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Chapter 6 - Antioxidant genes, the insecticide diazinon, and toxicity

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Abstract

Organophosphoruses (OPs) are a group of pesticides that include some of the most toxic chemicals employed in agriculture. OPs toxicity is due to the capability of these chemical substances to inhibit the enzyme cholinesterase (ChE) at cholinergic junctions of the nervous system; however, oxidative stress and generation of cellular reactive oxygen species (ROS) may be involved in the toxicity of these pesticides. Exposure to OPs pesticides induces considerable imbalance between the production of free radicals and the antioxidant defense system in the body, causing significant health implications. Oxidative damage is aggravated by altering the antioxidant enzymes activities and the expressions of corresponding genes such as superoxide dismutase (SOD), catalase (CAT), glutathione S-transferase (GST), Paraoxonases (PONs), and glutathione peroxidase (GPx), which act as free radical scavengers in conditions associated with oxidative stress. It is worth mentioning that diazinon (DZN) is one of the most prevalent OP compounds and a food contaminant, which is absorbed from the gastrointestinal tract and rapidly metabolized. Biochemical signs of toxicity from acute exposure to DZN, the gene expression of antioxidant enzymes, reveal a different pattern of changes in the expression of genes in the DZN-metabolizing tissues such as the liver.

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Keywords

Organophosphoruses; Reactive oxygen species; Oxidative stress; Diazinon; Antioxidant genes

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