Basal forebrain cholinergic neuronal dendritic spines alteration after acute and long-term chlorpyrifos exposure.

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INTRODUCTION

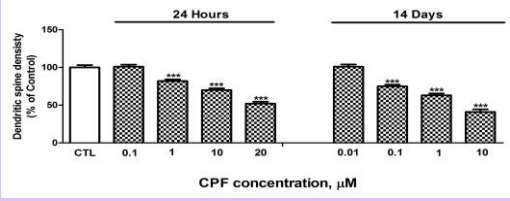
Chlorpyrifos (CPF) is an organophosphate insecticide reported to induce both after acute and repeated exposure learning and memory dysfunctions, although the mechanism is not completely known. CPF produces basal forebrain cholinergic neuronal loss, involved on learning and memory regulation, which could be the cause of such cognitive disorders. Otherwise, neuronal dendritic spines were reported to be also involved on learning and memory process regulation and their alteration could also contribute to this effect. In this regard, CPF has been reported to induce an alteration in the dendritic spines density in the prefrontal cortex and hippocampus after acute and repeated exposure to subclinical doses respectively, thus their alteration in basal forebrain cholinergic neurons could also mediate cognitive disorders. Accordingly, we hypothesized that CPF induces basal forebrain cholinergic dendritic spine alteration at low concentrations and at higher concentrations produces cell death.

METHODS

We evaluated in septal SN56 basal forebrain cholinergic neurons, the CPF effect after 24 h and 14 days exposure on dendritic spines.

RESULTS

This study shows that CPF induces after acute and long-term exposure an alteration of dendritic spines at lower concentrations than which induces cell death. Evaluation of genes related to dendritic spine plasticity revealed that some of them are altered at lower concentrations than which produces the effects observed and below the No Observed Adverse Effect (NOAEL).



CONCLUSIONS

The present finding suggests that the use of gene expression profile could be a more sensitive and accurate way to determine the NOAEL