

NEUROCHEMICAL CONTROL OF SLEEP AND WAKEFULNESS (*BIO333_2012; R. Winsky-Sommerer*)

WAKEFULNESS

The activated cortical state during wakefulness is induced by the activity of multiple waking neurochemical systems, incl.:

Serotonergic neurons (mainly localised in the dorsal raphe nucleus)

Noradrenergic neurons (localised in the locus coeruleus)

Cholinergic neurons (located in the brainstem while others are located in the basal forebrain)

Histaminergic neurons (located in the tuberomammillary nucleus)

Orexin-/hypocretin-producing neurons (posterior hypothalamus)

Altogether these systems control arousal and widely project and activate the thalamus and/or the cortex.

NREM sleep

The switch from Waking to NREM sleep is believed to be induced by the inhibition of all waking systems mentioned above by GABAergic neurons located in the ventral preoptic area of the hypothalamus (VLPO).

At the onset of sleep, VLPO sleep-active neurons are activated by the circadian clock localised in the suprachiasmatic nucleus of the hypothalamus (SCN) and adenosine, hypnogenic factor which concentration increases during waking.