DIAGNOSTIC WORK-UP OF BREAST CANCER IN FEMALES

By
Angela J. Stowe

A clinical project submitted in partial fulfillment of
the requirements for the degree of

MASTER OF NURSING

Washington State University
College of Nursing
Intercollegiate Center for Nursing Education

April 1999
To the Faculty of Washington State University:

The members of the committee appointed to examine the ICNE Research requirements and manuscript of Angela J. Stowe find it satisfactory and recommend that it be accepted.

[Signatures]

Chair

[Signatures]
ACKNOWLEDGMENTS

Nature shows that with the growth of intelligence comes increased capacity for pain, and it is only with the highest degree of intelligence that suffering reaches its supreme point. Arthur Schopenhauer (1788–1860), German philosopher.

TO: Lorna Schumann, my chair, editor, publisher and, I dare say, my friend:
Your pains have not been wasted on me, neither your intelligence. Thank you for enthusiastically suffering the former and sharing the latter so that my life might be enriched through our acquaintance.

Anne Hirsch, Assistant Dean of Student Affairs & Jan Holloway, Associate Professor, breast cancer survivor & survivor advocate: Thank you for your patience and your time.

Dr. Ryan Holbrook, kind surgeon & good friend: You inspired my interest in oncology, taught me everything I know about breast cancer, and by your example reminded me, I must never give up on my dreams, despite all odds.

Thank you to all the other wonderful people in my life who work ceaselessly to give me confidence and remind me that the possibilities are limitless.
ABSTRACT

According to American Cancer Society projections, nearly 44,000 women died of breast cancer in 1998. Numerous studies have shown that early detection increases survival and treatment options for breast cancer patients. Through consistent use of an accepted algorithm for diagnosis including self-breast evaluation, clinical breast exams, and regular mammograms many cancers can be detected in early, treatable stages. Attention to supportive data for diagnostic tests and cost effectiveness will assist the practitioner in recommending the appropriate diagnostic plan.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>MANUSCRIPT</td>
<td>2</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>16</td>
</tr>
<tr>
<td>TABLES</td>
<td>22</td>
</tr>
<tr>
<td>FIGURES</td>
<td>26</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

1. Possible Breast Cancer Associated Factors  
   - 22
2. Tumor, Node, Metastasis Staging System and Stage Groupings  
   - 23
3. ACS Screening Guidelines  
   - 24
4. Element Analysis of Breast Cancer Diagnosis Algorithm  
   - 25
<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age Specific Breast Cancer Rates</td>
<td>26</td>
</tr>
<tr>
<td>2.</td>
<td>5-year Survival Related to Site of Invasion on Diagnosis</td>
<td>27</td>
</tr>
<tr>
<td>3.</td>
<td>Diagnostic Algorithm for Evaluation of a Palpable Breast Lump</td>
<td>28</td>
</tr>
<tr>
<td>4.</td>
<td>Diagnostic Algorithm for Evaluation of a Non-Palpable Breast Lesion</td>
<td>29</td>
</tr>
</tbody>
</table>
Abstract

According to American Cancer Society projections, nearly 44,000 women died of breast cancer in 1998. Numerous studies have shown that early detection increases survival and treatment options for breast cancer patients. Through consistent use of an accepted algorithm for diagnosis including self-breast evaluation, clinical breast exams, and regular mammograms many cancers can be detected in early, treatable stages. Attention to supportive data for diagnostic tests and cost effectiveness will assist the practitioner in recommending the appropriate diagnostic plan.
Introduction

According to the most recent data, an estimated 180,300 women in the United States will be diagnosed with new, invasive breast cancer in 1998. More than 43,900 women died of its effects in 1997 (Landis et al., 1998). Breast cancer is second only to lung cancer in its fatal effect on females in the United States (ACS, 1997), accounting for 32% of all cancers and 18% of all cancer deaths in women (NCI, 1994). Almost one in every nine women will develop breast cancer in her lifetime (NCI, 1994). All practitioners providing health care to women should have an established protocol for breast cancer diagnosis. Early detection and diagnosis of this potentially devastating disease can lead to decreased mortality.

Breast Cancer Incidence

In 1987, after forty-five years of rising at 1-4% annually, breast cancer incidence finally stabilized at approximately 109.6 cases per 100,000 women (ACS, 1996). Although incidence is highest among Caucasian women of upper socioeconomic groups, rates among young African-American women are on the rise (ACS, 1997). Regardless of racial or ethnic background, the incidence of breast cancer increases dramatically with age. Studies have shown that race, ethnicity, and age affect mortality trends, as well as incidence. Overall, breast cancer is more likely to be fatal for African-American women than for other racial or ethnic groups. Recent improvements in mortality have been limited to white women, with mortality rates declining by 5.5% in whites and increasing in African-American women by 2.6% (Mahon, 1997). These statistics may not reflect incidence alone, but could be skewed by changes in availability to screening mammography. With the rise in reported incidence of breast cancer, the last five years have shown a continuing decline in mortality rates among all socioeconomic and ethnic groups.
Earlier detection and treatment has been associated with improved survival and may be the cause for the decline in mortality (ACS, 1997).

**Risk Factors**

Although some factors have been associated with an increased risk of breast cancer (Table 1), the data is not definitive, nor does it translate directly to disease prevention (NCI, 1994). Statistical models for projecting individualized probability of developing breast cancer have been developed using current age, previous breast biopsies, age at menarche, age at first live birth, and first degree relatives with breast cancer (Gail et al., 1989). Newer models have added Lobular carcinoma in situ. A computer program is currently available through the makers of tamoxifen that will assess risk factors using the Gail model and make 10-year and lifetime projections for development of breast cancer.

Age is the single most influential risk factor in the development of breast cancer. The risk for a 60 year-old Caucasian American woman to develop breast cancer is 14 times that of a 30 year-old woman (See Figure 1). Previous biopsy status relates to the presence of fibrocystic changes or benign conditions of atypia or hyperplasia which may increase lifetime risk.

There is evidence of hormonal influence on the risk of developing breast cancer as indicated by the risk factors surrounding the menstrual cycle and pregnancy. Research suggests that increased risk may be directly related to length of exposure to estrogen, as in early menarche, late menopause, and hormone replacement therapy. Early first term pregnancy and lactation may have a protective effect. The data regarding oral contraceptives is inconclusive with some studies suggesting increased risk with prolonged use and others suggesting a protective effect (Harris, Lippman, Morrow, & Hellman, 1996).
The familial component of breast cancer in some cases is undeniable. Research is ongoing in the quest for answers regarding breast cancer genes and the ability to identify high-risk individuals and families. BRCA-1, discovered in 1990, is an autosomal dominant gene which, in conjunction with BRCA-2 (discovered in 1995), appears to be responsible for the majority of familial breast cancer syndromes. Female carriers of BRCA-1 mutations have an estimated 55-87% chance of developing breast cancer by age 70. Cancer risks associated with BRCA-2 may be lower (Mann & Borgen, 1998). Women with BRCA-1 or BRCA-2 mutations account for 3-8% of breast cancer cases (Brody & Biesecker, 1998). Additional genes found in Li-Fraumeni syndrome and Cowden's disease are responsible for other breast cancer related syndromes. However, this genetic knowledge has not yet found clinical application (Mann & Borgen, 1998).

The majority of women will have one or more of the risk factors identified in Table 1. However, only 21% of the risk of breast cancer can be explained by analysis of risk factors (ACOG, 1992). Therefore, in the diagnostic process, it is reasonable to assume that all women are at risk for breast cancer. In a study measuring perception of breast cancer risk, women overestimated general population risk of breast cancer by twofold and personal lifetime risk by more than 50% (Smith, et al., 1996). It is the responsibility of the provider to recognize misperceptions and counsel all concerned women regarding their true risk of developing breast cancer.

Prevention

Prevention strategies for breast cancer depend upon the risk category of the woman and are centered around modifying the risk factors already identified. Avoidance of alcohol, tobacco, and radiation exposure may decrease risk of breast cancer. Increased physical activity, prevention of obesity, and low dietary fat intake alter estrogen metabolism and may therefore, decrease risk.
More directly linked factors relating to exposure to endogenous hormones and family history are more difficult to modify. Surgically induced menopause or prophylactic mastectomy may have some role in very high-risk individuals (Donegan & Spratt, 1995).

In September 1998, the National Surgical Adjuvant Breast and Bowel Project P-1 study (NSABBP) announced that tamoxifen decreases the incidence of invasive and noninvasive breast cancer and is appropriate for use as a preventive agent in many women at increased risk. In October 1998, Nolvadex (tamoxifen) received approval for preventative use in high-risk women. According to the NSABBP report, tamoxifen has the adverse effects of increasing endometrial cancer, stroke, pulmonary embolism, and deep-vein thrombosis rates. The side-effects limit the use of tamoxifen to women identified as high-risk for the development of breast cancer (Fisher et al., 1998). The findings of decreased incidence of breast cancer in women participating in studies of the osteoporosis drug, raloxifene (Evista) led to current ongoing research for its use in breast cancer prevention. Raloxifene belongs to the class of synthetic estrogens in which tamoxifen is included. The hope is that raloxifene will have the breast cancer prevention effect, without the increased risk of endometrial cancer due to its antiestrogen effect on the uterus.

Pathophysiology

Carcinomas of the breast are histologically identified as arising from the epithelial lining of the ducts (ductal) or the epithelium of the terminal ducts of the lobules (lobular). Breast carcinoma is either invasive or in situ. In situ carcinoma is regarded as an early cancer that would most likely progress to invasive cancer if left untreated and accounts for 15% of breast cancer cases at diagnosis (Giuliano, 1999) Fifty-two percent of women with breast cancer present with locally invasive disease. Women with regional metastasis to lymph nodes account for 27% of
cases. Only 3% of women with breast cancer present with distant metastasis. The remaining 3% go without staging (Carson & Johnson, 1996).

**Lobular Carcinoma in Situ**

Lobular carcinoma in situ (LCIS) is a condition of extensive atypical lobular hyperplasia. LCIS does not present clinically and is an incidental microscopic finding of breast tissue removed for another reason. LCIS is associated with an approximate 7-10 times increased incidence of invasive carcinoma. The ensuing carcinoma may occur in either breast. In the past, LCIS has been managed with bilateral simple mastectomy. Recent studies suggest that LCIS is simply a marker of increased risk and should be given high-risk follow up (Harris, et al., 1996).

**Ductal Carcinoma in Situ**

Ductal carcinoma in Situ (DCIS) is characterized by a proliferation of presumably malignant epithelial cells within the ductal-lobular system without invasion of the surrounding breast parenchyma. This heterogeneous population of lesions differs in architecture and behavior and is commonly multicentric. The most common clinical presentation of DCIS is mammographically detected microcalcifications. Recent years have seen a rise in incidence of ductal carcinoma in situ, presumably related to the use of screening mammography (Harris, et al., 1996).

**Invasive Adenocarcinoma of the Breast**

Invasive ductal or lobular carcinoma spreads through direct infiltration into the breast parenchyma or along mammary ducts. Individual tumors fall along a continuum of biologic aggressiveness. Invasive ductal carcinoma accounts for 65-80% of invasive breast cancers. The remaining 20-35% consists of tubular (lobular), medullary, mucinous, and papillary. Inflammatory breast carcinoma is more accurately described as a superficial presentation of an
underlying invasive carcinoma and does not represent a histologic category of disease.

Presentation of invasive cancers will be addressed at length below (Harris, et al., 1996).

**Prognosis**

Breast carcinomas are staged using the TNM system (Table 2). Five-year relative survival for women with breast cancer varies drastically depending on the stage of cancer at diagnosis. Staging relates to the spread of disease at diagnosis including, tumor size, local invasion of chest wall or skin, metastasis to lymph nodes, and metastasis to distant sites. Five-year relative survival for localized breast cancer is now 97%, an increase of 25% since the 1940s. If the cancer has spread to regional lymph nodes, survival drops to 76%. If distant sites are involved breast cancer five-year survival reaches a low of 20%. Survival for all groups continues to decline after five years, with 65% survival at 10 years and 56% at 15 years (ACS, 1997) (See Figure 2). These statistics reinforce the necessity of early detection and diagnosis to increase long-term survival.

**Presenting Signs and Symptoms**

Approximately 70% of breast cancer patients present with a palpable lump, usually painless. The upper outer quadrant of the breast contains the most breast tissue and is the most common site for development of a benign or malignant lesion. The earliest sign of breast cancer is an abnormality that appears on mammogram before it can be felt by the patient or the provider (Giuliano, 1999). As the use of screening mammography becomes more widespread, the percentage of women presenting with an abnormal mammogram will continue to increase.

Other presenting symptoms may include thickening, swelling, dimpling, skin irritation, distortion, nipple retraction, scaliness, pain, nipple tenderness or discharge (ACS, 1997). Although breast pain is most frequently associated with benign conditions, 15% of palpable breast cancers present with pain or discomfort. Nipple discharge is only seen in 2% of breast cancers
and is most worrisome if it is spontaneous, unilateral, or confined to one duct. Nipple discharge is more commonly caused by papilloma or fibrocystic changes. Inflammatory breast cancer is associated with edema of the skin, redness, heat, and tenderness and should be considered in the differential diagnosis of cellulitis or mastitis. Axillary adenopathy is seldom found, but may be associated with a poor prognosis (Donegan & Spratt, 1995).

**Early Detection**

In order to identify women at earlier, more treatable stages, an early detection and diagnosis algorithm must include the three key components of basic screening: self-breast exam, clinical breast exam, and routine mammography. Mammogram findings, physical symptoms, and age identify necessity to progress beyond routine screening. Dependent on the details of these factors the provider should proceed with any combination of the following: additional mammographic views, breast ultrasound, fine needle biopsy, core biopsy, and/or excisional biopsy. Any woman who is symptomatic or has an abnormal mammogram should receive appropriate diagnostic work-up.

**Self-Breast Exam**

Seventy-three percent of palpable masses are found by women themselves (Donegan & Spratt, 1995). A woman can take control of her breast health through adherence to a regular screening schedule. The American Cancer Society has established research-based guidelines for asymptomatic women (Table 3). The ACS advocates that women perform monthly self-breast exams in addition to annual evaluation by a health care practitioner. Self-breast exams are associated with a 20%-30% sensitivity and even lower specificity (Fletcher, O’Malley, & Bunce, 1985). However, research has shown that women who regularly perform self-breast exams present with smaller lesions (Henderson, 1995).
Women should be encouraged to perform self-breast exams with technique similar to that of the clinical breast exam. The exam should be performed near the same time each month as the shape and texture of the breast may change with the woman's monthly hormone cycle. It is important for a woman to become familiar with the contour and appearance of her own breasts. It is normal for breasts to be lumpy as they are made up of lobulated tissue. Monthly self-breast exams should allow the woman to differentiate normal from abnormal lumps. It may be helpful to provide the woman with information that includes an illustration of the structure of the breast including description of the duct and lobule based architecture. Frequent encouragement, answers to questions and hands on direction during the clinical breast exam may increase the efficacy of self-breast exams.

Clinical Breast Exam

The clinical breast exam (CBE) is the common intervention in every diagnostic pathway. A negative clinical breast exam offers reassurance to patients. It is vital that the practitioner be competent in performing the clinical breast exam to facilitate early detection and prevent false reassurance (McGinnis, 1989). Approximately 10% of palpable breast lesions are not visible on mammogram. Sensitivity of the clinical breast exam, the ability to find cancer when the woman being screened is positive for the disease, ranges from 57%-70% (Fletcher et al., 1993). The wide range of sensitivity values may be attributable to variations in technique and time spent. It is reasonable to assume that the specificity (the ability to determine the absence of disease in the woman without cancer) is much lower due to the number of cancers that present as diffuse microcalcifications or nonpalpable lesions detectable only by mammogram. The average charge for a clinical breast exam by a specialist is $70-$120. The clinical breast exam may be done in the
context of an annual medical check up. In this event, the cost may increase to, as much as $150 - $200.

The sensitivity of the clinical breast exam can be enhanced by establishing a routine including, careful examination and palpation of the entire breast and adjacent lymph node basins. The breasts should be examined with the patient sitting and supine. The practitioner must evaluate the entire breast from midsternum to the posterior axillary line, and from the costal margin to the clavicle. Using a consistent search pattern, the practitioner should inspect and palpate the breast for any flattening, dimpling, erythema, edema, nipple retraction, nipple discharge, breast fixation, tissue thickening, or palpable masses. The arm on the same side as the breast being examined should be raised during palpation in order to more evenly distribute the breast over the chest wall. Use of variable pressure with the finger pads of the middle three fingers in a circular motion has been associated with higher quality breast exams (McGinnis, 1989). A positive CBE in any individual must be followed up. In women greater than 30 years of age, the next step is always mammogram.

Mammography

As a result of insufficient research on mammography in the under 50 population, discrepancies in screening recommendations have arisen. American Cancer Society data for this population suggests reductions in breast cancer mortality by early detection ranging from 10 - 24% (Smart, et al., 1995). Despite the lack of consensus regarding age at which routine screening should begin, the role of mammography in the diagnosis of breast cancer is not in doubt. Mammography is a safe and relatively inexpensive method of detecting breast cancer and has been shown to reduce breast cancer mortality by at least 30% in women 50 and older (Fletcher, et al., 1993).
Mammography is 76 - 94% sensitive and greater than 90% specific (Fletcher et al., 1993). Human error in interpretation may account for the range of sensitivity values. A suspicious mass on mammography appears as dense and spiculated with irregular borders. Suspicious microcalcifications are described as pinpoint, clustered, linear, or branching (Donegan & Spratt, 1995). The average charge for a bilateral mammogram is $70-90. Additional magnification views could increase the cost to, as high as $150. The procedure can be uncomfortable and women should be cautioned against scheduling a mammogram during menstruation or at times when the breasts are especially sensitive. The mammogram equipment of today is precise and can deliver a high quality image with the very low radiation dose of 40 mrad per view. This compares to greater than 1000 mrad for CT scan (Donegan & Spratt, 1995). Ten percent of women with breast cancer present with normal mammograms. The false negative rate is higher in younger women due to the increased density of younger breast tissue (Clifford & Lugo-Zamudio 1996). This data describes the difficulty of breast cancer detection in the younger patient and is an indication for the use of additional imaging studies.

Breast Ultrasound

Breast ultrasound is most commonly used to evaluate palpable lesions in women less than thirty years of age. Ultrasound is not currently being used in screening, but as an adjunct to the clinical breast exam or to mammography in the detection of breast lesions. It is especially helpful in identifying the nature of a lesion, whether fluid filled or solid. Ultrasound has a sensitivity of 88% and a specificity of 96.5%. It is more expensive than mammography at $150-$200.

Imaging Alternatives

Alternatives to current mammographic technology for breast cancer screening are being investigated. Digital mammography may decrease the number of mammographic views required
by utilizing computer manipulation and analysis of images. CT may be helpful in very isolated cases. However, the 15 times increase in radiation dose and unnecessary radiation of other areas, reduce the likelihood of use for screening purposes. The high cost of CT scanning is also a factor (Donegan & Spratt, 1995).

MRI and contrast enhanced MRI may offer a radiation free alternative or adjunct in breast imaging. MRI has been shown to be helpful in staging and the identification of multifocal or multicentric involvement. Distinguishing a benign from a malignant condition on MRI is difficult (Kramer, et al. 1998). MRI and CT function suboptimally in the identification of microcalcifications (Sickles, 1990).

Tumor Markers

Research continues in the search for a simple screening blood test that will aid practitioners in the diagnosis of breast cancer. The tumor marker CA 15-3 has been studied in comparison to carcinoembryonic antigen (CEA) in the diagnosis of patients with breast cancer. These studies have not yielded an efficacious marker for diagnosis. However, CA 15-3 was shown to correlate with tumor stage and breast cancer recurrence (Safi, et al., 1998).

Breast Biopsy Options

Although detection of a possible cancerous lesion can be performed through the diagnostic studies discussed above, diagnosis of breast carcinoma cannot be made without confirmation by cytologic review of a tissue sample. The information gained from this process not only confirms the diagnosis, but provides vital prognostic indicators that assist with treatment planning. The practitioner may expect to receive a cytologic diagnosis within 3-5 days. See Table 3 for sensitivity and specificity data. Review by a pathologist of a biopsy sample begins at $70 and increases with sample size.
Fine Needle Aspiration vs. Core Needle Biopsy

A palpable lesion can be biopsied in the practitioner’s office by fine needle aspiration (FNA) or core needle biopsy (CNB). The data is inconclusive as to the benefit of one method over another. Both methods obtain limited specimens for review, which may result in an inconclusive diagnosis and an open surgical biopsy before an actual diagnosis can be made (Teague, et al., 1997). Specificity for both FNA and CNB is 100%. Whereas, sensitivity is higher for FNA, 97.5% vs. 90% for CNB. Both methods require experience and practice to perform effectively and sensitivity/specificity data may vary with practitioner skill (Ballo & Sneige, 1996). Local anesthesia and perhaps light sedation are indicated with both procedures. An average office charge for FNA is $100, for CNB $150. In office ultrasound can assist the practitioner with either procedure. This would add approximately $50 to the cost of the procedure.

Image-Guided Biopsy

With the advent of image-guided biopsy, nonpalpable lesions no longer present a diagnostic challenge. Stereotactic core needle biopsy (SCNB) is a mammogram guided procedure similar to core needle biopsy. Like the in-office core biopsy the sample size of SCNB is small and may result in an inconclusive diagnosis. However, the SCNB has been shown to be effective in sparing many women from an open surgical biopsy. Sensitivity and specificity data are 89% and 94%, respectively (Ballo & Sneige, 1996). Because the SCNB requires specialized equipment, at $1020 the cost is much higher than the in office procedures discussed above. SCNB also requires local anesthesia and will be followed by a short healing period, as a large bore needle is used to obtain a tissue core.

An option for more diffuse lesions or microcalcifications identified on mammogram is the needle localization biopsy (NLB). NLB is an open surgical biopsy performed with the aid of
localizing needles placed through the skin under mammography or ultrasound. The needles surround the suspicious lesion and guide the surgeon in obtaining the specimen. An NLB is the most expensive of the diagnostic options, as it requires out-patient surgery and radiologic supervision. Average cost is $3,000. Needle localization biopsy is considered outpatient surgery and involves local anesthesia and IV sedation by an anesthesiologist or nurse anesthetist. As with other surgical procedures, the patient needs to refrain from food or drink for 8 hours prior to the procedure. Recovery may take up to a week and bruising is common.

Excisional Biopsy

If the lesion is palpable and fine needle aspiration or core needle biopsy is not available, nondiagnostic, nonconcordant, or against the patient’s wishes, an open surgical biopsy may be performed. An open surgical biopsy average charge is $2500. The same pre and postoperative conditions apply to both needle localization biopsy and open surgical biopsy.

Conclusion

Breast cancer is a serious disease that kills thousands each year. Early detection, diagnosis, and treatment strongly impact mortality rate. Delay in the diagnosis of breast cancer is one of the most common reasons for medical malpractice claims in the United States, accounting for the largest indemnity payments of any single medical condition. Delay in diagnosis can be prevented by strict adherence to a research-based diagnostic algorithm and pursuance of every breast complaint to resolution (Osuch & Bonham, 1994). “The price of skill in the diagnosis of breast carcinoma is a kind of eternal vigilance based upon an awareness that any indication of disease in the breast may be due to carcinoma” (Haagensen, 1971).
References


<table>
<thead>
<tr>
<th>Table 1. Possible Breast Cancer Associated Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>First degree relative with breast cancer</td>
</tr>
<tr>
<td>Personal history of breast cancer or LCIS</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Age at menarche</td>
</tr>
<tr>
<td>Age at birth of first child</td>
</tr>
<tr>
<td>Age at menopause</td>
</tr>
<tr>
<td>Lactation</td>
</tr>
<tr>
<td>Diet — especially high fat intake</td>
</tr>
<tr>
<td>Exogenous hormones</td>
</tr>
<tr>
<td>Alcohol consumption</td>
</tr>
<tr>
<td>Benign breast disease</td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Radiation exposure</td>
</tr>
<tr>
<td>Cigarette smoke exposure in adolescence</td>
</tr>
<tr>
<td>Physical inactivity</td>
</tr>
<tr>
<td>Tumor Size (T)</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>TX</td>
</tr>
<tr>
<td>T0</td>
</tr>
<tr>
<td>Tis</td>
</tr>
<tr>
<td>T1</td>
</tr>
<tr>
<td>T2</td>
</tr>
<tr>
<td>T3</td>
</tr>
<tr>
<td>T4</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Stage Groupings**

- **I** 5-year survival rate: >95%  
  - Tis, N0, M0
- **II** 5-year survival rate: 85%  
  - T1, N0, M0
  - T1a 5-year survival rate: 65%  
    - T0, N1, M0
- **IIA** 5-year survival rate: 65%  
  - T1, N1, M0  
  - T2, N0, M0  
  - T3, N0, M0
- **IIIB** 5-year survival rate: 41%  
  - T0, N2, M0  
  - T1, N2, M6  
  - T2, N2, M0  
  - T3, N1/N2, M0
- **III A** 5-year survival rate: 65%  
  - T0, N2, M0  
  - T1, N2, M6  
  - T2, N2, M0  
  - T3, N1/N2, M0
- **III B** 5-year survival rate: 41%  
  - T4, any N, M0
- **IV** 5-year survival rate: 10%  
  - any T, any N, M1

Table 2

Used with the permission of the American Joint Committee on Cancer (AJCC®), Chicago, IL. The original source for this material is the AJCC® Manual for Staging of Cancer, 4th Edition (1992). Published by Lippincott-Raven Publishers, Philadelphia.
<table>
<thead>
<tr>
<th>Age 20-39</th>
<th>Monthly self-breast exam, clinical breast exam every three years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 40-49</td>
<td>Monthly self-breast exam, annual clinical breast exam, mammography every 1-2 years, baseline mammogram by age 40</td>
</tr>
<tr>
<td>Age 50+</td>
<td>Monthly self-breast exam, annual clinical breast exam, annual mammography</td>
</tr>
<tr>
<td>Element</td>
<td>Cost</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Self-breast exam</td>
<td>Free</td>
</tr>
<tr>
<td>Clinical Breast Exam</td>
<td>$70-150</td>
</tr>
<tr>
<td>Mammogram</td>
<td>$70-150</td>
</tr>
<tr>
<td>Breast Ultrasound</td>
<td>$150-200</td>
</tr>
<tr>
<td>Fine Needle Aspiration Biopsy</td>
<td>$100</td>
</tr>
<tr>
<td>Core Needle Biopsy</td>
<td>$150</td>
</tr>
<tr>
<td>Stereotactic Core Needle Biopsy</td>
<td>$1020</td>
</tr>
<tr>
<td>Needle Localization Biopsy</td>
<td>$3000</td>
</tr>
<tr>
<td>Open Surgical Biopsy</td>
<td>$2500</td>
</tr>
</tbody>
</table>
Age Specific Breast Cancer Rates

![Graph showing breast cancer rates per 100,000 population by age]

Figure 1
Figure 2: 5-year survival related to site of invasion on diagnosis

- Local
- Regional
- Distant

% of total breast cancer diagnoses vs. 5-year survival
Figure 3 Diagnostic Algorithm for Evaluation of a Palpable Breast Lump

Premenopausal

<30 years

Check in 6 weeks

Normal

Lesion still present

Stop

± Ultrasound

FNA/ Core Biopsy

Benign

Abnormal or Nondiagnostic Nonconcordant

Two Follow-up Visits Within 18 Months

Stop

Two Follow-up Visits Within 18 Months

Benign & Concordant

Postmenopausal

>30 years or Diagnostic Workup: Strong Family History

Diagnostic Workup: Mammogram Ultrasound

Diagnostic Biopsy: FNA/Core Biopsy

Not Available Patient Choice Nondiagnostic Nonconcordant

Definitive Treatment

Cancer

Benign & Concordant

Two Follow-up Visits Within 18 Months

Excisional Biopsy or Incisional Biopsy

Stop

Love, Ames, & Figlin 1996
Figure 4 Diagnostic Algorithm for Evaluation of a Non-Palpable Breast Lump

Mammogram

Nonpalpable Lesion

± Ultrasound

Cystic

Simple
Stop

Complex

Aspiration
Pneumocystogram

Solid/Calcifications

Benign
Stop

Nondiagnostic

Repeat Mammogram in 6 months

Suspicious

Diagnostic Biopsy: FNA/Core Biopsy

Benign & Concordant

Two follow-up visits within 18 months
Stop

Not Available
Nondiagnostic
Nonconcordant
Patient Choice

Wire Localization Biopsy

Benign

Two follow-up visits within 18 months (include postbiopsy mammogram within 3 months)
Stop

Cancer

Definitive Treatment (Include postbiopsy mammogram)

(Love, Ames, & Figlin 1996)