



RESEARCH

Open Access

Breast cancer risk in relation to occupations with exposure to carcinogens and endocrine disruptors: a Canadian case-control study

James T Brophy^{1,2*}, Margaret M Keith^{1,2}, Andrew Watterson¹, Robert Park³, Michael Gilbertson¹, Eleanor Maticka-Tyndale², Matthias Beck⁴, Hakam Abu-Zahra⁵, Kenneth Schneider⁵, Abraham Reinhartz⁶, Robert DeMatteo⁶ and Isaac Luginaah⁷

Abstract

Background: Endocrine disrupting chemicals and carcinogens, some of which may not yet have been classified as such, are present in many occupational environments and could increase breast cancer risk. Prior research has identified associations with breast cancer and work in agricultural and industrial settings. The purpose of this study was to further characterize possible links between breast cancer risk and occupation, particularly in farming and manufacturing, as well as to examine the impacts of early agricultural exposures, and exposure effects that are specific to the endocrine receptor status of tumours.

Methods: 1005 breast cancer cases referred by a regional cancer center and 1146 randomly-selected community controls provided detailed data including occupational and reproductive histories. All reported jobs were industry- and occupation-coded for the construction of cumulative exposure metrics representing likely exposure to carcinogens and endocrine disruptors. In a frequency-matched case-control design, exposure effects were estimated using conditional logistic regression.

Results: Across all sectors, women in jobs with potentially high exposures to carcinogens and endocrine disruptors had elevated breast cancer risk (OR = 1.42; 95% CI, 1.18-1.73, for 10 years exposure duration). Specific sectors with

FUNDERS

- **Canadian Breast Cancer Foundation – Ontario Region**
- Green Shield Foundation
- Breast Cancer Society of Canada
- Windsor Essex County Cancer Center Foundation

PARTNERS

- **National Network on Environments and Women's Health**
- University of Windsor
- Windsor Regional Cancer Centre
- Occupational Health Clinics for Ontario Workers
- Hospice of Windsor

Essex & Kent Counties



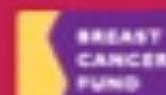
- Manufacturing
- Agriculture



STATE OF THE EVIDENCE:

THE CONNECTION BETWEEN BREAST CANCER AND THE ENVIRONMENT

by Janet Gray, Ph.D.



ESTABLISHED 1980

Sixth Edition 2010

FROM SCIENCE TO ACTION

by Janet Nudelman, M.A., and Connie Engel, Ph.D.



Gaps in Breast Cancer Research



- Occupation/Environment
- Endocrine Disrupting Chemicals
- Mixtures
- Cumulative effects
- Periods of vulnerability

Occupational Histories of Cancer Patients in a Canadian Cancer Treatment Center and the Generated Hypothesis and Farming

JAMES T. BROPHY, MARGARET M. KEITH, ETHAN LAUKKANEN, MD, DEBORAH HELLYER, ABRAHAM REINHARTZ, MD,

Occupational exposures increase cancer risk. A local collaborative process was launched in Windsor, Ontario, Canada to explore the role of occupation as a risk factor for cancer. An initial hypothesis-generating study found an increased risk for breast cancer among women aged 55 years or younger who had ever worked in farming. On the basis of this result, a 2-year case-control study was undertaken to evaluate the lifetime occupational histories of women with breast cancer. The results indicate that women with breast cancer were nearly three times more likely to have worked in agriculture when compared to the controls (OR = 2.80 (95% CI, 1.6–4.8)). The risk for those who

Occupation and Breast Cancer A Canadian Case-Control Study

JAMES T. BROPHY,^{a,b,c} MARGARET M. KEITH,^{a,b,c} KEVIN M. GOREY,^c ISAAC LUGINAAH,^d ETHAN LAUKKANEN,^e DEBORAH HELLYER,^a ABRAHAM REINHARTZ,^a ANDREW WATTERSON,^b HAKAM ABU-ZAHRA,^f ELEANOR MATICKA-TYNDALE,^c KENNETH SCHNEIDER,^f MATTHIAS BECK,^g AND MICHAEL GILBERTSON^b

^aOccupational Health Clinics for Ontario Workers (OHCOW), Canada

^bUniversity of Stirling, UK

^cUniversity of Windsor, Canada

^dUniversity of Western Ontario, Canada

^ePrince Edward Island Cancer Treatment Centre, Canada

^fWindsor Regional Hospital, Canada

^gUniversity of York, UK

ABSTRACT: A local collaborative process was launched in Windsor, Ontario, Canada to explore the role of occupation as a risk factor for cancer. An initial hypothesis-generating study found an increased risk for breast cancer among women aged 55 years or younger who had ever worked in farming. On the basis of this result, a 2-year case-control study was undertaken to evaluate the lifetime occupational histories of women with breast cancer. The results indicate that women with breast cancer were nearly three times more likely to have worked in agriculture when compared to the controls (OR = 2.80 (95% CI, 1.6–4.8)). The risk for those who

**Lifetime Histories
BREAST CANCER
Research Study**



*TOWARDS A BETTER
UNDERSTANDING OF THE
CAUSES OF
BREAST CANCER*

**IF YOU HAVE RECENTLY BEEN
DIAGNOSED WITH BREAST CANCER
YOU CAN HELP
WITH A ONE-TIME INTERVIEW**

Current Study

- 1,006 cases
- 1,146 controls

Questionnaire

Non-Occupational Factors



- Reproductive factors
- Income
- Smoking
- Family history
- Etc.

Questionnaire

Occupational Factors

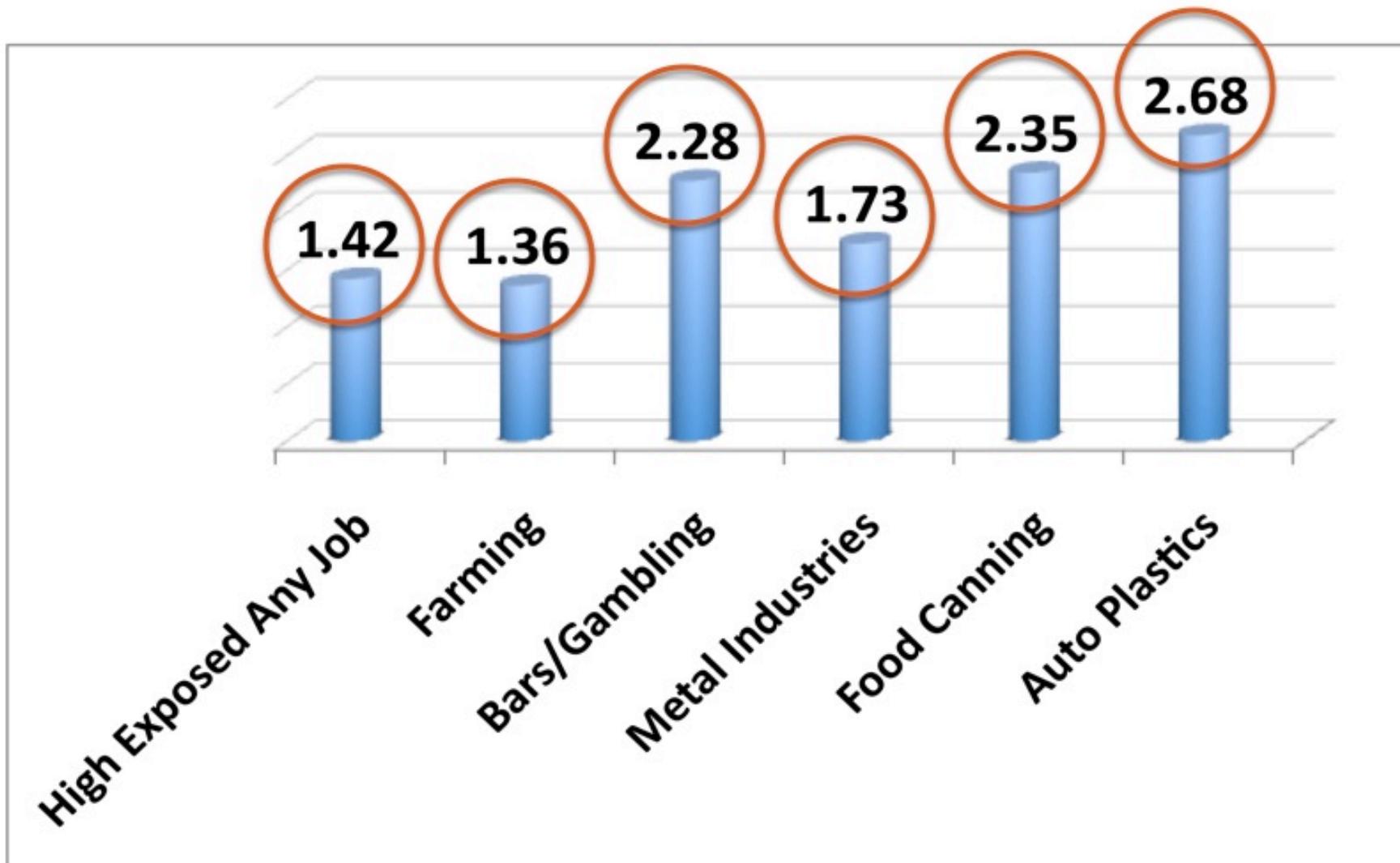
- All jobs
- Industry
- Occupation
- Exposure
- Vulnerability factors



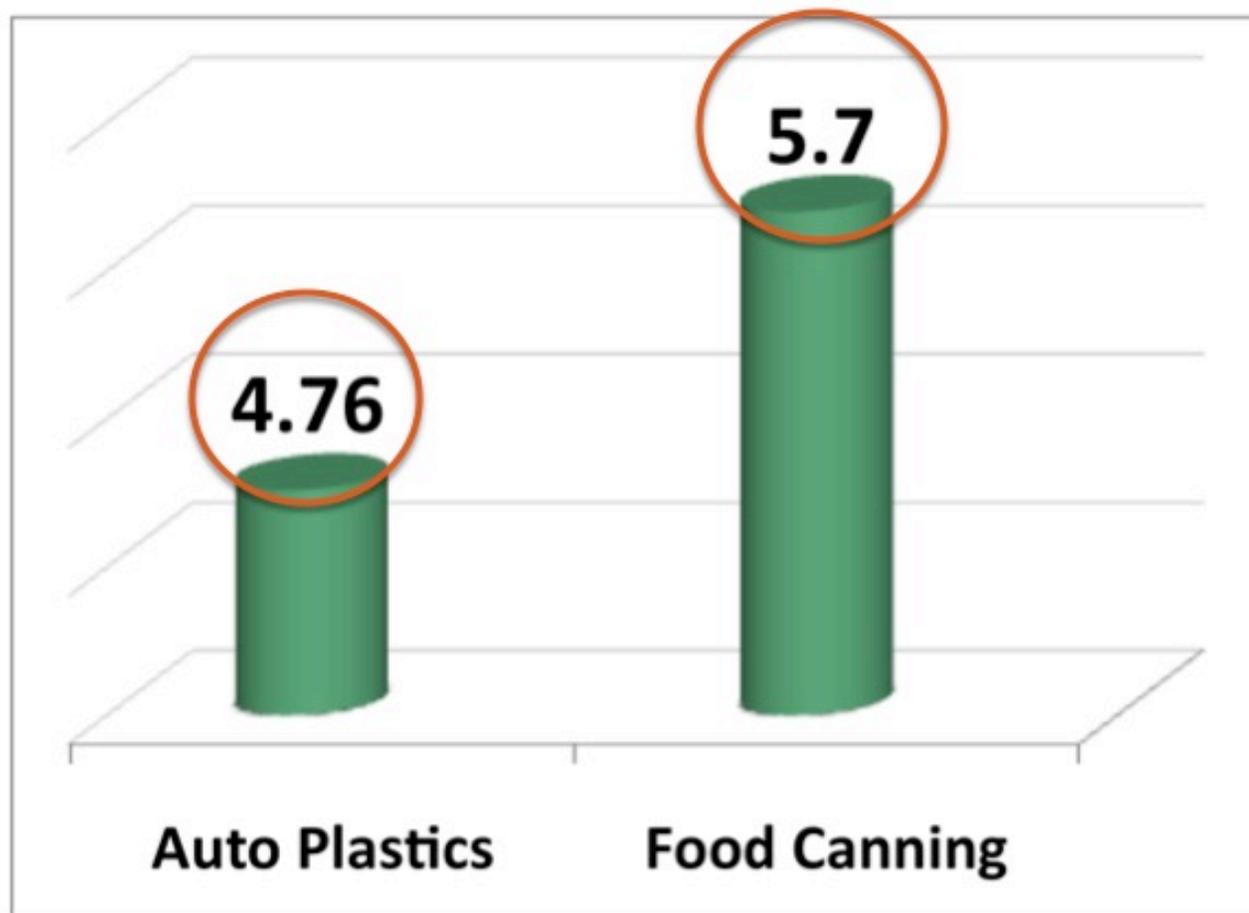
Non-Occupational Findings

- High postmenopausal BMI
- Less education and income
- Number of pregnancies
- Duration of child-bearing years
- Smoking

Occupational Findings



... *Premenopausal*



Hormone Receptor

ER+/PR+

- farming (1.32)
- metals (2.03)
- bars/gambling (3.87)
- auto plastics (3.63)

ER+ /PR-

- food canning (4.01)

ER-

- farming (1.71)
- food canning (3.19)

Farming Exposures (1.36)

- Pesticides
- Fungicides
- Fertilizers
- Diesel exhaust
- Other agricultural chemicals?



Bars/Gambling Exposures (2.28)

- Second-hand tobacco smoke
- Night work
- Other?



Metal Work Exposures (1.73)

- Metals
- Solvents
- Metalworking fluids
- Smoke/exhaust/PAHs
- Other chemicals



Food Canning Exposures (2.35)

- Plastic can linings
- Pesticides
- Other?



Automotive Plastics Exposures (2.68)

- Plastic resins
- Additives
- Flame retardants
- Solvents/glues/paints
- Other chemicals



NEW SOLUTIONS

A Journal of Environmental and Occupational Health Policy

“Chemical Exposures of Women Workers in the Plastics Industry With Particular Reference to Breast Cancer and Reproductive Hazards,” DeMatteo, et al., 2012

<http://baywood.metapress.com/link.asp?id=k01404273056>

What Are The Implications?

- Occupational exposures
- Regulatory change
- Workplace compensation
- More research
- PREVENTIVE ACTION





National Network on
Environments and Women's Health

Réseau pancanadien sur la santé
des femmes et le milieu

<http://www.nnewh.org/overview.php?section=4>