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Obesity and breast cancer – role of estrogens and the molecular underpinnings of aromatase regulation in breast adipose tissue

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Abstract

One in eight women will develop breast cancer over their lifetime making it the most common female cancer. The cause of breast cancer is multifactorial and includes hormonal, genetic and environmental cues. Obesity is now an accepted risk factor for breast cancer in postmenopausal women, particularly for the hormone-dependent subtype of breast cancer.

Obesity, which is characterized by an excess accumulation of body fat, is at the origin of chronic inflammation of white adipose tissue and is associated with dramatic changes in the biology of adipocytes leading to their dysfunction. Inflammatory factors found in the breast of obese women considerably impact estrogen signaling, mainly by driving changes in aromatase expression the enzyme responsible for estrogen production, and therefore promote tumor formation and progression. There is thus a strong link between adipose inflammation and estrogen biosynthesis and their signaling pathways converge in obese patients.

This review describes how obesity-related factors can affect the risk of hormone-dependent breast cancer, highlighting the different molecular mechanisms and metabolic pathways involved in aromatase regulation, estrogen production and breast malignancy in the context of obesity.