

# Sleep and Parkinson's Disease

To sleep, perchance to dream and not hurt someone

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# Sleep and Parkinson's Disease

To sleep, perchance to dream and not hurt someone

1. What is sleep?

2. What is the purpose of sleep?

3. What are the most common disorders?



# What is sleep?

SLEEP: A physiologic state of relative unconsciousness and inaction of voluntary muscles, the need for which recurs periodically.

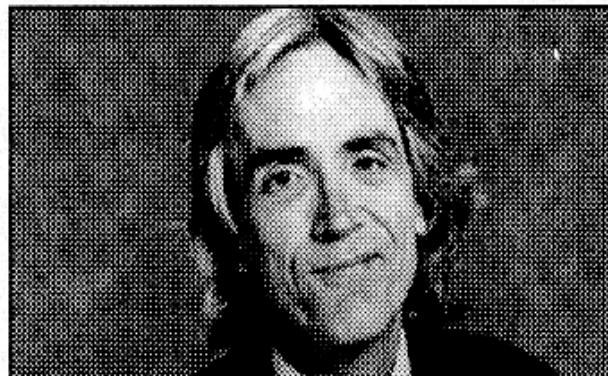
Stedman's Medical Dictionary. 27<sup>th</sup> ed. Baltimore, Md; Lippincott Williams & Wilkins; 2000:1648

# *He's not dead, he's just resting*

■ Life Imitates "Weekend at Bernie's": In November, government officials in East London, South Africa, thwarted an attempt by two men and a woman to register a corpse for pension benefits. According to the South African Press Association, the three propped up the recently deceased man (who they said was merely ill) at the window serving the illiterate and held his hand out to be fingerprinted before a clerk got suspicious.

## **NEWS OF THE WEIRD**

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CHUCK SHEPHERD

Salt Lake Tribune  
December 12, 1999

“To die, to sleep-to sleep,  
perchance to dream-ay, there’s the  
rub, for in this sleep of death what  
dreams may come ...” Hamlet

REST

≠

SLEEP

≠

DEATH

# WHAT IS SLEEP?

- Recumbent, Eyes closed, Quiescent.
- Perceptual Disengagement.
- Reversible State of Unconsciousness.
- Electrographic (EEG, EMG & EOG)

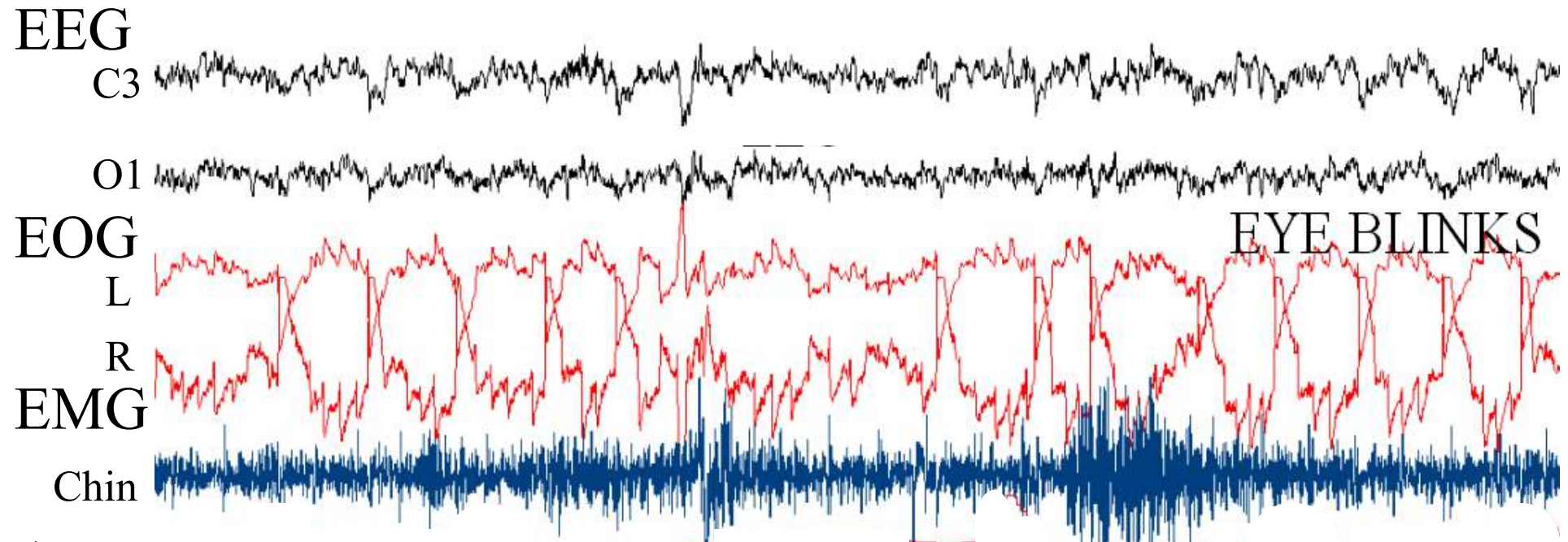
There are three normal states:

WAKE

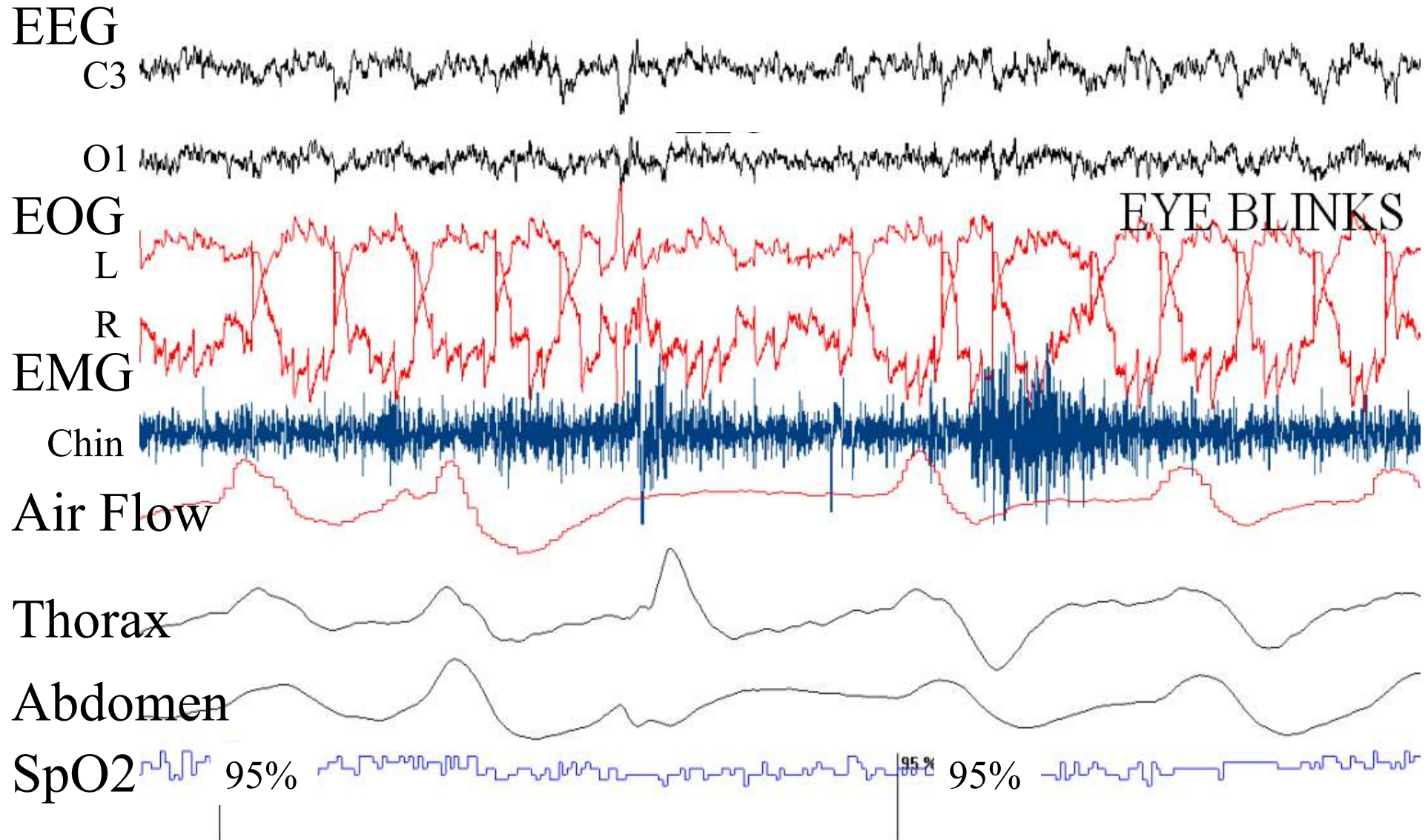
NREM

REM

# AWAKE

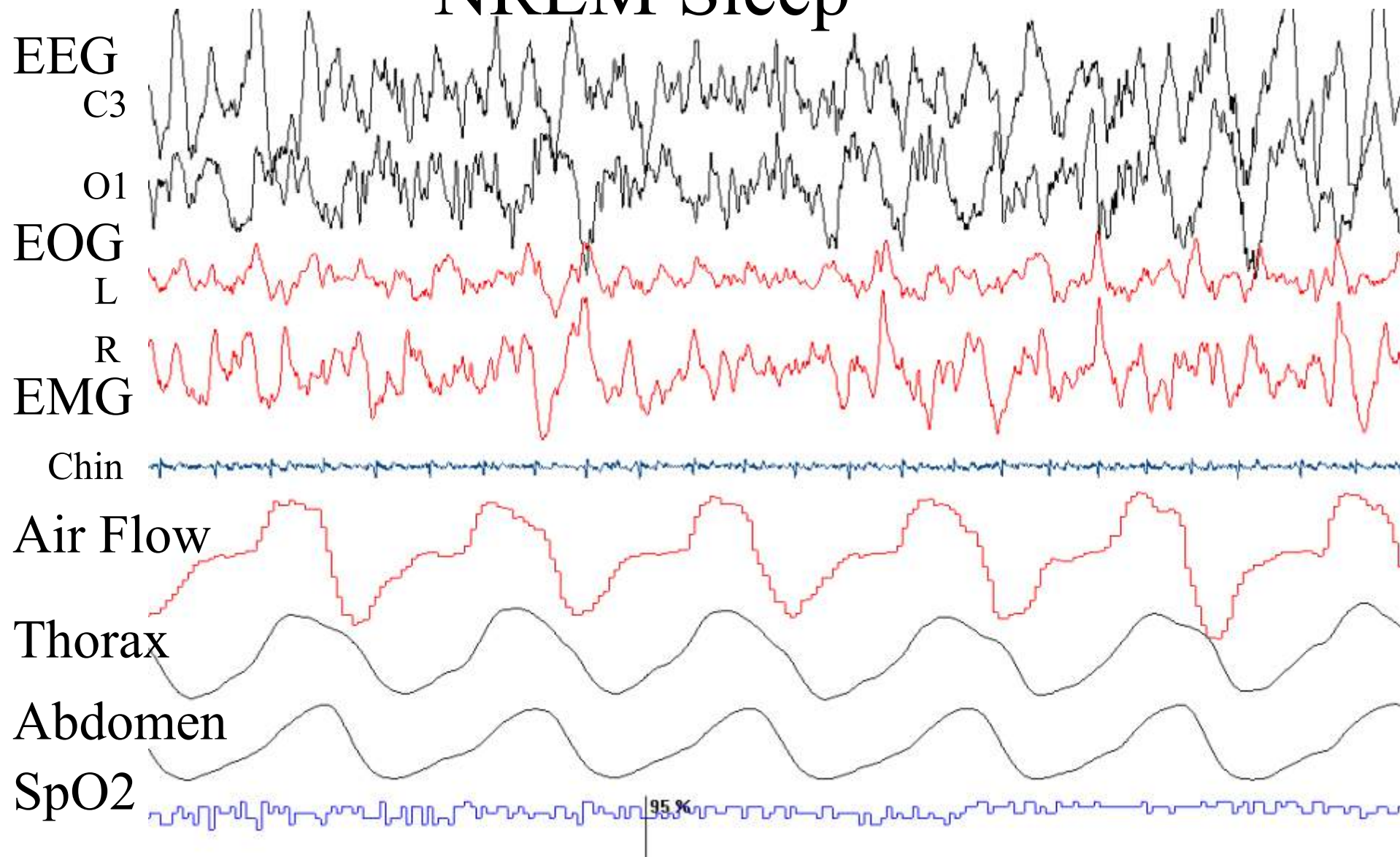


# AWAKE

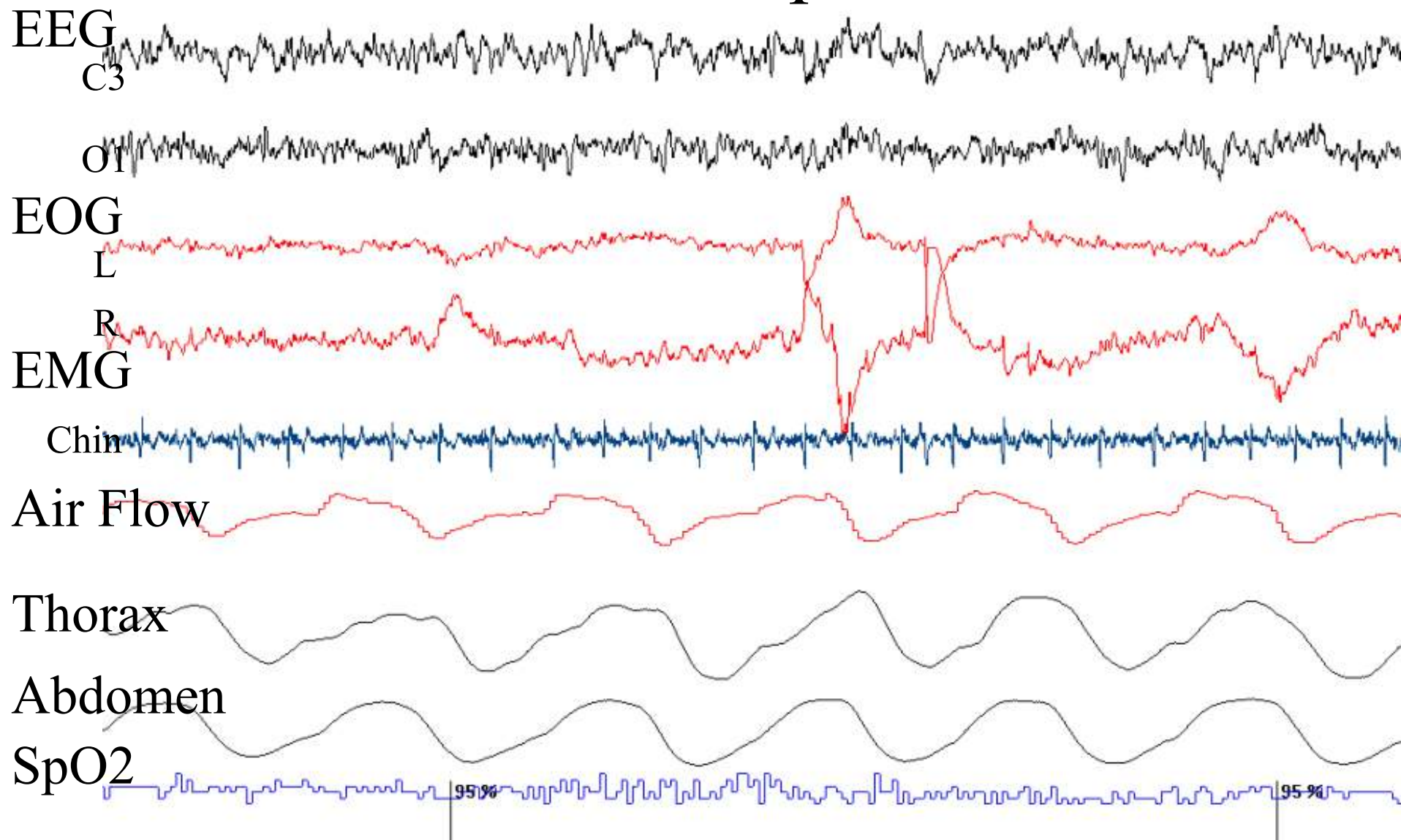




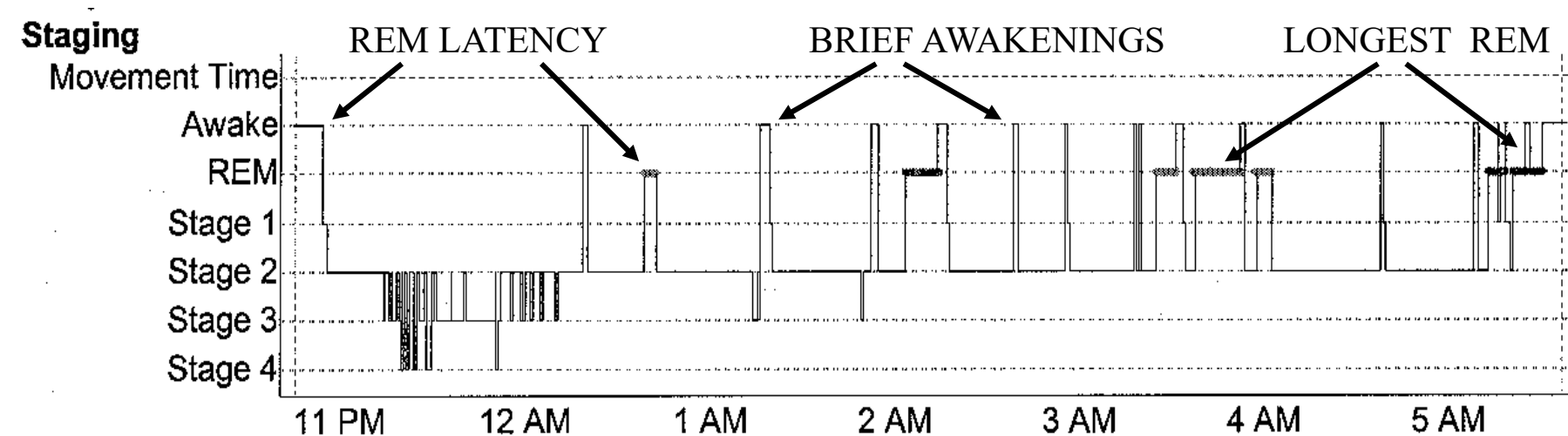
# NREM Sleep



# REM Sleep

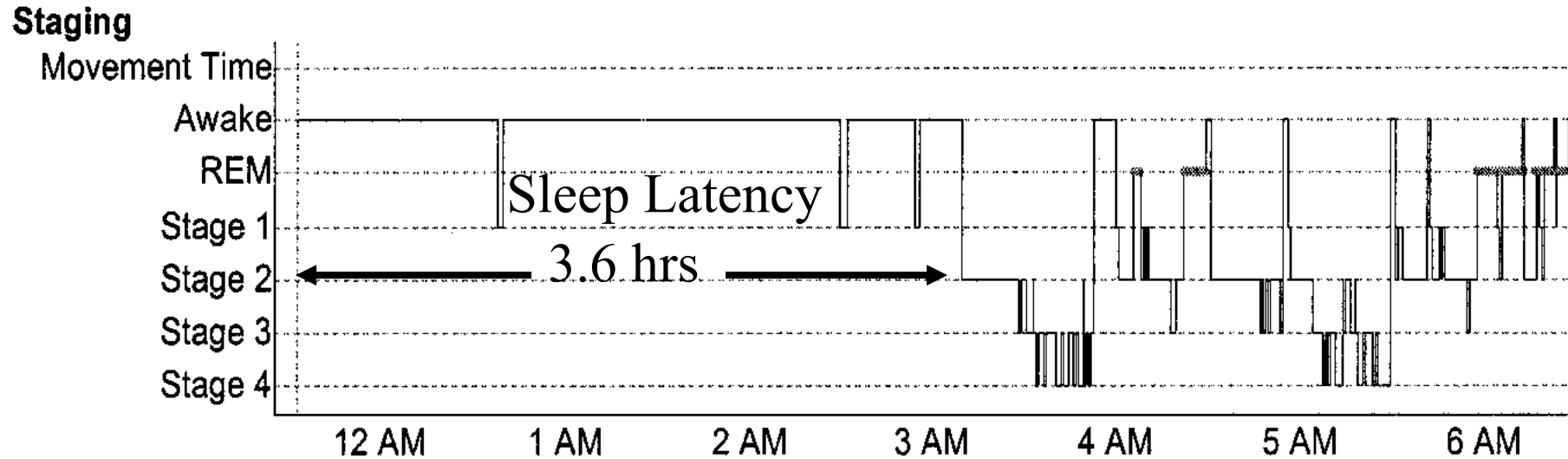


# SLEEP HISTOGRAM IN A NORMAL YOUNG HUMAN FEMALE



PARAMETER	Patient	Normal
TOTAL SLEEP TIME	6.2 Hrs.	8.0 Hrs
SLEEP EFFICIENCY	91 %	95%
STAGE 1 NREM	2%	< 5%
STAGE 3 & 4 NREM	9%	10-20%
STAGE REM	14%	20-25%

21 year old male with sleep onset insomnia and excessive daytime sleepiness for about 3 years.



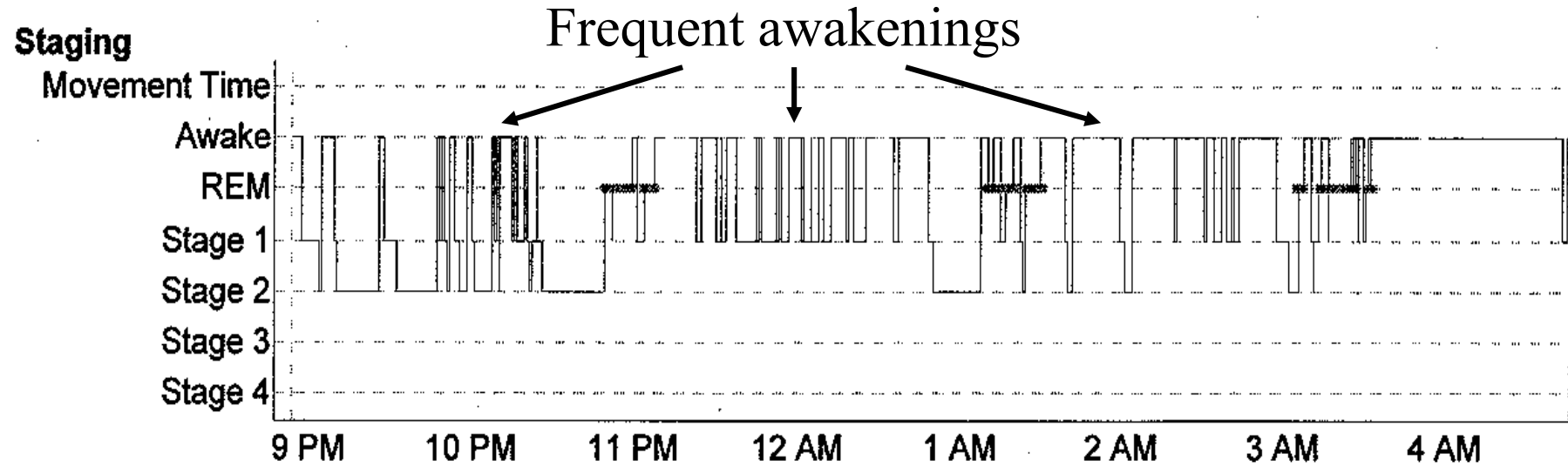
Total Sleep Time 3.1 hrs

Sleep Efficiency 45%

Slow Wave Sleep 25% TST

REM Sleep 16% TST

## SLEEP HISTOGRAM IN AN OLD HUMAN FEMALE (85)



TOTAL SLEEP TIME	3.7 Hrs
TOTAL WAKE TIME	3.8 Hrs
SLEEP EFFICIENCY	49 %
STAGE 1 NREM	41%
STAGE 3 & 4 NREM	0%
STAGE REM	16%

# WHAT THE HECK IS SLEEP?

Active

Complex

Alternating States

Highly Regulated

Multiple Neuronal Groups

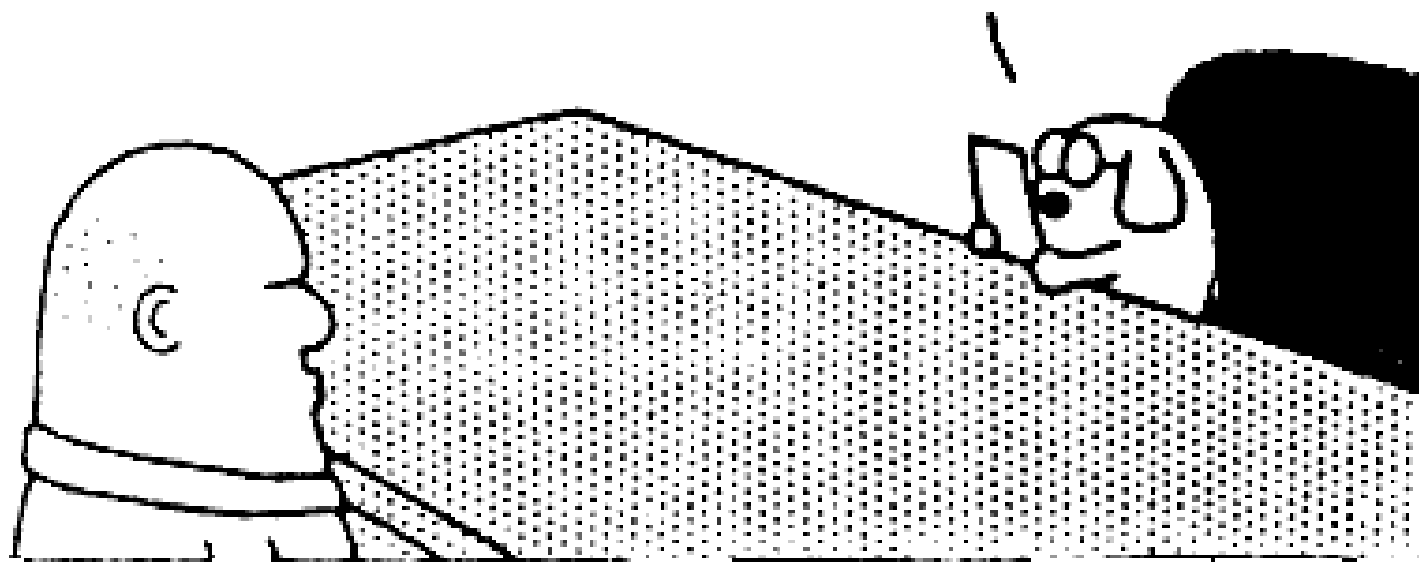
Oscillating Processes

Homeostatic

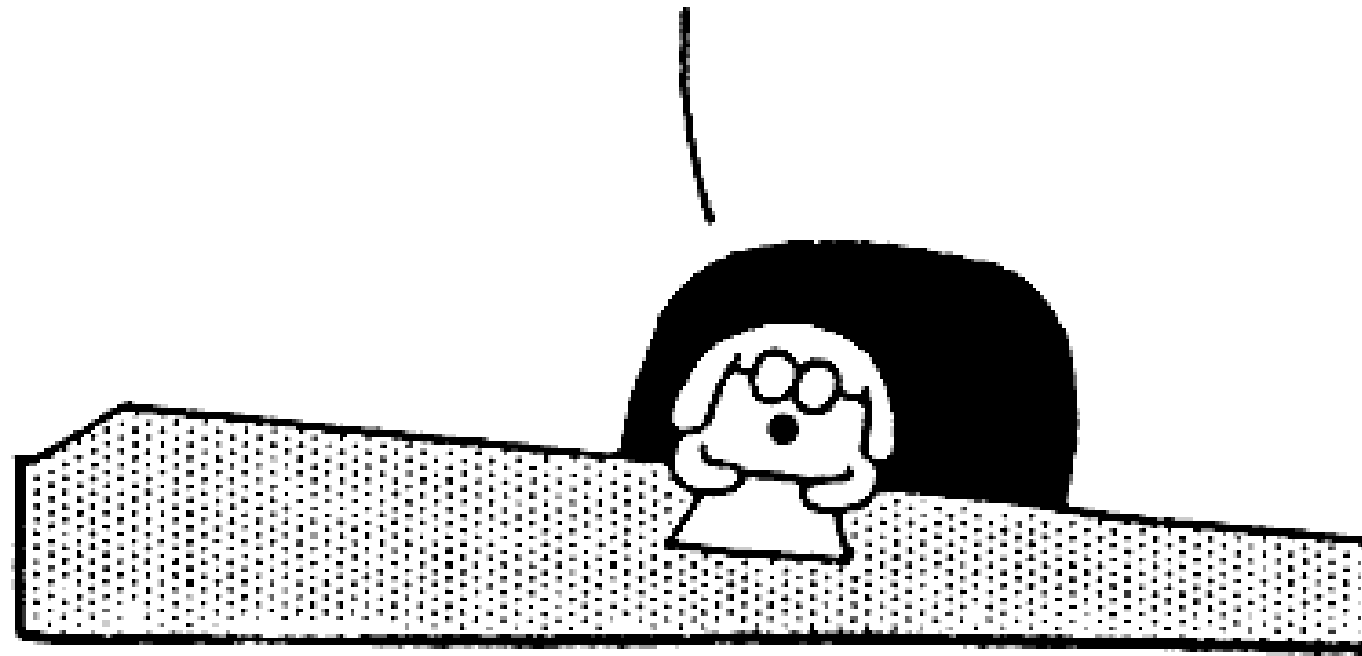
Essential to life but function ??????

## DOGBERT, CAREER COUNSELOR

ACCORDING TO YOUR  
OCCUPATIONAL PREFERENCE  
TEST, YOU LIKE TO REMOVE  
VITAL ORGANS FROM  
HELPLESS PEOPLE.

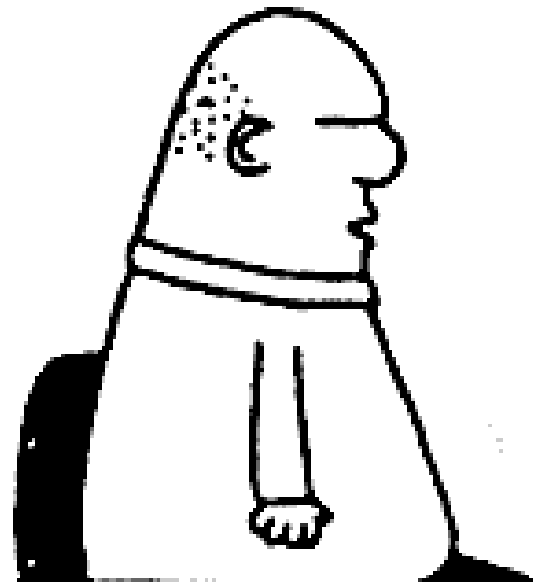


THAT NARROWS THE  
CAREER CHOICES TO  
DOCTOR OR SERIAL  
KILLER. DO YOU GET  
ALONG WITH OTHER  
PEOPLE?





OTHER PEOPLE  
ARE INSIGNIFI-  
CANT INSECTS.



WE'LL HAVE TO  
GO TO A  
TIE-BREAKER  
QUESTION.



# SLEEP

VOLUME 12

NUMBER 1

1989

Total Sleep Deprivation

SW Sleep Deprivation

REM Sleep Deprivation

Energy Use

Immune Function

Recovery

SPONSORED JOINTLY BY THE FOLLOWING INTERNATIONAL SOCIETIES:

**ASSOCIATION OF PROFESSIONAL SLEEP SOCIETIES**

■

**EUROPEAN SLEEP RESEARCH SOCIETY**

■

**LATIN AMERICAN SLEEP RESEARCH SOCIETY**

■

**JAPANESE SLEEP RESEARCH SOCIETY**

**RAVEN PRESS**

# Physiologic Correlates of Prolonged Sleep Deprivation in Rats

A. Rechtschaffen Science 1983; 221:182-184

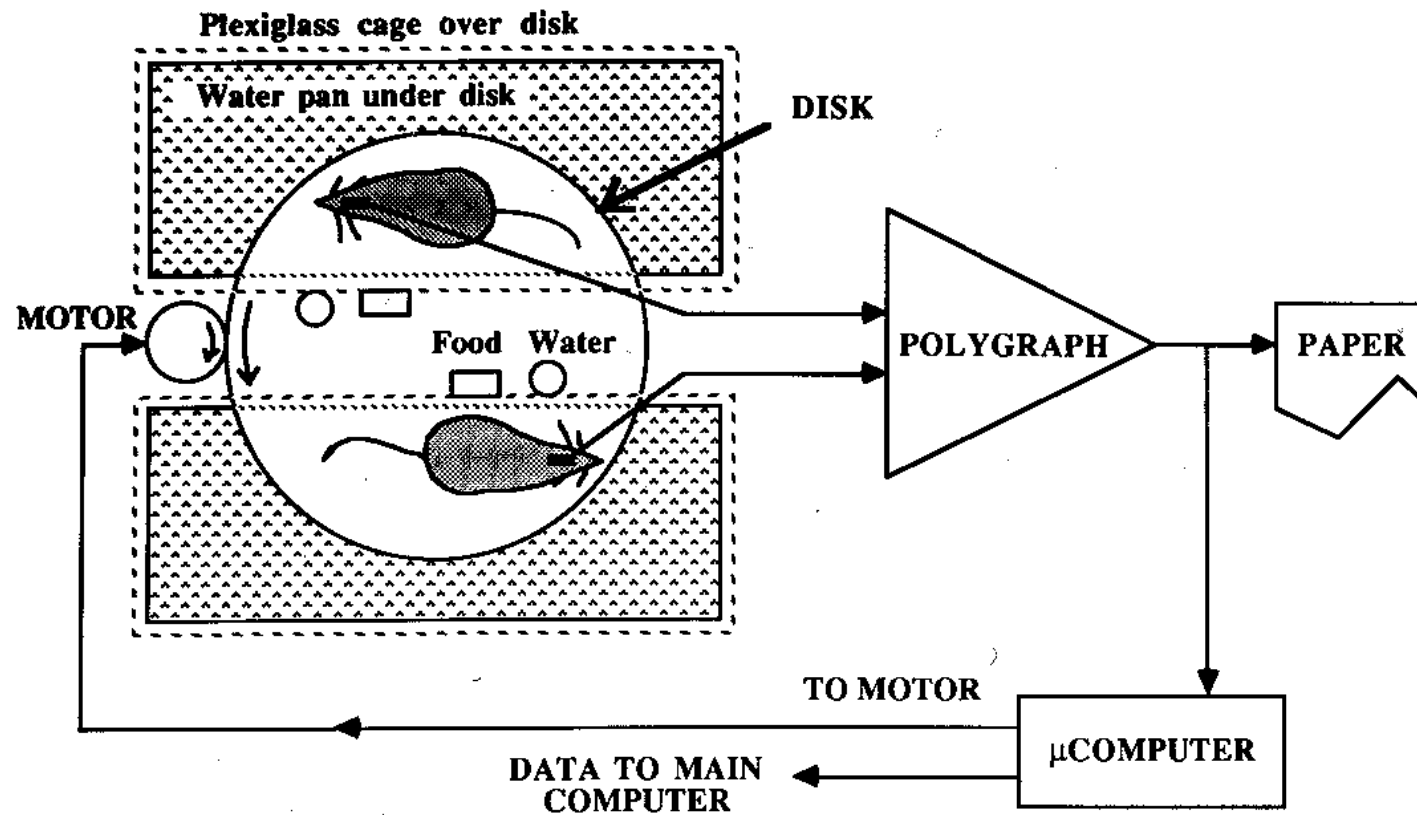


FIG. 1. Schematic diagram of the sleep deprivation apparatus.

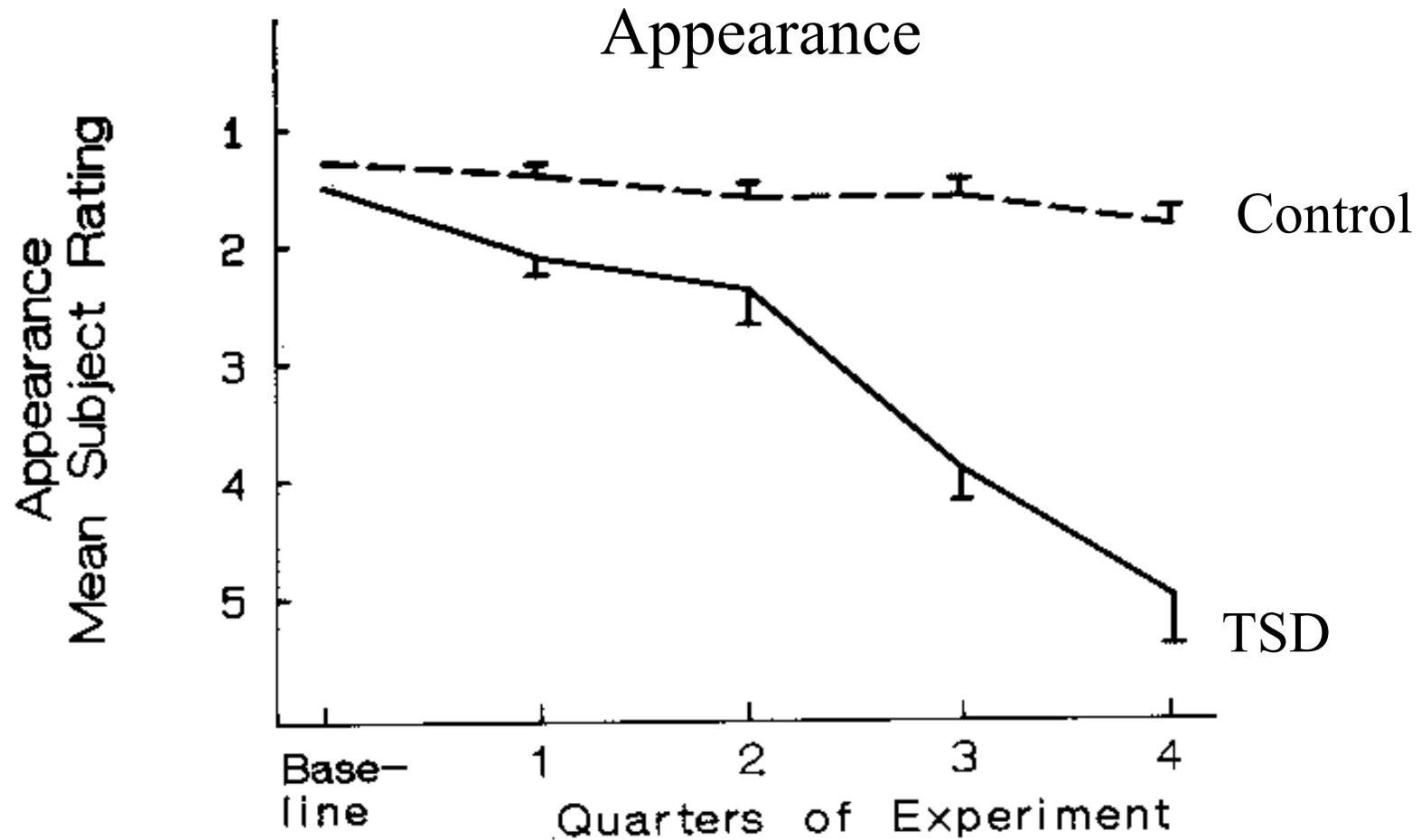






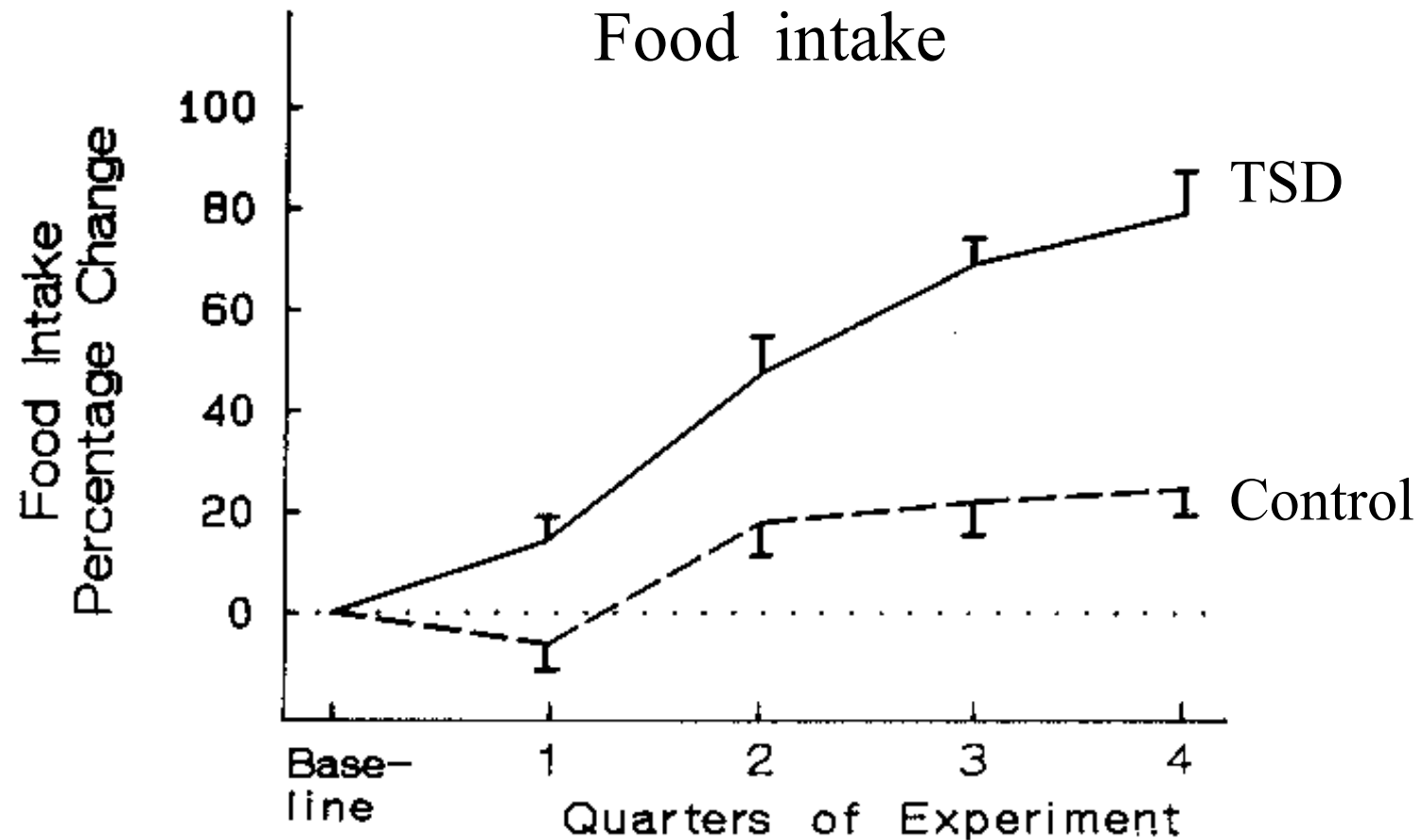
# Total Sleep Deprivation in the Rat

CA Everson Sleep 1989; 12:13-21



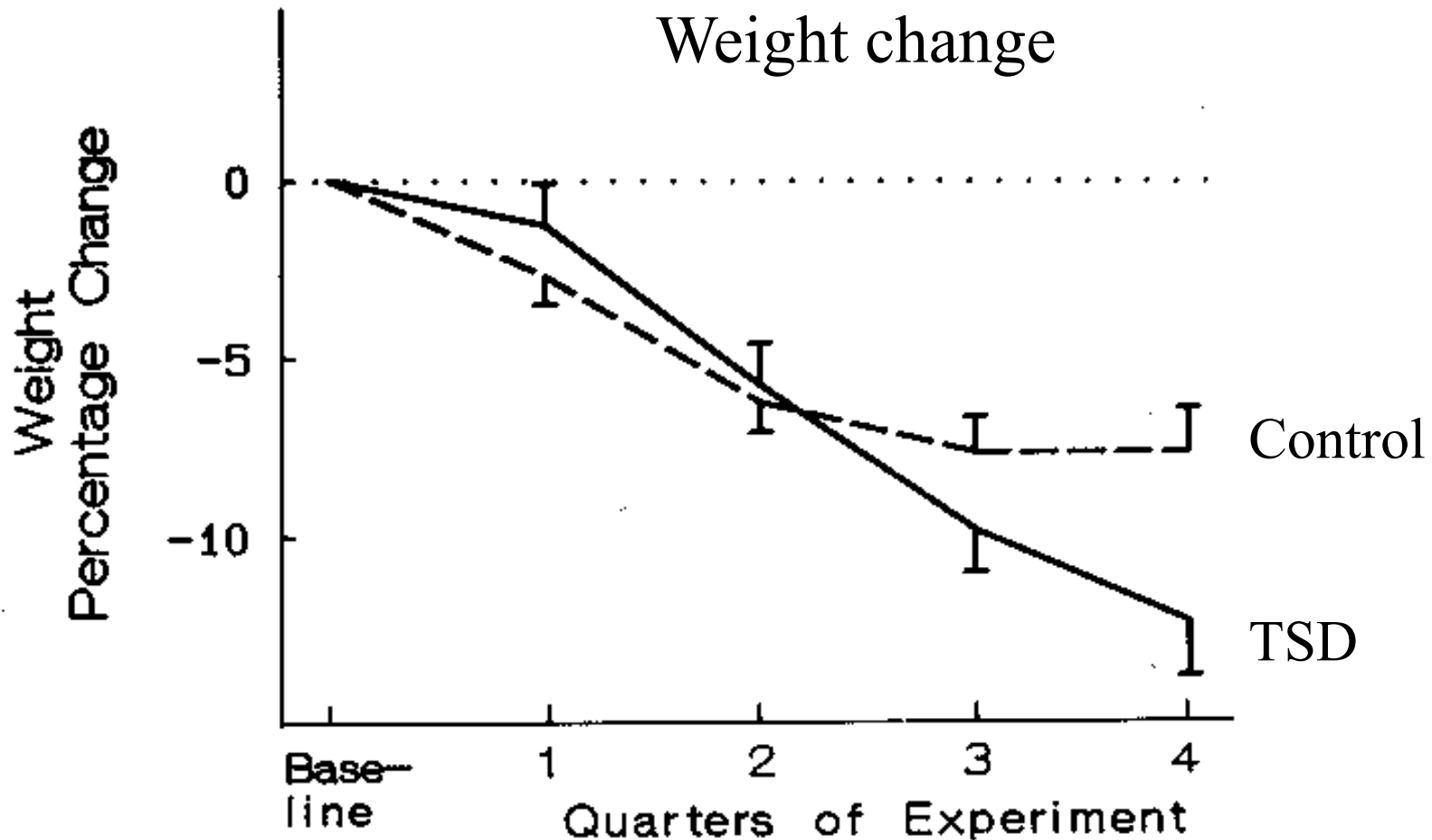
# Total Sleep Deprivation in the Rat

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# Total Sleep Deprivation in the Rat

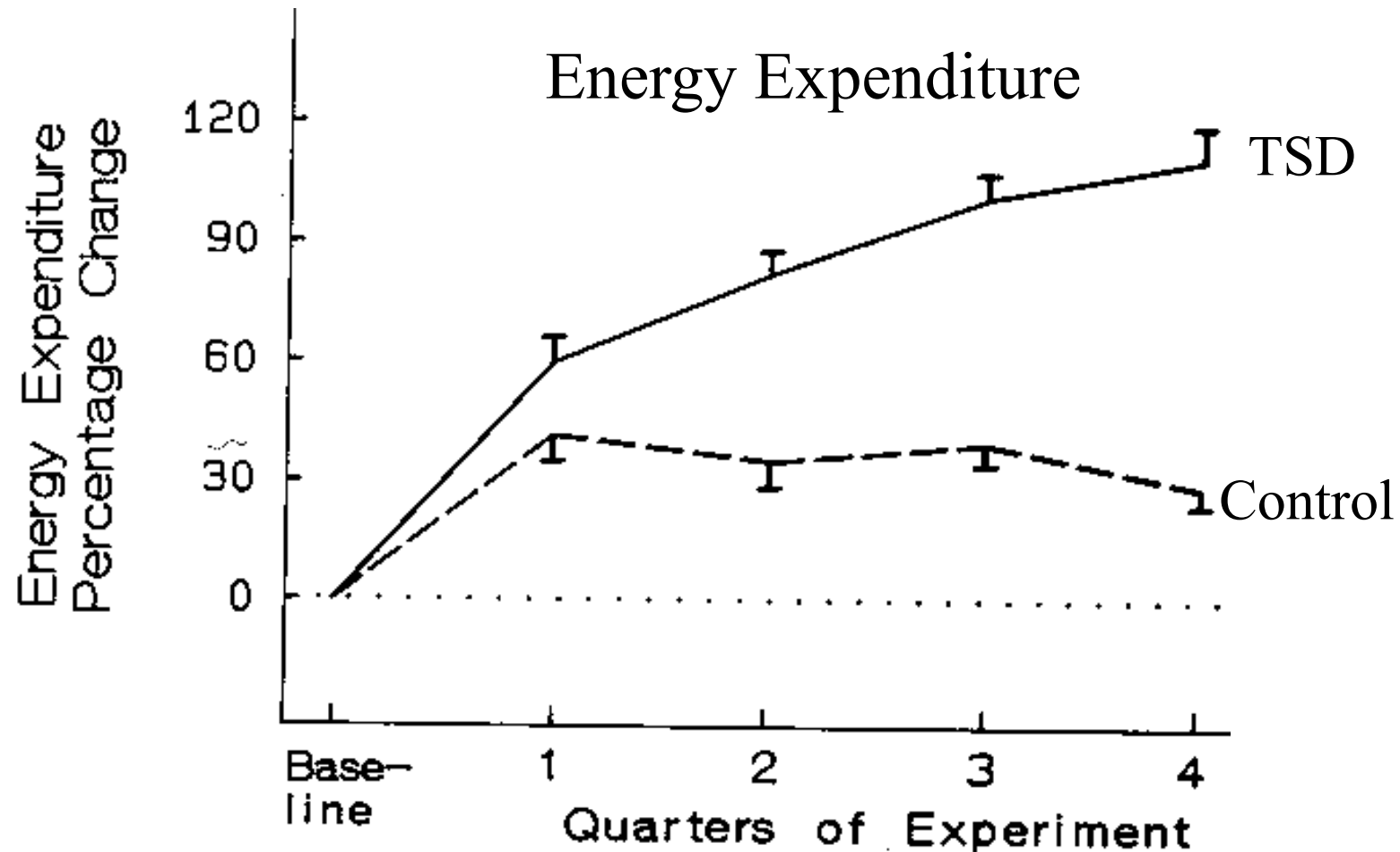
CA Everson Sleep 1989; 12:13-21





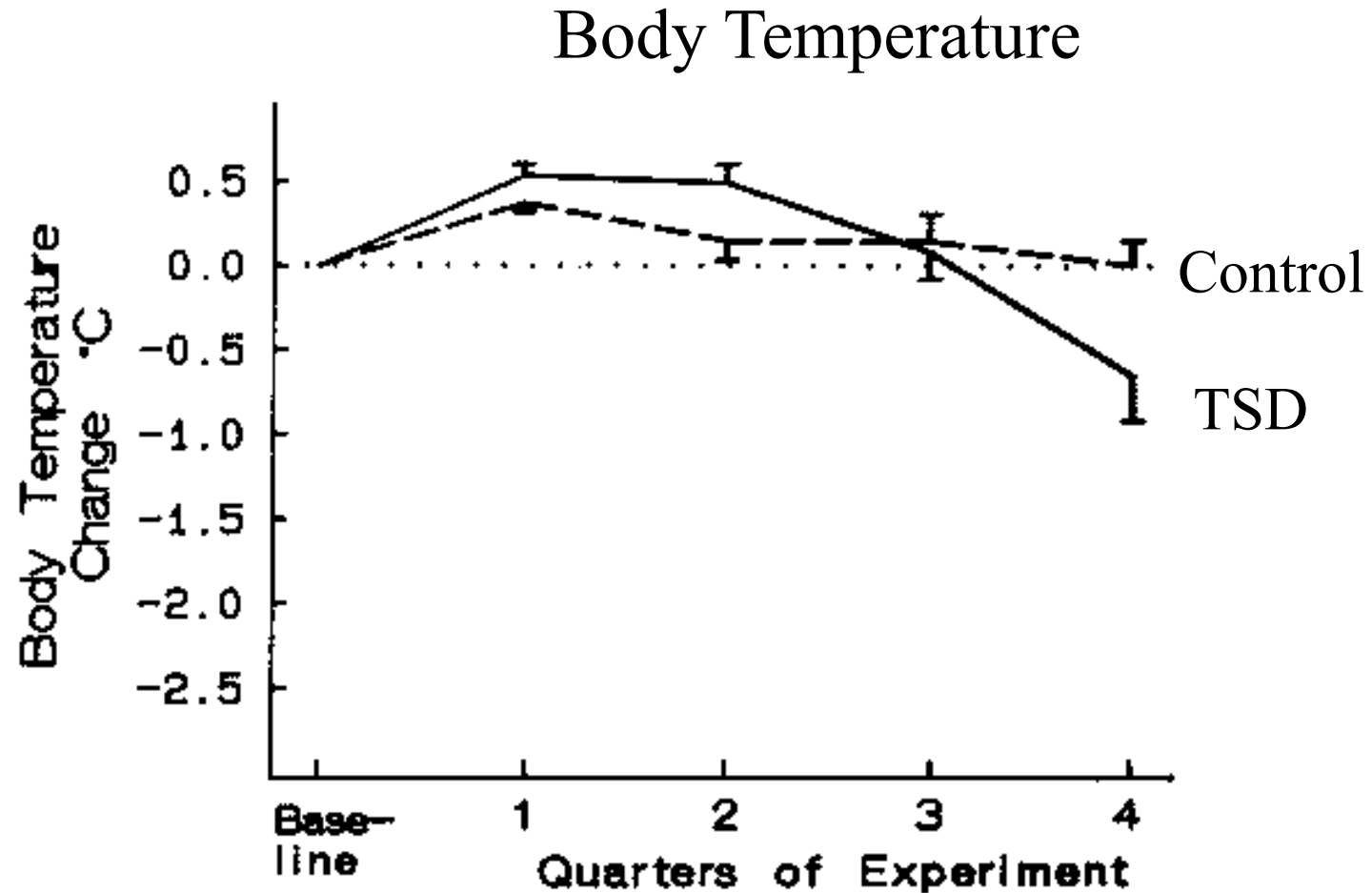
# Total Sleep Deprivation in the Rat

CA Everson Sleep 1989; 12:13-21



# Total Sleep Deprivation in the Rat

Bergmann Sleep 1989; 12:31-41



# Sleep Deprivation in the Rat

Mortality 100% :

TSD 11-32 days

REM 16-54 days

No specific histopathology.



**What's as important  
as a good night's sleep?**

# Erectile Dysfunction and OSA

Prevalence of OSA in men with ED is 30-50%.

Pressman J Urol 1985; 136:595-598.

Reduced libido is proportional to SpO2 nadir.

Watson Sleep Res 1987; 16:293.

ED is associated with hypoxic neuropathy.

Fanfulla Sleep 2000; 23: 775-781.

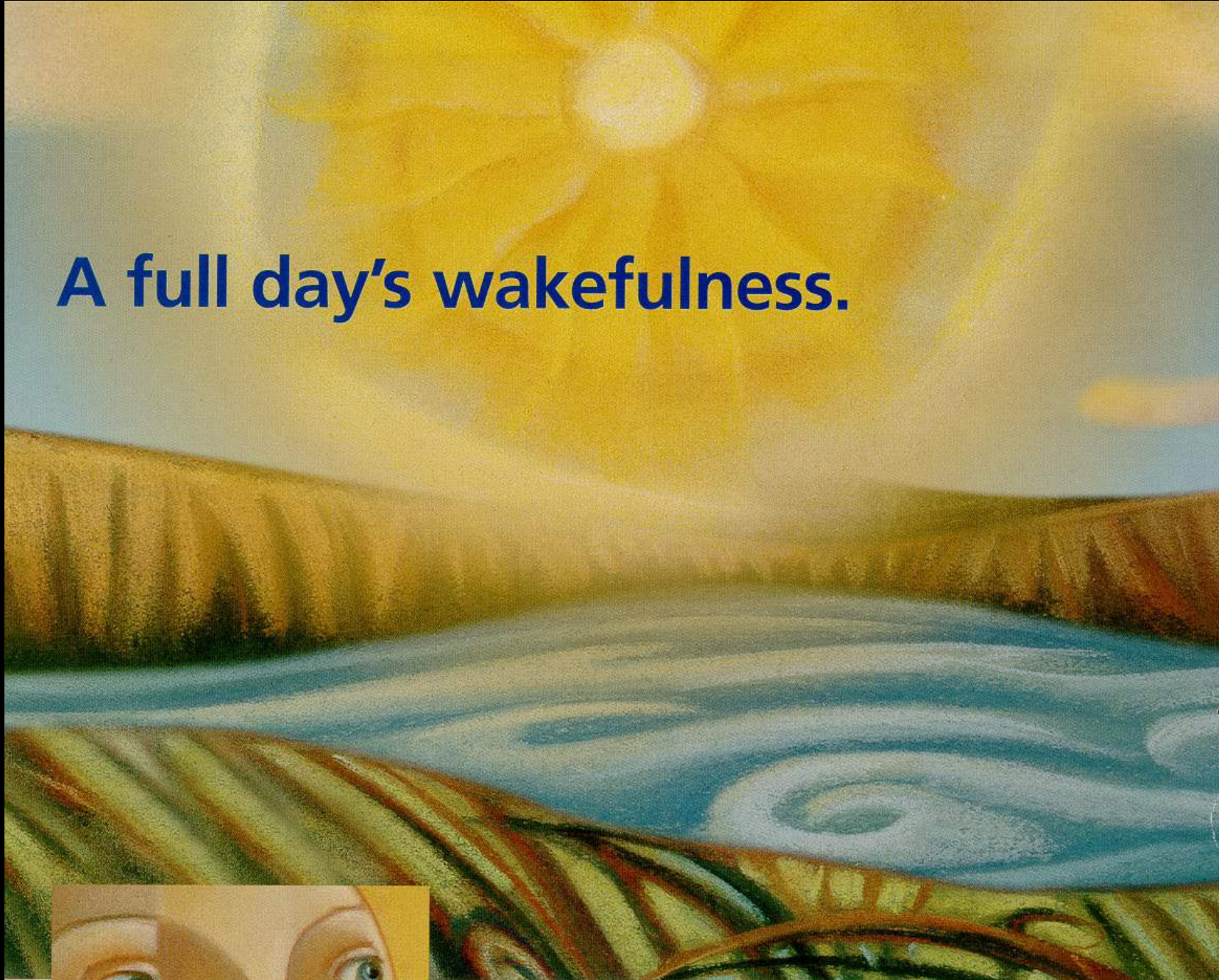




*else*  
What's as important  
as a good night's sleep?



**A full day's wakefulness.**





PROVIGIL<sup>®</sup>

(MODAFINIL)<sup>®</sup>

Tablets

A prescription for  
daytime wakefulness<sup>™</sup>

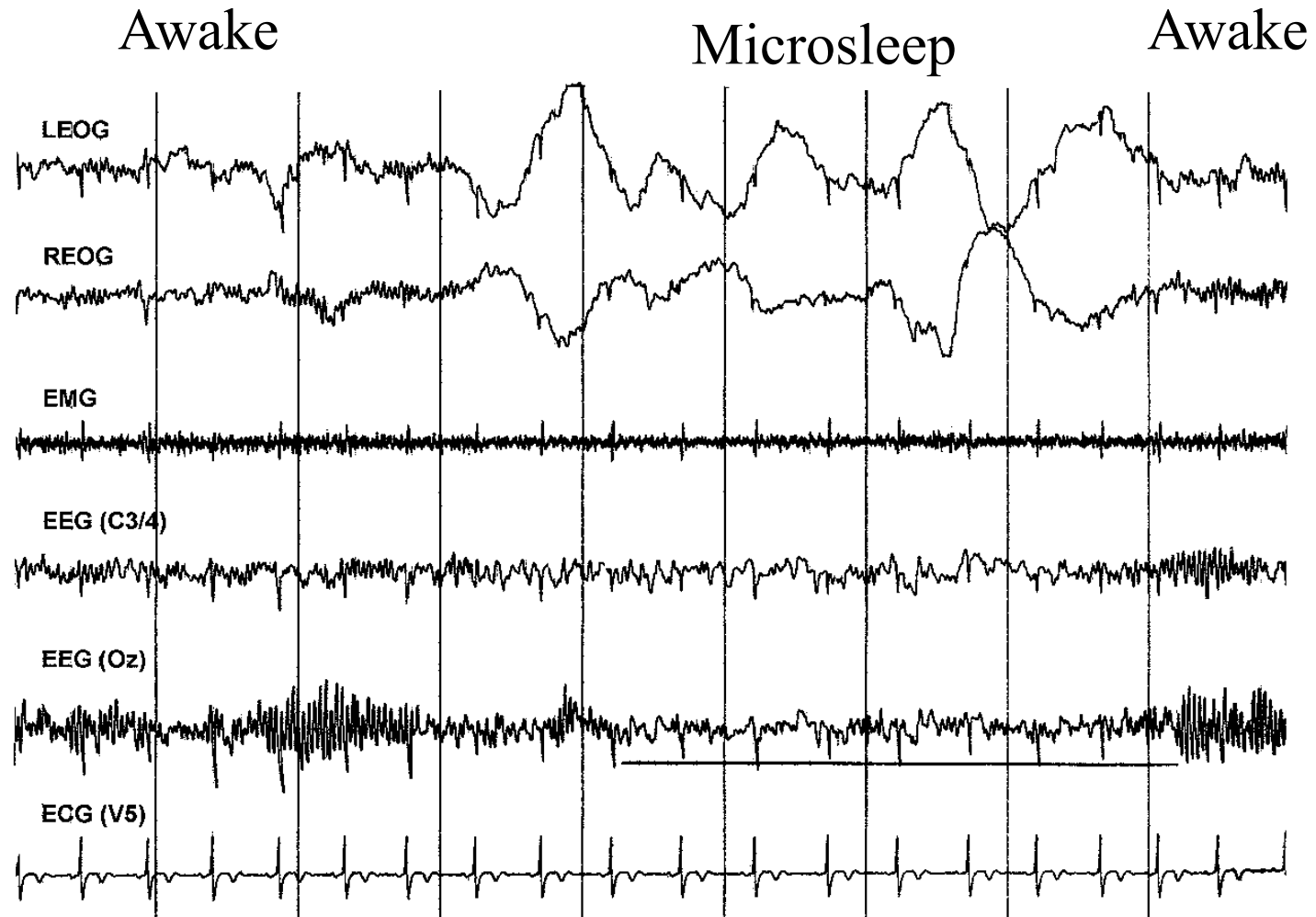


# STATE STABILITY









**Figure 1**—A 30-sec epoch from a standard polysomnogram that illustrates a microsleep. From the top, the first two channels are monopolar electrooculograms (LEOG and REOG) from the left and right outer canthi, the third channel a bipolar submental electromyogram (EMG), the fourth and fifth channels electroencephalograms (EEG) from C3/4 and Oz derivations. The last channel is an electrocardiogram (V5). The EOGs and EEGs are referenced to the ears A1/2. The microsleep is underlined and shows rolling eyes and a slowing of the EEG.



# What are the most common sleep disorders and their consequences?

1. “A physiologic state of relative unconsciousness...

# What are the most common sleep disorders and their consequences?

1. “A physiologic state of relative unconsciousness...**INSOMNIA**

# What are the most common sleep disorders and their consequences?

1. “A physiologic state of relative unconsciousness...INSOMNIA
2. and inaction of voluntary muscles...



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**ABNORMAL SLEEP BEHAVIOR**

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1. “A physiologic state of relative unconsciousness...INSOMNIA
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ABNORMAL SLEEP BEHAVIOR
3. the need for which recurs periodically...

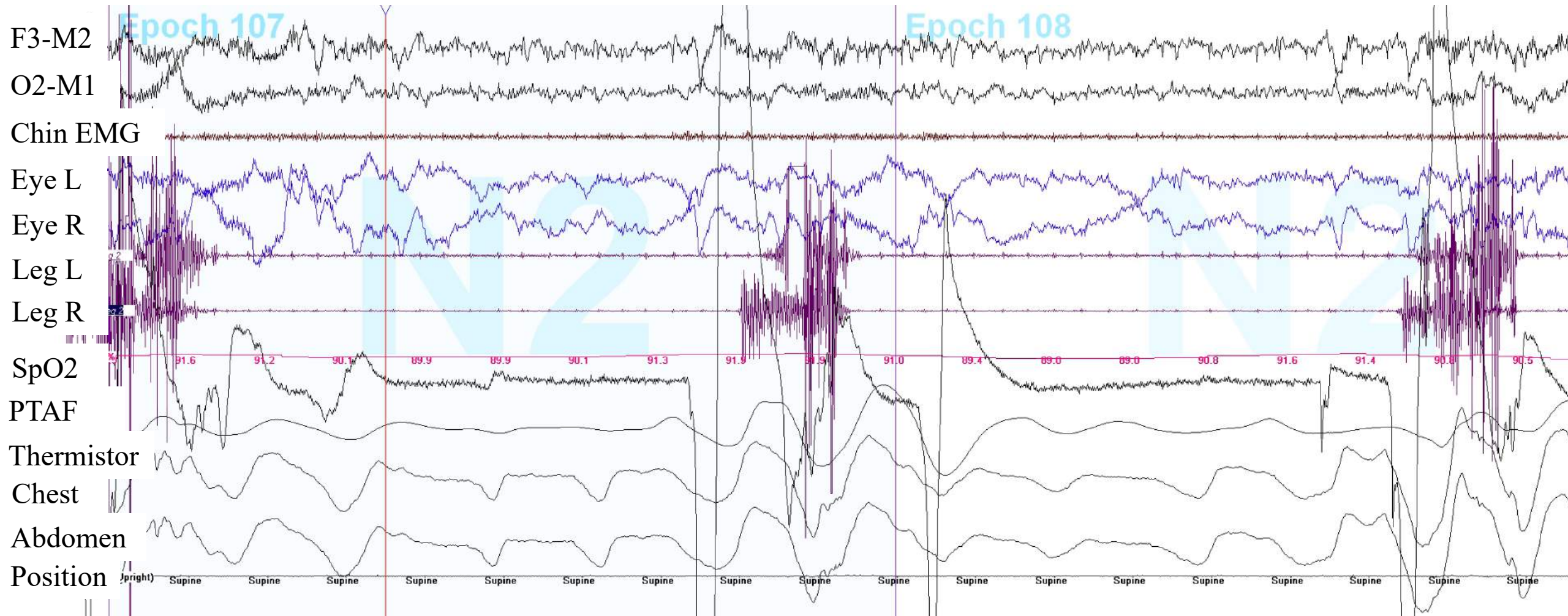
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ABNORMAL SLEEP BEHAVIOR
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IMPAIRED WAKING FUNCTION”

# Parkinson's Disease and Insomnia

1. Direct consequences of PD: Cortical atrophy  
Pain  
Dystonia  
Bradykinesia  
Nocturia
2. Psychiatric: Anxiety/Depression
3. Medications: Dopaminergic
4. Primary sleep disorders: Restless Leg Syndrome  
Periodic Limb Movements

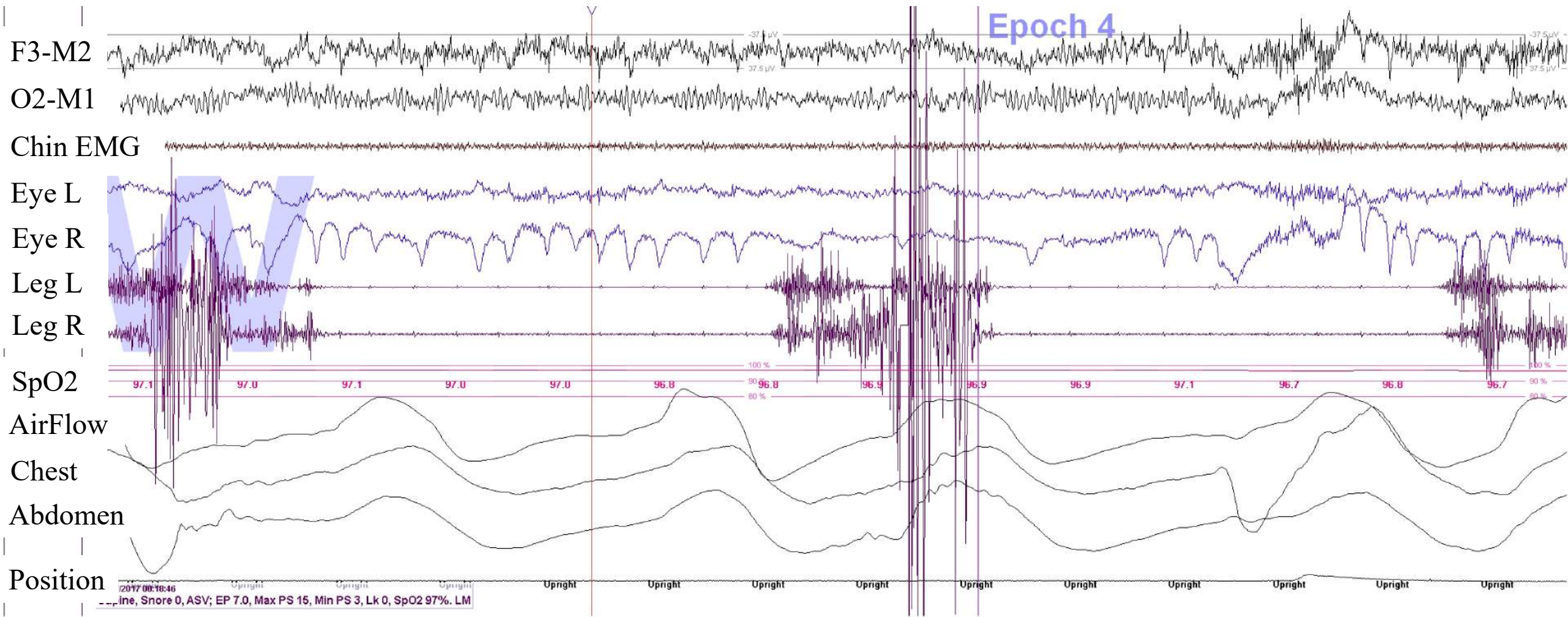
# 71 year old male with Restless Legs Syndrome and Complex Sleep Apnea



60 seconds



# 71 year old male with Restless Legs Syndrome and Complex Sleep Apnea



30 seconds

# What are the most common sleep disorders and their consequences?

1. “A physiologic state of relative unconsciousness...INSOMNIA
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ABNORMAL SLEEP BEHAVIOR

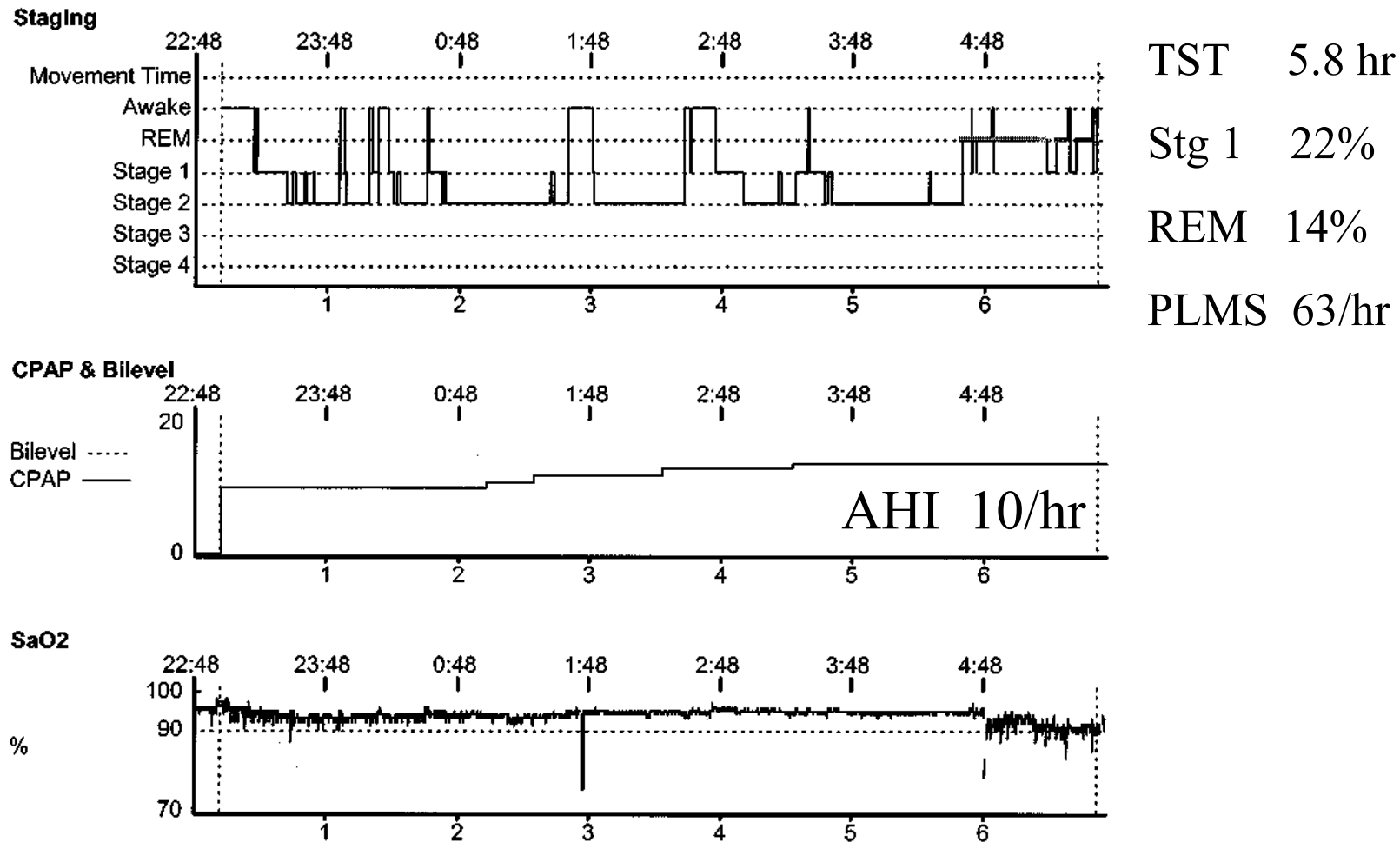
## 45 y/o male with abnormal sleep behavior.

- Lifelong Sx: somnambulism, somniloquy and enuresis until age 15.
- Recurrent, violent, aggressive behavior typically between 1 and 4 AM.
- Throws self out of bed, has sustained various self-injuries (knuckles and broken toe) and has hit his wife.
- Associated with vivid dreaming, usually of being threatened.
- No abnormal behavior during wake, loss of bowel or bladder function.
- Wife has had to sleep in separate room since they were married 3 years ago.



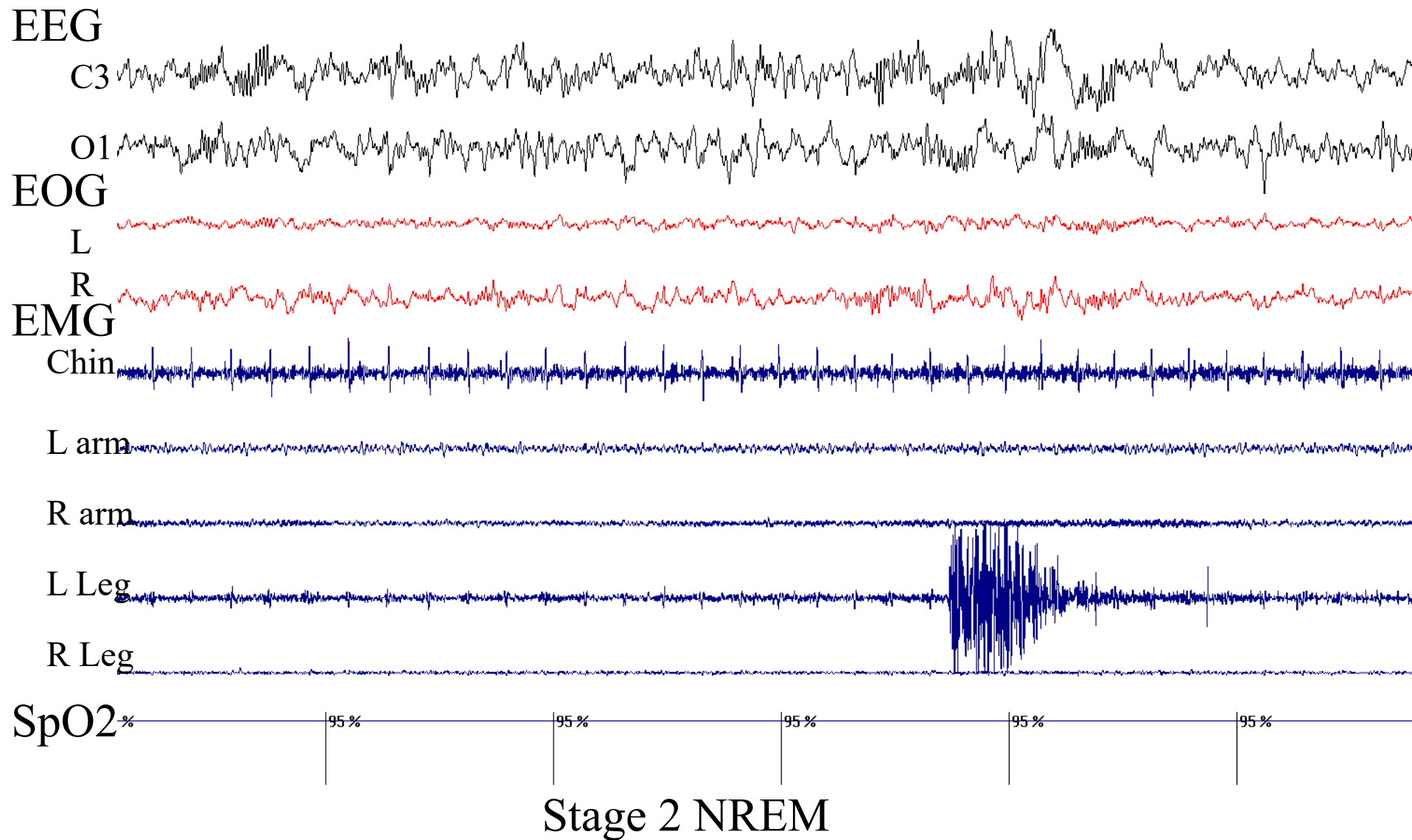
# 45 year old male with multiple sleep problems.

## Hypnogram and CPAP titration:



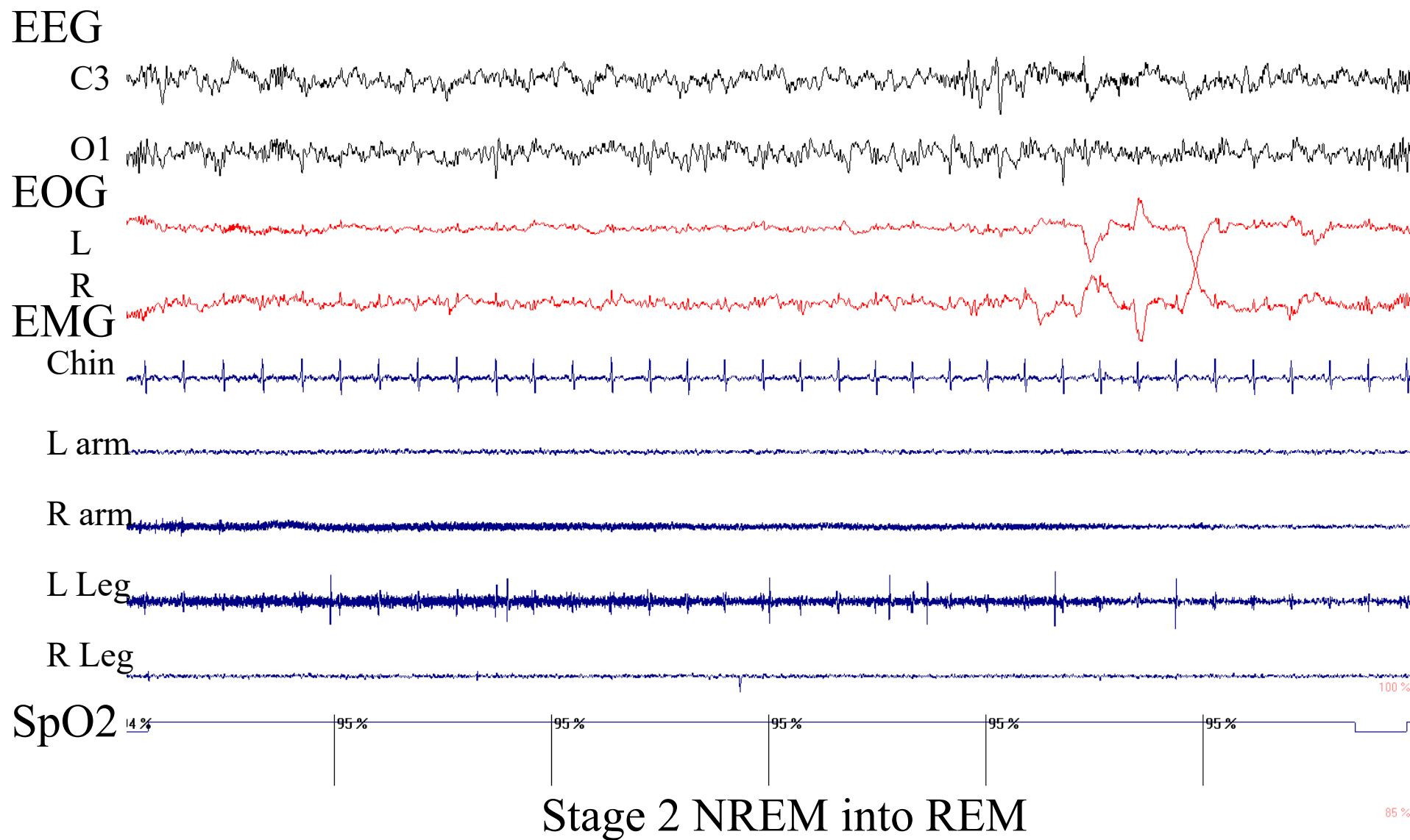
45 year old male with multiple sleep problems.  
Hypnogram and CPAP titration:

# 45 year old male with multiple sleep problems.

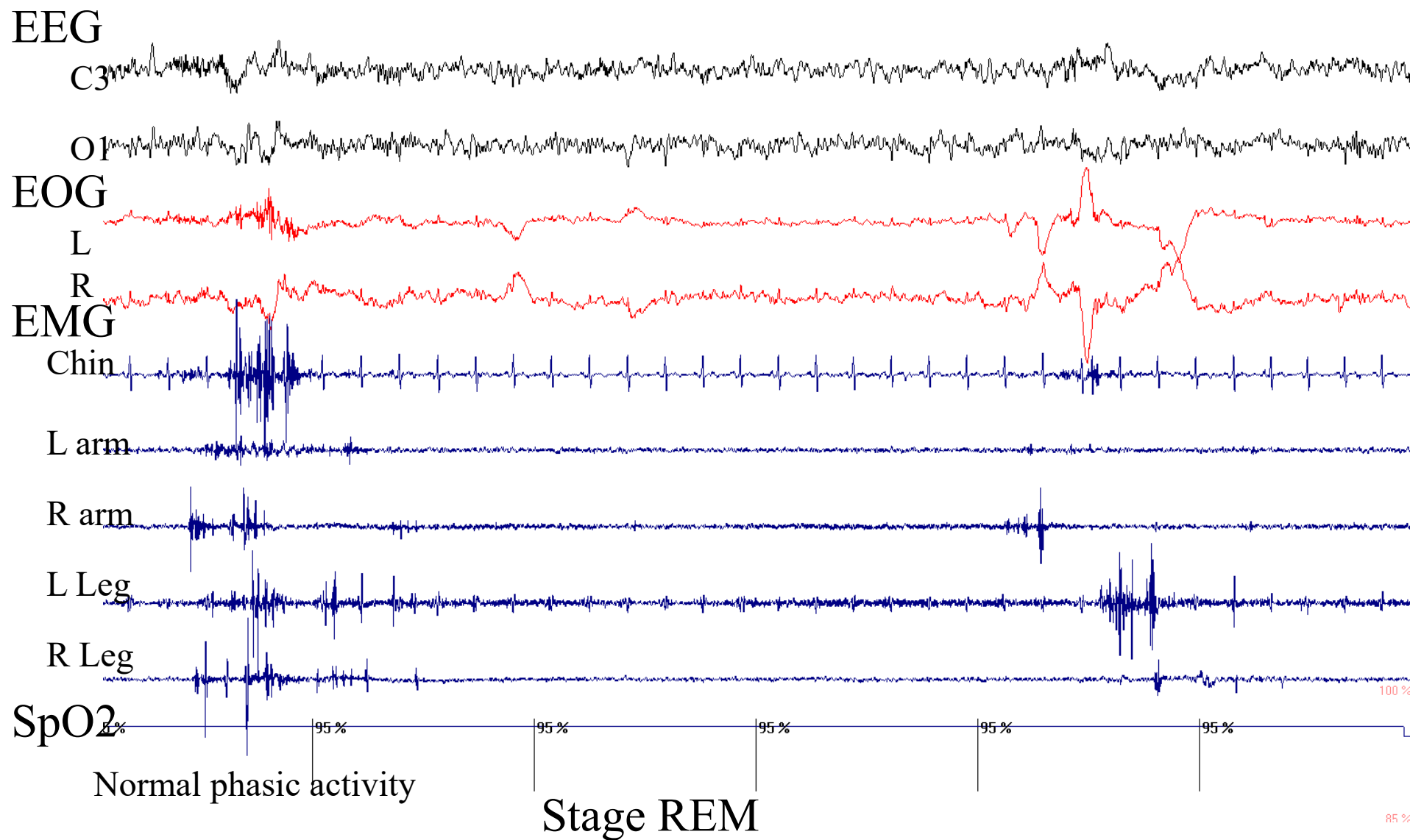


02:27

# 45 year old male with multiple sleep problems.

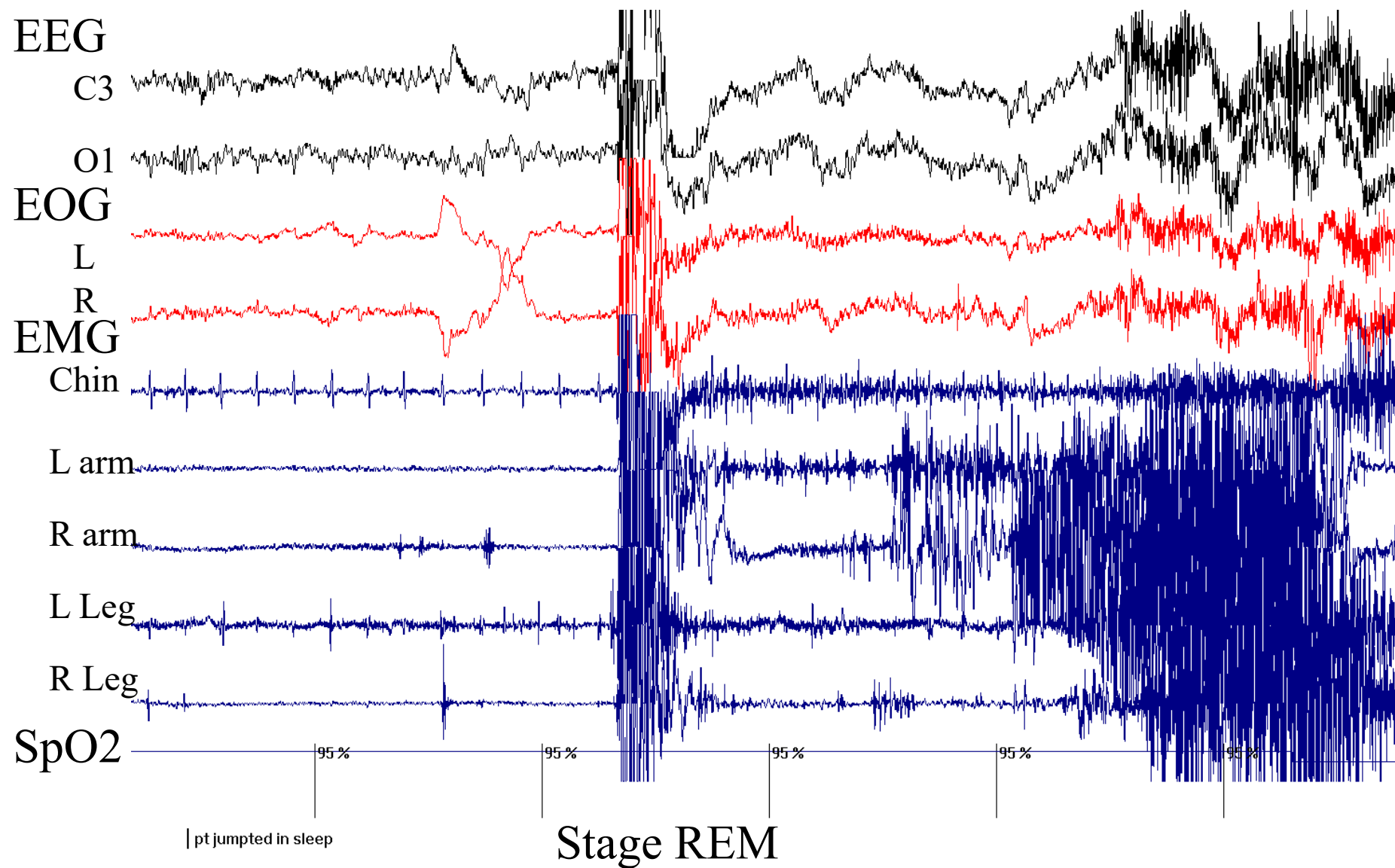


# 45 year old male with multiple sleep problems.



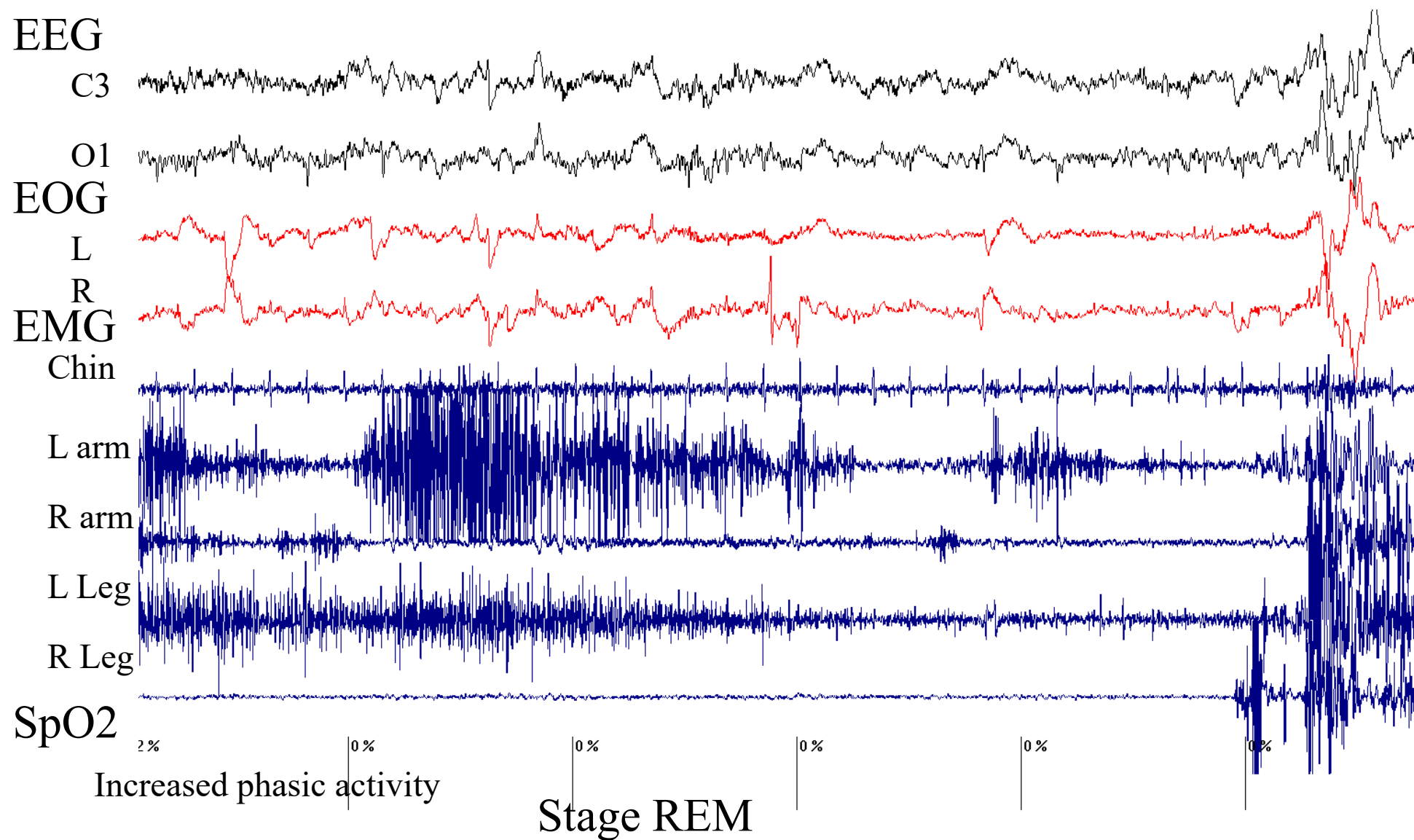
04:38

45 year old male with multiple sleep problems.



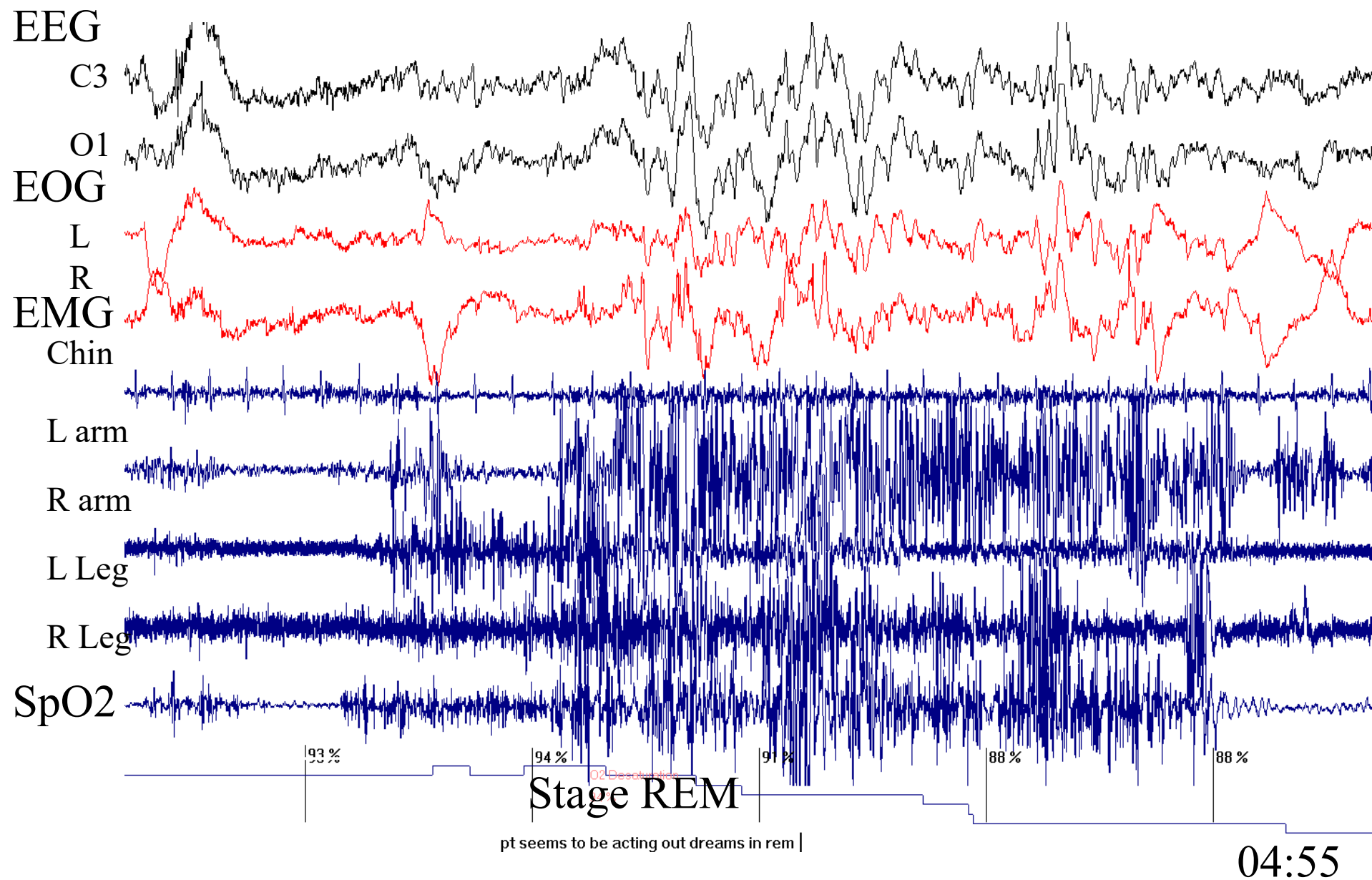


45 year old male with multiple sleep problems.

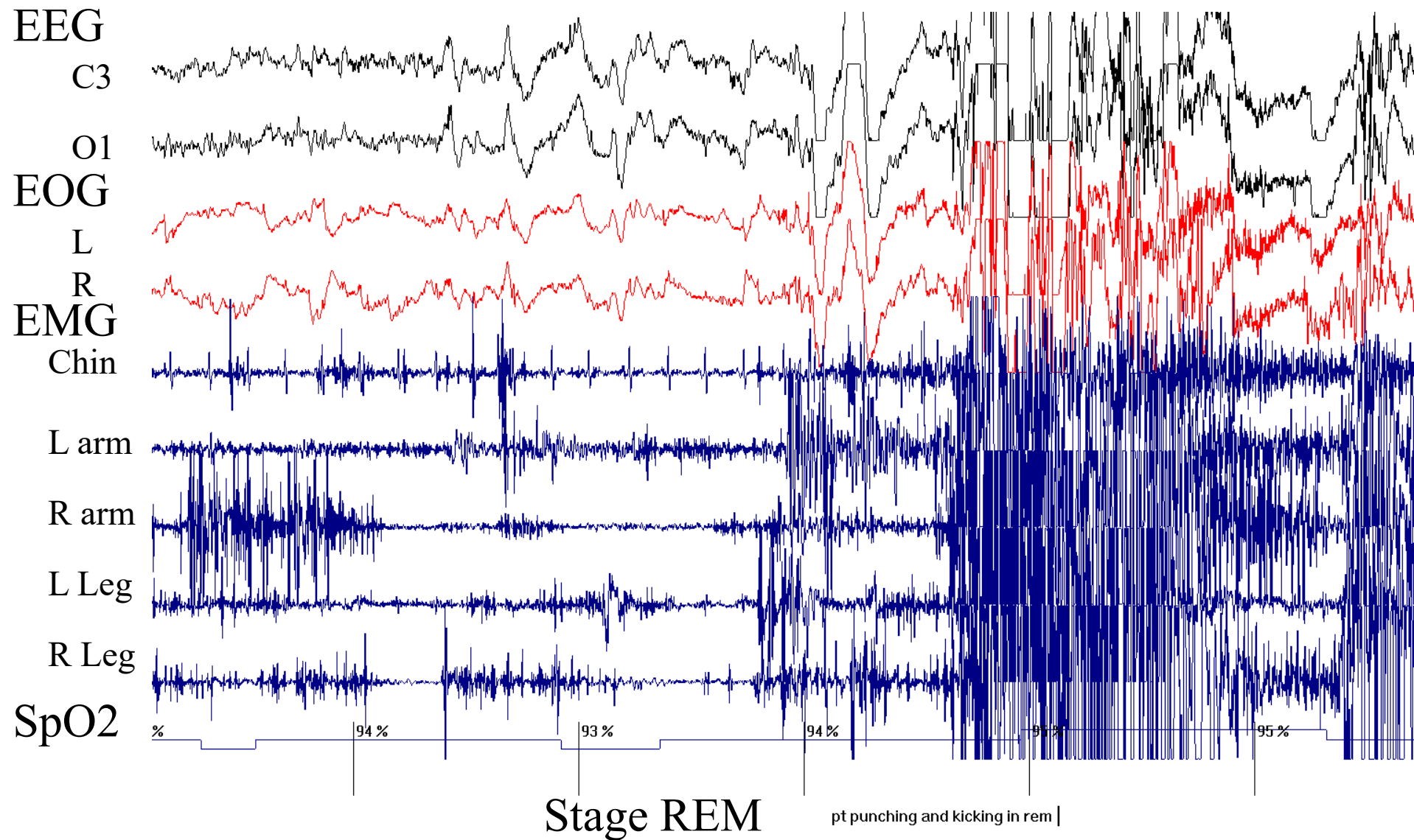


04:48

45 year old male with multiple sleep problems.



45 year old male with multiple sleep problems.



04:57

# Locus Coeruleus et sommeil paradoxal.

Jouvet M et Dlorme F.

C R Soc Biol 1965; 159:895-899.

Experimental animal model of REM Behavior disorder was induced by small pontine lesions in cats.

2-3 weeks after the lesions, during REM sleep cats displayed oneiric behavior and during NREM sleep was intruded by frequent PGO spikes, excessive movement of paws and vibrissas.

# Le Comportement Onirique du Chat.

Sastre JP et Jouvet M. *Physiol Behav* 1979; 22:979-989.

1. Violent and abrupt jerks of all muscles.
2. “Vertical leaps so intense that the animal collides with the ceiling of the cage.
3. “Visual orientation”
4. Exploration and Stalking.
5. Aggressive attack and rage.
6. Indiscriminate licking and nibbling.
7. NO: Feeding or Sexual behaviors during oneiric states.





# Chronic Behavioral Disorders of Human REM Sleep: A New Category of Parasomnia

Schenck CH, Bundlie SR, Ettinger MG and Mahowald MW.  
Sleep 1986; 9:293-308

4 Males 67-72 years and 1 Female 60 years.

4 month to 6-year histories of injuring themselves or spouses with aggressive behavior during sleep associated with dream enactment (“oneiric” behavior).

Therapy with clonazepam was effective.



# Major findings from 3 large series of chronic RBD patients

1. Male predominance 87%
2. Age of onset is “older” 55-60 yrs
3. Prodrome of 2-48 years 25%
4. Sleep related injury 79%
5. Dream enactment 87-93%
6. Altered dream content:  
Violent, Vivid, Fear and Anger.

# Major findings from 3 large series of chronic RBD patients

7. Tonic and/or phasic EMG activities
8. Periodic Limb movements: 50-60%
9. Aperiodic Movements in NREM 37%
10. Sleep architecture preserved
11. Submental EMG atonia may be present with abnormal phasic activity in limbs.

# Major findings from 3 large series of chronic RBD patients

12. Clonazepam 0.5 – 2.0 mg (4.0) effective in 90% and without tolerance.
13. MSLT is usually normal unless associated with narcolepsy.
14. Co-morbidity with other conditions including neurologic (~50%) and psychiatric disorders (9%). SSRI's and TCA's may induce RBD.

44 year old male prison guard referred by  
neurologist for abnormal sleep behavior  
insomnia and excessive sleepiness.

“First noticed a problem going to sleep 2 yrs ago. Quality of life is greatly diminished because of the lack of restful sleep. I fall asleep during conversation, work etc. I have taken several bad falls. Cut head open twice, severe cut on finger and sprained hand and ankle. Fall out of bed, off chairs or while standing.”

(to be continued)

44 year old male prison guard referred by neurologist for abnormal sleep behavior insomnia and excessive sleepiness.

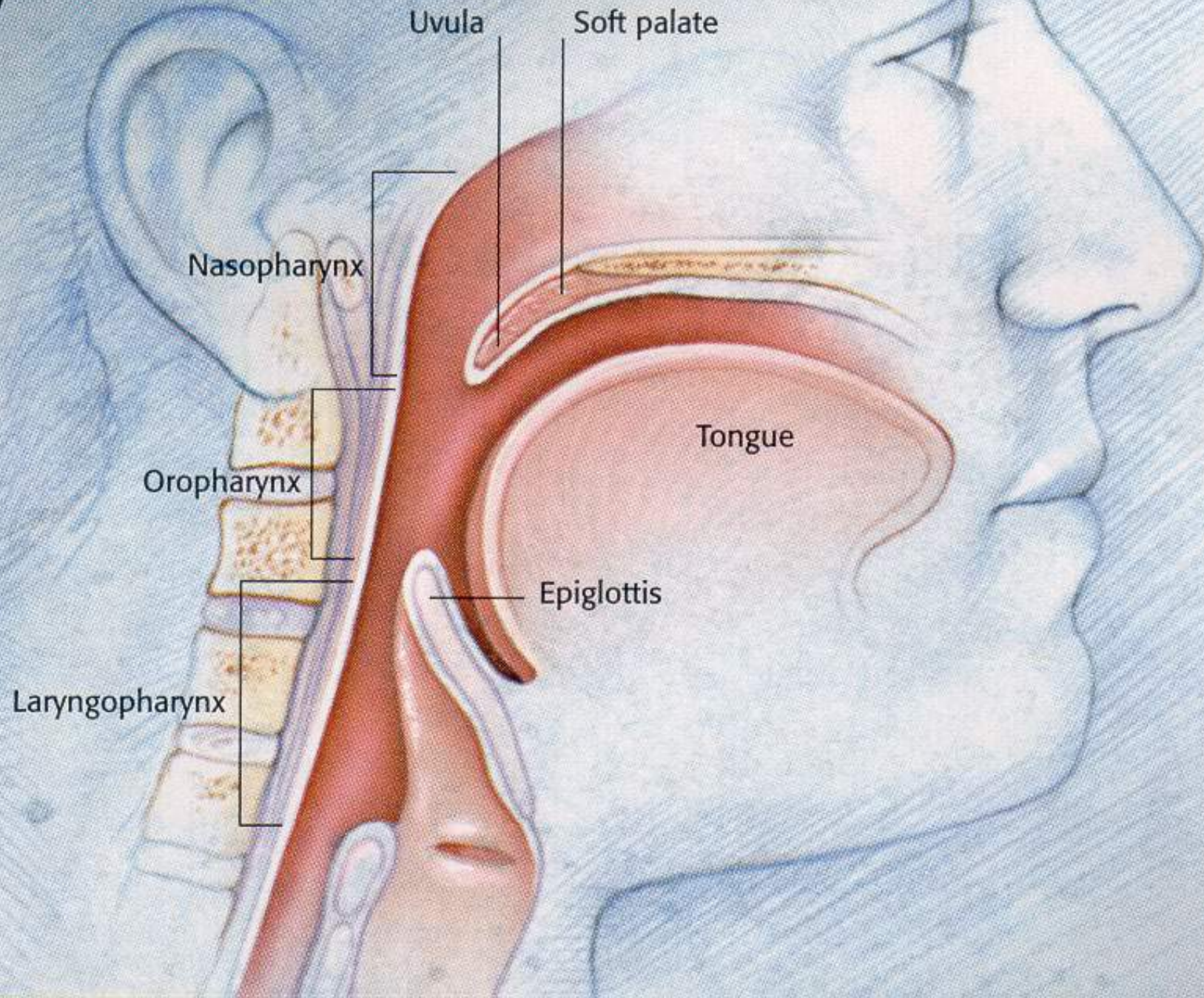
“I also have burned myself with cigarettes several times. Sit at the kitchen table and smoke a good part of the night, while dozing. The other part of the night is spent roaming around the house. Do a lot of talking, yelling and walking around at night, apparently acting out dreams. Have occasionally taken things apart (e.g. stove, dryer) and unable to find all the parts next day. Took pajamas off one night and have never seen them since.”



# What are the most common sleep disorders and their consequences?

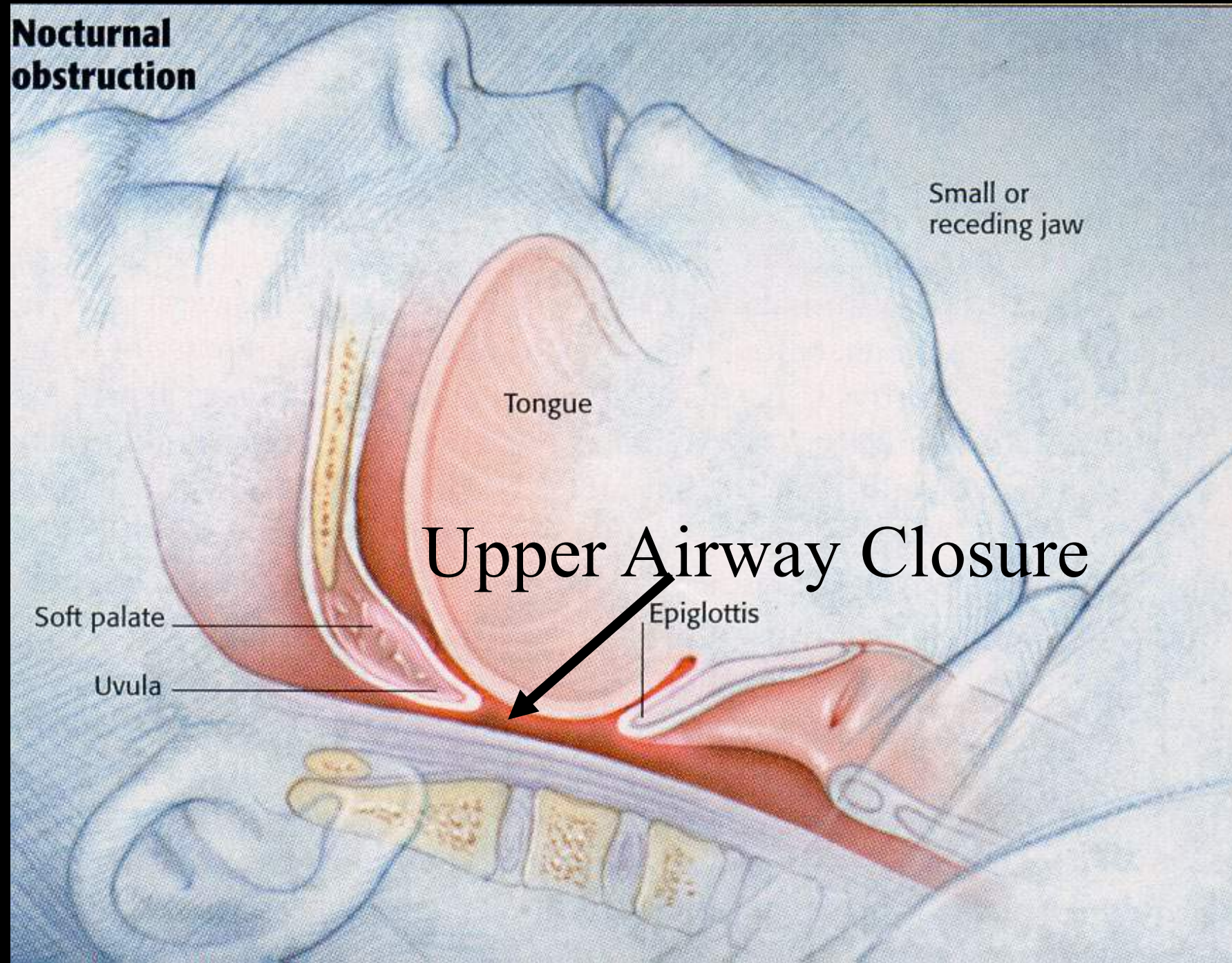
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2. and inaction of voluntary muscles...  
ABNORMAL SLEEP BEHAVIOR
3. the need for which recurs periodically...  
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# Normal airway

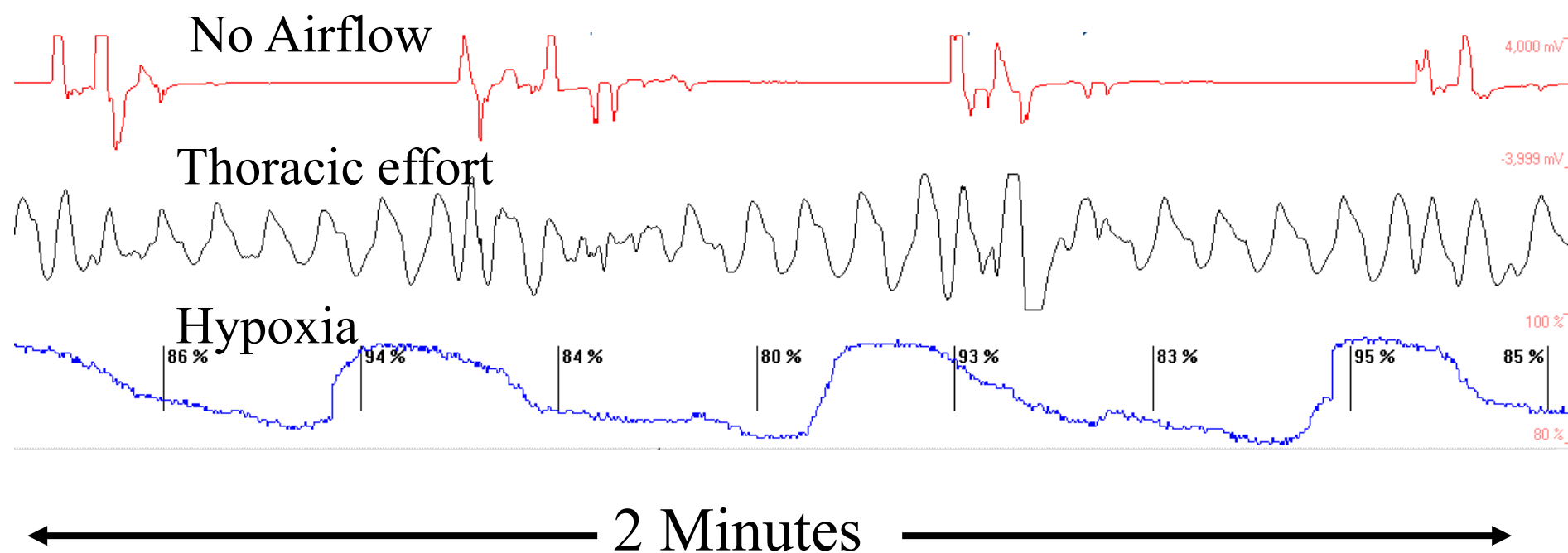


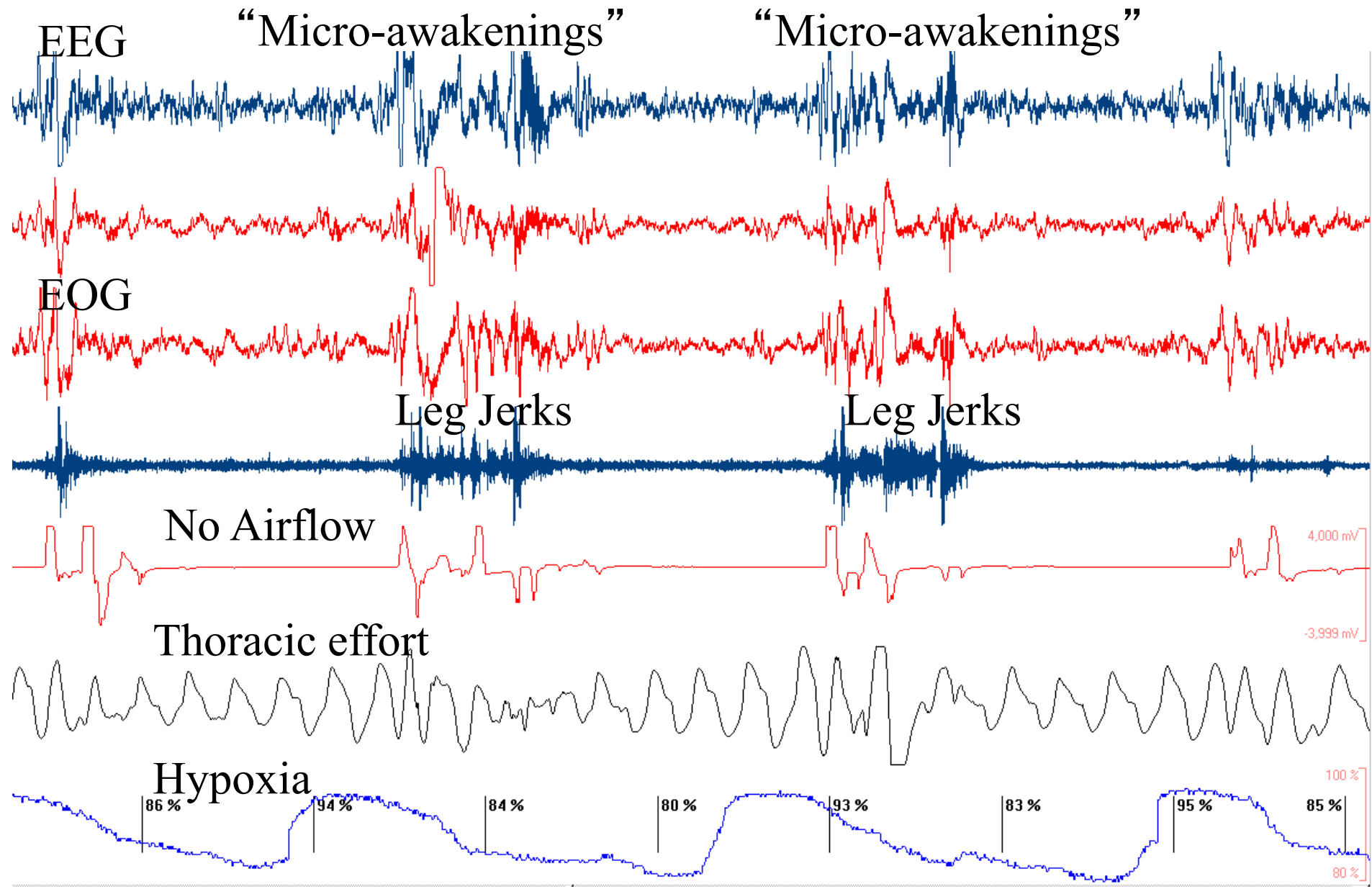


## Nocturnal obstruction



# OBSTRUCTIVE SLEEP APNEA

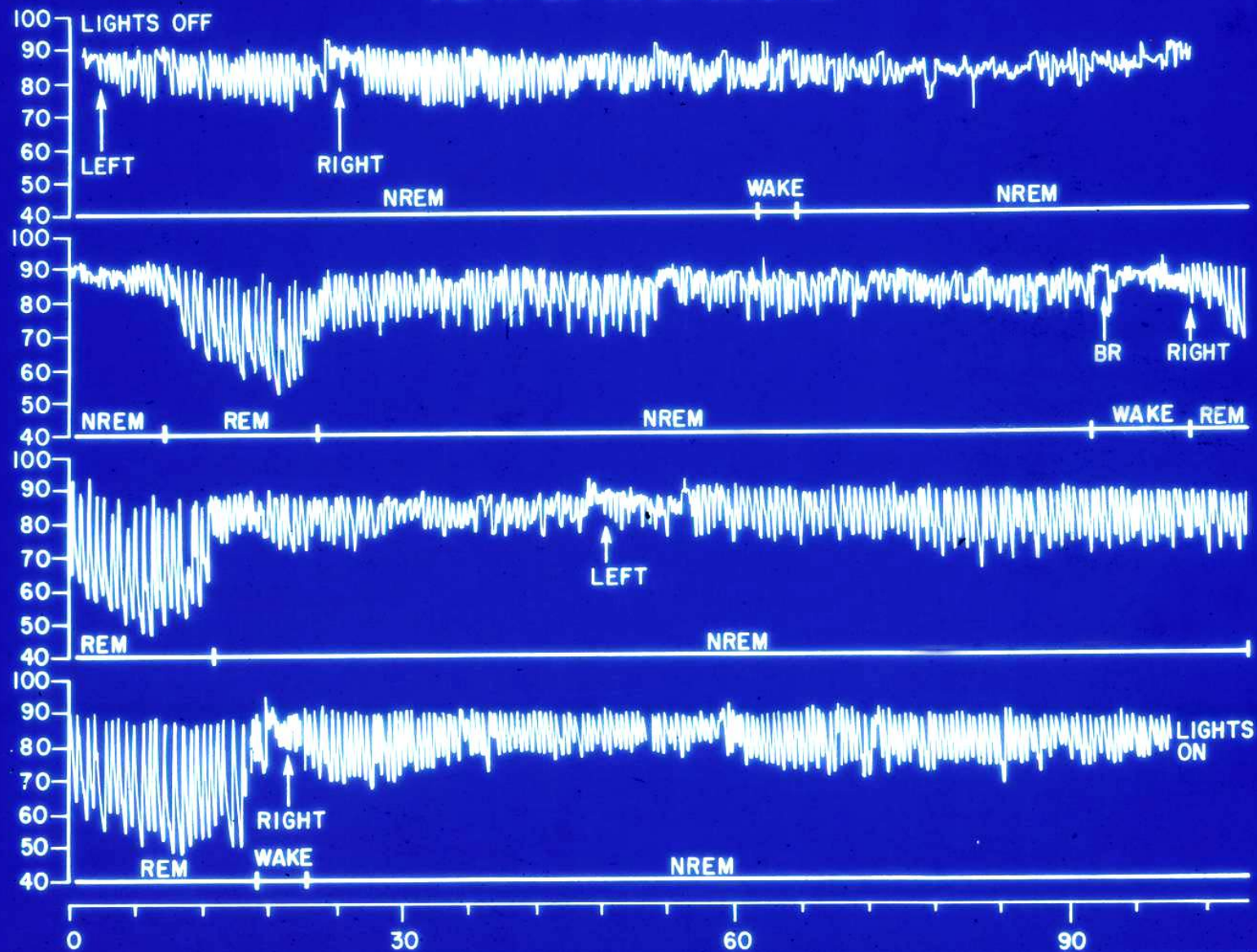




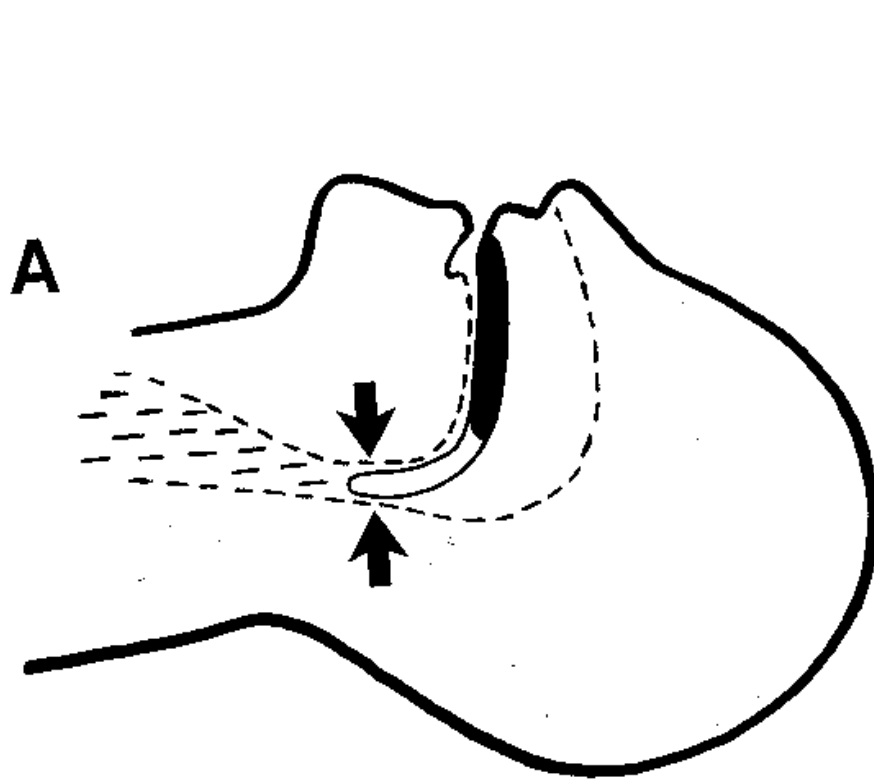
← 2 Minutes →



# J.B. 11-28-90 BASE LINE

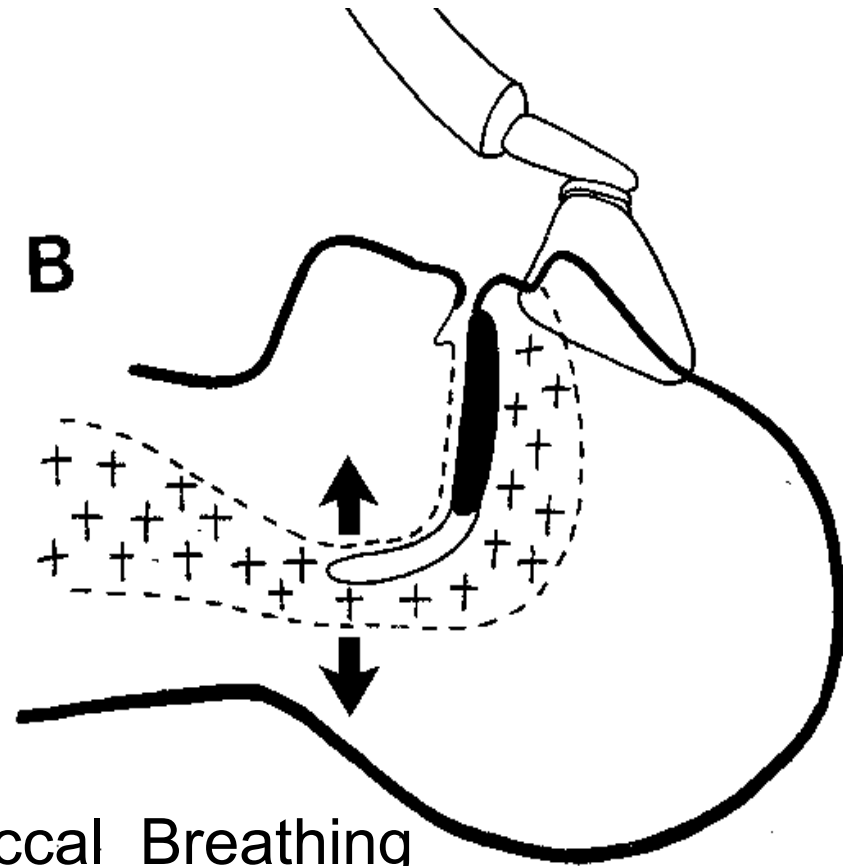


# Continuous Positive Airway Pressure



Aspiration Breathing

Collapse of airway 2<sup>nd</sup> to negative airway pressure.



Buccal Breathing

Support of airway with external positive pressure.

THANK YOU