P27-16
Oxidative stress and inflammation in malathion disrupted hepatic glucose metabolism

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Keywords: Organophosphate; Inflammation; Glucose metabolism; Oxidative stress.

Purpose: A lot of studies show that organophosphate pesticides exert several effects on glucose homeostasis. The present study investigates the influence of subchronic exposure to malathion on hepatic gluconeogenesis in relation to acetyl cholinesterase inhibition, oxidative stress and inflammatory response in the rat.

Methods: Malathion was administered by gavage at doses of 25, 50 and 100 mg/kg for 32 days.

Results & Conclusion: Fasting hyperglycemia was seen in line with increased activity of hepatic phosphoenolpyruvate carboxykinase, glucose 6-phosphatase, and tumor necrosis factor alpha. In addition to the impaired glucose tolerance and inhibition of acetyl cholinesterase activity in a dose-dependent manner, there were significant increases in hepatic lipid peroxidation, carbonyl groups and 8-deoxyguanosine as the biomarkers of reactive oxygen species mediated damage to lipid, protein and DNA, respectively.

The results suggest the possibility of malathion-induced insulin resistance in the liver through oxidative and inflammatory signaling pathways.

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P27-17
Operator exposure during fungicide applications in vineyards

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Purpose: The goal of the study was the establishment of field datasets of dermal and inhalation operator exposure levels during fungicide applications in vineyards. The comparison of those experimental measurements to the results of exposure predictive models used for regulating purposes, can highlight the robustness of such models in common plant protection product application scenarios, as in vineyards.

Methods: Operator dermal exposure (actual and potential) was monitored according to the whole body dosimetry method. Inhalation exposure was monitored using personal air sampling devices. Ten field trials were conducted by 5 different operators using tractor assisted hand-held lance with spray gun at Tanagra region of Viotia, Greece. An in-house GC-ECD analytical method was developed and validated for the analytical determination of penconazole which was the active substance of the fungicide formulation used in field trials.

Results and conclusions: From the overall comparison of the potential dermal exposure (PDE) of operator body (trunk and legs), hand and head it was concluded that, for the specific application scenario studied, the major contribution (ca 90%) came from the body exposure. Another 8% of the PDE values was attributed to the potential hand exposure while the rest accounted for head exposure. The comparison of the experimental values to those derived from the German model, used for regulating purposes, addressed the importance of considering possible cases where over or under estimation of operator exposure may occur, mainly when specific application scenario features (not directly comparable to the model application scenario adopted) are not taken into account.

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P27-18
Estimation of the distance between Trp-214 of HSA and TCP pesticide metabolite

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Human serum albumin (HSA) is the most abundant protein in the blood plasma, and is a major protein in the extracellular compartment. It is responsible for distributing and metabolizing many endogenous and exogenous ligands such as fatty acids, bilirubin, pharmaceuticals, metal ions, dyes, and pesticides. Pesticides potential health hazard is identified due to their high affinity to biomacromolecules such as proteins. Binding of pesticides to plasma proteins has toxicological importance, since it could cause some changes in HSA structure and its function. 3,5,6-Trichloro-2-pyridinol (TCP) is a stable metabolite of two major pesticides, Chlopyrifos insecticide and Triclopyr herbicide, which are widely used in the world. So by calculating the distance between HSA and TCP one of the binding properties would be found.

HSA has a single tryptophan residue (Trp-214). The distance between the Trp-214 and the bound TCP could be determined using fluorescence resonance energy transfer (FRET). The energy transfer will take place under some conditions such as distance between the donor and the acceptor (R_0). The value of R_0 is 4.4 nm using the following equations:

$$R_0{}^6 = 8.8 \times 10^{-25} K^2 N^{-4} \varphi$$

$$E = \frac{R_0{}^6}{R_0{}^6 + R^6} = \frac{1 - F}{F_0}$$

This distance is very low, so this binding can cause some structural changes in HSA or may indicate that TCP occupies the binding sites in HSA and thus interfere in HSA transportation and function as a pseudo-enzyme.

We conclude that more attention should be paid in the widespread usage of pesticides; also the importance of biological control of pests in agriculture should be taken into account.

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P27-19
Toxicological studies of diuron herbicide in male albino rats

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Diuron is a substituted urea herbicide widely used on agricultural crops such as soy, cotton and sugar cane. The current study aimed to evaluate some toxicological effects induced by diuron