

**CHARACTERIZATION OF THE INSECT CUTICLE SCLEROTIZATION
HORMONE BURSICON AND BURSICON-REGULATED GENES IN THE
HOUSE FLY *MUSCA DOMESTICA***

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ABSTRACT

Bursicon is a neurohormone that regulates the cuticle sclerotization and wing expansion process in insects. Bursicon is a heterodimeric cystine knot protein containing two subunits, burs α and burs β , which are encoded by two genes, *burs α* and *burs β* . In the current study, the *burs α* and *burs β* genes were cloned from the house fly *Musca domestica*. The transcriptional profiles of *burs α* and *burs β* genes were analyzed in the central nervous systems of *M. domestica*. Recombinant *M. domestica* bursicon heterodimer (r-bursicon) was expressed in mammalian 293 cells and insect HighfiveTM cells, and was analyzed for bursicon function. Using the r-bursicon with a fly neck-ligation assay and the DNA microarray analysis, a panel of genes that is regulated by bursicon was identified from *M. domestica* and also the fruit fly *Drosophila melanogaster*. Two of these genes, *suppressor of hairless* and *pleckstrin homology*, were cloned and sequenced for further study in *M. domestica* (designated *mdSu(H)* and *mdPH*). The mdSu(H) is a transcription factor involved in an important signal transduction pathway, the Notch signaling pathway, and the mdPH is possibly responsible for regulating the G protein coupled receptor 2, which is proposed to be the receptor of bursicon. By studying mdSu(H) and mdPH, we have provided two excellent components that very likely involved in the bursicon regulated signal transduction pathway during the insect cuticle sclerotization and wing expansion process.