



Cadmium induces cholinergic transmission disruption in SN56 cholinergic neurons from basal forebrain.



María Jesús Díaz¹, Paula Moyano², María Teresa Frejo¹, Gloria Gomez²,
María José Anadón², Margarita Lobo¹, Jimena García³, Miguel Andrés
Capo¹, José Manuel García² and Javier del Pino¹

¹Complutense University, School of Veterinary Medicine, Madrid 28040, Spain.

²Complutense University, Medical School, Madrid 28040, Spain.

³Alfonso X University, Health Sciences School, Madrid 28691, Spain.

INTRODUCTION

Cadmium is an environmental pollutant, which is a cause of concern because it can be greatly concentrated in the organism causing severe damage to a variety of organs including the nervous system, which is one of the most affected. Cadmium is a neurotoxic compound which induces cognitive alterations similar to those produced by Alzheimer's disease (AD). However, the mechanism through which cadmium induces this effect remains unknown. In this regard, cholinergic system in central nervous system (CNS) is implicated on learning and memory regulation, and it has been reported that cadmium can affect cholinergic transmission and it also induces a more pronounced cell death on cholinergic neurons from basal forebrain, which may explain cadmium effects on learning and memory processes. According to all above, an alteration of cholinergic transmission in basal forebrain cholinergic neurons, may results in the cognitive disorders observed after cadmium exposures.

METHODS

The present study is aimed at researching the selective neurotoxicity induced by cadmium on cholinergic system in CNS. For this purpose we evaluated, in basal forebrain region, the cadmium toxic effects on cholinergic transmission in NS56 cholinergic murine septal cell line.

RESULTS

This study proves that cadmium induces an alteration of Ach levels and acetylcholinesterase (AChE) and choline acetyltransferase (ChAT) activities in SN56 cells. The alteration of Ach levels was independent of alteration of AChE activity, but dependent of ChAT activity reduction.

CONCLUSIONS

Our present results provide new understanding of the mechanisms contributing to the harmful effects of cadmium on cholinergic neurons and suggest that cadmium could mediate the cognitive disorders through alteration of cholinergic transmission..

