Evidence now suggests eating soy foods in puberty protects against breast cancer

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Evidence is growing from animal and human studies that genistein, a potent chemical found in soy, protects against development of breast cancer - but only if consumed during puberty, says a Georgetown University Medical Center researcher in the British Journal of Cancer published online today. The challenge now, she says, is for scientists to understand precisely why soy appears to provide a shield against the most common cancer in women.

“Timing seems to be vitally important in use of this bioactive food, and if we can figure out why that is so, then we may be able to help prevent breast cancer in the widest sense possible,” says the researcher, Leena Hilakivi-Clarke, Ph.D., a professor of oncology at the Lombardi Comprehensive Cancer Center at Georgetown.

Although there are a number of tantalizing theories to explain the connection, “at the present time no convincing explanation can be offered as to why the breast cancer-risk reducing effect of genistein might be strongest during childhood and early adolescence,” she says.

Hilakivi-Clarke is a senior author of a review article published in the journal that sums up the state of knowledge concerning the role of early life genistein exposures in modifying breast cancer risk. She has long studied the link between soy use and breast cancer, as have her three co-authors, all Finnish researchers.

There have only been three human studies that tracked soy use during

puberty and later breast cancer development, and two of them focused on Asian females, who eat soy in their traditional diet. But these studies suggest soy offers a very strong protective effect – a 50 percent or more reduction in the risk of breast cancer - when soy is eaten during childhood and adolescence.

The strongest evidence for genistein's protective effect comes from studies in mice and rats, Hilakivi-Clarke says. For example, numerous studies in rats show that the data regarding prepubertal exposure to genistein are very consistent in showing a reduction in mammary cancer risk, she says. Exposure to soy in fetal development or in adult life does not have the same protective effect.

Further examination of experimental versus control rats demonstrated that use of genistein in puberty cut the number of so-called "terminal end buds" in the breast. These are the structures that lead to growth of the mammary epithelium, which are the cells lining milk ducts, etc., and it is in these epithelial cells that breast cancer originates. But Hilakivi-Clarke says it is not clear if a mere reduction in the number of these structures could reduce cancer risk, or why.

Other studies suggest that genistein controls expression of genes in terminal end buds that regulate cell growth, repair and death. For example, the chemical could be controlling the ability of stem cells, found on these buds, to reproduce themselves or to differentiate into more specialized cells. "There is evidence that suggests that the more stem cells there are on these structures, the greater the risk of breast cancer development," she says. This evidence supports the theory that breast cancer arises from stem cells that have lost growth control.

Other associated research has found that the genes that genistein appears to activate in developing mammary glands are well known --- BRCA1, p53, and PTEN tumor suppressors, Hilakivi-Clarke says. These genes

repair genetic damage and control cell survival and death, and they may also help control stem cell reproduction, she says, and genistein apparently “up-regulates” these genes, boosting production of their beneficial proteins.

What is perhaps most intriguing, she says, is that the same process that protects the breast from excess growth during pregnancy seems to be at work during puberty. “In pregnancy, BRCA1 is also up-regulated, perhaps in order to control the fate of stem cells, allowing them to make more cells for milk production, for example, but not more of themselves.”

So Hilakivi-Clarke favors the notion that genistein is acting as a breast cancer protective just as an early first pregnancy in women is known to protect against later development of the cancer:

“If malignancies occur in breast stem cells, then it is better that many of these cells are differentiated earlier rather than later. Pregnancy hormones do that, so the shorter time there is between puberty and pregnancy, the greater that protection may be,” she says. “Genistein may also help control the fate of stem cells in the same way.”

“We think this is the mechanism by which genistein works, but we really don’t know and we need to find out,” Hilakivi-Clarke says. “The findings will matter.”

Source: Georgetown University