

Sleep restriction desensitizes the serotonin 1A receptor system in rats

Roman V, Luiten PGM, Meerlo P

Department of Molecular Neurobiology, University of Groningen, Haren

Frequent sleep loss or sleep disturbance has adverse effects on mood and cognition, and may gradually result in neurobiological changes that sensitize individuals for neuropathologies such as depression. One of the neurobiological causes of mood disorders such as depression may be alterations of the serotonergic receptor sensitivity. Therefore, the present study in rats aimed to establish the effects of chronically restricted sleep on the functional sensitivity of serotonergic 1A receptors in the brain.

The study was performed with adult male Wistar rats. Half of the animals served as control. The other half was subjected to a chronic sleep restriction schedule allowing them to sleep 4h per day at the beginning of the light phase. The remainder of the time, the animals were kept awake by placing them in slowly rotating plastic drums. The sleep restriction schedule lasted for two days, one week, or one month. To determine the effects of sleep loss on serotonergic 1A receptor sensitivity, rats received an IP injection of the 1A agonist 8-OH-DPAT. The sensitivity to the drug was determined by measuring the acute hypothermic response by means of radio telemetry.

The drug induced an acute and short-lasting drop in body temperature. Sleep restriction significantly reduced the hypothermic response to the serotonergic 1A receptor agonist 8-OH-DPAT.

The present study shows that sleep restriction causes a desensitization of the serotonin 1A receptor system. Given the wealth of data indicating a role of the serotonin 1A receptor system in the regulation of behavior, emotionality and mood, it seems likely that sleep restriction along this way may affect the functional output of the brain. Further studies are needed to establish the importance of these changes for the development of depression-like behavior.

Viktor Roman, Department of Molecular Neurobiology, University of Groningen, Postbus 14, 9750 AA Haren, t 050 363 2363, e-mail v.roman@biol.rug.nl

Poster session: Neuroscience 2 on Thursday 3 June