Obstructive Sleep Apnea (OSA) and Diabetes

Presented by:

Indian Health Service (IHS)
Division of Diabetes November 2010

Objectives

1. Discuss the pathophysiology, prevalence, and clinical implications of obstructive sleep apnea.
2. Incorporate new data linking obstructive sleep apnea to diabetes.
3. Refer appropriate primary care patients for home sleep study.
4. Give one example of how you plan to change your practice as a result of this training.

Overview

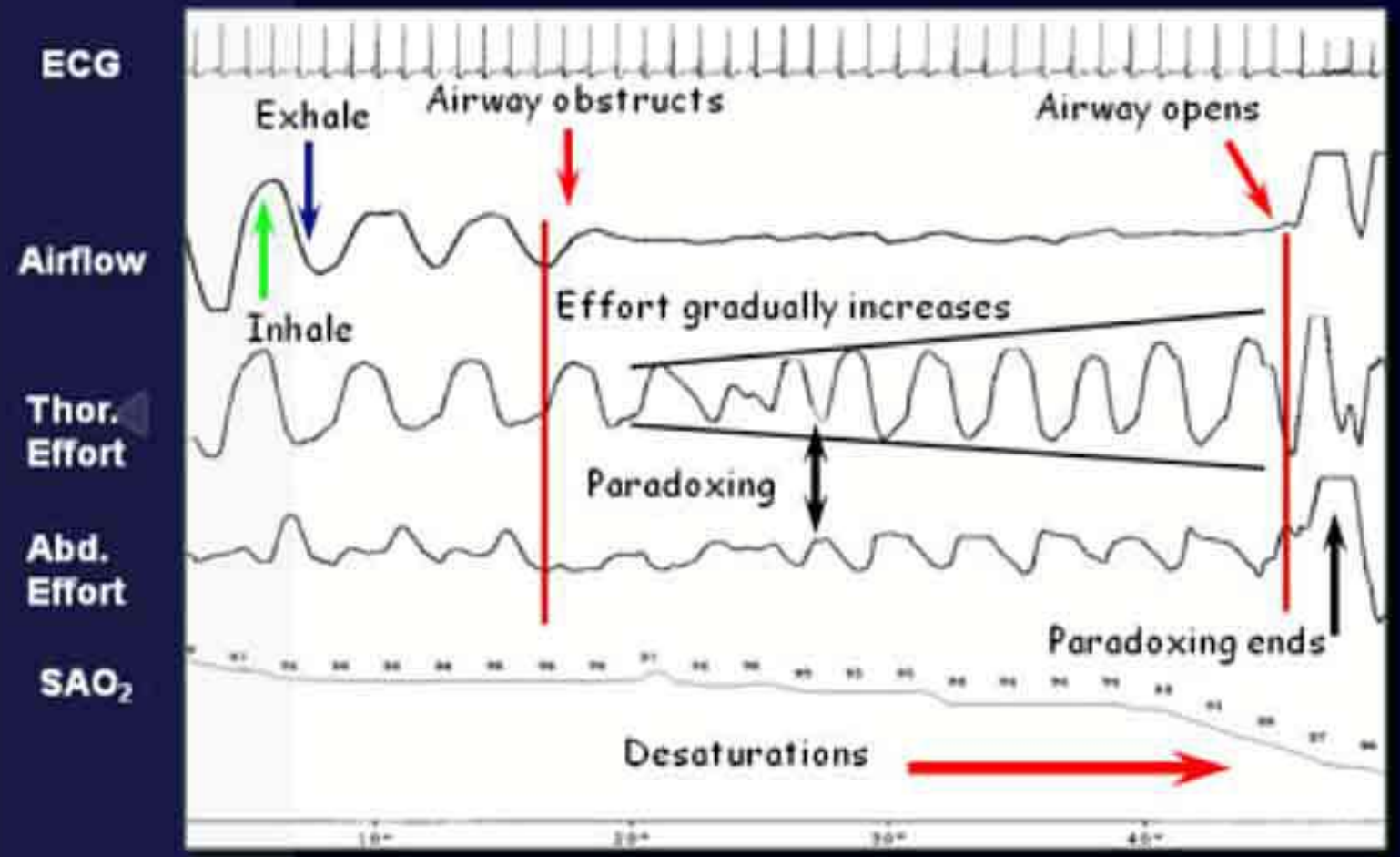
Kelly Acton, MD, MPH, FACP

Director, IHS Division of Diabetes

Obstructive Sleep Apnea (OSA)

Sleep related breathing disorder characterized by recurrent collapse of the upper airway, resulting in drops in oxygen saturations and transient arousals from sleep

Obstructive Apnea

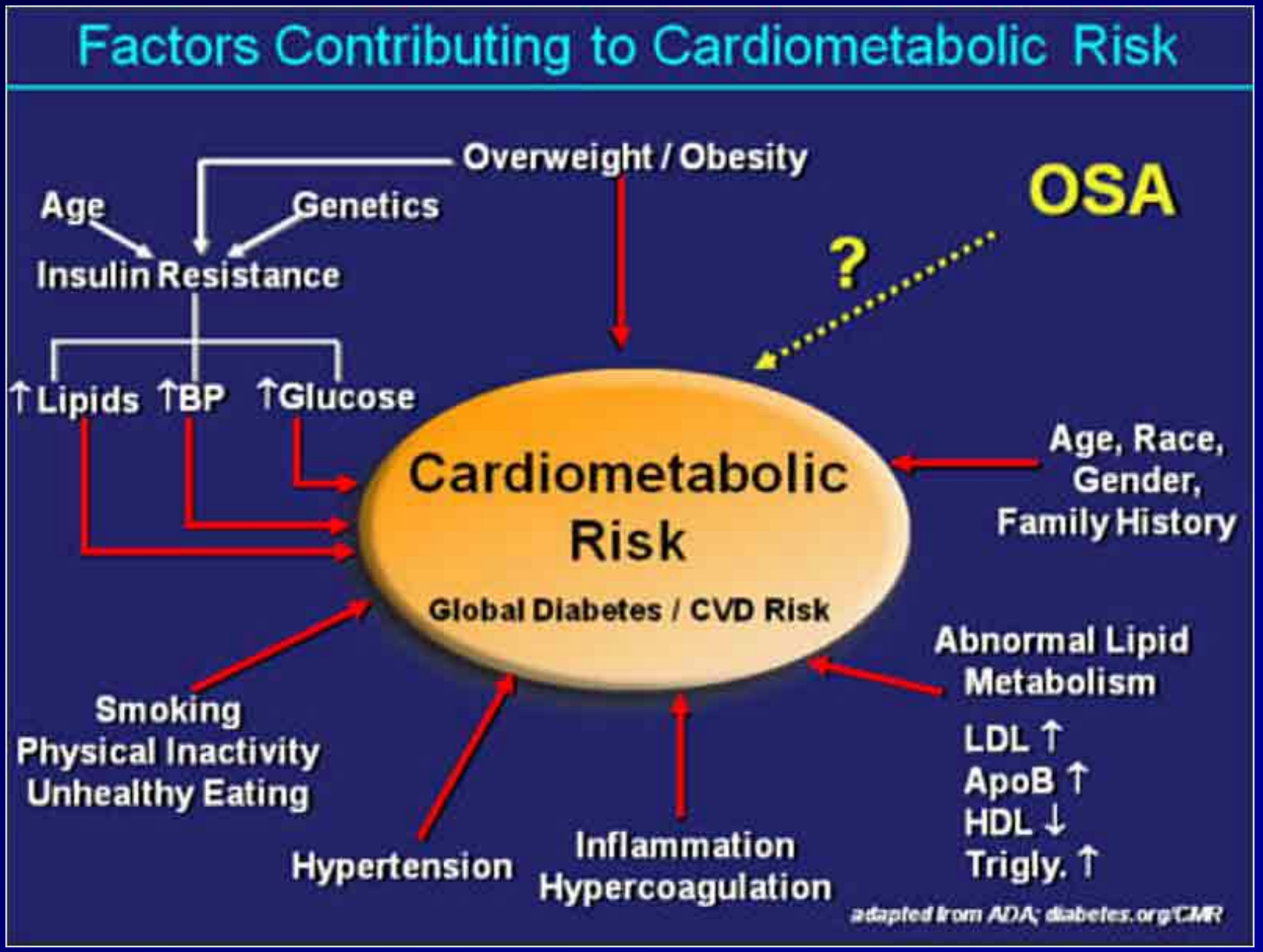


OSA : risk factors

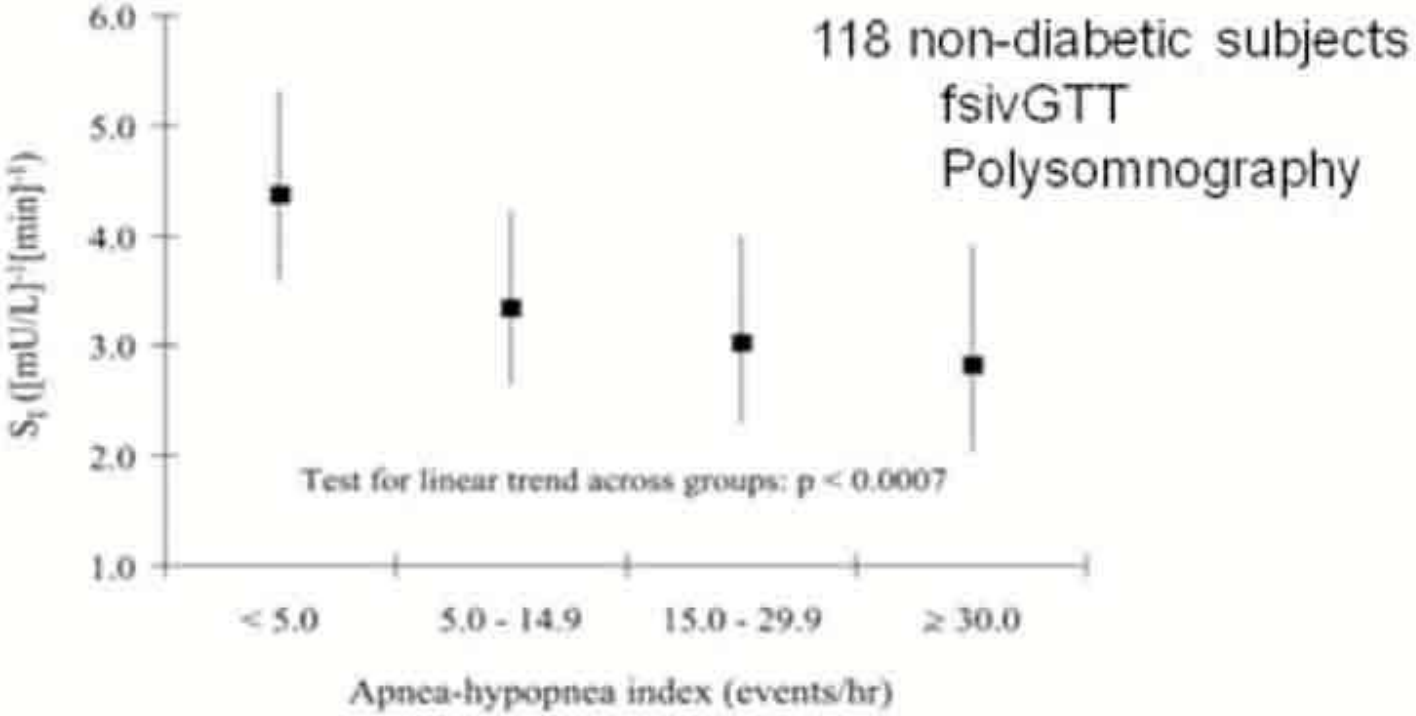
- **Obesity** (particularly central), **Age**, **Male gender**
- Race: African-American, Mexican American, Pacific Islander, Asian
- **Craniofacial features** including congenital anomalies, retrognathia, enlarged soft palate and tonsils, macroglossia
- Increased neck circumference (> 40cm)
- Positive family history (2-4 fold increase)
- Endocrine abnormalities: hypothyroidism, acromegaly, PCOS, type 2 diabetes

Aggravated by alcohol, sedatives, sleep deprivation, supine position, respiratory allergies, nasal congestion

Factors Contributing to Cardiometabolic Risk



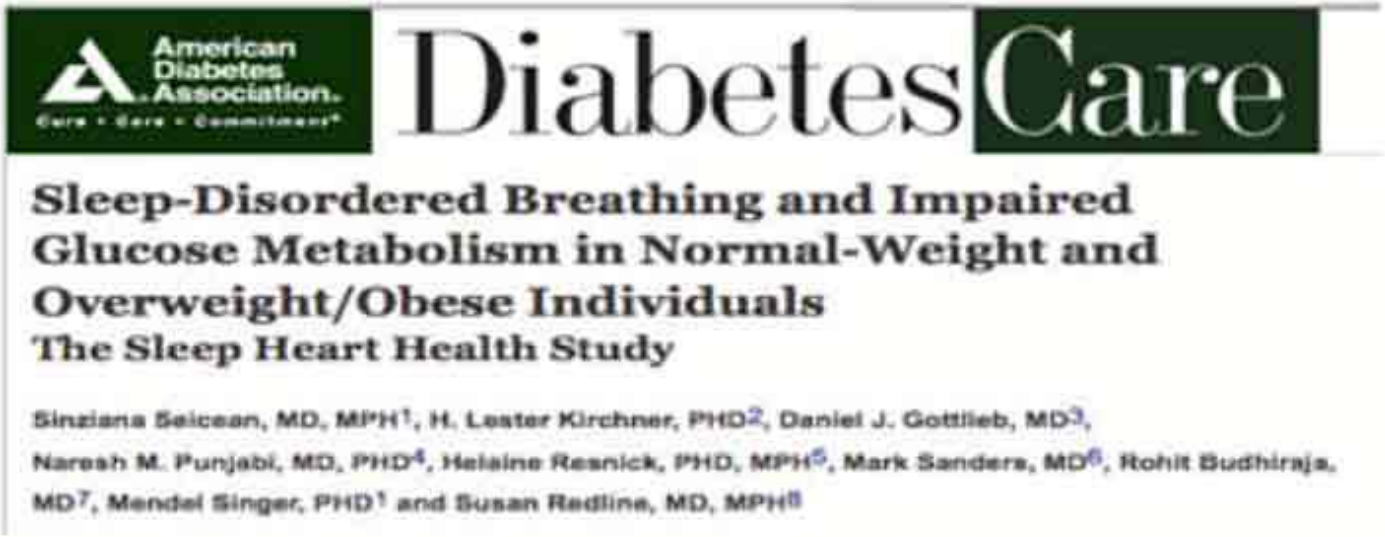
Decreased insulin sensitivity in OSA patients



....compared to normal subjects, those with mild, moderate and severe OSA showed 27%, 37% and 48% reduction in insulin sensitivity, independent of age, sex, percent body fat

Punjabi et al, AJRCCM, 2009

Higher prevalence of prediabetes and incident diabetes in patients with OSA



American Diabetes Association.

Diabetes Care

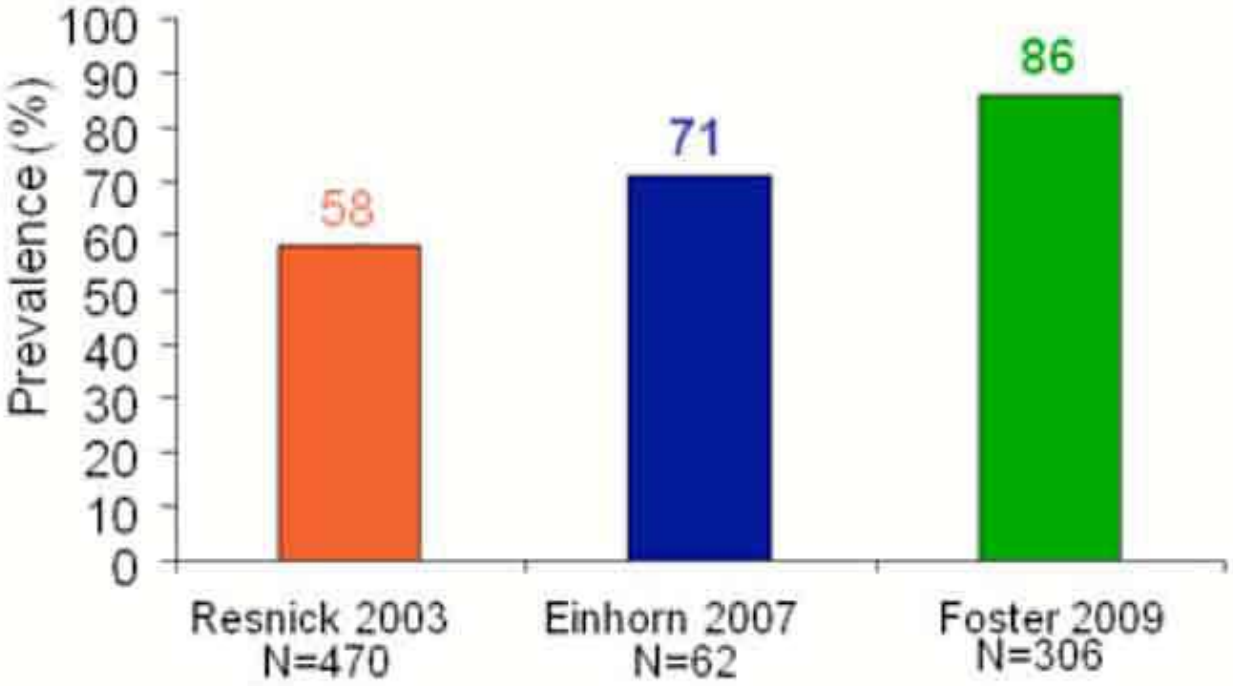
Sleep-Disordered Breathing and Impaired Glucose Metabolism in Normal-Weight and Overweight/Obese Individuals
The Sleep Heart Health Study

Sinziana Seicean, MD, MPH[1], H. Lester Kirchner, PHD[2], Daniel J. Gottlieb, MD[3], Naresh M. Punjabi, MD, PHD[4], Helaine Resnick, PHD, MPH[5], Mark Sanders, MD[6], Rohit Budhiraja, MD[7], Mendel Singer, PHD[1] and Susan Redline, MD, MPH[8]

....cross-sectional analysis of over 2500 non-diabetic individuals, the presence of OSA was associated with a significantly higher prevalence of prediabetes and incident diabetes, independently of the degree of obesity

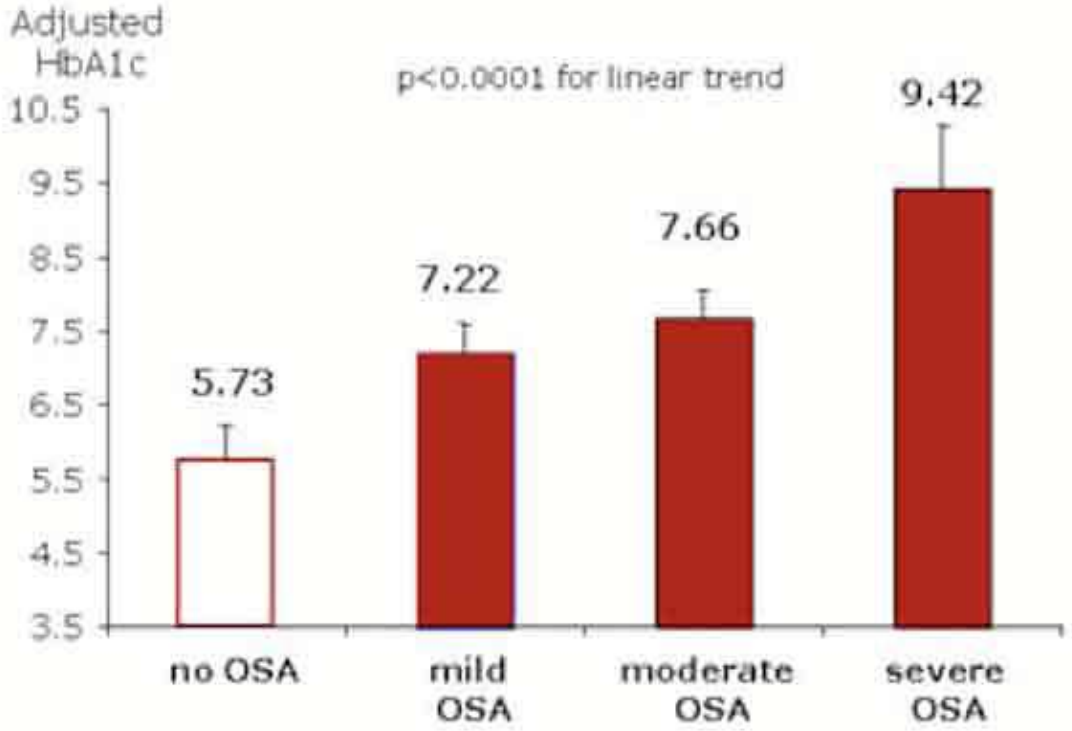
Seican et al, Diabetes Care, 2008

Prevalence of OSA in type 2 diabetics: PSG studies



....suggesting that nearly 17 million of the estimated 24 million diabetic people in the US will have OSA !

OSA severity is associated with poorer glucose control in type 2diabetics



N=60

Polysomnography HbA1c

Age: 57 ± 9 yrs

BMI: 34 ± 8 kg/m²

** Data adjusted for age, gender, race, BMI, number of diabetes medications, level of exercise, years of diabetes and total sleep time

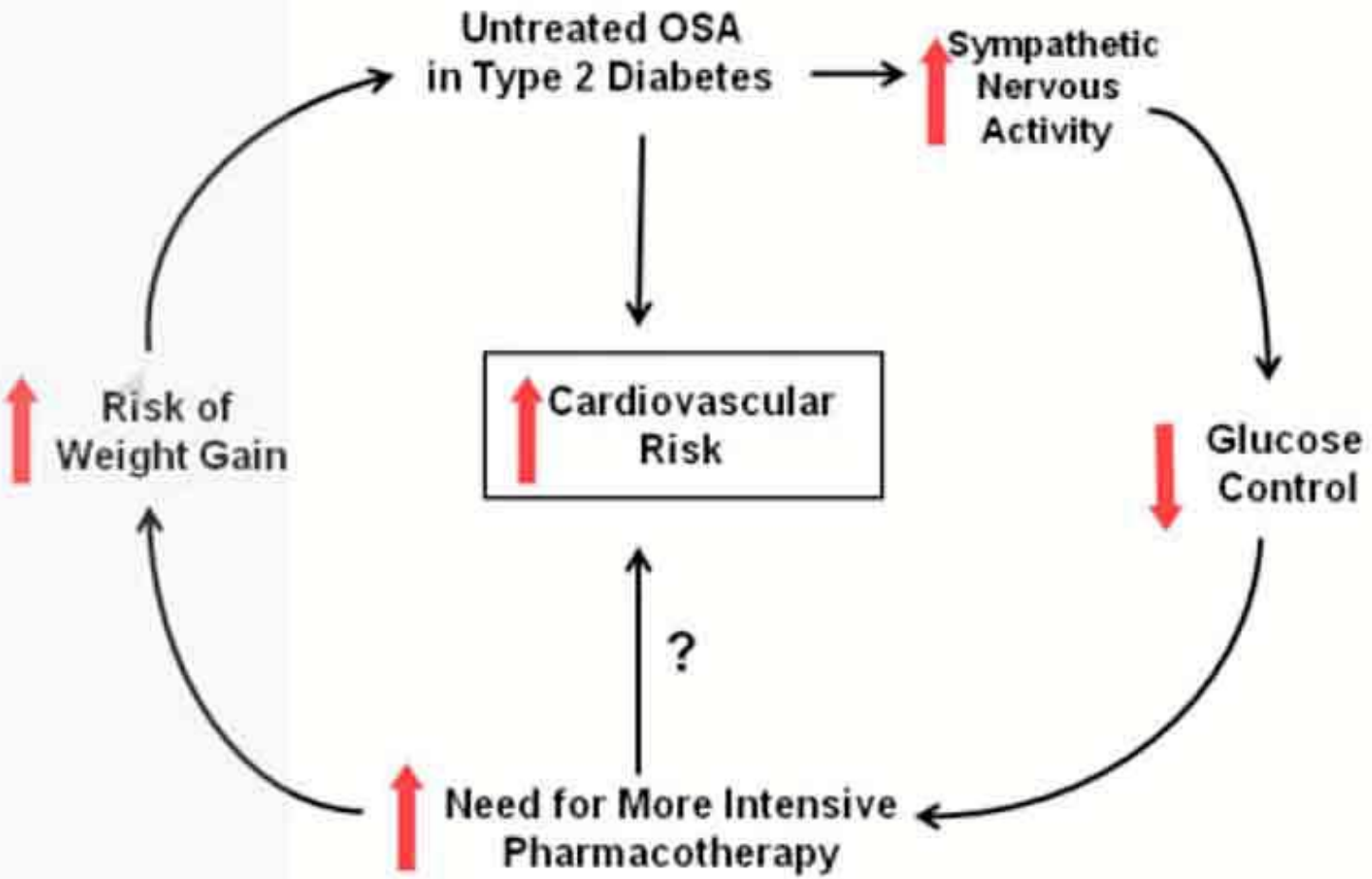
Aronsohn et al., Am J Respir Crit Care Med. 2009

….suggesting that

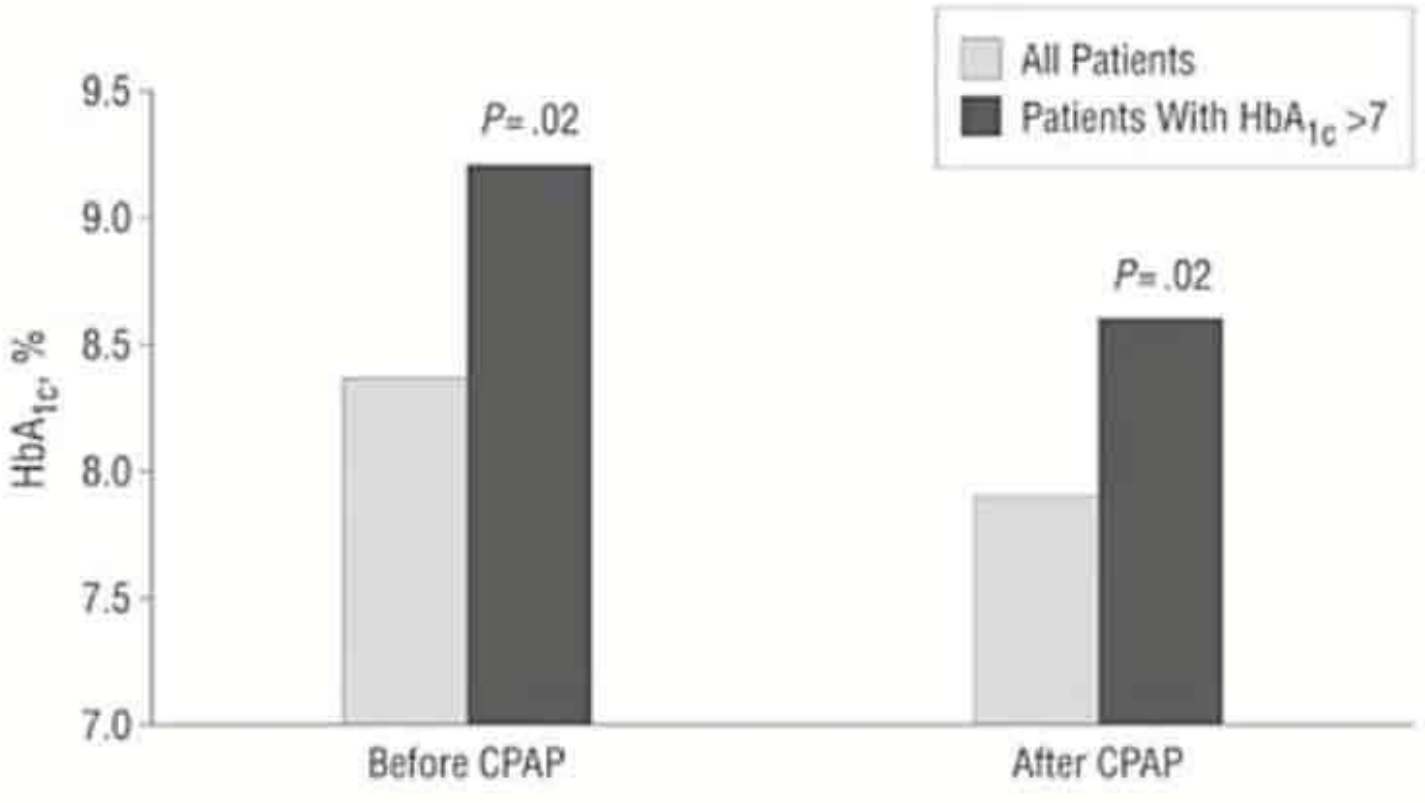
- untreated OSA may worsen glucose control and increase the need for more intensive pharmacotherapy in patients with type 2 diabetes

- treatment of OSA may improve glucose control as much as widely used pharmacologic agents

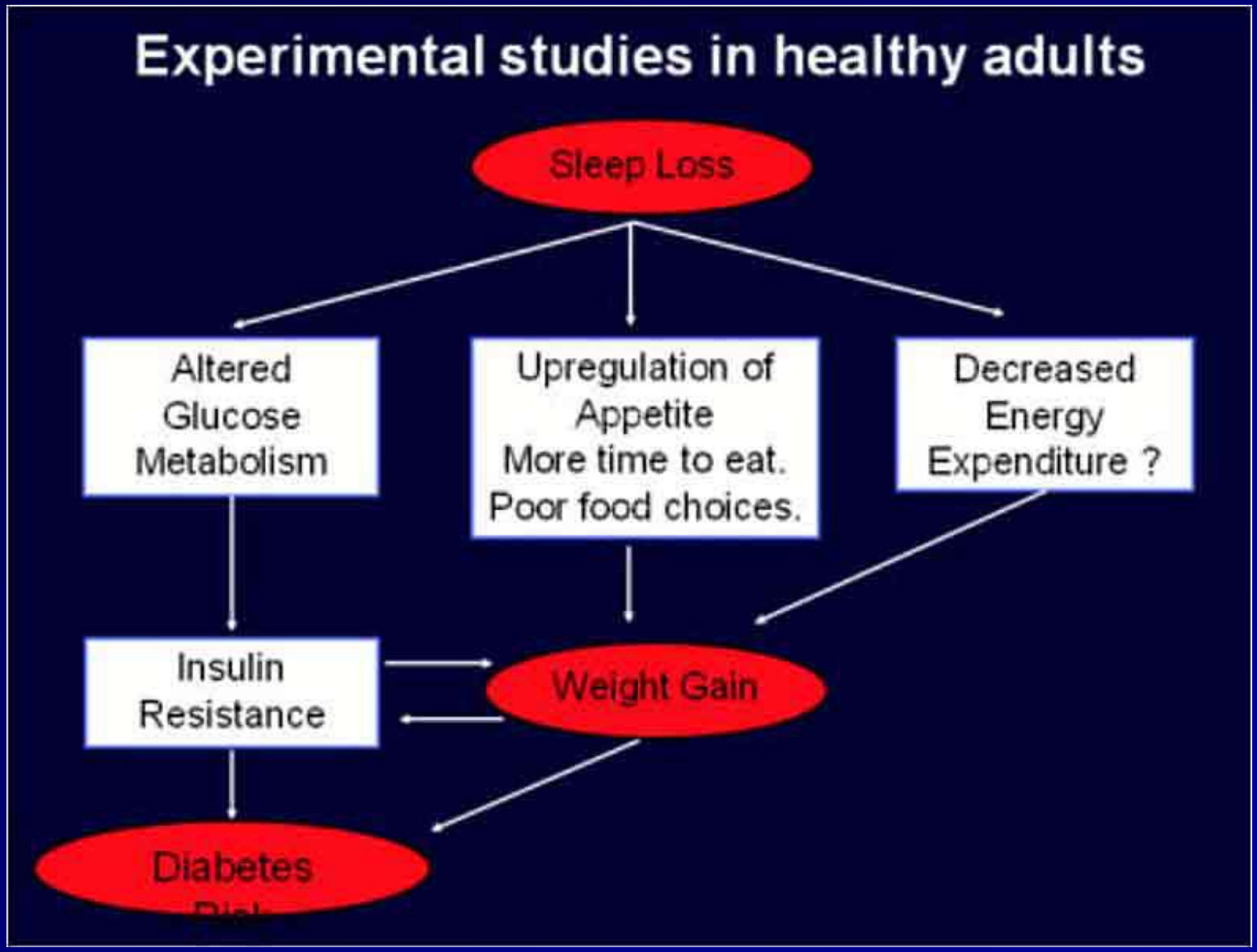
Putative feed forward cascade of unrecognized OSA



Postprandial HbA1c levels decrease after CPAP therapy in type 2 diabetics



Babu et al, Arch Intern Med 2005


Experimental studies in healthy adults
Sleep Loss
Altered Glucose Metabolism
Upregulation of Appetite More time to eat. Poor food choices.
Decreased Energy Expenditure ?
Insulin Resistance
Weight Gain
Diabetes

SUMMARY

- OSA is associated with insulin resistance, glucose intolerance and risk of diabetes, independently of adiposity
- OSA is a highly prevalent, unrecognized comorbidity in patients with type 2 diabetes
- Untreated OSA may worsen glucose control and increase the need for more intensive pharmacotherapy
- Robust clinical trials are needed to assess the effects of OSA treatment on glucose control
- Sleep duration and quality are potentially modifiable risk factors, therefore might have important clinical implications for prevention and treatment of diabetes and obesity

Recommendations for IHS

- Consider OSA in our patient population; prevalence?
- Ask patients with T2DM about sleep quality and duration.
- Consider OSA in patients with unexplained worsening glucose control.
- Assess local resources for diagnosis and treatment?

Clinical Definitions and Pathophysiology

Teresa Green, MD
Board Certified in Sleep Medicine
American Board Internal Medicine
Western Carolina Pulmonary and Sleep Consultants

Update in OSA:
New Links to Diabetes and the Role of Home Sleep Testing

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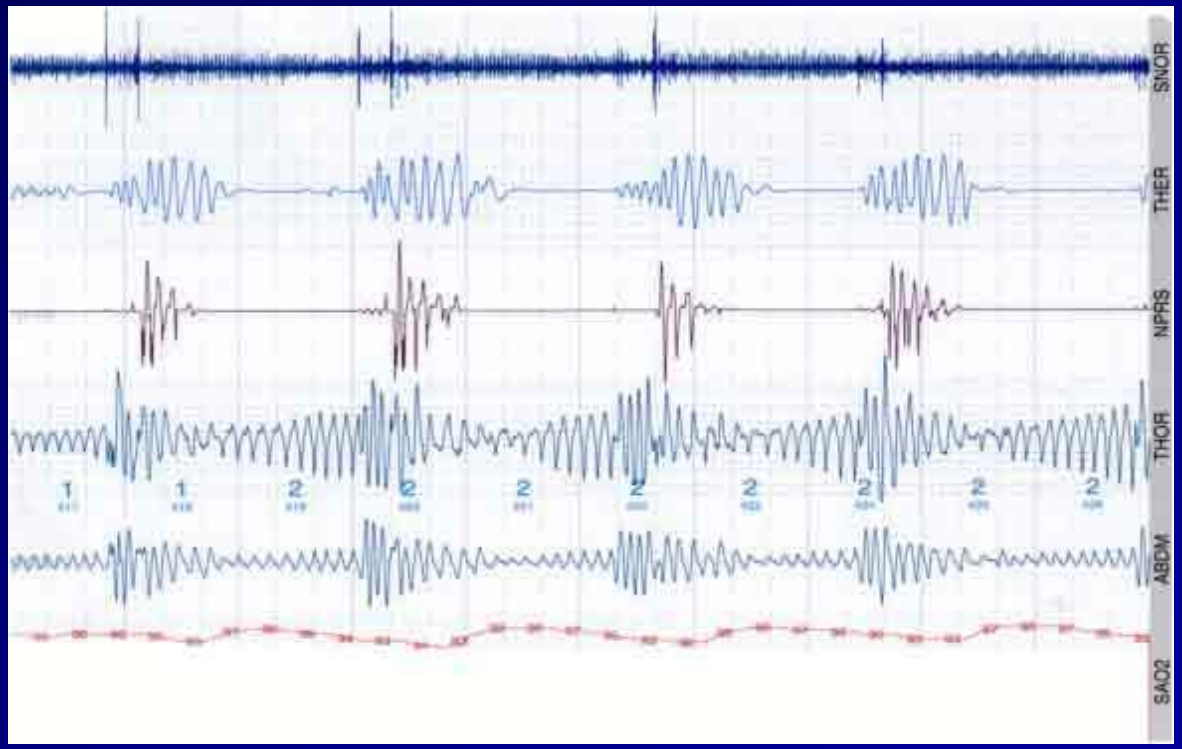
Western Carolina Pulmonary and Sleep Consultants

OSA Definitions

- **Apnea** = Cessation of airflow for ≥ 10 seconds

1. **Obstructive Apnea**
   - Absence of airflow with respiratory effort



Definitions

2. Central Apnea

- Absence of airflow with absent respiratory effort

Airflow

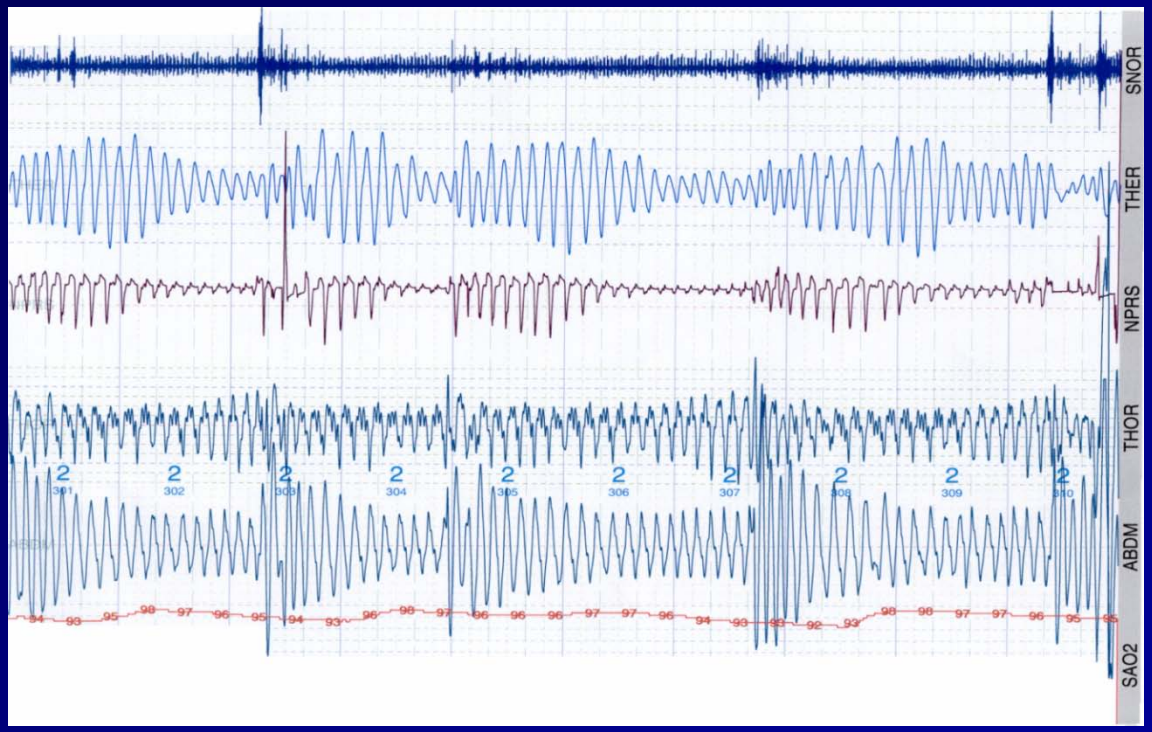
Chest (effort)

Abdomen (effort)

Oxygen

Definitions

- Hypopnea
  - ≥ 30% reduction in airflow associated with 4% oxygen desaturation
  - ≥ 50% reduction in airflow associated with 3% oxygen desaturation or arousal (alternative criteria)



Airflow

Airflow

Chest (effort)

Abdomen (effort)

Oxygen

Definitions

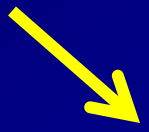
- Apnea Hypopnea Index (AHI)
  - Number of apneas and hypopneas per hour of sleep
  - Total Number of Events divided by the Total Sleep Time
- OSA
  - AHI ≥ 5
- Obstructive sleep apnea syndrome (OSAS)
  - AHI 5–15 associated with symptoms and/or significant comorbidities
  - AHI ≥ 15 regardless of associated symptoms and/or comorbidities

Spectrum of Disease

Snoring

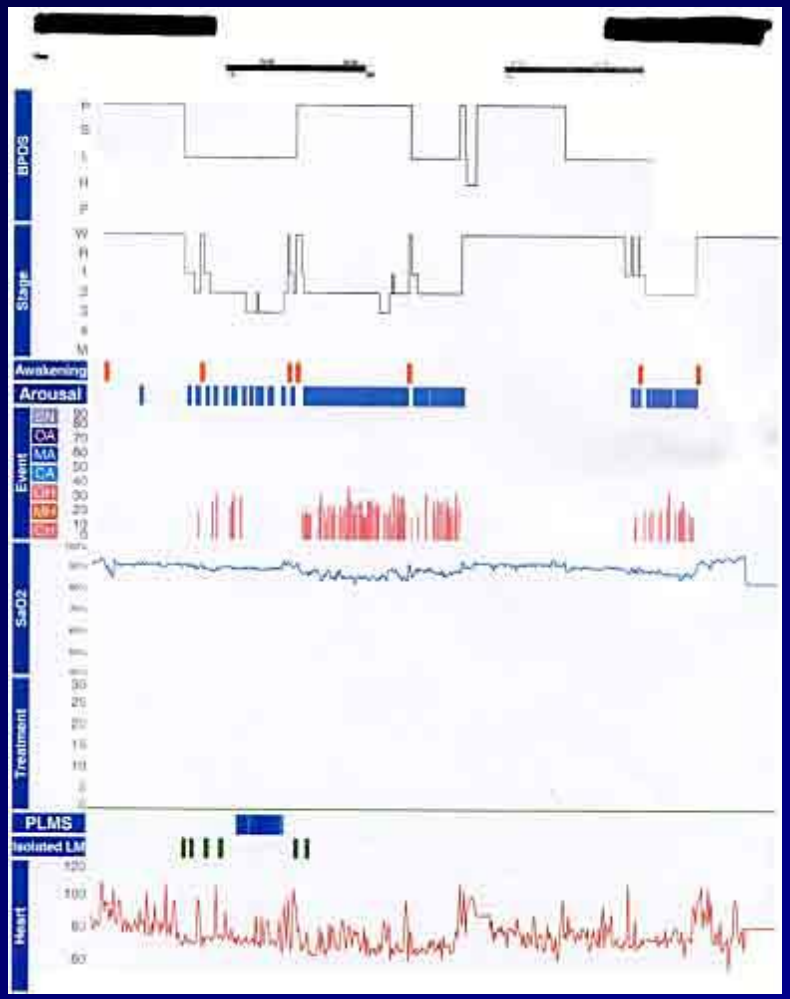
Upper Airway Resistance Syndrome (UARS)

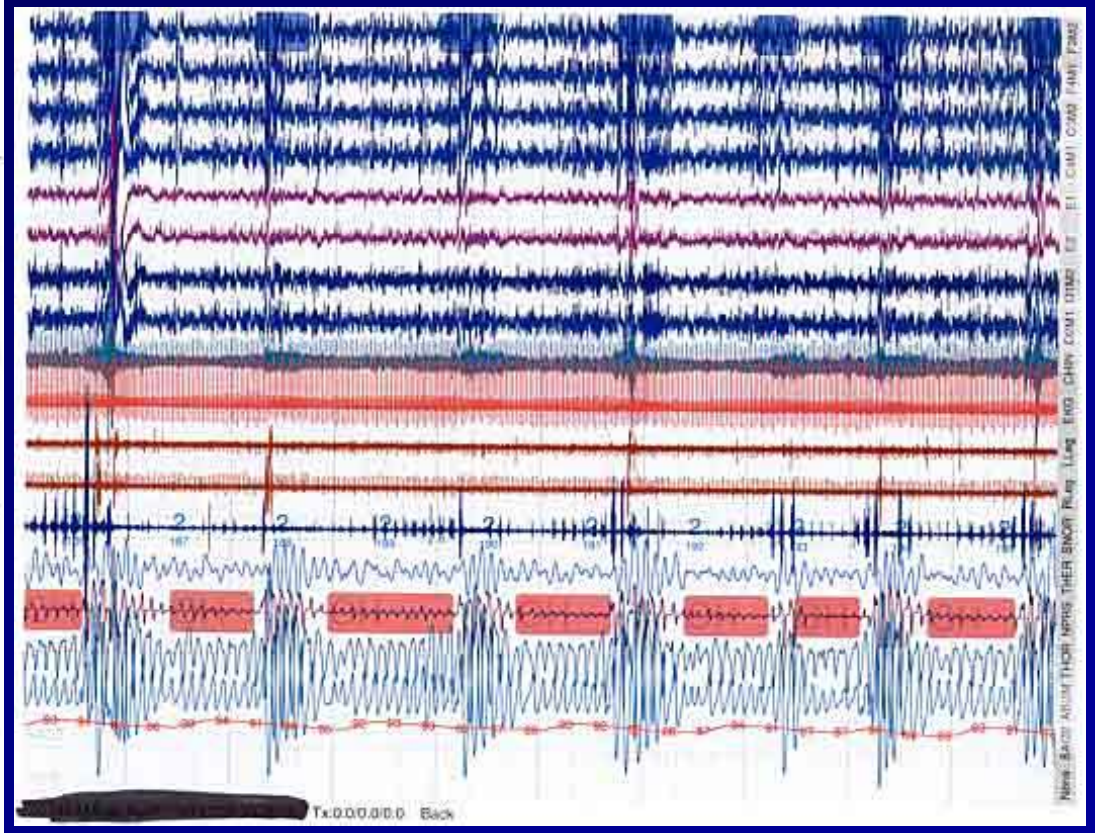
OSAS



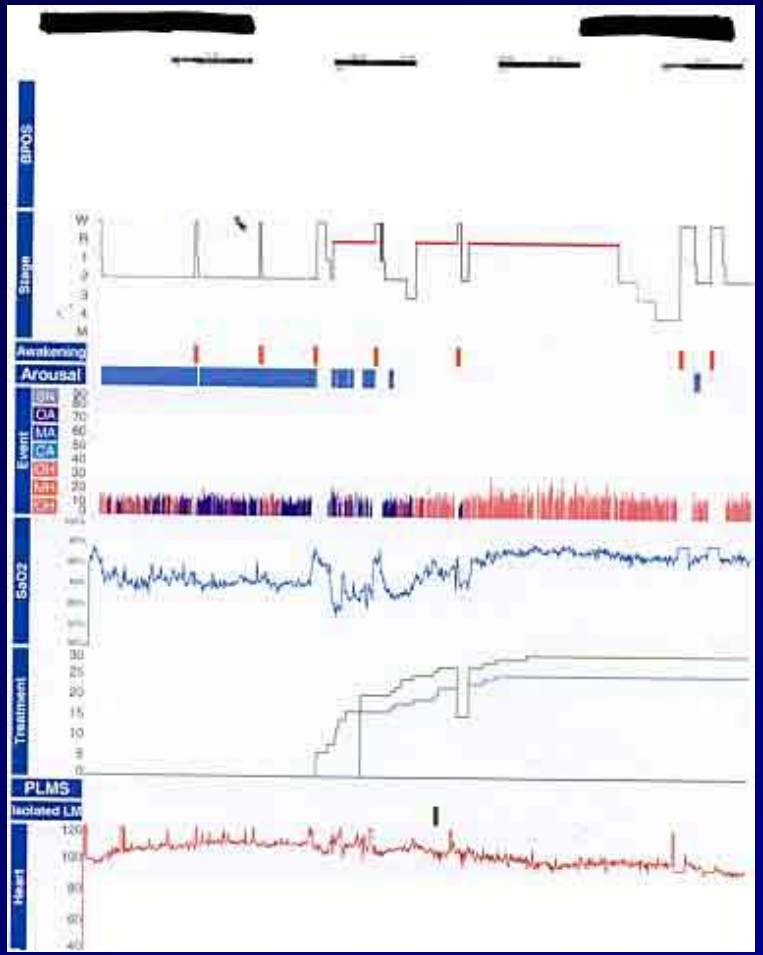
Obesity Hypoventilation

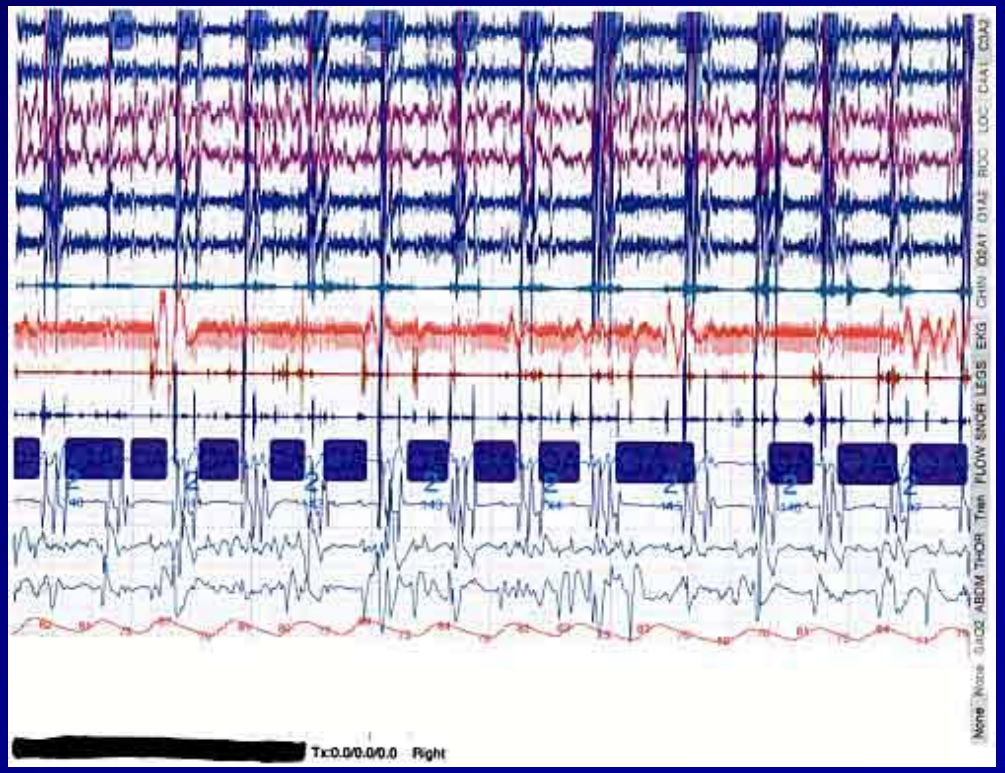
Moderate OSAS



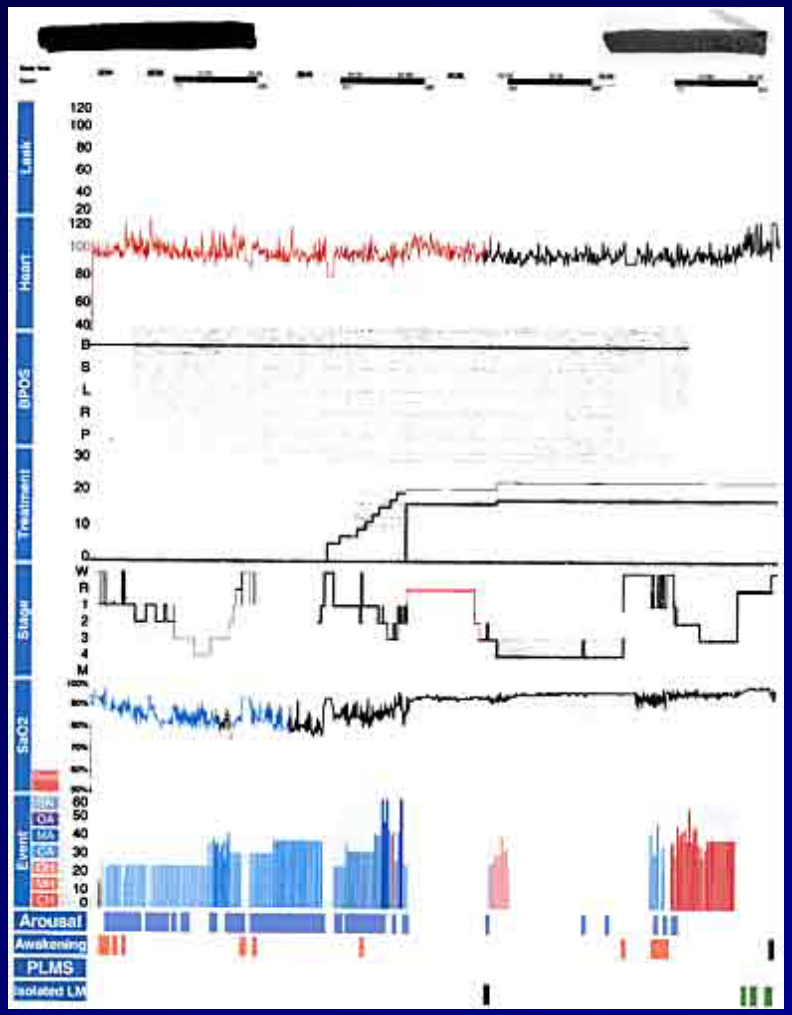


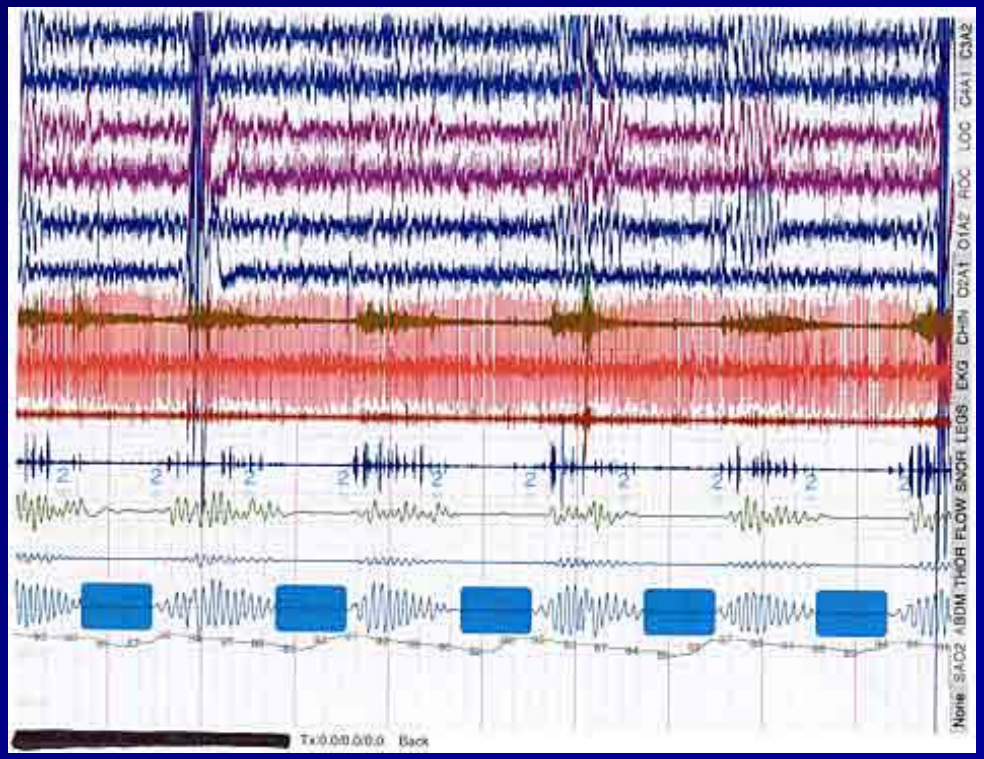
Severe OSAS


BRXS
Sleep
Awakening
Arousal
Event
OA
MA
CA
OH
RH
CH
SaO2
Treatment
PLMS
Isolated LM
Heart

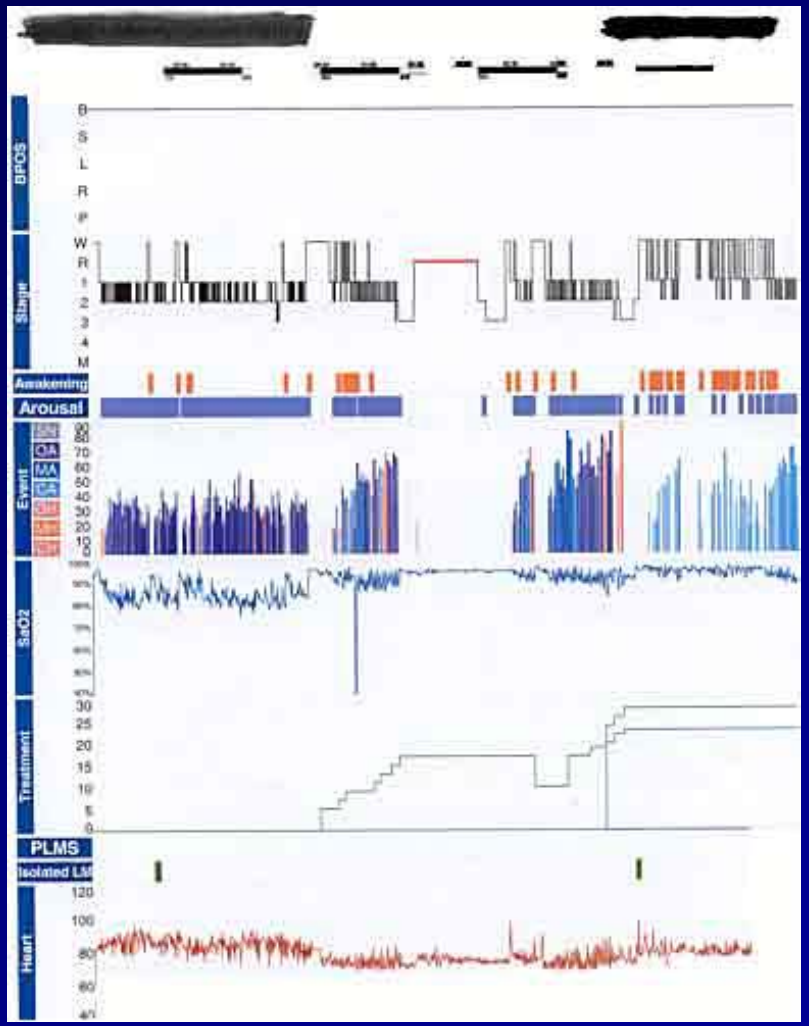

Tx:0.0/0.0/0.0
Right

Central Apnea/CSR





Complex Sleep Apnea



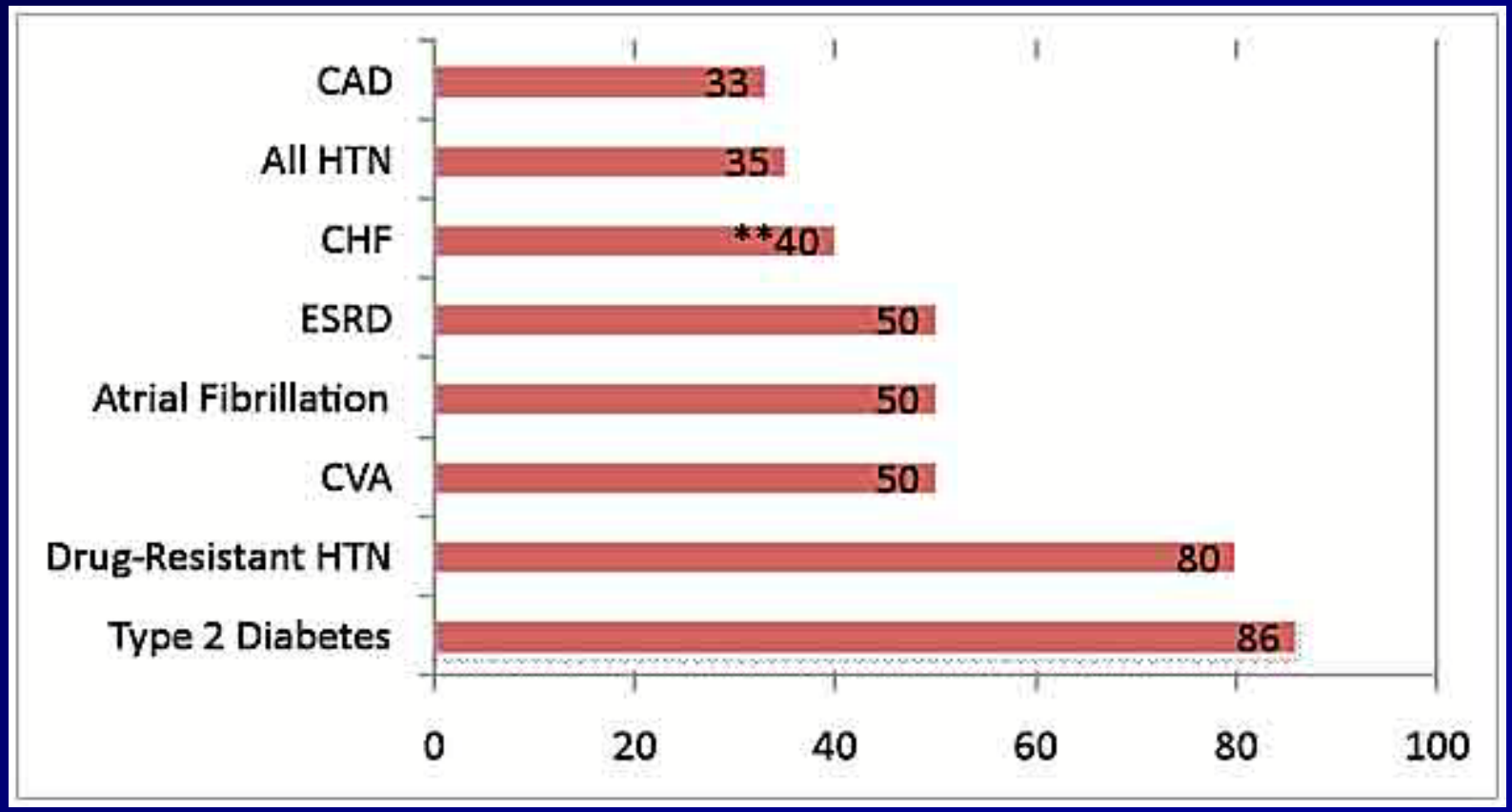
Prevalence and Clinical Implications

Prevalence of OSA(S)

- OSA (AHI ≥ 5)
  - 24% men, 9% women
- OSAS (AHI ≥ 5 with symptoms)
  - 4% men, 2% females

However…

Prevalence of OSAS in High-Risk Populations



Gami et al., J Cardiovasc Electrophysiol, Vol 19, 997-1003, 2008
West et al, Thorax, 61:945-250,2006
Sim et al, Chest epub. Nov 24 2008
Foster,et al, Diabetes Care, 32: 1017-1019, June 2009

Screening?

- Cervical Cancer: 1/1000–Pap smear
- Colon Cancer: 1–4/1000–Colonoscopy
- Breast Cancer: 6/1000–Mammograms
- OSAS: 1/4 Hypertensives
  1/3 CAD patients
  1/2 CVA patients
  4/5 Obese diabetics

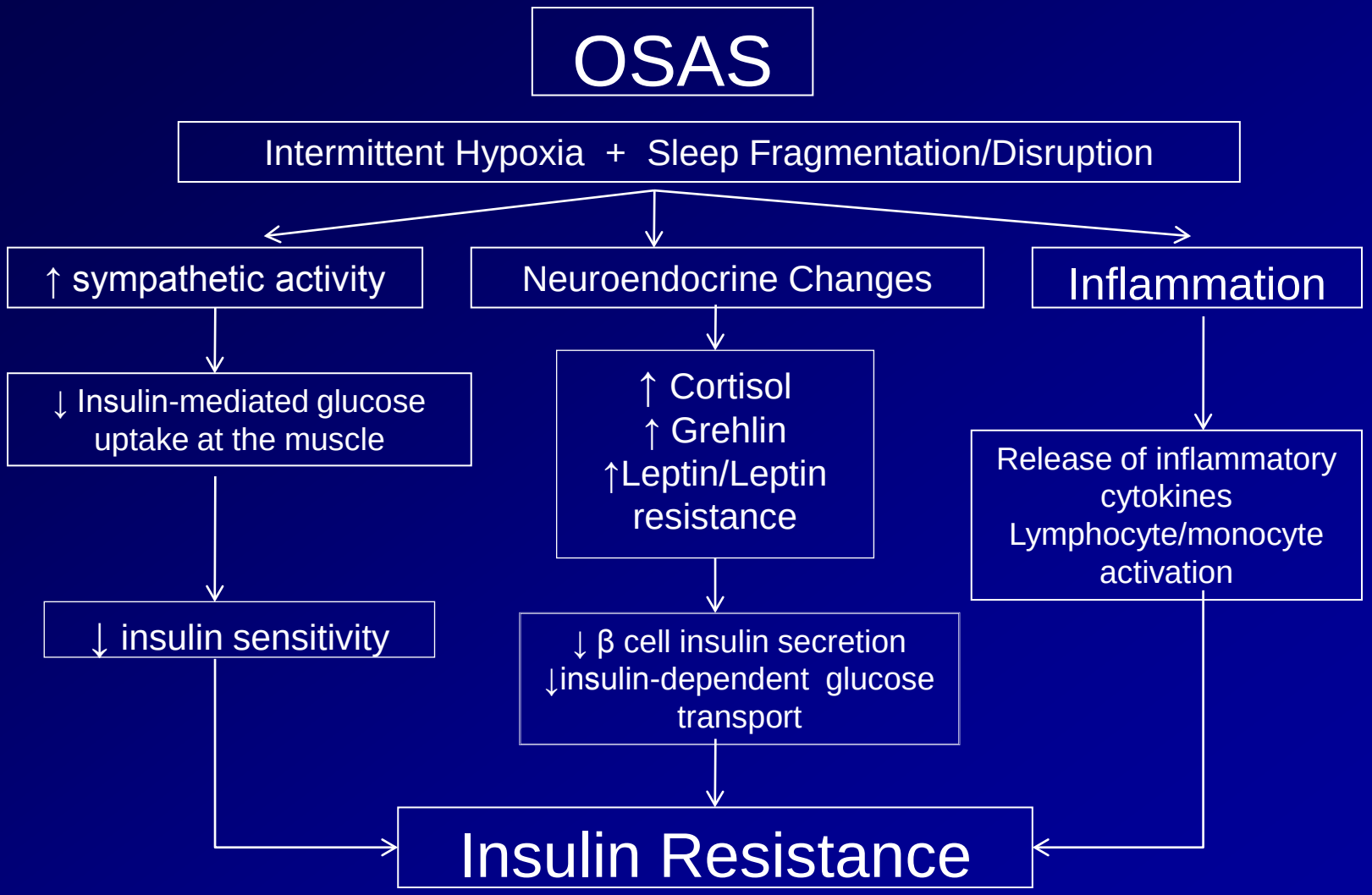
Prevalence in Obese Diabetics

- "Obstructive Sleep Apnea Among Obese Patients with Type II Diabetes"

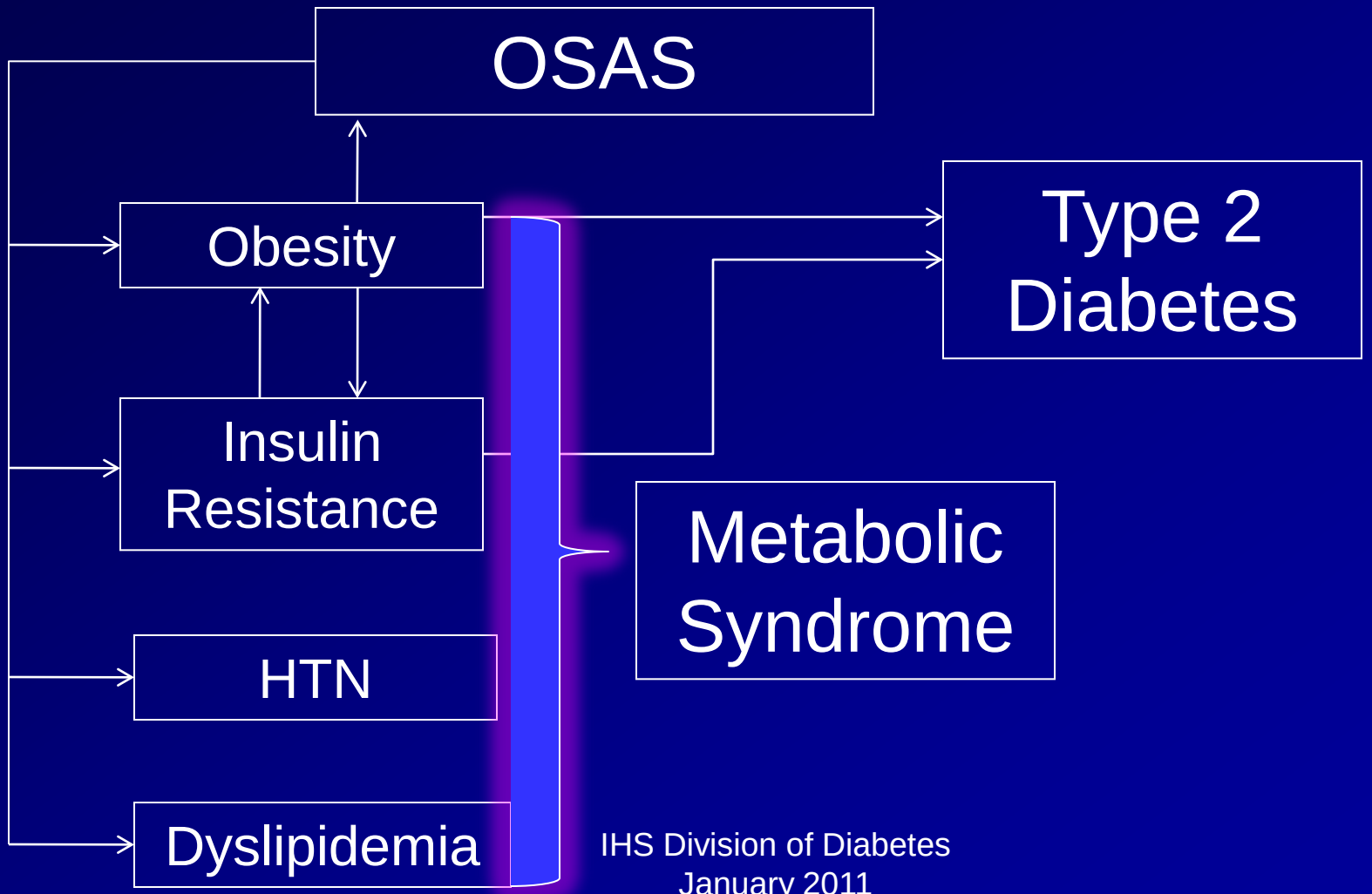
  Foster, et al Diabetes Care June 2009

  - 306 patients
  - 86% had AHI > 5 and mean AHI was 20.5
    - 33%–mild
    - 31%–moderate
    - 22%–severe
  - Larger waist circumference and higher body mass index (BMI) were associated with more severe OSAS

OSAS and Insulin Resistance



OSAS and Metabolic Syndrome/Diabetes



The Different “Faces” of OSAS

Symptoms of OSAS

- Excessive daytime sleepiness
- Fatigue
- Fragmented sleep/insomnia
- Morning headaches
- Irritability/mood disorders
- Difficulty concentrating
- Memory problems
- Nocturia

Morbidity from OSAS

- Neurocognitive
  - Impaired vigilance
  - Impaired psychomotor performance
  - Impaired attention/concentration
  - Impaired executive function
  - Impaired memory

Leading to:

- Increased risk of accidents (longer reaction times, divided attention deficits, 2x the number of collisions on driving simulator tests)
- Psychosocial stress (mood problems, marital discord, impaired job performance)

Morbidity from OSAS

- Cardiovascular
  - HTN
  - Myocardial infarction
  - CHF
  - Cardiac arrhythmias and sudden death
  - Stroke
  - Pulmonary HTN (?) and Cor Pulmonale
- Metabolic
  - Insulin resistance/diabetes mellitus
  - Obesity

Diagnosis and Sleep Testing

OSAS Diagnosis

- Level I Testing
  - In-lab, complete polysomnogram (EEG, cardiorespiratory monitoring, limb movement, and continuous video recording for parasomnias)
  - Gold standard for diagnosis of OSAS
  - Costly with limited accessibility
  - Still an “imperfect” gold standard due to false negative studies related to first night effect and/or lack of supine sleep

OSAS Diagnosis

- Level II Test
  - Ambulatory unattended complete PSG
  - Technically difficult and still expensive

- Level III Test
  - Ambulatory multichannel cardiorespiratory monitoring devices (minimum 4 channels)
  - Greater technical feasibility and more cost effective

OSAS Diagnosis

- Level IV Test
  - Ambulatory devices with less than three channels that allow calculation of an AHI
  - Not considered adequate by the AASM

Guidelines for Use of Portable Monitoring

- Should be used in conjunction with a clinical sleep evaluation
- Device should include monitoring of airflow, effort, and oxygenation (minimum of four channels)
- Interpretation should include review of the raw data
- Study must be interpreted by a board-certified sleep medicine specialist

Indications for Use of Portable Monitoring

- Diagnosis of OSAS in patients:
  - With high pretest probability of moderate to severe OSAS *and*
  - Without significant comorbid cardiopulmonary or neuromuscular disease

    or

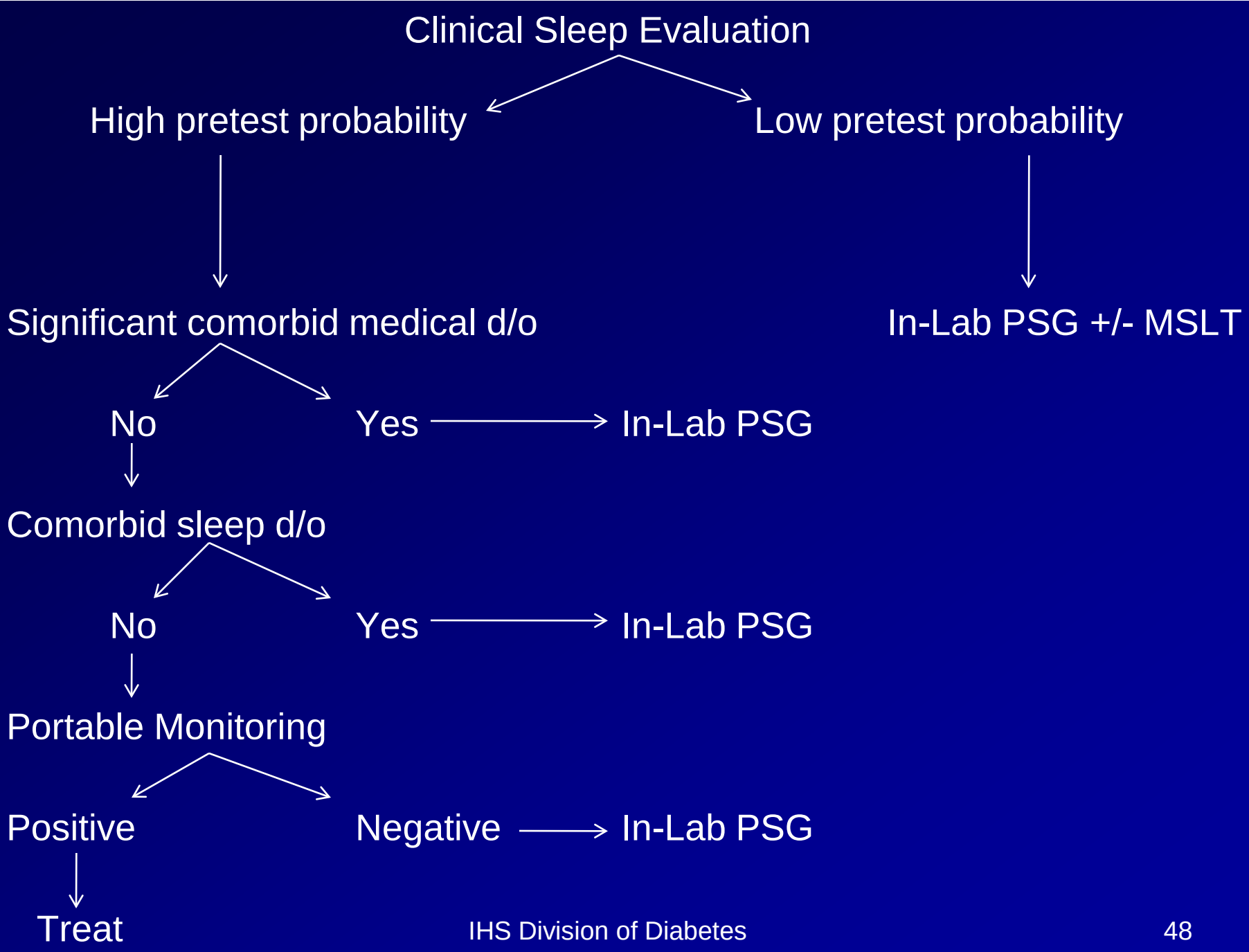
  - Unable to travel to the laboratory due to immobility, safety, or critical illness
- Monitoring response to non-CPAP treatments for OSAS (oral appliances, upper airway surgery, and weight loss)

Contraindications for Use of Portable Monitoring

- Screening of asymptomatic populations
- Evaluation of OSAS in patients with significant comorbid medical conditions (CHF, severe COPD, and neuromuscular disease), or chronic use of narcotic pain medications.
- Evaluation of OSAS in patients other sleep disorders (central sleep apnea, periodic limb movement disorder, insomnia, parasomnias, circadian rhythm disorders, or narcolepsy).

Limitations of Portable Monitoring

- False negative rate of up to 17%
- False positive rate variable depending on likelihood ratios (higher likelihood ratios–lower false positive rates)
- Data loss rate of 3–18%
- Overall equipment failure rate 12–24%
- Underestimation of AHI due to the inability to quantify sleep time
- Many devices do not adequately distinguish between obstructive and central apneas


Clinical Sleep Evaluation
High pretest probability
Low pretest probability
Significant comorbid medical d/o
In-Lab PSG +/- MSLT
No
Yes
In-Lab PSG
Comorbid sleep d/o
No
Yes
In-Lab PSG
Portable Monitoring
Positive
Negative
In-Lab PSG
Treat

Treatment Options

Treating Patients After a Positive Home Study

- CPAP
  - In-laboratory attended titration
  - In-home titration using AutoPAP
- Alternative treatment options
  - Oral appliances
  - ENT surgery
  - Conservative treatment
    - Weight loss
    - Supine avoidance
    - Treatment of nasal congestion/GERD

In-Home CPAP Titration

- Mask fitting ***KEY***
  - Assess nasal vs mouth breathing
  - Ensure absence of leak at various pressures and in the supine position
  - Attention to comfort
- Instruction on CPAP use
  - What to expect
  - Desensitization
  - Problems/side-effects

In-Home CPAP Titration

- Use an autoadjusting PAP device permanently

  OR

  Use an autoadjusting PAP device for 2–3 days and extrapolate optimal pressure based on 90–95% pressure

- Make adjustments based on patient's clinical improvement and compliance data downloaded from PAP device (gives residual AHI, leak)
- If data is problematic or there is limited clinical improvement–proceed with in-laboratory titration

In-Home CPAP Titration

- Close clinical follow-up is ***CRITICAL***
  - Address mask issues early
  - Address pressure intolerance
  - Optimize treatment efficacy by adjusting pressure range
  - Document clinical improvement and compliance for third-party payers

Requirements for Initial PAP Coverage (CMS)

- Clinical sleep evaluation (including BMI, neck circumference, and Epworth Sleepiness Score)
- OSAS diagnosed by proper devices (Type I, II, III, IV with three channels)
- PAP covered for 12-week trial period
- PAP coverage beyond 12 weeks:
  - Patients who are compliant
  - Show clinical benefit from CPAP during the 12-week trial period

Requirements for PAP Coverage after 12-Week Trial

- Face-to-face visit with practitioner to document clinical improvement (between 31–91 days)
- Objective documentation of compliance using data reports from PAP device:
  - Use of at least four hours per night
  - On 70% of nights
  - For 30 consecutive day period during the trial

What about CPAP “Failures”

- Face-to-face reevaluation by physician to determine etiology of the problems
  - Consider lower pressure settings or BiPAP for pressure tolerance problems
  - Mask change for mask problems
  - Treatment of nasal congestion
  - Consider in-laboratory study or specialty referral if problems persist or optimal treatment regimen remains unclear
- Discussion of alternative treatments:
  - Oral appliances
  - ENT surgery
  - Other

Keys to Success

- Proper patient selection–sleep history/evaluation
- Adequate equipment (minimum four channels)
- Scoring with review of raw data
- ***Patient education*** about OSAS and CPAP
- Close clinical follow-up
- Good RT/DME support for adjustments in therapy

Case Studies and Summary

Case # 1
The Perils of Overnight Oximetry

- 50-year-old woman with c/o fragmented sleep, EDS, snoring, witnessed apneas, and PND
- PMH: HTN, CVA, COPD, chronic pain
- FHx: + for OSAS in father and 2 siblings
- PE:
  - BMI 31.6, neck circumference 15”
  - Mallampati 3-4, 2+ tonsils

LINCARE, INC.
230 Sloan Road * Franklin, NC 28734-7392
Telephone: (828) 349-3151 Fax: (828) 369-3888

[redacted]

Start: 03/20/06 22:00
End: 03/21/06 08:10

Oximetry: Summary Report

Comments: Done on room air (re O2 order on file)

Recording time:	10:10:00	Highest pulse:	98	Highest SpO2:	100%
Excluded sampling:	00:17:24	Lowest pulse:	42	Lowest SpO2:	84%
Total valid sampling:	09:52:36	Mean pulse:	69	Mean SpO2:	94.1%
		1 S.D.:	7.9	1 S.D.:	3.4

Time with SpO2<90:	0:16:40,	2.8%	Time with SpO2	=>90:	9:35:56, 97.2%
Time with SpO2<80:	0:00:00,	0.0%	Time with SpO2=>80 & <90:		0:16:40, 2.8%
Time with SpO2<70:	0:00:00,	0.0%	Time with SpO2=>70 & <80:		0:00:00, 0.0%
Time with SpO2<60:	0:00:00,	0.0%	Time with SpO2=>60 & <70:		0:00:00, 0.0%
Time with SpO2<85:	0:04:04,	0.7%			

The longest continuous time with saturation <89 was 00:00:44, which started at 02:01:16.

A desaturation event was defined as a decrease of saturation by 4 or more.
One event was excluded due to artifact.
There were 12 desaturation events over 3 minutes duration.

There were 384 desaturation events of less than 3 minutes duration during which:
The mean high was 96.8%. The mean low was 91.2%.

The number of these events that were:

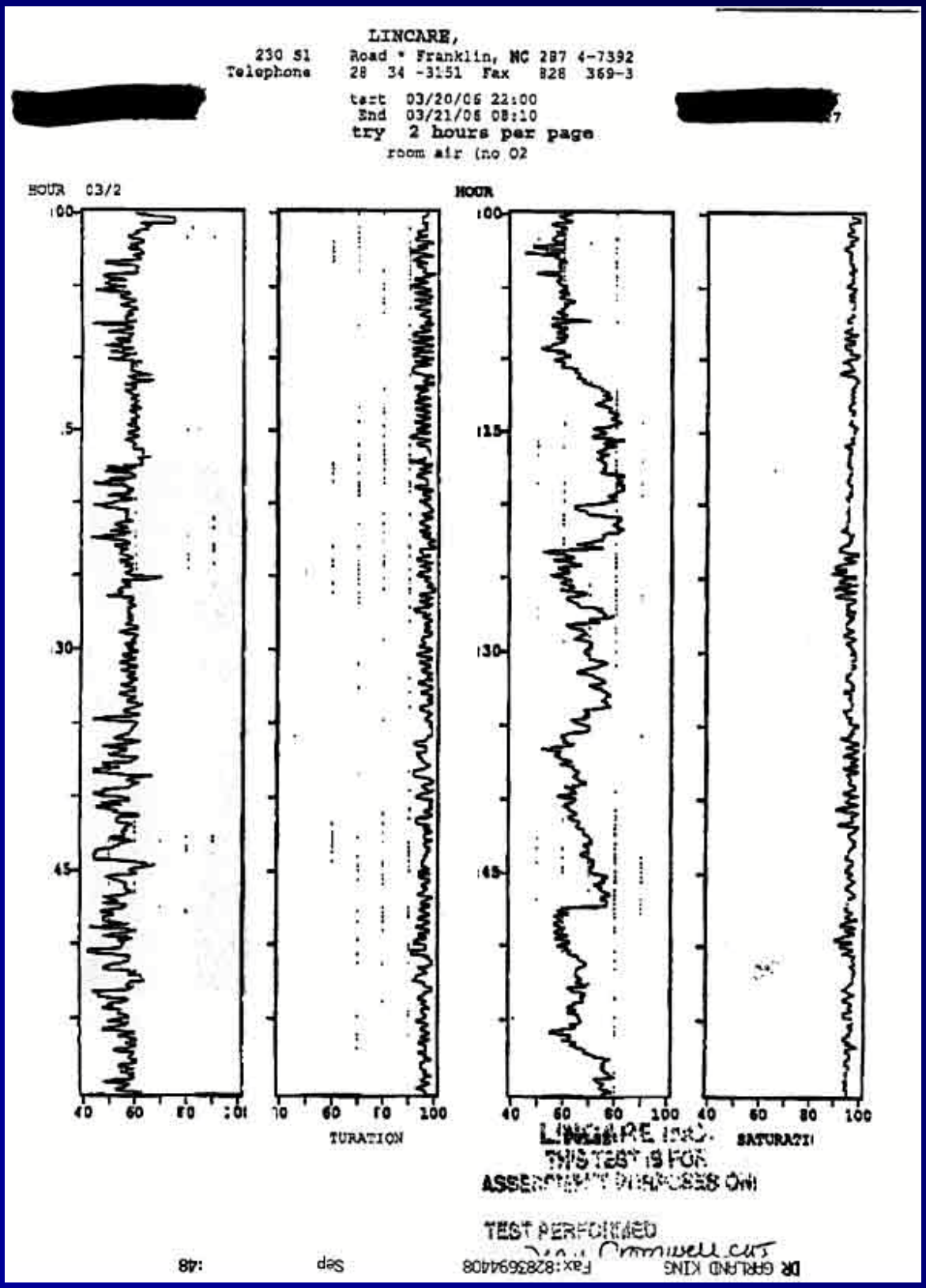
> 0 & <10 seconds:	24	> 0 seconds:	384
=>10 & <20 seconds:	175	=>10 seconds:	360
=>20 & <30 seconds:	71	=>20 seconds:	185
=>30 & <40 seconds:	25	=>30 seconds:	114
=>40 & <50 seconds:	25	=>40 seconds:	89
=>50 & <60 seconds:	14	=>50 seconds:	64
=>60 seconds:	50	=>60 seconds:	50

The mean length of desaturation events that were >=10 sec & <=3 mins was: 31.5 sec.
Desaturation event index (events >=10 sec per sampled hour): 36.4
Desaturation event index (events >= 3 sec per sampled hour): 38.9

PROFOX Oximetry version: Lincare Site 1C0103.05-1003 S95
Oximeter: BCI 3303 memory, 4 second resolution.

[redacted]

Dr GARLAND KING Fax:8285694408 Sep 14 2006 9:47 P.05

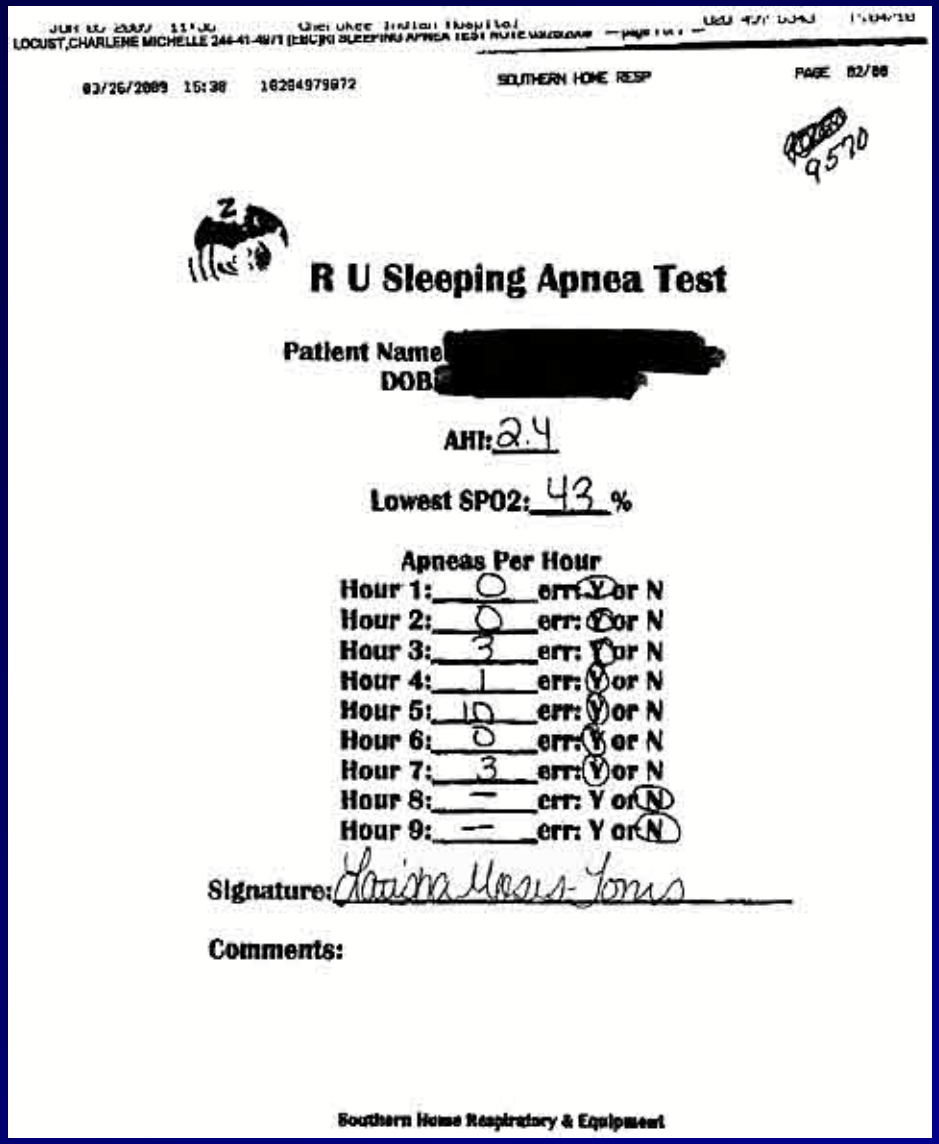

LINCARE,
230 S1 Road * Franklin, NC 287 4-7392
Telephone 28 34 -3151 Fax 828 369-3
tart 03/20/06 22:00
End 03/21/06 08:10
try 2 hours per page
room air (no O2
HOUR 03/2
HOUR
TURATION
SATURATI
TEST PERFORMED
Fax:8283694408
Sep
:48

Case # 1 (Continued)

- Overnight oximetry
  - Nadir SpO2–84% and only 16 min (2.8%) <90%
  - Desat index–36.4
  - Tracing with phasic desats
- PSG
  - AHI 21.8 (but without REM sleep), moderate-severe sleep fragmentation

Case # 2
The Perils of Type IV Devices

- 31-year-old woman referred for increasing SOB, hypoxia, and abnl CXR
- ROS:
  - Fatigue, wt gain,
  - Orthopnea, PND, snoring, and witnessed apneas
  - Morning headaches, sleep maintenance insomnia, and excessive daytime sleepiness
- PMH: Type II DM, HTN, morbid obesity
- PE:
  - BMI 75, neck circumference 21.5”
  - Mallampati score–IV
  - Decreased breath sounds throughout



Jun 05 2009 11:36 Cherokee Indian Hospital 828 497 9343 P.04/10
LOCUST,CHARLENE MICHELLE 244-41-49/1 (EBCK) SLEEPING APNEA TEST NOTE Medicare —page 1 of 1—

03/26/2009 15:38 18284979872 SOUTHERN HOME RESP PAGE 02/08

9570

R U Sleeping Apnea Test

Patient Name: [redacted]
DOB: [redacted]

AHI: 2.4

Lowest SPO2: 43 %

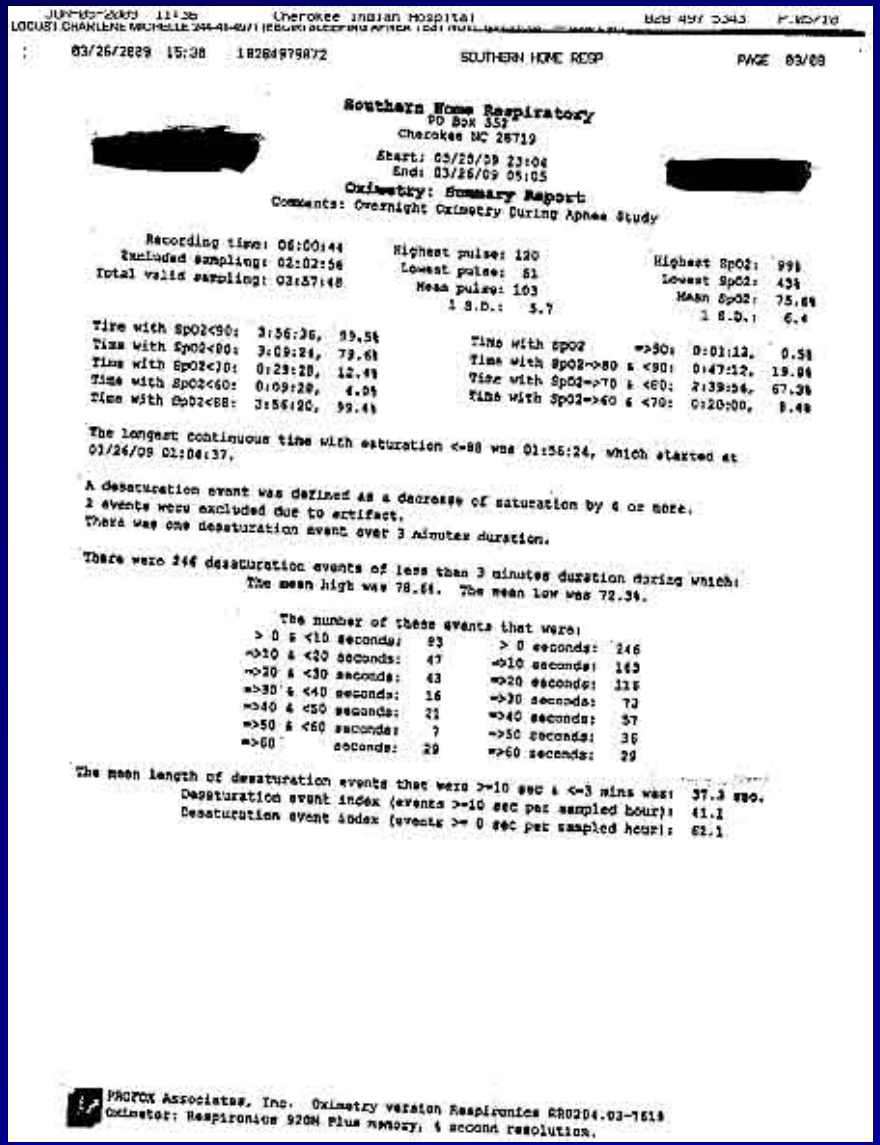
Apneas Per Hour

Hour 1: 0 err: Y or N
Hour 2: 0 err: Y or N
Hour 3: 3 err: Y or N
Hour 4: 1 err: Y or N
Hour 5: 10 err: Y or N
Hour 6: 0 err: Y or N
Hour 7: 3 err: Y or N
Hour 8: — err: Y or N
Hour 9: — err: Y or N

Signature: Lavina Moses-Jones

Comments:

Southern Home Respiratory & Equipment



Jun 05 2009 11:36 Cherokee Indian Hospital 828 497 9343 P.05/10
LOCUST,CHARLENE MICHELLE 244-41-49/1 (EBCK) SLEEPING APNEA TEST NOTE Medicare —page 1 of 1—

03/26/2009 15:38 18284979872 SOUTHERN HOME RESP PAGE 03/08

Southern Home Respiratory
PO Box 352
Cherokee NC 28719

[redacted]

Start: 03/25/09 23:04
End: 03/26/09 05:05

[redacted]

Oximetry: Summary Report
Comments: Overnight Oximetry During Apnea Study

Recording time:	06:00:44	Highest pulse:	120
Excluded sampling:	02:02:56	Lowest pulse:	81
Total valid sampling:	03:57:48	Mean pulse:	103
		1 S.D.:	5.7

Highest SpO2:	99%		
Lowest SpO2:	43%		
Mean SpO2:	75.8%		
1 S.D.:	6.4		

Time with SpO2<90:	3:56:36, 99.5%	Time with SpO2 =>90:	0:01:12, 0.5%
Time with SpO2<80:	3:09:24, 79.6%	Time with SpO2=>80 & <90:	0:47:12, 19.8%
Time with SpO2<70:	0:29:20, 12.4%	Time with SpO2=>70 & <80:	2:39:56, 67.3%
Time with SpO2<60:	0:09:20, 4.0%	Time with SpO2=>60 & <70:	0:20:00, 8.4%
Time with SpO2<88:	3:56:20, 99.4%		

The longest continuous time with saturation <=80 was 01:56:24, which started at 01/26/09 02:04:37.

A desaturation event was defined as a decrease of saturation by 4 or more.
2 events were excluded due to artifact.
There was one desaturation event over 3 minutes duration.

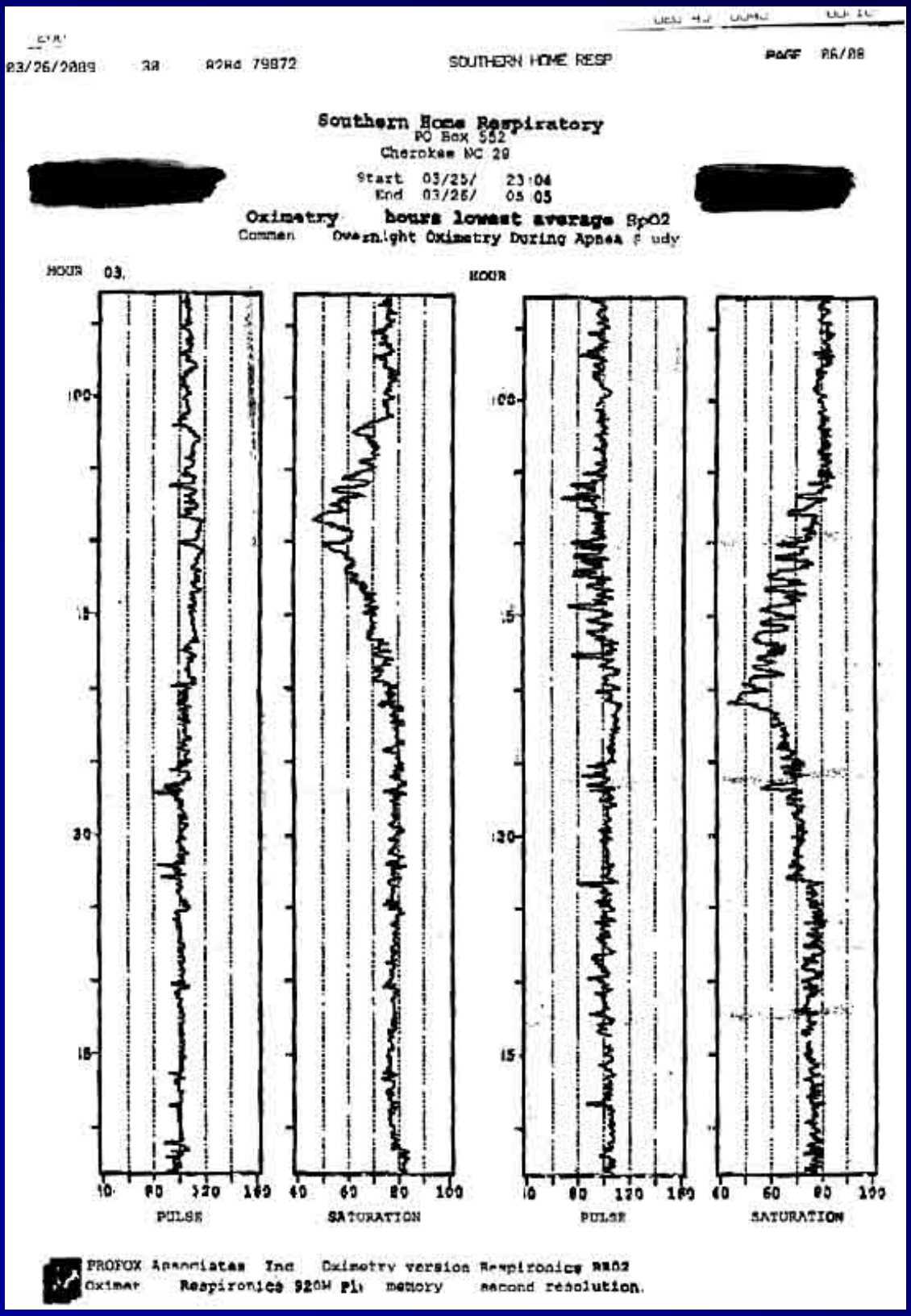
There were 246 desaturation events of less than 3 minutes duration during which:
The mean high was 78.6%. The mean low was 72.3%.

The number of these events that were:

> 0 & <10 seconds:	83	> 0 seconds:	246
=>10 & <20 seconds:	47	=>10 seconds:	163
=>20 & <30 seconds:	43	=>20 seconds:	116
=>30 & <40 seconds:	16	=>30 seconds:	73
=>40 & <50 seconds:	21	=>40 seconds:	57
=>50 & <60 seconds:	7	=>50 seconds:	36
=>60 seconds:	29	=>60 seconds:	29

The mean length of desaturation events that were >=10 sec & <=3 mins was: 37.3 sec.
Desaturation event index (events >=10 sec per sampled hour): 41.1
Desaturation event index (events >= 0 sec per sampled hour): 62.1

PROTOX Associates, Inc. Oximetry version Respironics 6R0204.03-7618
Oximeter: Respironics 920N Plus memory, 4 second resolution.


03/26/2009 38 RQHd 79872 SOUTHERN HOME RESP PAGE 06/08
Southern Home Respiratory
PO Box 552
Cherokee NC 28
Start 03/25/ 23:04
End 03/26/ 05:05
Oximetry hours lowest average SpO2
Comment Overnight Oximetry During Apnea Study
HOUR 03.
HOUR
PULSE
SATURATION
PULSE
SATURATION
PROFOX Associates Inc Oximetry version Respironics RR02
Oximar Respironics 920M Fl: memory second resolution.

Case # 2 (Continued)

- R U Sleeping Apnea Test
  - AHI–2.4
- Oximetry
  - Nadir SpO2 – 43%
  - Time <88% – 99.4% of recording
  - Desat index – 41.1
- PSG: AHI of 98
- Dx: Severe OSAS/obesity hypoventilation

Case # 3
Concerns About AutoPAP

- 67-year-old man with severe OSAS
  - AHI of 37.1, O2 desats to 83%
  - Optimal CPAP 13 cmH2O (but no supine sleep)
  - APAP 13–20 cmH2O

07/16/2009 10:29 5862525 MOUNTAINEER PAGE 12

Mountaineer Oxygen Services, INC.
1643 E. Main Street Sylva, NC 28779
Telephone: (828)586-5353 Fax: (828)586-2525

Test date: 07/14/09
Doctor: Dr T Green

Start: 07/14/09 19:56:29
End: 07/15/09 04:00:29

[redacted]

Oximetry: Comprehensive Report
Comments: overnight oximetry on autopap

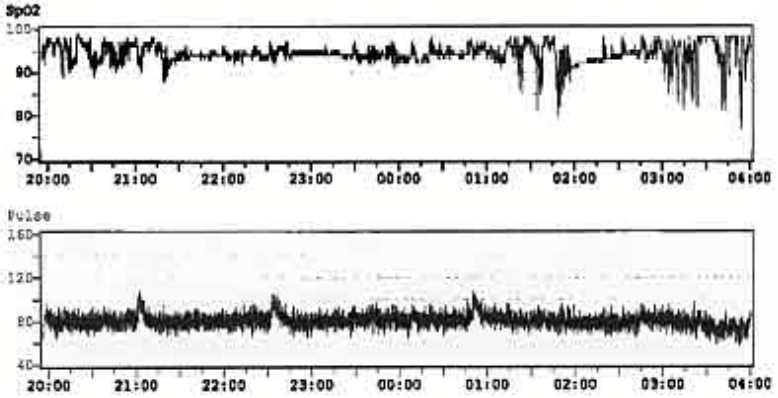
Recording time:	08:04:00	Highest pulse:	108	Highest SpO2:	99%
Excluded sampling:	00:00:08	Lowest pulse:	57	Lowest SpO2:	77%
Total valid sampling:	08:03:52	Mean pulse:	80	Mean SpO2:	94.3%

Time with SpO2<90:	0:13:52,	2.9%
Time with SpO2<80:	0:00:20,	0.1%
Time with SpO2<70:	0:00:00,	0.0%
Time with SpO2<60:	0:00:00,	0.0%
Time with SpO2<89:	0:10:00,	2.1%

The longest continuous time with saturation <=88 was 00:00:40, which started at 07/15/09 01:48:21.

A desaturation event was defined as a decrease of saturation by 3 or more.
No events were excluded due to artifact.
There were 0 desaturation events over 3 minutes duration.

There were 53 desaturation events of less than 3 minutes duration during which:
The mean high was 96.2%. The mean low was 87.1%.
The mean length of events that were >=10 sec & <=3 mins was: 43.1 sec.
Desaturation event index (number of events per hour): 6.6



Oximeter: Respironics 920M Plus memory, 4 second resolution.

07/16/2009 10:29 5862525 MOUNTAINEER PAGE 85

ResScan SOFTWARE [redacted]

Statistics

Serial No.: 20080361888
Product: AutoSet S AMER

7/2/2009 - 7/14/2009

Device Settings		
Therapy Mode: AUTOSET	EPR Mode: FULLTIME	EPR Level: 3.0 cmH2O
Minimum Pressure: 16.0 cmH2O	Maximum Pressure: 20.0 cmH2O	
Pressure - cmH2O		
Median: 16.0	95th Percentile: 16.0	Maximum: 16.0
Leak - L/min		
Median: 3.6	95th Percentile: 24.8	Maximum: 119.4
AHI & AI - Events/hr		
Apnea Index: 5.2	AHI: 15.4	% Time in Apnea: 2.1
Hypopnea Index: 10.2		
Usage		
Used Days >= 4 hrs : 10	Used Days < 4 hrs : 2	% Used Days >= 4 hrs : 78
Days not used: 1	Total days: 13	Median daily usage: 8:01
Total hours used: 91:02	Average daily usage: 7:00	

Designed by ResMed

Page 2 of 8

Case # 4–The Importance of Proper Patient Selection

- 50-year-old woman with OSAS diagnosed by home study, referred for “CPAP failure”
- HX: daytime sleepiness, witnessed apneas
- PMH: Chronic pain on multiple narcotic pain meds
- PE: BMI 20, Mallampati score–II
- HST: AHI 27, Desats to 84%; Dx; OSAS
  (Small Print: Possible Cheyne-Stokes pattern)
- Started on AutoPAP, but had persistent sx and residual events on compliance download
- In-laboratory PSG: No OSAS, but moderate ***Central*** sleep apnea.
- Switched to adaptive servo ventilation with improvement

Improving Sleep Care in a Primary Care Setting

- Screen patients with a basic sleep questionnaire
- Appropriate use of home sleep testing with careful clinical correlation
- Referral for in-laboratory studies in complex cases
- Consider referral to sleep clinic when the diagnosis is unclear, patient has difficulty adjusting to CPAP, or there is a concern about other sleep disorders

Quick OSAS Risk Quiz

- Do you regularly feel unrefreshed, even after a full night's sleep?
- Do you fall asleep easily during the day, while at work, or at home?
- Are you a loud, habitual snorer?
- Has your bed partner witnessed you choking, gasping, or holding your breath during sleep?
- Do you often suffer from poor concentration, memory loss, irritability, and/or bad mood?
- Do you have high blood pressure?

*** Yes answers to two or more questions suggests increased risk of OSAS ***

THINK

ABOUT SLEEP!

Your patients will thank you.