

# Association between cholinesterase's inhibition and cognitive impairment: A basis for prevention policies of environmental pollution by organophosphate and carbamate pesticides in Chile

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## Abstract

**Background:** In Chile organophosphate pesticides are widely used in the production of fruits. Pesticides use is regulated for professional practice but there is no regulation regarding exposure to the general population.

**Objective:** To relate exposure to cholinesterase's inhibitor pesticides during the spray season with neuropsychological impairment in occupationally exposed (OE) and environmentally exposed (EE) groups of people.

**Methods:** Exposure was assessed through inhibition of acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) activity and neuropsychological outcomes were evaluated through a large battery of tests covering general mental status, language, memory, attention, executive function, praxis and psychomotricity. Evaluations were carried out firstly in a period of no/low organophosphate pesticide use and subsequently during the spray season. All parameters were calculated as the relative change from baseline to spray season.

**Results:** For this study in total 156 participants were recruited divided equally over participants with environmental exposures (EE) and participants with occupational exposure (OE). In the EE, BChE's enzyme activity inhibition  $\geq 30\%$  showed significant association with 10% or more decreased performance in several tests evaluating six of the eight cognitive areas (excepting psychomotricity and mood status); besides, for AChE inhibition in EE, the association was significant in three tests evaluating attention and one of executive function. Whereas, in OE, the inhibition of the BChE  $\geq 30\%$  was associated with a low performance of one attention test and for AChE the exceedance of the standard

was associated with diminished performance in one test of memory and attention, respectively. The association between biomarkers of biological effect and cognitive impairment persisted among the EE group after removing confounders. No association was found between biomarkers of biological acute effect and decreased cognitive performance in the OE group.

Conclusions: Increased exposure to pesticides was confirmed by increased inhibition of cholinesterase's in both exposure groups; which was associated with a diminished neuropsychological performance, mainly in the environmentally exposed study group. [310 words].

### Palabras clave

**Palabras clave de autor:** [Agrochemicals](#); [Biological monitoring](#); [Neurotoxic effects](#)

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