Press release – 15 March 2021

Some pesticide cocktails may favour a risk of breast cancer in postmenopausal women

Some of the pesticides used in Europe are suspected of having harmful effects on human health. They may be involved in hormonal imbalances and also have carcinogenic properties, which have already been observed in occupational settings. To date, the link between exposure to these pesticides *via* the dietary route and breast cancer in the general population has been little studied. Scientists in a joint INRAE, INSERM, CNAM and Université Sorbonne Paris Nord research team had already demonstrated that women consuming organically-grown foods in the NutriNet-Santé cohort had a lower risk of postmenopausal breast cancer[1]. The same team has since pursued its work, focusing this time on exposure to different profiles of exposure to these pesticides in the same population. Their findings, published on 15 March in the *International Journal of Epidemiology,* throw new light on the role that dietary exposure to pesticides can have on the onset of postmenopausal breast cancers.

Some of the pesticides used in large quantities by agriculture in Europe are suspected of having harmful effects on human reproductive health and could notably play a role in the onset of breast and prostate cancers. They may disrupt the endocrine system (hormonal) and have carcinogenic effects, as has already been observed in populations exposed to them in an occupational setting. However, the link between dietary exposure to these pesticides and breast cancer in the general population has been little studied, although scientists from INRAE, INSERM, CNAM and Université Sorbonne Paris Nord had already shown that female consumers of organically-grown foods in the NutriNet-Santé cohort presented with a lower risk of postmenopausal breast cancer. So what is the link between the pesticide profiles of exposure consumed via the diet and the risk of postmenopausal breast cancer?

Their new, four-year study started in 2014 when the female participants completed a questionnaire to evaluate their consumption of organically and conventionally grown foods. A total of 13,149 postmenopausal women – the study sample – were included in the analysis, and 169 cases of cancer were reported. Thanks to a database on the contamination of foods as a function of their production mode[2], the scientists measured their exposure to 25 active substances contained in pesticides authorised in Europe, including those used by organic farmers. A Non-Negative Matrix Factorisation (NMF) method made it possible to establish four profiles (or components) of pesticide exposure that reflected the different pesticide cocktails to which we are exposed via our diet. Statistical models were then used to analyse these components in order to explore potential links with the risk of onset of breast cancer.

NMF component 1 was characterised by high exposure to chlorpyriphos, imazalil, malathion and thiabendazole, all synthetic pesticides. In this component, the scientists noted an increased risk of postmenopausal breast cancer among women who were overweight (BMI between 25 and 30) or obese (BMI>30). By contrast, NMF component 3 was characterised by low exposure to most synthetic pesticides and a 43% lower risk of postmenopausal breast cancer. The other two NMF components were not associated with a risk of breast cancer.

What are these synthetic pesticides used for?
Chlorpyriphos is used on citrus, wheat, stone fruit or spinach crops, for example. Imazalil is also applied to citrus,

potato and seed crops. Malathion, which is used to control sucking and chewing insects (aphids, mealybugs), has been banned in France since 2008 but is still authorised in some other European countries. Thiabendazole is used on maize, potato and certain seed crops.

These results suggest a link between certain profiles of exposure to pesticides and the onset of postmenopausal breast cancer. However, to confirm these findings, it is essential to both conduct experimental studies to clarify the mechanisms involved and confirm these results in other populations.

[1] Baudry J, Assmann KE, Touvier M, et al. Association of Frequency of Organic Food Consumption With Cancer Risk: Findings From the NutriNet-Santé Prospective Cohort Study. *JAMA Intern Med.* 2018;178(12):1597–1606. doi:10.1001/jamainternmed.2018.4357

[2] This database is operated by the European reference laboratory, CVUA, in Stuttgart

Reference

Pauline Rebouillat, Rodolphe Vidal, Jean-Pierre Cravedi, Bruno Taupier-Letage, Laurent Debrauwer, Laurence Gamet-Payrastre, Mathilde Touvier, Mélanie Deschasaux-Tanguy, Paule Latino-Martel, Serge Hercberg, Denis Lairon, Julia Baudry, Emmanuelle Kesse-Guyot, **Prospective association between dietary pesticide exposure profiles and postmenopausal breast-cancer risk in the NutriNet-Santé cohort**, International Journal of Epidemiology, 2021;, dyab015, https://doi.org/10.1093/ije/dyab015

Scientific contact:

Emmanuelle Kesse-Guyot - emmanuelle.kesse-guyot@inrae.fr
Centre of Research in Epidemiology and StatisticS, Sorbonne Paris Cité (CRESS)