TED

深度睡眠对大脑的好处

题目：The brain benefits of deep sleep — and how to get more of it

What if you could make your sleep more efficient? As a sleep scientist, this is the question that has captivated me for the past 10 years. Because while the lightbulb and technology have brought about a world of 24-hour work and productivity, it has come at the cost of our naturally occurring circadian rhythm and our body's need for sleep.

如果可以拥有 更高效的睡眠会怎么样？ 作为一名睡眠专家， 在过去的10年里， 我一直在研究这个问题。 当电灯和科技使得世界。24小时灯火通明， 我们付出的代价 是违背自然的昼夜节律， 和我们身体对睡眠的需求。

lightbulb
n.电灯泡

productivity
n.生产率

The circadian rhythm dictates our energy level throughout the day, and only recently we've been conducting a global experiment on this rhythm, which is putting our sleep health and ultimately our life quality in jeopardy. Because of this, we aren't getting the sleep we need, with the average American sleeping a whole hour less than they did in the 1940s.

昼夜节律决定了 我们一天的能量水平， 直到最近，我们才开始 就这一节律问题开展全球实验， 讲究其如何对我们的睡眠健康， 甚至生活质量产生危害。 正是因为如此， 我们总是睡得不够， 与1940年代相比， 美国人的平均睡眠时间 少了整整一个小时。

rhythm
n.节律

ultimately
adv.最后；最终

For some reason, we decided to wear it as a badge of honor that we can get by on not enough sleep. This all adds up to a real health crisis.

不知道为什么， 我们以睡眠不足为荣， 将其视为一块 可以佩戴的荣誉勋章。 这其实都为各类 健康隐患埋下了伏笔。

badge
n.徽章；标记

Most of us know that poor sleep is linked to diseases like Alzheimer's, cardiovascular disease, stroke and diabetes. And if you go untreated with a sleep disorder like sleep apnea, you're more likely to get many of these illnesses. But did you know about sleep's impact on your mental states? Poor sleep makes us make risky, rash decisions and is a drain on our capacity for empathy.

众所周知，睡眠不足 与疾病高度相关， 譬如老年痴呆，心血管疾病， 中风，糖尿病。 如果不对睡眠紊乱 （如睡眠窒息）加以治疗， 你将更容易患上这些疾病。 但是你知道睡眠 对你的精神状态有什么影响吗？ 睡眠不足会让我们 草率地做出冒险的决定， 我们体谅他人的能力也会下降。

When sleep deprivation literally makes us more sensitive to our own pain, it's not so surprising that we have a hard time relating to others and just generally being a good and healthy person when we're sleep-deprived.

缺乏睡眠会使我们 对自己的痛苦更加敏感， 难怪当我们睡得不够的时候， 会难以作为一个健康的正常人 同他人相处。

Scientists are now starting to understand how not only the quantity but also the quality of sleep impacts our health and well-being. My research focuses on what many scientists believe is the most regenerative stage of sleep: deep sleep. We now know that generally speaking, there are three stages of sleep: light sleep, rapid eye movement or REM and deep sleep. We measure these stages by connecting electrodes to the scalp, chin and chest. In light sleep and REM, our brain waves are very similar to our brain waves in waking life.

除了睡眠时长之外， 科学家们还开始了解到 睡眠的质量 是如何影响着我们的健康和幸福的。 我的研究重点放在 被许多科学家视为最有再生力的睡眠阶段： 深度睡眠期。我们知道，一般而言 睡眠有三个阶段： 浅睡期， 快速动眼期， 深睡期。 通过将电极与头皮，下巴和胸部相连， 我们可以记录这些睡眠阶段的电信号。 在浅睡及快速动眼期， 我们的脑电波与 清醒时的脑电波几乎一致。

Alzheimer's
老年痴呆

cardiovascular disease
心血管病

diabetes
n.糖尿病

empathy
n.移情作用

deprivation
n.剥夺

regenerative
adj.恢复的；新生的

But our brain waves in deep sleep have these long-burst brain waves that are very different from our waking life brain waves. These long-burst brain waves are called delta waves. When we don't get the deep sleep we need, it inhibits our ability to learn and for our cells and bodies to recover. Deep sleep is how we convert all those interactions that we make during the day into our long-term memory and personalities. As we get older, we're more likely to lose these regenerative delta waves. So in way, deep sleep and delta waves are actually a marker for biological youth.

但在深睡期中， 我们的脑电波却是一种长脉冲， 与我们清醒时的脑电波大相径庭。 这些长脉冲脑电波 被称为δ（delta）波。 当我们不能获得充足的深度睡眠时， 我们的学习能力会受到抑制， 细胞再生和身体机能的 修复也会受到影响。 深度睡眠让我们将 白天的经历 转化为长期记忆， 让我们成为我们自己。 当我们老去， 我们将很可能不再有 这些可再生的δ波。 可以说，深度睡眠和δ波 是生理年轻的一大标志。

So naturally, I wanted to get more deep sleep for myself and I literally tried almost every gadget, gizmo, device and hack out there -- consumer-grade, clinical-grade, what have you. I learned a lot, and I found I really do need, like most people, eight hours of sleep. I even shifted my circadian component by changing my meals, exercise and light exposure, but I still couldn't find a way to get a deeper night of sleep ... that is until I met Dr. Dmitry Gerashchenko from Harvard Medical School.

自然，我希望自己 有更长的深度睡眠， 我几乎尝试过各种小发明、小设备—— 零售的，临床的, 只要市面上有的我都愿意尝试。 我学到了很多，我发现 和大多数人一样， 我真的需要八个小时的睡眠。 我甚至通过控制我的饮食，运动和 暴露在光照下的时间 改变了自己的生理节律， 但我仍不能延长深度睡眠时间， 直到我遇到了哈佛医学院的 Dmitry Gerashchenko博士。

personality
n.人格；个性

regenerative
adj.恢复的；新生的

biological youth
生理年轻

gizmo
n.小发明

circadian
adj.生理节律的

Dmitry told me about a new finding in the literature, where a lab out of Germany showed that if you could play certain sounds at the right time in people's sleep, you could actually make sleep deeper and more efficient. And what's more, is that this lab showed that you actually could improve next-day memory performance with this sound. Dmitry and I teamed up, and we began working on a way to build this technology. With our research lab collaborators at Penn State, we designed experiments in order to validate our system. And we've since received grant funding from the National Science Foundation and the National Institute of Health to develop this deep-sleep stimulating technology. Here's how it works. People came into the lab and we hooked them up to a number of devices, two of which I have on right here -- not a fashion statement.

Dmitry告诉了我 文献中的一项新发现， 一个德国实验室发现， 如果你能在人们入睡后的适当时机 播放某些声音， 他们就能获得更深度、 更高效的睡眠。 除此以外，这一实验室还发现 这一声音还能够帮你提升 第二天的记忆力。 我和Dmitry决定合作 进一步开发这项技术。 我们与宾夕法尼亚 州立大学的实验室合作， 设计了实验来验证我们的系统。 我们得到了来自美国国家科学基金会 和国家卫生研究院的资金支持， 以顺利开发这种 激励深度睡眠的技术。 它是这样运作的。 人们来到实验室， 我们把许多设备连接到他们身上， 我现在手上拿的是其中的两个—— 这可不是时尚秀。

When we detected that people were in deep sleep, we played the deep-sleep stimulating sounds that were shown to make them have deeper sleep. I'm going to demo this sound for you right now.

当我们探测到人们进入深度睡眠后， 我们会播放刺激深度睡眠的声音， 让他们能睡得更深。 我现在将为大家展示这段声音。很奇怪，对吗?

literature
n.文学

collaborators
n.合作者

So that sound is actually at the same burst frequency as your brain waves when your brain is in deep sleep. That sound pattern actually primes your mind to have more of these regenerative delta waves. When we asked participants the next day about the sounds, they were completely unaware that we played the sounds, yet their brains responded with more of these delta waves.
这一声音其实和你深睡时的脑电波 有相同的突发频率。 实际上，它可以促使你的大脑 产生更多的可再生δ波。 当我们第二天询问参与者 是否听到了这些声音时， 他们全然不知我们曾播放声音， 然而，他们的大脑对此做出了反应， 产生了更多的δ波。

Here's an image of someone's brain waves from the study that we conducted. See the bottom panel? This shows the sound being played at that burst frequency. Now look at the brain waves in the upper part of the graph. You can see from the graph that the sound is actually producing more of these regenerative delta waves. We learned that we could accurately track sleep without hooking people up to electrodes and make people sleep deeper. We're continuing to develop the right sound environment and sleep habitat to improve people's sleep health.
这是研究中一位 被测试者的脑电波图像。 你们看到底部那块了吗? 那是播放声音的突发频率。 现在再看图上部的脑电波。 从图中可以看出， 这一声音诱导产生了更多的再生δ波。 从中我们知道，我们可以 准确地追踪睡眠， 即使不把人和电极相连， 我们也可以让人们睡得更深。 我们会继续探究 合适的声音环境和睡眠地点， 以帮助提升人们的睡眠健康。

Our sleep isn't as regenerative as it could be, but maybe one day soon, we could wear a small device and get more out of our sleep.
我们的睡眠还可以有更强的再生力， 在不久的将来， 也许我们可以佩戴一个小装置， 让我们从睡眠中获益更多。

frequency
n.频率；经常发生

participant
n.参与者

regenerative
adj.恢复的；新生的