''A walk through the stages of sleep'' by Matt Walker

They have lost 25 percent of all of their sleep, but because REM sleep comes mostly in the second half of the night and particularly in those last few hours, they may have lost perhaps 50, 60, maybe even 70 percent of all of their REM sleep. So there are real consequences to understanding what sleep is and how sleep is structured. And we'll learn all about the benefits of these different stages of sleep and the detriments that happen when we don't get enough of them in subsequent episodes.

And what this produces is a standard cycling architecture of human sleep, a standard 90-minute cycle. But what's different, however, is that the ratio of non-REM to REM within those 90-minute cycles changes as we move across the night, such that in the first half the night, the majority of those 90-minute cycles are comprised of lots of deep non-REM sleep, particularly stages three and four of non-REM sleep. But as we push through to the second half of the night, now that seesaw balance actually shifts over, and instead, most of those 90-minute cycles are comprised of a lot more rapid eye movement sleep, or dream sleep, as well as stage-two non-REM sleep, that lighter form of non-REM sleep.

But as we move into deeper non-rapid eye movement sleep, stages three and four, now all of a sudden the brain erupts with these huge, big, powerful brain waves. The body is actually recharged in terms of its immune system. We also get this beautiful overhaul of our cardiovascular system. And, in fact, upstairs in the brain, deep non-REM sleep will help consolidate memories and fixate them into the neural architecture of the brain. So that's non-REM sleep.

And it turns out that there are implications for understanding how sleep is structured in this way. Let's take someone who typically goes to bed at 10pm, and they wake up at 6am, so they have an eight-hour sleep window. But this morning, they have to wake up early for an early morning meeting, or they want to get a jump start on the day to get to the gym. And as a consequence, they have to wake up at 4am in the morning, rather than 6am in the morning. How much sleep have they actually lost? Two hours out of an eight-hour night of sleep means that they've lost 25 percent of their sleep. Well, yes and no.

Sleep is perhaps the single most effective thing that we can do each and every day to reset the health of our brain and our body. And by understanding a little bit more about what sleep is, perhaps we can get the chance to improve both the quantity and the quality of our sleep. So, exactly what is sleep? Well, sleep, at least in human beings, is subdivided into two main types. On the one hand, we have non-rapid eye movement sleep, or non-REM sleep for short. But on the other hand, we have rapid eye movement sleep, or REM sleep. And non-REM sleep has been further subdivided into four separate stages, unimaginatively called stages one through four, increasing in their depth of sleep. And as we go into those light stages of non-REM sleep, your heart rate starts to decrease, your body temperature starts to drop and your electrical brain wave activity starts to slow down.

But let's come on to REM sleep, which is the other main type of sleep. And it's during REM sleep when we principally have the most vivid, the most hallucinogenic types of dreams. The brain wave activity actually starts to speed up again. It's during REM sleep that we receive almost a form of emotional first aid. And it's also during REM sleep where we get a boost for creativity, that it stitches information together so that we wake up with solutions to previously difficult problems that we were facing. Coming back to these two types of sleep, it turns out that non-REM and REM will play out in a battle for brain domination throughout the night, and that cerebral war is going to be won and lost every 90 minutes, and then it's going to be replayed every 90 minutes.

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