

Study: Progesterone leads to inflammation

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Scientists at Michigan State University have found exposure to the hormone progesterone activates genes that trigger inflammation in the mammary gland.

This progesterone-induced [inflammation](#) may be a key factor in increasing the risk of [breast cancer](#).

Progesterone is a naturally occurring steroid hormone and promotes development of the normal [mammary gland](#). Progesterone previously has been identified as a risk factor for breast cancer, and in a study published in the *Journal of Steroid Biochemistry and Molecular Biology*, MSU scientists examined the genes activated by progesterone and the effects of their activation in a mouse model system.

Exposure to progesterone in normal amounts and in normal circumstances causes inflammation, which promotes breast development. However, exposure to progesterone in menopausal hormone therapy is known to increase breast cancer risk.

"Progesterone turns on a wide array of genes involved in several biological processes, including cell adhesion, cell survival and inflammation," said physiology professor Sandra Haslam, co-author of the paper and director of the Breast Cancer and the Environment Research Center at MSU. "All of these processes may be relevant to the development of breast cancer."

The study shows progesterone significantly regulates 162 genes in

pubertal cells, 104 genes in adult cells and 68 genes at both developmental stages. A number of these genes make small proteins, called chemokines, which control the process of inflammation.

Inflammation is a process where white blood cells move into a tissue. One type of white blood cell which moves to the breast during inflammation is a macrophage. Macrophages normally enter growing glands and help them develop, building blood vessels and reshaping growing tissue.

"Macrophages also may promote the development of tumors, such as breast cancer, as they make blood vessels to deliver nutrients and can clear the way for tumors to grow," Haslam said. "Long-term exposure to progesterone, such as that which occurs in menopausal hormone therapy, may encourage growth of tumors."

Haslam noted that as the link between progesterone and increased breast cancer risk was identified in recent years, women have been taking less [hormone therapy](#) after menopause and the rate of breast cancer in older women has gone down.

"This study reveals the targets of a specific form of the progesterone receptor, called PRA, in mammary cell development," said microbiology professor Richard Schwartz, a co-author of the paper and associate dean in the College of Natural Science. "The linkages identified provide targets for future work in reducing the influence [progesterone](#) has on developing breast cancer.

"Understanding the [genes](#) that regulate inflammation in the mammary gland will help us to better understand normal breast growth and also may help us devise better treatments for the abnormal growth in cancer."

Source: Michigan State University ([news](#) : [web](#))

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