

Chronic sleep deficit is a hallmark of modern times. Still, it is relatively seldom the object of the research. Total sleep deprivation catches much more attention, as it is more easy to control and more expressive in consequences. Both forms of sleep loss lead to worsened memory and attention, and susceptibility to distractions.

Sleep deprivation and the resulting daytime sleepiness is the source of human errors, often enough leading to dramatical consequences. Many 'headline news accidents' are associated with sleep deficit of people taking premature and/or improper decisions. Those decisions depend also on emotional state – mood, way of interpreting the situation (excessive optimism, risk taking), interpretation of the signals from other people, readiness to collaborate, responsibility or disregard for rules...

The consequences of sleep deficit for the emotional functioning were not studied systematically. It is surprising, considering the close relationship between the emotion and sleep-wake rhythmicity, what may be proved by the fact that nearly all mood disorders express co-occurring abnormalities of sleep. Matthew Walker from the University of California was a member of the team which studied the mechanism of excessive reactivity of brain structures to negative emotional stimuli and described it as follows: "It's almost as though, without sleep, the brain (...) was unable to put emotional experiences into context and produce controlled, appropriate responses."

The aim of this project is to describe the functioning – in states of chronic and acute sleep deficit – of brain 'reward system', structures responsible for experiencing positive stimuli, pleasures – from anticipation and desire, to enjoying it, and to satisfaction and satiety. Inability to gain pleasure from normally pleasurable experiences defines anhedonia, a symptom associated with many affective disorders (e.g., depression, addictions, post-traumatic stress disorder, eating disorders). Understanding conditionings and correlates of anhedonia will make us better prepared to prophylactic actions and treatment of the above problems.

In this project we will use magnetic resonance imaging, apply the battery of psychological questionnaires and measure the salivary hormones levels – cortisol and oxytocin. We want to study various kinds of hedonic experience – from 'sensual' to 'intellectual' and 'social' pleasures.

Description of functioning of the brain reward network in state of sleep deficit may help to explain the following phenomena:

- the well-known relationship of sleep deficit with bad eating habits (and obesity) – maybe in sleep deprivation the reward system activates so easily, that it is impossible to keep discipline and to restraint from unhealthy food;
- the therapeutic role of total sleep deprivation in the treatment of depression – if everything 'tastes better' in sleep deficit, maybe this is the secret of the temporary (until the recovery sleep) improvement of mood in many depressed patients;
- taking risky and ill-considered decisions by sleepless workers – as the immediate value of the reward (solving the problem or otherwise getting rid of it) is greater than usually.