Risk of ALS and passive long-term residential exposure to pesticides: a population based study

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Background

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease of the motor neuron. Its etiology is still largely unknown, but environmental factors may have an important role. Among these environmental risk factors, we assessed the possible role of agricultural pesticides.

Methods

We carried out a population case-control study in the Northern Italy provinces of Modena, Reggio Emilia, and Parma and in the province of Catania. For each ALS case diagnosed in that area from 1998 to 2011, four controls matched by sex, age and province of residence were randomly selected from the general population. For each subject we identified and geocoded their historical residences within a Geographical Information System (GIS) database. To evaluate passive exposures to neurotoxic pesticides, we added to the GIS a land use regression model related to 1976, focusing on an area of 100 meters around the subjects residences. In that area, we computed the land percentage dedicated to different cultivations (vineyards, orchards, extensive arable farming and crops) for which potentially neurotoxic pesticides had been used, to assess passive exposure to these chemicals.

Results

We identified 703 ALS cases and 2737 matched controls, 1251 of which subjects (254 cases) did not change residence over the entire study period. We computed the odds ratio of the disease associated with different land use through a conditional logistic regression model, dichotomizing subjects' exposure according to any specific pesticide use in the surrounding area. ORs were 0.74 (95% confidence interval (CI) 0.50–1.11) for vineyards, 0.78 (0.43–1.41) for orchards and 1.00 (0.78–1.28) for extensive arable farming and crops.

Conclusions

These results do not support an association between passive exposure to neurotoxic pesticides and ALS risk.

Key messages

- Despite the suggested role of pesticides as potential risk factors for ALS, our study did not show an association between passive long-term residential exposure to these chemicals and the risk of ALS
- GIS is a new technology designed to collect, integrate, analyze and display multiple data in a spatially referenced environment, allowing new perspectives in environmental exposure assessment