Energy Product Use for Alertness in the Military

Nancy J. Wesensten, Ph.D.
Walter Reed Army Institute of Research
Silver Spring, MD

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Sleep in the Deployed Environment

6. On average, how many hours of sleep do you get per day?

- O 4 or fewer
- O 5
- O 6
- O 7
- O 8 or more

5. How many hours of sleep do you need per day in order to feel well-rested?

- O 4 or fewer
- O 5
- O 6
- O 7
- O 8 or more

AVG Obtained = 5.5 Hrs

AVG Needed = 6.3 Hrs

RECOMMENDED = 7--8 Hrs per 24

From Mental Health Advisory Team (MHAT) 7 Survey OEF JUL—AUG 2010
What is Interfering with Sleep?

- Off-Duty Leisure
- Stress Related to Personal Life
- Stress Related to Combat
- High OPTEMPO
- Poor Sleep Environment
- Night Time Duties

Percent Reporting More than Half the Nights

From Joint Mental Health Advisory Team (J-MHAT) 7 Survey OEF JULY—AUG 2010
Consequences of Insufficient Sleep

2007 OIF

- Sitting in Briefings: 20%
- Riding in Convoy: 20%
- On Guard Duty: 10%
- Accident / Mistake Due to Sleepiness: 5%

2007 OEF

- Sitting in Briefings: 20%
- Riding in Convoy: 20%
- On Guard Duty: 10%
- Accident / Mistake Due to Sleepiness: 5%

Percent Responding “SOMETIMES” or “OFTEN”
### TABLE 2. Daily Energy Drink consumption reported by service member and rank during a combat deployment (N = 988)

<table>
<thead>
<tr>
<th>Energy drinks per day</th>
<th>All service members†</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>No.</td>
<td>(%)</td>
<td></td>
<td>No.</td>
<td>(%)</td>
</tr>
<tr>
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<td>545</td>
<td>55.2</td>
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<td>56.6</td>
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<td>192</td>
<td>19.4</td>
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<td>41</td>
<td>16.3</td>
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<td>11.5</td>
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<td>27</td>
<td>10.8</td>
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<tr>
<td>3</td>
<td>65</td>
<td>6.6</td>
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<td>26</td>
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<td>≥5</td>
<td>46</td>
<td>4.7</td>
<td></td>
<td>17</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Reported Caffeine Use - 2007

From Lieberman et al., 2012  N = 990 respondents (total eligible population = 504,433 in 2007).  11 locations: 9 US installations + 2 overseas sites (out of 35 sites surveyed).
Is CAFFEINE / ENERGY DRINK USE really the problem?

Or are ATTITUDES about SLEEP the problem? (i.e., What is the Driver?)
TSG Performance Triad Strategic Approach: Transform Mindset

“I can get by with 4-5 hours of sleep” → “Sleep is a critical commodity that my Soldiers and I must have.”

- **Inform** = What does “healthy sleep” look like?

- **Educate (1)** = Behaviors that foster healthy sleep (sleep hygiene) + **How to use caffeine**

- **Educate (2)** = Signs of more serious sleep problems
**Army Guidance: Consistent with FM 6-22.5**

| Sustained Ops (no sleep): | ▪ 200 mg @ ~ 0000  
▪ 200 mg again @ 0400 and 0800 h, if needed  
▪ Use during daytime (1200, 1600) only if needed |
|--------------------------|--------------------------------------------------|
| Night Ops with Daytime Sleep: | ▪ 200 mg @ start of night shift  
▪ 200 mg again 4 hours later  
▪ Last dose: at least 6 hrs away from sleep period |
| TEMPORARILY RESTRICTED SLEEP (6 or fewer hrs of sleep) | ▪ 200 mg upon awakening  
▪ 200 mg again 4 hours later  
▪ Last dose: at least 6 hrs away from sleep period |

**From:** Field Manual 6-22.5 (2009), Combat and Operational Stress Control Manual for Leaders and Soldiers. Chapter 4, Sleep Deprivation.
What Does Caffeine Content Look Like?

1 piece = 100 mg

1 packet (10 mints) = 70 mg

1 squirt (½ tsp) = 60 mg

1.7 gm = 44 mg

2 oz = 200 mg

12 oz = 50 mg

16 oz = 330 mg

16 oz = 160 mg
Caffeine Dosing: Timing is Everything

DAY WORK

What is Interfering with Sleep?

- Off-Duty Leisure
- Stress Related to Personal Life
- Stress Related to Combat
- High OPTEMPO
- Poor Sleep Environment
- Night Time Duties

Percent Reporting More than Half the Nights

First Dose

Last Dose to Precede Mid-Afternoon Dip and Backed Off from Nighttime Lights Out “As Far As Possible”
Caffeine Dosing: Timing is Everything

NIGHT WORK

FIRST DOSE

SECOND DOSE

LAST DOSE BACKED OFF FROM DAYTIME LIGHTS OUT “AS FAR AS POSSIBLE”
Caffeine Dose Creep (a.k.a. “TOLERANCE”): A Vicious Circle?

- Night of Insufficient Sleep
  - Caffeine Interferes with Nighttime Sleep
  - Dose with Caffeine in LATE PM!
  - Dose with Caffeine in AM
"AS FAR AS POSSIBLE?"

Estimate / Predict (Model) Caffeine Effects

Caffeine 600 mg Bolus

Table 3 Frequency of symptoms at each post-drug session

<table>
<thead>
<tr>
<th>Time</th>
<th>Nervousness</th>
<th>Excitation</th>
<th>Aggressive Feelings</th>
<th>Headache</th>
<th>Happiness</th>
<th>Pain in stomach or abdomen</th>
<th>Dry mouth</th>
<th>Pounding heart</th>
<th>Racing heartbeat</th>
<th>Tremors</th>
<th>Nausea</th>
<th>Jitteriness</th>
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Concerns about Energy Drinks In Particular:
A Straw Man?

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Evaluation of the evidence-based findings in these articles was then conducted. With the exception of some weak evidence for glucose and guaraná extract, there is an overwhelming lack of evidence to substantiate claims that components of EDs, other than caffeine, contribute to the enhancement of physical or cognitive performance.

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Summary / Conclusions

- Bulk of evidence supports safety / efficacy of appropriate caffeine use:
  - Dose
  - Timing
- Virtually no evidence to support efficacy of other energy drink components (but no clear safety concerns, either)
- SOLUTION: preach SMART CAFFEINE USE
  - Informed labeling to REDUCE inadvertent caffeine intake
  - Education on appropriate dosing
- MAIN SOLUTION: Practice what we preach: PROMOTE HEALTHY DAILY SLEEP AMOUNTS
RESEARCH GAPS

GENERAL PUBLIC KNOWLEDGE:

? What is an effective DOSE (do scientists AGREE on an effective dose?) for me?

? How much caffeine (CONTENT) in a given product?

? How should I TIME caffeine use?

SCIENTIFIC AGENDA:

? Long-term RECOVERY SLEEP consequences of chronic caffeine use (no free lunch?)

- Sleep History (Amount + Timing)
- Caffeine / Nicotine / Oral birth control use history (+ liver enzyme polymorphisms)
- Adenosine receptor + other functional polymorphisms
- Crossover v. Parallel groups design + study N (statistical power)
- Repeatability of “executive function” tests (lab-based tests of “risk-taking”)
- Timing of caffeine dosing relative to circadian trough, test administration
Caffeine Use During Chronic, Restricted Sleep

- Total of 48 healthy adult men and women 18-39 years of age (n = 24 CAFFEINE; n = 24 PLACEBO)
- Full in-lab polysomnography and electrocardiography monitoring

<table>
<thead>
<tr>
<th>STUDY DAY</th>
<th>PRIOR NIGHT TIME in BED (HOURS)</th>
<th>CAFFEINE 200 MG or PLACEBO</th>
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<td>n/a</td>
</tr>
<tr>
<td>5</td>
<td>10 (2100—0700)</td>
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<td>6</td>
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<td>0700, 1100</td>
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<td>13</td>
<td>8 (2300—0700)</td>
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