Electrophysiological studies and pharmacological properties of insect native nicotinic acetylcholine receptors

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Résumé en anglais	The existence of several nicotinic acetylcholine receptor genes in insects suggests that many nicotinic receptor subtypes are present, but the identification and characterization of these subtypes in native neurons has been limited. Their pharmacological properties came from electrophysiological studies in which variations in the sensitivity of insect neurons were correlated with time course, current amplitudes, desensitization rates occurring in varying proportions in different cells. Thus pressure application of agonists on cultured cells induced inward currents showing that acetylcholine and nicotine were partial agonists of some cells with a lower efficacy while they were full agonists in other neurons. The variation in kinetics appeared to be due to differential expression of distinct nicotinic receptor subtypes as corroborated by the blocking activity induced by antagonists. In fact, the alpha-bungarotoxin-sensitive nicotinic receptor subtypes described as homomeric could be also heteromeric receptors. Interestingly, some receptors mediating nicotinic responses have been termed ‘mixed’ receptors because they were blocked by a range of nicotinic and muscarinic antagonists. Following electrophysiological studies, it has been also demonstrated that insect nicotinic receptors were modulated by Ca^{2+} pathways. Ca^{2+} permeability through insect nicotinic receptors, voltage-gated Ca^{2+} channels or released from intracellular stores represents an important indication of insect native nicotinic acetylcholine receptor modulation. The Ca^{2+} flow may trigger a variety of cytosolic Ca^{2+} pathways underlying many cellular processes such Calmodulin kinase, PKA and PKC. Most of the studies suggested that the effect of phosphorylation mechanism was dependent on the receptor subtype.

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