**The Era of Online Learning – Niema Moshiri - TEDxUCSD**

* What if you can 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 20-hour work productivity
* It has come at the cost of our naturally occurring circadian rhythm and our body’s need for sleep
* 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 this sleep we need, with the average american sleeping a whole hour less than they did in the 1940s.
* For some reason, we decide 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.
* 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 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.
* 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.
* 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.
* We know now 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.
* But our brain wave in deep sleep have these long-burst brain waves that are very different from our walking 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 reactions 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.
* 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 learn a lot and I found I really do need, like most people eight hours of sleep.
* I even shifted my circadian component in order to by changing my meals, exercise and light exposure but I still could’nt find away to get a deeper night of sleep.
* That is until I met dr. Dmitry Gerashenko from Harvard Medical School, Dmity told me about a new finding in the literature.
* Where a lab of Germany showed that if you could place certain sounds at the right time and people sleep, you could actually makes deep sleeper and more efficient.
* And what’s more is that this lab showed that you actually could impove next day memory performance with this sound.
* Dmitri and I team up and we begin working on a way to build this technology with our research lab collaborates at Penn State, we designed experiments in order to validate our system and we since received grant funding from National Science Foundation and The National Institute of Health to develop this deep sleep stimulating technology.
* Here’re our works, people came in a lab and we hook them up to a number of devices, two of which I have on right here, not a fashion statement.
* When we dictated that people were in deep sleep, we play the deep sleep stimulating sound that was shown to make them have deeper sleep.
* I’m gonna demo this sound for you right now.
* Pretty weird, right?
* 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 the regenerative Delta waves.
* When we ask participants the next day about the sounds they are completely unware that we play the sounds, yet their brains responded with more of these delta waves.
* Here’s an image of someone’s brain waves from the study that we conducted.
* See the bottom pannel, 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 learn that we can accurately track sleep without hooking people up to electrodes and makes people sleep deeper.
* We’re continuing develop the right environment and sleep habitat to improve people sleep health.
* Our sleep isn’t as regenerative as could be, but maybe one day soon we can wear a small device and get more out of our sleep.