Neurotrophin 3 is a protein growth factor which has activity on certain neurons of the peripheral and central nervous system; it helps to support the survival and differentiation of existing neurons, and encourages the growth and differentiation of new neurons and synapses.

Neurotrophin 4 is a neurotrophic factor that signals predominantly through the TrkB receptor tyrosine kinase.

NGF is a polypeptide composed of three subunits, α, β and γ. The β-subunit itself is a homodimer of peptides composed by 118 amino acids and is responsible for the full biological activity of NGF. Its structure is well preserved among different species, with 90% homology between murine and human NGF. NGF regulates growth and survival of nerve cells, profoundly affecting the development of both young and adult nervous system.

In adults, NGF was shown to be effective in pain/hyperalgesia, as well as in several eye diseases, such as neurotrophic keratitis, optic nerve transection, ocular hypertension and retinal detachment. Said data have been reported mainly for NGF extracted from murine salivary glands, even these preparations are heterogeneous mixtures of different dimers.

Recently, human NGF was synthesized using genetic engineering techniques (Iwane et al., Biochem. Biophys. Res. Commun., 171: 116, 1990; EP0994188B1, WO2013/092776), with the advantage to obtain a more homogeneous form of protein to be administered to patients. Various animal models were used to stimulate and investigate the morphological and physiologic effects of the insults to the inner ear. When administered to deafened cochlea in animal models, neurotrophins, showed to be able to dramatically improve spiral ganglion neuron survival and to stimulate peripheral auditory fiber regrowth.