

Cancer Association of South Africa (CANSA)



Research • Educate • Support

Fact Sheet on Breast Cancer in Men

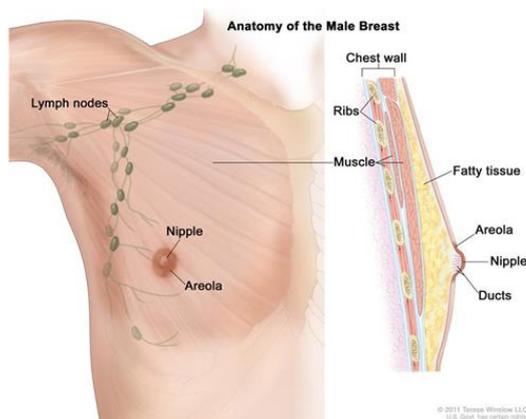
Introduction

The exterior of both male and female chests are basically the same, however, the size, shape, and function of breasts vary significantly between the sexes.

[Picture Credit: Male Breast]

The male breast also has a nipple and an areola (the darker pigmented circle around the nipple), but men lack the mammary glands and ducts necessary to produce milk.

Unlike women, a typical male does not have extensive fat deposits on his chest - in a woman, these protect the mammary glands. Instead, the shape of a man's chest is determined by the muscles underneath the skin. Although atypical, men can develop large mammary glands that result in breast enlargement. This condition is known as gynaecomastia. It is more common in adolescent boys but typically disappears after puberty.



Yetkin, G., Celayir, M.F., Tanik, C., Citgez, B., Uludag, M. & Mihmanli, M. 209.

“Male breast cancer is a rare disease and it differs from breast cancer in women by some characteristics. The incidence of the disease has increased in the last 25 years. The records of male patients who underwent surgery for breast cancer between 2007 and 2017 were retrospectively reviewed in a tertiary care hospital in Istanbul, Turkey. The patients' ages, background, family history, clinical features, histopathological features of the tumour, its stage, the treatment and the survival were investigated. SPSS 15.0 for Windows programme was used for statistical analysis. Survival analysis was performed with Kaplan-Meier method. Determinants were analysed by univariate Cox regression analysis. A total of 15 patients were evaluated in our study. Fourteen patients had invasive ductal carcinoma and one patient had intraductal papillary carcinoma. The median followup period of the patients was 36 months. The axillary lymph node metastasis positivity rate (number of metastatic lymph nodes/number of lymph nodes dissected) was statistically significantly higher in patients who died than in patients who survived. In univariate Cox regression analysis, the effects of age, tumour size, estrogen, progesterone, the presence of HER2/neu receptor and axillary metastasis on survival were not determined. We believe that raising awareness on male

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

Page 1

breast cancer in the community, genetic testing and screening mammography in high-risk patients will be useful in early diagnosis of the disease and improvement of its prognosis.”

Incidence of Breast Cancer in Men in South Africa

According to the outdated National Cancer Registry (2016), known for under reporting, the following cases of Breast Cancer in Men was histologically diagnosed in 2016. Histologically diagnosed means that a sample of tissue (biopsy) was forwarded to an approved laboratory where a specially trained pathologist confirmed a diagnosis of cancer:

Group 2016	Actual Number of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All males	188	1:828	0,48%
Asian males	10	1:656	1,02%
Black males	102	1:942	0,79%
Coloured males	21	1:735	0,44%
White males	55	1:624	0,25%

Khattab, A., Kashyap, S. & Monga, D.K. 2020.

“Although breast cancer is typically synonymous as a disease which commonly occurs in women, it does occur in men as well. This is because although minimal in quantity, men do have breast tissue that has the potential to become malignant similarly to women, albeit much less commonly. While male breast cancer (MBC) is rare, only occurring in 1% of all breast cancers , it does occur, and it is important to be cognizant of its reality and potential. In the US, here are about 2,800 cases of male breast cancer annually. Unfortunately, men with breast cancer are often diagnosed late and have high mortality. However, stage for stage, the survival between males and females is similar.”

Frequency of Histologically Diagnosed Cases of Breast Cancer in Men

According to the National Cancer Registry (2016), the frequency of histologically diagnosed cases of Breast Cancer in Men in South Africa is as follows:

Group 2016	0 to 19 Years	20 to 29 Years	30 to 39 Years	40 to 49 Years	50 to 59 Years	60 to 69 Years	70 to 79 Years	80 + Years
All males	0	0	8	21	44	61	39	15
Asian males	0	0	0	1	3	5	1	0
Black males	0	0	7	12	24	32	19	8
Coloured males	0	0	0	5	6	3	6	1
White males	0	0	1	3	11	21	13	6

According to the Breast Health Foundation (South Africa) it is estimated that South Africa has the highest incidence of male breast cancer in the world with 1-3% of breast cancer cases diagnosed in South Africa occurring in men. It is estimated that up to 400 cases of male breast cancer cases were diagnosed in South Africa during 2018.

Risk Factors for Breast Cancer in Men

Men diagnosed with male breast cancer at an early stage have a good chance for a cure. However, many men delay seeing a doctor when they notice unusual signs or symptoms, such as a breast lump. For this reason, many male breast cancers are diagnosed when the disease is more advanced.

Factors that increase the risk of male breast cancer include:

- Older age. Breast cancer is most common in men ages 40 to 80. About 1 in 5 men with breast cancer (20%) have a close relative who has also had breast cancer.
- The genes store the biological information inherited from parents. The genes most commonly linked to an increased risk of breast cancer in families are BRCA1 and BRCA2. Men in families with the BRCA2 gene are more likely to develop breast cancer than men in BRCA1 families. It is thought that the BRCA2 gene may cause up to 1 in 10 of breast cancers in men (10%).
- Exposure to oestrogen. If one takes oestrogen-related drugs, such as those used as part of sex reassignment surgery, the risk of breast cancer is increased. Oestrogen drugs may also be used in hormone therapy for prostate cancer. Although all men have oestrogen in their bodies, obesity, cirrhosis (liver disease) and Klinefelter's syndrome (a genetic disorder) increase oestrogen levels.
- Family history of breast cancer. If one has a close family member with breast cancer, there is a greater chance of developing the disease. If a first-degree relative—their mother, father, brother, sister, children—has breast cancer, men are also at slightly higher risk to develop the disease themselves. Men who have a BRCA mutation (a mutation or change in a gene that predisposes them to breast cancer) are at a greater risk. Although their chance of developing breast cancer is still low (only about 5% to 6%), men with a mutation in BRCA2 have a 100-fold greater risk of developing breast cancer than men in the general population.

There may be a breast cancer gene in a family if:

- a man in the family has breast cancer
- there are three close relatives on the same side of the family who developed breast cancer at any age
- there are two close relatives on the same side of the family who developed breast cancer under the age of 50
- there is one close relative who developed breast cancer under the age of 40
- there is a close relative with breast cancer in both breasts
- there is a close relative with breast cancer and another relative on the same side of the family with ovarian cancer

Close relatives, sometimes called one's first degree relatives, are parents, children, sisters and brothers.

- Klinefelter's syndrome. This genetic syndrome occurs when a boy is born with more than one copy of the X chromosome. Klinefelter's syndrome causes abnormal development of the testicles. As a result, men with this syndrome produce lower levels of certain male hormones (androgens) and more female hormones (oestrogens).
- being a heavy user of alcohol, which can limit the liver's ability to regulate blood oestrogen levels.
- Liver disease. If one has liver disease, such as cirrhosis of the liver, the male hormones may be reduced and female hormones may be increased. This can increase the risk of breast cancer.

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

- Obesity. Obesity may be a risk factor for breast cancer in men because it increases the number of fat cells in the body. Fat cells convert androgens into oestrogen, which may increase the amount of oestrogen in the body and, therefore, the increased risk of breast cancer.
- Radiation exposure. If one has received radiation treatments to the chest, such as those used to treat cancers in the chest, one is more likely to develop breast cancer later in life.

Caution Expressed Around Consumption of Foods High in Phytoestrogens by Individuals Diagnosed with a Hormone-Sensitive Cancer

The Cancer Association of South Africa (CANSA) has noted:

- A statement by Memorial Sloan Kettering Cancer Center saying that "... because compounds isolated from rooibos leaves demonstrated estrogenic activity, patients with hormone-sensitive cancers should use caution before taking rooibos." (Memorial Sloan Kettering Cancer Center).
- That phytoestrogens were successfully isolated from rooibos leaves by scientists from the School of Pharmaceutical Sciences, University of Shizuoka, Japan (Shimamura, *et al.*, 2006).
- That according to Deng, *et al.*, (2010), "... there are important safety concerns associated with dietary supplements and foods rich in phytoestrogens, especially for breast cancer patients with hormone-sensitive disease. Based on current evidence, we propose recommendations for advising breast cancer patients, ..."
- That, according to Nelles, Hu & Prins (2011), "Early work on the hormonal basis of prostate cancer focused on the role of androgens, but more recently estrogens have been implicated as potential agents in the development and progression of prostate cancer."
- That, according to Reger, *et al.*, (2016), "Experimental studies suggest that phytoestrogen intake alters cancer and cardiovascular risk. Some urinary phytoestrogens were associated with cardiovascular and all-cause mortality in a representative sample of 5 179 participants. This is one of the first studies that used urinary phytoestrogens as biomarkers of their dietary intake to evaluate the effect of these bioactive compounds on the risk of death from cancer and cardiovascular disease."

CANSA, therefore, wishes to advise individuals diagnosed with the following hormone-sensitive cancers, namely: Breast Cancer, Ovarian Cancer, Endometrial Cancer, and Prostate Cancer, to:

- use caution before taking Rooibos tea and to discuss the issue around Rooibos tea consumption with their treating Oncologist prior to consuming Rooibos tea
- also use caution before taking the following high phytoestrogen-containing foods: all soy foods (including soybeans, tofu, miso, and tempeh); legumes (especially lentils, peanuts and chickpeas) and flaxseed-containing foods. Patients are advised to discuss consumption of the listed high phytoestrogen-containing foods with their treating Oncologist prior to consuming them.

Research on Foods High in Phytoestrogens and Breast Cancer

Deng, G., Davatgarzadeh, A., Yeung, S. & Cassileth, B. 2010. Phytoestrogens: science, evidence, and advice for breast cancer patients. *Soc Integr Oncol.* 2010 Winter;8(1):20-30.

“There are important safety concerns associated with dietary supplements and foods rich in phytoestrogens, especially for breast cancer patients with hormone-sensitive disease. However, no consensus has been reached concerning specific dietary items that should be avoided, and safe levels of potentially problematic foods have yet to be determined. Excellent qualitative reviews of phytoestrogens and breast cancer have been published. These list agents that contain phytoestrogens and offer general cautions. Quantitative reviews, however, are needed but not yet available. Here we review quantitative data on phytoestrogens, their interaction with estrogen receptors, their bioavailability and pharmacokinetics, and their effects on breast cancer cells and animal models. We also note foods and botanicals with substances that interact with estrogen receptors and discuss the phytoestrogens they contain. Based on current evidence, we propose recommendations for advising breast cancer patients, which may also serve as a basis for the development of clinical practice guidelines.”

Shimamura, N., Miyase, T., Umehara, K., Warashina, T. & Fuji, S. 2006. Phytoestrogens from *Aspalathus linearis*. *Biol Pharm Bull.* 2006 Jun;29(6):1271-4.

“From the leaves of *Aspalathus linearis*, 24 known compounds and a new one, aspalalinin (25), were isolated. The structures of the compounds were determined mainly based on spectral evidence. The absolute configuration of aspalalinin was presented on the basis of X-ray analysis. Each isolate was assessed for its estrogenic activity by an estrogen ELISA assay. Compounds 12, 15, and 24 showed the estrogenic activity.”

Patisaul, H. & Jefferson, W. 2010. The pros and cons of phytoestrogens. *Front Neuroendocrinol.* Author manuscript; available in PMC 2011 Apr 12.

Phytoestrogens are plant derived compounds found in a wide variety of foods, most notably soy. A litany of health benefits including a lowered risk of osteoporosis, heart disease, breast cancer, and menopausal symptoms, are frequently attributed to phytoestrogens but many are also considered endocrine disruptors, indicating that they have the potential to cause adverse health effects as well. Consequently, the question of whether or not phytoestrogens are beneficial or harmful to human health remains unresolved. The answer is likely complex and may depend on age, health status, and even the presence or absence of specific gut microflora. Clarity on this issue is needed because global consumption is rapidly increasing. Phytoestrogens are present in numerous dietary supplements and widely marketed as a natural alternative to estrogen replacement therapy. Soy infant formula now constitutes up to a third of the US market, and soy protein is now added to many processed foods. As weak estrogen agonists/antagonists with molecular and cellular properties similar to synthetic endocrine disruptors such as Bisphenol A (BPA), the phytoestrogens provide a useful model to comprehensively investigate the biological impact of endocrine disruptors in general. This review weighs the evidence for and against the purported health benefits and adverse effects of phytoestrogens.

Rodriguez-Garcia, C., Sánchez-Quesada, C., Toledo, E., Delgado-Rodriguez, M. & Gaforio, J.J. 2019. “Dietary guidelines universally advise adherence to plant-based diets. Plant-based foods confer considerable health benefits, partly attributable to their abundant micronutrient (e.g., polyphenol)

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

Page 5

content. Interest in polyphenols is largely focused on the contribution of their antioxidant activity to the prevention of various disorders, including cardiovascular disease and cancer. Polyphenols are classified into groups, such as stilbenes, flavonoids, phenolic acids, lignans and others. Lignans, which possess a steroid-like chemical structure and are defined as phytoestrogens, are of particular interest to researchers. Traditionally, health benefits attributed to lignans have included a lowered risk of heart disease, menopausal symptoms, osteoporosis and breast cancer. However, the intake of naturally lignan-rich foods varies with the type of diet. Consequently, based on the latest humans' findings and gathered information on lignan-rich foods collected from Phenol Explorer database this review focuses on the potential health benefits attributable to the consumption of different diets containing naturally lignan-rich foods. Current evidence highlight the bioactive properties of lignans as human health-promoting molecules. Thus, dietary intake of lignan-rich foods could be a useful way to bolster the prevention of chronic illness, such as certain types of cancers and cardiovascular disease.”

Symptoms and Signs of Breast Cancer in Men

Symptoms of breast cancer in men are similar to those seen in women. Most male breast cancers are diagnosed when a man discovers a lump in his breast. But unlike women, men tend to delay going to the doctor until they have more severe symptoms, like bleeding from the nipple. At that point the cancer may have already spread.

The most common sign of breast cancer in men is a firm, non-painful mass located just below the nipple. There may not be other associated symptoms.

The cancer may cause skin changes in the area of the nipple. These changes can include:

- ulceration of the skin
- puckering or dimpling
- redness or scaling of the nipple
- retraction (turning inward) of the nipple
- bloody or opaque discharge from the nipple may also occur

Less than 1% of cases are bilateral (occurring on both sides).

Breast cancer that has spread (metastasised) to the bones may also produce bone pain at the sites of metastases. Advanced breast cancer can also produce symptoms typical of many cancers, including malaise, weakness, and weight loss. Breast cancer in men can spread to many other organs and cause other symptoms as well.



SIGNS OF MALE BREAST CANCER

- A lump or thickening in breast tissue
- The lump increasing in size and turning painful
- Skin covering the breast turning orange
- Occurrence of dimpling, puckering, redness or scaling on the breast
- Nipples turning inwards or discharge from them

DANGERS

Breast cancer in men is often diagnosed later than breast cancer in women, making it tough to treat. This may be because men are less likely to be suspicious of something strange in that area. Also, their small amount of breast tissue is harder to feel, making it harder to catch these cancers early.

DIAGNOSIS & TREATMENT

The same techniques that are used to diagnose breast cancer in women are used in men: physical exams, mammography, and biopsies (examining small samples of tissue under a microscope).

The same treatments that are used in treating breast cancer in women - surgery, radiation, chemotherapy, biological therapy, and hormone therapy - are also used to treat breast cancer in men.

[Picture Credit: Male Breast Cancer]

Diagnosis of Breast Cancer in Men

The same techniques that are used to diagnose breast cancer in women are used in men:

- Physical examination
- Mammography
- biopsies (examining small samples of tissue under a microscope)

[Picture Credit: Male Mammography]



Nofal, M.N. & Yousef, A.J. 2019.

BACKGROUND: To review the procedural diagnosis of male breast cancer.

METHODS: Medline and Google Scholar searches using the terms (male breast cancer) and (diagnosis); and (triple assessment).

RESULTS: Most of the search-specific items are incorporated in more comprehensive reviews about male breast cancer in general. Relevant data was extracted in accordance with the aim of this review.

RESULTS: Most of the diagnosed cases are advanced stage ductal invasive carcinomas, express hormone receptors in the great majority, and are less likely to over-express HER2-neu. They present usually as a painless retroareolar mass that requires triple assessment. The diagnosis needs a high index of suspicion primarily due to the unawareness of such a cancer in males.

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

Gao, Y., Agoldberg, J.E., Young, T.K., Babb, J.S., Moy, L. & Heller, S.L. 2019.

Background: Male breast cancer incidence is rising. There may be a potential role in selective screening in men at elevated risk for breast cancer, but the effectiveness of such screening remains unexplored.

Purpose: To evaluate patterns of male breast imaging utilization, to determine high-risk screening outcomes, and to delineate risk factors associated with cancer diagnosis.

Materials and Methods: This retrospective study reviewed consecutive male breast imaging examinations over a 12-year period (between 2005–2017). Examination indications, biopsy recommendations, and pathologic results were correlated with patient characteristics. Fisher exact test, Mann-Whitney test, Spearman correlation, and logistic regression were used for statistical analysis.

Results: A total of 1869 men (median age, 55 years; range, 18–96 years) underwent 2052 examinations yielding 2304 breast lesions and resulting in 149 (6.5%) biopsies in 133 men; 41 (27.5%) were malignant and 108 (72.5%) were benign. There were 1781 (86.8%) diagnostic and 271 (13.2%) screening examinations. All men undergoing screening had personal or family history of breast cancer and/or genetic mutations. There was a significant increase in the number of examinations in men relative to the number of examinations in women over time (Spearman correlation, $r = 0.85$; $P < .001$). Five node-negative cancers resulted from screening mammography, yielding a cancer detection rate of 18 per 1000 examinations (95% confidence interval [CI]: 7, 41), with cancers diagnosed on average after 4 person-years of screening (range, 1–10 person-years). Mammographic screening sensitivity, specificity, and positive predictive value of biopsy were 100% (95% CI: 50%, 100%), 95.0% (95% CI: 93.1%, 98%), and 50% (95% CI: 22.2%, 77.8%). Older age ($P < .001$), Ashkenazi descent ($P < .001$), genetic mutations ($P = .006$), personal history ($P < .001$), and first-degree family history ($P = .03$) were associated with breast cancer. Non-first-degree family history was not associated with cancer ($P = .09$).

Conclusion: There is potential benefit in screening men at high risk for developing breast cancer. Such screening may have increased over time.

Amrino, M.A., GAucalp, A., Leithner, D., Keating, D., AVendano, D., Bernard-Davila, B., Morris, E.A., Pinker, K. & Jochelson, MS. 2019.

PURPOSE: To investigate the utility of mammography for breast cancer screening in a population of males at increased risk for breast cancer.

METHODS: In this HIPAA-compliant institutional review board-approved single-institution study, mammography records and clinical data of 827 male patients who underwent digital mammography from September 2011-July 2018 were analyzed via the electronic medical record. 664 of these men presented with masses, pain, or nipple discharge and were excluded from this study. The remaining 163 asymptomatic men with familial and/or personal history of breast cancer, or with a known germline mutation in BRCA, underwent screening mammography and were included in this analysis.

RESULTS: 163 asymptomatic men (age: mean 63 years, range 24-87 years) underwent 806 screening mammograms. 125/163 (77%) had a personal history of breast cancer and 72/163 (44%) had a family history of breast cancer. 24/163 (15%) were known mutation carriers: 4/24 (17%) BRCA1 and 20/24 (83%) BRCA2. 792/806 (98%) of the screening mammograms were negative (BI-RADS 1 or 2); 10/806 (1.2%) were classified as BI-RADS 3, all of which were eventually downgraded to BI-RADS 2 on follow-up. 4/806 (0.4%) mammograms were abnormal (BI-RADS 4/5): all were malignant. The cancer detection rate in this cohort was 4.9 cancers/1000 examinations.

CONCLUSIONS: In our cohort, screening mammography yielded a cancer detection rate of 4.9 cancers/1000 examinations which is like the detection rate of screening mammography in a

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

population of women at average risk, indicating that screening mammography is of value in male patients at high risk for breast cancer.

Massarweh, S.A. & Choi, G.L. 2016.

“Breast cancer in men is relatively uncommon but its incidence has been rising. Traditionally, the management of breast cancer in men is based on extrapolation from clinical trials of breast cancer in women, due to the much more extensive data available in women with this disease. There are, however, unique characteristics that distinguish breast cancer in men and these should be taken into consideration when managing this patient population. Breast cancer in men is more frequently estrogen receptor (ER) and progesterone receptor (PgR) positive, and less frequently HER2 amplified. Lobular carcinoma, which accounts for 10-15% of breast cancers in women, is exceptionally rare in men. Genetic risk factors, particularly BRCA2 mutations, are increasingly recognized as a key risk factor for breast cancer in men and genetic testing is now routinely recommended for all men diagnosed with breast cancer. Tamoxifen remains the gold standard endocrine therapy for breast cancer in men, but other endocrine agents such as the aromatase inhibitors (AI) and fulvestrant are increasingly being used. While superior to tamoxifen in postmenopausal women, the use of AIs for adjuvant therapy in men with breast cancer may not be optimal since the physiology of hormonal regulation in men resembles that of premenopausal rather than postmenopausal women. Emerging areas of investigation include the role of genomic risk stratification to gain further insight into the biology of breast cancer in men, the study of the androgen receptor (AR) as a therapeutic target, and the role of gonadal suppression in the management of the disease. There is clearly a more concerted effort to study breast cancer in men as a unique disease in order to have a better understanding of its biology and we are likely to witness further advances that will help us better manage this unique disease situation.”

Elbachiri, M., Fatima, S., Bouchbika, Z., Benchekroun, N., Jouhadi, H., Tawfig, N., Sahraoui, S. & Benider, A. 2017.

“Breast cancer in men is rare, accounting for approximately 1% of all breast cancers and less than 1% of all neoplasias in men. This study aimed to highlight the clinical histological, prognostic and therapeutic features of this rare tumor in order to contribute to improve the management of these patients. We conducted retrospective study of 40 patients whose data were collected at the Mohammed VI Center for Cancers Treatment in Casablanca from January 2000 to December 2012. The average age was 62 years, the mean consultation time was 12 months, self-exam of a peri-areolar nodul was the main reason for consultation in 90% of cases. Infiltrating ductal carcinoma was the predominant histological type in 90% of cases. Multimodal treatment was based on mastectomy followed by adjuvant therapy including chemotherapy, radiation therapy and/or hormonal therapy, depending on tumor stage and its histological features. The mean follow-up time was 38 months, patient's evolution was characterized by complete remission in 16 patients (40%), local recurrence in 3 patients (7.5%) and metastatic recurrence in 5 patients (12.5%). Metastases mainly occurred in the bones (62%), followed by the lungs and the liver. 10 patients (25%) died. Breast cancer in men is similar to breast cancer in women. However, it has its own peculiarities, hence the importance of conducting broader prospective randomised studies in order to improve the treatment and the prognosis of this disease with a high psychosocial impact.”

Genetic Counselling Is a Must for Men

All men with breast cancer should be referred for genetic counselling.

This is different from women who are not automatically referred to a genetic counsellor for genetic testing, such as for mutations in BRCA-1 or 2. These “tumour suppressor genes” allow breast and other types of cancer to develop when they fail to function normally. Only women with a significant family history or certain other characteristics, such as being young or having triple-negative breast cancer (which lacks oestrogen, progesterone, and HER2 receptors), are recommended to have genetic testing.

Men should tell their health care provider if any man in their family has had breast cancer. Even if one’s grandfather is deceased, if he had breast cancer, that is important. Because male breast cancer is so rare, seeing even one man in a family lineage raises concerns about hereditary breast cancer.

Types of Breast Cancer in Men

The most common type of male breast cancer is infiltrating ductal carcinoma, which is also a common type of breast cancer in women. Ductal carcinoma refers to cancers with origins in the ducts (tubular structures) of the breast, and the term infiltrating means that the cancer cells have spread beyond the ducts into the surrounding tissue. On the other hand, lobular cancers (cancers of the milk glands), common in women, are extremely rare in men since male breast tissue does not normally contain lobules.

Other uncommon types of cancers of the breast that have been reported in men include ductal carcinoma *in situ* (cancer in the ducts that has not spread beyond the ducts themselves), cystosarcoma phyllodes (a type of cancer of the connective tissue surrounding the ducts), and Paget’s Disease of the breast (a cancer involving the skin of the nipple). Some other types of breast cancer that occur in men are named for their growth patterns and microscopic appearance of the cancer cells, including papillary carcinoma, inflammatory carcinoma, and medullary carcinoma.

Sakhiri, S., Jaidane, O., Bouhani, M., Adouni, O., Kammoun, S., Chargui, R. & Rahal, K. 2019.

“Pure ductal carcinoma in situ of male breast (DCIS) is extremely rare. Only a few cases have been reported until now. Its treatment is not well established. Prognosis is as good as in women. In this study, we reported 3 cases of pure ductal carcinoma in situ in the male breast. The mean age of DCIS patients was 58.3 years. The main symptom was a breast mass. The median size of the tumor was 25 mm. Two patients had an axillary lymph node. The left side was reached in 2 cases. All of the patients underwent mastectomy. The histopathological assessment showed papillary, cribriform, and comedocarcinoma in situ. There was no evidence of invasive carcinoma. In one case, the DCIS was associated with Paget’s disease of the nipple. One patient received hormonotherapy. The time of follow-up ranged between 6 and 117 months. One patient developed an invasive recurrence.”

About 85% of breast cancers in men have oestrogen receptors on their cell membranes. Oestrogen receptors on the cell membranes allow oestrogen molecules to bind to the cancer cells. Oestrogen binding to the cancer cells can stimulate cell growth and multiplication.

Gucalp, A., Traina, T.A., Eisner, J.R., Parker, J.S., Selitsky, S.R., Park, B.H., Elias, A.D., Baskin-Bey, E.S. & Cardoso, F. 2018. Male breast cancer: a disease distinct from female breast cancer. *Breast Cancer Res Treat.* 2018 Sep 28. doi: 10.1007/s10549-018-4921-9. [Epub ahead of print]

PURPOSE: Male breast cancer (BC) is rare, representing approximately 1% of cancers that occur in men and approximately 1% of all BCs worldwide. Because male BC is rare, not much is known about the disease, and treatment recommendations are typically extrapolated from data available from clinical trials enrolling female BC patients.

METHODS: We review the epidemiology, risk factors, prognosis, and the varied molecular and clinicopathologic features that characterize male BC. In addition, we summarize the available data for the use of systemic therapy in the treatment of male BC and explore the ongoing development of targeted therapeutic agents for the treatment of this subgroup of BCs.

RESULTS: There are important biological differences between male and female BC. Male BC is almost exclusively hormone receptor positive (+), including the androgen receptor (AR), and is associated with an increased prevalence of BRCA2 germline mutations, especially in men with increased risk for developing high-risk BC. Additional research is warranted to better characterize male BC. To accomplish this, a multi-national consortium approach, such as the International Male Breast Cancer Program, is needed in response to the scarcity of patients. This approach allows the pooling of information from a large number of men with BC and the creation of registries for future therapeutic-focused clinical trials.

CONCLUSIONS: Given the unique biology of BC in men, promising new therapeutic targets are currently under investigation, including the use of poly-ADP-ribose polymerase inhibitors or AR-targeted agents either as monotherapy or in combination with other agents.

Special Tests

The following tests and investigations may be ordered:

Breast ultrasound - ultrasound, also known as *sonography*, uses high-frequency sound waves to outline a part of the body.

Magnetic resonance imaging (MRI) of the breast - MRI scans use radio waves and strong magnets instead of X-rays. The energy from the radio waves is absorbed and then released in a pattern formed by the type of body tissue and by certain diseases. A computer translates the pattern into a very detailed image of parts of the body.

Nipple discharge examination - fluid leaking from the nipple is called *nipple discharge*. If a patient has a nipple discharge, he should have it checked by his doctor. If there is blood in this fluid, the patient might need more tests. One test collects some of the fluid to look at under a microscope to see if cancer cells are present.

Biopsy - a biopsy removes a body tissue sample to be looked at under a microscope. A biopsy is the only way to tell if a breast abnormality is cancerous. Unless the doctor is sure the lump is not cancer, this should always be done. There are several types of biopsies. One's doctor will choose the type of biopsy based on the situation.

- **Fine needle aspiration biopsy:** Fine needle aspiration (FNA) biopsy is the easiest and quickest biopsy technique. The doctor uses a very thin, hollow needle attached to a syringe to withdraw (aspirate) a small amount of tissue from a suspicious area.

- Core needle biopsy: For a core biopsy, the doctor removes a small cylinder of tissue from a breast abnormality to be looked at under a microscope. The needle used in this technique is larger than that used for FNA. The biopsy is done with local anaesthesia and can be done in a clinic or doctor's office.

Treatment Options for Breast Cancer in Men

The same treatments that are used in treating breast cancer in women are also used to treat breast cancer in men, and may include:

[Picture Credit: Mastectomy]



Wang, Y., Chen, K., Yng, Y., Tan, L., Chen, L., Zhu, L., Su, F., Liu, X. & Li, S. 2019.

Background: Male breast cancer (MBC) is a rare malignancy. We aimed to analyze the incidence trends, clinicopathological characteristics, and survival outcomes in early MBC comparison with early female breast cancer (FBC).

Methods: We included eligible MBC and FBC patients with stage I-II disease in the Surveillance, Epidemiology, and End Results (SEER) database from 2000-2015. Joinpoint regression was used to evaluate the trends in age-adjusted incidence. A one-to-four propensity score matching (PSM) analysis was performed to reduce bias in a retrospective study. Survival outcomes were evaluated using Kaplan-Meier analyses with the log-rank test and Cox proportional hazards regression analysis.

Results: Trends in the age-adjusted incidence rates of early MBC were stable [2000-2015, annual percentage change (APC) =0.50, 95% confidence interval (CI): -0.1 to 1.1, P=0.102]; however, the incidence of early FBC changed significantly over the time period (2000-2015, APC = 0.30, 95% CI: 0.0 to 0.6, P=0.045). In the matched cohort, unmarried status, higher grade, larger tumor size, and advanced lymph node (LN) status were associated with a higher risk of breast cancer death and death of any causes both in early MBC and FBC patients. The hormone receptor (HR) status was as a prognostic factor in FBC patients, but not in MBC. Early MBC had worse breast cancer-specific survival (BCSS) and overall survival (OS) than early FBC in stage I, stage II and HR-positive subgroup of patients.

Conclusions: The biological behavior, clinicopathological features, and clinical outcomes of early MBC are different from that of FBC. Further studies on individualized treatment approaches in MBC are needed.

Surgery - Surgery is usually the first treatment if the breast abnormality is found to be a cancer. Surgery helps get complete information about the cancer and it is a critical step in treatment. The most common surgery in men is called a modified radical mastectomy. This means that the nipple, areola (dark, round area around the nipple), and all of the breast tissue are removed. The muscles on the chest are left alone. Lymph nodes are also removed.

De La Cruz, L.M., Thiruchelvam, P.T.R., Shivani, J., Trina, J., Blankenship, S.A. & Fisher, C.S. 2019.

Background: Male breast cancer (MBC) management is extrapolated from female BC. Mastectomy remains the most frequently used surgical procedure for male breast cancer (MBC). We performed a literature review to assess the use of breast-conservation (BCS) in MBC as well as outcomes following BCS.

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

Methods: A systematic literature was performed, and articles screened to identify studies that measured overall survival (OS), disease-free survival (DFS), or local recurrence (LR) in patients undergoing BCS. Weighted averages based on study size were performed for LR, DFS, and 5-year OS.

Results: Eight studies met the inclusion criteria with male breast surgery cases, and 859 (14.7%) underwent BCS. The mean follow-up time was 53 months, and mean age was 62.6 years, with stage II as the most common presentation. Two studies reported that 50-71.4% of patients underwent sentinel lymph node biopsy, and four studies reported axillary lymph node dissection in 14.3-100%. Five studies reported on adjuvant radiation therapy in 12.0-100% of total patients undergoing BCS. Four studies reported use of hormonal therapy in 73.8-100% of patients. Four studies reported use of chemotherapy in 25-66.7% of patients. Seven studies reported LR among 116 patients, with a weighted average of 9.9%. Three studies reported on DFS in 14 patients, with a weighted average 85.6%. Two studies report OS in 143 patients with a weighted average of 84.4%.

Conclusions: Breast conservation may be considered a safe alternative in the surgical treatment of MBC. Future research should focus on better standardization of local therapy for MBC and improved reporting of outcomes.

Radiation therapy - Radiation therapy is a highly targeted, highly effective way to destroy cancer cells that may linger after surgery. This reduces the risk of recurrence (the cancer coming back).

Chemotherapy - Chemotherapy refers to special medicines that work to kill cancer cells. The doctor may recommend chemotherapy if a patient is at risk of having the cancer spreading beyond the breast or if it already has spread. Chemotherapy is not used for cancers with a low risk of spreading to other parts of the body.

Hansra, D., Jackson, S., Sequeira, J., Vazirani, R. & Alvares, R. 2020.

“Male breast cancer occurs rarely, comprising <1% of breast cancers. Due to the low incidence of male breast cancer, clinical trials of this disease are lacking. Therefore, therapeutic strategies utilized in the management of female breast cancer are often applied to male patients with breast cancer. Specifically, clinical outcomes using CDK 4/6 inhibitors require further investigation in male patients. To the best of our knowledge, the present report presents the first known case of a male patient treated with second line Abemaciclib, Lupron and Fulvestrant, producing complete remission. To the best of our knowledge this is also the first report of complete remission in a male breast cancer patient with a regimen utilizing a CDK 4/6 inhibitor.”

Targeted therapy - Medications that specifically target an abnormality within the cancer cells may be able to offer extra benefits and few side effects.

Hormone therapy - Medicines that target hormone receptors in breast cancer cells are called hormonal therapies. This form of treatment can be very effective against hormone-receptor-positive breast cancer - having either oestrogen or progesterone receptors present in the cancer. Most breast cancers in men are hormone-receptor-positive.

Eggemann, H., Bernreiter, A.L., Reinisch, M., Loibl, S., Taran, F.A., Costa, S.D. & Ignatov, A. 2019.

PURPOSE: Thromboembolism is a common adverse event in women treated with tamoxifen (TAM)

for breast cancer. The risk in male breast cancer patients is poorly investigated. We aimed to examine the risk of thrombotic events after TAM in male breast cancer patients.

PATIENTS AND METHODS: In this prospective cohort study, 448 patients treated between May 2009 and July 2017 for male breast cancer (BC) were assessed for eligibility. Patients with follow-up shorter than 6 months were excluded. The cumulative risk of thromboembolism was evaluated.

RESULTS: The median follow-up was 47 months (range 6-101 months) with a median age of 69.4 years (range 27-89 years). Oestrogen receptor and progesterone receptor expression levels were observed in 98.3 and 94.9% of cases, respectively. During the follow-up period, thrombotic events were documented in 21 (11.9%) of 177 patients receiving TAM and in 1 (2.5%) of 41 patients who did not receive tamoxifen. The estimated incidence was 51.9 per 1000 person-years and 21.5 per 1000 person-years, respectively. Notably, the highest risk was identified in the first 18 months, where 81% of the observed thrombotic events occurred. Patients aged older than 71 years had a significantly increased risk of thrombotic event under TAM treatment than their younger counterparts ($p = 0.033$). History of thrombotic event, cardiovascular and liver disease, as well as additional adjuvant treatment were not associated with increased thrombotic risk.

CONCLUSION: The risk of thrombotic event in men treated with TAM for breast cancer is markedly increased in the first 18 months of treatment, and should be considered during treatment decisions.

Follow-up Care and Treatment for Breast Cancer in Men

After treatment for breast cancer ends, the patient should talk to his treating physician about developing a follow-up care plan. This plan may include regular physical examinations and/or medical tests to monitor recovery for the coming months and years. This could also include regular physical examinations to help keep track of the breast cancer treatment received and develop a survivorship care plan once treatment is completed. In some instances, patients may be seen at survivorship clinics that specialise in the post-treatment needs of people with cancer.

About Clinical Trials

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments
- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The [South African National Clinical Trials Register](#) provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: www.sanctr.gov.za/

Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific condition or situation. Readers of this document should seek appropriate medical advice prior to taking or refraining from taking any action resulting from the contents of this Fact Sheet. As far as permissible by South African law, the Cancer Association of South Africa (CASNA) accepts no responsibility or liability to any person (or his/her dependants/estate/heirs) as a result of using any information contained in this Fact Sheet.

The Cancer Association of South Africa (CANSA) has taken every precaution in preparing this Fact Sheet. Neither CANSA, nor any contributor(s) to this Fact Sheet shall be held responsible for any action (or the lack of any action) taken by any person or organisation wherever they shall be based, as a result, directly or indirectly, of information contained in, or accessed through, this Fact Sheet.



References and Sources Consulted or Utilised

American Cancer Society

<http://www.cancer.org/cancer/breastcancerinmen/detailedguide/breast-cancer-in-men-diagnosis>

Amrino, M.A., GAucal, A., Leithner, D., Keating, D., AVendano, D., Bernard-Davila, B., Morris, E.A., Pinker, K. & Jochelson, MS. 2019. Mammographic screening in male patients at high risk for breast cancer: is it worth it? *Breast Cancer Res Treat.* 2019. 2019 Oct;177(3):705-711. doi: 10.1007/s10549-019-05338-1. Epub 2019 Jul 6.

Breast Health Foundation

<https://www.mybreast.org.za/>

Breastcancer.org

http://www.breastcancer.org/symptoms/types/male_bc/risk
http://www.breastcancer.org/symptoms/types/male_bc/symptoms
http://www.breastcancer.org/symptoms/types/male_bc/treatment/surgery
http://www.breastcancer.org/symptoms/types/male_bc/treatment/lymph_nodes
http://www.breastcancer.org/symptoms/types/male_bc/treatment/radiation
http://www.breastcancer.org/symptoms/types/male_bc/treatment/chemo
http://www.breastcancer.org/symptoms/types/male_bc/treatment/hormonal
http://www.breastcancer.org/symptoms/types/male_bc/treatment/targeted

Cancer.Net

<http://www.cancer.net/cancer-types/breast-cancer-male/after-treatment>

Cancer Therapy Advisor

<http://www.cancertherapyadvisor.com/fact-sheets/early-stage-breast-cancer-diagnostic-test-treatment/article/273260/2/>

De La Cruz, L.M., Thiruchelvam, P.T.R., Shivani, J., Trina, J., Blankenship, S.A. & Fisher, C.S. 2019. Saving the Male Breast: A Systematic Literature Review of Breast-Conservation Surgery for Male Breast Cancer. *Ann Surg Oncol.* 2019 Nov;26(12):3939-3944. doi: 10.1245/s10434-019-07588-1. Epub 2019 Jun 27.

Deng, G., Davatgarzadeh, A., Yeung, S. & Cassileth, B. 2010. Phytoestrogens: science, evidence, and advice for breast cancer patients. *Soc Integr Oncol.* 2010 Winter;8(1):20-30.

Eggemann, H., Bernreiter, A.L., Reinisch, M., Loibl, S., Taran, F.A., Costa, S.D. & Ignatov, A. 2019. Tamoxifen treatment for male breast cancer and risk of thromboembolism: prospective cohort analysis. *Br J Cancer.* 2019 Jan 17. doi: 10.1038/s41416-018-0369-2. [Epub ahead of print]

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

Elbachiri, M., Fatima, S., Bouchbika, Z., Benchekroun, N., Jouhadi, H., Tawfig, N., Sahraoui, S. & Benider, A. 2017. Breast cancer in men: about 40 cases and literature review. *Pan Afr Med J.* 2017 Dec 4;28:287. doi: 10.11604/pamj.2017.28.287.13527. eCollection 2017.

Freitas, A.C., Opinião, A., Fragoso, S., Nunes, H., Santos, M., Clara, A., Bento, S., Luis, A., Silva, J., Moura, C., Filipe, B., Machado, P., Santos, S., André, S., Rodrigues, P., Parreira, J. Vaz, F. 2018. Men seeking counselling in a Breast Cancer Risk Evaluation Clinic. *Ecancermedicalscience.* 2018 Jan 30;12:804. doi: 10.3332/ecancer.2018.804. eCollection 2018. PMID: 29456621.

Gao, Y., Agoldberg, J.E., Young, T.K., Babb, J.S., Moy, L. & Heller, S.L. 2019. Breast cancer screening in high-risk men: a 12-year longitudinal observational study of male breast imaging utilization and outcomes. Published Online: Sep 17 2019. <https://doi.org/10.1148/radiol.2019190971>

Gucalp, A., Traina, T.A., Eisner, J.R., Parker, J.S., Selitsky, S.R., Park, B.H., Elias, A.D., Baskin-Bey, E.S. & Cardoso, F. 2018. Male breast cancer: a disease distinct from female breast cancer. *Breast Cancer Res Treat.* 2018 Sep 28. doi: 10.1007/s10549-018-4921-9. [Epub ahead of print]

Hansra, D., Jackson, S., Sequeira, J., Vazirani, R. & Alvares, R. 2020. Male patient with metastatic stage IV breast cancer achieves complete remission on second line Abemaciclib, Fulvestrant and Leuprolide: a case report. *Mol Clin Oncol.* 2020 Feb;12(2):120-125. doi: 10.3892/mco.2019.1955. Epub 2019 Nov 29.

Healthline

<http://www.healthline.com/human-body-maps/chest>

Ibrahim, M., Yadav, S., Ogunleye, F. & Zakalik, D. 2018. Male BRCA mutation carriers: clinical characteristics and cancer spectrum. *BMC Cancer.* 2018 Feb 13;18(1):179. doi: 10.1186/s12885-018-4098-y. PMID: 29433453.

Khattab, A., Kashyap, S. & Monga, D.K. 2020. Cancer, Male Breast Cancer. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan. 2020 Apr 21.

Male Breast

https://www.google.co.za/search?q=human+male+breast&source=lnms&tbm=isch&sa=X&ei=5szhU-PMNNHb7Aaj7YDIDg&sqi=2&ved=0CAYQ_AUoAQ&biw=1517&bih=714&dpr=0.9#facrc=_&imgdii=_&imgsrc=1C4tI2ypCvGeVM%253A%3BBnDfbXdVdEHbCM%3Bhttp%253A%252F%252Fwww.cancer.gov%252Fimages%252Fcdr%252Ffive%252FCDR694414-750.jpg%3Bhttp%253A%252F%252Fwww.cancer.gov%252Fcantopics%252Fpdq%252Ftreatment%252Fmalebreast%252FPatient%252Fpage1%3B750%3B593

Male Breast Cancer

<http://www.dailymail.co.uk/indiahome/indianews/article-3840009/Indian-men-face-increasing-risk-Male-Breast-Cancer-faulty-genes-alcoholism.html>

Male Mammography

<https://www.thesun.co.uk/living/2796328/men-breast-cancer-symptoms/>

MacMillan Cancer Support

<http://www.macmillan.org.uk/Cancerinformation/Cancertypes/Breastmale/Aboutbreastcancerinmen/Causes.aspx>

Male breast cancer treatment (PDQ®): health professional version. PDQ Adult Treatment Editorial Board. 2018. PDQ Cancer Information Summaries [Internet]. Bethesda (MD): National Cancer Institute (US); 2002-. 2018 Feb 8. PMID: 26389234.

Massarweh, S.A. & Choi, G.L. 2016. Special considerations in the evaluation and management of breast cancer in men. *Curr Probl Cancer.* 2016 Mar - Aug;40(2-4):163-171. doi: 10.1016/j.currproblcancer. 2016.09.003. Epub 2016 Sep 17.

Mastectomy

<http://blog.thebreastcancersite.com/cs-chest-cancer/>

Mayo Clinic

<http://www.mayoclinic.org/diseases-conditions/male-breast-cancer/basics/risk-factors/con-20025972>

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

July 2020

MedicineNet.com

http://www.medicinenet.com/male_breast_cancer/page3.htm#what_are_the_different_types_of_male_breast_cancer

National Cancer Institute

<http://www.cancer.gov/cancertopics/factsheet/clinicaltrials/clinical-trials>

Nelles, J.L., Hu, W-y. & Prins, G.S. 2011. Estrogen action and prostate cancer. *Expert Rev Endocrinol Metab.* 2011. May 6(3):437-451.

Nofal, M.N. & Yousef, A.J. 2019. The diagnosis of male breast cancer. *Neth J Med.* 2019 Dec; 77(10):356-359.

Reger, M.K., Zollinger, T.W., Liu, Z., Jones, T. & Zhang, J. 2016. Urinary phytoestrogens and cancer, cardiovascular, and all-cause mortality in the continuous National Health and Nutrition Examination Survey. *Eur J Nutr.* April 2016; 55(3):1029-1040.

Shin, K., Martaindale, S. & Whitman, G.J. 2018. Male breast magnetic resonance imaging: when is it helpful? Our experience over the last decade. *Curr Probl Diagn Radiol.* 2018 Jan 10. pii: S0363-0188(17)30307-9. doi: 10.1067/j.cpradiol.2018.01.002. [Epub ahead of print] Review.

Sakhiri, S., Jaidane, O., Bouhani, M., Adouni, O., Kammoun, S., Chargui, R. & Rahal, K. 2019. Pure ductal carcinoma in situ in the male breast: a rare entity. *Eur J Breast Health.* 2019 Dec 5;16(1):77-80. doi: 10.5152/ejbh.2019.4928. eCollection 2020 Jan.

Shimamura, N., Miyase, K., Warashina, T. & Fuji, S. 2006. Phytoestrogens from *Aspalathus linearis*. *Biol Pharm Bull.* 2006 June 29(6):1271-4.

US Food and Drug Administration

https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm402937.htm?source=govdelivery&utm_medium=email&utm_source=govdelivery

<https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm402937.htm>

Wang, Y., Chen, K., Yng, Y., Tan, L., Chen, L., Zhu, L., Su, F., Liu, X. & Li, S. 2019. Incidence and survival outcomes of early male breast cancer: a population-based comparison with early female breast cancer. *Ann Transl Med.* 2019 Oct;7(20):536. doi: 10.21037/atm.2019.10.04.

WebMD

<http://www.webmd.com/breast-cancer/guide/breast-cancer-men>

Yetkin, G., Celayir, M.F., Tanik, C., Citgez, B., Uludag, M. & Mihmanli, M. 2019. Male breast cancer: a 10 year retrospective case series in a tertiary care hospital. *J Pak Med Assoc.* 2019 Aug;69(8):1209-1212.