Abstract

Partial Least Square–Cox Regression to Investigate Association between Patterns of Dietary Exposure to Persistent Organic Pollutants and Breast Cancer Risk in the E3N Cohort [†]

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Abstract: Exposure to persistent organic pollutants (POPs) is suspected to play a role in the occurrence of estrogen receptor-positive breast cancer (ER-positive BC). Our objective was to investigate the association between patterns of dietary exposure to POPs and ER-positive BC risk in the E3N cohort. The study included 67,879 women. The intake of 81 POPs, including dioxins, polychlorinated biphenyls (PCBs), per- and polyfluoroalkyl substances (PFASs), brominated flame retardants (BFRs) and polycyclic aromatic hydrocarbons (PAHs), was estimated using food consumption data, collected through a validated semi-quantitative food frequency questionnaire, and food contamination data, as measured in the second French Total Diet Study. ER-positive BC cases were identified through self-administered questionnaires, from next-of-kin spontaneous reports, or through information from the national cause-of-death registry. Partial least square–Cox regression (PLS–Cox), a supervised dimension reduction method, was used to identify POPs patterns associated with ER-positive BC occurrence. Cox proportional hazard models were then used to estimate hazard ratios (HRs) and their 95% confidence intervals (CIs) for the associations between the PLS–Cox patterns retained and the risk of ER-positive BC, adjusted on potential confounders identified using a directed acyclic graph. The women were followed for a maximum of 21.4 years, and 5,686 developed incident ER-positive BC. Based on POP intake estimates, five patterns were retained. The first pattern was characterized by positive weights for almost all POPs, especially PAHs and some dioxins. The other principal components were characterized by both positive and negative weights. A significant non-linear and non-monotonic association was highlighted between exposure to the first pattern and ER-positive BC risk, and significant positive linear associations were highlighted between exposure to the second, fourth and fifth patterns and ER-positive BC risk. The use of the PLS–Cox method allowed the identification of relevant patterns in POPs explaining, as far as possible, the covariance between the exposures and the outcomes. Identifying such patterns can help to better clarify the pollutants involved in BC occurrence and to estimate their cumulative effect.

Keywords: persistent organic pollutants; breast cancer; partial least square regression

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