Adaptation de la VNI et qualité du sommeil

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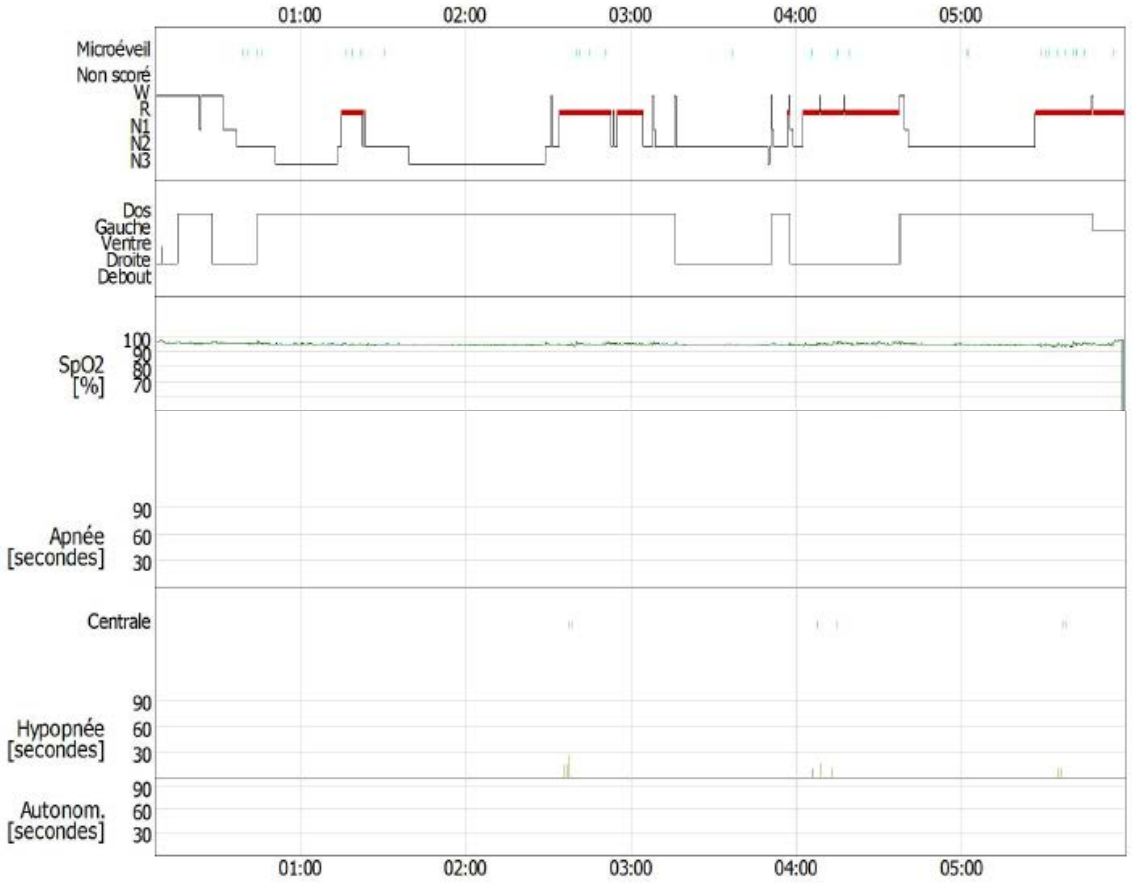
Sommeil sujet sain



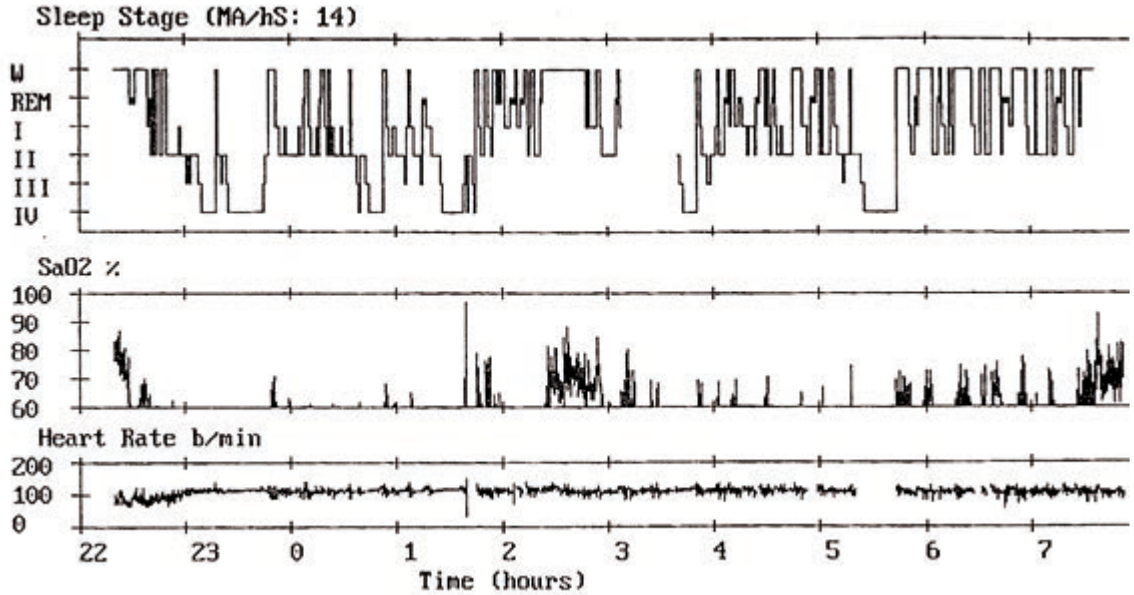
Architecture du sommeil:

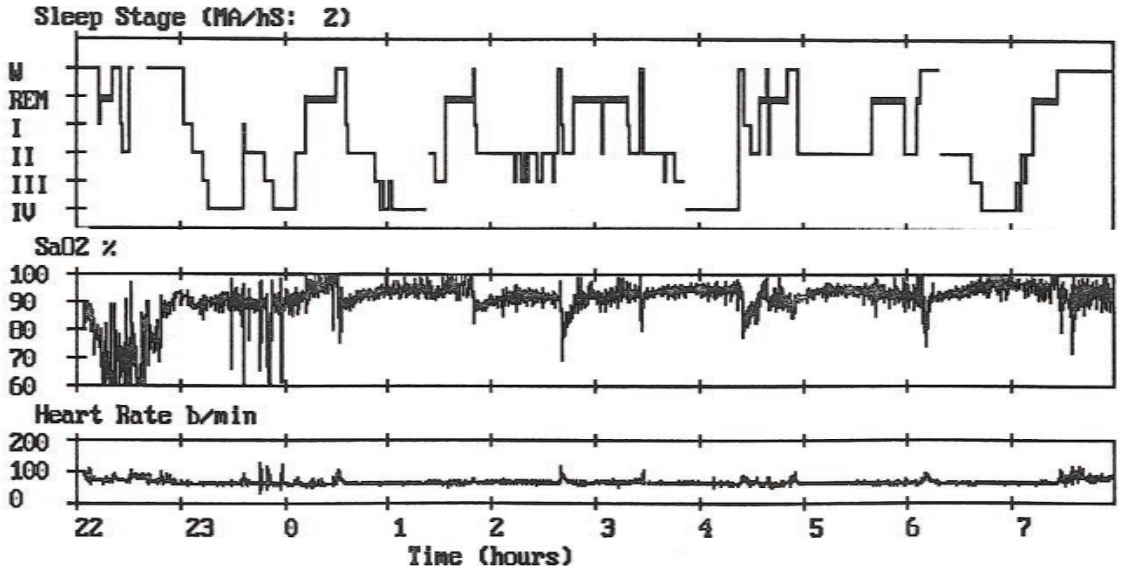
	Durée (min)	% TST	% PST
PST	353		
TST	322		
Eveil intra sommeil	30.4	-	4.2%
Stade 1	9	2.8%	2.7%
Stade 2	137	42.5%	40.8%
Stades 1+2 (SLL)	146	45.3%	43.5%
Stades 3 (SLP)	72.5	22.5%	21.6%
REM	103.6	32.2%	30.8%

Microstructure du sommeil:

	Total	Index TST
µéveils mouvements	0	0
µéveils respiratoires	2	0.4
Réactions d'éveils non spécifiques	28	5.2

VNI et sommeil





Contal; Sleep Medicine 2011

Retentissement de la VNI sur le sommeil

	N	Mean before NIV	Mean after NIV	Difference after and before NIV	P value
Total Sleep Time in min	60	340	343	3	0.82
Sleep efficiency in %	55	64	71	7	0.004
Sleep Latency in min	55	43	28	-15	0.07
REM in min	60	45	66	21	0.005
REM in % of TST	60	12	18	6	0.002
Sleep stage 1 in min	60	73	42	-31	0.001
Sleep stage 1 in % of TST	60	26	14	12	0.001
Sleep stage 2 in min	60	139	140	1	0.94
Sleep stage 2 in % of TST	60	40	41	1	0.83
SWS in min	55	87	98	11	0.26
SWS in % of TST	55	22	30	8	0.051
Micro Arousal	57	25	14	-11	0.003
Mean of SpO_2 in %	59	85	93	8	< 0.001
Minimum of SpO_2 in %	56	63	77	14	< 0.001
ODI	43	37	13	-24	< 0.001

Contal; Sleep Medicine 2011

VNI au long cours et asynchronie

Variables	Patients With PVA (n = 11)	Patients Without PVA (n = 9)	p Value†
TST, min	379 ± 64	395 ± 66	NS
Sleep efficiency, %	74.1 ± 11.0	69.1 ± 11.0	NS
Stage 1, %	17.6 ± 5.1	12.4 ± 2.2	0.008
Stage 2, %	56.2 ± 9.4	46.2 ± 9.5	0.031
Slow wave sleep, %	15.0 ± 10.0	23.6 ± 8.4	0.05
REM sleep, %	11.3 ± 3.3	17.9 ± 6.9	0.022
AHI, /h	5.1 ± 4.5	5.4 ± 5.9	NS
ODI, /h	7.6 ± 7.5	5.4 ± 5.0	NS
MAI, /h	30 ± 8	21 ± 9	0.032
Minimal Spo_2, %	79 ± 7	80 ± 6	NS
Mean Spo_2, %	90 ± 3	91 ± 3	NS
Mean $TcPco_2$, mm Hg	45 ± 6	43 ± 6	NS
Median $TcPco_2$, mm Hg	45 ± 6	44 ± 6	NS

Guo; Chest 2007

VNI et FUITES

VNI et fuites non intentionnelles

	Control	Taped	Delta	p-value
Leak $L \cdot s^{-1}$				
25th centile	0.08±0.01	0.03±0.02	-0.05±0.02	0.05
Median	0.35±0.07	0.06±0.03	-0.29±0.08	0.008
75th centile	0.61±0.08	0.09±0.04	-0.52±0.09	0.0005

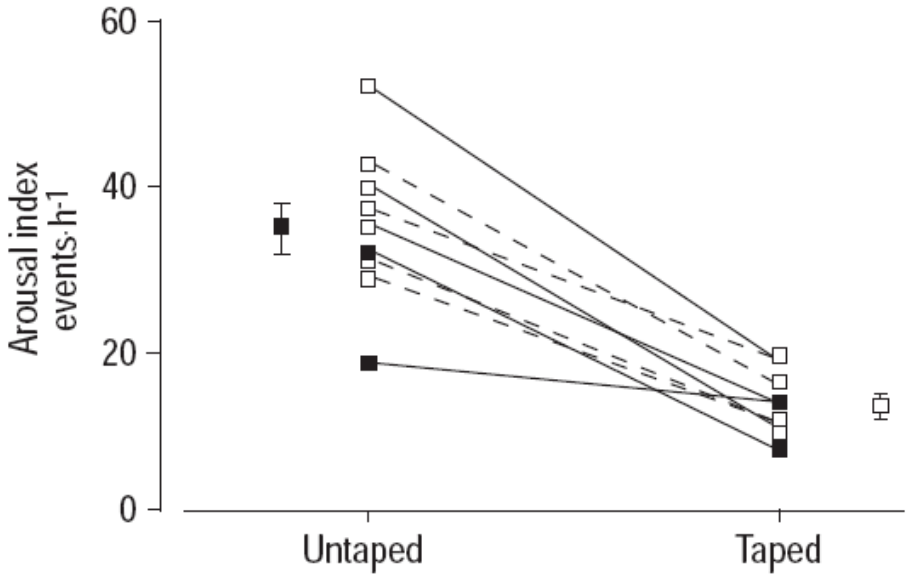


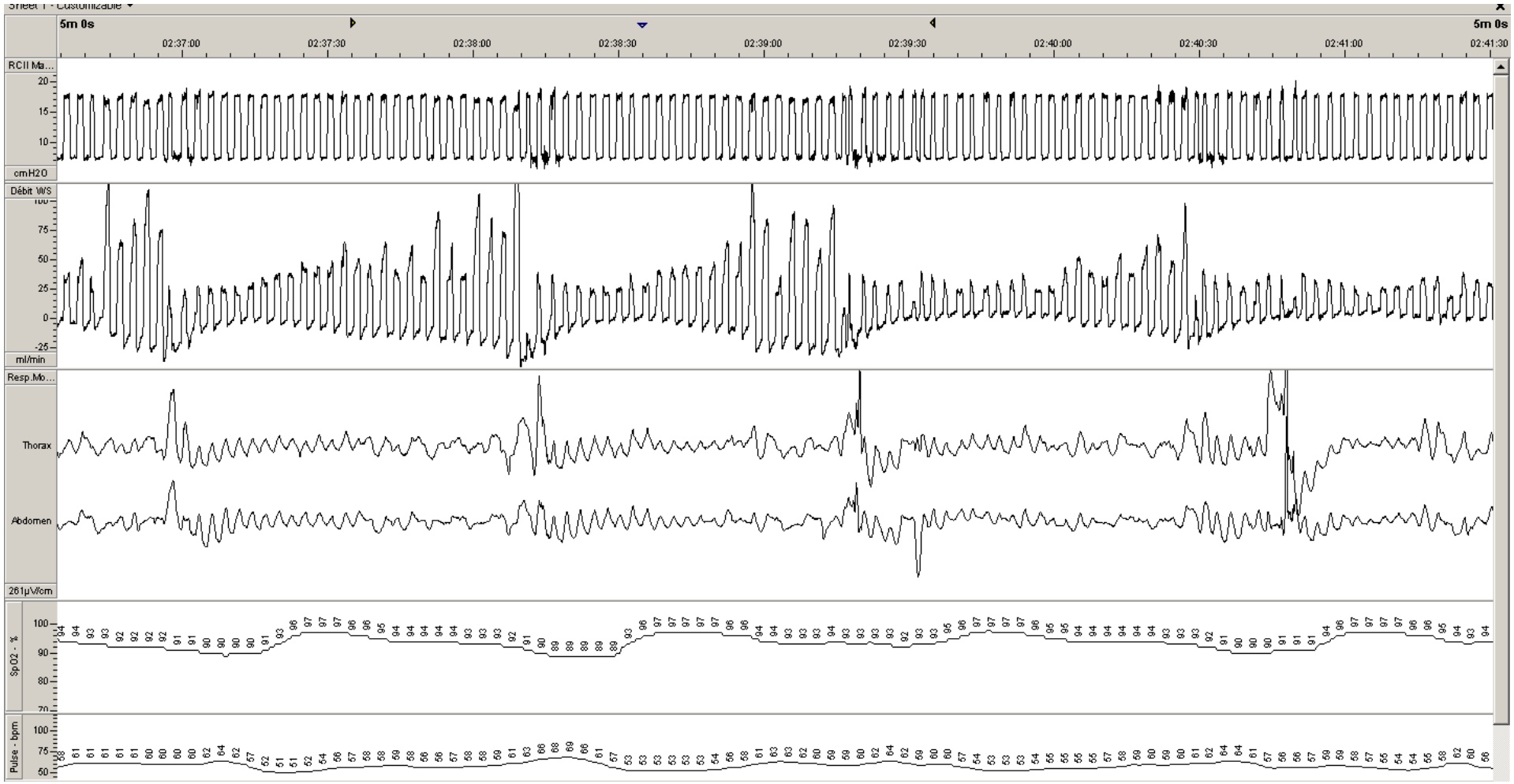
Table 3. – Effect of taping mouth on sleep architecture

	Control	Taped	Delta	p-value
Time available for sleep min	372±12	390±9	18±15	0.3
Total sleep time min	309±13	341±18	32±23	0.2
Sleep efficiency % time available	83.1±2.7	86.9±3.2	3.8±3.8	0.3
Sleep latency min	14.2±1.8	12.3±2.1	-1.9±2.3	0.4
Slow wave sleep % sleep time	13.1±1.6	19.5±2.2	6.4±3.4	0.09
REM sleep % sleep time	12.9±1.5	21.1±1.8	8.1±1.8	0.0016

Data are presented as mean±SEM. REM: rapid eye movement.

Teschler; ERJ 1999

Fuites et signaux respiratoires



Ventilation nocturne avec fuites

VNI – Sommeil - BPCO

VNI vs O_2 et sommeil

144 patients inclus en ITT BPCO sévère

Randomisés en OLD ou OLD + VNI (69 / 41 analysés)

Compliance VNI > à 4h00

Aide inspiratoire ≥ 5 cmH_2O

	LTOT	NIV + LTOT	NIV + LTOT
	Baseline	Baseline	NIV treatment
Total sleep time (min)	243 (226 to 260)	249 (231 to 267)	252 (234 to 271)
Sleep efficiency (%)	61.0 (56.8 to 65.2)	59.6 (55.4 to 63.8)	59.7 (55.7 to 63.7)
% NREM	85.0 (83.0 to 87.0)	86.7 (84.6 to 88.8)	82.6 (80.4 to 84.8)*
% REM	15.2 (13.2 to 17.3)	13.3 (11.2 to 15.4)	17.5 (15.3 to 19.7)*
Apnoea-hypopnoea index (events/h)	6.1 (4.8 to 7.5)	4.5 (3.4 to 5.6)	2.8 (1.6 to 4.0)*
$Tcco_2$ sleep increase (mm Hg)	18.8 (16.5 to 21.0)	16.5 (14.7 to 18.3)	12.6 (10.9 to 14.3)*
IPAP (cm H_2O)			12.9 (12.5 to 13.4)
EPAP (cm H_2O)			5.1 (4.8 to 5.3)

Mc Evoy, Thorax 2009

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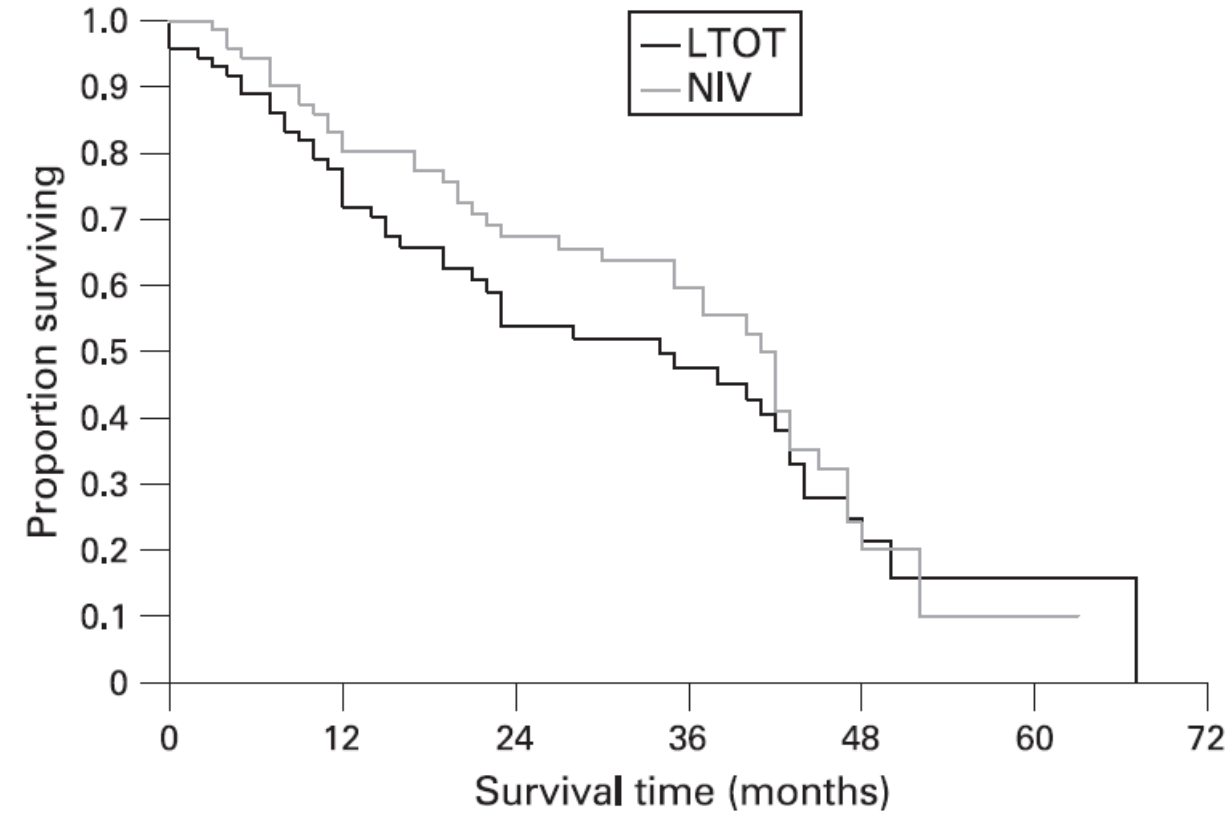
Mc Evoy, Thorax 2009

VNI et survie



Number at risk

LTOT	72	50	31	21	3	1	0
NIV	72	56	37	28	4	1	0

Mc Evoy, Thorax 2009

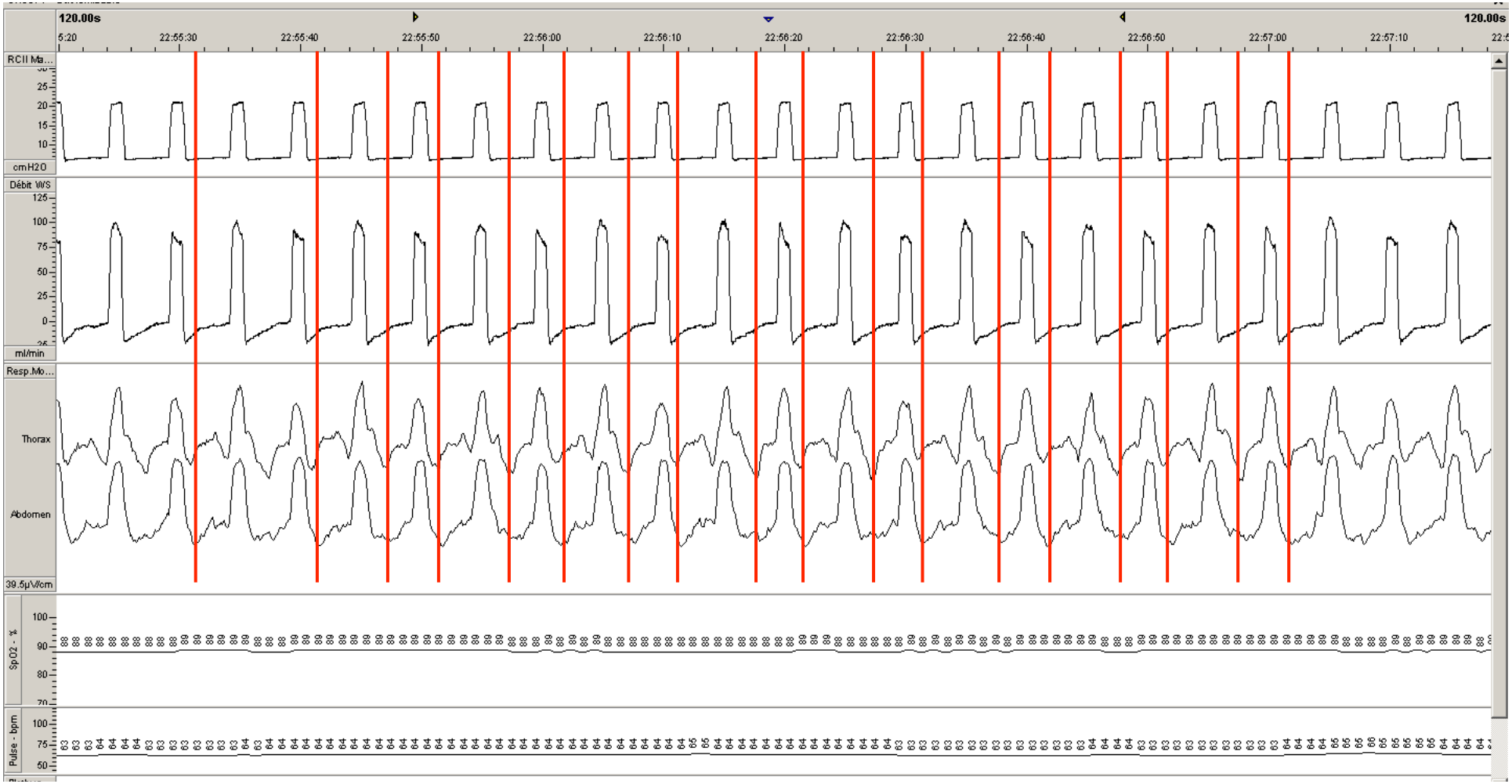
Ventilation synchronisée

Interactions patient-ventilateur et AI

- 8 patients BPCO
- 1ière nuit VNI standard
  - EPAP 5.4 ± 1.3 cmH_2O
  - AI 19 ± 2 cmH_2O
- 2ième nuit VNI adaptée
  - EPAP 6.3 ± 1.8 cmH_2O
  - AI 16.5 ± 2 cmH_2O

Adler; Sleep Breath 2011

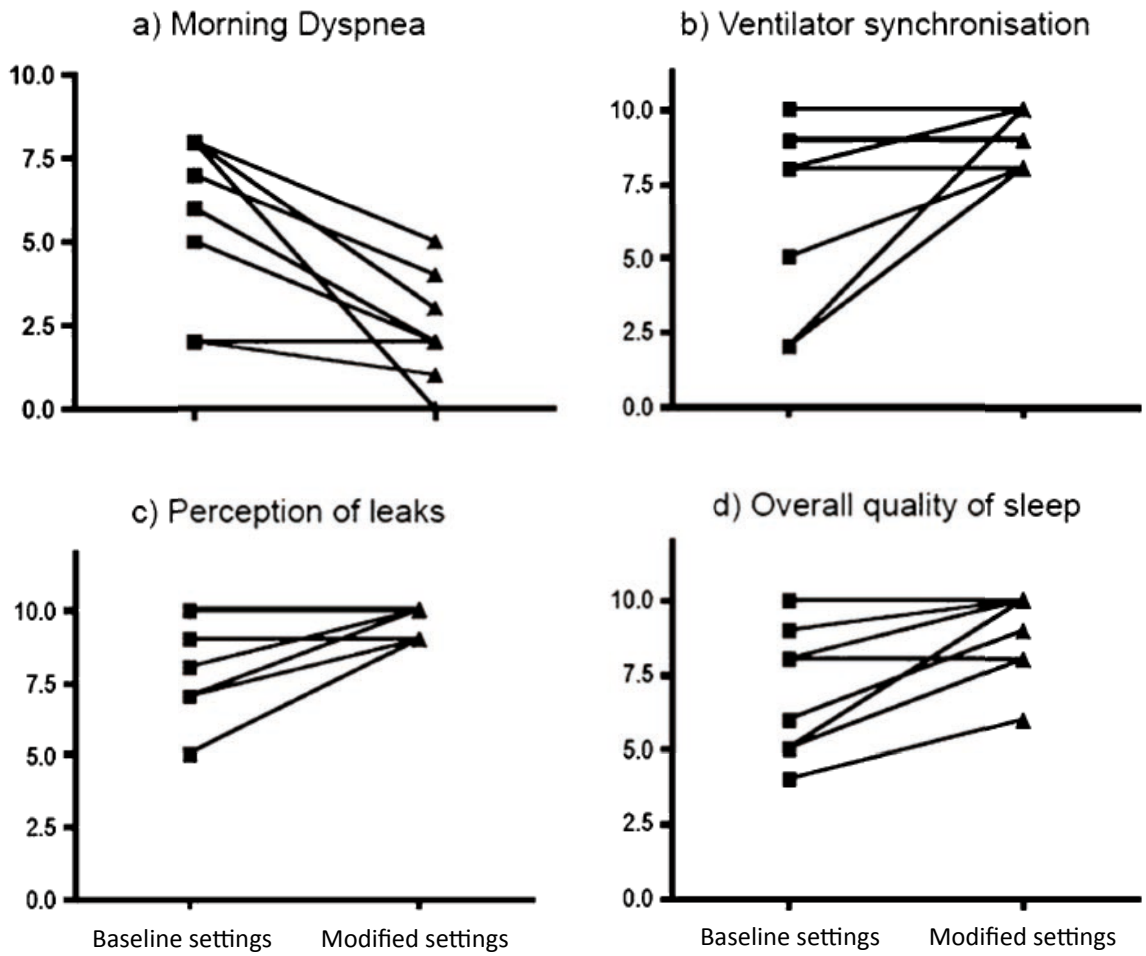
Cycles non récompensés



Dyspnée de déventilation

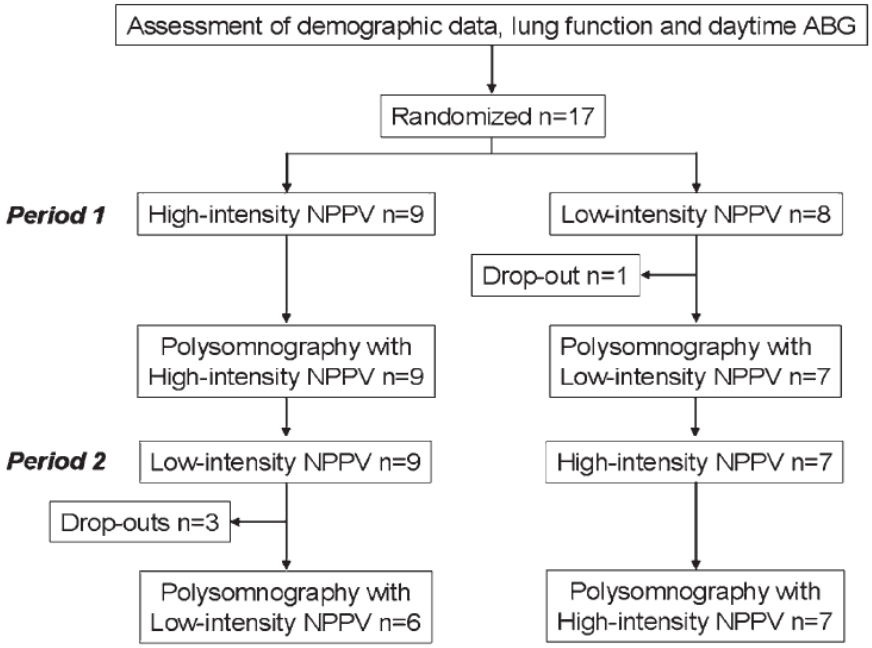
Courtesy D. Adler

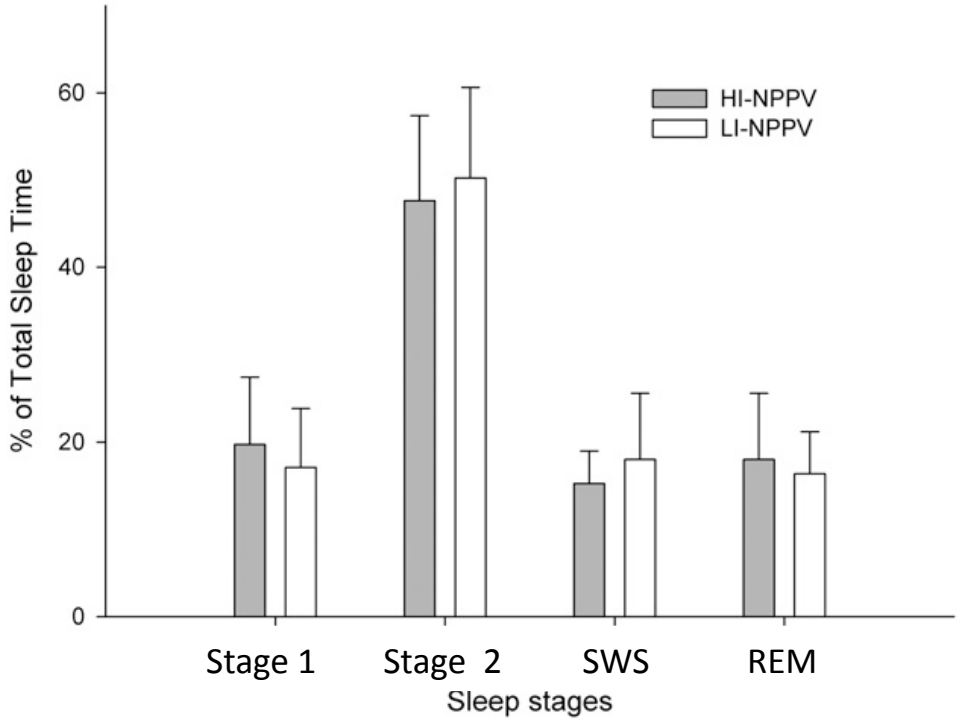
Répercussions de l'adaptation des réglages



Adler; Sleep Breath 2011

AI élevée et sommeil





Dreher; Chest 2011

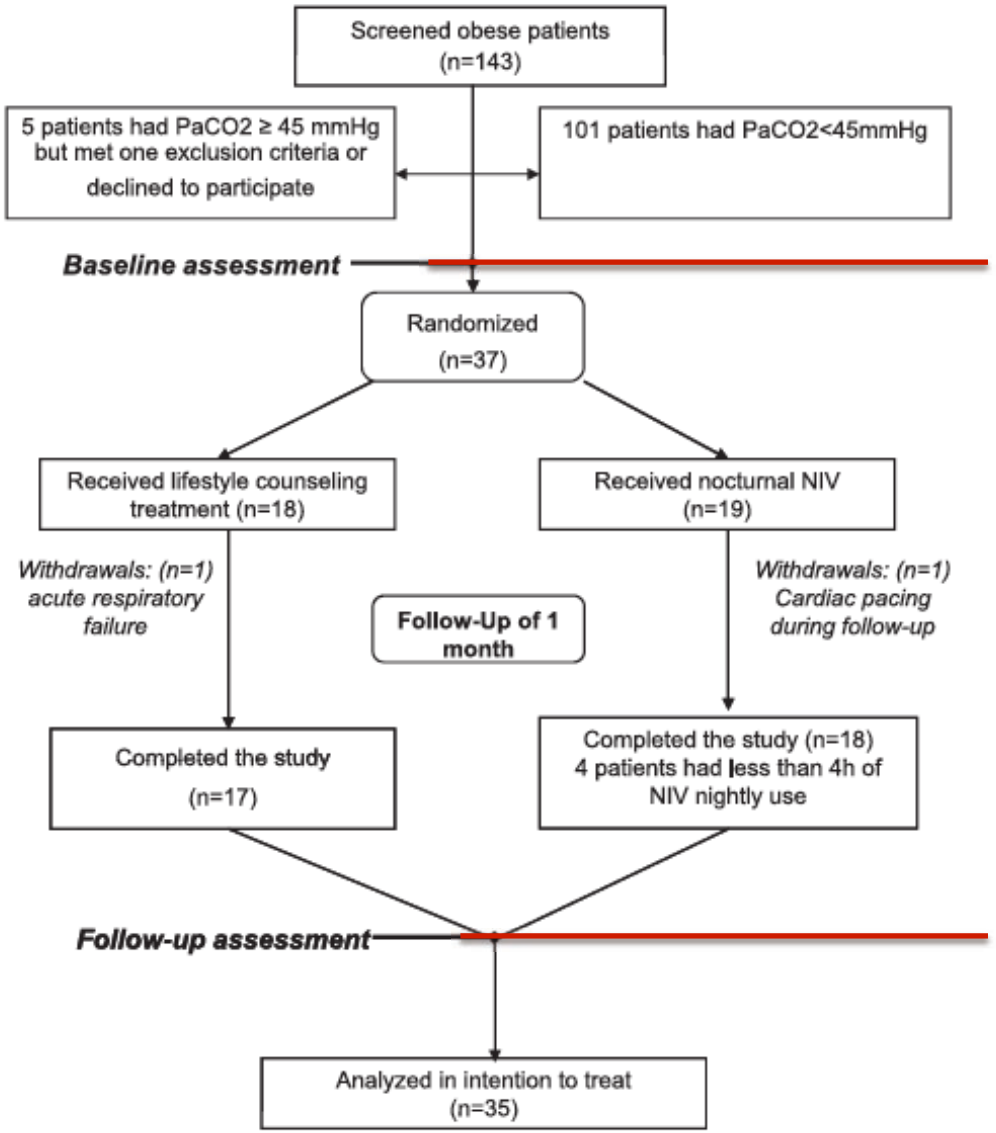
AI élevée et ventilation

Measure	Period	IPAP=14 cmH_2O LI-NPPV	IPAP=30 cmH_2O HI-NPPV	Treatment Effect (95% CI)	*P* Value
Mean Sao_2, %	1	87.4 ± 4.6	92.5 ± 1.4	1.3	.27
	2	92.8 ± 1.8	90.3 ± 2.0	(−1.1, 3.7)	
Minimum Sao_2, %	1	78.3 ± 9.8	85.5 ± 3.4	2.7	.20
	2	86.3 ± 7.0	84.4 ± 5.7	(−1.6, 6.9)	
ODI, events/h[a]	1	2.1 (0.5/26.0)	1.1 (0.6/5.9)	0.76	.31
	2	2.0 (0.9/3.8)	1.9 (0.6/5.1)	(0.43, 1.34)	
Sao_2 < 90%, No.[a]	1	1.3 (2/111)	2.5 (1/11)	0.86	.68
	2	1.5 (0/3)	6.0 (0/14)	(0.38, 1.92)	
Largest decrease in Sao_2, %[a]	1	6.0 (5/14)	5.5 (4/9)	1.02	.92
	2	5.5 (4/6)	7.0 (4/13)	(0.63, 1.67)	
pH	1	7.35 ± 0.04	7.41 ± 0.04	0.025	.025
	2	7.39 ± 0.03	7.38 ± 0.02	(0.004, 0.046)	
Pao_2, mm Hg	1	64.0 ± 11.5	75.6 ± 9.9	2.5	.46
	2	73.3 ± 16.8	66.7 ± 12.0	(−4.7, 9.8)	
$Paco_2$, mm Hg	1	57.4 ± 12.5	49.3 ± 6.8	−6.4	.010
	2	55.9 ± 7.0	51.3 ± 5.5	(−10.9, −1.8)	
HCO_3^-, mmol/L	1	30.7 ± 3.7	30.6 ± 2.9	−1.8	.013
	2	33.1 ± 3.6	29.5 ± 2.8	(−3.1, −0.5)	

Dreher; Chest 2011

VNI – Sommeil - SOH

VNI et SOH



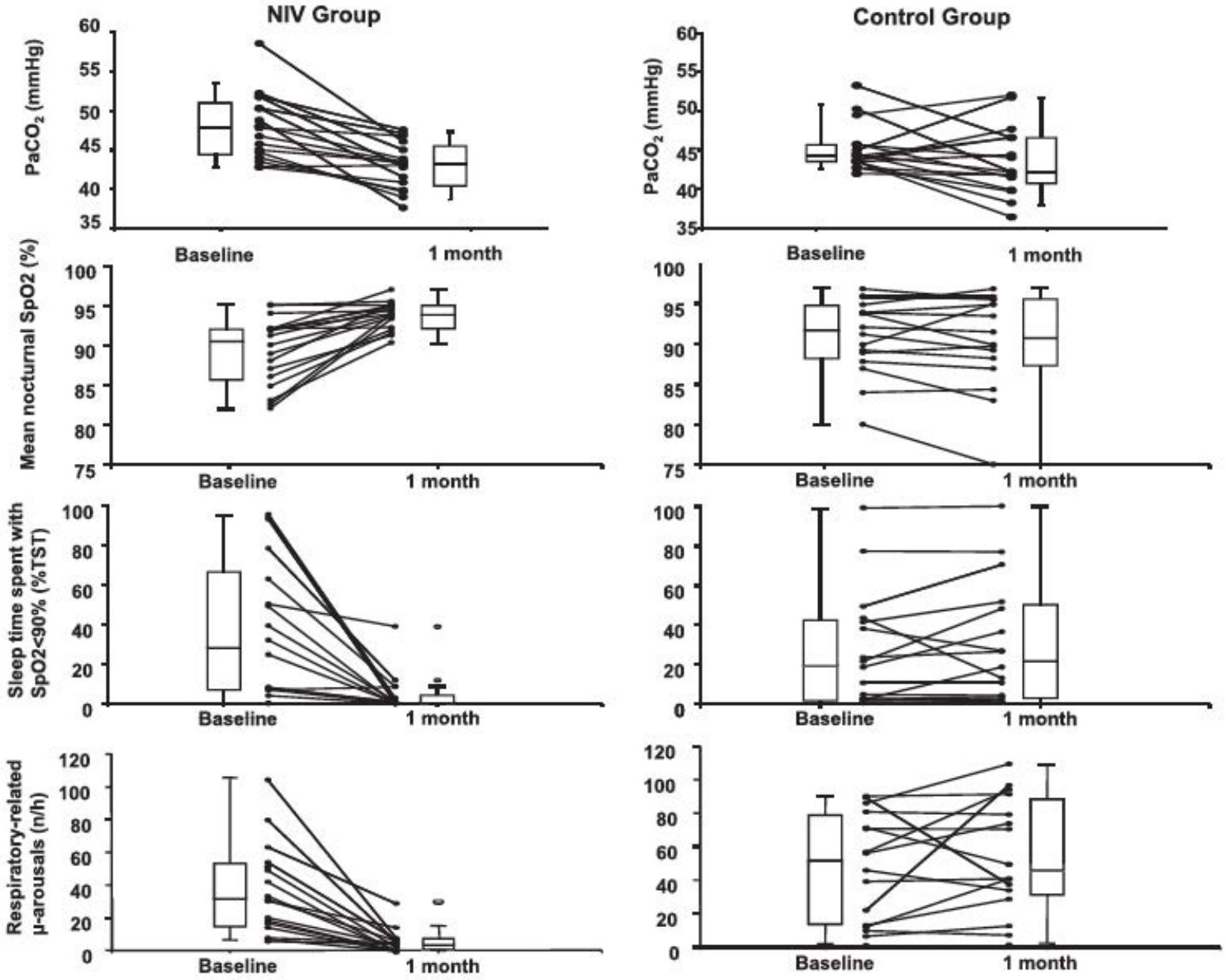
Borel, Chest 2012

VNI et SOH

Characteristic	Control Group (n = 18)	NIV Group (n = 19)
Sex, % male	41	44
Age, y	54 ± 6	58 ± 11[a]
BMI, kg/m²	39.6 ± 4.5	39.6 ± 6.3
Hypertension, %	77	89
Myocardial infarction, %	12	0
Type 2 diabetes, %	35	56

Parameter	Baseline		Treatment Period Effect		
	Control Mean ± SD	NIV Mean ± SD	Control Mean Difference (95% CI)	NIV Mean Difference (95% CI)	*P* Value
TST, min	339 ± 60	372 ± 66[a]	13.3 (−10.5 to 45.2)	−13.8 (−47.3 to 19.7)	ns
SL1-2, % TST	67 ± 18	77 ± 8	5.7 (−2.8 to 14.2)	−11.8 (−18.5 to −5.1)	.002
SL3-4, % TST	8 ± 17	6 ± 8	−4.3 (−11.7 to 3.1)	3.1 (−1.8 to 7.9)	ns
REM, % TST	24 ± 7	17 ± 6[b]	−1.6 (−7.3 to 4.1)	8.7 (4.3 to 13.0)	.004
Res µaro, No./h	48 ± 32	37 ± 28	7.2 (−7.3 to 21.6)	−31.2 (−43.9 to −18.5)	<.001
N-Res µaro, No./h	7 ± 9	8 ± 10	−2.5 (−7.2 to 2.2)	6.9 (0.8 to 12.9)	.003
AHI, No./h	54.1 ± 45.6	39.6 ± 37.1	6.3 (−7.9 to 20.4)	−34.1 (−51.7 to −16.5)	<.001
Nadir SpO_2, %	68.8 ± 16.5	70.4 ± 16.6	−0.6 (−6.0 to 4.7)	10.3 (−1.5 to 22.1)	.001
Mean SpO_2, %	91.0 ± 4.7	89.3 ± 4.2	−0.6 (−1.9 to 0.7)	4.4 (2.7 to 6.1)	<.001
SpO_2 < 90%, % TST	26.8 ± 29.4	36.7 ± 35.0	3.4 (−3.8 to 10.7)	−32.5 (−49.6 to −15.4)	<.001
ESS	13.1 ± 3.4	11.4 ± 5.6	−2.1 (−4.5 to 0.4)	−3.4 (−6.0 to −0.8)	ns

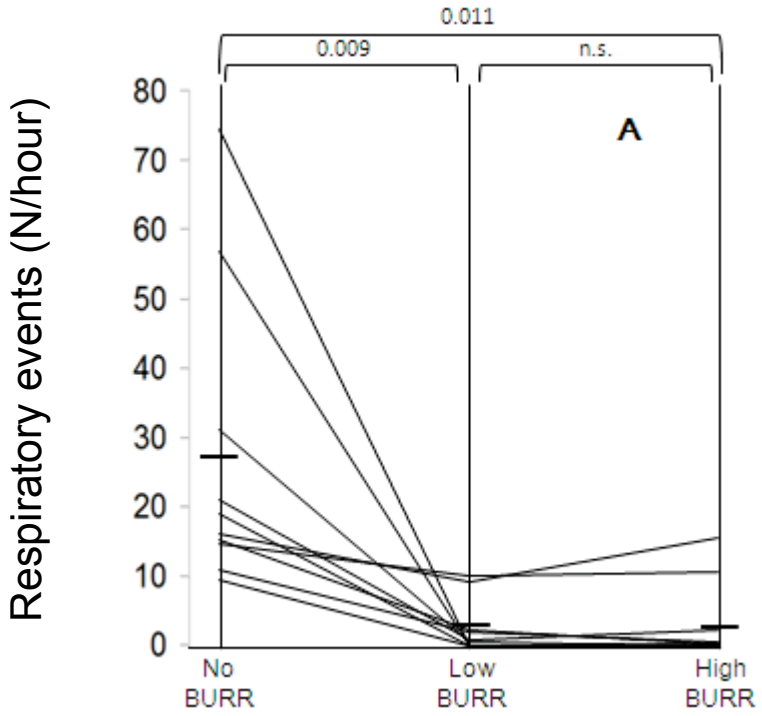
Borel, Chest 2012



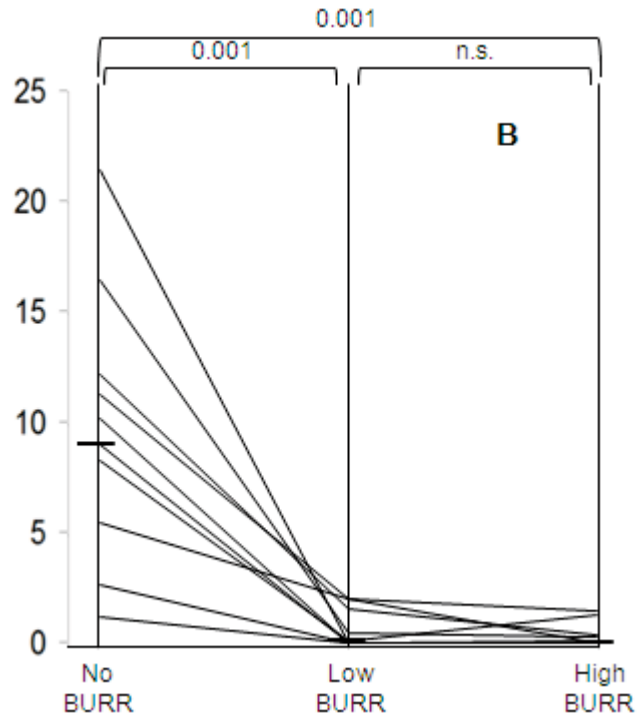
Borel, Chest 2012

Événements centraux et mixtes

Événements respiratoires survenus sous VNI au cours des 3 nuits consécutives avec un mode “S”, en mode “S/T” bas et en mode “S/T” haut.



A: Central events (N/hour)



B: Mixed events (N/hour)

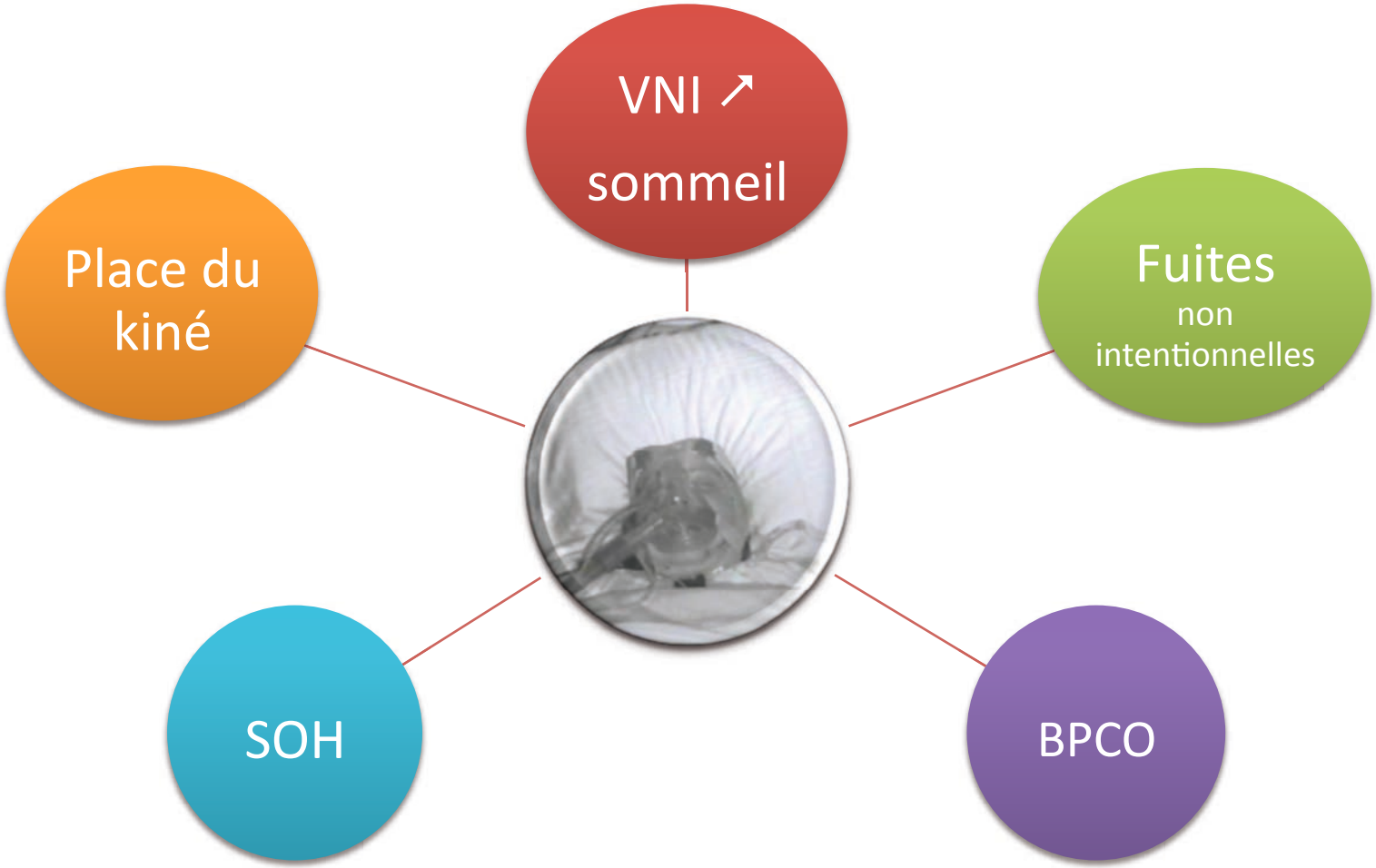
Contal, Chest 2013

Résultats de l'étude du sommeil pour les 3 réglages différents de la FR

	No BURR Median [IQR]	Low BURR Median [IQR]	High BURR Median [IQR]	p
TST (min)	413 [345;478]	445 [420;511]	425 [284;464]	0.273
Sleep efficiency (%)	73 [60;82]	83 [73;87]	71 [67;142]	0.273
WASO	134 [81;192]	81 [71;151]	142 [67;206]	0.905
Sleep latency (min)	20 [9;33] ¶	4 [1;8]	8 [4;12]	0.025
Number of arousals	60 [44;95]	55 [45;75]	56 [47;107]	0.905
Sleep REM % TST	20 [16;21]	18 [13;23] §	13 [9;15] #	0.067
Sleep N1 % TST	14 [12;20]	14 [7;19]	13 [12;18]	0.497
Sleep N2 % TST	56 [44;63]	58 [45;63]	61 [49;69]	0.273
Sleep N3 % TST	9 [4;14]	13 [7;20]	11 [5;22]	0.122
Micro arousal index	37 [28;53]	26 [21;37]	26 [19;39]	0.150

Contal, Chest 2013

Conclusion


VNI ↗
sommeil
Place du kiné
Fuites
non
intentionnelles
SOH
BPCO

Choix de la Fréquence respiratoire

3 mois de suivi

	Cycles contrôlés <50%	**Cycles contrôlés >50%**	Mean difference between groups (95% CI)	p-value
ΔPaCO₂ (kPa)	-0.1±0.7	-1.0±1.1	0.9 (0.3 - 1.5)	0.003
ΔBMI (kg/m²)	-0.3±1.5	-2.2±3.2	1.9 (0.2 - 3.6)	0.031
ΔESS	-2±5	-8±6	6 (2 - 9)	0.001
ΔSRI - summary score	3±11	13±12	-10 (-2 - -17)	0.010
ΔMean nocturnal SpO₂ (%)	3±6	5±4	-2 (-5 - 1)	0.146
ΔMean nocturnal tcCO₂ (kPa)	-0.3±0.8	-0.9±1.2	0.6 (0.0 - 1.3)	0.049

Murphy P, Thorax 2012