

Team Medicine

#6

Common solid
Tumors

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Introduction

- **This is a brief summary of what the doctor has said before the lecture.**

❖ **Definition of Cancer:**

Cancer is a term used for diseases in which abnormal cells divide and escape the body control => depressed immunity.

❖ In adulthood there are four types of cells:

- **Labile cells**
- **Permanent cells**
- **Stable cells**
- **Stem cells**

➤ **Constantly dividing (labile cells) :**

1- Skin cells. 2- GIT. 3-blood cells in the bone marrow.

Constantly dividing cells have **a higher risk of becoming malignant** and develop cancer, dividing uncontrollably.

*Cytotoxic drugs (chemotherapy) affect these constantly dividing cells by inhibiting their proliferation. Producing many effects including:

1- affects the cells of hair leading to hair loss (alopecia).

2-affects the epithelial lining as oral cavity.

3- affects hemopoietic cells leading Anemia, thrombocytopenia and leukopenia.

➤ **Stable cells:**

Divide only if needed.

E.g: the liver

➤ **Permanent cells:**

They don't have a division potential such as:

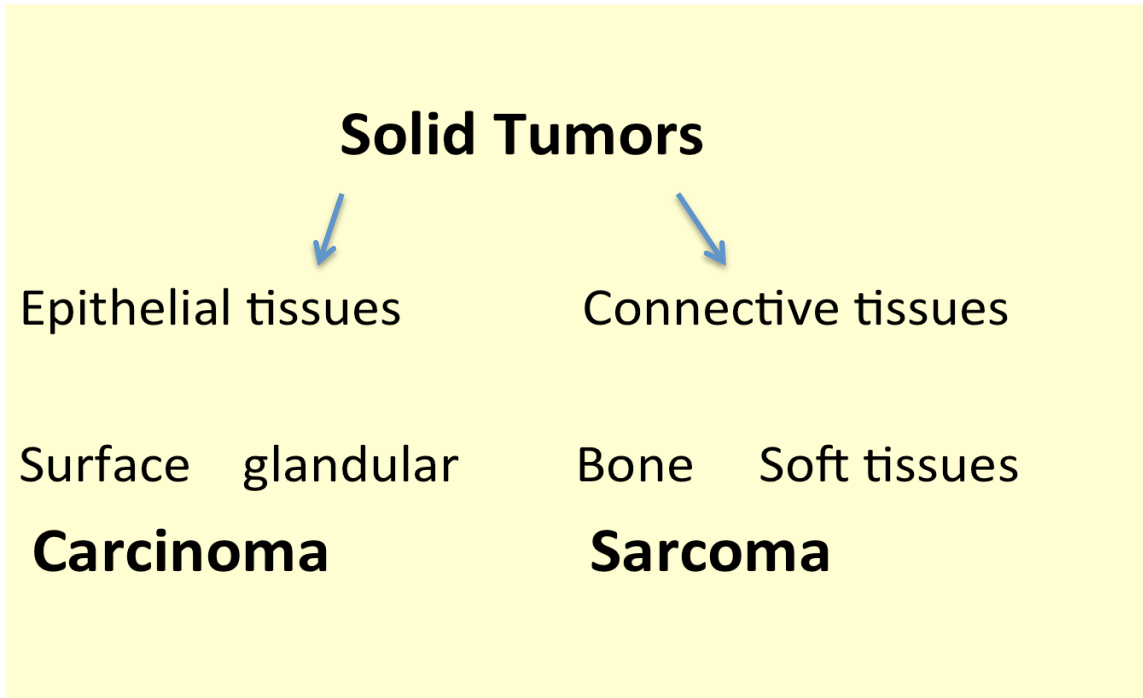
1- **Neurons**

2- **Muscle cells**

*These cells in childhood have some dividing capability so **they may give rise to cancers in children but rarely in adult.**

- ❖ Cancer is a disease of DNA , anything damages the DNA =>will cause mutations =>abnormal cellular division => carcinogenesis.
- ❖ Cancer symptoms are disabling and progressive.

Classification of solid tumors



❖ Cancers are classified by the Type of cell that the tumor cells presumed to be originating

g from: (95% of tumors causes in this classification)

- **Carcinoma:** Cancers derived from epithelial cells. This is 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.

*Other tumor types: **“have unique classification unlike the previous classification”**

1-Germ cell tumors: Cancers derived from pluripotent cells, in the testicle or the ovary (Seminoma and dysgerminoma, respectively).

2-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. 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.

❖ What is the essential work up for staging?

- Cancer staging can be divided into a clinical stage and a pathologic stage.
- In the TNM (Tumor, Node, Metastasis) system, clinical stage and pathologic stage are denoted by a small "c" or "p" before the stage (e.g., cT3N1M0 or pT2N0).
- Clinical stage is based on all of the available information obtained before a surgery to remove the tumor. Thus, it may include information about the tumor obtained by physical examination, radiologic examination, and endoscopy.
- Pathologic stage adds additional information gained by examination of the tumor microscopically by a pathologist.
- Radiology staging is usually through X-ray, MRI, CT and US.

❖ General staging of solid malignances:

➤ **Early:**

Confined to the organ.

➤ **Locally advanced:**

For example:

when a cancer in the breast and goes to the axillary lymph nodes.

Or when pharynx cancer goes to the cervical lymph nodes.

➤ **Metastatic:**

When Cancer goes to distant organs.

COMMON SOLID TUMORS

- In the U.S., The three most common cancers:
- **Men:** Prostate, lung, colorectal
- **Women:** Breast, colorectal, lung

- In the KSA., The three most common cancers:
- **Men:** colorectal, Lymphoma, leukemia
- **Women:** Breast, Thyroid, colorectal,



+ Colorectal cancer in Male and Female & breast cancer in Female is the most common solid tumors.

BREAST CANCER

- **Breast Cancer Facts:**
 - 1st most common cancer in females.
 - 2nd leading cause of death.

*pt with family Hx of breast CA must do mammogram earlier.
*Estrogen is the growth factor stimulant of mammary ducts => More exposure => more proliferation => more incidence of mutation => the incidence of cancer.

- **We Need Early Detection**

- Late presentation + Advanced stage = Poor Outcome

- Early Presentation + Early Stage = Good Outcome

+ Remember:

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

❖ Risk factors:

- History of 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
- Exogenous estrogens
- Radiation (High Dose)

❖ If you suspect Breast Cancer

- Do not just reassure the patient
- Do not give hormonal therapy
- Do not give antibiotics

❖ 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.

Warning signs and symptoms:

- Painless lump or thickening (can be painful)
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What to do if we suspect breast CA:

***Careful History& physical examination.**

***Bilateral mammogram + US**

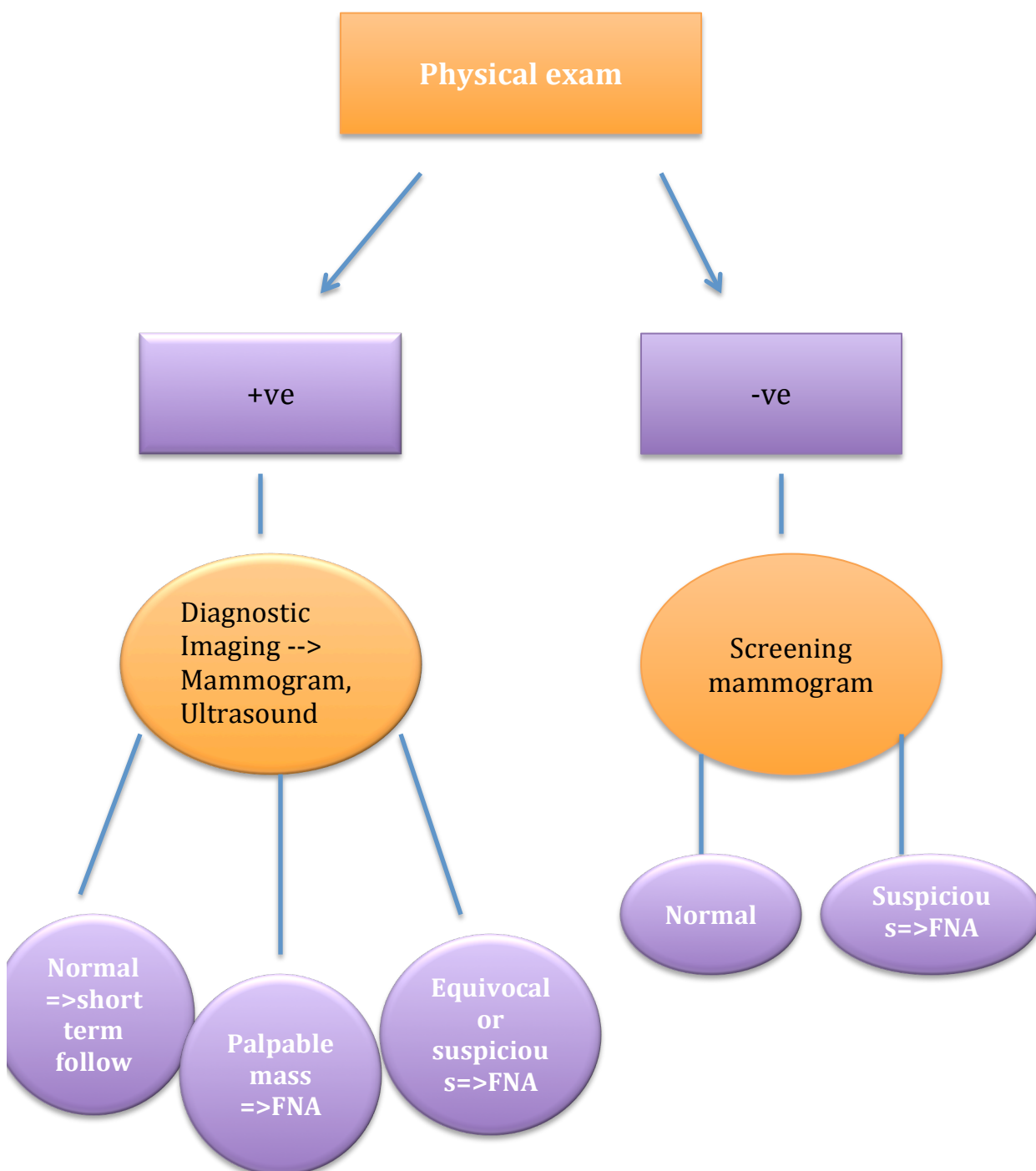
+/-FNA

FNA= Fine needle Aspiration

***If examination is positive => do mammogram and ultrasound => if there is a mass in the mammogram => take a biopsy (Fine needle aspiration).**

***If the patient tells you that she noticed a lump in her breast and you couldn't feel it in examination that DOESN'T mean that she is ok, you have to do mammogram.**

***In premenopausal women the breast is dense so mammogram is less sensitive than US, but usually we combine both (mammograms & US).**



❖ **Treatment:**

- Local Therapy: 1-Surgery. 2-Radiotherapy.
 - Systemic Therapy: 1-chemotherapy. 2- Hormonal Therapy. 3-Biological Therapy.
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COLON CANCER

- 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 is the second leading cause of cancer deaths.**

❖ **Risk factors of colon cancer**

- **Older age.** About 90 percent of people diagnosed with colon cancer are older than 50. Colon cancer can occur in younger people, but it occurs much less frequently.
- **A personal history of colorectal cancer or polyps.** If you've already had colon cancer or adenomatous polyps, you have a greater risk of colon cancer in the future.
- **Inflammatory intestinal conditions.** ulcerative colitis and Crohn's disease,
- **Inherited syndromes that increase colon cancer risk.** familial adenomatous polyposis and hereditary nonpolyposis colorectal cancer, which is also known as Lynch syndrome.
- **Family history of colon cancer and colon polyps.** a parent, sibling or child with the disease.
- **Low-fiber, high-fat diet.**

- **A sedentary lifestyle.**
- **Diabetes.** insulin resistance may have an increased risk of colon cancer.
- **Obesity.**
- **Smoking.** People who smoke cigarettes may have an increased risk of colon cancer.
- **Alcohol.** Heavy use of alcohol may increase your risk of colon cancer.
- **Radiation therapy for cancer**

- **Constipation:**

Why is constipation a risk factor?

- **Waste stagnation =>Bacterial action
=>Carcinogens**

- ❖ **Colon Cancer Pathogenesis**

- It starts with a simple cell that mutates and grows into a polyp
- If a polyp is allowed to remain in the colon it can grow into a cancerous tumor that can invade other organs.
- Colon cancer is the second leading cause of cancer deaths
- If a polyp is allowed to remain in the colon it can grow into a cancerous tumor that can invade other organs.

- ❖ **Signs & Symptoms:**

It can occur at any age but mostly if you're of 45 years of age.

- Change in bowel habits
- Blood in Stool

***Constipation is a very high risk factor of colon cancer.
*if waste stay more =>certain chemical reactions of normal flora on the waste and the product is carcinogens => start to form polyps(which are still benign) but adenomatous (tubulovillous polyps) premalignant polyps =>increase incidence of colon cancer.
OR it could be familial=> some gene mutations runs in family => form small polyps => to adenomatous =>colon cancer.**

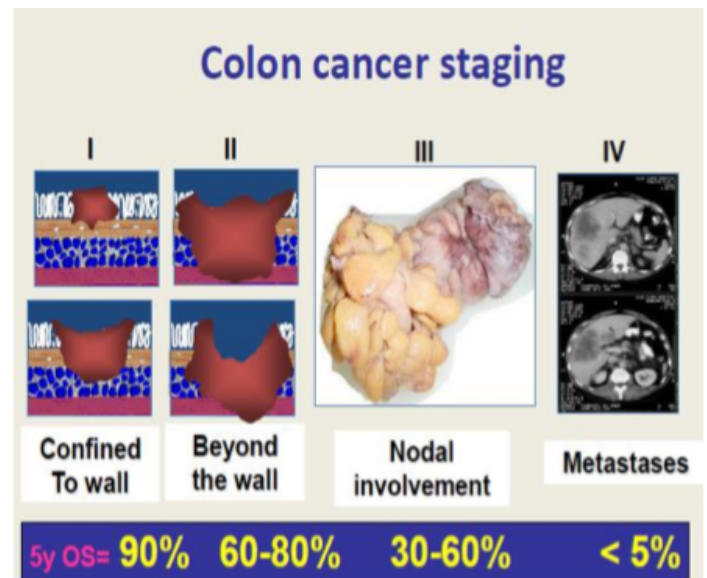
- ✓ Bright red
- ✓ Very dark red
- ✓ Black/Tarry Stool
- Diarrhea
- Constipation
- Does your bowel feel like it emptied completely?
- General abdominal discomfort
 - ✓ Gas pains
 - ✓ Bloating
 - ✓ Fullness
 - ✓ Cramps
- Weight loss w/ no explained reason
- Constant tiredness
- Vomiting (coffee grounds)
- Unexplained Fatigue and Unexplained iron deficiency anemia



❖ **Early detection:**

Why does this contribute to a better survival?

- Early detection => Early stage => Better survival
- **Occult blood in stools**
- Colonoscopy
- Better imaging,
- Better public and physician awareness.



❖ Management of Colon Cancer:

- Early => Surgery
- Locally Advanced => Surgery + Adjuvant Chemotherapy
- Metastatic => Chemotherapy + Surgery
- The most imp tumor marker is CEA
- Colon cancer => SURGERY is the treatment of choice, then give chemo after surgery to increase the survival rate
- Rectal cancer => Best treatment is CHEMO + RADIOTHERAPY for 1 month, then rest for 42 days & then surgery.

❖ Prevention

- ✓ Passive prevention => Identify etiological factors => Avoid these factors eg. Smoking, asbestos.
- ✓ General health maintenance
- ✓ Eat a healthy diet/ Don't smoke/ Don't drink too much / Exercise/ maintain optimal weight/ Try to avoid Breast Cancer risk factors / Weight gain/ Estrogen and progestin use / Alcohol use
- ✓ Active invasive cancer eg: Colonic polyps and DCIS
- ✓ Eliminate or prevent pre-invasive disease before invasion develops
Chemoprevention
- ✓ Surgery
- ✓ Active Prevention => Discover pre-malignant lesions => Get rid of them before developing
- ✓ In female we can give Tamoxifen as a chemoprevention from breast cancer .
- ✓ It is not an easy task. Why?
 - 1-Social change is difficult and takes a long time.
 - 2-Not good enough in high risk people

Tamoxifen: Antagonist of estrogen receptor in breast tissue.

❖ Summary

- Cancer is a disease of DNA.
 - In the adult body, there are four types of cells; labial, permanent, stable, and stem cells.
 - Solid tumors are classified into:
 - 1) Carcinoma: Epithelial tissue tumors, which include Surface and glandular tissue.
 - 2) Sarcoma: Connective tissue tumors, which include Bone and soft tissue.
 - Other tumor classification:
 - 1) Germ cell tumors: Cancers derived from pluripotent cells.
 - 2) Blastoma: Cancers derived from immature "precursor" cells or embryonic tissue.
 - Cancer staging is divided into:
 - 1) Clinical staging, is based on all of the available information obtained before a surgery to remove the tumor.
 - 2) Pathologic staging, adds additional information gained by examination of the tumor microscopically by a pathologist.
 - General staging of solid malignances can be divided into:
 - 1) Early: Confined to the organ.
 - 2) Locally Advanced: For example, when a cancer in the breast and goes to the axillary lymph nodes.
 - 3) Metastatic: when cancer goes to distant organs
 - The three most common cancers in KSA:
Men: Colorectal, Lymphoma, Leukemia.
Woman: Breast, thyroid, Colorectal.
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- Breast Cancer 1st most common cancer in females, and 2nd leading cause of death.
 - Early detection is important for Good prognosis.
 - Breast Cancer is a multi-risk factor disease.
 - **Warning signs and symptoms include:**
 - 1) **Painless lump or thickening (can be painful)**
 - 2) **Thickening or swelling that persistent**
 - 3) **Nipple pain or retraction**
 - 4) **Nipple discharge**
 - If you suspect Breast CA do, Hx & Ex, Bilateral mammogram+ US, and FNA.
 - Treatment includes, Local and systemic therapy.
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- Colon cancer is the second leading cause of cancer deaths.
 - Colon Cancer has many risk factors; **Constipation is a very high risk factor.**
 - Colon cancer usually begins with a polyp that later transforms into a cancerous

tumor.

- Signs & Symptoms: Change in bowel habits, blood in stool, diarrhea, constipation, abdominal discomfort, weight loss, fatigue.
 - Early detection by: Occult blood, Colonoscopy.
 - Management of colon cancer:
 - 1) Early => Surgery
 - 2) Locally Advanced => Surgery + Adjuvant Chemotherapy
 - 3) Metastatic => Chemotherapy + Surgery
-

❖ Questions

1) A 55-year-old male is being evaluated for constipation. There is no history of prior gastrectomy or of upper GI symptoms. Hemoglobin is 10 g/dL, mean corpuscular volume (MCV) is 72 fL, serum iron is 4 µg/dL (normal is 50-150 µg/dL), iron-binding capacity is 450 µg/dL (normal is 250-370 µg/dL), saturation is 1% (normal is 20%-45%), and ferritin is 10 µg/L (normal is 15-400 µg/L). Which of the following is the best next step in the evaluation of this patient's anemia?

- a. Red blood cell folate
- b. Serum lead level
- c. Colonoscopy
- d. Bone marrow examination
- e. Hemoglobin electrophoresis with A2 and F levels

2) A 64-year-old woman who is receiving chemotherapy for metastatic breast cancer has been treating midthoracic pain with acetaminophen. Over the past few days she has become weak and unsteady on her feet. On the day of admission she develops urinary incontinence. Physical examination reveals fist percussion tenderness over T8 and moderate symmetric muscle weakness in the legs. Anal sphincter tone is reduced. Which of the following diagnostic studies is most important to order?

- a. Serum calcium
- b. Bone scan

- c. Plain radiographs of the thoracic spine
- d. MRI scan of the spine
- e. Electromyogram with nerve conduction studies

3) A 47-year-old premenopausal woman of Mediterranean descent presents with a painless breast mass. Her mother underwent a mastectomy at age 74 because of breast cancer. Her sister has had ovarian cysts but no cancer. There is no other cancer in the family. Biopsy of the mass reveals infiltrating ductal carcinoma. The patient has two daughters and asks about genetic testing. What is the most likely cause of her malignancy?

- a. A germline mutation in the p53 suppressor gene
- b. A germline mutation in the BRCA1 gene
- c. A somatic mutation in the BRCA1 gene
- d. Exposure to a carcinogen such as diethylstilbestrol in utero
- e. Unknown

❖ Answers

1) The answer is c. The patient has a microcytic anemia. A low serum iron, low ferritin, and high iron-binding capacity all suggest iron-deficiency anemia. Most iron-deficiency anemia is explained by blood loss. The patient's symptoms of constipation point to blood loss from the lower GI tract. Colonoscopy would be the highest-yield procedure. Barium enema misses 50% of polyps and a significant minority of colon cancers. Even patients without GI symptoms who have no obvious explanation (such as menstrual blood loss or multiple prior pregnancies in women) for their iron deficiency should be worked up for GI blood loss. Folate deficiency presents as a megaloblastic anemia with macrocytosis (large, oval-shaped red cells) and hypersegmentation of the polymorphonuclear leukocytes. Lead poisoning can cause a microcytic hypochromic anemia, but this would not be associated with the abnormal iron studies and low ferritin seen in this patient. Basophilic stippling or target cells seen on the peripheral blood smear would be important clues to the presence of lead poisoning. Although a bone marrow examination will prove the diagnosis by the absence of stainable iron in the marrow, the diagnosis of iron deficiency is clear from the serum studies. Thalassemia (diagnosed by hemoglobin electrophoresis) is not associated with abnormal iron studies. The most important issue is now to find the source of the iron loss.

2) The answer is d. Spinal cord compression is an oncologic emergency. Major neurological deficit is often irreversible and severely compromises the patient's remaining quality of life. Vertebral and then epidural involvement precede the neurological findings; the thoracic cord is involved 70% of the time. The patient is often given high-dose dexamethasone before being sent for MRI. In the presence of neurological compromise, the definitive test, MRI scan, should be performed as quickly as possible. Multiple epidural metastases are noted in 25% of patients; their presence can affect treatment (eg, the extent of radiation therapy fields). If no neurological abnormalities are present, most experts recommend plain radiographs of the painful vertebra as the initial diagnostic test. A radionuclide bone scan would reveal the vertebral involvement but would not show the degree of spinal cord compromise. Electromyogram and nerve conduction studies would be normal in spinal cord disease. Bone scan and thoracic spine films are less specific than MRI. Hypercalcemia might cause confusion but not spinal cord signs.

3) The answer is e. Although much is being learned about the genetic mechanisms that underlie the susceptibility to cancer, most cancers are still considered "sporadic." Many are attributed to a combination of genetic factors (often

acquired) and environmental carcinogens, such as ambient radiation. Only 20% of women who develop breast cancer have a positive family history of this disease. Of these, only 5% to 10% have an autosomal dominant mutation in *BRCA1* or *BRCA2*. Genetic testing, which is quite expensive, should be reserved for women who have had multiple family members (usually in different generations) with premenopausal breast cancer or ovarian cancer. Women of Ashkenazi Jewish origin have a particularly high carriage rate for *BRCA*.

The p53 tumor suppressor gene is disordered in the Li-Fraumeni syndrome, which is associated with tumors in numerous organs, generally in very young patients. Other specific genetic defects have been discovered in colon cancer (the familial adenomatous polyposis and hereditary nonpolyposis colorectal cancer syndromes), in retinoblastoma, and a few other rare familial cancer syndromes. Intrauterine exposure to DES is associated with cancer of the vagina, not breast.