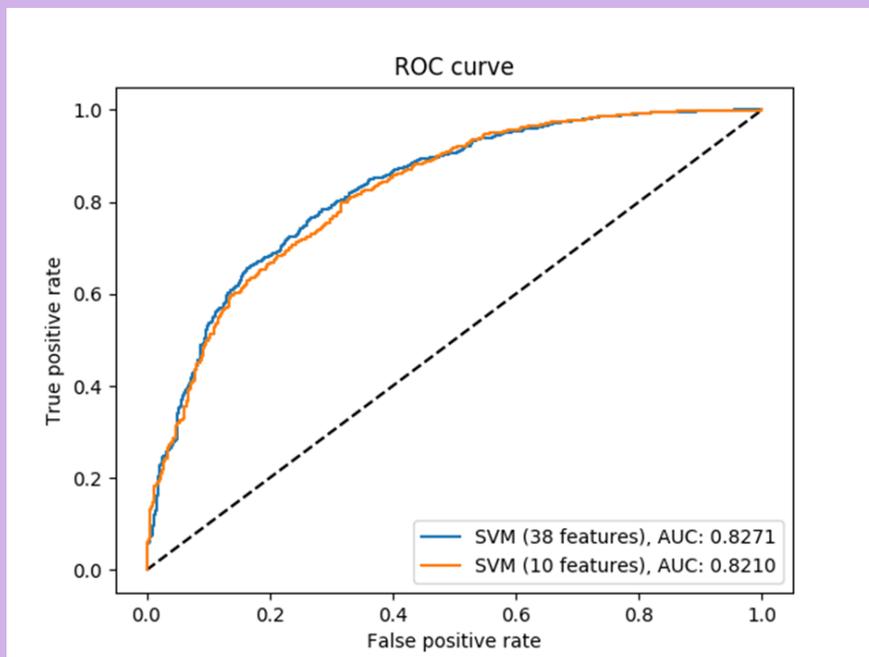
第8題：性別：男性。

計分標準：

如果「三題以上」回答為「是」者，為阻塞性睡眠呼吸中止的危險群。

Anesthesiology 2008; 108:812-821

## Prediction of OSA (AHI≥10) :38-Feats vs 10-Feats



Model	AUC	ACC	TPR	TNR	PPV	LR+	LR-
38-Feat	0.827	0.780	0.835	0.649	0.850	2.379	0.254
10-Feat	0.821	0.774	0.844	0.609	0.835	2.159	0.256

# Phenotyping with Multiple Trait: Sleep Disturbance, Sleepiness, Co-morbidities

- 822 moderate-to-severe OSA (AHI $\geq$ 15/hr) clustered with Latent class analysis (LCA)

TABLE 1 Demographic and clinical characteristics of the total cohort and by clusters

	Total cohort	Cluster 1	Cluster 2	Cluster 3	p-value
Subjects n	822	269	203	350	
% of total	100	32.7	24.7	42.6	
Males n (%)	666 (81.0)	211 (78.4)	170 (83.7)	285 (81.4)	0.336
Age years	54.5 $\pm$ 10.6	54.1 $\pm$ 11.0	56.6 $\pm$ 10.3	53.6 $\pm$ 10.3	0.005
BMI kg·m <sup>-2</sup>	33.5 $\pm$ 5.7	33.3 $\pm$ 5.6	33.0 $\pm$ 5.6	34.0 $\pm$ 5.8	0.130
AHI events·hour <sup>-1</sup>	44.9 $\pm$ 20.7	43.8 $\pm$ 20.4	43.1 $\pm$ 18.9	46.7 $\pm$ 21.7	0.181
ODI events·hour <sup>-1</sup>	35.5 $\pm$ 20.2	34.0 $\pm$ 18.4	33.5 $\pm$ 18.9	37.8 $\pm$ 21.9	0.117
Minimum oxygen saturation %	76.2 $\pm$ 8.0	76.5 $\pm$ 7.8	76.7 $\pm$ 7.7	75.7 $\pm$ 8.4	0.385
SF-12 physical component score	40.3 $\pm$ 10.9	39.7 $\pm$ 10.5	45.4 $\pm$ 9.9	37.7 $\pm$ 10.7	<0.001
SF-12 mental component score	48.3 $\pm$ 10.9	46.9 $\pm$ 11.2	52.9 $\pm$ 9.6	46.6 $\pm$ 10.7	<0.001

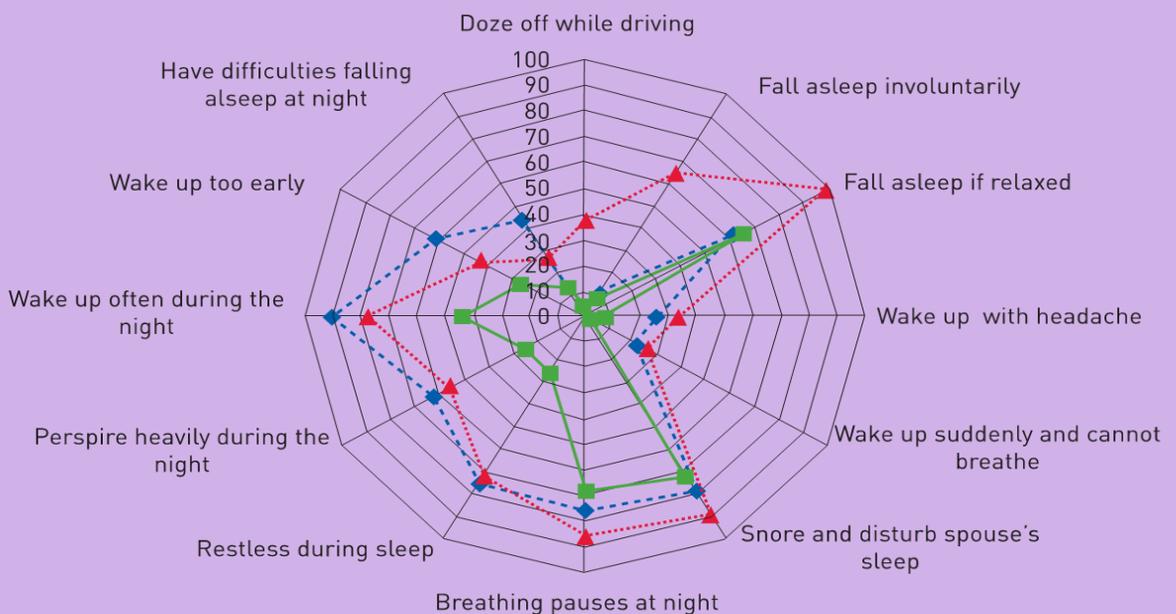
Cluster 1 Disturbed sleep group

Cluster 2 Minimally symptomatic group

Cluster 3 Excessive daytime sleepiness group

## Conditional Probability of 12 Symptoms within Cluster

—◆— Disturbed sleep group —■— Minimally symptomatic group —▲— Excessive daytime sleepiness group



# Phenotyping with Multiple Trait: Symptoms, Co-morbidities, and Anthropometrics

- 18,263 moderate-to-severe OSA (AHI $\geq$ 15/hr) clustered with multiple correspondence analysis (MCA)

**Table 1. Patients characteristics of the entire cohort and by clusters: Anthropometric and demographic characteristics.**

	All clusters N = 18,263	Cluster 1 N = 1,823	Cluster 2 N = 4,200	Cluster 3 N = 3,363	Cluster 4 N = 2,715	Cluster 5 N = 3,511	Cluster 6 N = 2,642
Age (years)	59 [50; 67]	48 [41;55]	63 [56;71]	66 [60;74]	49 [40;57]	56 [48;63]	60 [54;66]
Gender (male)	13,465 (73.8)	1,427 (78.3)	3,138 (74.7)	2,349 (69.8)	2,209 (81.4)	2,432 (69.3)	1,910 (72.3)
BMI (kg/m <sup>2</sup> )	31 [27;36]	29 [26;35]	31 [27;35]	33 [29;38]	28 [25;33]	31 [27;36]	33 [29;37]
Waist circumference (cm)	109 [100;120]	104 [96;116]	108 [100;119]	115 [106;124]	100 [92;111]	108 [99;118]	113 [104;122]
Sedentary	3071 (16.8)	233 (12.8)	272 (6.5)	1021 (30.4)	90 (3.3)	538 (15.3)	917 (34.7)
Current smoker	2838 (15.5)	562 (30.8)	357 (8.5)	207 (6.2)	721 (26.5)	632 (18)	360 (13.6)
Former smoker	5366 (29.4)	338 (18.5)	1156 (27.5)	1570 (46.7)	324 (11.9)	912 (26)	1068 (40.4)
Systolic Blood pressure (mmHg)	130 [125;140]	130 [120;140]	130 [130;140]	140 [130;147]	130 [120;140]	130 [124;140]	140 [130;150]
Diastolic Blood pressure (mmHg)	80 [70;86]	80 [70;86]	80 [70;84]	80 [70;85]	80 [70;80]	80 [70;88]	80 [70;90]

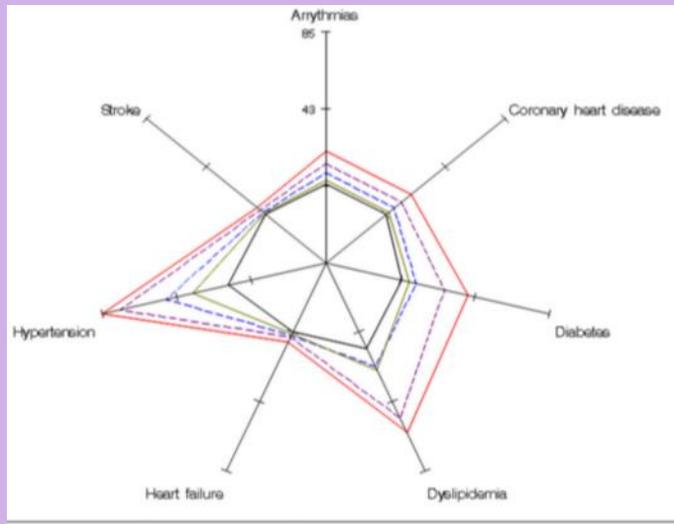
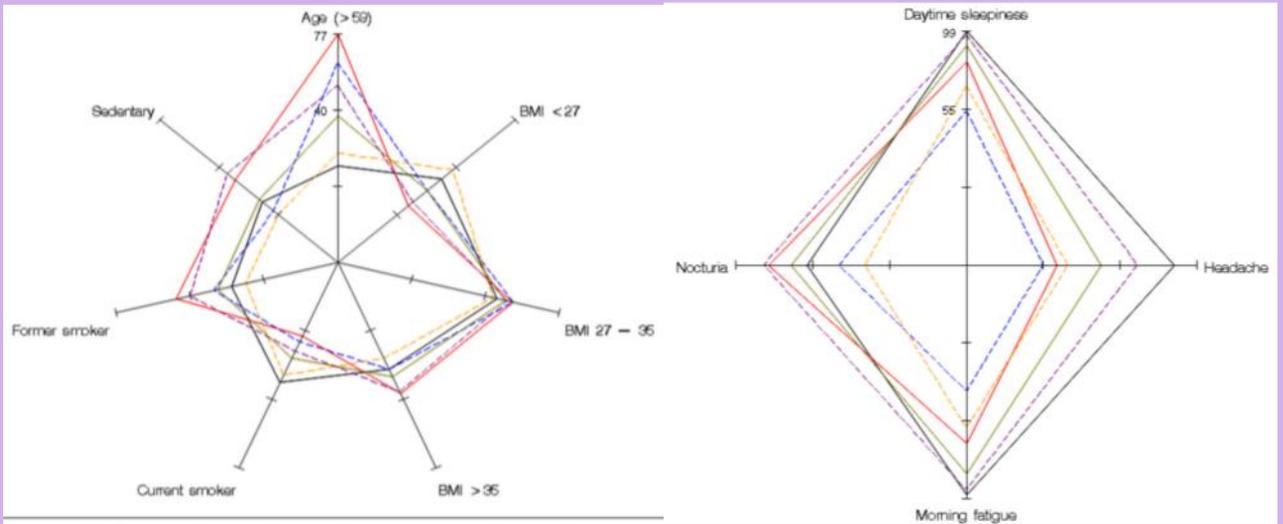
**Table 2. Patients characteristics of the entire cohort and by clusters: Co-morbidities.** Values in Numbers (%).

	All clusters N = 18,263	Cluster 1 N = 1,823	Cluster 2 N = 4,200	Cluster 3 N = 3,363	Cluster 4 N = 2,715	Cluster 5 N = 3,511	Cluster 6 N = 2,642
<b>Cardiovascular and metabolic co-morbidities</b>							
Coronary heart disease	1402 (7.7)	19 (1)	295 (7)	642 (19.1)	17 (0.6)	101 (2.9)	328 (12.4)
Arrhythmias	1562 (8.6)	28 (1.5)	343 (8.2)	689 (20.5)	22 (0.8)	139 (4)	341 (12.9)
Stroke	594 (3.3)	13 (0.7)	141 (3.4)	244 (7.3)	10 (0.4)	63 (1.8)	124 (4.7)
Heart failure	538 (2.9)	11 (0.6)	116 (2.8)	250 (7.4)	10 (0.4)	54 (1.5)	99 (3.7)
Hypertension	8462 (46.4)	254 (13.9)	2050 (48.8)	2857 (84.9)	115 (4.2)	1203 (34.3)	1988 (75.1)
Diabetes	2683 (14.7)	44 (2.4)	408 (9.7)	1306 (38.8)	7 (0.3)	221 (6.3)	697 (26.4)
Dyslipidemia	5552 (30.4)	195 (10.7)	922 (22)	2090 (62.1)	104 (3.8)	834 (23.8)	1407 (53.3)
<b>Other co-morbidities</b>							
Respiratory co-morbidities *	1171 (6.4)	56 (3.1)	229 (5.5)	388 (11.5)	56 (2.1)	178 (5.1)	264 (10)
Depression	2573 (14.1)	229 (12.6)	325 (7.7)	604 (18)	142 (5.2)	578 (16.5)	698 (26.4)

**Table 3. Patients characteristics of the entire cohort and by clusters: Sleep characteristics. OSAS symptoms and functional scales.**

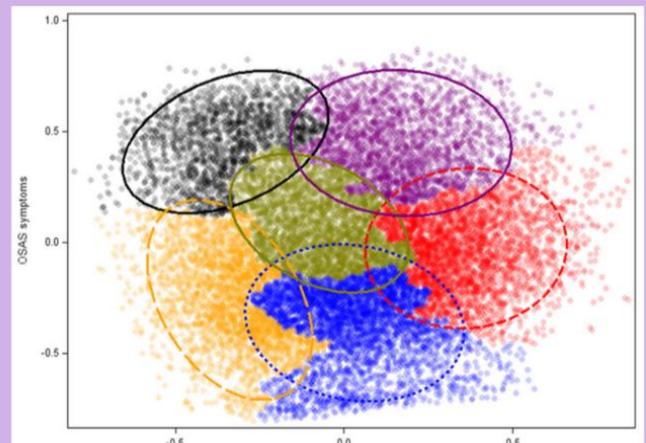
	All cluster N = 18,263	Cluster 1 N = 1,823	Cluster 2 N = 4,200	Cluster 3 N = 3,363	Cluster 4 N = 2,715	Cluster 5 N = 3,511	Cluster 6 N = 2,642
<b>Sleep characteristics</b>							
Self-reported sleep duration (hours)	7 [6; 8]	7 [6;8]	7.5 [6.5;8]	7.5 [6;8]	7 [6;8]	7 [6;8]	7 [6;8]
Short sleeper (<6h)	1465 (8)	168 (13.2)	206 (11)	284 (12.1)	175 (11.8)	342 (13.6)	290 (14.1)
Intermediate sleeper (6h-9h)	8558 (46.9)	970 (76.1)	1429 (76.3)	1662 (71.1)	1190 (80.5)	1860 (73.8)	1447 (70.4)
Very long sleeper (>9h)	1516 (8.3)	136 (10.7)	239 (12.8)	393 (16.8)	113 (7.6)	317 (12.6)	318 (15.5)
AHI (/h)	35 [26; 51]	31.6 [22;47]	34 [26;47.4]	40 [30;55]	31 [22;42]	34 [25;50]	39 [29;58]
ODI (/h)	27 [16; 45]	23 [13;40.9]	26 [15.9;41]	33 [21;50]	21 [11.8;35]	25 [14.2;42]	31 [18;51]
Time spent with nocturnal SaO <sub>2</sub> below 90% (%)	34 [9; 104]	20 [5;72]	32 [9;91]	59 [18;148]	15 [4;50]	29 [8;89]	49 [15;130]
<b>OSAS symptoms</b>							
Snoring	16955 (92.4)	1818 (99.7)	3314 (78.8)	3226 (95.9)	2484 (91.5)	3434 (97.8)	2614 (98.8)
Self-declared daytime sleepiness	14451 (79.2)	1812 (99.4)	2261 (53.8)	2755 (81.9)	1856 (68.3)	3197 (91.1)	2577 (97.4)
Morning fatigue	12740 (69.8)	1770 (97.1)	1618 (38.5)	2293 (68.2)	1612 (59.4)	2975 (84.7)	2480 (93.7)
Nocturia	10647 (58.3)	1060 (58.1)	1670 (39.7)	2695 (80.1)	672 (24.7)	2361 (67.2)	2194 (82.9)
Headaches	6578 (36)	1567 (86)	446 (10.6)	632 (18.8)	667 (24.6)	1544 (44)	1726 (65.2)
Near miss accident	1389 (7.6)	348 (19.1)	77 (1.8)	133 (4)	158 (5.8)	305 (8.7)	368 (13.9)
<b>Functional scales</b>							
Pichot Scale	13 [6; 20]	16 [9;22]	7.5 [3;14]	12 [6;19]	10 [4;17]	14 [8;20]	16 [10;22]
Depression scale	3 [1; 7]	4 [1;7]	2 [0;5]	3 [1;7]	2 [0;5]	4 [1;7]	5 [2;8]
Epworth scale	10 [6; 14]	12 [8;15]	8 [5;12]	9 [6;13]	10 [6;14]	11 [7;14]	11 [7;14]

# Conditional Probability of Age, Risk Factors, Symptoms, Co-morbidities



## Cluster

- 1: Young symptomatic
- 2: Old obese
- 3: Multi-disease old obese
- 4: Young snorers
- 5: Drowsy obese
- 6: Multi-disease obese symptomatic



# Phenotyping with Complex Trait: Sleep Disturbance, Sleepiness, Co-morbidities PAP Adherence

**Table 1:** Demographic and clinical characteristics of the ISAC symptom clusters

Variable	Baseline Characteristics				<i>p</i> <sup>*</sup>
	Overall	Disturbed Sleep	Minimally Symptomatic	Sleepy	
<i>N</i> (%)	706 (100)	229 (32.4)	170 (24.1)	307 (43.5)	–
Male, %	80.6%	77.7%	84.1%	80.8%	0.278
Age, years	54.7 ± 10.3	54.4 ± 10.8	56.8 ± 10.0	53.8 ± 10.0	<b>0.008</b>
BMI, kg/m <sup>2</sup>	33.6 ± 5.7	33.7 ± 5.6	33.0 ± 5.4	34.0 ± 5.9	0.194
AHI, events/hour	45.9 ± 19.9	44.8 ± 18.8	43.6 ± 18.0	47.9 ± 21.5	0.135
ODI, events/hour	36.3 ± 19.8	34.4 ± 17.4	34.5 ± 18.6	38.7 ± 21.9	0.132
SaO <sub>2</sub> Nadir	76.1 ± 8.1	76.4 ± 7.9	76.5 ± 7.6	75.5 ± 8.5	0.447
% Time SaO <sub>2</sub> <90	14.1 ± 18.2	13.3 ± 18.7	12.4 ± 16.2	15.7 ± 18.8	0.166
SF-12 Physical <sup>†</sup>	40.1 ± 11.0	39.7 ± 10.7	45.2 ± 10.0	37.6 ± 10.7	<b>&lt;0.0001</b>
SF-12 Mental <sup>†</sup>	48.3 ± 10.7	47.2 ± 11.1	52.7 ± 9.8	46.8 ± 10.2	<b>&lt;0.0001</b>

**Table 3:** Comparisons of PAP adherence and usage among symptom clusters

Variable	Symptom Clusters			<i>p</i>
	Disturbed Sleep	Minimally Symptomatic	Sleepy	
<i>N</i> (%)	229 (32.4)	170 (24.1)	307 (43.5)	–
Any PAP Usage, n (%)	140 (61.1)	102 (60.0)	215 (70.0)	<b>0.034<sup>†</sup></b>
PAP Usage Group, n (%)				0.085
Full User	112 (48.9)	84 (49.1)	165 (53.8)	
Partial User	28 (12.2)	18 (10.6)	50 (16.3)	
Non-user	89 (38.9)	68 (40.0)	92 (30.0)	
Hours PAP Usage <sup>‡</sup>				
Mean ± SD	6.5 ± 2.3	6.2 ± 1.7	6.4 ± 1.9	0.596
Median (Range)	6.9 (0.1, 10.4)	6.5 (0.3, 9.7)	6.9 (0.6, 10.4)	0.160
Nights PAP Used <sup>‡</sup>				
Mean ± SD	24.2 ± 6.6	23.8 ± 6.2	24.5 ± 5.9	0.720
Median (Range)	28 (1, 28)	26 (1, 28)	27 (2, 28)	0.183

# Changes in Symptoms within and between Cluster

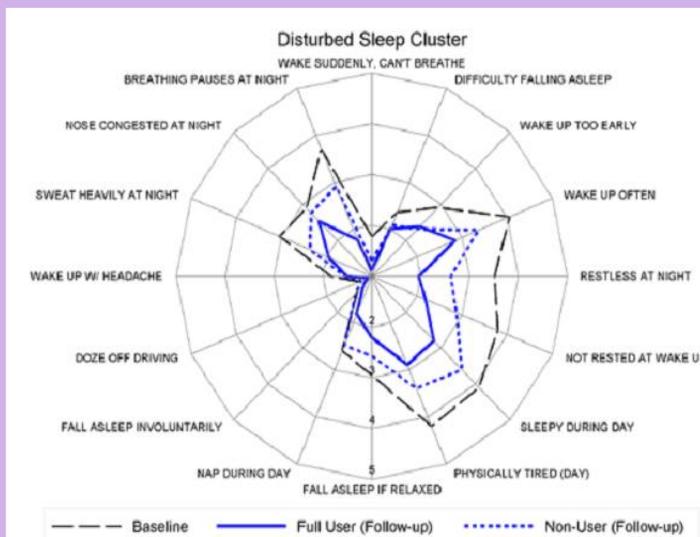
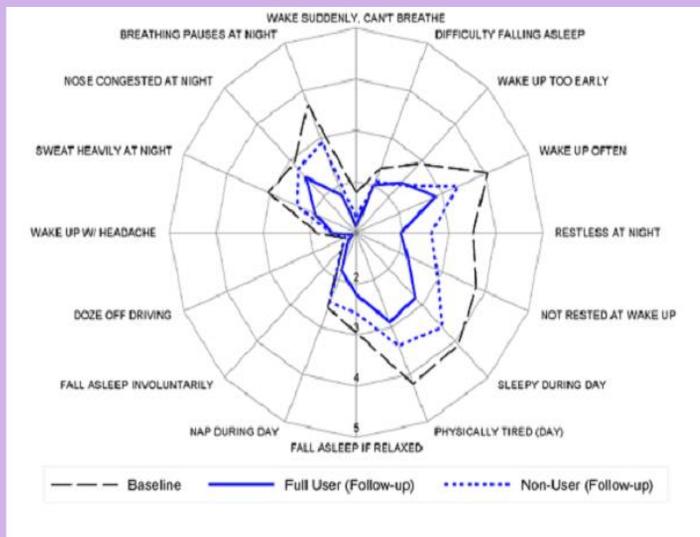
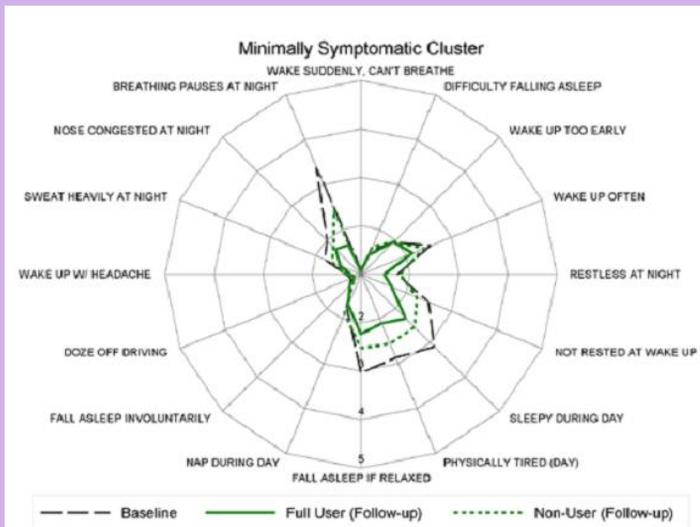
Symptom Measures	Estimate (95% CI) <sup>Ⓐ</sup>			Overall p <sup>Ⓒ</sup>	Pairwise Differences Estimates <sup>Ⓓ</sup>		
	Disturbed Sleep (DS)	Minimally Symptomatic (MS)	Sleepy (S)		DS vs. MS	DS vs. S	MS vs. S
<b>Sleepiness &amp; Fatigue</b>							
Epworth Sleepiness Scale	-2.06 (-2.64, -1.48) <sup>§</sup>	-1.33 (-2.00, -0.66) <sup>§</sup>	-5.31 (-5.81, -4.81) <sup>§</sup>	<0.0001	-0.19 (-0.42, 0.04)	0.84 (0.65, 1.04) <sup>¶</sup>	1.03 (0.82, 1.25) <sup>¶</sup>
I feel sleepy during the day	-0.94 (-1.13, -0.75) <sup>§</sup>	-0.68 (-0.91, -0.46) <sup>§</sup>	-1.41 (-1.57, -1.24) <sup>§</sup>	<0.0001	-0.22 (-0.47, 0.03)	0.40 (0.18, 0.62) <sup>¶</sup>	0.62 (0.38, 0.86) <sup>¶</sup>
I fall asleep involuntarily during the day	-0.04 (-0.21, 0.13)	-0.04 (-0.24, 0.16)	-1.31 (-1.45, -1.16) <sup>§</sup>	<0.0001	0.00 (-0.24, 0.25)	1.18 (0.97, 1.39) <sup>¶</sup>	1.18 (0.94, 1.41) <sup>¶</sup>
I fall asleep if I relax (TV)	-0.56 (-0.73, -0.39) <sup>§</sup>	-0.58 (-0.78, -0.39) <sup>§</sup>	-1.21 (-1.36, -1.07) <sup>§</sup>	<0.0001	0.02 (-0.19, 0.23)	0.53 (0.35, 0.71) <sup>¶</sup>	0.51 (0.31, 0.70) <sup>¶</sup>
I take a nap during the day	-0.48 (-0.65, -0.30) <sup>§</sup>	-0.01 (-0.22, 0.19)	-0.58 (-0.73, -0.43) <sup>§</sup>	<0.0001	-0.36 (-0.56, -0.15) <sup>¶</sup>	0.08 (-0.10, 0.26)	0.44 (0.24, 0.63) <sup>¶</sup>
I doze off at the steering wheel when driving	-0.11 (-0.23, 0.02)	-0.09 (-0.24, 0.05)	-0.82 (-0.92, -0.71) <sup>§</sup>	<0.0001	-0.02 (-0.26, 0.23)	0.92 (0.71, 1.13) <sup>¶</sup>	0.94 (0.71, 1.17) <sup>¶</sup>
I feel physically tired during the day	-1.07 (-1.25, -0.88) <sup>§</sup>	-0.53 (-0.74, -0.32) <sup>§</sup>	-1.54 (-1.70, -1.39) <sup>§</sup>	<0.0001	-0.48 (-0.73, -0.23) <sup>¶</sup>	0.43 (0.21, 0.64) <sup>¶</sup>	0.91 (0.67, 1.15) <sup>¶</sup>
<b>Insomnia-Related</b>							
I have difficulties falling asleep at night	-0.28 (-0.44, -0.13) <sup>§</sup>	-0.03 (-0.21, 0.15)	-0.01 (-0.14, 0.13)	0.021	∅	∅	∅
I fall back to sleep	-0.54 (-0.73, -0.35) <sup>§</sup>	0.09 (-0.13, 0.31)	-0.04 (-0.2, 0.13)	<0.0001	-0.46 (-0.68, -0.25) <sup>¶</sup>	-0.37 (-0.55, -0.19) <sup>¶</sup>	0.09 (-0.11, 0.29)
I wake up often during the night	-0.90 (-1.1, -0.69) <sup>§</sup>	-0.26 (-0.50, -0.03)	-0.92 (-1.1, -0.74) <sup>§</sup>	<0.0001	-0.46 (-0.68, -0.23) <sup>¶</sup>	0.02 (-0.18, 0.21)	0.47 (0.26, 0.69) <sup>¶</sup>
I feel rested when I wake up	-1.25 (-1.46, -1.05) <sup>§</sup>	-0.13 (-0.37, 0.11)	-1.10 (-1.27, -0.92) <sup>§</sup>	<0.0001	-0.81 (-1.04, -0.59) <sup>¶</sup>	-0.11 (-0.31, 0.08)	0.70 (0.49, 0.91) <sup>¶</sup>
I wake up suddenly and feel as if	1.27 (1.07, 1.47) <sup>§</sup>	0.52 (0.29, 0.74) <sup>§</sup>	1.69 (1.52, 1.86) <sup>§</sup>	<0.0001	0.60 (0.36, 0.83) <sup>¶</sup>	-0.34 (-0.54, -0.13) <sup>¶</sup>	-0.93 (-1.16, -0.71) <sup>¶</sup>
<b>Apneic</b>							
I have been told that I stop breathing at night	-1.29 (-1.55, -1.04) <sup>§</sup>	-1.32 (-1.62, -1.03) <sup>§</sup>	-1.77 (-1.99, -1.55) <sup>§</sup>	0.009	0.02 (-0.25, 0.29)	0.32 (0.09, 0.56) <sup>¶</sup>	0.30 (0.05, 0.56)
Any loud snoring	0.02 (0.01, 0.07) <sup>§</sup>	0.06 (0.02, 0.17) <sup>§</sup>	N/A	N/A	0.35 (0.11, 1.09)	N/A	N/A
I snore loudly and it disturbs my	0.10 (0.05, 0.19) <sup>§</sup>	0.14 (0.07, 0.28) <sup>§</sup>	0.02 (0.01, 0.05) <sup>§</sup>	<0.0001	0.70 (0.30, 1.66)	5.01 (2.11, 11.9) <sup>¶</sup>	7.14 (2.86, 17.8) <sup>¶</sup>
My nose is congested at night	-0.28 (-0.48, -0.08) <sup>§</sup>	-0.25 (-0.48, -0.02)	-0.54 (-0.71, -0.37) <sup>§</sup>	0.065	∅	∅	∅
I wake up with a headache	-0.30 (-0.42, -0.17) <sup>§</sup>	-0.08 (-0.23, 0.07)	-0.50 (-0.61, -0.39) <sup>§</sup>	<0.0001	-0.23 (-0.44, -0.03)	0.21 (0.04, 0.39)	0.44 (0.25, 0.64) <sup>¶</sup>
<b>Other</b>							
I perspire heavily during the night	-0.90 (-1.08, -0.72) <sup>§</sup>	-0.26 (-0.47, -0.05)	-0.65 (-0.81, -0.5) <sup>§</sup>	<0.0001	-0.49 (-0.70, -0.28) <sup>¶</sup>	-0.19 (-0.37, -0.01)	0.30 (0.10, 0.50) <sup>¶</sup>
Presence of RLS	0.43 (0.26, 0.72) <sup>§</sup>	0.57 (0.25, 1.26)	0.33 (0.21, 0.52) <sup>§</sup>	0.445	∅	∅	∅

# Changes in Co-morbidities, BMI, BP, and QoL Among Clusters

Table 5: Adjusted models for changes in comorbidities, BMI, blood pressure and quality of life within and between symptom clusters<sup>†</sup>

Measure	Estimate (95% CI) <sup>Ⓐ</sup>			Overall p <sup>Ⓒ</sup>	Pairwise Differences Estimates <sup>Ⓓ</sup>		
	Disturbed Sleep (DS)	Minimally Symptomatic (MS)	Sleepy (S)		DS vs. MS	DS vs. S	MS vs. S
Hypertension	0.67 (0.32, 1.41)	2.25 (0.93, 5.40)	0.97 (0.52, 1.82)	0.116	∅	∅	∅
Cardiovascular Disease	0.65 (0.18, 2.39)	5.40 (1.34, 21.8)	1.16 (0.37, 3.64)	0.083	∅	∅	∅
Obstructive Lung Disease	1.38 (0.58, 3.28)	1.12 (0.37, 3.41)	1.11 (0.52, 2.35)	0.925	∅	∅	∅
Diabetes Mellitus	2.07 (0.51, 8.40)	4.15 (0.69, 25.1)	N/A	N/A	0.50 (0.05, 4.66)	N/A	N/A
Body Mass Index	0.66 (0.37, 0.96) <sup>§</sup>	0.66 (0.32, 1.01) <sup>§</sup>	0.35 (0.09, 0.60) <sup>§</sup>	0.188	∅	∅	∅
Diastolic Blood Pressure	-0.11 (-1.37, 1.16)	-2.58 (-4.06, -1.10) <sup>§</sup>	-2.81 (-3.9, -1.71) <sup>§</sup>	0.004	0.26 (0.06, 0.46) <sup>¶</sup>	0.28 (0.11, 0.46) <sup>¶</sup>	0.02 (-0.17, 0.22)
Systolic Blood Pressure	2.01 (0.20, 3.81)	-0.41 (-2.53, 1.70)	1.31 (-0.25, 2.88)	0.223	∅	∅	∅
SF-12 Physical Component	0.96 (-0.27, 2.20)	1.23 (-0.21, 2.67)	4.82 (3.77, 5.88) <sup>§</sup>	<0.0001	-0.03 (-0.22, 0.16)	-0.38 (-0.55, -0.22) <sup>¶</sup>	-0.36 (-0.53, -0.18) <sup>¶</sup>
SF-12 Mental Component	3.26 (1.77, 4.75) <sup>§</sup>	0.61 (-1.12, 2.35)	2.80 (1.53, 4.07) <sup>§</sup>	0.057	∅	∅	∅

# Symptom Profile at Baseline and PAP



Baseline -----  
 Adherent —————  
 Non-adherent .....

# 李佩玲醫師和曾屏輝醫師一起研究發表的論文

RESEARCH ARTICLE

## A Higher Proportion of Metabolic Syndrome in Chinese Subjects with Sleep-Disordered Breathing: A Case-Control Study Based on Electrocardiogram-Derived Sleep Analysis

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Table 3. Logistic regression analysis for sleep-disordered breathing based on metabolic parameters.

Variables	Univariate analyses			Multivariate analyses		
	Crude OR	95% CI	P-value*	Adjusted OR	95% CI	P-value*
BMI	1.27	1.10–1.46	.001			
Waist circumference	1.10	1.04–1.16	< .001	1.10	1.04–1.16	.001
Systolic blood pressure	1.03	1.00–1.05	.03			
Fasting blood glucose	1.03	1.01–1.05	.01			

Table 4. Comparison of metabolic syndrome and its various components between subjects with sleep-disordered breathing and the control group.

Metabolic syndrome component	SDB (n = 40)	Control (n = 80)	OR (CI)	P-value*
Waist circumference (central obesity)	29 (72.5)	34 (42.5)	3.6 (1.6–8.1)	.002
High blood pressure	19 (47.5)	29 (36.3)	0.6 (0.7–3.4)	.23
Low HDL	14 (35.0)	21 (26.3)	1.5 (0.7–3.4)	.32
Hyperglycemia	18 (45.0)	21 (26.3)	2.3 (1.0–5.1)	.04
Hypertriglyceridemia	17 (42.5)	29 (36.3)	1.3 (0.6–2.8)	.50
Number of MS components	2.4 ± 1.6	1.7 ± 1.4	-	.01
Metabolic syndrome	18 (45.0)	18 (22.5)	2.8 (1.2–6.3)	.01