

Pesticide toxicity: a mechanistic approach

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Abstract

Pesticides are known for their high persistence and pervasiveness in the environment, and along with products of their biotransformation, they may remain in and interact with the environment and living organisms in multiple ways, according to their nature and chemical structure, dose and targets. In this review, the classifications of pesticides based on their nature, use, physical state, pathophysiological effects, and sources are discussed. The effects of these xenobiotics on the environment, their biotransformation in terms of bioaccumulation are highlighted with special focus on the molecular mechanisms deciphered to date. Basing on targeted organisms, most pesticides are classified as herbicides, fungicides, and insecticides. Herbicides are known as growth regulators, seedling growth inhibitors, photosynthesis inhibitors, inhibitors of amino acid and lipid biosynthesis, cell membrane disrupters, and pigment biosynthesis inhibitors, whereas fungicides include inhibitors of ergosterol biosynthesis, protein biosynthesis, and mitochondrial respiration. Insecticides mainly affect nerves and muscle, growth and development, and energy production. Studying the impact of pesticides and other related chemicals is of great interest to animal and human health risk assessment processes since potentially everyone can be exposed to these compounds which may cause many diseases, including metabolic syndrome, malnutrition, atherosclerosis, inflammation, pathogen invasion, nerve injury, and susceptibility to infectious diseases. Future studies should be directed to investigate influence of long term effects of low pesticide doses and to minimize or eliminate influence of pesticides on non-target living organisms, produce more specific pesticides and using modern technologies to decrease contamination of food and other goods by pesticides.

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