Research links stress and breast cancer

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Research findings from a Queen's University study have for the first time uncovered a possible biological link between severe psychological stress and an increased risk of developing breast cancer.

The study, led by biochemist Christopher Mueller, found that the stress hormone hydrocortisone may repress the activity of a tumour-suppressing gene known as BRCA1 that is related to breast cancer.

Previous population studies have shown a relationship between the experience of intense psychological stress, such as that associated with the loss of a spouse or loved one, and an elevation in breast cancer risk. However, this is the first time a breast specific biological basis for this link has been proposed.

"The results of this particular study are very exciting," says Dr. Mueller. "This provides a strong incentive to rethink treatment strategies."

Published recently in the journal *Genes, Chromosomes and Cancer*, Dr. Mueller sees strong potential to build upon these findings and identify opportunities for clinical interventions to reduce or manage stress-related breast cancer risk. However, more research must be completed to confirm the effects of hydrocortisone on human breast tissue

BRCA1 is a tumour-suppressing gene involved in a range of key cellular processes, including the repair of damaged DNA and the regulation of cell death. In researching the effects of various hormones on cultured mouse mammary cells, Mueller found that continuous exposure to

hydrocortisone was associated with a decreased expression of BRCA1. Mueller theorizes that by disrupting BRCA1's normal activity, hydrocortisone may impede the ability of breast cells to maintain genomic stability and suppress transformation into a cancerous form.

Changes in BRCA1 and its activity are known to contribute to some cases of breast cancer, the most common cancer among Canadian women. Mutations to the gene are implicated in a large proportion of familial breast cancers, while low levels of BRCA1 expression have been found in many sporadic cases of the disease.

"The knowledge gained through this research may help us identify genetic and biological markers that could tell us whether an individual woman is at increased risk of breast cancer due to stress," says Dr. Mueller. "If we can develop a method of pinpointing those who may be particularly susceptible to the effects of hydrocortisone, we may be able to support them in taking steps to reduce their risk."

The study was funded by the Ontario Region of the Canadian Breast Cancer Foundation. Study co-author and recent Queen's doctoral graduate Lilia Antonova was also supported by a Foundation fellowship and a training award from the Canadian Institutes of Health Research.

"Primary prevention research, which focuses on the possible causes and risk factors for breast cancer, is one of the Foundation's research funding priorities, and we are proud to support Dr. Mueller's work as it offers a significant opportunity to build knowledge about the biology of breast cancer," says Sharon Wood, Ontario CEO for the Canadian Breast Cancer Foundation. "We are encouraged by his findings to date, which may ultimately inform risk reduction strategies for individual women."

Source: Queen's University

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