NeuroNights
Sleep is Prevention
How to Sleep Better

• Common Sleep Disorders
• Sleep Hygiene
• Improving Sleep in Brain Injury
• Introduction to Cognitive Behavioral Therapy
International Classification of Sleep Disorders – 3

Breathing
Circadian
Movement
Parasomnias
Hypersomnia
Insomnia
Sleep Disorders in Traumatic Brain Injury

- Higher prevalence
- Poor sleep maintenance and sleep efficiency (50%)
- Delayed sleep onset (36%)

- Sleep Apnea (medullary respiratory centers)
- Circadian Rhythm Disorders (retinohypothalamic tract)
- Insomnia (hypothalamus)

Sleep Related Breathing Disorders

Sleep Apnea - disorder in which breathing is briefly and repeatedly interrupted during sleep.

Symptoms

• Snoring, gasping, choking, or interruptions in breathing
• Problems with sleep maintenance
• Unrefreshing sleep and daytime tiredness
• Morning headaches
Circadian Rhythm Disorder

- Disruption or misalignment endogenous circadian timing system
Circadian Rhythm Disorder

Sleep Diary

Actigraphy
Restless Legs Syndrome

Restless Legs Syndrome (RLS)

RLS symptoms
Symptoms include an urge to move the legs and associated unpleasant sensations, typically at night. Moving usually provides some relief.
Restless Legs Syndrome

- U – Urge
- R – Rest (worse)
- G – Gets better (movement)
- E – Evening (worse)
Insomnia

• Difficulty initiating sleep
• Difficulty maintaining sleep
• Waking up earlier than desired
Insomnia

Short Term < 3 months

Chronic > 3 months
Sleep Hygiene

Sleep environment
• Cool (60-67°F)
• Dark
• Quiet or
• White noise
Sleep Hygiene

• Regular bedtime and rise time
Sleep Signals

CORTISOL/MELATONIN RELATIONSHIP

MELATONIN 65 PG/ML
CORTISOL 350 NMOL/L

6AM 9AM 12PM 3PM 6PM 9PM 12AM 3AM 6AM

ACCELERATING ACTIVITY DECELERATING ACTIVITY WIND DOWN PHYSICAL REPAIR PSYCHOLOGICAL REPAIR

MELATONIN ——— CORTISOL ———
Sleep Signals
Wake Signals
Screen Time/Blue Light
Screen Time/Blue Light

Figure xx - Visible spectrum and path to the SCN

- Visible spectrum (wavelength, nm)
  - 400 to 700 nm
- Blue light sweet spot: 480 nm
- Suprachiasmatic nucleus (SCN)
- Hypothalamus
- Retina
- Optic nerve
- Retinal ganglion cells signal to the SCN through the optic nerve
Screen Time/Blue Light

- Blue Light
  - Melatonin Suppression
    - 80%
    - 80%
    - 40%
    - <2%
Morning Light Exposure
Exercise

Exercise makes you ... and healthy!

Exercise improves the quality of slow-wave sleep and helps achieve efficient sleep earlier.

Sleep deeply*

*Enhances slow-wave stability, the indicator of deep sleep.

Illustration: Sara Kobayashi
Naps

THE DIFFERENCE BETWEEN

POWER NAP
10–20 MINUTES
A short nap intended to rejuvenate you

FULL SLEEP CYCLE
90 MINUTES
A full sleep cycle that moves through the 5 stages of sleep
Clock checking
Caffeine and Alcohol
Caffeine decreases sleep duration?

1. Caffeine can positively affect exercise performance.
2. However, caffeine (400 mg) before sleep lowers sleep duration, even when taken 6 hours before bedtime.

Sleep Duration

- Placebo
- Caffeine 0 h before sleep
- Caffeine 3 h before sleep
- Caffeine 6 h before sleep

Dikos et al., Caffeine affects on sleep taken 3, 5, and 7 hours before going to bed. Journal of Clinical Sleep Medicine, 2013.
ALCOHOL’S EFFECT ON SLEEP

- Alcohol decreases the time it takes to fall asleep.
- Alcohol also suppresses REM in the first part of the night.
- REM Rebound: Alcohol increases wakefulness and lengthens REM in the second part of the night.
- Alcohol increases Stage 4 (slow wave) sleep in the first part of the night.

Ref: Roehrs & Roth, 2001
Improving Sleep in TBI

May improve
• Psychotherapy (CBTi)
• Acupuncture

Less Clear
• Bright light therapy
• Exercise

Improving Sleep in TBI

• Psychotherapy (CBTi)
  • 6 studies (5 TBI, 1 Stroke)
  • 3 studies randomized control trials (RCT)
  • In-person and online programs

• Acupuncture
  • 4 RCT
  • Acupuncture vs sham

Improving Sleep in TBI

Melatonin

• Improved subjective sleep quality
• Increased sleep efficiency on actigraphy
• Decreased anxiety and fatigue
• No serious adverse events
• No effect on sleep onset latency

Cognitive Behavioral Therapy

THOUGHTS
What we think affects how we feel and act

CBT
CHANGING PERCEPTIONS

BEHAVIORS
What we do affects how we think and feel

Sleep
Cognitive Behavioral Therapy

Behavioral
• Sleep restriction
• Stimulus control

Cognitive
• Addressing maladaptive thoughts
• Cognitive Distortions
  • Fortune telling
  • Catastrophizing
  • Overgeneralization
Cognitive Behavioral Therapy

Precautions

• Poorly controlled Seizure Disorder
• Untreated Bipolar Disorder
• Occupational risks
Sleep Restriction

![Graph showing the relationship between sleep pressure and time]

- **Day Time**: Awake
- **Night Time**: Asleep
- **Day Time**: Awake

**Very High**

Sleep Pressure or "debt"

**Zero**
Stimulus Control

Strengthening association of the bed and sleep
Increasing sleep efficiency
Stimulus Control
Stimulus Control

- Using the bed only for sleep
- Going to bed only when sleepy
- Getting out of bed when unable to fall sleep
Relaxation Techniques

Progressive Muscle Relaxation
Imagery
Diaphragmatic breathing
Mindfulness Meditation
Tai chi / Yoga
Cognitive Distortions/Automatic Thoughts

- Identify
- Challenge
- Restructuring
- Exposure
Take Home

• Sleep Disorders
• Sleep Hygiene
  • More – exercise, daytime light, regular sleep schedule, cool, quiet, dark environment
  • Less – nighttime light, caffeine, alcohol, clock checking, long naps
• Cognitive Behavioral Therapy