XXXII Diada Pneumològica Manresa

4 i 5 d'abril de 2014

Món St Benet, Sant Fruitós de Bages

OBESITAT I MALALTIA RESPIRATÒRIA

La Síndrome d'Obesitat Hipoventilació

Mercè Mayos
Hospital de la Sta. Creu i Sant Pau

La Síndrome d'Obesitat Hipoventilació

.....During the time of Alexander the great, there was a leader called Dionysius of Heraclea, who had problems with **extreme overweight**. He was so fat that he could not eat anymore. In fact, he is reported by historians to **have been choked by his own fat**.

Case Reports

Extreme Obesity Associated with Alveolar Hypoventilation— A Pickwickian Syndrome*

C. Sidney Burwell, M.D., Eugene D. Robin, M.D., Robert D. Whaley, M.D. and Albert G. Bickelmann, M.D.†
Boston, Massachusetts

1956

Obesity Hypoventilation Syndrome

Mechanisms and Management

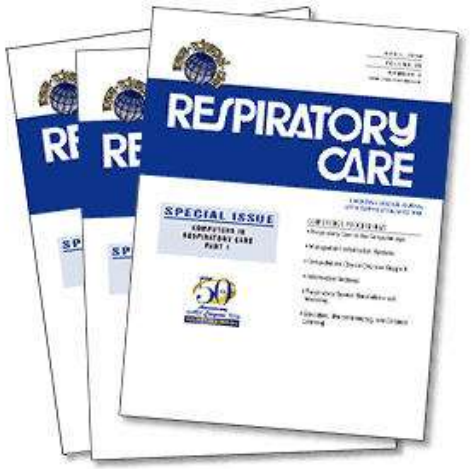
Amanda J. Piper[1] and Ronald R. Grunstein[1]

Obesity hypoventilation syndrome (OHS) refers to the appearance of awake hypercapnia (Pa_{CO_2} > 45 mm Hg) in the obese patient (BMI > 30 kg/m^2) after other causes that could account for awake hypoventilation, such as lung or neuromuscular disease, have been excluded. Although sleep-disordered breathing is not currently part of the basic definition of OHS, breath-

Am J Respir Crit Care Med Vol 183. pp 292–298, 2011

Obesity Hypoventilation Syndrome: A State-of-the-Art Review

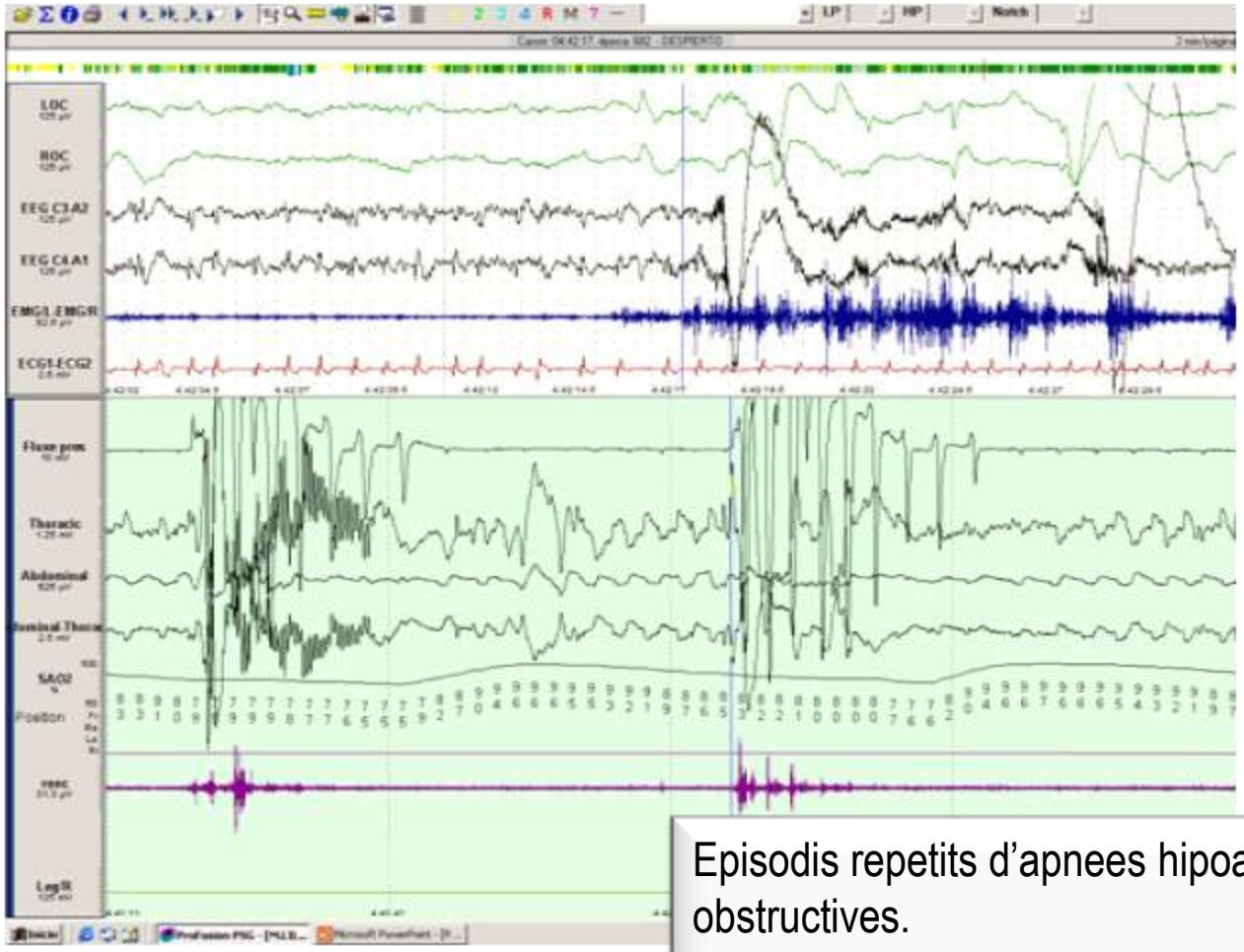
Babak Mokhlesi MD MSc



OHS is defined as daytime hypercapnia and hypoxemia ($P_{aCO_2} > 45$ mm Hg and $P_{aO_2} < 70$ mm Hg at sea level) in an obese patient (body mass index [BMI] ≥ 30 kg/m^2) with sleep-disordered breathing in the absence of any other cause of hypoventilation.[8] It is important to recognize that OHS is a diagnosis of exclusion and should be distinguished from other conditions that are commonly associated with hypercapnia (Table 1). Hypercapnia is very unlikely to develop in OSA patients with BMI below 30 kg/m^2

La Síndrome d'Obesitat Hipoventilació

Alteracions respiratòries nocturnes

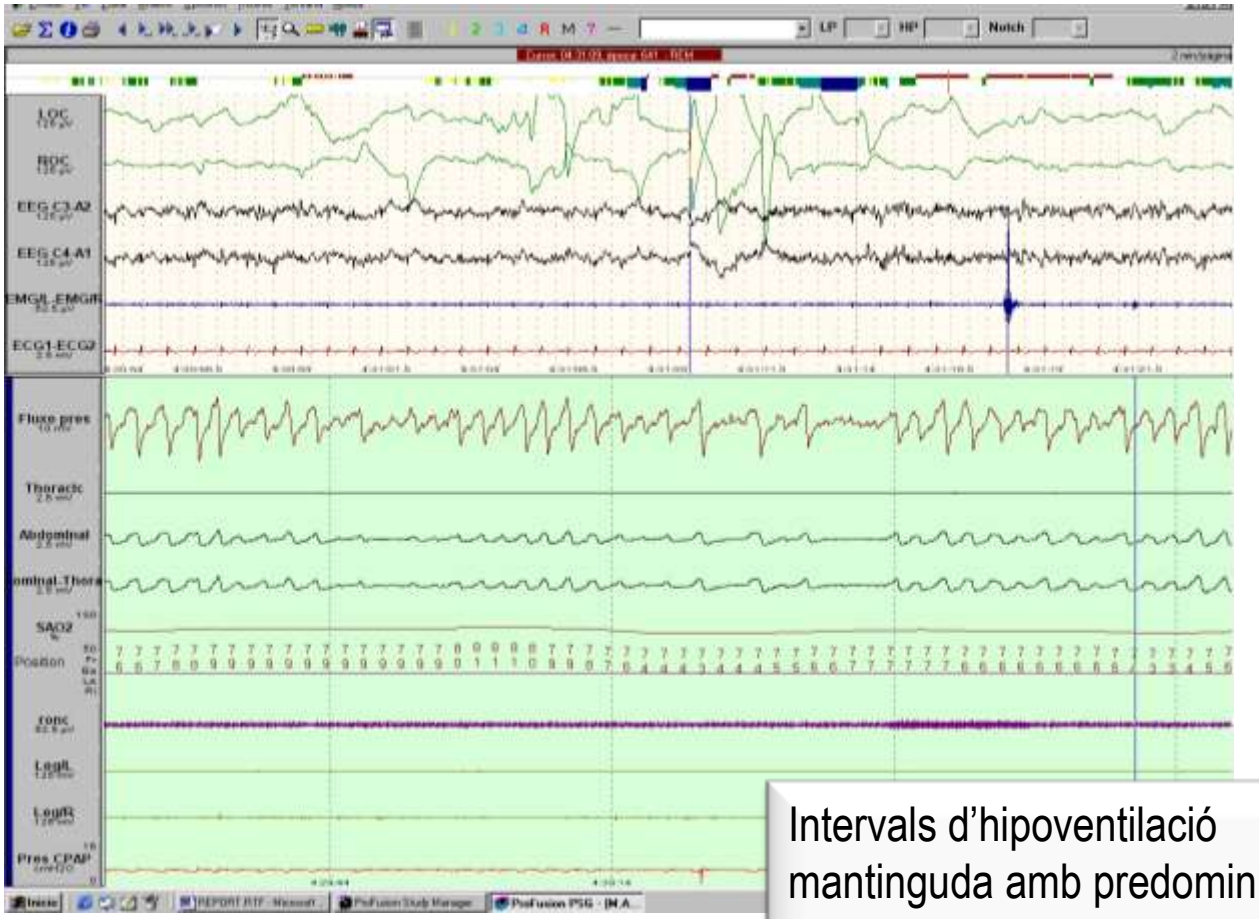


Episodis repetits d'apnees hipoapnees obstructives.

90%.

La Síndrome d'Obesitat Hipoventilació

Alteracions respiratòries nocturnes



Intervals d'hipoventilació mantinguda amb predomini en fase REM.

10%.

THORAX

Obesity hypoventilation syndrome: does the current definition need revisiting?

Nicholas Hart, Swapna Mandal, Ari Manuel, et al.

In our view, the use of $PaCO_2$ alone in the definition of OHS may miss early disease, if used in isolation. Clearly delineating the OHS population is a key issue, for appropriate care, and for conducting unbiased clinical studies and determination of phenotypes associated with poor prognosis within the obese population. We propose that the definition of OHS should be based on obesity, plus a $PaCO_2$ ≥45 mm Hg (6 kPa) OR an arterial base excess >3 mmol/L OR a standard HCO_3^- >27 mmol/L (in the absence of another cause for a metabolic alkalosis). Clearly, the BMI, the exact levels of $PaCO_2$, and now the HCO_3^-, used in the definition of OHS are relatively arbitrary thresholds, and may benefit from refinement; but the addition of a raised arterial HCO_3^- criterion seems to add value to the identification of this increasing problem.

Thorax January 2014 Vol 69 No 1

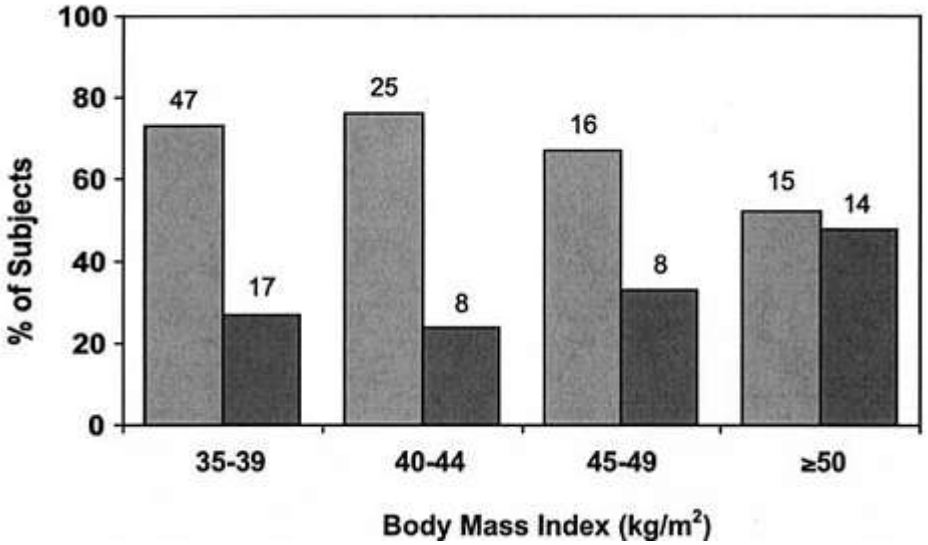
La Síndrome d'Obesitat Hipoventilació
Prevalença

10-20%: Estudis en Unitats de Son.

Obesity-Associated Hypoventilation in Hospitalized Patients: Prevalence, Effects, and Outcome

Sogol Nowbar, MD, Kristin M. Burkart, MD, Ralph Gonzales, MD, Andrew Fedorowicz, MD, Wendolyn S. Gozansky, MD, MPH, Jon C. Gaudio, MD, Ma[illegible] Clifford W. Zwillich, MD

4332 admissions.
6% obesitat: IMC> 35 kg/m^2 .
1% SOH.



Am J Med 2004

J Appl Physiol 108: 199–205, 2010.
First published October 29, 2009; doi:10.1152/japplphysiol.00713.2009.

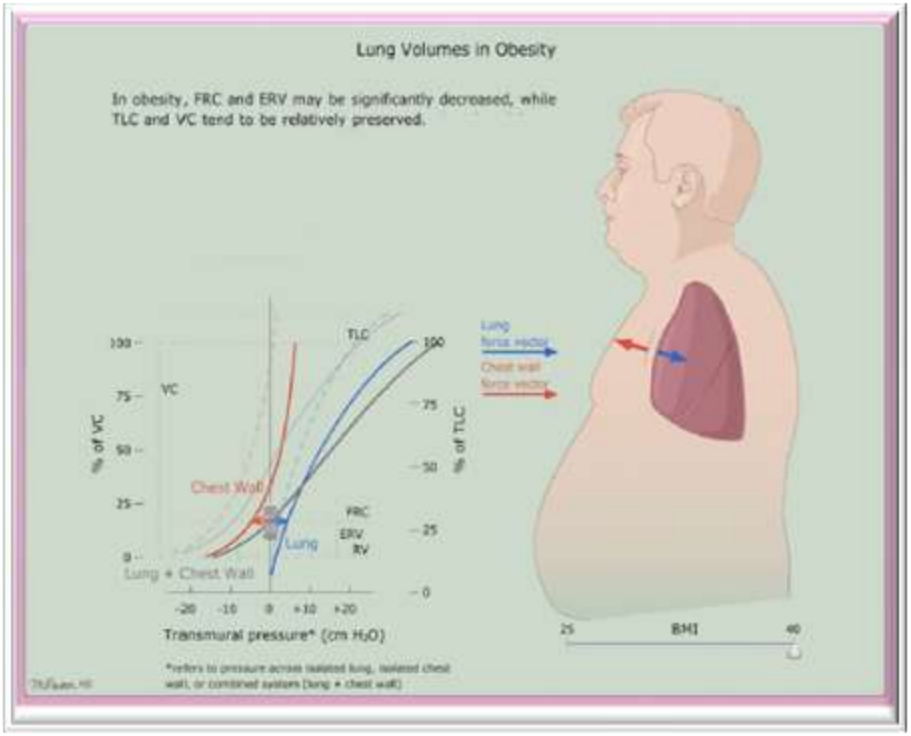
Review

HIGHLIGHTED TOPIC | *Pulmonary Physiology and Pathophysiology in Obesity*

Big breathing: the complex interaction of obesity, hypoventilation, weight loss, and respiratory function

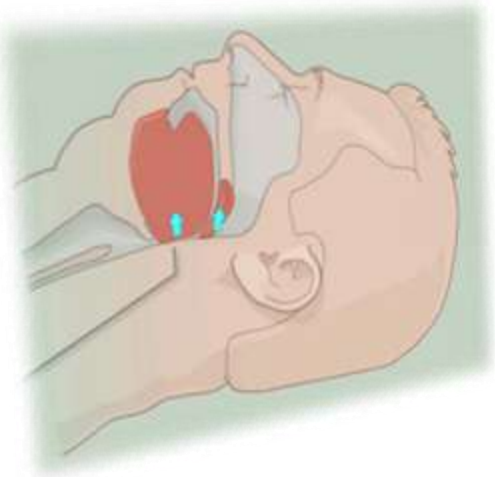
Amanda J. Piper[1,2] and Ronald R. Grunstein[1,2]

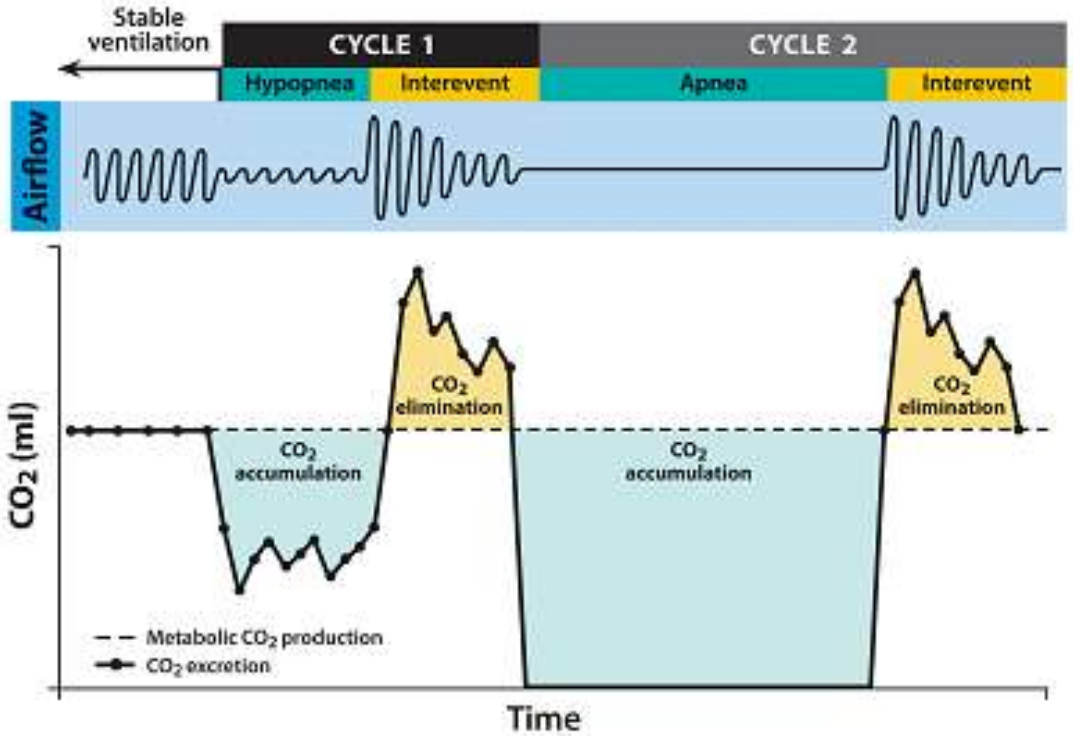
La Síndrome d'Obesitat Hipoventilació:
Fisiopatologia



- Deteriorament de la mecànica respiratòria.
- Alteració de la funció muscular.
- Increment del treball respiratori.

La Síndrome d'Obesitat Hipoventilació:
Fisiopatologia





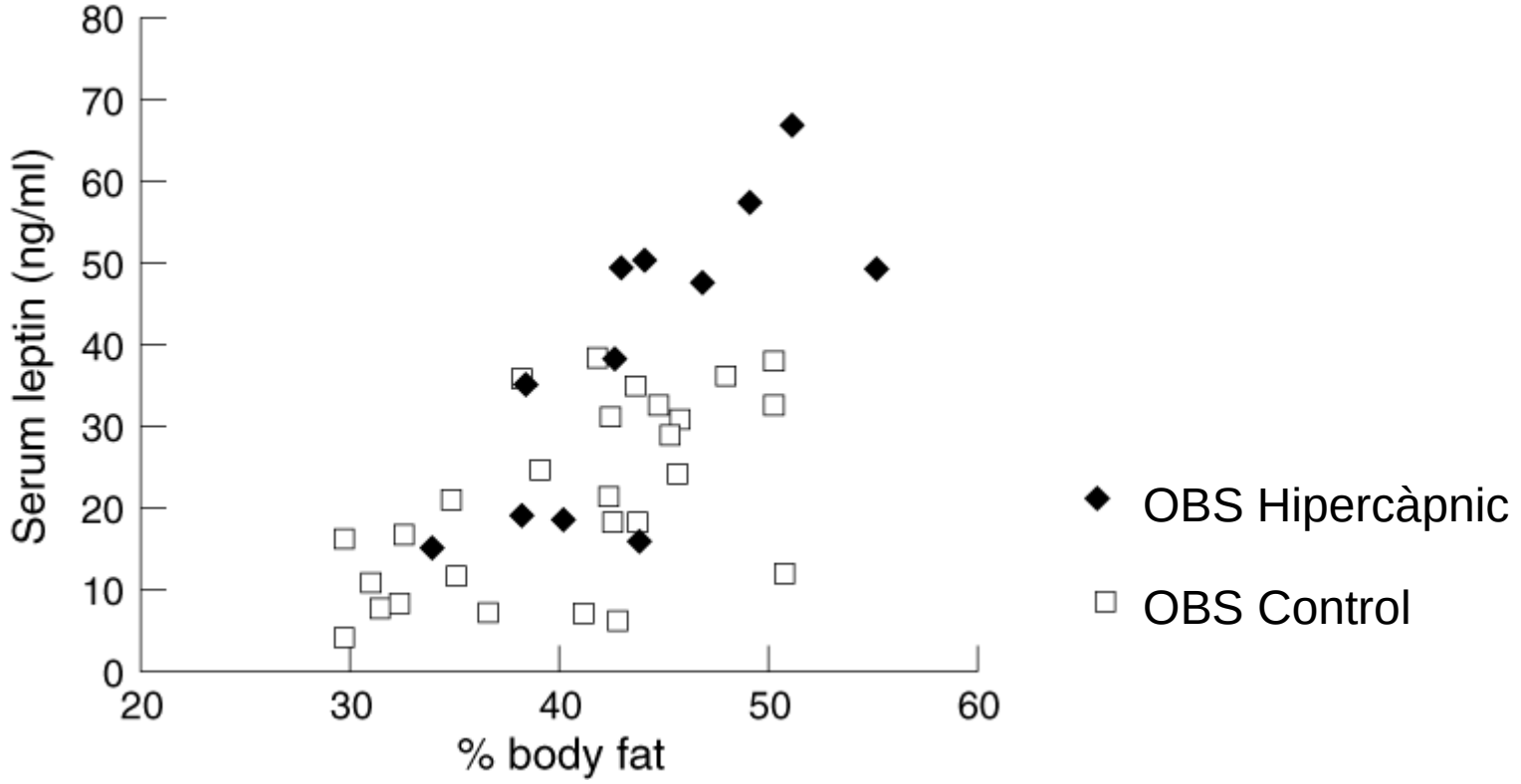
Alteració dels mecanismes de compensació de l'apnea

La Síndrome d'Obesitat Hipoventilació
Fisiopatologia

- *Modified control of breathing in genetically obese (ob/ob) mice. Tankersley CG et al. J Appl Physiol 1996;81:716-23*:
  El dèficit de leptina provoca hipoventilació i altera la resposta a la hipercàpnia.

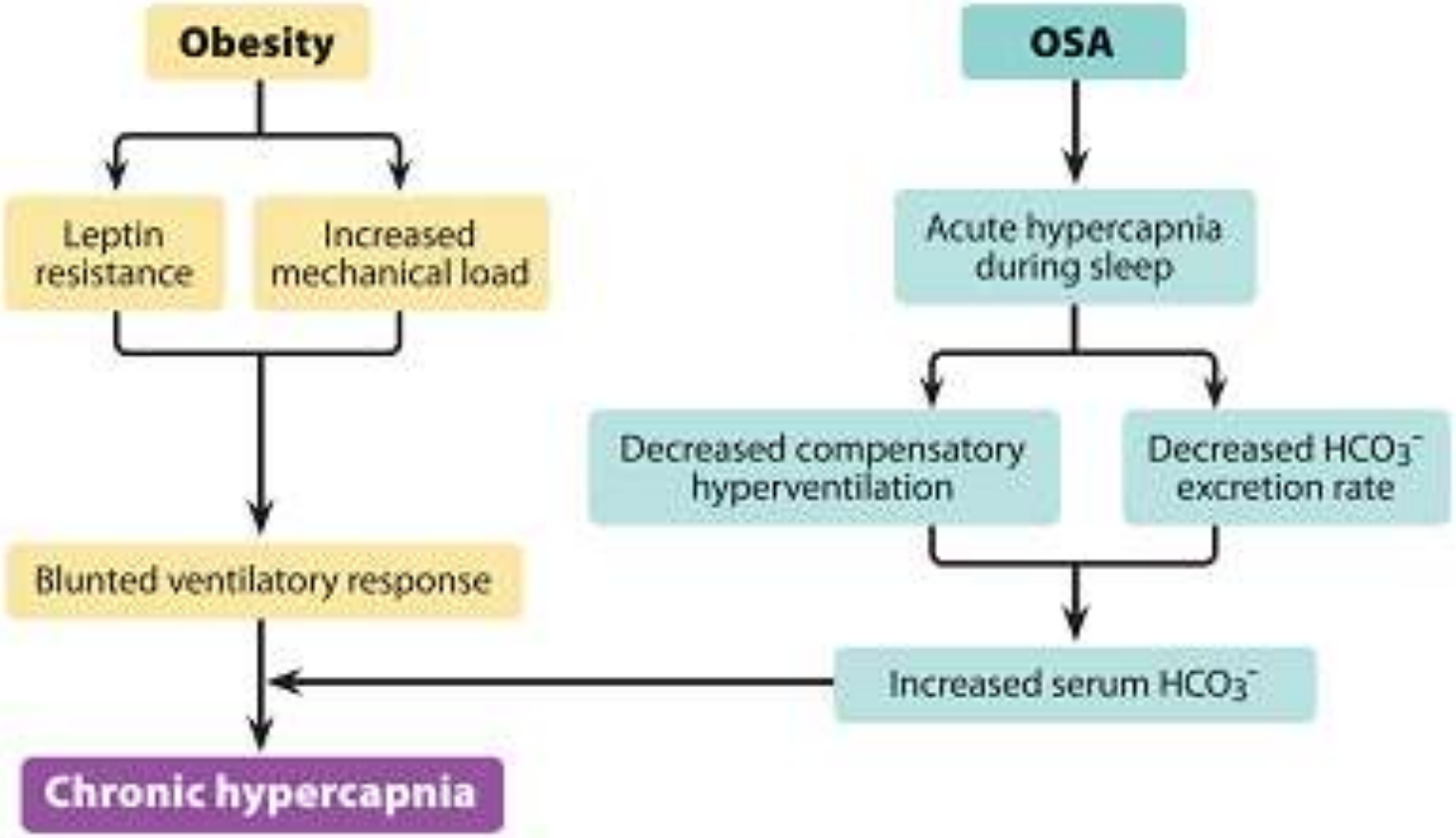
- *Leptin prevents respiratory depression in obesity. Am J Respir Crit Care Med 1999;159:1477-84:*
  El tractament substitutiu amb leptina augmenta la ventilació i millora la resposta a la hipercàpnia.

Association of serum leptin with hypoventilation in human obesity. Phipps Pr et al. Thorax 2002;57:75-6



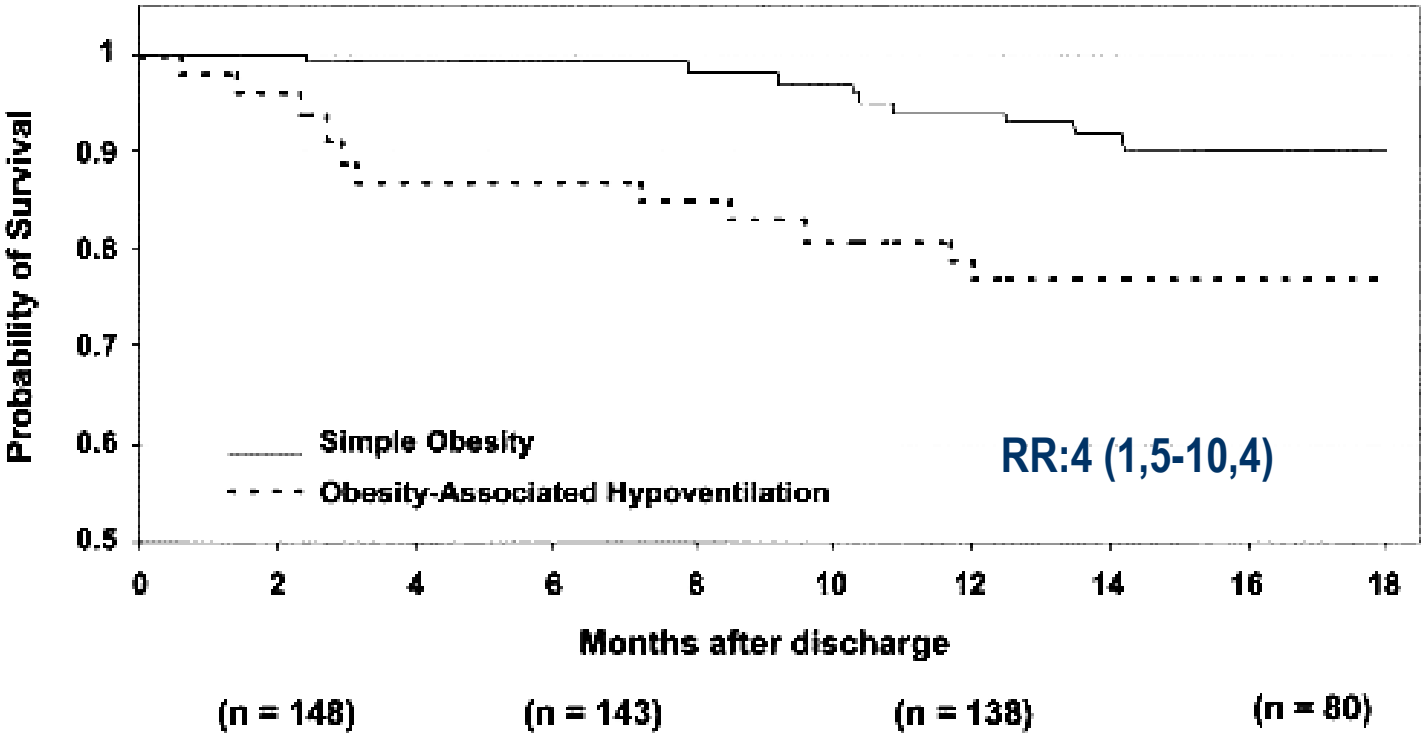
Els nivells de leptina sèrica és millor predictor de la hipercàpnia en el SOH que el greix corporal

La Síndrome d'Obesitat Hipoventilació
Fisiopatologia



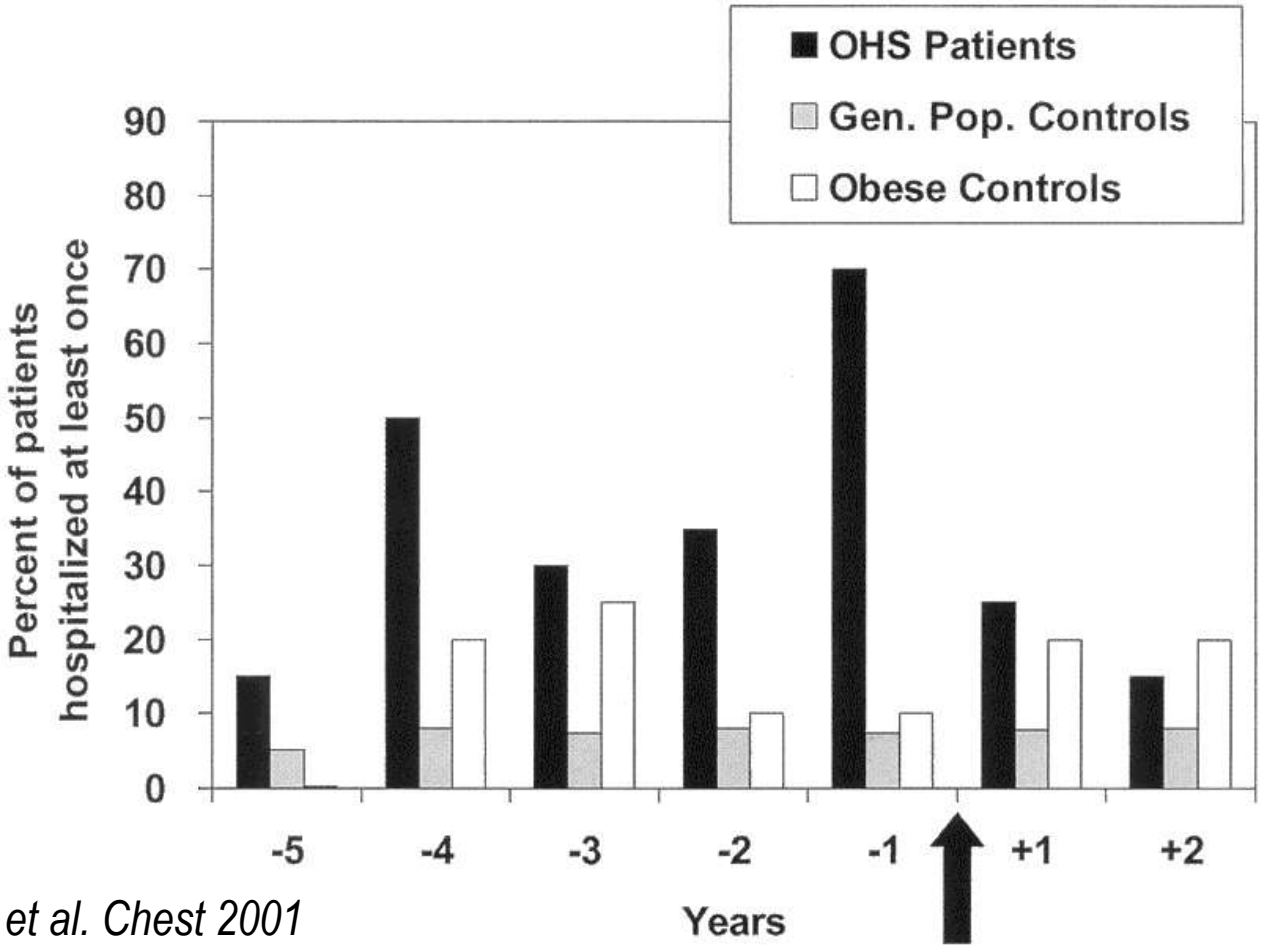
Obesity-Associated Hypoventilation in Hospitalized Patients: Prevalence, Effects, and Outcome

Sogol Nowbar, MD, Kristin M. Burkart, MD, Ralph Gonzales, MD, Andrew Fedorowicz, MD, Wendolyn S. Gozansky, MD, MPH, Jon C. Gaudio, MD, Matthew R. G. Taylor, MD, Clifford W. Zwillich, MD



25% diagnòstics de SOH a l'alta.

La Síndrome d'Obesitat Hipoventilació
Conseqüències clíniques



Berg G et al. Chest 2001

Characteristics of Patients With the "Malignant Obesity Hypoventilation Syndrome" Admitted to an ICU

Paul E. Marik, MD, FCCM, FCCP, ABPNS[1], and Himanshu Desai, MD[1]

MOHS

Fallida multiorgànica relacionada amb la obesitat.
Insuficiència respiratòria hipercàpnica.
8% ingressos UCI.
Mitjana 6 ingressos en 2 anys previs.
18% mortalitat.

Journal of Intensive Care Medicine
2012

Short-term and long-term effects of nasal intermitent positive pressure ventilation in patients with Obesity-Hypoventilation Syndrome.

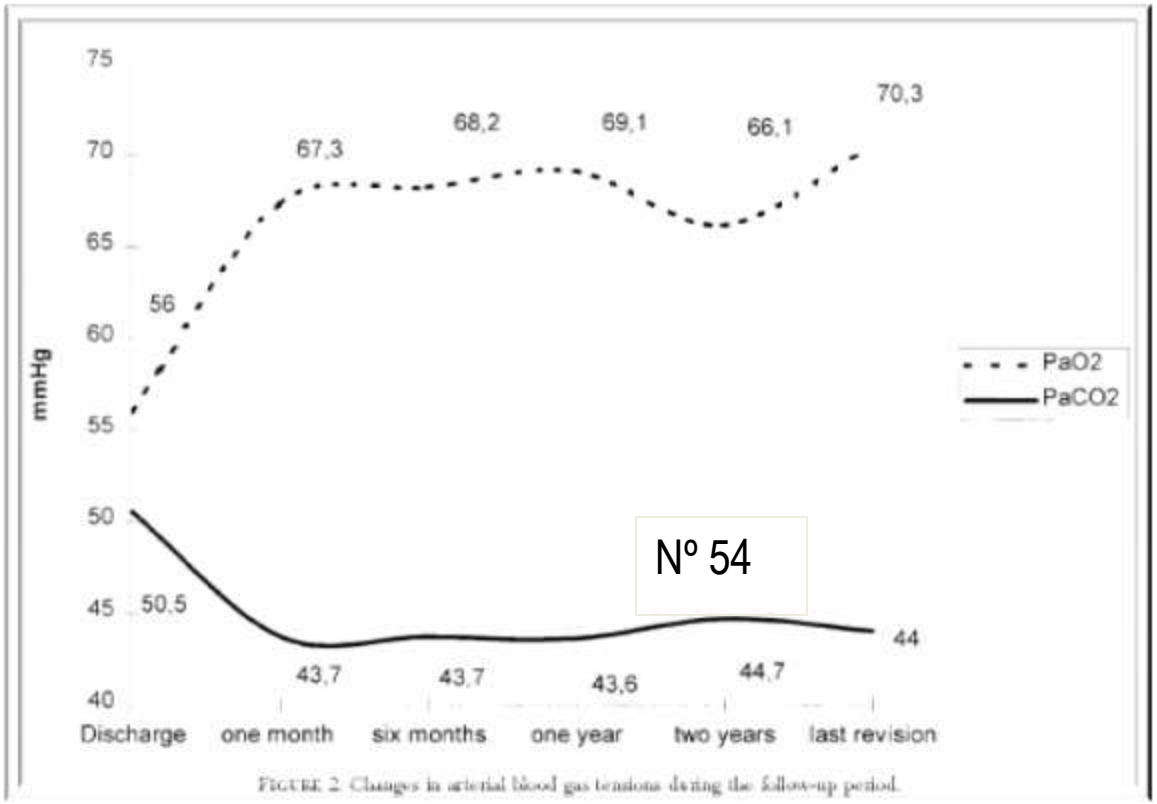


FIGURE 2. Changes in arterial blood gas tensions during the follow-up period.

L A Perez de Llano et al.
Chest 2005;128:587

Short-term and long-term effects of nasal intermitent positive pressure ventilation in patients with Obesity-Hypoventilation Syndrome.

Table 4—*NIPPV Modes at Hospital Discharge and After Follow-up

Modality	At Hospital Discharge	After Follow-up
CPAP	3	16
Bilevel device	49	30
Volume-cycled	2	3
Supplemental oxygen	47	31
NIPPV weaned		5

*Values given as No. of patients.

L A Perez de Llano et al.
Chest 2005;128:587

Randomised trial of CPAP vs bilevel support in the treatment of obesity hypoventilation syndrome without severe nocturnal desaturation

A J Piper,[1,2,3] D Wang,[1,2] B J Yee,[1,2,3] D J Barnes,[1] R R Grunstein[1,2,3] Thorax 2008

Table 4 Change in daytime gas exchange, weight and subjective sleep quality following 3 months of positive pressure in the three treatment groups

Outcome	Change in CPAP group Mean (SD)	Change in BVS group Mean (SD)	Mean difference between treatments (95% CI)	p Value†
$Paco_2$ (mm Hg)	−5.8 (8.4)*	−6.9 (6.7)*	1.04 (−4.5 to 6.6)	0.7

Exclosos 20% pacients amb SpO_2 < 80% durant 10 min en l'estudi amb CPAP.

BVS, bilevel ventilatory support; CPAP, continuous positive airway pressure; $Paco_2$, arterial carbon dioxide tension; Spo_2, oxygen saturation; ESS, Epworth Sleepiness Scale; PSQI, Pittsburgh Sleep Quality Index.
*p<0.05, **p<0.001, within group changes from baseline.
†p Value denotes mean difference between CPAP and BVS treatment groups using unpaired *t* tests.

SAHS + SOH

Estudi aleatoritzat: 18 CPAP *vs* 18 BIPAP

Seguiment 3 mesos

CHEST Original Research
SLEEP MEDICINE

Obesity Hypoventilation Syndrome*

Hypoxemia During Continuous Positive Airway Pressure

Banerjee D et al. Chest 2007;31: 1678-84

Table 3—*The Effect of 1 Night of CPAP Therapy on Overnight Sleep Parameters for Subjects With OSA (n = 23) and OSA Plus OHS (n = 23)**

Parameters	OSA	OSA Plus OHS	p Value
Percentage of non-REM of total sleep	77.7 (2.1)	75.9 (2.5)	NS
Percentage of REM of total sleep	22.2 (2.2)	24.1 (2.5)	NS
Sleep			NS
Arous			NS
Apnea			NS
SpO_2			0.003
SpO_2			0.015
Non-F			NS
REM			NS
Total			NS
Percentage of TST with Spo2 < 90%†	1 (0–5)	18 (1–54)	0.015
Percentage of TST with Spo2 < 80%†	0 (0–0)	0 (0–6)	0.05

*Data were normally distributed and presented as mean (SE). See Table 1 for expansion of abbreviation.
†Data are not normally distributed and are presented as median (interquartile range).

43% SOH , CT90%> 20% TST durant l'estudi d'anivellació de CPAP.

SOH: IAH: 78 (8); CT90%: 75% (31-96).

Official Journal of the Asian Pacific Society of Respirology
Respirology 2013

Continuous positive airway pressure in clinically stable patients with mild-to-moderate obesity hypoventilation syndrome and obstructive sleep apnoea

NEUS SALORD,[1,4,5,8] MERCEDES MAYOS,[1,4,5] ROSA MARIA MIRALDA,[1] ARIADNA FARRÉ,[1] MONTSERRAT CARRERAS,[1] ROSA SUST,[2] CRISTINA MASUET-AUMATELL,[7] JOSE RODRÍGUEZ[2] AND ANTONIO PÉREZ[3,6]

Background and objective: **The use of continuous positive airway pressure (CPAP) treatment in patients with obesity hypoventilation syndrome (OHS) and obstructive sleep apnoea (OSA) was evaluated, and factors that might predict CPAP treatment failure were determined.**

SOH + SAHS
IMC: 43 (7,5) kg/m^2
PCO_2: 50 (47-53) mmHg

Table 2 Diagnostic and titration night sleep variables of the 29 OHS patients

	Diagnostic study ($n = 29$)	CPAP titration study ($n = 29$)	*P*-value
Sleep efficiency† (%)	79.4 ± 11	84.9 ± 10	0.001
Arousal index† (n/h)	63.4 ± 26	12 ± 8	<0.001
Apnoea hypopnoea index (events/h)	74.7 (62–100)	12.2 (3–22)	<0.001
Stage I† (%)	16.5 (11–26)	4.6 (3–7)	<0.001
Stage II† (%)	59.9 ± 14	37.3 ± 13	<0.001
Stage III–IV† (%)	6.6 (1.6–17)	28.0 (26–46)	<0.001
REM sleep† (%)	10.3 ± 7	25.4 (11)	<0.001
Mean night SpO_2 (%)	81.4 ± 7	90.8 ± 4	<0.001
Minimum nocturnal SpO_2 (%)	53.0 (47.8–66)	77 (63–85)	<0.001
TST with SpO_2 <90% (%)	58.0 (39–74)	7.0 (0.7–40)	<0.001

Official Journal of the Asian Pacific Society of Respirology
Respirology 2013

Continuous positive airway pressure in clinically stable patients with mild-to-moderate obesity hypoventilation syndrome and obstructive sleep apnoea

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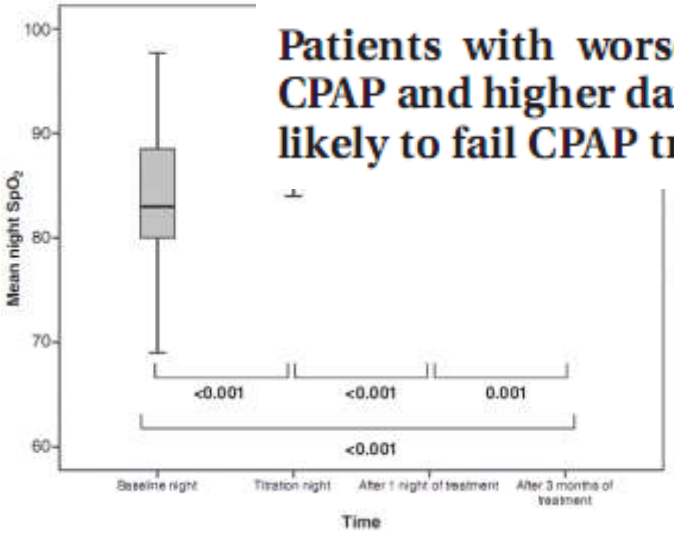
Patients with worse night-time saturation while on CPAP and higher daytime $PaCO_2$ at 1 month were more likely to fail CPAP treatment.



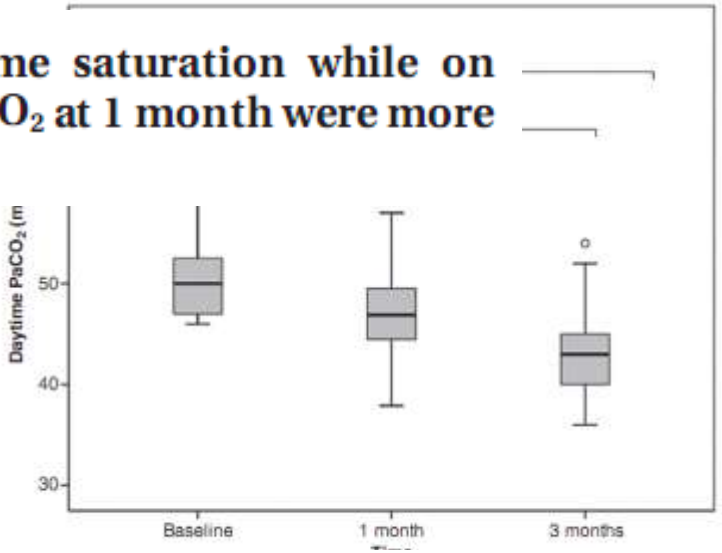
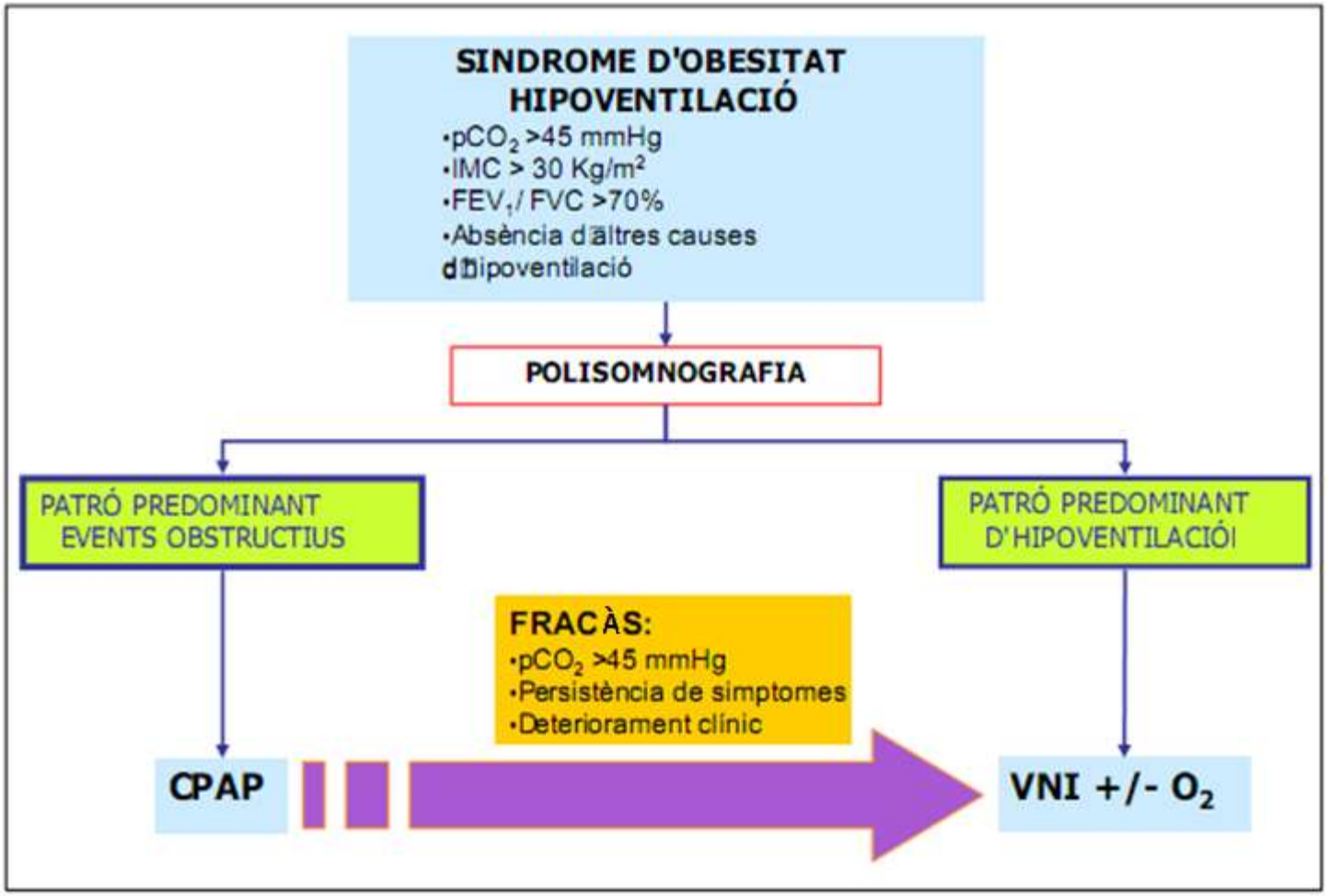


Table 4 Night-time saturation and 7:00 am arterial gas measurements after the first night of CPAP treatment and after 3 months in 27 OHS patients

	After the first night of optimum CPAP treatment ($n = 27$)	After 3 months of CPAP treatment ($n = 27$)	*P*-value
Study time with SpO_2 <90% (%)	8.4 (0.0–39.0)	0.30 (0.4–4.0)	0.011
Mean night-time SpO_2 (%)	92.3 ± 3.0	94.1% ± 2.8	0.001
Early morning PaO_2 (mm Hg)	74.6 ± 16	81.1 ± 15	0.038
Early morning $PaCO_2$ (mm Hg)	53.0 (49–55)	48.0 (46–51)	0.009

La Síndrome d'Obesitat Hipoventilació
Tractament



La Síndrome d'Obesitat Hipoventilació Tractament

.....In 1909 after losing approximately 90 pounds, President Howard Taft stated, "I have lost that tendency to sleepinees wich made me think of the fat boy in Pickwick.
My color is very much better and my ability to work is greater.

Tractament de l'obesitat

La Síndrome d'Obesitat Hipoventilació
Punts Clau

- Definició en continua revisió.
- Mecanismes fisiopatogènics multifactorials.
- Importància del diagnòstic precoç.
- Necessitat de diagnòstic polisomnogràfic.
- Reavaluació del suport ventilatori en fase estable.
- Tractament de l'obesitat com a objectiu fonamental.