

Θα πρέπει ο ΑΗΙ να είναι το πρωτεύον
κριτήριο στην εκτίμηση και θεραπεία του ΣΑΥ?

ΚΑΤΑ

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Εργαστήριο ύπνου 401 ΓΣΝΑ & Ν. Ερρίκος Ντυνάν

Ο δείκτης απνοιών-υποπνοιών (ΑΗΙ)

ΤΑ ΒΑΣΙΚΑ ΕΡΩΤΗΜΑΤΑ

- ❖ Είναι αξιόπιστος στην εκτίμηση της βαρύτητας του ΣΑΥ ;;
- ❖ Μπορεί να προβλέψει την βαρύτητα της κλινικής συμπτωματολογίας ;;
- ❖ Μπορεί να προβλέψει τις βραχυ- και μακροπρόθεσμες επιπλοκές του ΣΑΥ;;;
- ❖ Μπορεί να προβλέψει την έκβαση της θεραπευτικής αντιμετώπισης;;;

Ποιά τα όρια φυσιολογικού από παθολογικό

Δείκτης απνοιών - υποπνοιών (apnea-hypopnea index, **AHI**)

συμβάματα (άπνοιες - υπόπνοιες) ανά ώρα ύπνου

AHI <5: φυσιολογικός δείκτης

AHI 5-14: ήπιο σύνδρομο

AHI 15-29: μέτριο σύνδρομο

AHI ≥30: σοβαρό σύνδρομο

Η αναγκαία χρονική διάρκεια για ένα αναπνευστικό επεισόδιο

- Πάνω από 10 δευτερόλεπτα (διάρκεια 2 αναπνοών)
- Σε παιδιά με αυξημένο αναπνευστικό ρυθμό διάρκεια 2 αναπνοών χωρίς χρονικό όριο
- Τι γίνεται σε άλλες περιπτώσεις με αυξημένο αριθμό αναπνοών (παχυσαρκία, περιοριστικού τύπου πνευμονικά νοσήματα κλπ)??

Guilleminault C. State of the art. Sleep and control of breathing. Chest 1978

Gould GA, et al. The sleep hypopnea syndrome. Am Rev Respir Dis 1988

AASM The Scoring of Respiratory Events in Sleep: Reliability and Validity JCSM 2007

Table 3—Percentage of Patients Classified as Positive for OSA by Method and AHI Threshold for OSA Diagnosis (n = 323)

Hypopnea Definition	AHI Cut-off (events/h)		
	≥ 5	≥ 15	≥ 30
Chicago	92%	67%	42%
Recommended	59%	38%	22%
Alternative	76%	50%	31%

P < 0.001 for all pair-wise comparisons at all thresholds examined.

significant at the 0.01 level (one-tailed).

(B)
is are

Τελικά εκτιμούμε και θεραπεύουμε
ασθενείς ή αριθμούς ??

TABLE 2 Centers for Medicare and Medicaid Services Criteria for CPAP Treatment of Sleep Apnea

CPAP will be covered for adults with sleep-disordered breathing if:

AHI \geq 15 or

AHI \geq 5 with (“mild, symptomatic”)

Hypertension

Stroke

Sleepiness

Ischemic heart disease

Insomnia

Mood disorders

Centers for Medicare and Medicaid Services.

National Coverage Determination for Continuous Positive Airway Pressure (CPAP) Therapy for Obstructive Sleep Apnea (OSA).

NCD #240.4. 2005 [cited 2008 22 September.]; Available from: <http://www.cms.hhs.gov>.

Video Player

File View Help



Use SHIFT + LEFT (RIGHT) click to zoom in (out)



For Help, press F1

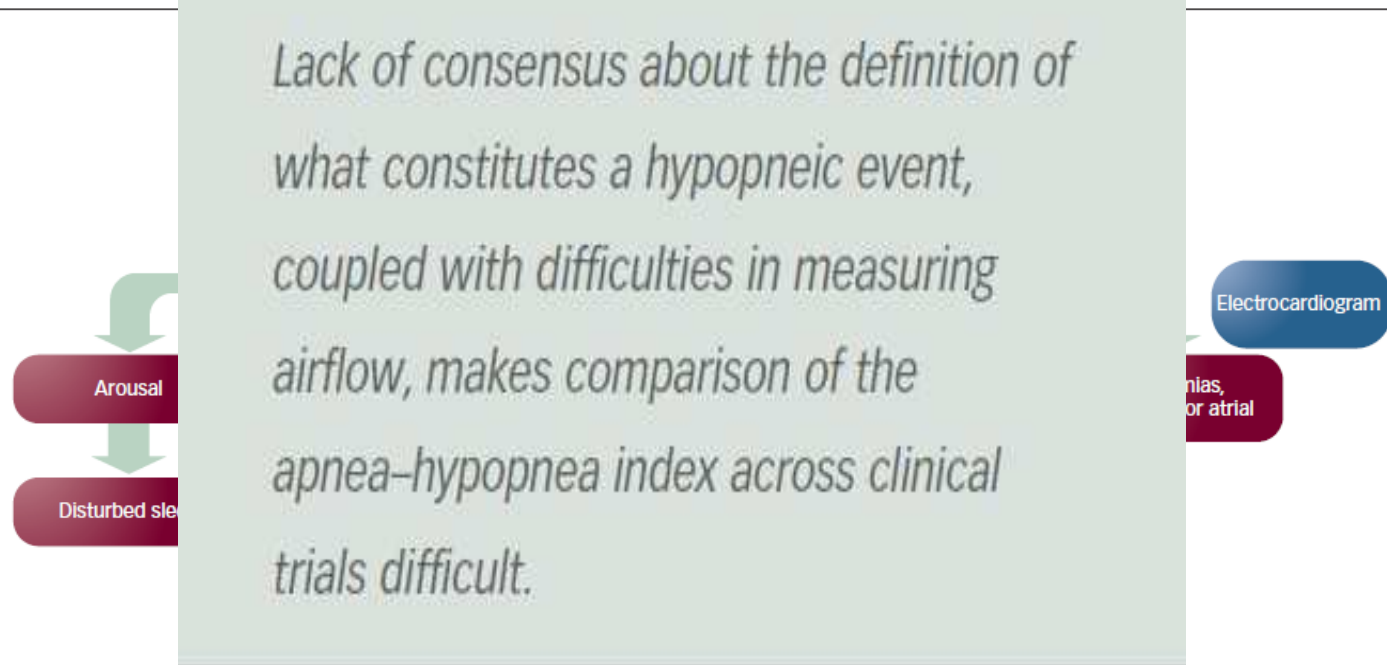
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Beyond the Apnea–Hypopnea Index—Prognostic Value of Other Elements of Polysomnography to Describe Sleep-disordered Breathing in Heart Failure

Philip B Adamson, MD, FACC

The Heart Failure Institute, Oklahoma Heart Hospital, Oklahoma Foundation for Cardiovascular Research, and
Department of Physiology, University of Oklahoma Health Sciences Center

Figure 2: Simplified Summary of Sleep Apnea Pathophysiology, Including Aspects That Can Be Monitored with Parameters in a Standard



Πολυκαταγραφική μελέτη ύπνου



Σύνοψη καταγραφής

Υπνόγραμμα

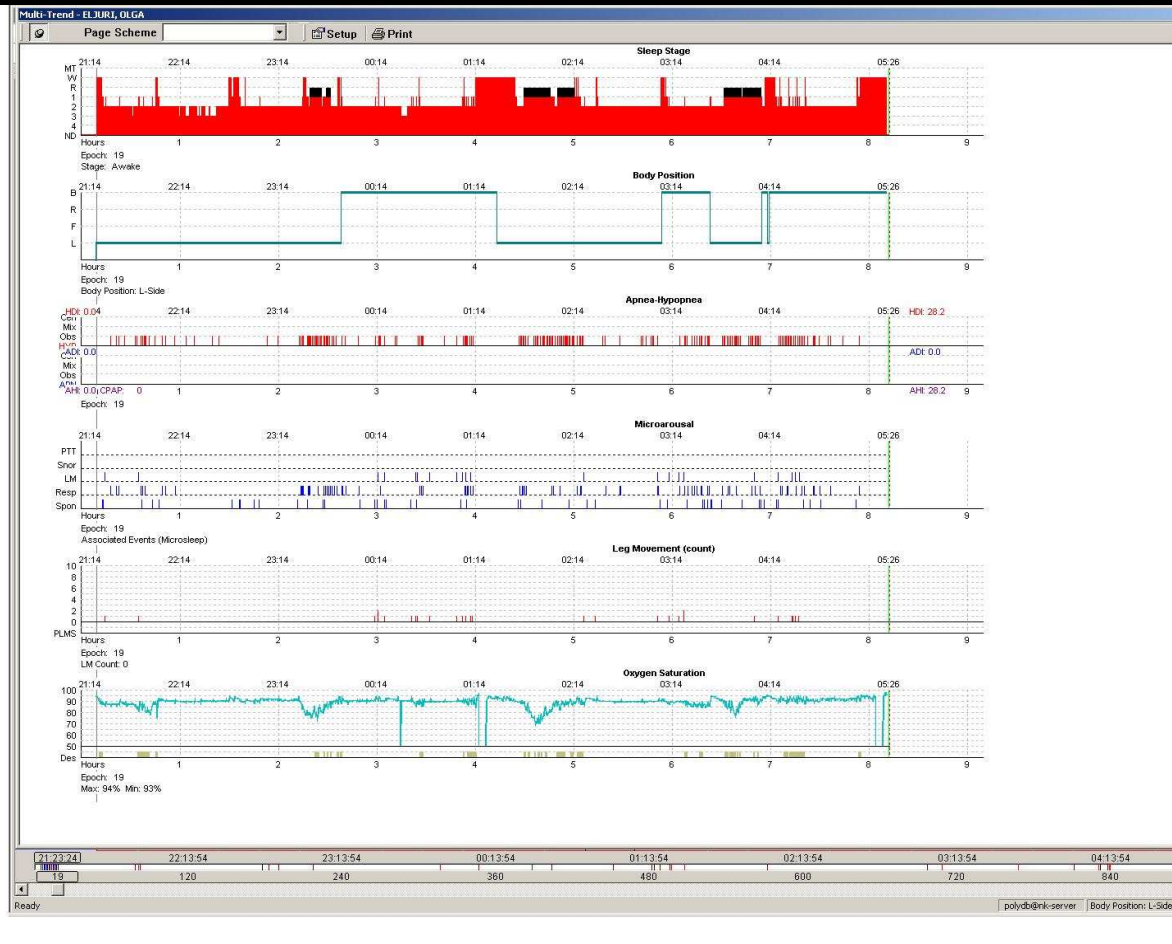
Θέση σώματος

Αναπνευστικά
επεισόδια

Μικροαφυπνίσεις

Κινήσεις ποδιών

Οξυμετρία



Δείκτης απνοιών-υποπνοιών (AHI)

Σε σύνθετες περιπτώσεις μπορεί να μην είναι αρκετός διότι δεν δίνει πληροφορίες σχετικά με:

Διάρκεια αναπνευστικών επεισοδίων

Σοβαρότητα και συχνότητα (ODI) αποκορεσμών

Παρουσία ή μη υπερκαπνίας

Βαθμός διαταραχής μικροαρχιτεκτονικής ύπνου

Παρουσία ή μη αρρυθμιών

Ύπαρξη και σημασία ρογχαλητού

Ύπαρξη και σημασία RERAs (respiratory effort related arousals)

TABLE 4 Limitations of the AHI as a “Gold Standard.” Each of These Patients Has the Same AHI

	Patient 1	Patient 2
AHI (events/hr)	10	10
Apnea duration (sec)	10–18	10–180
Lowest SaO ₂ (%)	90	61
REM on study (%)	18	0
SWS on study (%)	12	0
Arousals/hr	8	180
Cardiac arrhythmias	none	+with sinus arrest

Abbreviations: AHI, apnea plus hypopnea index; REM, rapid eye movement; SWS, slow wave sleep.

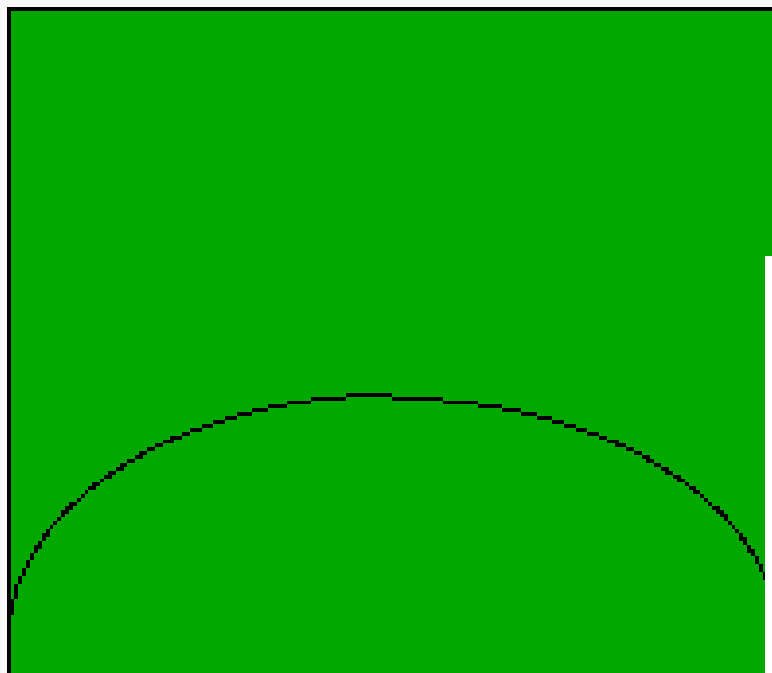
Adnan Habib and Barbara Phillips. The Spectrum of Sleep-Disordered Breathing 245-257 in Obstructive Sleep Apnea. Informa Healthcare USA 2007

Ο ΑΗΙ στους ηλικιωμένους

- Ancoli-Israel: ηλικίες 65-95
Δείκτης απνοιών-υποπνοιών (ΑΗΙ) > 10 σε 70 % των ανδρών, 56 % των γυναικών
(3 φορές μεγαλύτερο από άτομα μέσης ηλικίας)
 - SLEEP, 1991.
- Bixler et al: 2 φορές μεγαλύτερη συχνότητα ΑΗΙ >15 σε ηλικίες 65-100 σε σχέση με άτομα μέσης ηλικίας
 - Am J Respir Crit Care Med, 1998.
 - Am J Respir Crit Care Med, 2001.
- Sleep Heart Health Study: 1.7 φορές συχνότερο σε ηλικίες 60-99 απ' ότι σε ηλικία 40-60
 - Arch Intern Med, 2002.

Η σημασία του ΣΑΥ στις διάφορες ηλικίες

Clinically significant OSA



Age

Sleep apnea activity

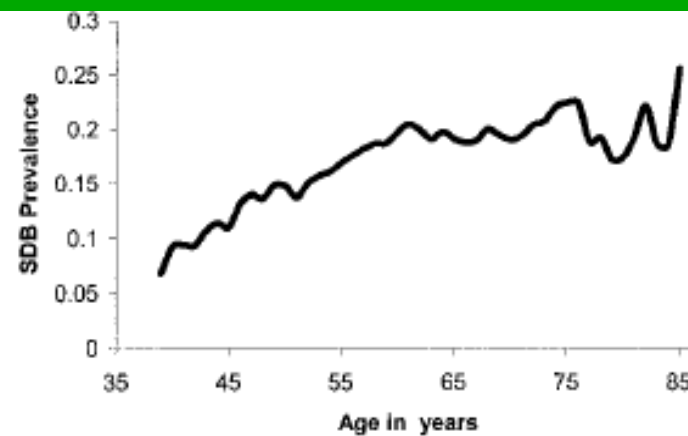


Figure 1. Prevalence of OSA by age in the Sleep Heart Health Study (31). SDB = Sleep-disturbed breathing.

The Scoring of Respiratory Events in Sleep: Reliability and Validity

Susan Redline, M.D., M.P.H.¹; Rohit Budhiraja, M.D.²; Vishesh Kapur, M.D., M.P.H.³; Carole L. Marcus, M.B., B.Ch.⁴; Jason H. Mateika, Ph.D.⁵; Reena Mehra, M.D., M.S.⁶; Sariam Parthasarthy, M.D.⁷; Virend K. Somers, M.D.⁸; Kingman P. Strohl, M.D.⁹; Loreto G. Suiit, M.D.⁹; David Gozal, M.D.⁹; Merrill S. Wise, M.D.¹⁰; and Stuart F. Quan, M.D.¹¹

Η σχέση του ΑΗΙ με δείκτες ημερήσιας υπνηλίας (ερωτηματολόγια ή MSLT) είναι μικρή και στις περισσότερες περιπτώσεις μη αξιόπιστη πιθανόν λόγω των πολλαπλών διαφορών στη μεθοδολογία των υπάρχουσών μελετών

Η χαμηλή διαγνωστική αξία του ΑΗΙ στην ημερήσια υπνηλία (δεδομένα της Sleep Heart Health Study)

ΜΕΓΑΛΟΣ ΑΡΙΘΜΟΣ
ΣΥΜΜΕΤΕΧΟΝΤΩΝ

886 άνδρες και 938 γυναίκες

ΑΛΛΑ

Μη παρακολουθούμενες
κατ'οίκον μελέτες

Χρήση μόνον θερμικού τύπου
ανιχνευτή

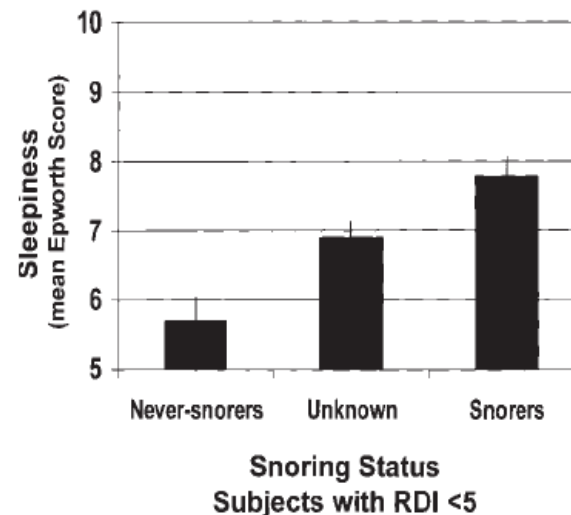
Gottlieb DJ et al. Relation of Sleepiness to
Respiratory Disturbance Index The Sleep Heart
Health Study AJRCCM 1999

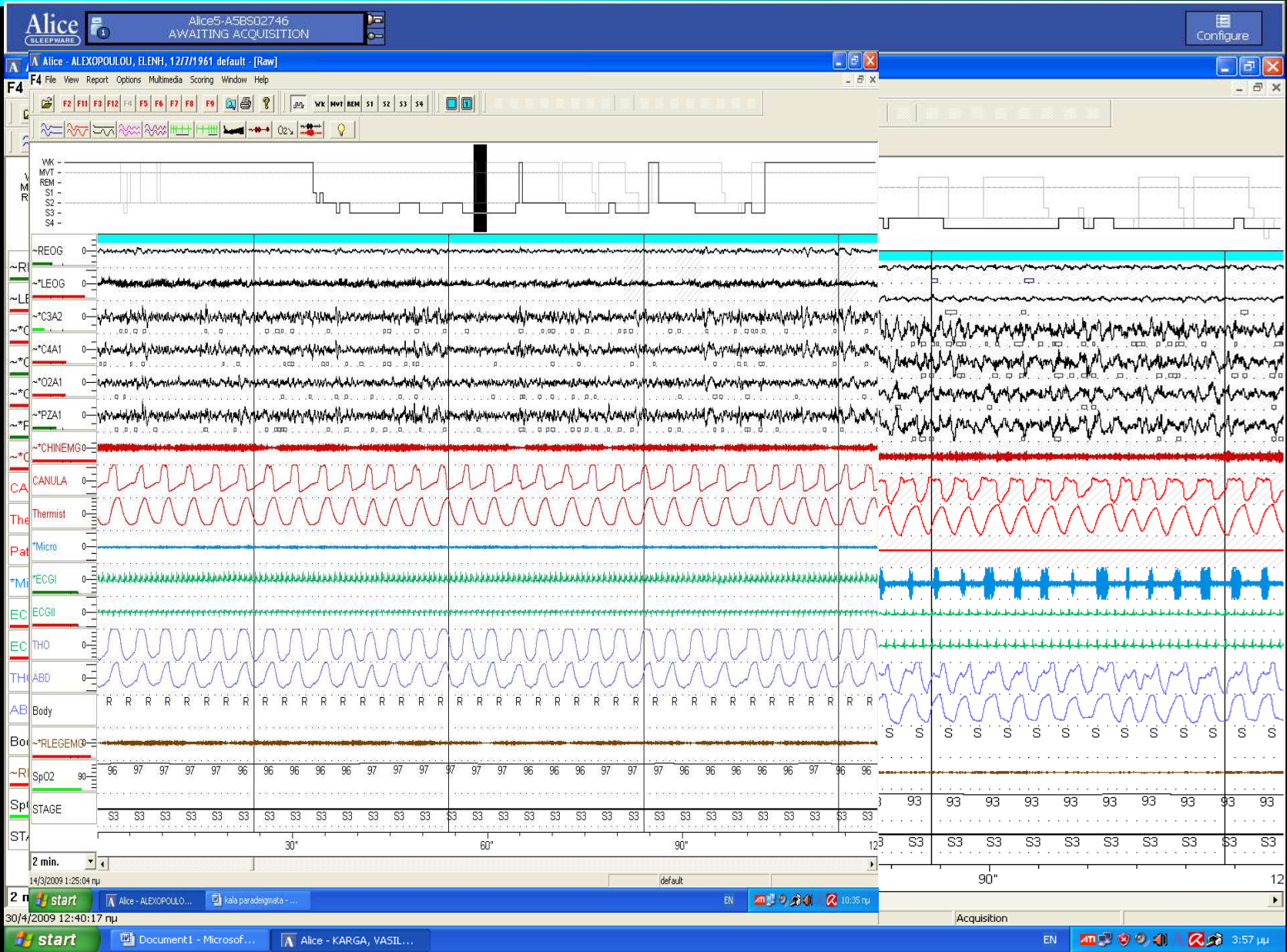
RELATION OF SLEEPINESS TO RESPIRATORY DISTURBANCE INDEX

	RDI < 5	5 ≤ RDI < 15	15 ≤ RDI < 30	RDI ≥ 30
Subjects, n	898	524	211	191
ESS score, mean (SD)*	7.2 (4.3)	7.8 (4.4)	8.3 (4.6)	9.3 (4.9)
ESS score, median*	6	7	8	9
ESS score ≥ 11, %*	21	28	28	35

Definition of abbreviations: ESS = Epworth Sleepiness Scale; RDI = respiratory disturbance index, defined as the number of apneas plus hypopneas per hour of sleep.

* p < 0.001 for difference between groups.





Γιατί ο ΑΗΙ δεν ξεχώρισε τους «νυσταγμένους» ;;

- ✓ Διότι η υπνηλία επηρεάζεται και από άλλους παράγοντες (διαταραχές νυκτερινής οξυγόνωσης, μικροαφυπνίσεις, διαταραχές μακροαρχιτεκτονικής ύπνου, RERAs)
- ✓ Διότι πέραν από την βαρύτητα του ΣΑΥ υπάρχει και γενετική προδιάθεση
- ✓ Διότι ο ΑΗΙ δεν προσδιορίστηκε σωστά

AHI και ημερήσια υπνηλία

TABLE 2 Polysomnographic findings in obstructive sleep apnoea syndrome patients with and without excessive daytime sleepiness (EDS)

	EDS	No EDS	p-value
Subjects n	23	17	
TST min	401 ± 41	379 ± 63	NS
Sleep latency min	11 ± 16	18 ± 18	0.05
Sleep efficiency %	90 ± 7	82 ± 13	0.04
Awake min	37 ± 29	66 ± 56	0.03
Arousal index	65 ± 20	60 ± 24	NS
Respiratory arousals n	58 ± 20	57 ± 22	NS
AHI events · h⁻¹	62 ± 18	60 ± 20	NS
Apnoea duration s	29 ± 8	22 ± 7	0.008
PLMI events · h⁻¹	3 ± 1	2 ± 1	NS
Sleep %			
Phase 1/2	81 ± 12	78 ± 11	NS
Phase 3/4	6 ± 8	8 ± 5	NS
REM	13 ± 6	14 ± 8	NS
Nocturnal Sa_aO₂ %			
Minimum	69 ± 12	79 ± 8	0.002
Mean	87 ± 6	90 ± 5	0.01

Data are presented as mean ± SD, unless otherwise stated. TST: total sleep time; NS: nonsignificant; AHI: apnoea-hypopnoea index; PLMI: periodic limb movement index; REM: rapid eye movement; Sa_aO₂: arterial oxygen saturation.

TABLE 1 Demographic characteristics of obstructive sleep apnoea syndrome patients with and without excessive daytime sleepiness (EDS)

	EDS	No EDS	p-value
Subjects n	23	17	
Age yrs	49 ± 6	50 ± 9	NS
BMI kg · m⁻²	33 ± 5	31 ± 6	NS
Awake Sa_aO₂ %	96 ± 1	96 ± 1	NS
ESS score	17 ± 3	5 ± 2	<0.0001
MSLT score min	4 ± 1	16 ± 3	<0.0001

Data are presented as mean ± SD, unless otherwise stated. NS: nonsignificant; BMI: Body mass index; Sa_aO₂: arterial oxygen saturation; ESS: Epworth Sleepiness Scale; MSLT: multiple sleep latency test.

O. Mediano et al. Daytime sleepiness and Polysomnographic variables in sleep apnoea patients Eur Respir J 2007; 30: 110–113

ΣΑΥ και τροχαία

TABLE 2. Association of SDB and 5-year MVA history estimated by adjusted OR, 95% CI; Sleep Cohort Study, n = 913^a

SDB category	Any MVA in 5 years			Multiple MVA in 5 years		
	Women OR (95% CI)	Men OR (95% CI)	Total OR (95% CI)	Women OR (95% CI)	Men OR (95% CI)	Total OR (95% CI)
No SDB			(Reference category)			
Habitual snorer, AHI < 5	0.9 (0.5, 1.6)	3.4 ^b (1.8, 6.9)	1.5 ^b (1.0, 2.4)	3.3 (0.9, 12.0)	2.2 (0.7, 7.0)	2.9 ^b (1.0, 8.6)
AHI 5–15	0.8 (0.3, 2.0)	4.2 ^b (1.6, 11.3)	1.9 (0.9, 3.8)	4.5 (0.8, 25.0)	1.8 (0.2, 14.0)	3.1 (0.8, 12.7)
AHI > 15	0.6 (0.2, 2.5)	3.4 ^b (1.4, 8.0)	1.6 (0.8, 3.1)	2.4 (0.2, 25.0)	11.9 ^b (1.1, >25)	7.3 ^b (1.8, >25)

SDB, sleep-disordered breathing; MVA, motor vehicle accident; OR, odds ratio; CI, confidence interval; AHI, apnea-plus-hypopnea index.

^a Gender specific OR adjusted for age and miles driven per year; OR for total sample adjusted for age, miles driven per year, and gender.

^b p > 0.05.

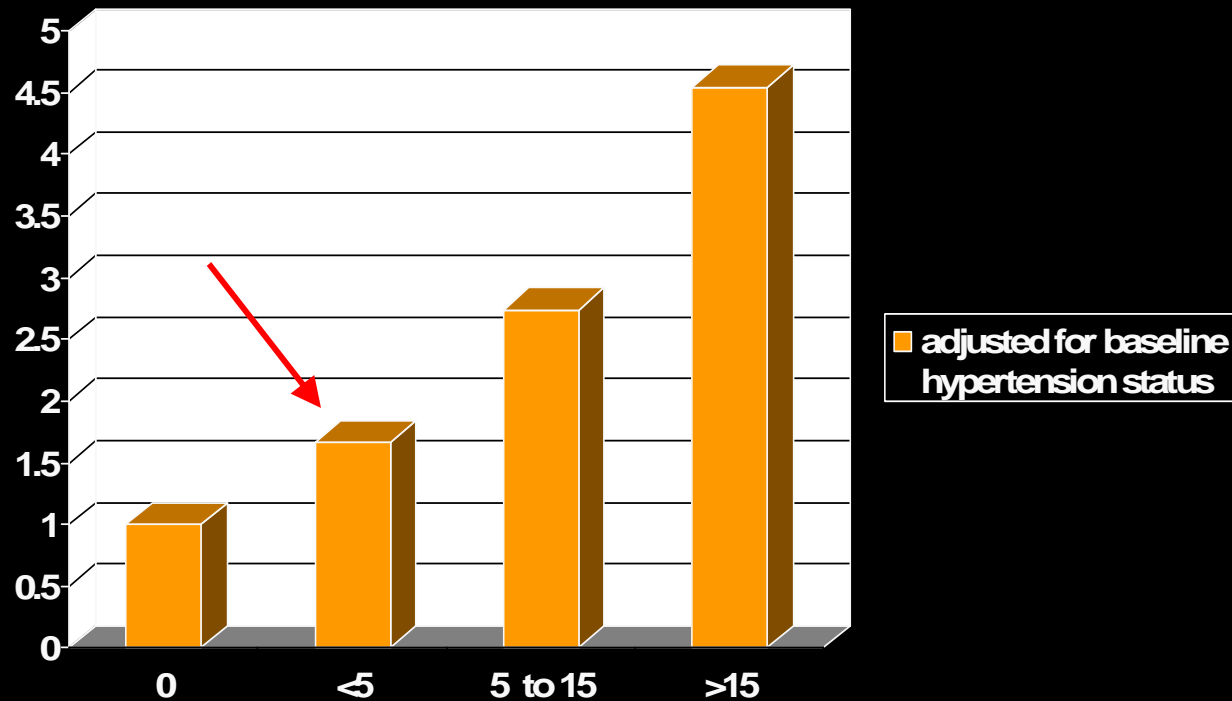
Odds ratios did not increase with SDB severity, and there were no associations for women.

Young T. et Sleep-disordered breathing and motor vehicle accidents in a population-based sample of employed adults.

Sleep. 1997

Peppard PE, Young T, et al. Prospective study of the association between sleep-disordered breathing and hypertension. N Engl J Med 2000;342:1378-84.

Odds ratio for hypertension according to AHI



Wisconsin Sleep Cohort Study

N = 893 ασθενείς με παρακολούθηση 4-8 ετών

Adjusted Odds Ratio (OR) and 95% Confidence Intervals (CIs) of Hypertension by Sleep-Disordered Breathing Measures, Sleep Heart Health Study, 1995-1998*.

Table 4. Adjusted Odds Ratio (OR) and 95% Confidence Intervals (CIs) of Hypertension by Sleep-Disordered Breathing Measures, Sleep Heart Health Study, 1995-1998*

Variables	No. of Subjects	Adjusted for Demographics†	OR Adjusted for Demographics‡		
			BMI OR (95% CI)	BMI, Neck, Waist-to-Hip Ratio OR (95% CI)	BMI, Neck, Waist-to-Hip Ratio, Alcohol Use, Smoking OR (95% CI)
Apnea-hypopnea index per hour	1691	1.00	1.00	1.00	1.00
<1.5					
1.5-4.9		1.05 (1.00-1.11)	1.10 (1.00-1.20)	1.11 (1.05-1.18)	1.07 (0.91-1.26)
5-14.9					1.20 (1.01-1.42)
15-29.9					1.25 (1.00-1.56)
≥30					1.37 (1.03-1.83)
P (trend)					.005
Arousal index per hour					1.00
<12					
12-16.9					0.94 (0.78-1.12)
17-22.9					1.04 (0.86-1.26)
23-29.9					1.12 (0.90-1.39)
≥30					1.15 (0.91-1.45)
P (trend)					.003
Percentage of sleep with oxygen saturation <90%					1.00
<0.05					
0.05-0.49					1.10 (0.94-1.29)
0.50-3.9					1.24 (1.05-1.46)
4.0-11.9					1.13 (0.90-1.42)
≥12					1.45 (1.12-1.88)
P (trend)					.0003
Snoring					1.00
No					
Yes					1.01 (0.88-1.17)
Unknown					1.26 (1.08-1.46)

Potential problems derived from the somewhat arbitrary AHI definition (highly dependent on the definition used for hypopnea identification) were addressed by using alternative definitions of SDB in addition to AHI

*For definition apnea-hypopnea index, see Table 1. Hypertension is defined as resting blood pressure of at least 140/90 mm Hg or use of antihypertensive medication. BMI indicates body mass index.

†Adjusted for age (continuous variable), sex, and ethnicity.

‡Models include demographics and variables listed in column headings.

§For arousal index analysis, the number of subjects were 5112. The remaining observations were excluded because of unreliable sleep staging data.

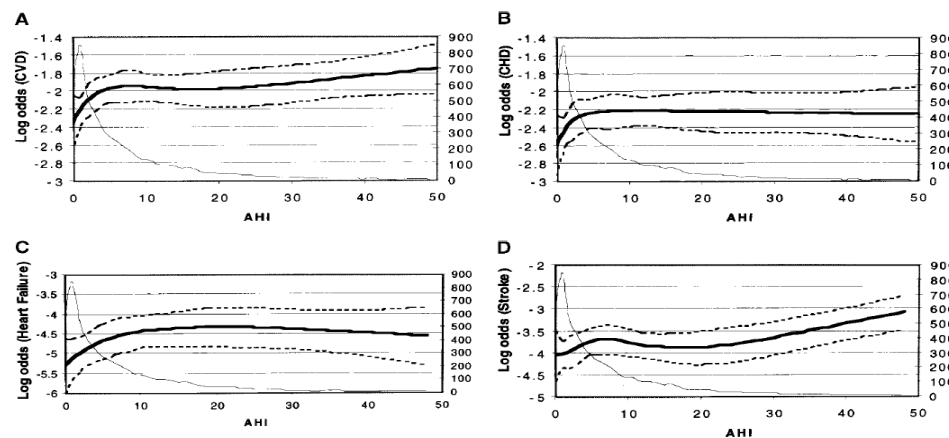
¶ns may apply

Sleep-disordered Breathing and Cardiovascular Disease

Cross-sectional Results of the Sleep Heart Health Study

EYAL SHAHAR, CORALYN W. WHITNEY, SUSAN REDLINE, ELISA T. LEE, ANNE B. NEWMAN, F. JAVIER NIETO, GEORGE T. O'CONNOR, LORI L. BOLAND, JOSEPH E. SCHWARTZ, and JONATHAN M. SAMET for the Sleep Heart Health Study Research Group

The adjusted relative odds from multivariable models are compatible with modest to moderate effects of sleep-disordered breathing on CVD manifestations within a range of the AHI that is typically considered "normal" or only mildly elevated (1–10 respiratory events per hour of sleep). AHI values of this magnitude are not uncommon in the general population but, for most individuals, remain unrecognized (21). If the

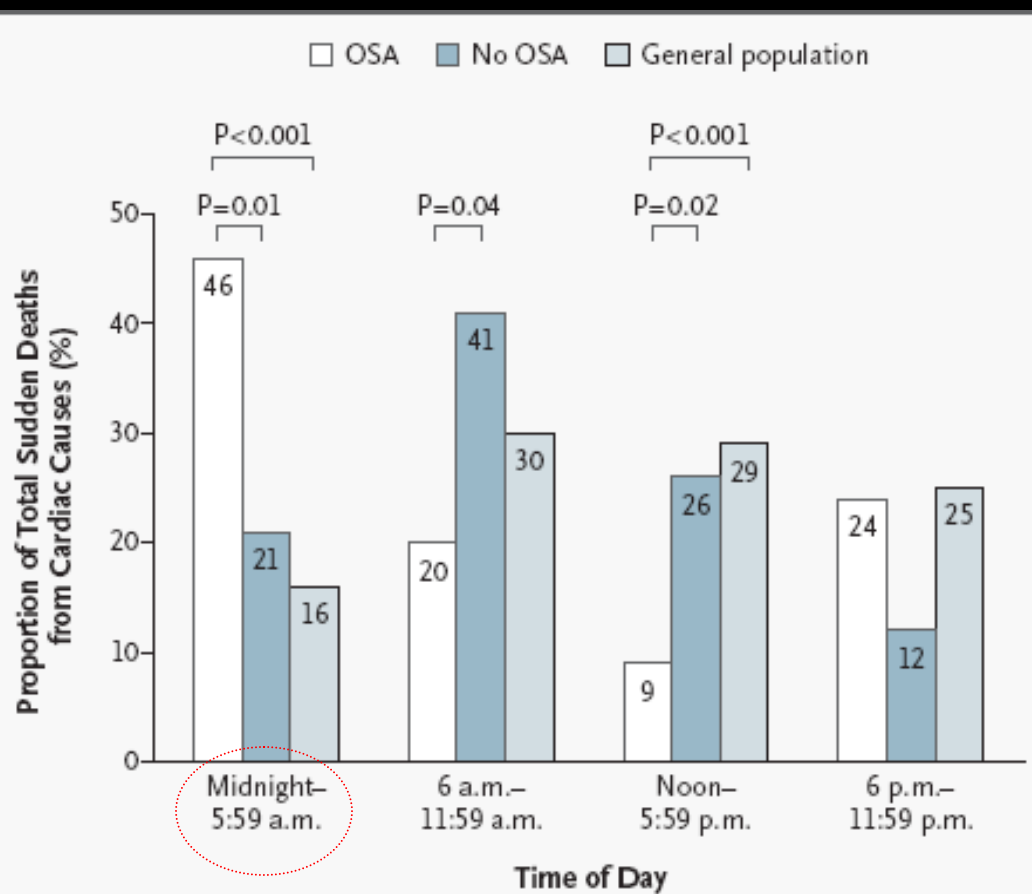


Am J Respir Crit Care Med 2001

ORIGINAL ARTICLE

Day–Night Pattern of Sudden Death in Obstructive Sleep Apnea

Apoor S. Gami, M.D., Daniel E. Howard, B.S., Eric J. Olson, M.D., and Virend K. Somers, M.D., Ph.D.



Gami et al. NEJM
2005;352:1206-14

“Don’t ever go to sleep. Too many people die there.”

Mark Twain

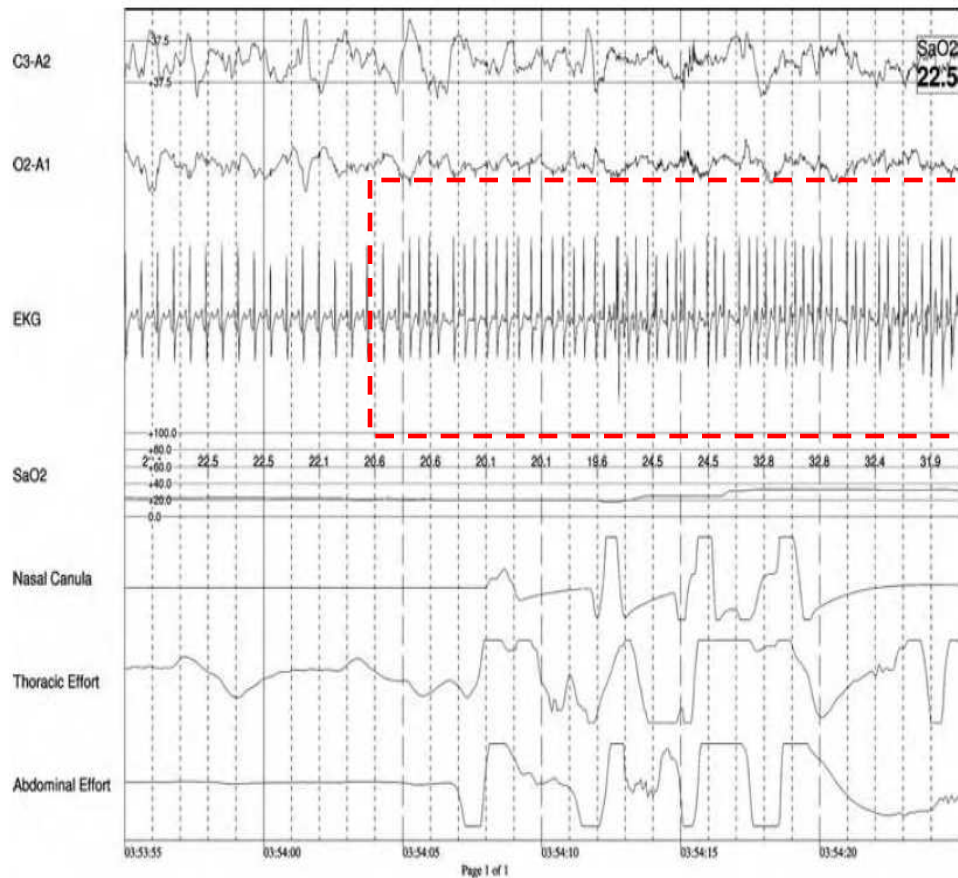


FIGURE 3 Thirty-second polysomnographic recording of a patient in sinus rhythm who converts to atrial fibrillation after a prolonged obstructive apnea accompanied by severe oxygen desaturation. *Note:* C3, left central electrode; O2, right occipital electrode; A1 and A2, left and right auricular (reference) electrodes. *Abbreviations:* EKG, electrocardiogram; SaO₂, arterial oxyhemoglobin saturation.

Mild Obstructive Sleep Apnea Syndrome Should be Treated

Lee K. Brown, MD.

Table 1—Compliance with positive airway pressure treatment in mild to moderate OSA.

Reference number	N	AHI	Follow-up Time	Compliance, hours/night	Compliance, Other Metric
41	29	21.6 ± 7.5 ^a	3 weeks	4.9 (0-8.4) ^b	62% of nights with >4 hours
42	88	21.3 ± 1.3 ^c	3 months	3.6 ± 0.3 ^c	43% with ≥4 hours use for 70% of nights
43	28	12.9 ± 6.3 ^a	8 weeks	3.53 ± 2.13 ^a	<u>48% with >4 hours use/night</u>
44	48	31 ± 26 ^a	2 months	4.9 ± 2.4 ^a	n/a
45	66	20 ± 6 ^a	6 months	4.8 ± 2.2 ^a	64% with >4 hours use/night

the student, the professor and the birth of modern

SLEEP RESEARCH

*story by Lynne Lamborg
art by Michael Hagelberg*

Regularly Occurring Periods of Eye Motility, and Concomitant Phenomena, During Sleep¹

Eugene Aserinsky² and Nathaniel Kleitman

*Department of Physiology, University of Chicago,
Chicago, Illinois*

Manuscript received April 3, 1953.



THE CHICAGO 5
For more than a half a century, University of Chicago researchers have led the field of sleep research. From left: Nathaniel Kleitman, Eugene Aserinsky, Eve Van Cauter, William Dement and Allan Rechtschaffen.

