Toxicological evaluation of the entomotoxin Cry1Ac: haematological, biochemical and proteomic analyses


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Insects are responsible for losses of 30% of global agricultural production. Cry δ-endotoxins, obtained from Bacillus thuringiensis, an entomopathogenic microorganism, have been considered one of the most viable alternatives on biological control. Due to their insecticidal potential, specificity and innocuousness to non-target organisms, they are widely used in agriculture. As genetically modified organisms (GMOs) are becoming increasingly prevalent, several researches should be conducted to investigate the safety of foods derived from GMOs. This work aimed to evaluate the acute toxicity of Cry1Ac entomotoxin in Wistar rats through classical toxicological analyses in accordance with the protocol 425 of the Organization of Economic Cooperation and Development – OECD, as well as proteomic analysis of serum after removal of immunoglobulin G and albumin. Animals treated with Cry1Ac (n = 6) received a dose of 2000 mg/kg and negative control received 0.9% saline solution. After 14 days, no deaths or signs of toxicity were observed. The haematological and biochemical parameters remained within the normal range, except for creatinine, which increased by 32%. In addition, the pancreas appeared slightly smaller in animals treated with Cry1Ac, with a reduction of about 0.8% if compared to control group. Proteomic analyses showed no exclusive spots between control and treated groups. However, five spots were differentially expressed, showing a decreased expression pattern in Cry1Ac group. Further studies are necessary to determine whether these differences are relevant to the study of toxicity through the identification of these proteins by mass spectrometry techniques and/or N-terminal sequencing.

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