

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

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Update:

This project is a mechanistic-epidemiological study aiming the risk of breast cancer in relation to exposure to POPs. The breast cancer cases are Greenlandic Inuit females taken during 2000 – 2003 that will be evaluated by comparison with matched Inuit female controls with respect to age, lifestyle. The study includes determination of serum level of POPs (14 PCBs and 10 organochlorine pesticides), perfluorinated compounds (PFCs), trace elements, fatty acids profile, endogenous estrogens, and determination of relevant gene polymorphisms. Meanwhile, the serum POP related bioeffect on hormone receptor functions, i.e. estrogen receptor (ER), androgen receptor (AR) and the aryl hydrocarbon receptor (AhR) mediated dioxin-like activity in serum from breast cancer cases and control subjects are determined. The data will be adjusted by age, smoking (serum cotinine as marker of smoking status), diet (fatty acids n3/n6 ratio as marker of marine food intake). Moreover, the impact of trace elements and the role of gene polymorphisms relevant for POPs metabolism and breast cancer risk are determined. Until now, most of measurements have been finished and the data evaluation will be finished before May 2010. The results are planned to be presented at the International Polar Year Oslo Science Conference, 8-12 June, 2010. At least four manuscripts in international journals are expected as a result from this project.

Abstract IPY Oslo Science Conference June 8-12, 2010

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Time: Thursday 10 June 14:15 **Location:** Room E6

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Breast cancer (BC) is the most common cancer for women in the western world that have been increasing since 1940. The established BC risk factors like genetic inheritance, factors contributing to lifelong exposure to active estrogens can only explain approximately one third of all cases. More than 70% of diagnosed BC women have non inherited or sporadic cancer; the risk of BC is thought to be modified by lifestyle and environment. A high increase in BC incidence in the western world has been reported the last 50 years. Before 1966 BC was reported absent from the Arctic. In a 20-year period (1969 to 88) a total of 193 BC's were observed in Inuit populations in the circumpolar region with a significant increased incidence of

20%. The further increase since 1988 is of concern and might be explained by higher burden of POPs in Inuit, increased exposure to new POP compounds like PFCs (perfluorinated compounds) together with a change to western lifestyles.

POPs, including dioxins/furans, polychlorinated biphenyls (PCBs), and organochlorine pesticides, are potential endocrine disrupters and suspected to play an important role in the risk of BC. Evidences regarding POP exposure and BC risk are controversial. However, studies found a 3-fold risk of postmenopausal breast cancer with mutations in the P450 polymorphic CYP1A1 gene and high PCB levels.

The present mechanistic - epidemiological study is carried out on samples from BC cases and controls taken from Greenlandic Inuit during 2000-2003. The data evaluation includes factors as age, lifestyle, POP serum levels, serum trace elements and fatty acids. Moreover, serum POP related bio-effect on hormone receptor functions, and total serum dioxin-like activity, and the role of gene polymorphisms relevant for POP metabolism and breast cancer risk are determined. An overview of the currently obtained data will be presented.

Bonefeld-Jorgensen 2010. Dioxin-like activity in the blood of Greenlandic Inuit and Danish women: a pilot study. *Int J. Circumpolar Health* 69(2) 109-212.

Bonefeld-Jorgensen E. Biomonitoring in Greenland: human biomarkers of exposure and effects – a short review. Rural and Remote Health 10: 1362. (Online) 2010. Available: www.rrh.org.au/articles/subviewnew.asp?ArticleID=1362 (Accessed 18 June 2010).