

Does Exposure to Persistent Organic Pollutants (POPs) Increase the Risk of Breast Cancer?

Project number: EOI 1257

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Abstract:

The team of the applied project is international and interdisciplinary including physicians, chemists, and molecular toxicologist.

The aim of the project is to undertake an epidemiological investigation of the risk of breast cancer in relation to exposure to POPs. The study will be carried out on samples from breast cancer (BC) cases already taken from Greenlandic Inuit's (women). This population is known to have a high burden of POPs being up to 10 times the level found in European and other Caucasian populations. The obtained data of 30 cases will be evaluated by comparison to 80 matched Inuit controls with respect to e.g. age, diet, alcohol and smoking. The investigation will include determination of serum levels of lipophilic and non-lipophilic POPs such as non dioxin-like (nonDL-) and DL-PCBs, organochlorine pesticides, and PFCs (perfluorinated compounds), respectively. In addition, serum trace elements, fatty acids (n-3/n-6 ratio), POP related bio-effect on hormone functions, total serum dioxin activity and hormone metabolites in urine. Moreover, determination of genotypes relevant for POP metabolism and breast cancer risk.

Perspectives. Few studies of breast cancer vs. POP exposure have been published for the arctic population and to our knowledge none of these studies together include data on interviews on diet, fatty acid biomarkers, trace elements, genotyping and determination of xenobiotic serum activities. Although the proposed study includes relatively few cases, because of the few inhabitants in Greenland (58.000), we believe that this study will contribute to the elucidation of the mechanisms behind the risk of breast cancer in relation to exposure to environmental chemicals and support prophylactic and preventive actions.

Project Status: Active

Project Progress 2008:

Volunteers for matched Inuit controls have been contacted and asked whether their samples collected for the project "Plasma organochlorine concentrations and bone ultrasound measurements: a cross-sectional study in peri- and postmenopausal Inuit women from Greenland, Cote et al 2006, Environ. Health 5:33 (2000-2002) can be used as controls for the present Breast Cancer project. Accept has been obtained and the samples were sent from Quebec to Aarhus university in December 2008.

The Breast cancer cases serum/blood samples has been handled / analysed for the following analyses:

1. Send to Laboratory of Toxicology, Quebec Canada for POP analyses
2. Send to Department of human biology and Natural Sciences, University of Guelph, Canada for n-3/n-6 analyses
3. Send to Danish National Environmental Research Institute for trace element analyses
4. Analyses for PFOS are presently carried out.

5. For determination of the POP related oestrogenic and androgenic bioactivities, solid phase and HPLC fractionation performed on cases serum samples, the control samples are currently performed.
6. Data of POPs and n-3 / n-6 fatty acids are already measured for the matched control samples.

Preliminary results (if applicable):

The first data on cases serum samples indicate that the PFOS levels are not positive related to age, the maximum and minimum level found until now is 87.3 ng / ml and 22.8 ng / ml, respectively.

Plans 2009:

Progress in the following analyses for remaining samples are planned / expected in 2009:

- a. PFOS (control samples);
- b. SPE-HPLC fractionation (control samples);
- c. POP related xenohormone bioactivities (cases and controls);
- d. Genotypes (cases and controls) reduced number because of reduced funding compared to the applied amount;
- e. The genotyping of the BRACA1/2 gene are planned to be performed in the spring 2009
- f. Trace elements (cases and controls)
- g. Analyses hormone metabolites in urine has been cancelled because of reduced funding compared to the applied amount;

Expected Completion Date: Ongoing