

Effectiveness of NADH in Alleviating Effects of Sleep Deprivation in Healthy Middle-Aged Adults*

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STUDY ABSTRACT

Aims: Sleep deprivation affects cognitive performance and quality of life. It impacts otherwise healthy individuals who cross time zones, work shifts, or have certain sleep, psychiatric, or medical disorders. Despite manufacturers' claims, few over-the-counter substances have been shown in rigorously designed studies to improve daytime alertness following sleep deprivation.

We tested the ability of oral stabilized NADH (ENADAlert®, a nutritional supplement) to improve alertness, mood, and performance on cognitive tasks in middle-aged subjects after one night of total sleep deprivation. NADH has been shown to increase subjective measures of energy in Chronic Fatigue Syndrome¹. NADH has also been shown to reduce the effects of jet lag on cognitive performance and sleepiness².

Methods: A double blind, placebo-controlled, randomized crossover study involving 25 healthy men and women ages 40-59 was conducted. Subjects were screened for medical, psychiatric, and sleep disorders and then underwent baseline cognitive assessment using a computerized battery (described below). On the baseline test day, subjects consumed sublingual placebo and had electrodes placed to simulate experimental conditions. They returned for one night of enforced, polygraphically-monitored wakefulness followed by morning consumption of sublingual NADH (ENADAlert 20 mg) or placebo determined randomly. During the day, cognitive testing, mood assessment (Profile of Mood States), and assessment of subjective (Stanford and Epworth Sleepiness Scales) and objective sleepiness (Multiple Sleep Latency Test – 3 naps) were performed. The complete CogScreen-Aeromedical Edition (CogScreen-AE) computerized cognitive battery assessed attention, memory, and reaction time among other factors. CogScreen-AE subtests were analyzed by throughput (correct responses/minute), accuracy, and speed (median reaction time to correct responses). All variables with sufficient data were combined in summary measures; two were discarded.

Results: Cognitive performance as assessed by overall throughput was significantly better ($p=.018$) following NADH than after placebo, after adjusting for baseline performance. Analysis of individual cognitive tests revealed that math throughput

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and visual sequence comparison throughput were significantly better following NADH (math throughput, $p=.023$; visual sequence comparison throughput, $p=0.032$; see figures). Overall accuracy and speed were not different between conditions. Subjective measures of sleepiness and mood and polygraphically recorded sleep latency did not differ between conditions. Although several subjects reported typical effects of total sleep deprivation, no adverse effects were reported.

Conclusions: This study is among the first to rigorously evaluate a non-prescription substance, aside from stimulants, for sleep deprivation. NADH is the first non-stimulant to show enhancement of cognitive performance following acute sleep deprivation. On the other hand, NADH did not reduce daytime sleepiness or enhance mood. NADH may have an important role to play in mitigating the effects of unavoidable sleep deprivation.

References:

(1) Forsyth LM, Preuss HG, MacDowell AL, Chiazzè L, Birkmayer GD, Bellanti JA: Therapeutic effects of oral NADH on the symptoms of patients with chronic fatigue syndrome. Annals of Allergy Asthma & Immunology 1999, 82:185-191.

(2) Kay GG, Viirre E, Clark J. Stabilized NADH as a countermeasure for jet lag. Abstract presented and published in the proceedings of The 48th International Congress of Aviation and Space Medicine, September 2000.

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