

# Common solid tumors

435 medicine teamwork

[ **Important** | **Notes** | Extra | **Editing file** ]

## lecture objectives:

- ⇒ pathological classification and staging of solid tumors.
- ⇒ Common solid tumors worldwide and in Saudi Arabia.
- ⇒ Study of Two common solid tumors: breast cancer and colorectal cancer regarding: risk factors, clinical presentation, early detection, diagnostic tools, broad lines of management, and prevention.

We recommend that you wait until we upload Introduction to Cancer lecture it will be much easier .  
. ان شاء الله we will upload it next monday

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References: Doctor's slides & Notes, Kumar,  
Step-up, Robbins.

# Introduction

## Classification of solid tumors:

It is already explained in Introduction to Cancer lecture with more details & notes .

Cancers are classified by the type of cell that the tumor cells presumed to be the origin of the tumor. These types include:

### Carcinoma:

- Cancers derived from **epithelial cells** (either surface cells “for example, squamous cells” or glandular cells “give adenocarcinoma”).
- This group includes many of the most common cancers: breast, prostate, lung, pancreas, and colon.

### Sarcoma:

- Cancers arising from **connective tissue** (i.e. bone, cartilage, fat, nerve).
- Each of which develop from cells originating in mesenchymal cells outside the bone marrow.

### Germ cell tumor:

- Cancers derived from **pluripotent cells**, most often presenting in the testicle or the ovary (seminoma and dysgerminoma, respectively).

### Blastoma:

- Cancers derived from **immature** (precursor) **cells** or embryonic tissue.
- Most common in children.
- Blastoma as a suffix, with the Latin or Greek word for the organ or tissue of origin as the root (e.g. hepatoblastoma).

Some types of cancer are named for the size and shape of the cells under a microscope, such as giant cell carcinoma, spindle cell carcinoma, and small cell carcinoma.

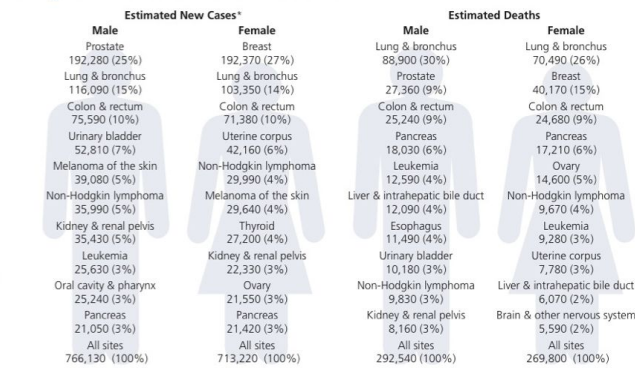
## General principles of solid tumors treatment:

Stage	Early	Locally advanced	Metastatic
Treatment	Local +/- systemic	Local & systemic	Systemic +/- local

## Common solid tumors:

In U.S (the three most common)	In KSA (The three most common)
<ul style="list-style-type: none"> <li>- <b>Men:</b> <ul style="list-style-type: none"> <li>o prostate</li> <li>o lung</li> <li>o colorectal</li> </ul> </li> <li>- <b>Women:</b> <ul style="list-style-type: none"> <li>o breast</li> <li>o colorectal</li> <li>o lungs</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- <b>Men:</b> <ul style="list-style-type: none"> <li>o colorectal “most common”</li> <li>o Lymphoma</li> <li>o Leukemia</li> </ul> </li> <li>- <b>Women:</b> <ul style="list-style-type: none"> <li>o breast”most common”</li> <li>o Thyroid</li> <li>o colorectal</li> </ul> </li> </ul>

Leading Sites of New Cancer Cases and Deaths – 2009 Estimates



\*Excludes basal and squamous cell skin cancers and in situ carcinoma except urinary bladder.

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In U.S

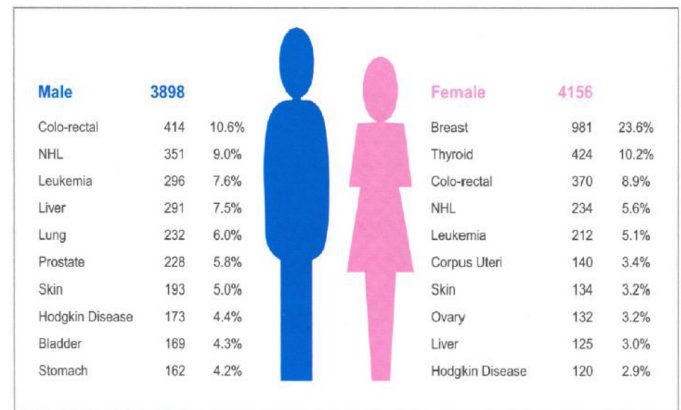


Figure 2.3 Ten Most Common Cancers among Saudis by Sex, 2006

In KSA

So let's start our lecture...

# Breast Cancer

## Epidemiology:

- **2nd** most common cancer.
- **1st** most common cancer in females.
- **2nd** leading cause of death.
- Over 75% of women who are diagnosed with breast cancer are age 50 or older.
- Men can get breast cancer, although this is very rare. For every man who is diagnosed, over 100 women are found to have breast cancer.
- Most women (about 80%) who get breast cancer do not have a sister or mother who has breast cancer.
- Excluding skin cancer, breast cancer is the most common cancer in women.
- 1990s the breast cancer death rate declined by the largest amount in over 65 years.
- Heart disease is the leading killer of women.
- Approximately 97% of women diagnosed with breast cancer at an early stage survive 5 yrs or more.
- There is no single cause of breast cancer. Research has shown that several different factors increase the risk of breast cancer.
- Genetic and lifestyle differences increase the risk for some cancers.

There were 981 female breast cancer cases for year 2006. Breast cancer ranked first among females accounting for 23.6% of all newly diagnosed female cancers (4,156) in year 2006. The ASR was 18.1/100,000 for female population. The five regions with the highest

ASR were Eastern region at 25.0/100,000, Riyadh region at 22.6/100,000, Makkah region at 18.0/100,000, Madinah region at 17/100,000 and Tabuk region at 17/100,000. The median age at diagnosis was 47 years (Range 19-107 years).

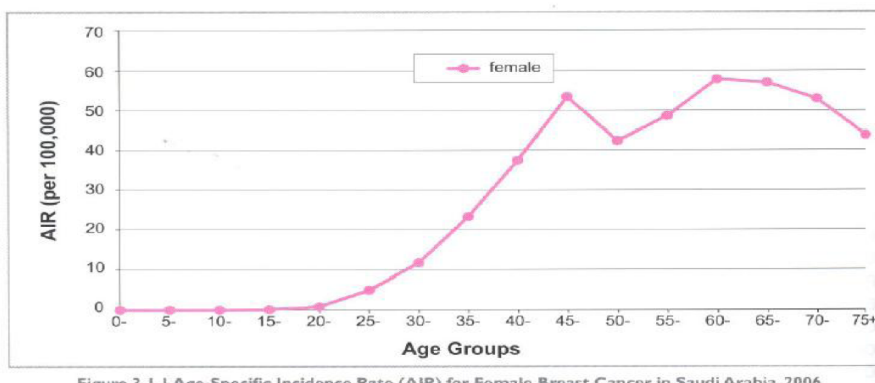


Figure 3.1.1 Age-Specific Incidence Rate (AIR) for Female Breast Cancer in Saudi Arabia, 2006

\* AGE-SPECIFIC INCIDENCE RATE (AIR) FOR FEMALE BREAST CANCER IN SAUDI.<sup>1</sup>

<sup>1</sup> "in the west the median age is 65, while here in saudi it is 45"

## Risk factors for breast cancer:

- **Family history of breast cancer**, especially in first-degree relatives.
- Benign breast diseases / atypical hyperplasia.
- Early menarche, late menopause.
- Late first pregnancy / no pregnancy.<sup>2</sup>
- Exogenous estrogens. "hormonal therapy"
- Personal hx, being overweight, excess fat intake, lack of breastfeeding, lack of physical activity, alcohol consumption.
- Radiation (HD). \*radiation therapy for Hodgkin disease.

### Note

Anything that increase estrogen level is a risk factor for developing breast cancer such as early menarche/late menopause, late or no pregnancy, exogenous estrogen & obesity "oral contraceptives used to contain high levels of estrogen and they were considered a risk factor back then. nowadays' they contain very small concentration of estrogen, so they aren't really considered a risk factor."

## Classifications of breast cancer:

### Based on type of tissue:

- Ductal carcinoma.
- Lobular carcinoma.


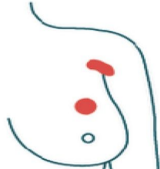

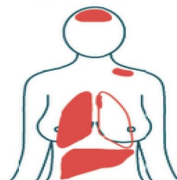
### Based on invasiveness:

- **Non-invasive:**
  - Ductal carcinoma in situ (DCIS). Can be detected in mammography as calcification.
  - Lobular carcinoma in situ (LCIS)<sup>3</sup>. Cannot be detected in mammography.
- **Invasive:**
  - Invasive ductal carcinoma (**the most common subtype of invasive carcinoma**).
  - Invasive lobular carcinoma.
  - Medullary carcinoma.
  - Colloid carcinoma.
  - Tubular carcinoma.
  - Others...

### Based on expression of proteins and genes: (IMP in treatment)

- ER-positive. \*ER: estrogen receptor.
- PR-Positive. \*PR: progesterone receptor.
- HER2-positive.

## Staging:

Stage 1 (Early disease)	Stage 2 (Early disease)	Stage 3 (Locally advanced)	Stage 4 (Advanced disease)
<p><b>Confined</b> to the breast. (node-negative)</p>	<p><b>Spread</b> to movable ipsilateral <b>axillary nodes</b>.</p>	<p><b>Spread</b> to the superficial structures of the chest wall involvement of ipsilateral <b>internal mammary lymph nodes</b>.</p>	<p><b>metastatic</b> present at distant sites such as bone, liver, lungs and brain and including <b>supraclavicular lymph node involvement</b>.</p>
			

<sup>2</sup> multiple pregnancy & lactation are protective because the main hormone in pregnancy is progesterone "even though, cancer may develop in pregnant or lactating women"

<sup>3</sup> DCIS and LCIS both can progress to invasive carcinoma, but LCIS unlike with DCIS, subsequent invasive carcinoma may arise in either breast.

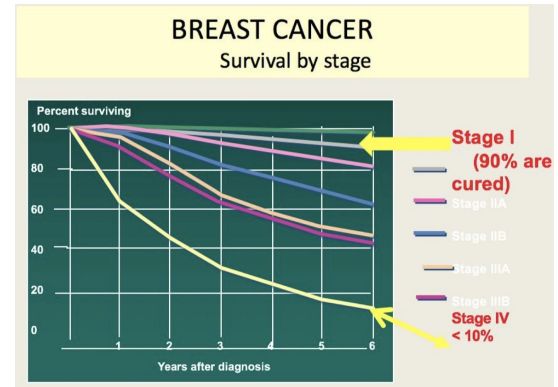
## 5 years survival:

- 90% in stage 1.
- <10% in stage 4.

**So the earlier detection of breast cancer will lead to longer survival and vice versa.**

## Good Breast Health Plan:

- Mammograms (for the asymptomatic).
- Self Awareness (Monthly Self Exams) (BSE).
- Physician awareness.



## Clinical presentation:

### Warning signs and symptoms:

- Painless lump or thickening (can be painful)
- thickening or swelling that persist
- nipple pain or retraction
- nipple discharge.
- breast skin irritation or dimpling.

\*Women should seek immediate medical advice as they have any of these warning signs:

A mass/lump that is painless, hard, and has irregular edges is more likely to be cancerous, but some rare cancers are tender, soft, and rounded.

A change in the size or shape of the breast.

A change in the way the skin of the breast, areola, or nipple looks or feels (for example, scaly, warm, swollen, red)

Many of these breast symptoms are due to benign breast conditions but only a doctor can really give you a diagnosis

Most women with symptomatic rather than screen-detected breast cancer present with a painless, increasing mass that may also be associated with nipple discharge, skin tethering, and/or ulceration.

### REMEMBER:

- Breast cancer :
  - o Most common cancer in females.
  - o Wide age range 20 - +70y.
  - o Breast cancer can occur during pregnancy, during lactation.
  - o Breast cancer can occur in pre, peri and postmenopausal females.

## Diagnostic strategies:

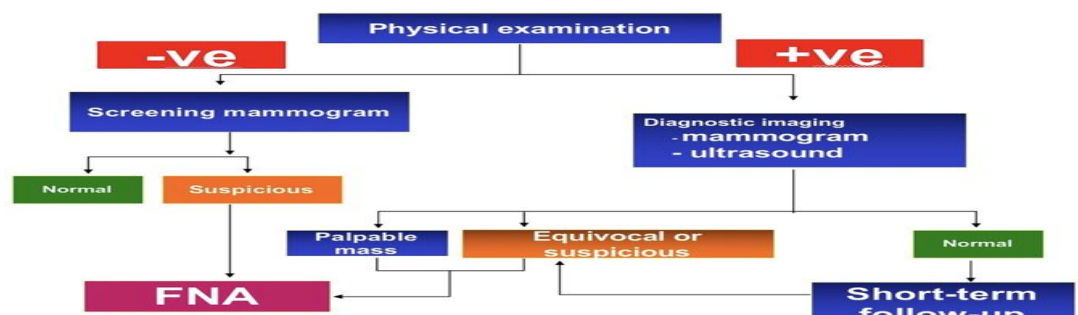
Suspecting breast cancer is one of the most important steps in diagnosing early breast cancer.

So what to do if you suspect breast cancer: إذا قالت المريضة عندي مشكلة في الصدر وانت تشوف انه ما عندها شي وش بتسوي؟

- Do not just reassure the patient.
- Do not give hormonal therapy.
- Do not give antibiotics.
- Take a careful history.
- Perform careful physical exam.
- Do all the needed investigations to exclude breast cancer.

## Diagnostic tests:

- Radiology (mammography, ultrasound).
- FNA (Fine needle aspiration). To differentiate between benign and malignant.
- Core biopsy. To provide the grade, proliferation index (Ki-67), and to test for ER, PR and HER2/neu.
- Open biopsy.



## Prognosis:

Late Presentation + Advanced Stage = Poor Outcome

Early Presentation+ Early Stage= Good Outcome

So **Early diagnosis + Early and proper intervention = GOOD PROGNOSIS.**

predictors of a high risk of recurrence:

- large size of the primary tumor.
- High-grade/poorly differentiated tumor.
- Estrogen, progesterone(ER, PR), and HER2 receptor -negative.
- young age and pre-menopausal status.

## Management:

**Local therapy:**

- Surgery. (Mastectomy or breast-conserving surgery)
- Radiotherapy.

**Systemic therapy:**

- Chemotherapy.
- Hormonal therapy.
- Biological therapy.

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# COLON CANCER

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## The Colon:

- The Colon is a long, coiled, tubular digestive tract.
- It basically acts as a waste processor.
- Takes digested food in the form of Solid waste pushing it out of the rectum and anus.
- The Colorectal tube is a prime location for the development and growth of small polyps or tumors.

## Colon Cancer:

- Colon cancer is the **second leading cause of cancer deaths**
- *Third most common cancer in the United States (in men and women) (Step UP)*
- *Virtually, all colorectal tumors arise from adenomas. Majority are endoluminal adenocarcinomas arising from the mucosa. Rarely, carcinoid tumors, lymphomas, and Kaposi sarcoma may be present but majority are adenocarcinomas.(Step UP)*
- It starts with a simple cell the mutates and grows into a polyps
- If a polyp is allowed to remain in the colon it can grow into a cancerous tumor that can invade other organs.

## Risk factors of colon cancer:

- **Older age:** *About 90 percent of people diagnosed with colon cancer are older than 50. (it can occur in younger people, but it occurs much less frequently)*
- **A personal history of colorectal cancer or polyps** (even if it was non-cancerous polyps).
- **Inflammatory bowel disease:** *(ulcerative colitis and Crohn's disease) UC poses a greater risk than Crohn disease.*
- **Inherited syndromes:** familial adenomatous polyposis and hereditary nonpolyposis colorectal cancer, which is also known as Lynch syndrome.
- **Family history of colon cancer and colon polyps:** *(you're more likely to develop colon cancer if you have a parent, sibling or child with the disease. If more than one family member has colon cancer or rectal cancer, your risk is even greater).*
- **Chronic Constipation, why?** Stagnation of waists in colon, more bacteria that produce carcinogens that act on the epithelium by working on the waists, colon comes from glandular epithelium so they're always in the proliferation stage.
- A sedentary lifestyle.
- Diabetes mellitus Type 2, Obesity, Smoking, Alcohol.
- Radiation therapy for other cancers.

## Symptoms of Colon Cancer:

- **A change in bowel habits**, including diarrhea or constipation or a change in the consistency of the stool.
- **Rectal bleeding or blood in the stool**,
- **Persistent abdominal discomfort.** (such as cramps, gas or pain)
- **Incomplete defecation.** (A feeling that the bowel doesn't empty completely)
- **Unexplained weight loss.**
- **Weakness or fatigue.**
- **Unexplained iron deficiency anemia.** (could be the only presentation).

(From Step UP)

The presence of symptoms is typically a manifestation of relatively advanced disease. Most symptoms have melena or hematochezia, abdominal pain, change in bowel habits, or unexplained iron deficiency anemia.

### Taken from Step Up:

#### Signs and symptoms based on specific location of the tumor

##### 1. **Right-sided tumors:**

- *Obstruction is unusual because of the larger luminal diameter (the cecum has the largest luminal diameter of any part of the colon), allowing for large tumor growth to go undetected.*
- *Common findings: occult blood in stool, iron deficiency anemia, and melena.*
- *Change in bowel habits is uncommon.*
- *Triad of anemia, weakness, RLQ mass (occasionally) is present.*

##### 2. **Left-sided tumors:**

- *Smaller luminal diameter—signs of obstruction more common*
- *Change in bowel habits more common—alternating constipation/diarrhea; narrowing of stools (“pencil stools”)*
- *Hematochezia more common*

##### 3. **Rectal cancer (20% to 30% of all CRCs)**

- Hematochezia—most common symptom*
- Tenesmus*
- Rectal mass; feeling of incomplete evacuation of stool (due to mass)*

## Investigations:

### Early Detection of colon Cancer → Early Stage → Better Chances of survive

- **Colonoscopy**
- **Better imaging,**
- **Better public and physician awareness.**

→ More cases are diagnosed at earlier stage of disease.

### colon cancer stages:

**stage 1** "early colon cancer": limited to the layers of the colon wall

**stage 2:** has grown to nearby tissue, but didn't involve nearby lymph nodes yet "the doctor talked about all stages except stage 2"

**stage 3** "locally advanced": has grown to nearby lymph nodes

**stage 4** : metastasized"colon cancer may metastasize to liver or lung"

### Taken From Kumar:

- **Colonoscopy** is the '**gold standard**' for investigation and allows biopsy for histology. **Biopsy of the tumour is mandatory, usually performed at endoscopy.**
- **Double-contrast barium enema:** it can visualize the large bowel but is now superseded by CT colonography.
- **Endoanal ultrasound and pelvic MRI:** they are used for staging rectal cancer.
- **Chest, abdominal and pelvic CT scanning:** to evaluate tumour size, local spread and liver and lung metastases this contributes to the tumour staging.
- **PET scanning:** is useful for detecting occult metastases and for evaluation of suspicious lesions found on CT or MRI.
- **Serum carcinoembryonic antigen (CEA)** is of little use for primary diagnosis and **should not** be performed as a screening test. It is useful **for follow-up; rising levels suggest recurrence.**
- **Faecal occult blood tests:** are used for mass population screening and are of value in hospital or general practice.

## Treatment:

"Just For your knowledge doctor said it is not required"

### Taken From Kumar:

Surgery is only **curative** treatment of CRC.

Surgical resection of **tumor-containing** bowel as well as resection of **regional lymphatics**.

#### Note From Kumar:

**Radiotherapy is not helpful for colonic cancers proximal to the rectum** because of difficulties delivering a **sufficient** dose to the tumour without **excess** toxicity to adjacent structures.

1. **Total mesorectal excision (TME)** is required for **rectal cancers** and removes the entire package of mesorectal tissue surrounding the cancer. A low rectal anastomosis is then performed.
2. **A segmental resection** and **restorative anastomosis** with **removal of the draining lymph nodes** as far as the root of the mesentery is used for cancer elsewhere in the colon.
3. **Local transanal surgery** is very occasionally used for early superficial rectal cancers.
4. **Adjuvant postoperative chemotherapy** improves disease-free survival and overall survival.



## Follow-up:

“Just For your knowledge doctor said it is not required”

### Taken From Step UP :

Follow-up is important, and varies among physicians

- A. Stool guaiac test
- B. Annual CT scan of abdomen/pelvis and CXR for up to 5 years
- C. Colonoscopy at 1 year and then every 3 years
- D. CEA levels are checked periodically (every 3 to 6 months)
  - A subsequent increase in CEA is a sensitive marker of recurrence
  - Often, second-look operations are based on high CEA levels postresection
  - Very high elevations of CEA suggest liver involvement
- E. About 90% of recurrences occur within 3 years after surgery.

## Prevention of Colon and Breast Cancers

There is Different Strategies for Cancer Prevention:

**1-Passive Prevention.** (Not good enough In high risk people)

**2-Active Prevention.**

Passive Prevention	Active Prevention
<p>Discover Etiological factors ↓ Avoid theses factors</p> <p><i>eg. Smoking, Asbestosis, obesity, Alcohol use (Estrogen &amp; Progestin use for Breast cancer)</i></p> <p>General health maintenance:</p> <ul style="list-style-type: none"><li>● Eat a healthy diet</li><li>● Don't smoke</li><li>● Don't drink</li><li>● Exercise/ maintain optimal weight</li></ul>	<p>Discover pre-malignant lesions ↓ Get rid of them before developing invasive cancer</p> <p><i>eg. Colonic polyps &amp; DCIS (Ductal Carcinoma in Situ) "the colonic cancer starts as a polyp, so if you remove it you prevent the cancer"</i></p> <p>Eliminate or prevent pre-invasive disease before invasion develops</p> <p>How ? Generally Chemoprevention or Surgery</p>

# MCQs

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**1) A 29-year-old African-American woman comes to the physician after discovering a mass on breast self-examination. Her last menstrual period was 2 weeks ago. She reports occasional bilateral gray nipple discharge that has not changed since menarche. She has no significant past medical history and does not take any medications. Examination reveals a 1.5-cm fluctuant mass in the upper and outer quadrant of the left breast. Which of the following is the best next step in management?**

- a. Reassurance and continued breast self-examination.
- b. Mammography.
- c. Open biopsy.
- d. Fine-needle aspiration.

**2) A 55-year-old woman is brought to the emergency department because of intractable back and thigh pain for the past 3 hours. Upon presentation she says that the pain is 9 of 10 in severity and localized to her lower back. She lives with her sister, and she has no primary care physician. She denies any complaints aside from fatigue, which she attributes to her multiple jobs and caring for her sister's children. She has a pulse of 110/min, blood pressure of 140/88 mmHg, respiratory rate of 20/min, and temperature of 37.8°C (100.1°F). On physical examination she is exquisitely tender over the L2–3 area of the spine. She also has point tenderness over the anterior right thigh. Sensation is intact over the lower extremities bilaterally and she has 5/5 strength in the lower extremities bilaterally. Breast examination reveals a retracted nipple and dimpling of the right breast. What will likely represent the mainstay of treatment for this patient's symptoms? ☐**

- a. Chemotherapy.
- b. Hormone replacement therapy.
- c. Radiotherapy.
- d. Surgery.

**3) A 56-year-old woman presents to the surgery clinic. A suspicious lesion was found on routine mammography 1 week earlier. The patient denies any pain at the site of the lesion, but over the past month she has experienced increased fatigue. Past gynecologic history is notable for nulliparity, onset of menarche at the age of 9 years, and age at menopause of 50 years. Her pulse is 76/min, blood pressure is 123/76 mm Hg, and temperature is 37.8°C (100.1°F). Breast examination is significant for a fixed, non-tender 2-cm lump in the upper outer quadrant of the left breast. Pelvic examination is within normal limits. Mammography revealed an irregular 2-cm lump corresponding with the physical findings. A breast biopsy is performed, which shows ductal carcinoma in situ. Which aspect of this patient's history, physical examination, and laboratory findings is the most influential in determining her prognosis?**

- a. Age of menarche.
- b. Histology of the tumor.
- c. Presence of fatigue and fever.
- d. Shape of the tumor.
- e. Size of the tumor.

### **Answer key:**

**Question (1): The correct answer is D.** The lifetime incidence of breast cancer is 12% in women who live to age 90 years, and nearly 75% of patients have no known risk factors. Breast carcinoma is not likely in a 29-year-old woman (only 2% of all breast cancers are diagnosed in women <30 years old); however, with such a high incidence of breast cancer this is still a serious possibility, and the price of missing the diagnosis is too high. Whenever there is a palpable solitary breast mass, tissue needs to be obtained for pathologic examination. The best method is by fine-needle aspiration, often guided by ultrasound; however, if the mass is readily palpable, it may not be necessary to use radiographic guidance. Of note, one-half of all breast cancers develop in the upper outer quadrant of the breast. **Answer B is incorrect.** Mammography is not likely to be helpful in this case. Younger women have more fibrous breast tissue, which makes mammograms harder to interpret. Elderly women's breasts can be more adequately visualized by mammography because of the fatty replacement of tissue that occurs with age. Breast ultrasound is the best option to evaluate a breast mass in a woman <30 years old. Regardless, tissue should be obtained from this palpable mass for pathologic examination.

**Question (2): The correct answer is A.** This patient likely has metastatic breast carcinoma. The finding of a retracted nipple and dimpling of the breast in a woman with no regular health care is highly suggestive of breast carcinoma. The complaint of bone pain in a patient likely to have breast cancer is an ominous one and likely represents metastases to bone. With regard to therapy, most patients with metastatic breast cancer do not recover with any means of treatment. The decision to begin local therapy (surgery or radiation therapy) or systemic therapy (endocrine medications or chemotherapy) depends on the extent and localization of the disease. In this patient, with multiple symptom-atic sites, a systemic treatment such as chemotherapy is the treatment of choice.

**Question (3): The correct answer is E.** The staging of breast cancer is predicated largely upon the size of the tumor and whether there is nodal involvement. Stage is the critical factor in prognosis for breast cancer. **Answer A is incorrect.** early age of menarche increased the risk of developing breast cancer in this patient, but it does not change the prognosis. **Answer B is incorrect.** the histology of the tumor does not contribute as much to the prognosis of breast cancer as does tumor size. The diagnosis of lobular carcinoma in situ does, however, increase the probability of invasive carcinoma of both breasts. **Answer C is incorrect.** presence of fatigue and fever are not involved in the staging of breast carcinoma. **Answer D is incorrect.** while irregular masses on mammography are more likely to be malignant, shape does not contribute to formal staging and prognosis.