Interneuron

An interneuron (also called relay neuron, association neuron, connector neuron or local circuit neuron) is one of the three classifications of neurons found in the human body.

Interneurons create neural circuits, enabling communication between sensory or motor neurons and the central nervous system (CNS). They have been found to function in reflexes, neuronal oscillations, and neurogenesis in the adult mammalian brain.

Classification

Interneurons can be further broken down into two groups:

Local interneurons, and relay interneurons.

Relay interneurons have long axons and connect circuits of neurons in one region of the brain with those in other regions.

The interaction between interneurons allow the brain to perform complex functions such as learning, and decision making.

see spinal interneuron —- Unlike the peripheral nervous system (PNS), the central nervous system, including the brain, contains many interneurons. In the neocortex (making up about 80% of the human brain), approximately 20-30% of neurons are interneurons.

Interneurons in the CNS are primarily inhibitory, and use the neurotransmitter GABA or glycine. However, excitatory interneurons using glutamate in the CNS also exist, as do interneurons releasing neuromodulators like acetylcholine.

In 2008, a nomenclature for the features of GABAergic cortical interneurons was proposed, called Petilla terminology.

The hippocampus has contributed enormously to our understanding of the operation of elemental brain circuits, not least through the classification of forebrain interneurons. Understanding the operation of interneuron networks however requires not only a wiring diagram that describes the innervation and postsynaptic targets of different GABAergic cells, but also an appreciation of the temporal dimension. Interneurons differ extensively in their intrinsic firing rates, their recruitment in different brain rhythms, and in their synaptic kinetics. Furthermore, in common with principal neurons, both the synapses innervating interneurons and the synapses made by these cells are highly modifiable, reflecting both their recent or remote use (short-term and long-term plasticity) and the action of extracellular messengers [1)].

1)

Kullmann DM. Interneuron networks in the hippocampus. Curr Opin Neurobiol. 2011 Oct;21(5):709-16. doi: 10.1016/j.conb.2011.05.006. Review. PubMed PMID: 21636266.