

# SLEEP AND HEADACHE

Sandhya Kumar, MD , FAASM

Associate Professor,

Department Of Neurology

Wake Forest School Of Medicine, Winston-Salem, NC



# Sleep and Headache

- Relationship known for centuries.
- 1853 Romberg wrote” The attack is generally closed by a profound and refreshing sleep”
- 1873 Liveing remarked for an acute attack of migraine “The most frequent termination by far is sleep”
- Complex and not entirely understood



# Headache and Sleep

- Two of the common disorders seen in clinical practice
- Sleep Apnea: 10-17% males and 3-9% females
- Migraine: 13.2% (8.6% male and 17.5% female)
- Headaches 2-8 times more common among people with sleep disorders than in the general population



# Relationship

- Headache is a symptom of a primary sleep disturbance
- Sleep disturbance is a symptom of a primary headache disorder
- Sleep disturbance and headache are symptoms of an unrelated medical disorder
- Sleep disturbance and headache are both manifestations of a similar underlying pathogenesis



Travica T et al The relationship between headaches and sleep disturbances. Headache. 1995;35:590-596

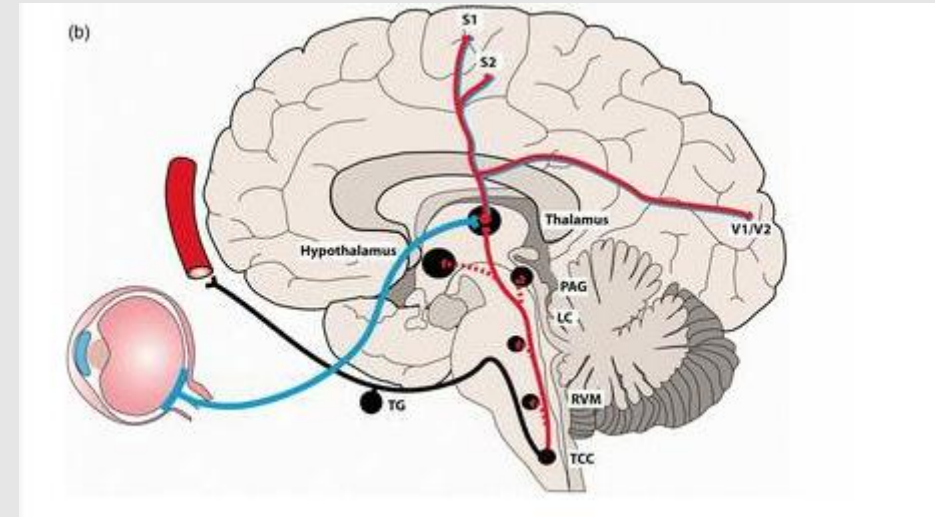
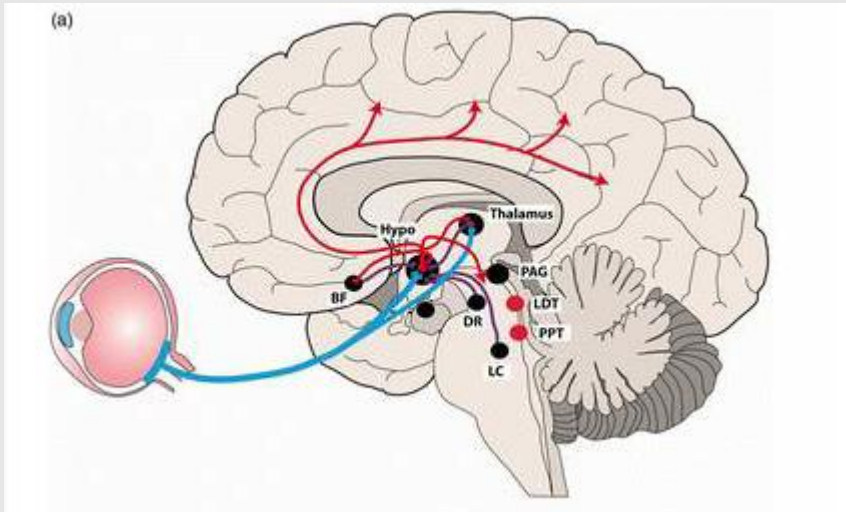
# Headache as a result of sleep disturbances/underlying process that disturbs sleep

- -OSA
- -RLS/PLMS
- -Insomnia
- -Chronic pain syndrome
- -Depression or anxiety
- -Poor neck positioning/cervical pathology



# Shared pathophysiologic mechanisms

Headache and Sleep : Cephalalgia :2014(34); P.R. Holland



Headache. 2005 Jul-Aug;45(7):904-10.

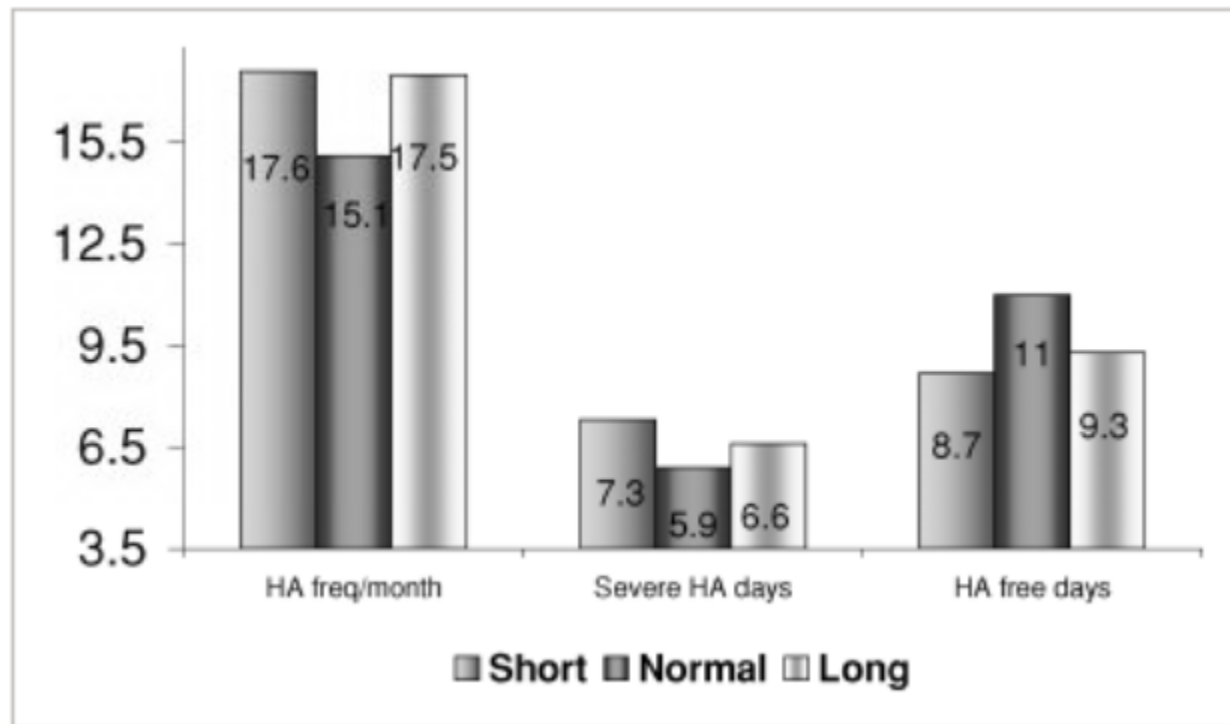
## **Headache and sleep: examination of sleep patterns and complaints in a large clinical sample of migraineurs.**

Kelman L<sup>1</sup>, Rains JC.

- Migraines triggered by sleep disturbance in 50%
- Headaches awakening from sleep- 71%( nearly half between 4 AM and 9 AM)
- Insomnia -3 fold increase than the general population
- Short sleep periods ( less than 6 hrs) 38%
- Choose to sleep or rest due to headaches- 85%
- Forced to sleep or rest due to headaches -75%



# Headache and Sleep



**Table 1** Demographic data and Epworth sleepiness scale in 200 patients with episodic and chronic migraine

<b>Demographic data</b>	
Age (years)	45 (12.5)
Sex (F/M)	162/38 (81%/19%)
BMI	27.8 (6.0)
Episodic migraine	72 (36%)
Chronic migraine	128 (64%)
<b>Epworth sleepiness scale</b>	
Mean (SD) score	8.4 (4.3)
<b>Score 10 or more</b>	
All migraine	37%
Episodic migraine	32.4%
Chronic migraine	39.8%*
<b>Score 15 or more</b>	
All migraine	10%
Episodic migraine	4.3%
Chronic migraine	15.3%†

Values are mean (SD) or n (%).  
\*NS; †p<0.05.  
BMI, body mass index.

Headache. 2005 Jul-Aug;45(7):904-10.

Headache and sleep: examination of sleep patterns and complaints in a large clinical sample of migraineurs.

Kelman L<sup>1</sup>, Rains JC.

**MIL**  
**MIGRAINE**

J Neurol Neurosurg Psychiatry. 2005 Oct; 76(10):  
1467-1468.  
doi: [10.1136/jnnp.2005.062497](https://doi.org/10.1136/jnnp.2005.062497)

PMCID: PMC1739348  
PMID: [16170102](https://pubmed.ncbi.nlm.nih.gov/16170102/)

Excessive daytime sleepiness in migraine patients

M Peres, M Stiles, H Siow, and S Silberstein



# Migraine and Sleep

[Headache](#), 2019 Jan;59(1):32-45. doi: 10.1111/head.13435. Epub 2018 Nov 1.

## Sleep Disorders Among People With Migraine: Results From the Chronic Migraine Epidemiology and Outcomes (CaMEO) Study.

[Buse DC](#)<sup>1</sup>, [Rains JC](#)<sup>2</sup>, [Pavlovic JM](#)<sup>1,3</sup>, [Fanning KM](#)<sup>4</sup>, [Reed ML](#)<sup>4</sup>, [Manack Adams A](#)<sup>5</sup>, [Lipton RB](#)<sup>1,3</sup>.

### Author information

- 1 Albert Einstein College of Medicine, Bronx, NY, USA.
- 2 Elliot Hospital, Center for Sleep Evaluation, Manchester, NH, USA.
- 3 Montefiore Headache Center, Bronx, NY, USA.
- 4 Vedanta Research, Chapel Hill, NC, USA.
- 5 Allergan plc, Irvine, CA, USA.

### Abstract

**OBJECTIVES:** We examined the cross-sectional association of sleep apnea and indices of sleep quality with both episodic migraine (EM) and chronic migraine (CM).

**BACKGROUND:** Sleep apnea and abnormal patterns of sleep, such as insomnia, were associated with migraine onset, severity, and progression in previous research.

**METHODS:** The Chronic Migraine Epidemiology & Outcomes Study, a longitudinal study, used a series of web-based surveys to assess migraine symptoms, burden, and patterns of health care utilization. Quota sampling was used from September 2012 to November 2013 to generate a representative sample of the US population. Persons who screened positive for sleep apnea on the Berlin Questionnaire are said to be at "high risk" for sleep apnea. Respondents indicated if they believed that they had sleep apnea, if a physician had diagnosed it, and if and how they were treated. Other aspects of sleep quality were assessed using the Medical Outcomes Study (MOS) Sleep Measures.

**RESULTS:** Of 12,810 eligible respondents with migraine and data on sleep, 11,699 with EM (91.3%) and 1111 with CM (8.7%) provided valid data for this analyses. According to the Berlin Questionnaire, 4739/12,810 (37.0%) were at "high risk" for sleep apnea, particularly persons with CM vs EM (575/1111 [51.8%] vs 4164/11,699 [35.6%]), men vs women (1431/3220 [44.4%] vs 3308/9590 [34.5%]), people with higher body mass index, and older people (all  $P < .001$ ). Among respondents to the MOS Sleep Measures, persons with CM were more likely to report poor sleep quality than those with EM, including sleep disturbance (mean [SD] values: 53.2 [26.9] vs 37.9 [24.3]), snoring (38.0 [33.9] vs 31.0 [32.1]), shortness of breath (34.9 [29.8] vs 15.3 [20.6]), somnolence (44.1 [23.4] vs 32.2 [21.2]), and less likely to report sleep adequacy (34.0 [24.2] vs 39.2 [22.1]).

**CONCLUSIONS:** Compared with respondents with EM, a larger proportion of those with CM were at "high risk" for sleep apnea and reported poor sleep quality. This reflects an association between CM vs EM and sleep apnea and poor sleep quality; the potential relationships are discussed.



# Childhood migraine and Sleep

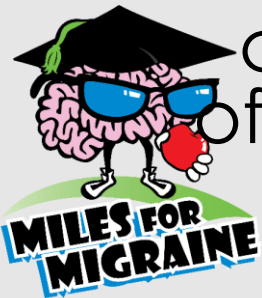
[Sleep Med.](#) 2019 Jun 8;63:57-63. doi: 10.1016/j.sleep.2019.04.023. [Epub ahead of print]

**Clinical presentation, diagnosis and polysomnographic findings in children with migraine referred to sleep clinics.**

[Armoni Domany K<sup>1</sup>](#), [Nahman-Averbuch H<sup>2</sup>](#), [King CD<sup>2</sup>](#), [Dye T<sup>3</sup>](#), [Xu Y<sup>4</sup>](#), [Hossain M<sup>4</sup>](#), [Hershey AD<sup>5</sup>](#), [Simakajornboon N<sup>6</sup>](#).

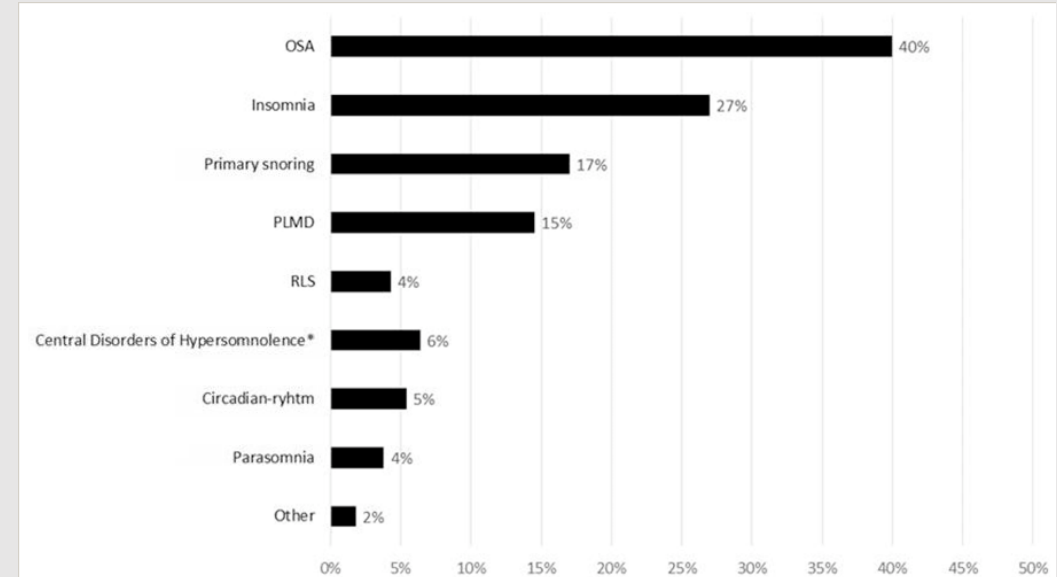
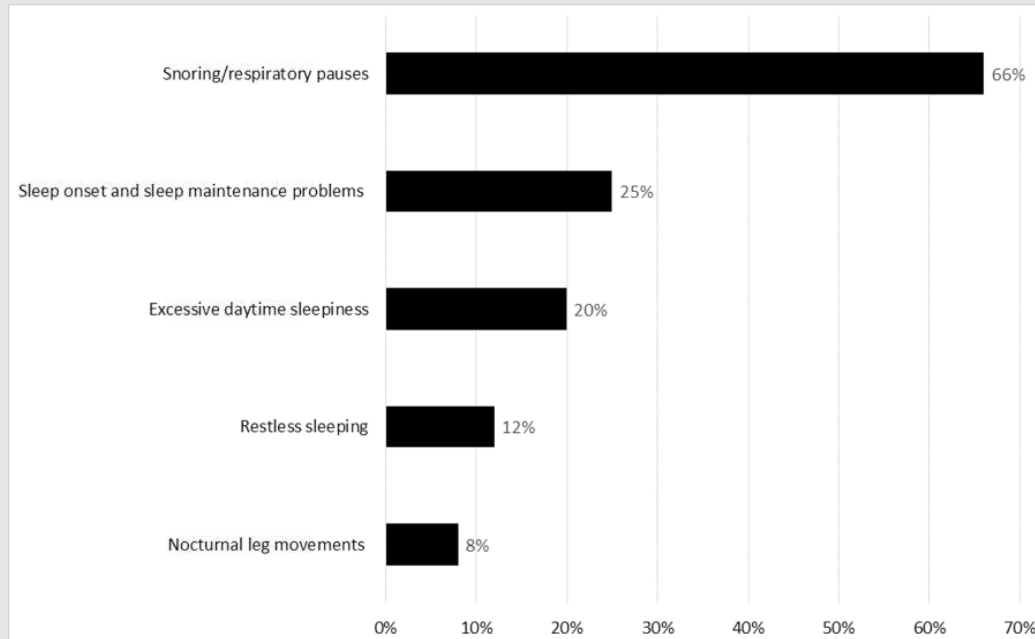
- Retrospective study of headache center patients from 2007-2017
- -Children < 18 yrs of age and diagnosed with migraines who had PSG within 1 year of diagnosis (N=185)
- SLEEP ARCHITECTURE:
  - Higher % of N2 (p <0.001)
  - Lower % of N3 (P<0.001)

controls :children 5-14 yrs of age (N=180)



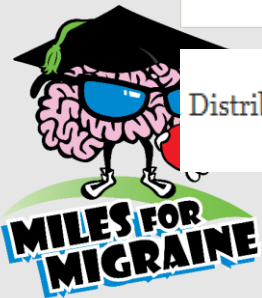
# Pediatric migraine and Sleep

Domany et al. Sleep medicine :Nov 2019,(63) 57-63



<b>NREM2%</b>	54 ± 10	46 ± 7	<0.001	<0.001
<b>NREM3%</b>	22 ± 8	30 ± 7	<0.001	<0.001

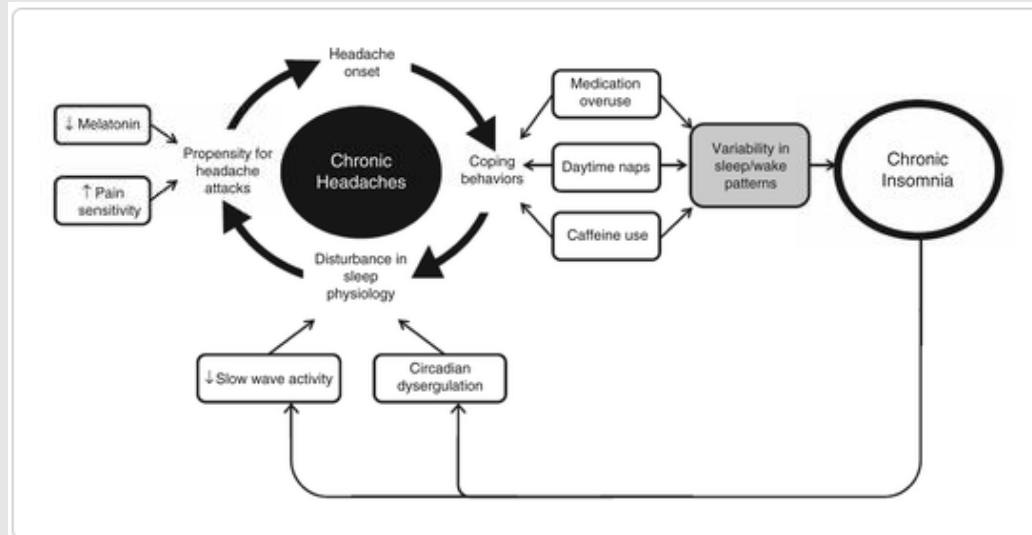
Table 2. Polysomnographic characteristics of Children with Migraine (n = 185) reported as mean with SD.



Distribution of the most common causes for referral to the sleep clinic (N = 185).

# Chronic headaches and insomnia

Jason C Ong, Margaret Park, *Cephalalgia* 32(14); 2012



- Chronic headaches:
- -3-5% general population
- -70-80% in headache clinic
- -Increased disability, impaired QOL , higher health care utilization.
- -14% episodic headaches convert to chronic headaches



# Cognitive behavioral therapy for Insomnia to reduce Chronic Migraine

Smitherman, Calhoun, Walters - Headache 58(7) 2018 ;1052-1059

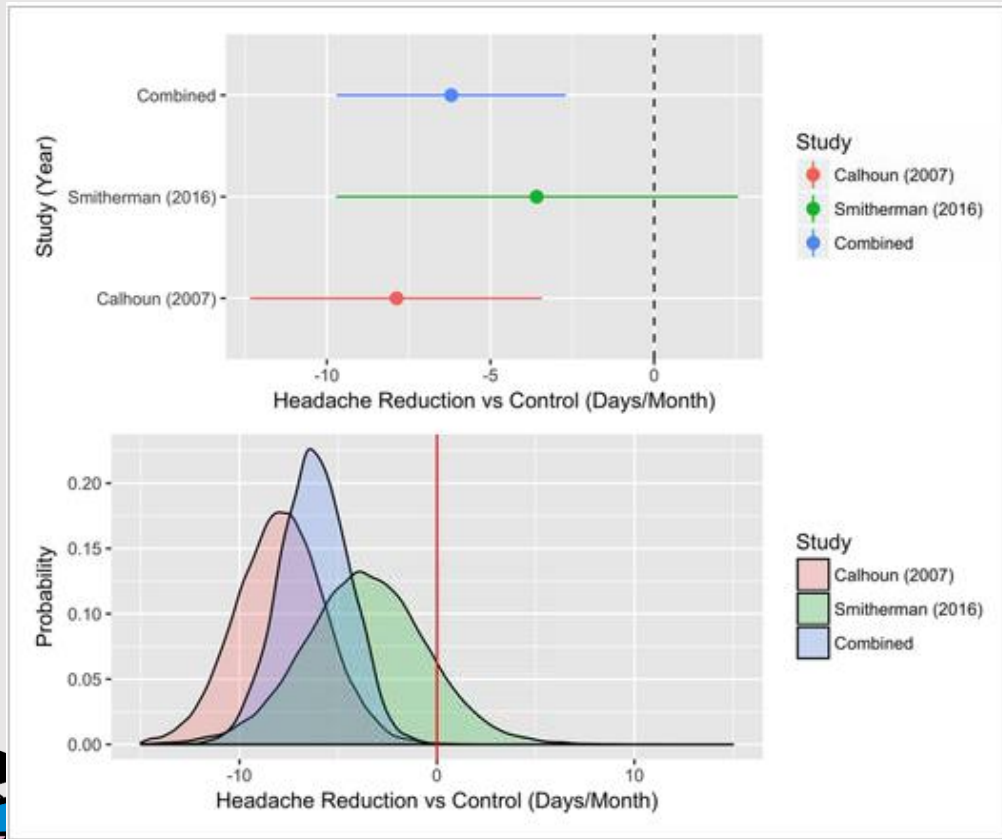
- -2 randomized trials comparing CBTi to sham control intervention
- -Calhoun: One 1.5 hr intervention
- -Smitherman: Three 30 minute sessions
- -Sham control similar
- -change in headache frequency from baseline to 6-8 weeks

Calhoun and Ford <sup>21</sup> (1 session)	Smitherman et al <sup>22</sup> (3 sessions)	Control (same for both studies)
Eliminate naps	Go to bed only when sleepy and intending to sleep	Consistent dinner time each evening
Move dinner ≥4 hours before bedtime and limit fluids within 2 hours of bedtime	Leave the bedroom if unable to sleep after 20 minutes, and return only when sleepy	Acupressure twice daily
Eliminate TV, reading, and music in bed	Use bedroom only for sleep and sexual activity	Consistent liquid intake
Schedule consistent bedtime that allows 8 hours in bed	Set an alarm and get up at same time each day	5 minutes stretching exercises upon awakening
Use visualization/imagery techniques when in bed	Sleep restriction (restrict time in bed to total sleep time plus 30 minutes)	Serving of protein at breakfast



# Cognitive behavioral therapy for Insomnia to reduce Chronic Migraine

Smitherman, Calhoun, Walters - Headache 58(7) 2018 ;1052-1059



- **Calhoun:**

- Baseline headache frequency-

- Control:24.9 days, Active Treatment: 25.9

- Follow up: Control: 25.6 days, Active Treatment: 18.6 days

- **Smitherman:**

- Baseline headache frequency-

- Control: 20.2 days, Active Treatment: 22.8

- Follow up:Control: 14.7 days, Active Treatment: 11.6



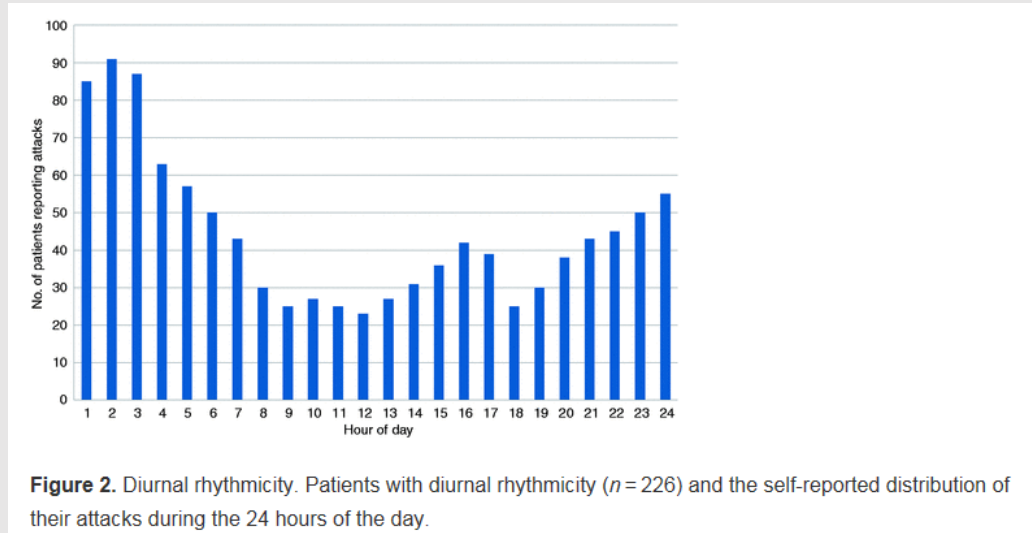
# Cluster Headache-ICHD 3

- -At least five attacks
- -Attacks characterized by severe unilateral orbital, supraorbital and/or temporal pain lasting 15-180 minutes
- -Either or both of the following
- \*At least one of the following ipsilateral to the headache
- -Conjunctival injection and/or lacrimation
- -Nasal congestion and /or rhinorrhea
- -Eyelid edema
- -Forehead and facial sweating
- -Miosis and/or ptosis
- \* a sense of restlessness or agitation
- -Attacks have a frequency between eight per day and one every other day



# Sleep and Chronobiology in CH

Cephalalgia: Barloese, Lund and Petersen: 35(11)2015



- -Strongest chronobiological trait
- -Most common time 2 AM

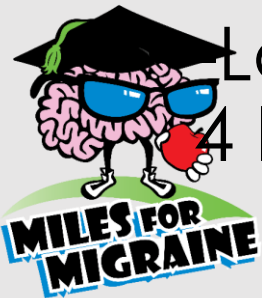




# Hypnic headache(Alarm clock headache)

- Recurrent headache attacks
- -Developing only during sleep and causing awakening
- -Occuring on > 10 days /month for more than 3 months
- Mean age of onset: 61 yrs
- Mean duration of attack:1 62 mins
- Mean frequency of attacks: 21 days per month
- Bilateral :68%, Unilateral: 32 %

Lasting > 15 mins and upto 4 hrs



# Exploding head syndrome

Cephalalgia : Brian A Sharpless; 2018 : Vol:38; Issue 3

- -Loud noises or sense of explosions in the head
- -Mostly during wake sleep transitions
- -Tachycardia, fear , muscle twitches
- -Usually no pain/headache

Sound	N	Sound	N
Dropping an object from a height	11	Bang	6
Explosion/bomb going off	6	Door slamming	4
High pitched noise	3	Someone or something hitting a wall	3
Gunshot	2	Fireworks	2
Thud	2	Breaking glass	2
Car crash	2	Door knock	1
“Ding dong”	1	Electrical explosion	1
Scream	1	Train noise	1
White noise	1	Music	1
Drums/percussion	1	Metal pans banging together	1
Things being broken apart	1	—	—

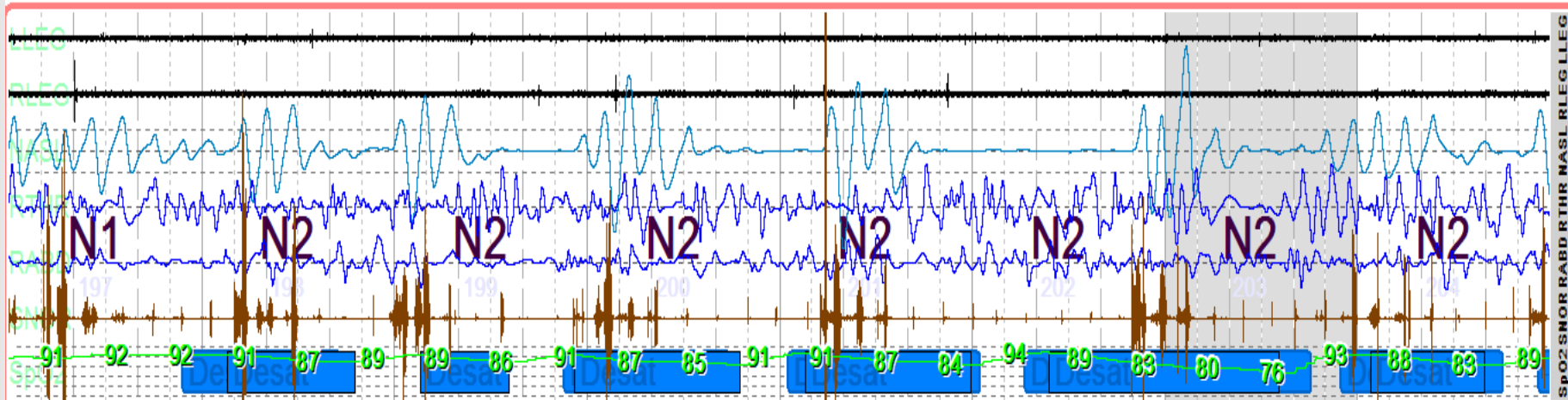
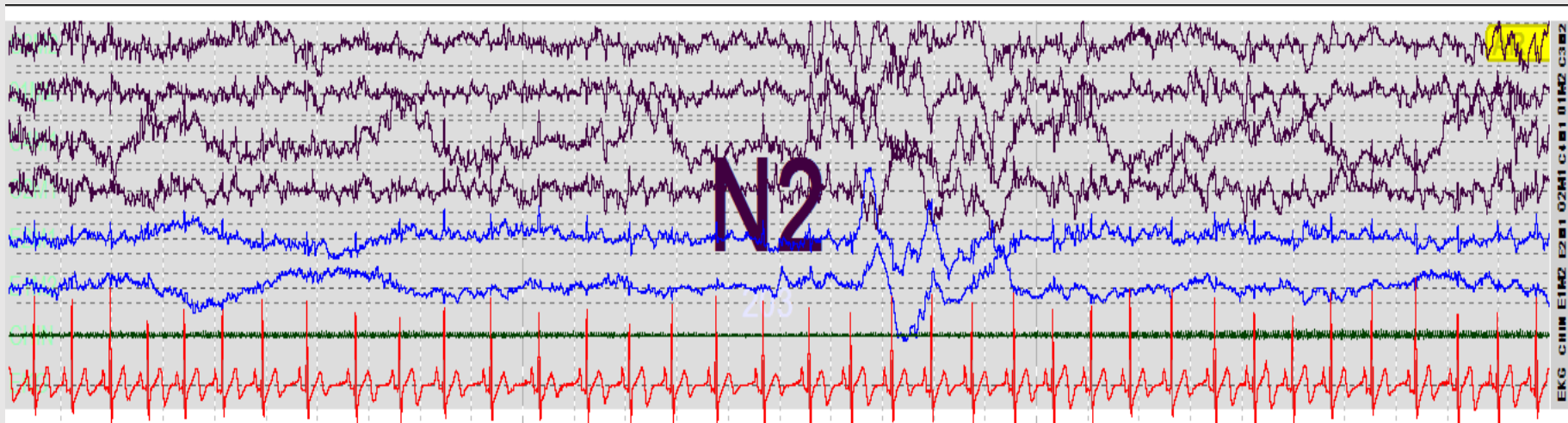


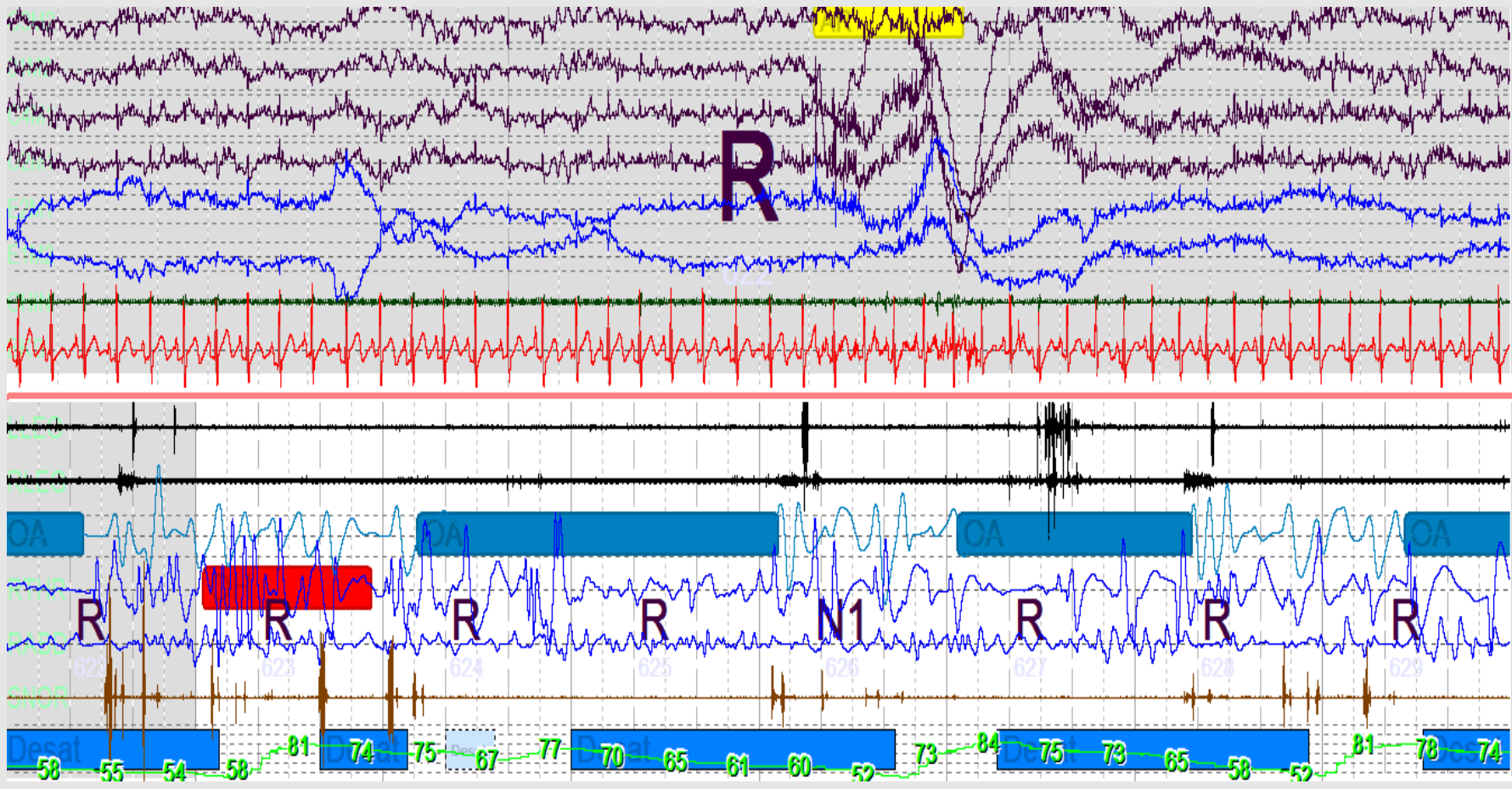
# Sleep Apnea Headaches

- A. Headache present on awakening after sleep and fulfilling criterion C
- B. Sleep apnea (apnea-hypopnea index  $\geq 5$ ) has been diagnosed<sup>a</sup>
- C. Evidence of causation demonstrated by at least two of the following:
  - 1. headache has developed in temporal relation to the onset of sleep apnea
  - 2. either or both of the following:
    - a) headache has worsened in parallel with worsening of sleep apnea
    - b) headache has significantly improved or remitted in parallel with improvement in or resolution of sleep apnea
  - 3. headache has at least one of the following three characteristics:
    - a) recurs on  $>15$  days per month
    - b) all of the following:
      - (i) bilateral location
      - (ii) pressing quality
      - (iii) not accompanied by nausea, photophobia or phonophobia
    - c) resolves within four hours
- D. Not better accounted for by another ICHD-3 diagnosis.



# Sleep Apnea





# Sleep and Headache

- -HH and cluster headaches awakens patients during night
- -Migraine and tension headache can start at night, but usually wakes up in the morning with headache
- -Sleep Apnea headache- morning headache due to sleep apnea



# Headache and Sleep

- -Association between headache and sleep is bidirectional
- -Headache leads to sleep disturbances
- -Sleep problems results in headaches
- -Prevalence of sleep disorders greater in headache population
- -Both share common pathogenesis
- -Screening for sleep disorders need to be part of headache evaluation
- -Sleep hygiene and basic sleep management strategies
- -Opportunity for multimodel therapeutic intervention



# Sleep Hygiene

- Regular bed time and wake up time
- Bedroom only for sleep
- Avoid electronics at least an hour before bed
- If no sleep after 20 mins get out of bedroom
- Avoid naps
- No clock watching, keep a note
- No caffeine after 2-3 PM, avoid nicotine
- No alcohol within 6 hrs of sleep
- Rituals that help you relax –warm bath, reading
- Avoid exercise close to bedtime

