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# Insect Neuropeptides: As Potential Targets for Pest Control

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Neuropeptides are cellular components which are synthesized in specialized neuro glandular cells of invertebrate ganglion. It consists of amino acid residues linked by the peptide bond and act as most diverse signaling substances both structurally and functionally in the insect systems. These oligopeptides are synthesized as biologically inactive large protein molecules termed as precursors, which undergo post translation changes to convert into active peptides (Altstein, 1989) and are well known to involve insect life viz., development, growth, reproduction and metabolisms. The peptides are synthesized from respective cells or organs and are transported through the haemolymph to the target organs and acts upon the receptor sites. Changes in signaling pathway and receptor sites of these peptides could alter the insect physiological functions and it can be exploited for pest control strategies through man made manipulations. Hence, in near future, insect neuropeptides and their receptors are promising targets for generation of novel selective insecticides for successful pest management.

## Functions of insect neuropeptides

Insect neuropeptides are involves in many physiological functions of insects. They play a vital role in the growth and development, behavior and reproduction, metabolism and homeostatis and muscle movement. The large peptides also act as hormone (Prothocic Trophic Hormone and Bursicon). They play a fundamentals role in embryonic and postembryonic processes like moulting and diapauses, which are regulated by the peptides, PTTH, allatostatin, allatotropin and eclosion hormones, which are secreted from neurohaemal organs and neurosecretory cells. Homeostasis functions viz., blood sugar regulation, mobilization of fats during the flight, diuresis and antidiuresis functions are regulated by the peptide, adipokinetic hormone(AKH) and behavior functions like migration, mating and oviposition are influenced by the hormone pheromone biosynthesis activating hormone (PBAN), which are secreted on neuroglandular cells. These physiological functions are exerted, while interaction with specific receptors, termed as G-protein coupled receptors (GPCRs) and the receptors of respective neuropeptides like AKH receptor, allatotropin receptor, allatostatin receptor, diuretic hormone receptor, ecdysone triggering hormone receptor, myosuppressing receptor, proctolin receptor and sex peptide receptor (Caers et al., 2012).

Possible control strategies using insect neuropeptides

As the neuropeptides occupies inevitable role in insect survival, novel pest control strategies can be exploited. Physiological functions of peptides can be manipulated with use of antagonist or inhibitors of biosynthetic enzymes. These could be achieved at any level of synthesis, release and

biological activity. Further, diverse nature of neuropeptides and its receptors among the insect species provides enormous scope to use them as potential targets for development of new insecticides with specific selectivity. These selective insecticides are environmentally safer thus play an alternative to the broad spectrum chemicals, where insecticide resistance are challenging. Neuropeptides signaling system can be disturbed by developing synthetic ligands and peptide analog mimetics and pesticides, which interfere with their regular functions. Employing peptidase induced degradation and down regulation of synthesis and receptors using RNAi induced gene silencing of specific neuropeptides would give some new area in this field. However, it needs through knowledge of synthesis pathways which regulates the physiological functions, characterization of receptor sites and peptide signaling systems are essential to exploit this area. Therefore, insect neuropeptides and its receptors are the candidates to develop the selective insecticide, which would fit well in future pest management programmes.

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