

Get Your Zzzs: Healthy Sleep Tips and Fatigue Management Strategies

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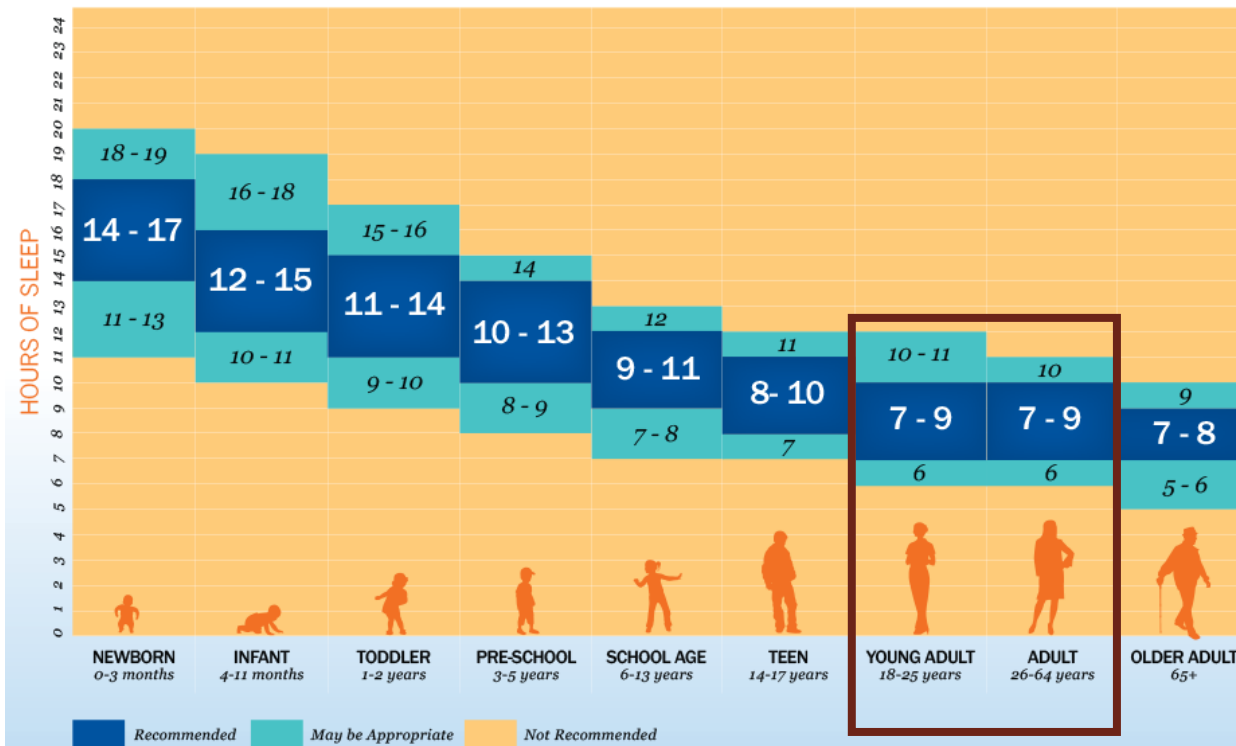
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The investigators have adhered to the policies for protection of human subjects as prescribed in AR 70-25.

How Much Sleep Do We Need?

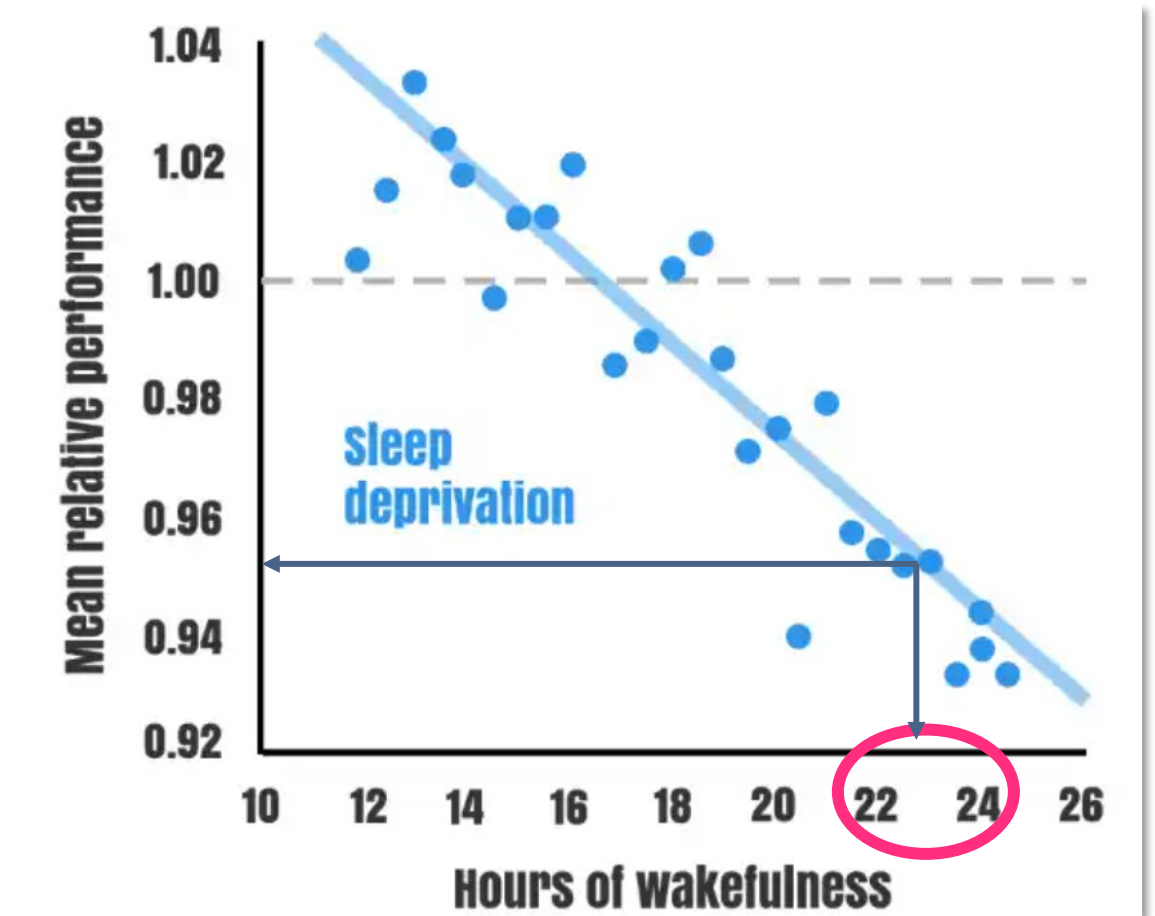
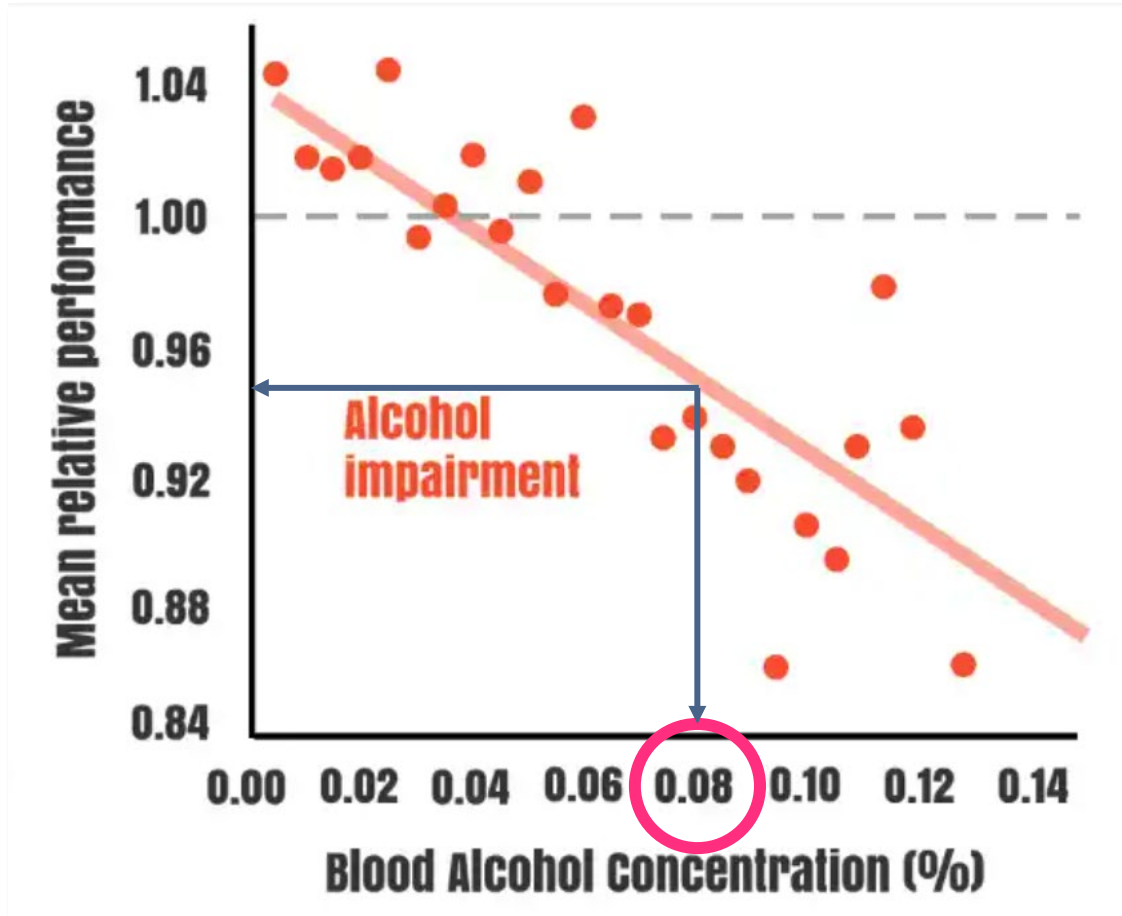
SLEEP DURATION RECOMMENDATIONS



SLEEPFOUNDATION.ORG | SLEEP.ORG

Hirshkowitz M, The National Sleep Foundation's sleep time duration recommendations: methodology and results summary, Sleep Health (2015), <http://dx.doi.org/10.1016/j.sleh.2014.12.010>

Sleep Loss = Intoxication

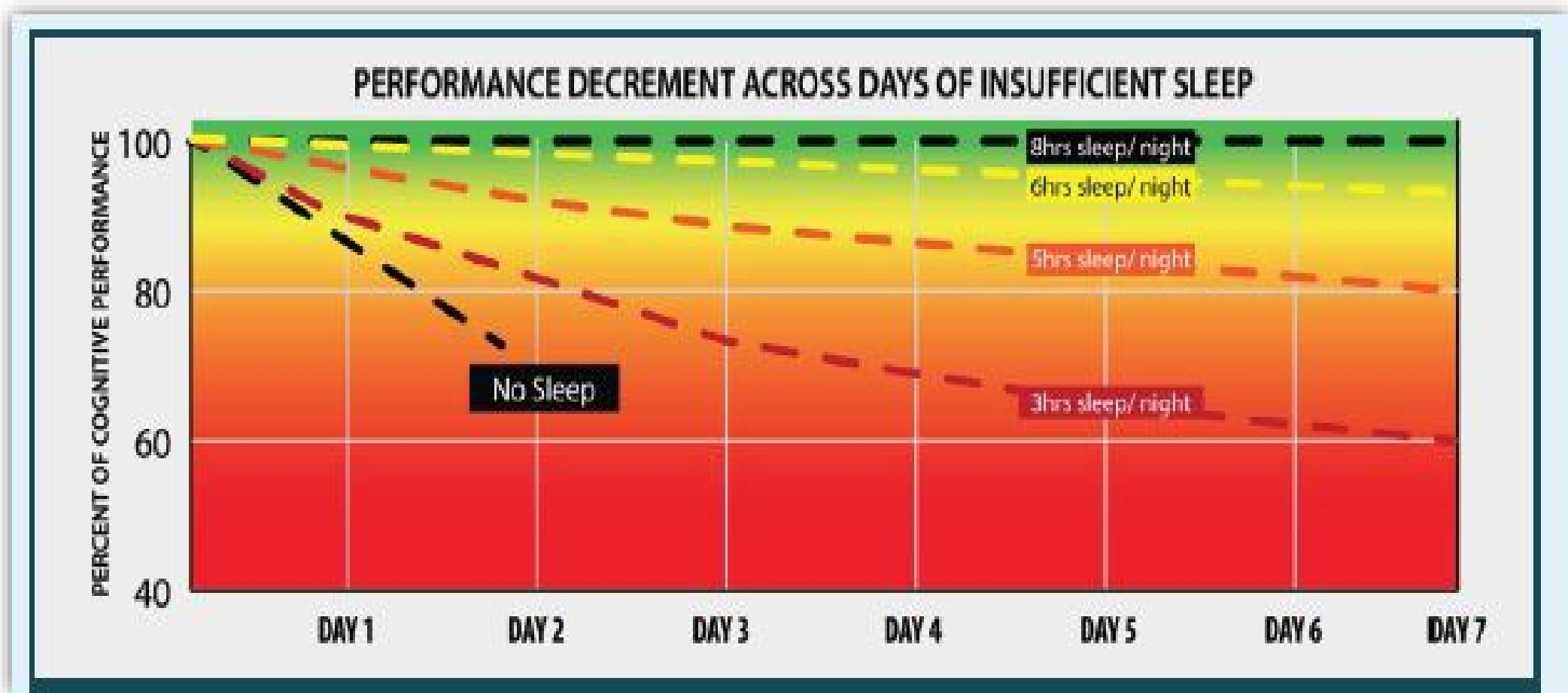


Dawson & Reid, 1997

What Does This Look Like?

- 0.02%:
 - Experience altered mood, may make poor judgments.
- 0.05%:
 - Less physical control over body (gestures, speech, focusing vision)
 - Tracking objects visually more difficult
 - Ability to respond reduced
 - Inhibitions lowered, more risky
- 0.08%:
 - Impaired coordination (balance, speech)
 - Impaired alertness/reaction time
 - Impairment in focusing on and evading obstacles
 - Impaired executive function (reasoning, judgment, self-control, concentration)
 - Impaired memory (formation, consolidation, and retrieval)

Cognition with Chronic Sleep Loss



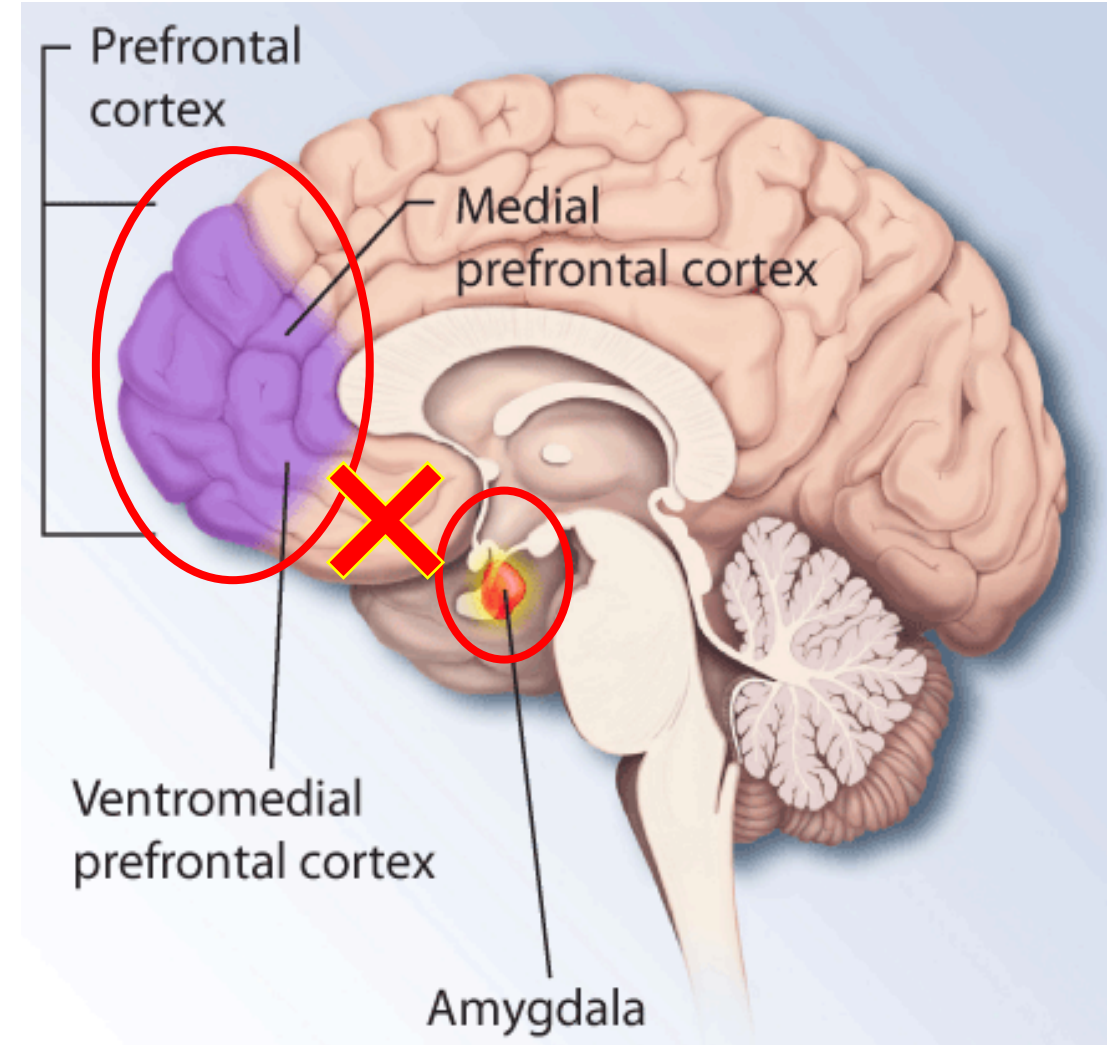
Cognitive Consequences of Fatigue

- Attention
 - Reduced ability to sustain attention
- Vigilance
 - Slower reaction time
- Decision making
 - Slower and incorrect decisions
- Learning and memory
 - Reduced ability to learn new info and store new memories
- Problem Solving/Creativity
 - Impairment in ability to make connection and generate insight



Sleep and Emotion Regulation

- With sleep, prefrontal cortex keeps your emotional brain, the amygdala, in check
- Sleep loss severs this top-down control, allowing over-active amygdala.
- Exaggerated emotional response, increases negativity
- Related – increased risk taking behavior



Sleep and Mood/Emotion Regulation

- Ranger Instructors and Soldier with more self-reported sleep issues reported:
 - Higher anxiety
 - More depressive symptoms
 - Higher alcohol consumption
 - Lower satisfaction with life
 - More risky behaviors



Hunger and Weight Gain



- Reduced insulin sensitivity
- Blood sugar changes
- Crave salty, sweet, and starchy foods
- Higher levels of ghrelin = hunger
- Lower levels of leptin = less appetite control
- 50% higher risk for obesity with <5 hrs of sleep per night

Sleep Loss Increases Disease Risks

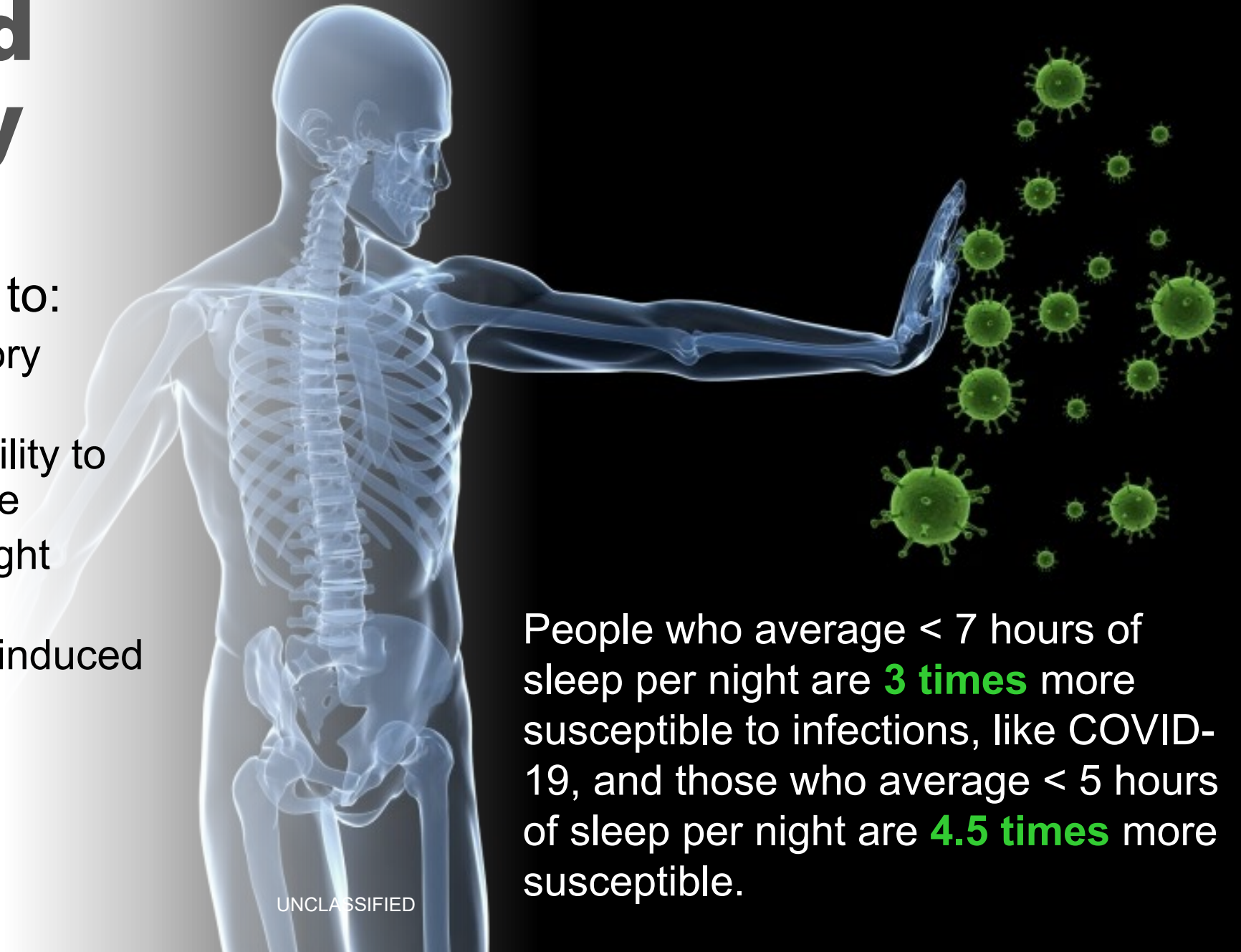
- For those with <5 hours versus >7 hours of sleep
 - 42% greater chance of obesity
 - 36% increase in elevated lipids
 - 62% greater risk of stroke
 - 69% more hypertension
 - 152% increase in heart attacks
 - 40% increased risk of diabetes

<https://www.hopkinsmedicine.org/health/healthy-sleep/health-risks/the-effects-of-sleep-deprivation>



Sleep and Immunity

- Lack of sleep linked to:
 - Impaired inflammatory function
 - Increased susceptibility to infection and disease
 - Reduced ability to fight infection
 - Decreased vaccine-induced antibody response



People who average < 7 hours of sleep per night are **3 times** more susceptible to infections, like COVID-19, and those who average < 5 hours of sleep per night are **4.5 times** more susceptible.

Fatigue Management - Napping

- Take a 20-min daytime nap
 - Decreases subjective sleepiness
 - Increases alertness
 - Increases cognitive performance
 - Improves mood
- Longer naps (60-90 min)
 - Facilitates memory consolidation
 - Enhances creativity
 - Reduces stress
 - Strengthens immune function
- 30-60 min naps
 - Can result in greater sleep inertia and grogginess
 - Use caffeine immediately afterward



Fatigue Management - Caffeine

- Caffeine can temporarily boost energy and performance
 - Adenosine binding to receptors results in sleepiness
 - Caffeine acts by blocking adenosine receptor
- Use caffeine strategically to increase performance.
 - Do not need caffeine when you are already rested (e.g., in morning after good sleep, after nap)
 - Stop using caffeine at least 6 hours before bedtime to prevent sleep disruption
 - 2B-Alert can predict timing and amount of caffeine needed for optimal performance





Fatigue Management – Sleep Banking

- When leaders anticipate periods of insufficient sleep, promoting sleep banking can mitigate performance deficits
- Increase hours of sleep per night (> 9hrs) in anticipation of restricted sleep or continuous operations
 - Up to two weeks in advance
- Physical and cognitive performance will decline slower and recover faster

Other Fatigue Management Tips



- Take frequent breaks throughout the workday
- Hydrate
- Exercise
- Get plenty of light, preferably natural sunlight

Habits for Healthy Sleep

THE DOs



Keep a regular sleep schedule. Go to bed and wake up at the same time even on off-duty days.

7+

Schedule enough time to get 7 or more hours of sleep a night.



Establish a routine. Start an hour before bed to calm the body and brain.



Only use your bed for sleep and not work or entertainment.



Exercise regularly during the day, but only light exercise closer to bedtime.



Get out of bed if you cannot fall asleep to avoid connecting your bed with stress.

& DON'Ts

Use electronic devices in bed or within an hour of bedtime.



Go to bed hungry, thirsty, or too full.



Consume caffeine within 6 hours before bed or more than 400mg/day.



Drink alcohol before bed because it disrupts healthy sleep cycles.



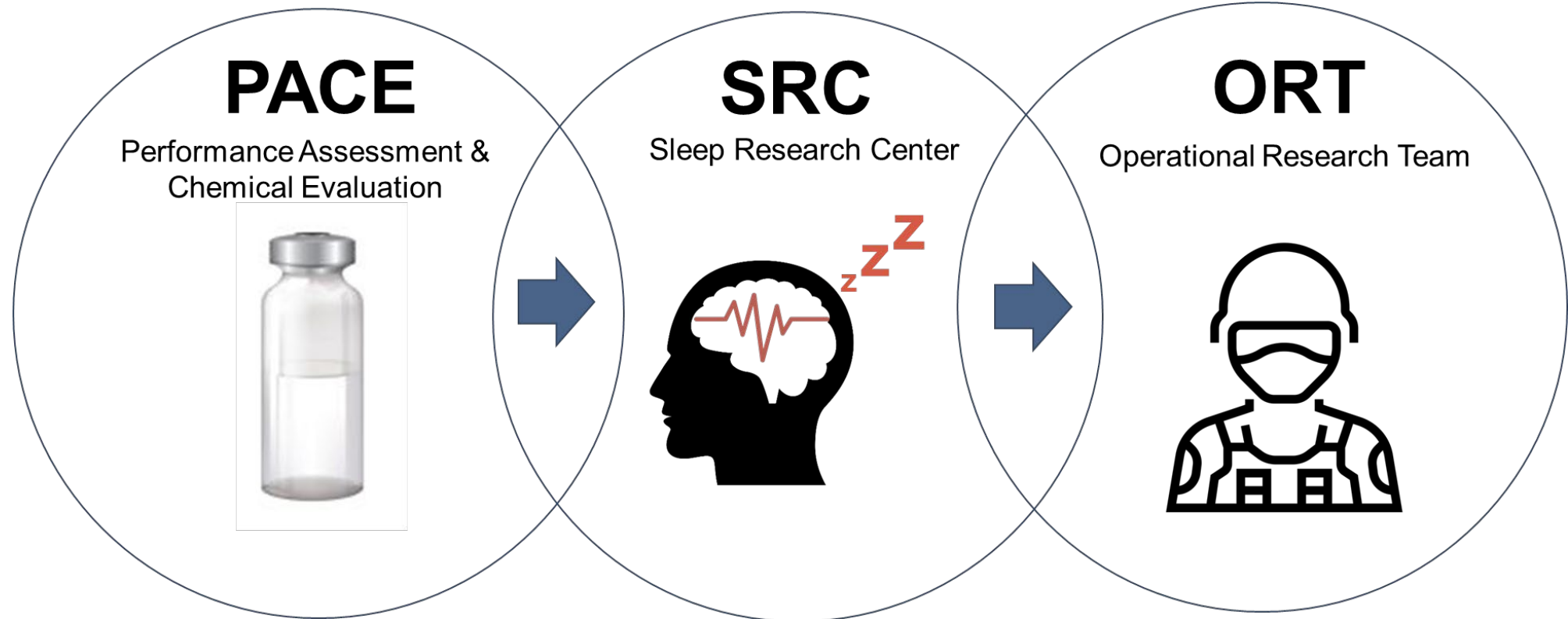
Nap too close to bedtime or too long if you have trouble sleeping at night.



Focus on not being able to sleep (e.g., repeatedly checking the time).



Behavioral Biology Branch

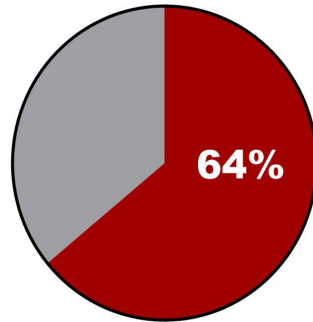


OUR MISSION

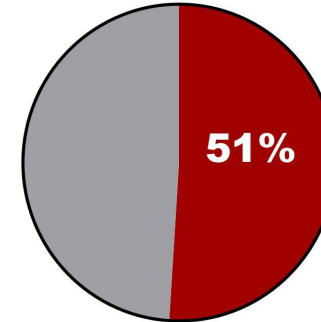
To develop interventions and technologies to mitigate the effects of fatigue, increase resilience to traumatic stress, and promote performance in Soldiers

The Threat

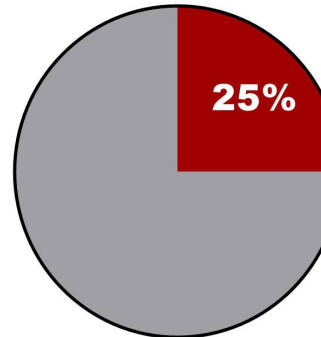
Sleep can make the difference between mission success or failure



of Soldiers are chronically sleep deprived (<7 h of sleep per night)



of accidents in deployed settings are attributable to sleepiness



of all motor vehicle accidents are attributable to sleep deprivation



Sleep loss is often unavoidable in deployed environments



SLOWED REACTION TIME
IMPAIRED RESPONSE TIME
DEPRESSION
OBESITY
IRRITABILITY
FATIGUE
WEAKENED IMMUNE SYSTEM
COGNITIVE DECLINE
IMPAIRED JUDGEMENT
SLEEP DEPRIVATION
DECREASED ACCURACY



How can fatigue be managed during continuous and sustained military operations?

Known Warfighter Fatigue Management Strategies

- Sleep Management Planning
- Sleep Banking
- Tactical Naps
- Caffeine
- Mindfulness

SLEEP UNDER STRESSFUL CONDITIONS QUICK GUIDE WRAIR

THE CHALLENGE
Being in an environment that is dangerous or tense and being uncertain of what tomorrow brings can cause worries and anxiety that can make it difficult to sleep. Stress can cause difficulty initiating and/or maintaining sleep. Losing sleep when under stress is common.

- If you are having feelings of anxiety and you are having trouble sleeping, use this guide to learn about strategies, tips, and techniques to reduce stress and improve your sleep.

STRATEGIES TO COMBAT DAYTIME STRESS AND BEDTIME WORRIES

- Journal thoughts and feelings of that day and of the future.
- Make a list or reminders of tasks needed to be accomplished the next day to have some level of control and get it out of your head.
- Try these relaxations techniques: focused attention, progressive muscle relaxation and self-guided imagery (see back for examples).

Caffeine, Sleep & Performance in the Operational Environment

Sleep & Performance
Caffeine is effective if used properly to improve performance and alertness when needed. If not used properly, caffeine misuse and overuse can cause a vicious cycle of poor sleep and performance. Take 200mg of caffeine every 6 hours upon waking/start of shift. Avoid caffeine 6 hours prior to bedtime, when possible. For full effectiveness, save caffeine for operations.

2B-Alert Algorithm
The 2B-Alert algorithm developed by the Biotechnology High Performance Computing Software Applications Institute (BHS&I) and WRAIR Sleep Research Center predicts performance based on sleep-wake patterns, time-of-day, and dose and source of caffeine. The tool also can provide caffeine dosing recommendations to optimize performance during a pre-specified time period in the future. <https://2b-alert-web.bhsai.org>

Developed by the Behavioral Biology Branch, Center for Military Psychiatry and Neuroscience
For more sleep resources, check out our website: <https://www.wrair.mil/Useful/349>
This updated or BHS&I owned content is for the personal use of the individual and it is not to be reproduced or shared.

TACTICAL NAPPING

TACTICAL NAPS ARE BRIEF PERIODS OF SLEEP THAT RESTORE AND SUSTAIN WARFIGHTER READINESS AND PERFORMANCE
THE MORE SLEEP YOU GET, THE BETTER YOU WILL PERFORM PHYSICALLY, COGNITIVELY, AND EMOTIONALLY.

IN GARRISON	FOR SUSTAINED OPERATIONS		
MAINTAIN HEALTHY SLEEP PATTERNS <p>Naps can help achieve the goal of 7+ hours of sleep every 24 hours that is necessary for maximal health and performance</p>	BEFORE <p>Sleep banking, or taking a nap before a period of unavoidable sleep loss, can help sustain performance during that sleep loss</p>	DURING <p>When feasible, napping during continuous or extended operations will help sustain and restore performance</p>	AFTER <p>Performance decrements from sleep loss can only be reversed by subsequent recovery sleep</p>




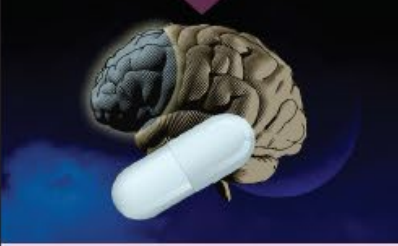











Developed by the Behavioral Biology Branch, Center for Military Psychiatry and Neuroscience
WRAIR Walter Reed Army Institute of Research

WARFIGHTER FATIGUE MANAGEMENT DURING NOCTURNAL OPERATIONS

DAY OF THE FIRST MISSION NIGHT MAXIMIZE PRE-MISSION SLEEP

 Sleep until you wake up naturally, don't set an alarm	 Avoid stimulants after the late evening	 Nap in the afternoon/evening	 Exercise later in the day	 Use caffeine closer to mission start time
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SLEEP BANKING Sleep banking, or getting as much extra sleep as possible in the nights leading up to your first mission night, has shown to support mission performance when optimal sleep conditions are not possible.

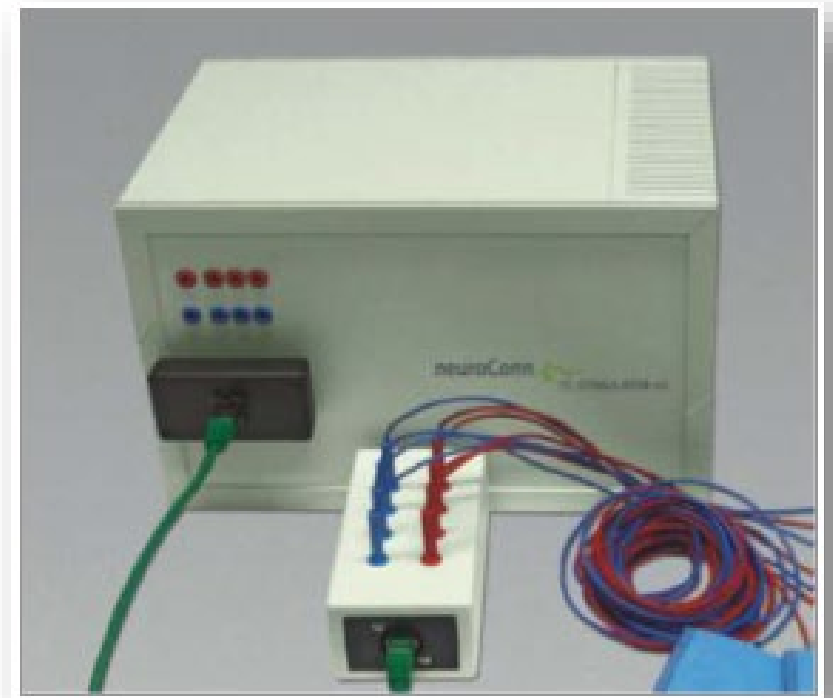
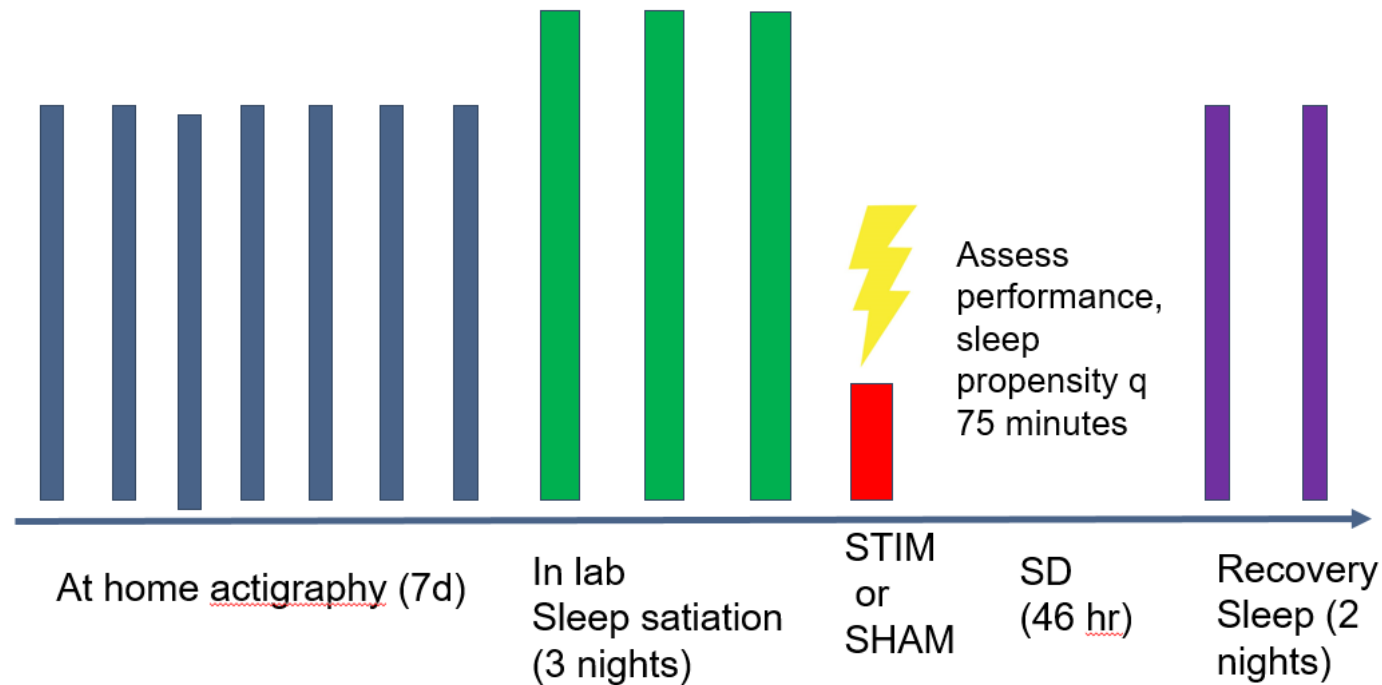
		MONITOR AND PREDICT		INTERVENE									
		READINESS TRACKING	BIOMARKERS	BRAIN STIMULATION	DRUGS/SUPPLEMENTS	FIELD STRATEGIES							
CURRENT		SLEEP TRACKING & PERFORMANCE PREDICTION		FATIGUE VULNERABILITY & RESILIENCE BIOMARKER ASSESSMENT		LABORATORY BRAIN STIMULATION		TARGETED SLEEP PROMOTERS		INFORMING POLICY & GUIDANCE	CURRENT		
	INTERIM		MOBILE EEG & DIGITAL PHENOTYPING		NOVEL PHYSICAL BIOMARKERS OF SLEEP LOSS		NOVEL STIMULATION TECHNOLOGY		RESETTING THE BIOLOGICAL CLOCK			SLEEP STRATEGIES & ENVIRONMENTAL STRATEGY IMPLEMENTATION	INTERIM
		FUTURE		READINESS DASHBOARD FOR LEADERSHIP		REAL-TIME BIOMARKER DETECTION TOOLS		RUGGEDIZED "SMART" CAP		TARGETED WAKE PROMOTERS			

Stimulation Efforts

- Transcranial Electrical Stimulation during sleep
- Transcranial Electrical Stimulation during wake
- Acoustic Stimulation

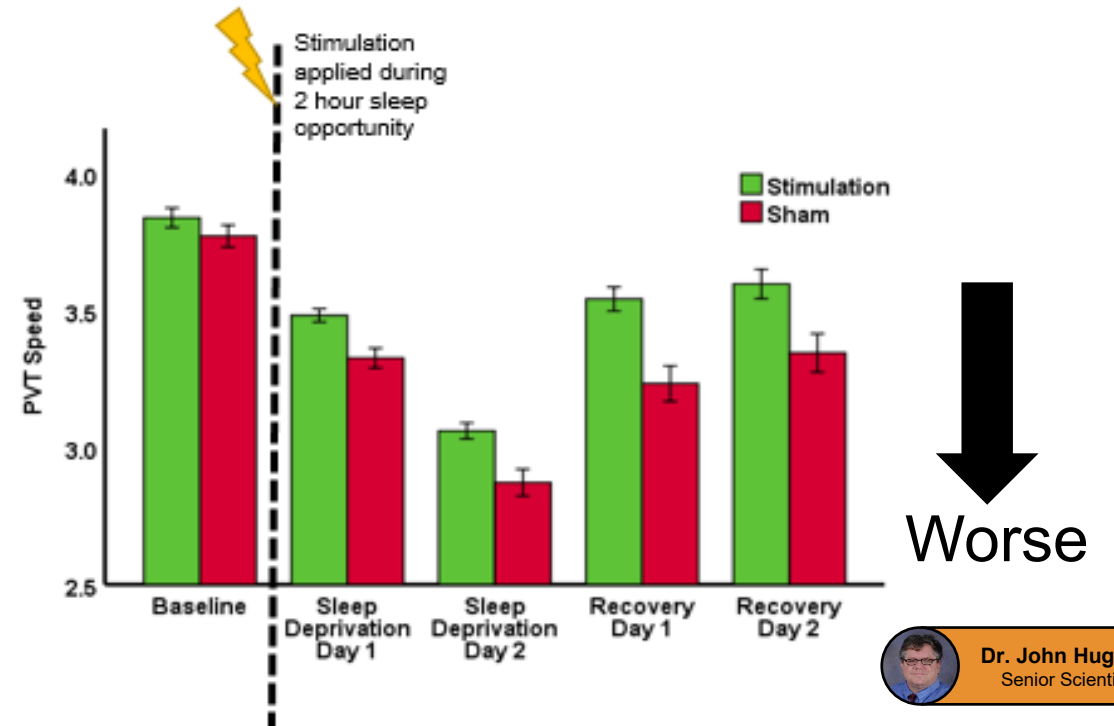
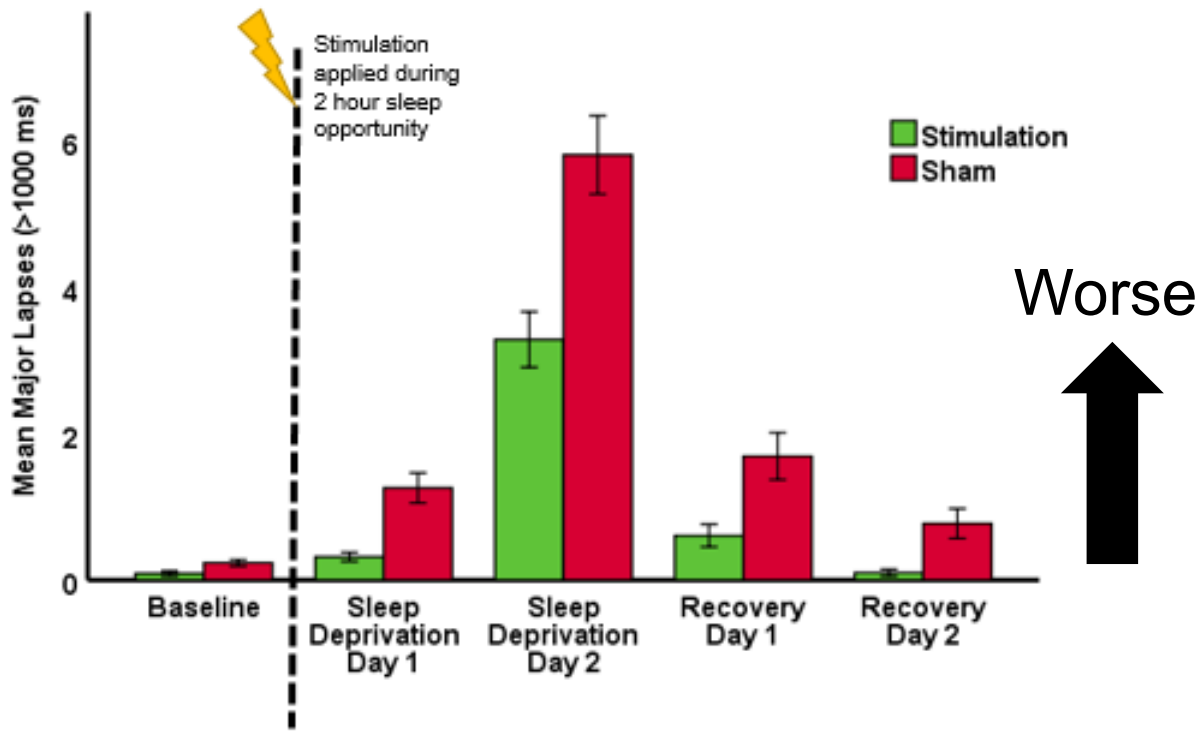
Transcranial Electrical Stimulation During Sleep

- Can we get the restorative properties from sleep in a shorter time?



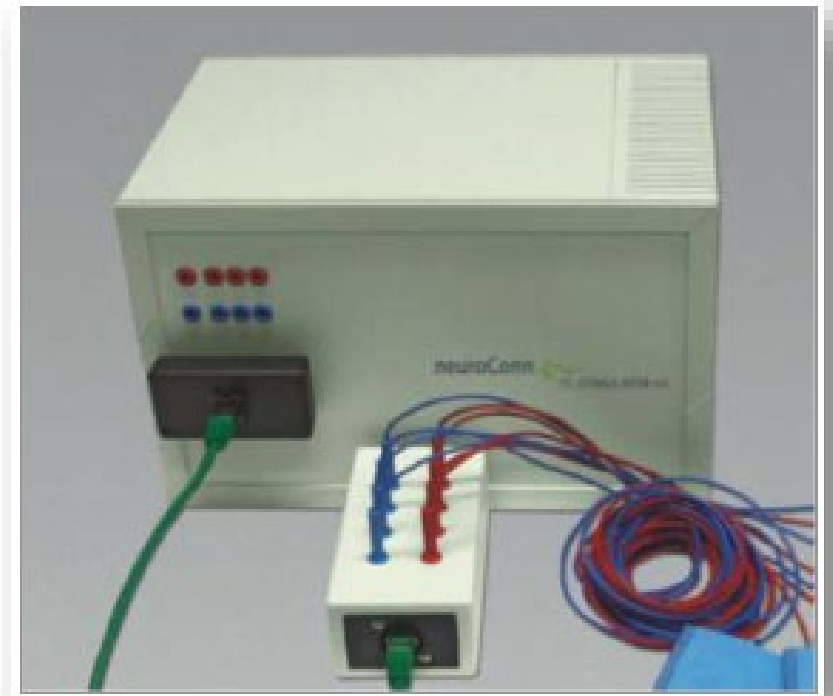
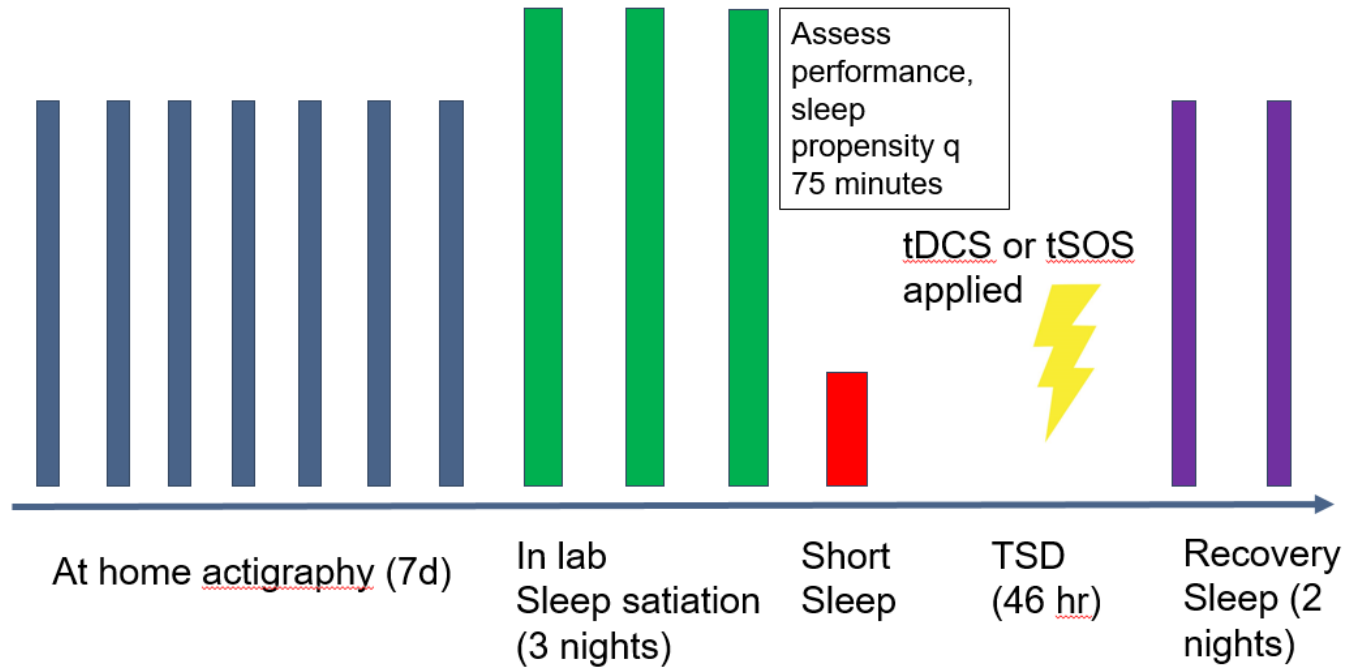
Transcranial Electrical Stimulation During Sleep contd.


Psychomotor Vigilance Test: Objective measure of alertness



Transcranial Electrical Stimulation While Awake

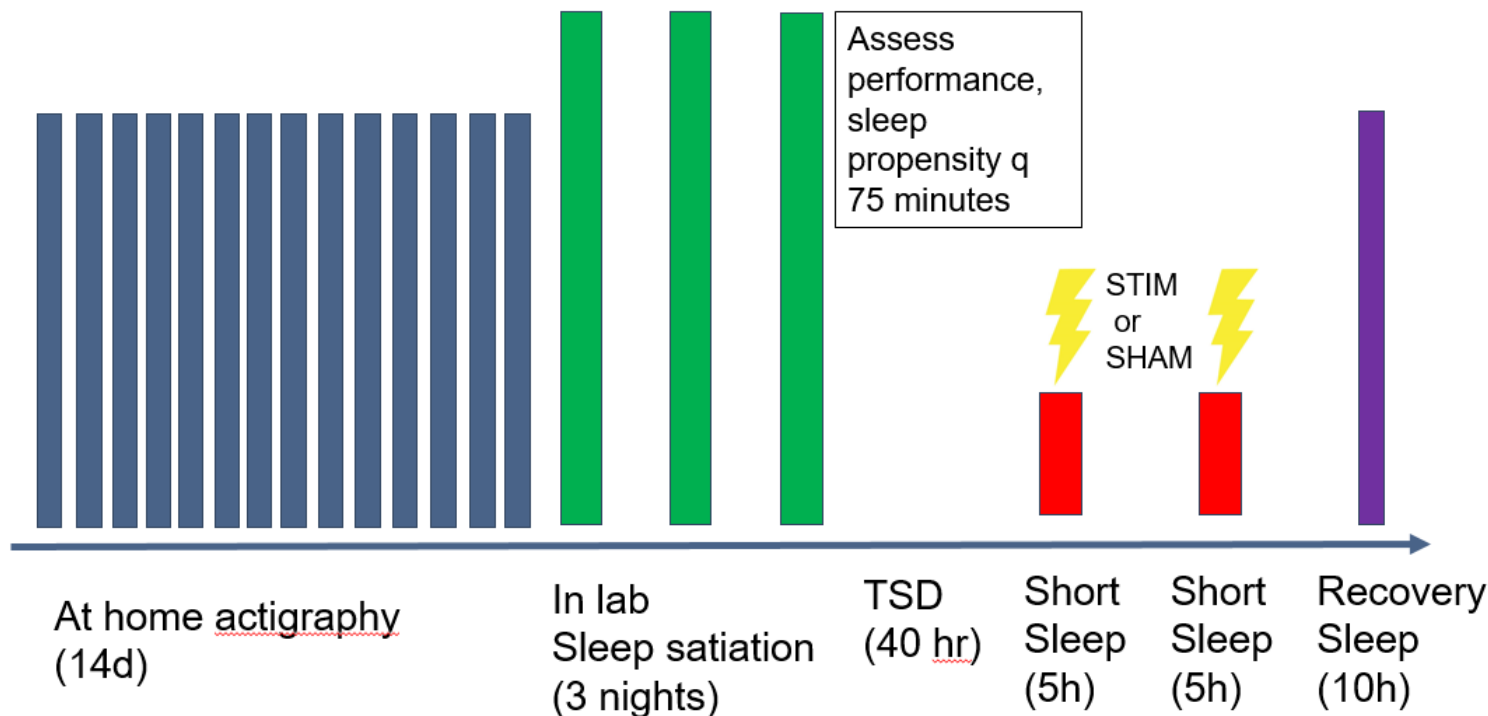
- Can we reduce sleep pressure/build up of the need to sleep?



 **Dr. Tracy Jill Doty**
Chief of Operations and Training

Acoustic Stimulation During Sleep

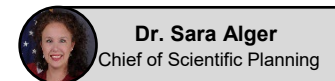
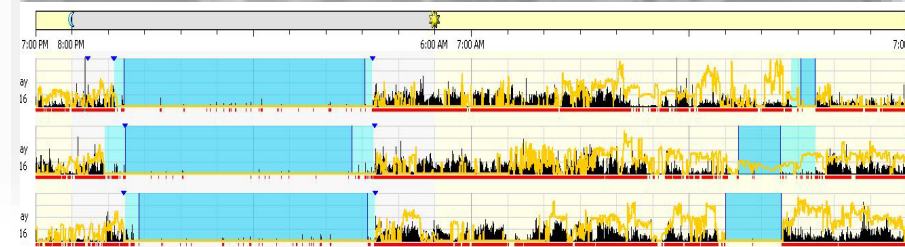
- Can we improve recovery after sleep loss in the face of continued sleep loss?



Dr. John Hughes
Senior Scientist

Determining Tactical Sleep Strategies

- Phase 1: novel analysis of previously-collected actigraphy data
- Phase 2: compare
 - 1 consolidated nighttime sleep
 - 1 shorter consolidated nighttime sleep and 1 daytime nap
 - 1 shorter consolidated nighttime sleep and 2 daytime naps
- Phase 3: assess the ideal sleep strategy identified in Phase 2 in the operational environment



Dr. Sara Alger
Chief of Scientific Planning

Resetting the Biological Clock

- Can you rapidly shift your biological clock during transmeridian travel to reduce jetlag-related fatigue?
- Can you expedite the transition between day and night work, or to transition back to a consistent schedule more rapidly after a sustained operation?



Non-invasive device to provide passive light exposure during sleep



Dr. Tina Burke
Associate
Branch Director

Resources for Healthy Sleep

WRAIR Resources Page - checklists, infographics, and research overviews

- <https://wrair.health.mil/Biomedical-Research/Center-for-Military-Psychiatry-and-Neuroscience/CMPN-Training-Products/>

WRAIR SRC Recruitment Page – current studies and phone and email info

- <https://wrair.health.mil/Join-a-Study/Sleep-Research-Center/>

WRAIR Behavioral Biology Branch on social media



HEALTHY VOLUNTEERS NEEDED FOR SLEEP RESEARCH STUDY!

WHERE
WRAIR Sleep Research Suites
503 Robert Grant Avenue
Silver Spring, MD 20910

AGES:
18-39 Years

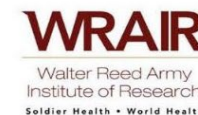
PRINCIPAL INVESTIGATOR
John Hughes, MD

PURPOSE OF STUDY: To determine if brief, relatively soft sounds presented to volunteers during a short sleep period of a few hours following sleep deprivation will improve recovery from the negative effects of sleep deprivation on attention.

STUDY REQUIRES

- *3-hour screening visit
- *14 days (at home) of recording sleep/wake activity with a wrist-worn activity monitor
- *2 overnights in the lab
- *5 continuous days and 5 nights in the lab
- *You **must** test negative for alcohol, nicotine, and drugs and not take certain prescription medicines (birth control allowed)
- *Active duty military and federal personnel must be on leave status.

Total compensation possible is \$2,839.



FOR INFORMATION CALL:
(301) 319-9287

