What’s up with your Sleep?

Nathaniel Green¹, Asya Rolls¹* and Fahed Hakim²

¹Department of Immunology, Faculty of Medicine, Technion - Israel Institute of Technology, Israel
²Pediatric Pulmonary Unit, Rambam Health Care Campus, Israel

Development and mass production of both home computers and cellular phones began in the 1970s. Today, in the fourth decade of their availability, widespread adoption of these and other technologies, including the laptop, the tablet and the smartphone, have improved our ability to gather and disseminate information, communicate with one another and access entertainment. However, this progress has not come without costs. Health agencies around the world are unable to dismiss the potential impact of radiation from these devices on tumorigenesis [1]. Although subtle and less likely to elicit attention-grabbing headlines, the effects of “device-creep” on sleep integrity are becoming increasingly relevant as more people, especially youth, take their devices with them into bed. These devices and popular applications, like WhatsApp and Facebook, can also fragment sleep, waking us several times a night with subtle beeps and blinking lights.

It has been proven that we process sensory inputs during our sleep, even if we do not wake up. Studies have shown that tones, odors and other sensory stimuli presented during sleep can strengthen or attenuate specific memories. For example, presentation of conditioned olfactory and auditory stimuli can reinforce learning [2,3] or cause the extinction of fear-related memories [4]. Thus, even stimuli that are inadequate to wake us can influence mental processes during sleep. Therefore, it is reasonable to assume that the tones and lights emitted by our devices are likely to fragment our sleep; and this fragmentation comes with a price.

An unresolved question remains as to the quantitative effect of device-creep on sleep fragmentation. Decrements in sleep efficiency have been linked with deficits in: cognitive functions, mood and physiological function. Teasing apart the discrete effects of sleep fragmentation from other elements of sleep architecture and sleep duration is complicated by the difficulty of specifically targeting individual sleep elements without disturbing others. We targeted hypocretin/orexin neurons, which play a key role in arousal processes [5]. We used optogenetics to activate these neurons at different intervals in sleeping mice and were able to fragment sleep, waking us several times a night with subtle beeps and blinking lights.

Taken together, it is clear that sleep fragmentation is a major health risk factor. However, in contrast to sleep deprivation, which is evident, we are less aware of sleep fragmentation. Our modern life style provides plenty of opportunities to fragment our sleep and the increasing use of technology requires us to be more aware of those risks and take actions to decrease its damage on our health.

REFERENCES

3. Rudoy JD, Voss JL, Westerberg CE, Paller KA. Strengthening individual


