Breast Cancer & Breast Health

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CANCER:

What is it?

What is Cancer?

- Constellation of diseases
- If untreated → serious illness & death
- Normal cell becomes abnormal
Normal Cells | Cancer Cells
---|---
• Serve a purpose | • Serve no purpose
• Grow predictably | • Grow out-of-control
• Divide predictably | • Divide out-of-control
• Die when abnormal or worn out | • Fail to die even when abnormal
• “Stay home” | • “Leave home” (metastasize to other tissues or organs)

How does cancer begin?

Cellular DNA damage

- DNA “drives” all cell activity
- Healthy DNA:
  - Normal cell activity
- Damaged DNA:
  - Abnormal cell activity
  - Cell grows & divides out of control

Gene mutations cause DNA damage

**Inherited** gene mutations
- 5-10% of cancers
  - Born with the mutation
  - Inherited from parent

**Sporadic** gene mutations
- 90-95% of cancers
  - Single cell mutation
  - Carcinogen exposure
  - Not born with/not inherited/not passed on
  - Cell division error
  - Familial tendencies
Cancer is named...

According to where it begins

When cancer *spreads*, still named for the location where it *began*

Are all cancers the same?

- No
- Behave differently
- Grow & respond differently
- Cancers in the same organ in different people can be very different (e.g., breast)

*Cancer treatment always targets that particular cancer*

How does cancer grow?

Abnormal cell survives → Abnormal cell divides → Multiple abnormal cells form a tumor
How does cancer spread?

Invasion
- Cells expand to nearby tissues

Metastasis
- Cells spread to other sites (blood stream, lymphatic system)
- New tumors develop away from primary site

Carcinogens
Agents that can cause cancer
- Known carcinogens:
  - Tobacco
  - Radon
  - Asbestos
  - Ultraviolet Rays
- Yet unknown carcinogens

Recognizing carcinogens for what they are…
Cancer is:
A "clonal" disease. It originates from one ancestral cell that, having acquired the capacity of limitless cell division & survival, gives rise to limitless descendants.

A "clonally evolving" disease - Every generation of cancer cells creates cells genetically different from its parents.

When chemotherapy or the immune system attacks cancer, mutant clones resist & grow. This relentless cycle of mutation, selection, & overgrowth generates cells that more & more adapted to survival.

-- Siddhartha Mukherjee The Emperor of All Maladies

How common is cancer?

One-third of women in the US will develop cancer during their lifetime

Half of men in the US will develop cancer during their lifetime
BREAST CANCER

What is it?

Breast Cancer

Cancer that develops in the structures of the breast

Structures of the female breast:

Each breast:

- 15-20 lobes, lobules & milk-producing glands
- Ducts
- Fat and fibrous tissue
- Lymph vessels connecting lymph nodes
How common is Female Breast Cancer?

1 of 8 women in U.S. will develop breast cancer in her lifetime

12% lifetime risk

192,000 diagnosed/year in U.S.

Female vs. Male Breast Cancer

100 x more common in women than in men

Women:
• Growth-promoting hormones

Men:
• May not know risk
• May not pay attention
• May ignore
Male Breast Cancer

Mark Goldstein

- Diagnosed in 1988
- October 2011, Kearney was his 215th SGK race
- 2,000 men dx/year in U.S. (192,000 women dx/year in U.S)

“Men should not die from breast cancer out of ignorance.”

Changing as it does during adolescence, menstrual cycles, nursing, and menopause, the breast may be the most dynamic organ in the human body.

National Cancer Institute

RECOGNIZING

The Risks
Risk factors for breast cancer:

Three categories (ACS) of causes

• Risk factors you cannot change
• Lifestyle-related factors
• Factors with uncertain, controversial, or unproven effect on breast cancer risk

Risk factors you cannot change:

• Gender
• Aging
• Genetic risk factors
• Family history of breast cancer
• Personal history of breast cancer
• Race and ethnicity
• Dense breast tissue
• Certain benign breast conditions
• Lobular carcinoma in situ
• Menstrual periods
• Previous chest radiation

Gender

Being a woman

• 100 x more common in women than men
• Largely due to female hormones:
  • Estrogen
  • Progesterone
Age

- age = risk
- 2 out of 3 breast cancers found after age 55

Genetic factors

5-10% breast cancer due to inherited gene mutations
- BRCA genes prevent abnormal cell growth
- Mutations to BRCA1 & BRCA2 most common mutations for breast cancer
  (Ashkenazi Jews originally from Eastern Europe)
- Many other, rare gene mutations exist

These mutations are inherited from a parent and may necessitate different surveillance

Family Health History

Higher risk if:
- Mother, father, sister, brother or daughter had breast cancer
  Especially if diagnosed before age 50
- Other relatives had breast or ovarian cancer on mother or father’s side

But… 85% of women who get breast cancer have no family history
Personal Health History

Higher risk with personal history of:
• Breast cancer in one breast
  3-4 x risk of developing new breast cancer
  – not recurrence – in same or other breast
• Certain abnormal cells (atypical hyperplasia)
• Lobular carcinoma in situ (LCIS)
• Ductal carcinoma in situ (DCIS)

Race & Ethnicity

• Overall, white women more likely to develop breast cancer than
  African American, Hispanic/Latina,
  Asian/Pacific Islander, American
  Indian/Alaska Native
• African American women more likely to die of breast cancer

Breast density

Breasts have:
• Glandular tissue = dense tissue
• Fatty tissue = not dense
Women with denser tissue have higher risk of breast cancer
Certain benign breast conditions

Some benign conditions increase risk of breast cancer:

- Fibrocystic disease
- Calcifications
- Mastitis
- Lipoma
- Fibroadenoma
- Atypical ductal hyperplasia

Lobular Carcinoma in Situ

LCIS increases risk of breast cancer

- LCIS looks like cancer cells growing in the lobules
- Cells do not grow through the lobule walls
- Cells don’t become cancer if not treated

Menstrual history

Slightly increased risk if:

- Started menstruation before age 12
- Menopause after age 55

May be due to longer lifetime exposure to estrogen and progesterone
Radiation therapy to chest

Significantly higher risk if:
- Radiation to chest wall between ages 10-40
  Hodgkin disease, non-Hodgkin lymphoma
- The younger the age, the higher the risk

DES Exposure
Diethylstilbestrol

Slightly increased risk
- Given 1940s – 1960s to pregnant women to lower chance of miscarriage
- Women whose mothers took DES during pregnancy may also have slightly higher risk

Lifestyle-related risk factors that can be influenced or controlled

- Having children
- Birth control
- Hormone therapy after menopause
- Breastfeeding
- Alcohol
- Being overweight or obese
- Physical activity
Having children

Slightly increased breast cancer risk if:
• No children
• First child after age 30

Slightly reduced risk if:
• Many pregnancies
• Becoming pregnant at young age

Birth control

Increased risk:
• Oral and injectable contraceptives
• Risk may be slight and may revert back to normal once stopped, depending upon the drug

Breastfeeding

• May slightly lower risk
• Difficult to study
• Benefit may be tied to fewer menstrual cycles
Hormone therapy after menopause

- Different types exist
- Some types increase risk
- Make decision with your doctor after weighing risks and benefits

Alcohol Use

- The more alcohol a woman drinks...
- The greater the risk

Weight

- Being overweight or obese after menopause...
- Increases risk
Weight

- Complex connection
- Estrogen produced mostly by:
  - Ovaries before menopause
  - Fat after menopause
- More fat tissue after menopause = higher risk
- Higher risk when
  - Weight gained in adulthood vs. childhood
  - Excess fat in waist vs. hips and thighs

Trends in Overweight* Prevalence (%), Adults 18 and Older, US, 1992-2010

Activity

Physical activity…

…lowers risk
Factors with uncertain, controversial, or unproven effects:

- Diet and vitamin intake
- Antiperspirants
- Bras
- Induced abortion
- Breast implants
- Chemicals in the environment
- Tobacco smoke
- Night work

Diet and vitamin intake

- Research results are conflicting
- No clear link to risks
- But...calories and fat intake influence weight!!

Antiperspirants

- Rumors suggest chemicals are absorbed and lead to breast cancer
- Little evidence to support rumor
- Large study found no increase in breast cancer with underarm products or shaved underarms
Bras

- Rumors suggest bras cause breast cancer by obstructing lymph flow
- No scientific or clinic basis for rumor

Abortions

- Strong data that neither induced of spontaneous abortions (miscarriages) have an overall effect on risk

Breast implants

- Several studies provide data that implants do not increase risk
- Implants may cause scar tissue
- Harder to see breast tissue using standard mammography
- May be linked to rare type of lymphoma – too few cases to draw conclusions
Chemicals in the environment

- Research being conducted
- Compounds with estrogen-like properties are of interest
  - Plastics, certain cosmetics and personal care products, pesticides

Tobacco smoke

- Studies in recent years have found smoking might increase risk
- Limited evidence that smoking causes breast cancer
- Evidence on secondhand smoke and breast cancer is controversial

Night work

- Several studies suggest that women who work at night might have increased risk
- Research continues
BUT, after reviewing all these risk factors…

- Most women with risks never develop cancer
- Many who develop breast cancer have no apparent risk factors - other than being a woman and growing older
- When a woman with risk factors develops breast cancer, hard to know just how much those factors contributed to her disease

SIGNS & SYMPTOMS

Early signs & symptoms of breast cancer

Usually none
Signs & symptoms as breast cancer grows

- Lump or thickening – breast or underarm
- Change in size or shape of breast
- Dimpling or puckering in skin
- Inverted nipple
- Discharge from nipple – especially if bloody
- Scaly, red, or swollen skin on breast

Tell health provider about any change from normal

PREVENTION STRATEGIES & LIFESTYLE CHOICES that make a difference

Lower your risk by changing the risk factors that can be changed

- Weight
- Exercise
- Alcohol
- Avoid or limit hormone replacement
Know if you are at increased risk

Do you have:
• Strong family history of breast cancer?
• Known genetic mutation in family?
• Personal health risks?

Women at average risk – 1 in 8

Breast Cancer Risk Assessment Tool

• National Cancer Institute (NCI)
• Estimates risk of invasive breast cancer
• Designed for health care professionals
• Not all-inclusive for all risks (radiation)

If higher than average risk, talk to your doctor about…

• Genetic testing for BRCA gene mutations
• Breast cancer chemoprevention
  • Tamoxifen, Raloxifene, Aromatase inhibitors
    (block effects of estrogen on breast tissue)
• Preventive surgery for high risk women
  • Prophylactic mastectomy
  • Prophylactic ovary removal
CURRENT SCREENING RECOMMENDATIONS

Screening texts and exams

Goal:
Find before symptoms begin

Screening does not prevent disease, it finds it at an early stage

Screening texts and exams

Breast cancers found during screening exams more likely to be:
• Small
• Still confined to the breast

Breast cancers found because they’re felt more likely to:
• Be larger
• Have spread beyond the breast
Why screening is important

The size of a breast cancer and how far it has spread are important factors in predicting the prognosis (outlook).

Screening recommendations for women with AVERAGE lifetime risk:

- **Mammogram**
  - Screening mammogram every year after age 40 as long as in good health
- Clinical Breast Exam by health professional
- Breast Awareness
- Breast self exam (optional)

**Mammogram**

X-ray of the breast
- Analog – x-ray plate
- Digital – computer image

Screening mammogram:
- No symptoms exist
- Too small to be felt

Diagnostic mammogram:
- Problem recognized
- Change on a screening mammogram
<table>
<thead>
<tr>
<th>Screening recommendations for women with AVERAGE lifetime risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mammogram</td>
</tr>
<tr>
<td>• <strong>Clinical Breast Exam by health professional</strong></td>
</tr>
<tr>
<td>✓ Every 3 years ages 20-40</td>
</tr>
<tr>
<td>✓ Every year after age 40</td>
</tr>
<tr>
<td>• Breast Awareness</td>
</tr>
<tr>
<td>• Breast self exam (optional)</td>
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<td>• <strong>Clinical Breast Exam by health professional</strong></td>
</tr>
<tr>
<td>• <strong>Breast Awareness</strong></td>
</tr>
<tr>
<td>✓ Know how your breasts normally look &amp; feel</td>
</tr>
<tr>
<td>✓ Notify health care provider of changes</td>
</tr>
<tr>
<td>• Breast self exam (optional)</td>
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</tbody>
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<tr>
<td>• <strong>Breast Awareness</strong></td>
</tr>
<tr>
<td>✓ Begin in 20s</td>
</tr>
<tr>
<td>✓ Know benefits and limitations</td>
</tr>
<tr>
<td>✓ Report breast changes to health professional</td>
</tr>
</tbody>
</table>
Breast Awareness & Self Exam

Women at MODERATELY increased risk:

- Lifetime risk of 15% to 20% via assessment tool
- Personal history of breast cancer or other conditions: DCIS, LCIS
- Extremely dense breasts or unevenly dense breasts

**Screening Recommendations:**
- Talk with doctor about the benefits and limitations of adding MRI screening to yearly mammogram

Women at HIGH risk (2% of population):

- Known BRCA1 or BRCA2 gene mutation
- First-degree relative with a BRCA1 or BRCA2 gene mutation, but no genetic testing themselves
- Lifetime risk of > 20% via assessment tool
- Radiation therapy to chest - ages of 10 - 30 years
- Self or first-degree relative with syndrome linked to breast cancer

**Screening recommendations:**
- MRI and a mammogram every year
Make the move from AWARENESS to ACTION…

- Statistical indifference
- Information apathy
- Siren Fatigue

“You can present the material, but you can’t make me care.” -- Bill Watterson

Credible Resources:

- American Cancer Society
- Centers for Disease Control
- Oncology Nurse Community
- Susan G. Komen for the Cure
- Nebraska Department of Health & Human Services Cancer Registry

2012 Estimated US Cancer Cases*

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>29%</td>
<td>29%</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td>0%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>Melanoma of skin</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>All Other Sites</td>
<td>19%</td>
<td>20%</td>
</tr>
</tbody>
</table>

*Excludes basal and squamous skin cancers and in situ carcinomas except urinary bladder.
### 2012 Estimated US Cancer Deaths

<table>
<thead>
<tr>
<th>Site</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung &amp; bronchus</td>
<td>29%</td>
<td>28%</td>
</tr>
<tr>
<td>Prostate</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>6%</td>
<td>7%</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Kidney</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>All other sites</td>
<td>25%</td>
<td>24%</td>
</tr>
</tbody>
</table>

### The Lifetime Probability of Developing Cancer for Men, 2006-2008*

<table>
<thead>
<tr>
<th>Site</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sites¹</td>
<td>1 in 2</td>
</tr>
<tr>
<td>Prostate</td>
<td>1 in 6</td>
</tr>
<tr>
<td>Lung and bronchus</td>
<td>1 in 13</td>
</tr>
<tr>
<td>Colon and rectum</td>
<td>1 in 19</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>1 in 26</td>
</tr>
<tr>
<td>Melanoma¹</td>
<td>1 in 38</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>1 in 43</td>
</tr>
<tr>
<td>Kidney</td>
<td>1 in 51</td>
</tr>
<tr>
<td>Leukemia</td>
<td>1 in 64</td>
</tr>
<tr>
<td>Oral Cavity</td>
<td>1 in 69</td>
</tr>
<tr>
<td>Stomach</td>
<td>1 in 91</td>
</tr>
</tbody>
</table>

* For those free of cancer at beginning of age interval

### The Lifetime Probability of Developing Cancer for Women, 2006-2008*

<table>
<thead>
<tr>
<th>Site</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sites²</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 16</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>1 in 20</td>
</tr>
<tr>
<td>Uterine corpus</td>
<td>1 in 36</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>1 in 51</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>1 in 87</td>
</tr>
<tr>
<td>Melanoma²</td>
<td>1 in 55</td>
</tr>
<tr>
<td>Ovary</td>
<td>1 in 71</td>
</tr>
<tr>
<td>Pancreas</td>
<td>1 in 69</td>
</tr>
<tr>
<td>Uterine cervix</td>
<td>1 in 147</td>
</tr>
</tbody>
</table>

* For those free of cancer at beginning of age interval

² Sitess adjust based on incidence of skin cancers and in situ cancers except urinary bladder