

## **Sleep, recovery**

### **Why Sleep matters:**

- **Death - 4x increased risk in next 10 years if you sleep less than 6 hours per night**
- **Worsened body composition - It both impacts appetite regulation AND impairs glucose metabolism,**
- **Heart attack - 48% higher chance of heart attack if sleeping less than 6 hours**
- **Depression/Mood - Sleep deprivation increases risk for depression. 75% of people with depression don't get adequate sleep.**
- **Cancer - Increased risk of prostate and breast cancer with inadequate sleep**
- **Sleeping pills can be dangerous - People taking sleeping pills are 35% more likely to develop cancer**
- **Alzheimer's - Sleep deprivation increases inflammation, which is the driver of most chronic conditions, including dementia**
- **Increased risk of stroke, immune dysfunction, stress, blood pressure elevation, chronic pain, etc, etc, etc**
- **Hormones- Low T**

## 1. Travel fatigue:

1. Acute or chronic, occurs in all athletes regardless of direction of travel. Cramped space, mild hypoxia, environmental changes, reduced activity, diet and hydration changes
2. Intervention- maximize sleep during travel

## 2. Jet lag:

1. Rapid travel between time zones, Desynchronization between internal circadian clock and external time
2. Performance and mood affects, increased injury risk
3. Intervention- Maximize time to adaptation

**SuperChiasmatic nucleus- SCN- master clock as well as peripheral clocks in every cell in the body. Synced by neuronal/ hormonal signaling**

**Melatonin- and Min body temp signal sleep- Dim light 2 hrs prior to sleep.**

## **Sleep Stages**

There are two basic types of sleep: rapid eye movement (REM) sleep and non-REM sleep (which has three different stages). Each is linked to specific brain waves and neuronal activity. You cycle through all stages of non-REM

and REM sleep several times during a typical night, with increasingly longer, deeper REM periods occurring toward morning.

**Stage 1** non-REM sleep is the changeover from wakefulness to sleep. During this short period (lasting several minutes) of relatively light sleep, your heartbeat, breathing, and eye movements slow, and your muscles relax with occasional twitches. Your brain waves begin to slow from their daytime wakefulness patterns.

**Stage 2** non-REM sleep is a period of light sleep before you enter deeper sleep. Your heartbeat and breathing slow, and muscles relax even further. Your body temperature drops and eye movements stop. Brain wave activity slows but is marked by brief bursts of electrical activity. You spend more of your repeated sleep cycles in stage 2 sleep than in other sleep stages.

**Stage 3** non-REM sleep is the period of deep sleep that you need to feel refreshed in the morning. It occurs in longer periods during the first half of the night. Your heartbeat and breathing slow to their lowest levels during sleep. Your muscles are relaxed and it may be difficult to awaken you. Brain waves become even slower.

**REM sleep** first occurs about 90 minutes after falling asleep. Your eyes move rapidly from side to side behind closed eyelids. Mixed frequency brain wave activity becomes closer to that seen in wakefulness. Your breathing becomes faster and irregular, and your heart rate and blood pressure increase to near waking levels. Most of your dreaming occurs during REM sleep, although some can also occur in non-REM sleep. Your arm and leg muscles become temporarily paralyzed, which prevents you from acting out your dreams. As you age, you sleep less of your time in REM sleep. Memory consolidation most likely requires both non-REM and REM sleep.

## How does one take the information they have and make sense of it?

- Polysomnogram is gold standard
- Start by tracking (Oura/ Whoop)
  - Validation of accuracy is pending
- Sleep stages Rem/ Non rem.
- 3-5 90 min REM cycles per night
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- **Deep/ SWS vs REM-** need both Deep early in sleep cycle REM later
  - Stage 3- NREM= SWS- **physically restorative**, before REM, lower HR and RR
    - Shortly after falling asleep
    - Difficult to wake up, groggy
    - 95% of growth hormone is produced during SWS
    - Goal 15-25% ( 1-2 hrs)
    - Body will prioritize deep sleep- will increase a night following poor sleep

- ETOH will crush this
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- **REM- Mentaly restorative.** integration of experiences, learning , connecting, reworking and learning. Dreaming . temporary paralysis keep you from acting out dreams
  - Goal 25% time in REM sleep (90 min)
  - Declines with age
  - Body will prioritize SWS. Lack of REM can be a sign of chronic sleep depravation
  - Occurs later in sleep cycle- consistency is key
- Disordered sleep, night time awakenings, latency
- Chronotype (genetics\_ PER3, ADORA2, CYP1A2, CLOCK)
  - Morning person vs night person
  - Maximize productivity and sleep by planning activities to match chronotype

**What has been the biggest effect you have seen as far as what works for improved sleep?**

- First step is to track and monitor- What is the deficit? Latency, REM, SWS, night time awakenings

- Sleep hygiene
  - Screens, dark, cool,
- Matching lifestyle to chronotype (exercise, cognitive performance)
- **Social Jet lag**
- Mindfulness/Meditation
- ETOH- very powerful suppressor of REM sleep

**What does a strict sleep pattern do for people and are we taught to give up sleep for everything else?**

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**What are the sports teams doing to optimize their performance with sleep monitors and how can we learn from this?**

- Interventions

**3. Dark**

*Blackout curtains, tape over LEDs, etc*

**4. Cold**

*65 degrees is ideal temperature*

**5. Quiet**

*earplugs if needed. Sub waking noise is a problem.*

**6. Timing**

*Learning your chronotype is important*

- Planning days leading up to travel
- “If you would not sent your alarm, dont stay up”

### **Sleep in athletic performance**

- **Sleep loss negatively affects recovery**
- **1 night sleep deprivation - on wt lifting performance no difference in weight lifted. Less vigor , fatigue , mood**
  - **Good if you struggle with sleep before big event**
- **Treadmill running test - less distance covered in sleep deprived**
- **Chronic sleep 3 days 3 hrs of sleep- wt lifting. Less weight lifted in max deadlift and leg press**
- **1 night bad sleep- not a big deal. Dont use as source of stress. Avoid chronic sleep loss**
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- **East vs west coast in the evening based on NBA/ NFL/ NHL . “Circadian Disadvantage”**
  - **Teams traveling east to west playing evening games had lower win percentage . [Here](#)**

- Eastern Conference teams travelling westward had more difficulty winning, especially when games were later in the evening. Those NBA teams traveling eastward had a winning percentage of 45.4% compared with 36.2% for teams traveling westward.
- West to East travel- takes 0.5 days per time zone crossed to re-set circadian clock
- East to West- 1 day per time zone
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- Collage athletes sleep and performance- Sleep ext. Min goal of 10 hrs / night improves sprint performance
- Tracking to pay attention to sleep and performance

**“Obtain anything less than eight hours of sleep a night, and especially less than six hours a night, and the following happens: time to physical exhaustion drops by 10 to 30 percent, and aerobic output is significantly reduced.** Similar impairments are observed in limb extension force and vertical jump height, together with decreases in peak and sustained muscle strength. Add to this marked impairments in cardiovascular, metabolic, and respiratory capabilities that hamper an underslept body, including faster rates of lactic acid buildup, reductions in blood oxygen saturation, and converse increases in blood carbon dioxide, due in part to a reduction in the amount of air that the lungs can expire. Even the ability of the body to cool itself during physical exertion through sweating - a critical part of peak performance - is impaired by sleep loss”

- Importance in recovery sleep accelerates physical recovery from common inflammation, stimulates muscle repair, and helps restock



cellular energy in the form of glucose and glycogen

## **Managing jet lag in athletes- June 2021 consensus statement.**

### **Sport Med**

- **Looking at CBT(min) - core body temp min.**
- Plan ahead. Adjust training load.
- Short trip- (1-3 day) - align sleep and **meal times**, without shifting body clock.
- West- east (**eastward**)- Shift body clock forward
  - Changing light exposure times avoiding light in evening, maximize bright light in morning

CBTmin shift by 1 day per time zone crossed (advances)  
4hr time zone change takes 4 days

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- East to west (**westward**)shift clock backwards - Max light in the evening, avoid in the morning
  - 0.5 day per time zone (4 hr time change takes 2 days)
- **Shift eating and exercise schedule over 3-4 days gradually**

### **Sleep & exercise**

### **Supplements:**

1. Melatonin  
*Very safe and well tolerated. No negative feedback. 2 hrs prior to sleep with dim light*
2. CBD  
*Higher dosing, but well tolerated.*
3. Phosphatidylcholine  
*If REM is more of the problems can be helpful. Cortisol elevation*
4. GABA  
*Doc Parsley's makes a nice blend*
5. *Magnesium glycinate*
6. *5-htp - converted to serotonin in brain*

### **Interventions:**

1. Hot or Cold shower/ sauna  
*Cooling body down. Vasodilation. Polar, chili pad*
2. Meditation/Nidra Yoga  
*Mindfulness practices including box breathing*
3. PEMF  
*Earthpulse is affordable machine.*
4. Different beds

*Consider a trial and notice difference.*

*Possible Improved sex life.*

1. Ooler  
*Keeps bed cold if partner wants room warmer*
2. CBTI 1st line treatment via American Medical Association

**Problems and interventions:**

1. **Trouble falling asleep**  
*Sleep hygiene, Box breathing, blue blockers, meditation*
  
1. **Not enough Deep Sleep**  
*Earlier bed time, environmental cues. No ETOH, 3 hrs fasting before bed.*
  
1. **Not enough REM sleep**  
*Sleeping later, or phosphatidylcholine. Sleep constituency and timing*
  
1. **Not enough total sleep**
  1. -latency,

*Look at chronotype via Oura and prioritize*

1. **Can't stay asleep**

***Environment, partner, molecules, stress***