



Steroid Hormone Receptors Expression and Breast Cancer Management

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Abstract

It is currently believed that estrogen and progesterone both the steroid hormones antagonize each other in the prevention of breast cancer. Many investigators on the other hand reported that the presence of both the steroid hormone receptor is a good prognostic indicator of breast cancer. Both estrogen and progesterone receptors are essentially important in the prevention of breast cancer through the synthesis of maspin an anti-breast cancer protein by the hormone receptor induced Nitric Oxide (NO) production. Both the breast cancer tissue and neutrophil were found to synthesize maspin, and both the steroid hormone stimulates maspin synthesis by binding with their corresponding receptor which ultimately activate the homologous DNA sequence in the nucleus. It was concluded that both estrogen and progesterone are complementary with each other in NO induced maspin synthesis to prevent breast cancer malignancy.

Keywords: Estrogen; Progesterone; Nitric oxide; Breast cancer

Introduction

Breast cancer is most common type of cancer affecting women irrespective of the age [1]. It is a major health problem and the mortality rates are in expected to surge in the next years [2]. It is a heterogeneous disease, where the proper mechanistic cause is yet to identify. It has been reported that breast cancer tissue in women is a classical model for the steroid-hormones (estrogen & progesterone) dependent condition [3,4]. Several studies revealed that steroid hormones are exerted their effects by binding to the nuclear receptors [5] and activate a highly homologous sequence of DNA known as Hormone Responsive Element (HRE), which ultimately lead to the expression of hormonal effects. On the basis of nuclear estrogen and progesterone hormone receptor (NSHR), patients with breast cancer are classified into four groups ER+, ER-, PR+ and PR-. Both the steroid hormone receptor status is of prognostic significance [6]. It has also been reported that the presence of steroid hormone receptor (ER+ and PR+) is a good prognostic indicator of breast cancer [7], and ER-, PR- tumor is reported to be poorer than positive receptor status [8]. Furthermore, patients with PR+ tumors, the metastasis have been 3 to 6 time less probable than those with PR- tumors [9]. In order to investigate this issue, we previously found that the steroid hormone receptors (ER and PR) can reduce or control breast cancer metastasis through the synthesis of maspin (mammary serine proteinase inhibitor) an anti-metastasis protein *via* the estrogen and progesterone receptor induced Nitric Oxide (NO) production both in the neutrophil and breast cancer tissue of the patients [3,4]. Both the steroid hormones induced synthesis of maspin is higher in breast tissue and in neutrophil of ER+ and PR+ patients than that of ER- and PR- victims [3,4]. In order to exert their effects, both the steroid hormones must diffuse through the cell-surface membrane and transported to nucleus to active Hormone Responsive Element (HRE), and for that transportation, the hormone must bind with their receptor. ER+ and PR+ breast tissues and neutrophils exerted significant production of maspin through the hormone induced NO production due to binding of the hormone with their receptor which ultimately up regulates the hormone action. In addition, the binding of one hormone to its receptor inhibits or reduce the binding of another hormone to its receptor, this phenomenon is known as Receptor Crosstalk.

Conclusion

Taking all the results and reports, it could be hypothesized that both the steroid hormones (estrogen and progesterone) are complement to each other at least in the prevention of breast cancer malignancies through the Nitric Oxide (NO) induced synthesis of anti-breast cancer protein by the binding with their corresponding receptors. Therefore, presence of receptors ER+ and PR+ might be the good prognostic indicator of breast cancer.

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