

Insomnia cures: Do drug remedies provide the kind of sleep that our brain needs?

With all the money we as a society spend on sleep, from \$7 billion on [beds](#) per year (in the U.S. alone) to nearly 9 million Americans on prescription sleep [treatments](#), to over \$1 billion on over-the-counter or alternative sleep therapies and activities, you'd sure think we were all well-rested. I've provided some neuroscientific lectures to sleep centers on some of the reasons we think people need to sleep – including the adenosine hypothesis, homeostasis, memory consolidation, parasympathetic restoration of the body, and so forth – but none of the experts in the field are at a consensus of why sleep actually needs to occur. I wrote an [article](#) on how losing out on sleep can potentially have epigenetic effects on one's genome, which could be one factor of many as to why chronic sleep deficits are related to a litany of health problems and diseases.

Does 'forcing' sleep work?

Most of the so-called 'Z' sleep therapies (zolpidem, eszopiclone, zaleplon), including Lunesta, Ambien, Intermezzo, Sonata, etc. are non-benzodiazepine class drugs that are GABA receptor agonists – they work by modulating neurotransmitters. More recently, a new class of sleep drug (known as orexin receptor antagonists) has been approved (such as Belsomra). Orexin (also called hypocretin) is a neuropeptide produced by neurons in the hypothalamus that [induces](#) wakefulness and vigilance (among some other physiological factors). It was identified in part because some humans and animals with narcolepsy are deficient in orthorexins-producing neurons in the brain.

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Virtually all medications for sleep work on neurotransmitters, to change our balance of tiredness and vigilance. Even the antihistamines Benadryl (diphenhydramine) and doxylamine succinate are used in a tremendous number of OTC sleep medications, and do produce marked drowsiness in many people. In this way, the antihistamine passes the blood-brain barrier to affect histamine's regulation of sleep and wakefulness in the brain, inducing sleepiness. Since so many people use so many of these interventions to try to improve sleep, it begs the question 'how good is the actual quality of the sleep?'

Placebo and sleep

It turns out that there's a fairly substantial placebo effect within sleep itself. Telling people that they slept longer or more deeply than they actually did, or that results of a (fictitious) sleep EEG were more positive than they actually were leads people to be able to think more quickly and respond more positively to questions about alertness and restedness. Even sleep medications, though approved by statistical superiority compared against placebo, have a very small effect magnitude on sleep itself, and is intertwined with a strong placebo effect. Seeing a physician and filling a prescription for a sleep medication and then taking it at bedtime is a whole chain of behaviors that includes expectancy and formality that a sleeping routine is commencing. But clearly if the entire need for sleep could be eliminated by placebo, we would have evolved a way *not* to lay dormant and vulnerable for a third of each of our days a long, long time ago. In the distant past, sleep was a risky proposition for early humans and our

1260p Sleep Hypnotism of an energy-saver: Estimates are that sleeping rather than staying awake for the same amount of time [only](#) saves about a hundred or so calories.

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So we have an interesting irony in society

now: We no longer have to congregate in communities for protection and don't consider sleep a risky endeavor that we need to undertake nonetheless; but we have the technology instead to try to replace or enhance sleep by artificial means. Can drug therapies – from the Z-class drugs, to OTCs, to (in the case of Michael Jackson) propofol (with benzodiazepines) – really be used to force 'real' sleep to occur? Does it count? Is it a substantial replacement, or just a short-term workaround? There is research indicating that some stages of sleep seem to be relatively well-recreated by anesthetics and hypnotics, however: they don't replace all phases of sleep, the [sleep quality](#) is not always as substantive, and [not every drug treatment affects sleep stages in the same way](#). Unfortunately, one of the most powerful effects of sleep is to consolidate and reinforce memories, and many sleep aids are [associated](#) with impaired memory or memory loss.

So as with everything in nature, there is a balance between risk and benefit, help and hindrance. The act of sleep and artificially assisting sleep are not on the whole a zero-sum game. Artificially inducing sleep can be considered by some to be worth pursuing, even in light of the potential side effects, including parasomnias and other effects. Likewise, to forgo treatment for chronic or acute sleep concerns can be associated with its own health consequences.

What is interesting about sleep is that for something that we're all invested in spending so much money and time on, sleep hygiene — and quantifying our individual sleep lives — is something that is still quite nascent, and I think is something likely to take a dramatic upswing in the next few years.

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