How much sleep do we really need? While many scientists argue that our need for sleep cannot be changed, several developments suggest they could be wrong. On the frontier of technological innovation, neuroscientists and biologists are forcing us to reconsider everything we think we know. We might even dramatically reduce the amount of time we spend sleeping.

Our observations

- Wearables company Fitbit has released data on 6 billion nights of its American users’ sleep. While the average adult should sleep at least 7 hours a night to prevent health issues, the data shows that women average 6 hours and 50 minutes a night, while men average 6 hours and 26 minutes. The report also notes that our sleep suffers as a result of inconsistency (or a lack of routine).

- In *Why We Sleep*, neuroscientist Matthew Walker notes that our chronic state of sleep deficiency damages our mental and physical health. Research links lack of sleep to depression, stress, anxiety, diabetes, cancer, heart attacks and obesity. Walker argues that as our modern way of life deprives us of the sleep we need, low-level exhaustion has become the accepted norm.

- Biologists argue that because sleep has fundamental biological roots, we cannot change our 7-9 hour need for sleep. Our circadian rhythm is a deeply engrained cycle found in every multi-cellular organism. Even in a deep cave with no access to light or clocks, our bodies keep an internal schedule of almost exactly 24 hours, with a repeating pattern of prolonged wakefulness (± 15 hours) and sleep (±9 hours).

- Our sleep compromises several 90-minute cycles of brain activity. When we fall asleep, our brain waves slow down, descending through stage 1 (relaxation) and stage 2 (light sleep) down to stage 3 (deep sleep). After this phase, the brain goes into rapid eye movement (REM) sleep, which is linked to learning, memory and dreaming.

- Recent discoveries in biology, neuroscience, genomics and technology promise to change everything we know about sleep. DARPA, the research arm of the U.S. military, is trying to squeeze a full night’s sleep into fewer hours (in fact, DARPA has been optimizing soldiers’ sleep for decades). Full control of our sleep cycles could maximize time spent in deep sleep, ensuring full physical and mental benefits while cutting sleep time in half. Transcranial direct-current stimulation, a technology that targets the brain, has already been used to prolong deep sleep and reduce waking periods. Meanwhile, scientists have discovered a genetic mutation that could be causing the need for sleep, which opens up the opportunity to genetically alter sleepiness. Elsewhere, researchers have discovered the neurotransmitter orexin which regulates wakefulness (narcolepsy is caused by a lack of orexin) and are now investigating potential treatment.
Connecting the dots

The burden of sleepless nights weighs heavy upon modern society. Data indicates that our average amount of sleep is well below the recommended threshold of 7-9 hours. Moreover, research overwhelmingly confirms the extent of the damage wrought upon our health. Biologists implore us to listen to our circadian rhythm, which is put under intense pressure by our modern way of life. They argue that we simply cannot circumvent our need to sleep 7-9 hours. However, scientific findings increasingly suggest that this biological perspective could be flawed. Scientific research is opening the door to a future in which we require less sleep. In fact, human evolution has featured a shift towards sleeping more deeply over shorter time periods. Historically, we have faced intense pressure to learn and teach new skills and make social connections – all at the expense of sleep. Non-REM sleep accounts for an increasingly smaller share of our sleep. Moreover, if humans followed typical primate sleep patterns, we would sleep about 9.5 hours a day. But 7-8 hours has become the scientifically accepted norm. In addition, sleep patterns differ widely across cultures: the amount and timing of sleep are far less important than sticking to a routine (a finding supported by the FitBit report). All in all, history shows that radically reducing the time we spend asleep must be considered a possibility. In fact, recent innovations indicate that we could already be on the verge of transforming the biology of sleep.

Sleep has become the subject of a new wave of scientific research and technological innovation. In their quest to uncover the function(s) of sleep, scientists are exploring our DNA and brain activity. As their research links sleep to genetic mutations and neurotransmitters, these could become pathways to a future in which the role of sleep changes (and possibly, a future in which sleep pressure is reduced dramatically). Finally, these developments around sleep are part of a larger push towards human enhancement (e.g. anti-aging research, building resilient astronauts, performance-enhancing altered states, drugs to boost cognitive ability, genetic engineering, and bionics), in which shifts within society (e.g. lack of sleep, work-home misbalance, population aging) are driving technological innovation.

Implications

- The growing interest in sleep, accompanied by rising media and political attention for (mental) health issues related to a lack of sleep, point to a shift in our thinking about sleep. This shift is likely to lead to increased interest in innovations to make sleep more effective and more efficient (e.g. weighted blankets, beds, technologies like the Somneo Sleep Trainer and the Fisher Wallace Stimulator, and transcranial neurotechnologies).
- Rising sleep efficiency (either through our continuous, perhaps unsustainable, society-wide shift towards less and less sleep or through technological innovation) will free up an increasing amount of time, which, as we do now, we are most likely to spend on work and/or entertainment.