

# Use of carbamate insecticides and risks of non-Hodgkin's lymphomas in the French agricultural cohort (AGRICAN)

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## *Background*

Agricultural use of carbamate insecticides and risks of non-Hodgkin's lymphomas (NHL) have been linked in some but not all occupational epidemiologic studies. Moreover, studies on associated risks of NHL by histological subtype of NHL and by type of carbamate insecticides used are scarce.

## *Objectives*

We evaluated the effects of carbamate insecticides on the risks of NHL and three major histological subtypes of NHL - multiple myeloma (MM), chronic lymphocytic leukaemia / small lymphocytic lymphoma (CLL/SLL), diffuse large B-cell lymphoma (DLBCL) - in a sample of 65,630 French farmers from the prospective cohort AGRICAN.

## *Methods*

AGRICAN participants completed a questionnaire on lifetime occupational history of agricultural practices including pesticides uses and other factors including body mass index, smoking, and alcohol consumption at study enrolment (2005-2007). Their answers were crossed with data from the French crop-exposure matrix, PESTIMAT, to assess their exposure to 19 specific carbamate insecticides by purpose of pesticide use (soil, animals, barns or seeds). Multivariate Cox proportional hazards models with age as time scale and gender as a covariate were used to estimate hazard ratios (HRs) with 95% confidence intervals (CIs) for NHL risks (by subtype and overall) associated with exposure to carbamate insecticides. Non-users of pesticides were chosen as reference group.

## *Results*

Between inclusion and end of follow-up in 2015, 533 cases of NHL were diagnosed in our analytical sample of farmers, including 125 cases of MM, 135 cases of CLL/SLL and 72 cases of DLBCL. The risk of MM was elevated in participants who had used any carbamate insecticides at least on barns (HR = 1.69, 95% CI: 1.00-2.87). The risk of MM was also increased for those who used any carbamate insecticides on animals (HR = 1.64, 95% CI: 0.96-2.81) and at least on soil (HR = 1.27, 95% CI: 0.75-2.15) although the 95% CIs included 1.00. Use of any carbamate insecticides was not associated with CLL/SLL (HR = 0.88, 95% CI: 0.57-1.36), DLBCL (HR = 0.69, 95% CI: 0.39-1.24) or NHL overall (HR = 1.01, 95% CI: 0.80-1.27).

## *Discussion*

Our results may suggest a potential role of carbamate insecticides use on animals or barns in the etiology of MM. Further analyses on specific carbamate insecticides and respective duration of use are ongoing.

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