

# WHAT HAPPENS WHEN YOUR BRAIN

We all know the outward effects of not getting enough sleep. Our grogginess makes us lose focus, we have less energy, and it's much harder for us to make decisions. But what really happens to our brains when we don't get enough sleep? This infographic helps to answer this question.

## Lost Memories

The hippocampus, a moon-shaped structure in the temporal lobe, exhibits a distinct pattern of neural activity when the waking mind learns new information. Scientists believe our brain later "replays" the same pattern while we're sleeping to help the info stick. Lose sleep, lose long-term memories.

## Anger

Sleep loss primes us to focus on negative experiences, misinterpret facial expressions and pick fights. Emotional volatility may be a product of interrupted communication between brain regions.

## Impaired Wit

When you skimp on sleep, the clever commentary may not flow so easily. Sleep loss affects cognitive processes like divergent thinking, which helps us switch topics nimbly during conversation. Activity in the inferior frontal gyrus increases when sleep-deprived people tried to list uses for different objects, suggesting the brain draws on divergent thinking to compensate for strained cognitive functioning.

## Head in the Clouds

We all lose focus now and then, but brain activity linked to attention lapses changes when people lose sleep. These lapses correspond to altered thalamus functions and less-active frontal and parietal networks, which means we tune out when we're bored. When sleep-deprived people space out, they also exhibit impaired visual sensory processing, suggesting a whole other level of disengagement.

## Food Binges

Sleep loss corresponds with decreased activity in the frontal lobe, which controls decision-making, and more activity in the amygdala, a key player in the fear detection. Together, these neural changes dull judgement and ratchet up desire — the ideal mind-state for scarfing down fistfuls of bacon.

## False Memories

The sleep-starved brain may fail to encode memories successfully in the first place, thanks to altered function in the hippocampus, as well as prefrontal cortex and parietal lobe regions. People are more likely to incorporate misinformation into memories of events observed after a night without sleep.

## Cerebral Shrinkage

Healthy adults getting poor sleep lose volume in the frontal, temporal and parietal lobes. Researchers don't yet understand if sleep loss causes shrinkage or vice versa.

## Slurred Speech

The temporal lobe, the brain region associated with language processing, is highly active in well-rested people but inactive in their exhausted and enunciation-challenged counterparts.

## Risky Decisions

When sleep-deprived people prepare to make economic decisions, the brain's reward center in the prefrontal cortex lights up, suggesting they expect to win (e.g., make money). But when risky choices don't pan out, brain activity decreases in the region related to punishment (the anterior insula), suggesting people don't care about losing money like they would on a good night's sleep.

## Brain Damage

Add all-nighters to the list of things that kills brain cells — in this case, in the brain stem. The damage may be irreparable, making "catching up on lost sleep" a poor excuse for snoozing til noon on weekends.

## Hallucinations

The well-rested brain filters stimuli (noise, light, smell, etc.) to separate what matters from what doesn't and prevent sensory overload. When the brain can't filter information coming in, chaos ensues. After an all-nighter, people may begin to anticipate things that aren't there.

# DOESN'T SLEEP?

