Nucleus

see also Cell nucleus.

In neuroanatomy, a nucleus is a cluster of densely packed neurons, located deep within the cerebral hemispheres and brainstem.

The neurons in one nucleus usually have roughly similar connections and functions.

It is one of the two most common forms of nerve cell organization, the other being layered structures such as the cerebral cortex or cerebellar cortex. In anatomical sections, a nucleus shows up as a region of gray matter, often bordered by white matter. The vertebrate brain contains hundreds of distinguishable nuclei, varying widely in shape and size. A nucleus may itself have a complex internal structure, with multiple types of neurons arranged in clumps (subnuclei) or layers.

The term “nucleus” is in some cases used rather loosely, to mean simply an identifiably distinct group of neurons, even if they are spread over an extended area. The reticular nucleus of the thalamus, for example, is a thin layer of inhibitory neurons that surrounds the thalamus.

Some of the major anatomical components of the brain are organized as clusters of interconnected nuclei. Notable among these are the thalamus and hypothalamus, each of which contains several dozen distinguishable substructures. The medulla and pons also contain numerous small nuclei with a wide variety of sensory, motor, and regulatory functions.

In the peripheral nervous system, a cluster of neurons is referred to instead as a ganglion.

Examples

Caudate nucleus

Dentate nucleus

Hypoglossal nucleus

Lenticular nucleus

Lentiform nucleus

Nucleus accumbens

Nucleus ambiguus

Nucleus intercalatus

Nucleus raphe dorsalis

Olivary nucleus

Subthalamic nucleus

Suprachiasmatic nucleus

Ventral intermediate nucleus