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Strategies of Drug Discovery in Insects

Authors : Alaaeddeen M. Seufi

Abstract : Many have been published on therapeutic derivatives from living organisms including insects. In addition to traditional maggot therapy, more than 900 therapeutic products were isolated from insects. Most people look at insects as enemies and others believe that insects are friends. Many beneficial insects rather than Honey Bees, Silk Worms and Shellac insect could insure human-insect friendship. In addition, insects could be MicroFactories, Biosensors or Bioreactors. InsectFarm is an amazing example of the applied research that transfers insects from laboratory to market by Prof Mircea Ciuhrii and co-workers. They worked for 18 years to derive therapeutics from insects. Their research resulted in production of more than 30 commercial medications derived from insects (e.g. Imunomax, Noblesse, etc.). Two general approaches were followed to discover drugs from living organisms. Some laboratories preferred biochemical approach to purify components of the innate immune system of insects and insect metabolites as well. Then the purified components could be tested for many therapeutic trials. Other researchers preferred molecular approach based on proteomic studies. Components of the innate immune system of insects were then tested for their medical activities. Our Laboratory team preferred to induce insect immune system (using oral, topical and injection routes of administration), then a transcriptomic study was done to discover the induced genes and to identify specific biomarkers that can help in drug discovery. Biomarkers play an important role in medicine and in drug discovery and development as well. Optimum biomarker development and application will require a team approach because of the multifaceted nature of biomarker selection, validation, and application. This team uses several techniques such as pharmacoepidemiology, pharmacogenomics, and functional proteomics; bioanalytical development and validation; modeling and simulation to improve and refine drug development. Our Achievements included the discovery of four components of the innate immune system of Spodoptera littoralis and Musca domestica. These components were designated as SpliDef (defesin), SpliLec (lectin), SpliCec (cecropin) and MdAtt (attacin). SpliDef, SpliLec and MdAtt were confirmed as antimicrobial peptides, while SpliCec was additionally confirmed as anticancer peptide. Our current research is going on to achieve something in antioxidants and anticoagulants from insects. Our perspective is to achieve something in the mass production of prototypes of our products and to reach it to the commercial level. These achievements are the integrated contributions of everybody in our team staff.

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