

Molecular subtypes of breast cancer

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Breast cancer is the most common cancer that is suffered by women worldwide. Nearly 2.3 million women were diagnosed with breast cancer in 2020. Due to their wide prevalence, scientists have attempted methods to characterise breast cancer depending on variation in gene expression and protein abundance in different types of breast cancer cells. Breast cancer can be broadly characterised into 4 subtypes: human epidermal growth factor receptor 2 positive (HER2 positive), luminal A, luminal B and triple-negative. They are categorised based on the ability of the cancer cells to respond to a key hormone, oestrogen. Depending on the presence or absence of 3 receptors, oestrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2), cancer cells can be classified into 4 subtypes. A particularly aggressive form of the disease is observed in the HER2 positive type which is experienced by one in five women. This subtype is classified as cancer cells that are ER and PR negative but HER2 positive. Different treatment options are used to treat this subtype including surgery, radiotherapy, or chemotherapy. Additionally, novel treatments such as monoclonal antibody therapy using Herceptin are growing in popularity to treat this cancer. The most common form observed in all ages and races is the luminal A type which is classified as ER and/or PR positive. Unlike the HER2 subtype, these cancers are usually slow-growing and are treated using hormone therapy. In the case of luminal B, they typically grow faster than luminal A and are defined as ER and PR positive, HER2 positive or negative. Various treatment options exist including chemotherapy, hormone therapy or treatments that target the HER2 receptor. Lastly, as the name signifies, triple-negative breast cancer cells are ER, PR, and HER2 negative. This subtype is invasive and its treatment has been historically very difficult due to the absence of ER, PR or HER2 receptors which are targets in conventional breast cancer therapies. Thankfully, other treatment options are available including chemotherapy, radiotherapy and immunotherapy. Evolution in cancer research is necessary to develop more efficient methods for the diagnosis and treatment of the various subtypes of breast cancer.

Keywords: Breast cancer, Molecular subtypes, HER2, Luminal A, Luminal B, Triple-negative

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