

Pathophysiology and Diagnosis of Breast Cancer

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DESCRIPTION

Breast cancer is a malignant tumor that starts in the breast. It may occur in one or both of the breasts. The breast is composed of glands, ducts and fatty tissue. In women, breast makes and delivers the milk to feed newborns and infants. Breast cancer can be classified as either primary or metastatic [1]. Cancer can be caused in different parts of breast such as lobules, ducts, nipple, stroma, blood and lymph vessels.

Lobules are the glands which generate the milk. Cancers which start here are called Lobular cancers. Ducts are the small canals that carry the milk to nipple. This is the most common place to start the cancer. Cancers which are start here are called Ductal cancer. The nipple is the maiden in the skin of the breast where the ducts come together and turn into larger ducts, so the milk can be pulled out from the breast. This is less common type of breast cancer called Paget disease of the breast. The stroma (contains fat and connective tissue) surrounds the ducts and lobules. This is a less common type of breast cancer called Phyllodes tumor. Blood and lymph vessels are also found in breast. Angiosarcoma is a less common type of breast cancer that forms in the lining of vessels. Various types of breast cancer include angiosarcoma, paget disease, inflammatory breast cancer, lobular carcinoma, ductal carcinoma, recurrent breast cancer etc. Breast cancer symptoms may not appear in the early stages of cancer. Signs and symptoms may include change in the size, shape or appearance of breast, redness or flakiness around the breast, clear or bloody nipple discharge, swelling in the armpit, pain in the breast, lumps near the breast [2,3].

Pathophysiology

Breast cancer occurs due to contact between an environmental (external) factor and a genetically vulnerable host. Normal cells divide as many times as they require before stopping. They adhere to other cells and remain in tissues for a long time. When cells lose their ability to stop dividing, adhere to other cells and die at the appropriate moment, and finally become malignant. Cells are protected from programmed cell death by various protein clusters and the pathways. One of the protecting

pathways is the PI3K/AKT pathway; another is the RAS/MEK/ERK pathway. Generally, the PTEN protein turns off the PI3K/AKT pathway, when the cell is prepared for programmed cell death. In some breast cancers, the gene for the PTEN protein is metamorphosed, so the PI3K/AKT pathway is trapped in the "on" position, and the cancer cell does not self-destruct [4].

Risk factors

The cause of breast cancer is still unknown but some risk factors include age, gender, body mass index, age of first period, alcohol use, dense breast, history of previous cancer, family history and genetic factors, use of hormone replacement therapies, obesity, radiation exposure, one or more pregnancies, inherited genes, postmenopausal therapy etc. Being a women are more likely to expose the breast cancer [5,6].

Diagnosis

To determine the fibroadenomas (lumps in breast), one or more imaging tests are performed. The following are:

Mammogram: It is a type of x-ray examination, used to examine the breasts.

PET/CT: This type of nuclear imaging associates with Positron Emission Tomography (PET) scans and Computed Tomography (CT) scans to deliver images that identify the anatomic location of abnormal metabolic activity inside the breasts.

Breast ultrasound: It is an imaging test which utilizes the sound waves to detect the abnormalities inside the breasts. It can help to determine the breast lumps as a cyst.

Scintimammography: This imaging is also known as nuclear medicine breast imaging. It may be used to examine a breast abnormality that has been discovered on mammography. This procedure is non-invasive.

Breast MRI: During breast MRI, an influential magnetic field, radio frequency pulses and a computer will be used to generate detailed pictures of the within the breasts. It is helpful in evaluating breast lumps, particularly in women with dense breast issue [7].

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Treatment

Depending on the size, shape, type of tumor, growth rate the treatment varies from person to person. Treatment may include lumpectomy (removing the breast cancer), mastectomy (removing the entire breast), sentinel node biopsy (removing a limited number of lymph nodes), axillary lymph node dissection (removing several lymph nodes), removing both breasts. Other treatments may include radiation therapy, immunotherapy, hormone therapy, chemotherapy, targeted therapy drugs and palliative care [8-10].

Prevention

Making changes in an individual daily life may help to reduce the risk of breast cancer. This includes;

- Less intake of alcohol.
- Exercise most days of the week.
- Limit postmenopausal hormone therapy.
- Become familiar with your breasts through breast self-exam for breast awareness.
- Maintain healthy weight.

CONCLUSION

Breast cancer is the common type of malignancy in women. It is difficult to prevent because the causes are unknown. Many risk factors have been identified, including alcohol use, history of previous cancer, use of hormone replacement therapies, obesity, radiation exposure, postmenopausal therapy, etc. Screening programs must be implemented for the early detection of tumor.

Early detection of tumor leads to increased treatment options and hence the rate of curability will be increased.

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