



FOR THE MILITARY: STAYING ALERT AND AWAKE OFTEN MEANS STAYING ALIVE

by *Steven Grenard RRT, RPSGT*

Keeping America's defense forces alert and awake, especially in times of stress and under combat conditions doesn't always mean relying on the body's natural mechanisms. Sleep disorders are just as prevalent among the population that wears a uniform as it is among civilians and those disorders often translate to sleepiness at inopportune times when staying awake and remaining alert could be a matter of life or death. Focus Journal readers might find some of the tactics and interventions used by the military to combat the problem of EDS of interest.

One of these interventions is the distribution of caffeinated chewing gum as an easier way to get caffeine instead of taking pills or downing several cups of coffee. Back in 2005 the army changed the manner by which "Stay Alert" gum was given to the troops. They stopped providing it in traditional stick form in foil wrap and

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placed it into a more sturdy candy-coated "pellet" form, similar to Chiclets and wrapped them in a metal foil package like an MRE. "Stay Alert" gum is included in the Army's "First Strike" ration, a compact and lighter-weight version of the traditional MRE designed to be carried along for the first 72 hours of a combat operation.

Cinnamon-flavored "Stay Alert" caffeinated gum is made exclusively for the military by Wrigley's. In hotter climates, the army found that the civilian-style gum package would get shoved into a pocket and end up turning into a hard-to-chew foil ball after a long march in the heat. The candy-coated pellet size stands up better to heat and covers up the bitter taste of caffeine while the metal foil package is tougher and withstands more physical abuse.

Gum is a more easily used and is a palatable means for taking in caffeine (and staying awake) on the move. There is no time in the field to brew a cup of instant coffee and using ground up coffee or crystals by absorbing it through the mucous membranes of the mouth is so bitter that many soldiers don't bother. However, should the opportunity arise to brew up some real coffee it may be of interest to know that Starbucks gives a pound of its coffee to

every employee every month and that many of these employees direct that their benefit be sent to our troops overseas.

Since caffeine is the simplest over the counter solution to fight lethargy among our troops, a new kind of beverage called Shock Coffee has been developed. It has 50% more caffeine than a normal cup of coffee. Shock's Hyper-Caffeinated product line includes ground coffee, Shock Ready-to-Drink Mochas and Lattes, Shock-a-lots, chocolate covered coffee beans for those who prefer to chew their caffeine and Shock-A-Cino, a Hyper-caffeinated cappuccino. While the Shock-a-lots and the cold Triple Mochas and Lattes seem to be military favorites, the Shock Coffee brand has been referred to as one of the "comforts of home."

But chewing caffeine gum or drinking caffeinated beverages and shock drinks may not be the only way the military can "legally" combat sleepiness. We all know there are medications which act as stimulants including Ritalin, Adderall and even cocaine but these have unacceptable and dangerous side effects that are not worth their use. The Defense Advanced Research Projects Agency (aka: DARPA) has been grappling with the problem of sleepy troops for years. They have recently funded a totally novel and safe pharmacological means of keeping troops awake and alert. DARPA has funded the development of a new drug which is a nasal spray of the naturally occurring brain hormone called orexin A. Researchers have discovered it reverses the effect of sleep deprivation in monkeys, allowing them to perform like well-rested monkeys on cognitive tests. The drug is a no-brainer, pun intended, treatment candidate for narcolepsy since that disorder is caused by a deficiency of orexin.

The treatment is "a totally new route for increasing arousal, and the new study shows it to be relatively benign," according to J. Siegel, a co-author of the research and quoted in, of all places WIRE Magazine...(where else?).

Orexin A is clearly a candidate to become a "sleep replacement" drug. For years stimulants have been used to combat sleepiness, but they can be addictive and often have side effects, including raising blood pressure, increasing heart rate, and causing mood swings and other psychological problems. This is why the military, for example, has funded research into new drugs like Provigil and Nuvigil and now orexin A in

an effort to help troops stay awake without deleterious side effects.

The orexin study monkeys, deprived of sleep for 30 to 36 hours were given either orexin A or a saline placebo before taking standardized cognitive tests. The monkeys given orexin A in a nasal spray scored about the same as alert monkeys, while the saline-control group was severely impaired.

The study, which appeared in the Dec 26, 2008 edition of the Journal of Neurosciences, found orexin A not only restored monkeys' cognitive abilities but made their brains look "awake" in PET scans. Staging sleep via EEG to see how that looks would be the next logical step both in primate and human studies. The study also revealed that orexin A only had an impact on sleepy monkeys, not alert ones. It acted by reversing only the effects of sleepiness. MSLTs and MWTs may be on the drawing board for this application as well.

As far as the narcolepsy population is concerned, the researchers felt that up to now the only pharmacologic treatment has been temporary quick fixes designed to combat the sleepiness symptoms of the disorder rather than correcting the underlying biochemical causes of the disorder which is orexin (aka: hypocretin) deficiency. Clearly if this drug works out in further testing including human trials and is approved by the FDA it will become the sleepiness equivalent of another hormone, that being insulin for diabetes. It may be years before that happens, however. And the researchers are cautious on whether or not orexin A nasal spray will be the best choice for to help stay awake in the face of sleep deprivation.

Dr. Michael Twery, director of the National Center for Sleep Disorders Research was interviewed and quoted for the WIRED article: "He said that while research into drugs for sleepiness is "very interesting," he cautioned that the long-term consequences of not sleeping were not well-known. Both Twery and Siegel noted that it is unclear whether or not treating the brain chemistry behind sleepiness would alleviate the other problems associated with sleep deprivation.

"New research indicates that not getting enough sleep is associated with increased risk of cardiovascular disease and metabolic disorders," said Twery. "Still, Siegel said that Americans already recognize that sleepiness is a problem and have long treated it with a variety of stimulants. "We have to realize that we are already living in a society where we are already self-medicating with caffeine," Twery said.

He also said that modafinil, which is marketed as Provigil by Cephalon and AlerteC in Canada, has become widely used by healthy individuals for managing sleepiness. "We have these other precedents, and it's not clear that you can't use orexin A temporarily to reduce sleep," said Siegel. "On the other hand, you'd have to be a fool to advocate taking this and reducing sleep as much as possible."

The abstract of the study concludes with this interesting finding as well: "Consistent with the differential effects on performance, nasal delivered orexin-A produced a more pronounced reversal of sleep deprivation induced changes in brain metabolic activity (CMRglc) than intravenous orexin-A. These findings provide strong evidence for the effectiveness of intranasal orexin-A in alleviating cognitive deficits produced by loss of sleep."

You can read the full abstract at the following website: <http://www.jneurosci.org/cgi/content/abstract/27/52/14239>

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