

Immunomodulatory effects of alpha-cypermethrin on cytokine production in greenhouse workers

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Objectives

Cypermethrin (CYP) belongs to type II synthetic pyrethroid insecticides and is widely utilized for agricultural and environmental applied.

Synthetic pyrethroids are neurotoxins: they affect axons of the neurons of the peripheral and central nervous system.

Pyrethroids, and particularly CYP, induced cytotoxic and genotoxic effects both singularly and in synergy with other pesticides and/or contaminants.

Aim of the present study was to evaluate the effects of Alpha-cypermethrin (α -CYP) on plasma levels of IL-1 β , IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-12p70, TNF- α , TNF- β and interferon- γ (INF- γ) from occupationally exposed greenhouse workers (GhW). Urinary levels of 3-phenoxybenzoic acid (3-PBA), a metabolite of Alpha-CYP, were also determined.

Methods

The study population consisted of 30 GhW specialized in pesticide spraying who worked for companies located in the Ragusa province of Sicily and 30 control, office workers. GhW typically manipulate various pesticides (mostly pyrethroids) throughout the year, depending on the season and on cultivation type in the greenhouse. GhW were exposed to α -CYP during the mixing, loading and spraying of insecticides and during the cleaning of the nozzles, servicing of the devices and reentry to treated areas

Results

Urinary 3-PBA levels in GhW were significantly ($p < 0,01$) higher than control. In fact, the mean urinary 3-PBA level in GhW was 7.8 ± 2.1 $\mu\text{g/g}$ creatinine; while the concentration of 3-PBA in control group was always below the LOD.

The mean plasma IL-1 β , IL-4, IL-5, IL-6, IL-10, IL-12p70, TNF- α and TNF- β levels were not significantly different between the two groups of workers in the study. Mean plasma INF- γ and IL-8 levels were significantly ($p < 0,05$) different between GhW and control group; mean plasma IL-2 level was more significantly ($p < 0.001$) higher in GhW than control. No correlation was found between urinary 3-PBA levels of GhW and plasma levels of cytokines detected.