



# Circadian Rhythm Sleep Disorders



# General criteria for circadian rhythm sleep disorders



- A. There is a persistent or recurrent pattern of sleep disturbance due primarily to one of the following:
  - i. Alterations of the circadian time keeping system
  - ii. Misalignment between the endogenous circadian rhythm and exogenous factors that affect the timing or duration of sleep
- B. D. circadian-related sleep disturbance leads to insomnia, EDS, or both
- C. The sleep disturbance is associated with impairment of social, occupational, or other areas of functioning



# Circadian rhythm sleep disorder, Delayed Sleep Phase Type



- A. There is delay in the phase of the major sleep period in relation to the desire sleep time and wakeup time, as evidenced by a chronic or recurrent complaint of inability to fall sleep at a desired conventional clock time together with the inability to awaken and desired and socially acceptable time.
- B. When allowed to choose their preferred schedule, patients will exhibit normal sleep quality and duration for age and maintain a delayed, but stable, phase of entrainment to the 24 hour sleep wake pattern
- C. Sleep log or actigraphy monitoring poorly 7 days demonstrates a stable delay in the tightening of the habitual sleep period

*Note: A delay in the timing of other or circadian rhythms such as the nadir of core body temperature rhythm or DLMO may be useful*



# Circadian rhythm sleep disorder, Delayed Sleep Phase Type



## *KEY POINTS*

- Typical sleep onset time is between 1 AM and 6 AM, and wake time occur in the late morning to early afternoon
- The Horne-Ostberg questionnaire is a useful tool to assess the chronotype of ‘morningness’ or ‘eveningness’
- Most often become night shift workers
- Measures of the circadian timing generally show the expected phase delay in the timing of the nadir of the temperature rhythm and dim light melatonin onset
- Differential diagnosis includes insomnia
- Treatment (recommended):
  - Phase shift
  - bright/blue light



# Circadian rhythm sleep disorder, Advanced Sleep Phase Type



- A. There is advance in the phase of the major sleep period in relation to the desire sleep time and wakeup time, as evidenced by a chronic or recurrent complaint of inability to fall sleep at a desired conventional clock time together with the inability to awaken and desired and socially acceptable time.
- B. When allowed to choose their preferred schedule, patients will exhibit normal sleep quality and duration for age and maintain a delayed, but stable, phase of entrainment to the 24 hour sleep wake pattern
- C. Sleep log or actigraphy monitoring poorly 7 days demonstrates a stable delay in the tightening of the habitual sleep period

*Note: A delay in the timing of other or circadian rhythms such as the nadir of core body temperature rhythm or DLMO may be useful*



# Circadian rhythm sleep disorder, Advanced Sleep Phase Type



## Key Points

- Typical sleep onset time is between 6 to 9 PM, and wake time occur in the early morning between 2 to 5 AM
- Very common in the elderly is actually D2 decreased retinopic light input
- The Horne-Ostberg questionnaire is a useful tool to assess the chronotype of 'morningness' or 'eveningness'
- Measures of the circadian timing generally show the expected phase advance in the timing of the nadir of the temperature rhythm and dim light melatonin onset
- Differential diagnosis includes depression and hypersomnia
- Tx:
  - Phase shift
  - bright/blue light



# Circadian rhythm sleep disorder, Irregular Sleep-Wake Type



- A. There is a chronic complaint of insomnia, excessive sleepiness, or both
- B. Sleep loss or actigraphy monitoring including sleep diaries for at least 7 days demonstrate multiple irregular sleep bouts (at least 3) during a 24-hour period
- C. Not better explained by another sleep disorder, medical, or neurological disorder



# Circadian rhythm sleep disorder, Irregular Sleep-Wake Type



## *Key points*

Characterized by a lack of a clearly defined the circadian rhythm of sleep and wake

Differential diagnosis includes poor sleep hygiene and insomnia

sleep logs show irregular sleep onset or wake times, although there may be fairly consistent broken sleep b/w 2-6 AM and a daily period of agitation & wandering espec in the evening (known as "sundowning" which may indicate cortical dysfnx)

## Management

Sleep hygiene (minimize time in bed to < 7-8 hours, ↑ environmental cues such as light and social interactions, instituting regular meal times and sleep-wake times

both morning and evening bright light (3000 lux for 2 hours) has been shown in institutionalized pts to improve nocturnal sleep and reduce agitation in some demented pts

Melatonin 2.5-10 mg at desired sleep time has shown marked improvement in pts (espec pediatric pts)





# Circadian rhythm sleep disorder, Free Running Type



- A. There is a complaint of insomnia or excessive sleepiness related to the abnormal synchronization between the 24 hour light dark cycle & endogenous circadian rhythm of sleep and wake propensity
- B. Sleep loss or actigraphy monitoring including sleep diaries for at least 7 days demonstrates a pattern of sleep and wake times that typically Delays each day with a period longer than 24 hours

Note: monitoring sleep logs or actigraphy for more than 7 days is preferred in order to clearly established the daily drift

Typically associated with blind individuals



# Circadian rhythm sleep disorder, Shiftwork type



- A. There is a complaint of insomnia or EDS that is temporally associated with a recurring work schedule that overlaps the usual time for sleep
- B. Symptoms or associated with the shift work schedule over the course of at least one month
- C. Sleep log or actigraphy monitoring for at least 7 days demonstrates disturbed circadian and sleep time misalignment



# Circadian rhythm sleep disorder, Shiftwork type



## *Key Points*

Differential diagnosis includes OSA, narcolepsy, insufficient sleep, delayed sleep phase disorder, and insomnia

## Treatment:

adequate work environment

Provigil, Nuvigil

caffeine

naps



# Circadian rhythm sleep disorder, Shiftwork type



## *Key Points*

### Shift Maladaptive Syndrome

-Characterized by:

- 1) Chronic sleep disturbance (insomnia) and waking fatigue
- 2) GI sx's (dyspepsia, diarrhea, etc)
- 3) ETOH or drug abuse
- 4) Higher accident rates
- 5) Psychologic changes (depression/malaise, personality change)
- 6) Difficult interpersonal relations

### Factors that are Likely to Cause Shift Work Coping Problems:

Over age 40-50

Heavy domestic work load

Hx of sleep d/o

EtOH or drug abuse

Epilepsy

Heart dz

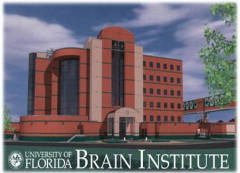
Second job ("moonlighting")

Morning-type person ("larks")

Psychiatric illness

Hx of GI complaints

Diabetes



# Circadian rhythm sleep disorder, Shiftwork type



## *Key Points*

Factors associated with work systems and work likely to cause shift work problems:

More than 5 third shifts in a row w/o off-time days

More than 4 1-hour night shifts in a row

First shift starting at times prior to 0700

Rotating hours that change once per week

Less than 48 hrs off-time after a run of third shift work

XS regular overtime

Backward rotating hours (first to third to second shift)

12-hour shifts including critical morning tasks

12-hour shifts involving heavy physical work

XS weekend work

Long commuting times

Split shifts with inappropriate break period lengths

Shifts lacking appropriate shift breaks

12-hr shifts with exposure to harmful agents

Complicated schedules making it difficult to plan ahead



# Circadian rhythm sleep disorder, Jet Lag Type



- A. There is a complaint of insomnia or EDS associated with transmeridian jet travel across at least 2 time zones
- B. There is associated impairment of daytime function, malaise, or somatic symptoms such as GI disturbances within 1-2 days after travel



# Circadian rhythm sleep disorder, Jet Lag Type



## *Key Points*

The severity of the symptoms is dependent on the number of time zones traveled and the direction of travel

Eastward travel (requiring Advancing circadian rhythms and sleep-wake hours) is usually more difficult to adjust to than westward travel

80% of business travelers c/o sleep disturbances

Besides distance/time zones traveled, factors such as high altitude, low humidity, secondary smoke, reduced barometric pressure, etc also contribute to jet lag

Sx's include: insomnia & daytime sleepiness with decreased subjective alertness

May also have somatic complaints including

dyspepsia

eye irritation

n/v

cramps

intermittent dizziness

constipation

nasal discharge

headaches

dependent edema

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# Circadian rhythm sleep disorder, Jet Lag Type



## *Key Points*

in general, it takes sleep phase is affected by 1 to 1.5 hours per time zone changes

For EASTBOUND flight, sx's may persist when crossing 3-4 time zones for 2-4 days

For 6 time zones, may persist up to 10 days (due to attempt to sleep at peak of temperature cycle)

For WESTBOUND flight across 6 time zones, attempt to sleep at 10 PM (4 AM of original time zone), sleep onset is likely to be rapid because

Process S is higher than usual and Process C (at or just after the temperature cycle nadir) is low (but sleep duration is likely to be below as Process S discharges and Process C begins to rise)

For > 7 to 9 time zone change, WESTBOUND flight result in physiologic changes al in “westbound direction”; for EASTBOUND, phase changes may be both ‘eastbound’ and ‘westbound’





# Circadian rhythm sleep disorder, Jet Lag Type



## *Key Points*

### **Management**

Approach to management depends on number of time zone changes and length of stay

For fewer than 4 time zone changes, best tx for long stays is rapid adjustment to new time zone schedule; this would include sleep deprivation on first night following an eastward flight to ensure a good nights sleep on night 2 and therefore rapidly adhering to the new time zone

May also attempt adjustment to new time zone prior to flight

Daytime napping hinders synchronization



# Circadian rhythm sleep disorder, Jet Lag Type



## *Key Points*

### Pharmacologic treatment:

- Short acting BZDs can help insomnia (but may cause amnestic effects)
- Melatonin (2-5 mg): may ameliorate sx's when taken at what would be midnight of the new time zone for one or two days before departure, and then at bedtime in the new time zone for about 3 days after arrival;  
Produces phase shift in opposite direction of bright light  
EASTBOUND flight: 10 mg in evening

Light exposure reduces the duration of sx's with timing of light critical ( $> 10,000\text{lux}$  for  $> 30$  min; can be attained by sitting 2 feet in front of 40 Watt bulb)

The period of max phase-shifting effects of bright light occur 2-3 hours before the minimum of the endogenous temperature rhythm (which is approx midpoint of the usual sleep period)

- For a trip for USA to Europe, bright light should be at 5AM EST (11 AM European time based on 6 hour time zone change) the first day, and 1-2 hours earlier for each of the next 2 – 3 days; light exposure should be minimized at midnight to 2 AM EST (2-8 PM European time)
- For trip from USA to Japan (10 hour time zone change), bright exposure should occur at midnight to 2 AM EST (2-4 PM Japan time) the first day with subsequent exposure 1-2 hours later each day for about 5 days; light should be minimized b/w 4-6AM EST (6-8 PM Japan time) initially