BREAST OVERVIEW: FROM A SURGEON'S PERSPECTIVE

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Estimated New Cancer Cases

**Males**
- Prostate: 19%
- Lung & bronchus: 14%
- Colon & rectum: 9%
- Urinary bladder: 7%
- Melanoma of skin: 6%
- Kidney & renal pelvis: 5%
- Non-Hodgkin lymphoma: 5%
- Oral cavity & pharynx: 4%
- Leukemia: 4%
- Liver & intrahepatic bile duct: 4%
- All other sites: 22%

**Females**
- Breast: 30%
- Lung & bronchus: 13%
- Colon & rectum: 7%
- Uterine corpus: 7%
- Thyroid: 5%
- Melanoma of skin: 4%
- Non-Hodgkin lymphoma: 4%
- Pancreas: 3%
- Leukemia: 3%
- Kidney & renal pelvis: 3%
- All other sites: 21%
Trends in Cancer Incidence

US Females, 1975-2014

- Breast
- Colon & rectum
- Lung & bronchus
- Uterine corpus
- Melanoma of the skin
- Thyroid
- Liver
## Lifetime Probability of Cancer

**Females, 2012-2014**

<table>
<thead>
<tr>
<th>Site</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sites</td>
<td>1 in 3</td>
</tr>
<tr>
<td>Breast</td>
<td>1 in 8</td>
</tr>
<tr>
<td>Lung &amp; Bronchus</td>
<td>1 in 17</td>
</tr>
<tr>
<td>Colon &amp; Rectum</td>
<td>1 in 24</td>
</tr>
<tr>
<td>Uterine corpus</td>
<td>1 in 35</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>1 in 42</td>
</tr>
<tr>
<td>Non-Hodgkin Lymphoma</td>
<td>1 in 54</td>
</tr>
<tr>
<td>Thyroid</td>
<td>1 in 56</td>
</tr>
<tr>
<td>Pancreas</td>
<td>1 in 65</td>
</tr>
<tr>
<td>Ovary</td>
<td>1 in 78</td>
</tr>
<tr>
<td>Leukemia</td>
<td>1 in 80</td>
</tr>
</tbody>
</table>
Estimated Cancer Deaths

<table>
<thead>
<tr>
<th></th>
<th>Males 323,630</th>
<th>Females 286,010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung &amp; bronchus</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>Prostate</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>All other sites</td>
<td>24%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Breast is the leading cause of cancer death for females with 14% of deaths. For males, the leading cause is Lung & bronchus with 26% of deaths.
## Trends in 5-year Survival

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sites</td>
<td>49</td>
<td>55</td>
<td>69</td>
</tr>
<tr>
<td>Breast (female)</td>
<td>75</td>
<td>84</td>
<td>91</td>
</tr>
<tr>
<td>Colorectum</td>
<td>50</td>
<td>60</td>
<td>66</td>
</tr>
<tr>
<td>Leukemia</td>
<td>34</td>
<td>43</td>
<td>64</td>
</tr>
<tr>
<td>Lung &amp; Bronchus</td>
<td>12</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>82</td>
<td>88</td>
<td>94</td>
</tr>
<tr>
<td>Non-Hodgkin Lymphoma</td>
<td>47</td>
<td>51</td>
<td>73</td>
</tr>
<tr>
<td>Ovary</td>
<td>36</td>
<td>38</td>
<td>47</td>
</tr>
<tr>
<td>Pancreas</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Prostate</td>
<td>68</td>
<td>83</td>
<td>99</td>
</tr>
<tr>
<td>Urinary Bladder</td>
<td>72</td>
<td>79</td>
<td>78</td>
</tr>
</tbody>
</table>
Breast Cancer: Who do you know?

- Most common cancer
  - >250,000 women diagnosed with breast cancer each year
- Second most common cause of cancer-related deaths
  - >40,000 deaths from breast cancer each year
What does breast cancer look like?
Patient Stories: **Family Matters**

- **Patient**: 60 yo woman
- **Family**: Multiple family members with breast cancer
- **Screen**: Breast Cancer
Family History
Patient Stories: Bad Genetics

Patient: 28 yo woman

Mom:
• Breast cancer
• Genetic mutation

Screen: Breast Cancer
Genetics Mutations

- Has genetic condition
- No condition
Patient Stories: **Something’s Changing**

- **Patient**: 51 yo woman
- **Biopsy**: Abnormal breast biopsy (atypia)
- **Exam**: Breast Cancer
Abnormal Breast Biopsy

Mammary glands
Milk ducts
Areola
Nipple
Fatty tissue
DCIS
Invasive ductal carcinoma
### Breast Cancer Risk Factors

- Family history and ancestry
- Genetic mutation
- Abnormal breast biopsy
- Personal risk factors
  - Gender
  - Age
  - Weight
  - Breast density
- Personal risk factors related to hormones
  - Age of menses and menopause
  - Pregnancy and breastfeeding
  - Hormone replacement
- Exposures and environment
  - Alcohol
  - Radiation

**Well...what CAN you do?**
Breast Cancer Risk Assessment

- Family history and ancestry
- Genetic mutation
- Abnormal breast biopsy
- Personal risk factors
  - Gender
  - Age
  - Weight
  - Breast density
- Personal risk factors related to hormones
  - Age of menses and menopause
  - Pregnancy and breastfeeding
  - Hormone replacement
- Exposures and environment
  - Smoking
  - Radiation

*Genetic mutation risk
* * CODING TIP * *
BUT WAIT!!??!!

WARNING
Dangers of Risk Assessment & Genetic Testing?
Genetic Testing

$250 !!!
What do you need to know?

• Not all women are the same.
• Not everyone’s risk of breast cancer is the same.
• Every woman needs breast cancer risk assessment.
• Know your risk. You may have options.
Breast Cancer Screening
Breast Cancer Screening

That was then…
• Mammography
  • Yearly starting at 40

This is now…
• Imaging options
  • Mammography
    • 3D/tomosynthesis
  • MRI
  • Ultrasound
  • Density
  • Average vs high risk
    • Start at 40
    • Start at 45
    • Annual vs. biennial
### The Guidelines

<table>
<thead>
<tr>
<th>Recommended</th>
<th>ACOG</th>
<th>ACR/SBI</th>
<th>ACS</th>
<th>AMA</th>
<th>NCCN</th>
<th>USPSTF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age to start mammograms</td>
<td>40</td>
<td>40</td>
<td>45 (choice 40-44)</td>
<td>40</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Age to stop mammograms</td>
<td>Annual while in good health</td>
<td>When life expectancy &lt;5-7 years</td>
<td>When life expectancy &lt;10 years</td>
<td>When life expectancy &lt;10 years</td>
<td>Upper age limit not established</td>
<td>74</td>
</tr>
<tr>
<td>Interval</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual 45-54; 1-2 years 55+</td>
<td>Annual</td>
<td>Annual</td>
<td>2 years</td>
</tr>
</tbody>
</table>
* * CODING TIP * *
Breast Density: What is it?
What is breast density?

- Almost entirely fatty: 10%
- Scattered areas of fibroglandular density: 40%
- Heterogeneously dense: 40%
- Extremely dense: 10%

Not Dense

Dense
Density is a function of BMI.
Density is a function of BMI.

Same tissue. Larger envelope.
Density is a function of age.
Density is a function of race?

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>African American</th>
<th>Asian</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.54%</td>
<td>27.26%</td>
<td>53.72%</td>
<td>12.48%</td>
<td></td>
</tr>
<tr>
<td>8.38%</td>
<td>31.02%</td>
<td>51.69%</td>
<td>8.91%</td>
<td></td>
</tr>
<tr>
<td>9.20%</td>
<td>15.86%</td>
<td>56.09%</td>
<td>27.13%</td>
<td></td>
</tr>
<tr>
<td>9.42%</td>
<td>29.21%</td>
<td>52.14%</td>
<td>9.23%</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2: Controlled Variables and Percent Concordance in Predicted Breast Density**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Percent Concordance</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age and BMI</td>
<td>73.4</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Age, BMI, and Asian race</td>
<td>73.5</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Age and bra or cup size</td>
<td>74.1</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Age, BMI, and bra or cup size</td>
<td>75.4</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Note—BMI = body mass index.
## Paradoxical Density

<table>
<thead>
<tr>
<th>Density</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>Low</td>
</tr>
<tr>
<td>Younger</td>
<td>Low</td>
</tr>
<tr>
<td>Older</td>
<td>High</td>
</tr>
<tr>
<td>High BMI</td>
<td>High</td>
</tr>
</tbody>
</table>
Breast density can change!?!
Breast density can change!?!
Breast Density

Density as a Risk Factor

- Relative risk for breast cancer with heterogeneously dense breasts = 1.2
- Relative risk for breast cancer with extremely dense breasts = 2.1

The Masking Effect

- Mammographic sensitivity ↓ with ↑ density
  - Largely due to superimposition of overlapping radiopaque dense breast tissue on an underlying cancer when the three-dimensional breast is imaged in a two-dimensional plane

The Masking Effect
What is breast cancer???
Anatomy of the Breast

Invasive cancer: 80%
- Ductal: 85%
- Lobular: 15%

In situ cancer: 20%
- DCIS: 90%
- LCIS: 10%
Progressing to Cancer

- Mammary glands
- Milk ducts
- Arcola
- Nipple
- Fatty tissue

Norm

DCIS
Invasive ductal carcinoma
Breast Cancer Diagnosis

- **Type**
  - Invasive vs in situ
  - Ductal vs lobular

- **Grade**
  - 1-3

- **Receptors**
  - Estrogen receptor (ER)
  - Progesterone receptor (PR)
  - Human-epidermal-growth-factor-receptor

- **Stage**
  - T N M
  - 1-4
# Breast Cancer Diagnosis

<table>
<thead>
<tr>
<th><strong>TUMOR</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (&lt; 2 cm)</td>
<td>![Small Tumor]</td>
<td>![Medium Tumor]</td>
<td>![Large Tumor]</td>
</tr>
<tr>
<td>T2 (2 – 5 cm)</td>
<td>![Small Tumor]</td>
<td>![Medium Tumor]</td>
<td>![Large Tumor]</td>
</tr>
<tr>
<td>T3 (&gt; 5 cm)</td>
<td>![Small Tumor]</td>
<td>![Medium Tumor]</td>
<td>![Large Tumor]</td>
</tr>
<tr>
<td>T4 (involves skin, chest wall; inflammatory)</td>
<td>![Large Tumor on Skin]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NODES</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N0 (negative)</td>
<td>![No Nodes]</td>
<td>![Mobile Nodes]</td>
<td>![Fixed Nodes]</td>
</tr>
<tr>
<td>N1 (mobile)</td>
<td>![No Nodes]</td>
<td>![Mobile Nodes]</td>
<td>![Fixed Nodes]</td>
</tr>
<tr>
<td>N2 (fixed)</td>
<td>![No Nodes]</td>
<td>![Mobile Nodes]</td>
<td>![Fixed Nodes]</td>
</tr>
<tr>
<td>N3 (internal mammary)</td>
<td>![No Nodes]</td>
<td>![Mobile Nodes]</td>
<td>![Fixed Nodes]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>METASTASIS</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M0 (no spread)</td>
<td>![No Spread]</td>
<td>![Spread to Distant Site]</td>
</tr>
<tr>
<td>M1 (spread to at least 1 distant site)</td>
<td>![Spread to Distant Site]</td>
<td></td>
</tr>
</tbody>
</table>

![Spread to Distant Site Diagram]
* * CODING TIP * *

LOCATION ????
* * CODING TIP * *

LOCATION ?? ??
How is breast cancer treated?
Multidisciplinary Clinic

- Medical Oncology
- Surgeon
- Reconstructive Surgeon
- Pathologists
- Radiologists
- Genetics
- Nutrition
- Psycho-Oncology
- Physical Therapy
- Pharmacist
- Nursing
- Social Work
Issues to Consider

- **Surgical Treatment**
  - Mastectomy vs breast conservation
  - Contralateral prophylactic mastectomy
  - Management of the axilla
  - Reconstruction
- **Systemic Therapy**
  - Chemotherapy
  - Targeted therapies
  - Endocrine therapy
- **Radiation Therapy**
  - Whole breast +/- boost
  - Chest wall (post-mastectomy)
  - Lymph nodes
- **Hereditary Cancer Syndromes**
  - Genetic testing
Surgical Options

- For the breast
  - Lumpectomy
  - Mastectomy
- For the axillary lymph nodes
  - Axillary lymph node dissection
  - Sentinel lymph node biopsy
Normal Anatomy

- Areola
- Nipple
- Ducts
- Lobules
- Lymph nodes
- Ribs
- Muscle
- Ducts
- Areola
- Nipple
- Lobules
- Stroma
- Chest wall
- Supraclavicular lymph nodes
- Clavicle (collarbone)
- Infraclavicular lymph nodes
- Axillary lymph nodes
- Internal mammary lymph nodes
Surgical Options for the Breast

- **Lumpectomy**
  - Same as partial mastectomy, quadrantectomy, excisional biopsy
  - With or without localization (wire or seed, single or bracketed)
  - With or without lymph node assessment (sentinel lymph node biopsy or axillary dissection)
- Oncoplastics
Surgical Options for the Breast

- **Mastectomy**
  - Modified radical mastectomy
  - Total or simple
  - Skin sparing
  - Nipple and skin sparing
Surgical Options for the Breast

- **Modified radical mastectomy**
  - Removes nipple-areolar complex (NAC) and skin
  - By definition, includes an axillary lymph node dissection
  - No reconstruction *(usually)*
Surgical Options for the Breast

• Total (or simple) mastectomy
  • Removes nipple-areolar complex (NAC) and skin
  • With or without lymph node assessment
  • No reconstruction
Surgical Options for the Breast

- Skin sparing mastectomy
  - Removes nipple-areolar complex (NAC) but saves the skin envelope
  - With or without lymph node assessment
  - Typically with reconstruction
  - Tissue expander with delayed implant or tissue flap
  - Immediate implant
  - Immediate tissue flap
Surgical Options for the Breast

- Nipple & skin sparing mastectomy
  - Saves the nipple-areolar complex and the skin envelope
  - With or without lymph node assessment
  - Typically with reconstruction
  - Tissue expander with delayed implant or tissue flap
  - Immediate implant
  - Immediate tissue flap
* * CODING TIP * *

Mastectomy = Mastectomy

*Unless partial mastectomy....
Surgical Options for the Nodes

- **Axillary lymph node dissection**
  - Any type of breast surgery
  - Does not require tracer
  - Usually requires a separate incision for a lumpectomy, but not for a mastectomy
  - Number of lymph nodes removed may vary
Surgical Options for the Nodes

- **Sentinel lymph node biopsy**
  - Any type of breast surgery
  - Requires tracer
    - Blue dye injected by surgeon during the surgery (in the OR)
    - Radioactive tracer injected by nuclear medicine prior to surgery (day before or morning of)
  - May require separate incision
  - All patients have sentinel lymph nodes (does not mean they have cancer in those nodes)
  - Number of sentinel lymph nodes removed may vary
**CODING TIP**

**BEWARE!!**

- Code 1 = breast surgery
- Code 2 = lymph node surgery
- Code 3 = breast surgery + lymph node surgery
How does the diagnosis influence the surgical options?

• For the breast
  
  • Depends mostly on tumor size and breast size/anatomy
  
  • Less influenced by the type, grade, or receptors
  
• For the lymph nodes
  
  • Sentinel lymph node biopsy is preferred and recommended if nodes are clinically negative
  
  • Axillary lymph node dissection is often considered and preferred if lymph nodes are known to be positive prior to surgery
The Future of Breast Cancer
Research Highlights

- Breast cancer risk assessment
- Breast cancer screening
- Database for atypia patients
- Database for breast cancer patients
- Genetic testing
- Breast cancer staging
- Breast cancer prognosis
Together, we can move further, faster to fight breast cancer.

Questions?

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