Primary hippocampal neuronal cell death induction after acute and repeated paraquat exposures mediated by glutamatergic transmission disruption.

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INTRODUCTION

Paraquat (PQ) is a widely used non-selective contact herbicide shown to produce memory and learning deficits after acute and repeated exposure similar to those induced in Alzheimer's disease (AD). However, the complete mechanisms through which it induces these effects are unknown. On the other hand, glutamatergic system, mainly in the hippocampus, are involved on learning, memory and cell viability regulation. An alteration of hippocampal glutamatergic transmission or neuronal cell loss may induce these effects. In this regard, it has been suggested that PQ may induce cell death and affect glutamatergic transmission, which alteration could produce neuronal loss. According to these data, we hypothesized that PQ could induce hippocampal neuronal loss through glutamatergic transmission alteration.

METHODS

To prove this hypothesis, we evaluated in hippocampal primary cell culture, the PQ toxic effects after 24 h and 14 consecutive days exposure on neuronal viability and the glutamatergic mechanism related to it.

RESULTS

This study shows that PQ disrupted glutamate levels through induction of glutaminase activity. In addition, PQ induced, after 24 h and 14 days exposure, cell death on hippocampal neurons that was partially mediated by glutamatergic transmission disruption.

CONCLUSIONS

Our present results provide new view of the mechanisms contributing to PQ neurotoxicity and may explain cognitive dysfunctions observed after PQ exposure.