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Galleria mellonella for testing new therapeutic drugs

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The innate immune system of insects matches with the human innate immune system to a fault, and one of the main contributions of its purity is one of its imperfections — the lack of a proper adaptive immunity system. The idea that the JAK/STAT pathway, a cellular pathway that usually regulates cell division and growth in mammals, can also work to relieve stress and external healing, was discovered after an in-depth study of the innate immune system in insects. Galleria mellonella, also known as the greater wax moth, can be regarded as one of the most excellent insect model organisms, as they have no ethical boundaries (being a mini-host). Additionally, the maintenance of this insect is very easy and suitable for researchers. Besides, their reaction towards the invasion of pathogens has been studied to be very similar to that of humans. The cell-mediated defence mechanism in G. mellonella consists largely of hemocytes, the functions of which are similar to that of neutrophils and macrophages in mammals. The study of the transcriptome of the larvae has suggested new prospects for exploring the bioactive molecules and has also shown scope for genetic manipulation. For the testing of new therapeutic drugs, the use of insects and mainly G. mellonella at an initial trial stage is becoming very popular because the virulent human pathogens react similarly in the insect’s cellular environment as they do in humans. By using different mutant strains of some virulent organisms, experiments are being done to study their level of pathogenicity, and the research studies are later being used as a background in order to develop new drugs. G. mellonella is also being subjected to trials where the mutant strains of virulent pathogens are injected, alongside the antibacterial or antiviral drugs. Therefore, insects can be used as mini-hosts at a smaller stage, prior to studying the effects of drugs in larger animals or humans.

Keywords: Immunity, Model organism, Haemocytes, Therapeutic drugs, Virulence

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