The Role of Estrogen in Breast Cancer Risk

A tremendous host of possible causes, ranging from gender to genetic make-up, form the fundamental base of breast cancer disease. However, a notable link exists between breast cancer risk and a prominent female hormone known as estrogen. Estrogen has an essential role in normal sexual development, regulation of menstrual cycles, breast development, functioning of the ovaries and uterus, as well as many other functions. As such, estrogen is necessary for growth and development; a job it does well under normal circumstances. The trouble arises when alterations in estrogen modify the appropriate progression of these essential functions in the body (1).

A meta-analysis published by the Endogenous Hormones and Breast Cancer Collaborative Group, analyzed breast cancer risk factors and circulating hormone concentrations in more than 6000 postmenopausal women controls in 13 prospective studies. Researchers included the following variables as potential risk factors; age, body mass index (BMI), type of menopause, smoking, alcohol consumption and reproductive factors. Incidence of each risk factor was then compared to the level of sex hormones in the blood to determine if any correlation was present. Sex hormones measured included estrogens, androgens and sex-hormone binding globulin (2).

According to the results of this review, circulating concentrations of sex hormones are associated with several of the measured risk factors for breast cancer. Specific observations include the following

-Concentrations of all the hormones were higher in obese women than in women with a low BMI

-Cigarette smoking and alcohol were associated with moderate increases in all the sex hormones

-Age at menarche, parity, age at first full-term pregnancy and family history of breast cancer were not strongly related to any of the hormones examined

Data from this analysis show the strongest association between estrogen and testosterone hormone concentrations and BMI. Reasons for this association may be due to the presence of aromatase in adipose (fat) tissue. Aromatase is an enzyme that is responsible for a key step in the biosynthesis of estrogens. As such, women with a higher BMI carry more adipose tissue, increasing total aromatase concentration and activity. This contributes to a greater production of estrogen, and may potentially lead to an increased risk for breast cancer development (2).

The studies reviewed in this meta-analysis effectively demonstrate the link between risk factors and circulating sex hormones. However, to understand the implications of these findings and their relevance to breast cancer, it is necessary to investigate how estrogen may be implicated in breast cancer risk. Estrogen may become carcinogenic as a result of its role in stimulating breast cell division, its work during the critical periods of breast growth and development; its effect on other hormones that stimulate breast cell division, and its support of the growth of estrogen-responsive tumors (1). Disruption of any of these processes causes excessive proliferation of abnormal breast cells and the resulting development of cancer. In conclusion, this information enlightens the importance of a healthy body weight and health-

conscious behaviours, to ensure a normal balance of plasma (blood) estrogen and other sex hormones as an effective preventative measure.

References

1. Cornell University (2002). *Estrogen and Breast Cancer Risk: Factors of Exposure.* Retrieved from http://envirocancer.cornell.edu/factsheet/general/fs10.estrogen.cfm

2. Endogenous Hormones and Breast Cancer Collaborative Group. Circulating sex hormones and breast cancer risk factors in postmenopausal women: reanalysis of 13 studies. *British Journal of Cancer* 105(5): 709-722, 2011.

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Note: The information provided should not replace medical advice and represents only some of the research conducted on each topic