

Sleep Disorders

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Sleep Physiology

- Sleep goes through "cycles" during the night
 - NREM → REM → NREM → REM
 - Repeated during the night
 - One cycle from NREM to REM about 90 minutes.
 - Length of REM increases during cycles
 - Length of N3 decreases during cycles
- 



Sleep Physiology

- There are several stages of sleep and each has unique EEG findings.
- Non-REM sleep (N1, N2, N3)
- REM sleep

What Is Sleep Latency?

Sleep latency, or sleep onset latency, is the time it takes a person to fall asleep after turning the lights out. REM latency measures how long after it takes a person to reach their first REM sleep stage after turning the lights out.

Awake with
mental activity



Beta
14-30 Hz

Awake and
resting



Alpha
8-13 Hz

Sleeping



Theta
4-7 Hz

Deep sleep



Delta
< 3.5 Hz



Sleep EEG



➤ Awake, eyes open

- ✓ Beta waves
- ✓ Low amplitude, high frequency

➤ Awake, eyes closed

- ✓ Alpha waves
- ✓ Increased amplitude, more synchronous





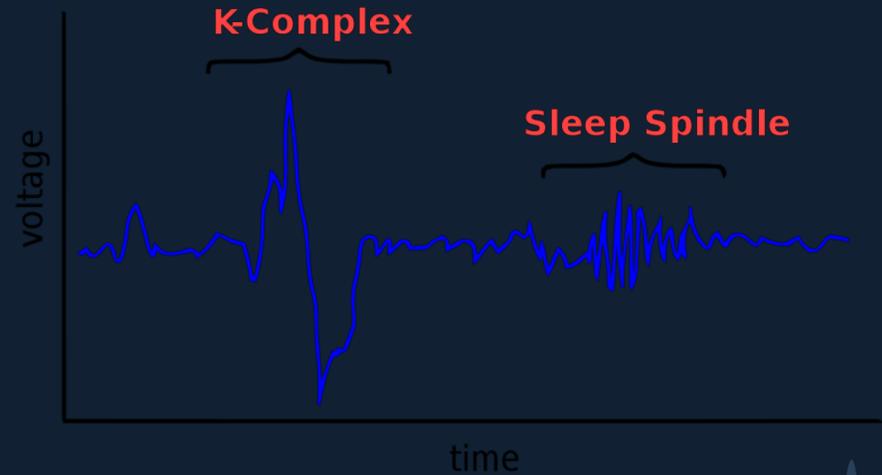
Non-REM Sleep

N1

- Lightest sleep (easy to wake)
- Theta waves
- Smallest percentage (5-10%) sleep time

N2

- Theta waves
- K complexes: Sudden \uparrow amplitude
- Sleep spindles: Sudden \uparrow frequency
- Largest percentage (50%) sleep time

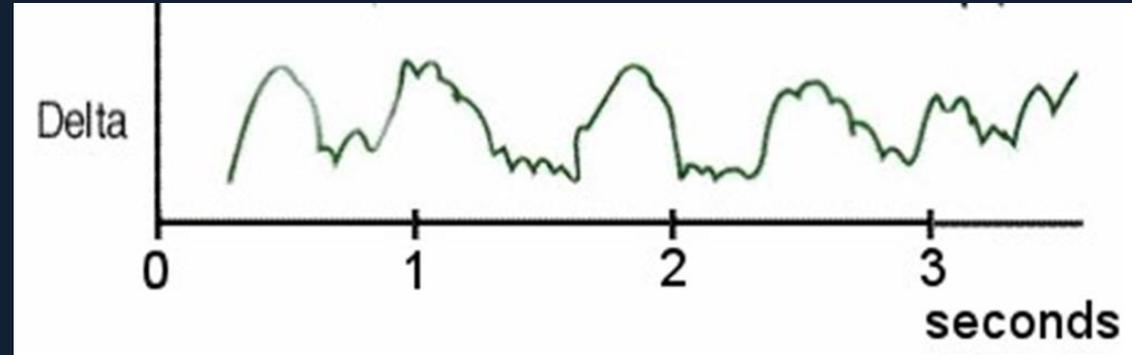




Non-REM Sleep

N3

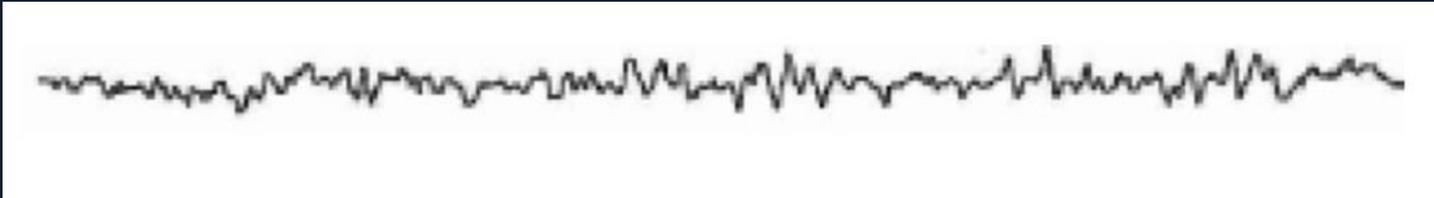
- Last phase before REM sleep
- “Slow waves”
- Delta waves
- Lowest frequency, highest amplitude
- Deepest sleep (hardest to wake sleeper)
- Sleep walking, sleep talking, bed wetting



REM Sleep

➤ Rapid Eye Movement

- PPRF (Paramedian Pontine Reticular Formation).
- Low voltage pattern.
- Often appears “ saw-toothed ”



- Loss of motor tone (muscle paralysis)
Dreaming , nightmares.



Types of sleep disorders:

1. Primary sleep disorder

- Dyssomnia : its excessive or insufficient timing of sleep .
- Parasomnia : abnormal sleep related habits

2. Secondary sleep disorder

Disturbances in sleep can potentiate and/or exacerbate psychological distress and other mental illnesses





When taking a sleep history, ask about:

- Activities prior to bedtime that may interfere with restful sleep
- Bed partner history
- Consequence on waking function; quality of life
- Drug regimen, medications Exacerbating or relieving factors
- Frequency and duration
- Genetic factors or family history
- Habits (alcohol consumption, use of caffeine, nicotine, illicit substances, and hypnotics)



Dyssomnia



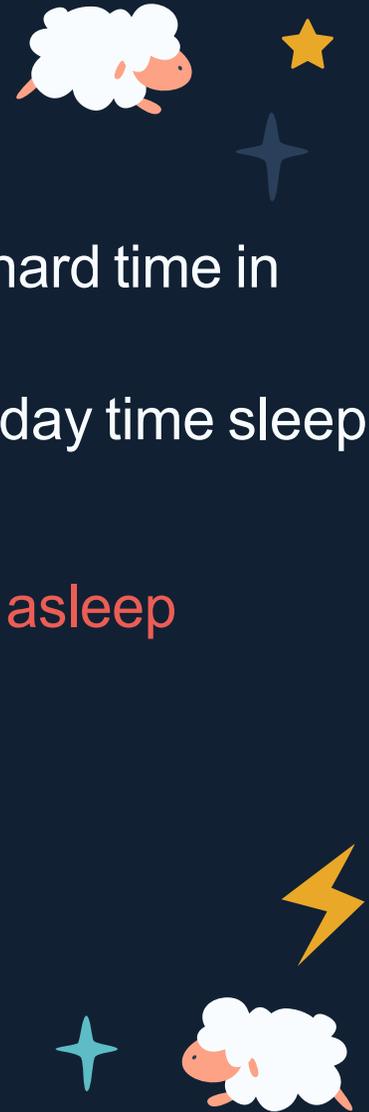
- *Dyssomnia* : its defined as having hard time in falling a sleep or
- remaining a sleep , or excessive day time sleep .

There are 2 types of dyssomnia:

1. insomnia: difficult to fall or remain asleep

2. hypersomnolence:

- Breathing related disorder.
- Narcolepsy.
- Circadian rhythm sleep disorder.





Insomnia Disorder



- Its a group of symptoms that interfere with duration and/or quality of sleep despite *adequate opportunity* for sleep.

✦ • *Types of insomnia:*

1. *Acute insomnia:* sleep difficulty which is less than 3 months in duration and associated with stress and change in sleep schedule ,usually it resolves spontaneously .



2. *Chronic insomnia :* sleep difficulty which last from 3 month up to a year and associated with reduced quality of life and increase risk for psychological disorders .





Insomnia can be :

- ✓ Initial insomnia
- ✓ Middle sleep insomnia(sleep maintenance insomnia)
- ✓ Late sleep insomnia (early morning awaking)
- ✓ Non restorative sleep
(waking up feeling fatigued ,unrefreshed)



DIAGNOSTIC CRITERIA

- 1) Difficulty initiating/maintaining sleep or early-morning awakening with inability to return to sleep.
- 2) At least 3 days a week for at least 3 months.
- 3) Causing significant distress or impairment in normal function of the patient .
- 4) Happen even if there is adequate opportunity to sleep.
- 5) Does not occur exclusively during the course of another sleep-wake disorder.
- 6) Its not resulting as physiological effects of a substance or medication.
- 7) Having a Coexisting mental and medical disorders do not adequately explain the insomnia.





Treatment of insomnia:



Non pharmacological	pharmacological
Sleep education	Hydroxyzine (atarax)
Sleep hygiene	Mirtazapine (remeron)
Stimulus control	Agomelatine (valdoxan)
Sleep restriction	Zopiclone
	Zolpidem CR (stilnox CR)
	Benzodiazepine (BZD)

NOTE :

BNZ used only for a short period of time and of not more than 2 weeks to prevent the patient dependence on the medications.





HYPERMOMNOLENCE DISORDER



- Defined as increased quantity of sleep and reduced quality of wakefulness (sleep drunkenness) and it causes decreased function and alertness after waking up.
- The patient usually complains of nonrestorative sleep, reduced or inability to recall the routine daily preformed activities plus having a hard time to wake up in the morning .
- ❖ So hypersomnolence is characterized by :
 - ✓ Increased daytime sleepiness.
 - ✓ Prolonged nocturnal sleep episodes.
 - ✓ Increased irresistible urge to sleep.



Causes:

- Obstructive sleep apnea (the most common cause).
- Side effect from drugs: BNZ
- Bad sleep routine : staying awake online or playing games.
- Chronic physical illness.
- Insufficient night time rest.
- Narcolepsy.
- Circadian rhythm disorder.

kleine-levin syndrome (recurrent episodes of excessive sleep with cognitive and behavioral changes. The patient may sleep up to 20h per episode).

Psychiatric disorder (it's a form of major depressive disorder characterizes by persistent feeling of sadness and hopelessness).



Diagnostic criteria:



1. Excessive sleepiness other than the normal daily 7 h :
 - Recurrent episodes of sleep during the same day.
 - Prolonged non restorative sleep more than 9h .
 - Difficulty in being fully awake after waking up .
2. It should happen more than 3 times a week for more than 3 months.
3. Causing significant impairment in the patient functioning abilities.
4. Does not occur during the course of another sleep-wake disorder.
5. Not being a side effect of some substance or medication .
6. Coexisting mental and medical disorders do not adequately explain the hypersomnolence.



Obstructive sleep apnea

★ Chronic breathing disorder characterized by repetitive collapse of the upper airways during sleep.

❖ Features:

- Excessive day time sleepiness
- Apneic episodes.
- Cessation of breathing.
- Hypopneic episodes of decreased airflow.
- Sleep fragmentation.
- frequent awaking due to gasping or choking.
- Snoring (due to narrowed airways).
- Non-refreshing sleep or waking up with fatigue.
- Morning headache.
- Hypertension.





Risk factors

- obesity
- narrowing of the airways
- increased neck circumference.

Prevalence

- most common in middle aged women and men.
- Male to female ration ranges from 2:1 to 4:1.
- Children 1-2%
- Middle aged adults 2-15%
- Older adults >20%

Traetment

- Positive airway pressure : continuous (CPAP)
- behavioral strategies such as weight loss & exercise.
- Surgery



Narcolepsy

➤ Its excessive sleepiness in daytime and in inappropriate places or time.

❖ Causes:

- ✓ HLA-DR2 is the gene which is mainly responsible for this condition.
- ✓ Decreased hypocretin1 and hypocretin2 in patient with narcolepsy.(hypocretin is a hypothalamic neuropeptide neurotransmitter which regulate the sleep- wake cycle)



Clinical Symptoms :



- Cataplexy (sudden brief episode of paralysis due to loss of muscle tone).
- Excessive sleepiness.
- Hallucinations.
 - Hypnagogic hallucination ➡ Falling asleep.
 - Hypnopompic hallucination ➡ Waking up (less common) .
- Sleep paralysis.



Diagnostic criteria:

➤ Recurrent episodes of need to sleep, lapsing into sleep, or napping during the day, occurring at least 3 times per week for at least 3 months, associated with at least one of the following:

- ✓ Cataplexy (brief episodes of sudden bilateral loss of muscle tone, most often associated with intense emotion).
- ✓ Hypocretin deficiency in the CSF .
- ✓ Reduced REM sleep latency on polysomnography.
- ✓ Hallucinations and/or sleep paralysis at the beginning or end of sleep episodes are common (but not necessary for diagnosis in the DSM-5).



Treatment

- Scheduled daytime naps.
- Avoidance of shift work.
- For excessive daytime sleepiness: amphetamines/- non-amphetamines such as methylphenidate, modafinil and sodium oxybate.
- For cataplexy: sodium oxybate (drug of choice).
- SSRI (eg. fluoxetine) have also been used to help reduce cataplexy. These drugs are indicated for usage in treatment as they have a tendency to help in suppressing REM.



Circadian rhythm sleep wake disorders

Recurrent patterns of sleep disruption, due to an alteration of the circadian system or misalignment between the endogenous circadian rhythm and sleep wake schedule required by an individual's environment or schedule.





Symptoms:

- excessive daytime sleepiness, insomnia.
- Headache
- Difficulty concentrating reaction
- Times and frequent performance errors
- Irritability
- Waking up at inappropriate times

Causes:

- Time zone changes.
- Work shifts(ex : medical field workers) .
- Irregular sleep-wake pattern.



TABLE 15-1. Circadian Rhythm Sleep Wake Disorders

DISORDERS	DEFINITIONS	RISK FACTORS	TREATMENTS
Delayed sleep phase disorder (DPSD)	Chronic or recurrent delay in sleep onset and awakening times with preserved quality and duration of sleep	<ul style="list-style-type: none"> ■ Puberty (secondary to temporal changes in melatonin secretion) ■ Caffeine and nicotine use ■ Irregular sleep schedules 	<ul style="list-style-type: none"> ■ Timed bright light phototherapy during early morning ■ Administration of melatonin in the evening ■ Chronotherapy (delaying bedtime by a few hours each night)
Advanced sleep phase disorder	Normal duration and quality of sleep with sleep onset and awakening times earlier than desired	Older age	<ul style="list-style-type: none"> ■ Timed bright light phototherapy prior to bedtime ■ Early morning melatonin not recommended (may cause daytime sedation)
Shift-work disorder (SWD)	Sleep deprivation and misalignment of the circadian rhythm secondary to nontraditional work hours	<ul style="list-style-type: none"> ■ Night shift work ■ Rotating shifts ■ Shifts >16 hours ■ <i>Being a medical/psychiatry resident</i> 	<ul style="list-style-type: none"> ■ Avoid risk factors ■ Bright light phototherapy to facilitate rapid adaptation to night shift ■ Modafinil may be helpful for patients with severe SWD
Jet lag disorder	Sleep disturbances (insomnia, hypersomnia) associated with travel across multiple time zones	Recent sleep deprivation	<ul style="list-style-type: none"> ■ Disorder is usually self-limiting. ■ Sleep disturbances generally resolve 2–3 days after travel.

Treatment



- Non-pharmacological:

- (Sleep education) educating the patient about the sleep stages and making them develop good sleep habits and regulating their naps

- Pharmacological:

- Administration of melatonin in the evening
- Hypnotic: short acting benzodiazepine



Parasomnia



- It's a sleep disorder that cause abnormal behaviors while being a sleep or in the sleep- wake transition .
- This condition includes walking ,talking and doing other activities while falling a sleep and this lead to decrease the restful sleep and its dangerous because the patient don't know what is he doing or where he is.
- It can happen as an isolated episodes during childhood or in the adolescence.





Types of parasomnia ★



★ **Sleep –walking** - (it can happen in night sleep or even day time nap.)

Sleep-talking - (it involves different forms of talking from mumbling up to full conversations).

Sleep-related groaning - (usually happen when you exhale slowly and deeply and can be mistaken with snoring).

Night mares. - (troubling ,intense dreams that may cause danger and anxiety or fear happening during the REM phase of sleep).

Night terrors -(the patient waking up suddenly in a terrified state which can last from 30sec to 5 min and can be associated with sweating or crying usually happening in the NON-REM phase of sleep.)

★ **Bedwetting.** - (mainly with children).

★ **REM sleep related behaviors** - (include jumping kicking and patient can wake up easily and remember the dream.)





Parasomnia		
Characteristic	Sleep terror	Nightmare
Time of night	First third	Last third
Movements	Common	Rare
Severity	Severe	Mild
Vocalisation	Common	Rare
Autonomic discharge	Severe and intense	Mild
Amnesia	Present	Absent
State on waking	Disoriented/confused	Oriented
Leave the bed	Common	Very rare





Causes:

- Stress .
- Anxiety.
- Depression.
- Substance use.
- Side effect of some medication.
- Irregular sleep (night shifts).
- Other sleep disorders(insomnia).
- Sleep deprivation.

Symptoms:

- wake up confused or disoriented
- wake up wondering where you are
- not remember doing certain activities
- find unfamiliar cuts on your body
- have difficulty sleeping throughout the night





Thanks!

