Neurotransmitter Receptors in the Substantia Nigra & the Tuberomammillary Nucleus

The Substantia Nigra

The substantia nigra (SN) is an area of deeply pigmented cells in the midbrain that regulates movement and coordination. Neurons of the SN are divided into the substantia nigra pars compacta (SNc) and the substantia nigra pars reticulata (SNr). Neurons of the SN produce Dopamine, which stimulates movement. In contrast, GABAergic neurons of the SNr can stimulate or inhibit movement depending on the input signal.

The SN controls movement by functioning as part of the basal ganglia, a network of neurons that control voluntary movement and information. Along with the SN, the basal ganglia includes the caudate, the putamen, and the globus pallidus, which is further divided into the globus pallidus internus (Gpi) and the globus pallidus externa (Gpe). Excluding the caudate, which is thought to be involved in learning and memory, the nucleus of the basal ganglia receive signals from the cerebral cortex and the thalamus. The combined actions of signals transmitted via the direct and indirect pathways, which causes a net loss of motor activity or a reduction in fine movement control.

The SN is involved in the direct pathway, which causes a net loss of motor activity or a reduction in fine movement control. The indirect pathway, which causes a net loss of motor activity or a reduction in fine movement control, is thought to be downregulated in Parkinson's disease. The combined actions of signals transmitted via the direct and indirect pathways are believed to be a key factor in Parkinson's disease.

The number of neurons in the SN has been estimated to be as low as 65,000 in primates and 4,000 in rodents. Neurons in the SN have the highest number of GABAergic and glutamatergic receptors, which are involved in the regulation of movement and coordination. The combined actions of signals transmitted via the direct and indirect pathways are believed to be a key factor in Parkinson's disease.

The Tuberomammillary Nucleus

The Tuberomammillary nucleus (TMN) is a small area of cells located in the hypothalamus. The TMN is involved in the regulation of sleep, wakefulness, and appetite. TMN neuron groups E1 and E2 contribute to wakefulness either collectively or individually, impact sleep, the stress response, and a reduction in fine movement control.

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