

# Muscle and Neuronal Nicotinic Acetylcholine Receptors

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## Editorial

Nicotinic acetylcholine receptors (nAChRs) are a family of ligand-gated ion channels (LGICs) that are widely distributed in the nervous system and muscle. They are composed of five subunits: two  $\alpha$  subunits, two  $\beta$  subunits, and one  $\gamma$  subunit in muscle nAChRs, and two  $\alpha$  subunits, three  $\beta$  subunits, and one  $\delta$  subunit in neuronal nAChRs. The  $\alpha$  subunit is the primary binding site for acetylcholine (ACh) and is highly conserved across species. The  $\beta$  subunit is also conserved but has a lower affinity for ACh. The  $\gamma$  and  $\delta$  subunits are more variable in sequence and function. The nAChR is a heteropentamer with a stoichiometry of  $2\alpha:2\beta:\gamma$  in muscle and  $2\alpha:3\beta:\delta$  in neurons. The receptor is activated by ACh, which binds to the  $\alpha$  subunit, causing a conformational change that opens the ion channel. This allows the flow of cations, primarily  $Ca^{2+}$  and  $Na^{+}$ , into the cell, leading to depolarization and activation of downstream signaling pathways. The nAChR is a key component of the neuromuscular junction and is involved in various physiological processes, including muscle contraction, learning, and memory. Mutations in the nAChR subunits can lead to various neurological disorders, including myasthenia gravis and congenital myasthenic syndrome. The nAChR is also a target for various drugs, including anesthetics, anticholinergics, and cholinergic agonists. The nAChR is a complex protein with a high degree of structural and functional diversity. It is a member of the LGIC family, which includes other receptors such as GABA<sub>A</sub> receptors and glycine receptors. The nAChR is a heteropentamer with a stoichiometry of  $2\alpha:2\beta:\gamma$  in muscle and  $2\alpha:3\beta:\delta$  in neurons. The  $\alpha$  subunit is the primary binding site for ACh and is highly conserved across species. The  $\beta$  subunit is also conserved but has a lower affinity for ACh. The  $\gamma$  and  $\delta$  subunits are more variable in sequence and function. The nAChR is activated by ACh, which binds to the  $\alpha$  subunit, causing a conformational change that opens the ion channel. This allows the flow of cations, primarily  $Ca^{2+}$  and  $Na^{+}$ , into the cell, leading to depolarization and activation of downstream signaling pathways. The nAChR is a key component of the neuromuscular junction and is involved in various physiological processes, including muscle contraction, learning, and memory. Mutations in the nAChR subunits can lead to various neurological disorders, including myasthenia gravis and congenital myasthenic syndrome. The nAChR is also a target for various drugs, including anesthetics, anticholinergics, and cholinergic agonists.

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