Etiology and Risk Factors

Mostly women; risk of developing breast cancer expressed after age 50, with highest risk after age 75; all relatives of breast cancer patients are at some increased risk for developing the disease; first degree relatives (siblings, parent, child) have 2 to 3-fold increase in risk; possibly higher risk when 2 or more relatives affected, when patient is premenopausal, or when patient has bilateral breast cancer; early age of menarche; late onset of menopause; nulliparity; late age at first pregnancy (compared to women with first pregnancy at age 18, relative risk of cancer doubled if first pregnancy delayed until after 24 and quadrupled if after 30); possibly long term oral contraceptive intake (4+ years), intake prior to first pregnancy; HRT (particularly estradiol) and CHRT; radiation; affluent and westernized countries; high fat diet; postmenopausal obese women; moderate alcohol intake; benign breast disease; possible risk factor-fibrocystic disease (presence of macroscopic, fluid-filled cysts and nonspecific proliferation of epithelial and mesenchymal tissue); atypical hyperplasia; lobular neoplasia; intraductal carcinoma; patients who have already had on breast cancer; inherited mutations of BRCA-1 and BRCA-2 genes. Seven Cancer Warning Signs: Change in bowel or bladder habits, A sore that doesn't heal, Unusual bleeding or discharge, Thickening or lump in breast or elsewhere, Indigestion or difficulty swallowing, Obvious change in wart or mole, Nagging cough or hoarseness.

How condition is diagnosed

Self breast exam; routine mammogram showing distinct, irregular, sometimes crablike densities, clusters of 5 or more microcalcifications (each less than 1 mm in diameter and an area less than 1 cm) or distortion with no excuse for being present; ultrasonography; hormone receptor tests; HER-2 gene assay; nipple discharge testing positive for hemoglobin; underlying breast cancer may cause protrusion, affect breast contour, or slight skin dimpling from entrapment of Cooper's ligaments; nipple inversion may be a sign; peau d'orange (skin thickening and exaggeration of usual skin markings from blocked dermal lymphatics) which often accompanied by inflammation, and usually suggesting inflammatory breast cancer; biopsy revealing cancer-Common biopsy's include: **Core biopsy:** similar to fine-needle aspiration; a small needle is inserted into the lump to remove fluid, which can help determine whether the lump is cancerous. **Stereotactic needle biopsy:** used for masses that are too small to be felt, ensuring that the needle is directed into the breast mass and that an adequate sample of the abnormal tissue is obtained. **Surgical biopsy:** removing part or all of lump to test if cancerous

Physiological effects

Hypercalcemia; sudden increase in bone pain; erythema around skin lesions; increase in number and intensity of lesions on bone scan; elevation in CEA and CA 15-3. These often occur b/c of endocrine therapy. N/V, polyurea, polydipsia, dehydration, lethargy, may occur w/hypercalcemia; enhanced levels of inflammatory mediators and acute-phase proteins; increased lactate production; hypoalbuminemia (d/t increased total body water associated w/cancer cachexia); elevated serum ffa's; some tumors secrete serotonin, calcitonin, or gastrin which may lead to diarrhea/vomiting; altered organ systems possible; immune system suppression; increase in lab values

Physiological effects of Chemo/Radiation/Immunotherapy/Marrow Transplant therapy with BRCA

Myelosuppression; neutropenia; anemia; thrombocytopenia; malabsorption of dissacharides, fat, electrolytes d/t GI toxicity; anemias; low H & H; increased TIBC; low folate/B12; depressed immune function; increase SGOT, SGPT, bil, LDH, BUN, & creatinine; increase alk. Phosphatase; decreased T3 & T4; hyperglycemia; increased PT; electrolyte imbalance; liver toxicity from Chemo drugs; symptoms of hepatomegaly, ascites, jaundice from marrow implant; increased serum ammonia from encephalopathy

Nutritional implications in disease state

Cachexia (syndrome of progressive weight loss, anorexia, asthenia, anemia, abnormal fat, CHO, PRO metabolism); reduced, normal, or increased REE; relative insulin resistance d/t excess fat and pro metabolism, along w/decreased uptake glucose in muscles; loss skeletal muscle protein; visceral organ atrophy; hypoalbuminemia; fluid/electrolyte imbalance; diarrhea; N/V; moderate to sever malnutrition; immune system suppression; taste and smell changes (increase want for sweet, sour, & salty foods); negative N balance

Nutritional implications with Chemo/Radiation/Immunotherapy/Marrow transplant therapy with BRCA

Myelosuppression; neutropenia; anemias; thrombocytopenia**;** taste and smell alterations; mucositis; cheilosis; glossitis; stomatitis; esophagitis; diarrhea; malabsorption of nutrients; N/V; anorexia; oligophagy; adynamic ileus; depressed immune function; loss of appetite; dental problems; dry mouth; esophageal stricture; hyperglycemia; increased folate requirement w/Methotrexate; myopathy; osteoporosis and weight gain with LT use of prednisone; electrolyte imbalance; low levels of B12, folic acid, vitamins A, E, and K; liver toxicity; fatigue, fever, chills, flu-like symptoms with immunotherapy; GVHD (may lead to excessive N loss); VOD from marrow transplant leading to encephalopathy; pancytopenia; PEM secondary to neoplastic disease; radiation-induced enteritis

Lab alterations seen in disease state

Lab Test: CA 15-3
Normal Value: < 31 U/ml
Alteration: increase
Cause of Alteration: Glycoprotein shed from tumor cells into bloodstream. High levels often mean metastasized cancer. Used to assess stage of cancer.

Lab Test: CK-BB
Normal Value: (40-200 U/L in men) (35-150 U/L in women)
Alteration: increase
Cause of Alteration: Not normally present in measurable amounts in human serum. However, it may increase after severe damage of tissues containing CK-BB. Elevated levels associated with breast cancer.

Lab Test: CA 27-29
Normal Value: <38 U/ml
Alteration: increase
Cause of Alteration: Glycoprotein (from family known as mucins) found in higher concentrations in blood with breast cancer b/c of upregulation. Used along with CA 15-3 to assess cancer stage and monitor therapy.

Lab Test: CA 125
Normal Value: 0-35 U/ml
Alteration: increase
Cause of Alteration: antigenic determinant on a glycoprotein recognized by a monoclonal antibody. It is expressed in the amnion and its derivatives of fetal coelemic epithelia. The antigen found high with ovarian cancer, but also elevated with breast cancer.

Lab Test: CEA
Normal Value: (< 3 ng/ml in non-smokers) (< 5 ng/ml in smokers)
Alteration: increase
Cause of Alteration: CEA is a serum glycoprotein. CEA is a normal cell product that is overexpressed by adenocarcinomas, primarily of the colon, rectum, breast, and lung.

Medications Commonly Used in Disease State

Medication: Cyclophosphamide

Action: Alkylating Agent whose active metabolites alkylate nucleic acids and interfere with neoplastic and normal cell growth. Cytotoxic action is due to cross-linking of strands of DNA and RNA and inhibition of protein synthesis. Also possesses immunosuppressive activity.

Nutritional Concerns: Take on an empty stomach. If GI distress, take with meals in divided doses. Increase fluid before dose and for more than 72 hours after dose. 2-3 L/day may be essential. Anorexia, or lowering of weight. Dry mouth, stomatitis, abdominal pain, nausea, vomiting, and diarrhea. Decreased WBC (increased risk of infection), anemia, increase SGOT, SGPT, bil, LDH, BUN, & creatinine.

Medication: Methotrexate

Action: Cell cycle specific for the S phase of cell division. Acts by inhibiting dihydrofolate reductase, which prevents reduction of dihydrofolate to tetrahydrofolate; this results in decreased synthesis of purines and consequently DNA

Nutritional Concerns: Increase fluid to increase urine output. Food delays absorption, peak concentration and bioavailability. Folate (food or in supplement) lowers drug response. May decrease absorption of fat, B12, Ca++, and Folate. Anorexia, lowered weight, dehydration. Altered taste, N/V, diarrhea. Stop use if diarrhea and ulcerative colitis occur. Avoid alcohol. Decreased WBC (increased risk of infection), decreased platelets, anemia, increase SGOT, SGPT, bil, BUN.

Medication: 5-Fluorouracil

Action: Pyrimidine antagonist. Inhibits the methylation reaction of deoxyuridylic acid to thymidylic acid preventing synthesis of DNA and, to a lesser extent, RNA. Cell cycle specific for the S phase of cell division.

Nutritional Concerns: Bland diet may lower GI problems. B6 taken orally may treat hand-and-foot syndrome. Anorexia, lowered weight, increased thiamin requirement. Bitter/sour taste, stomatitis, esophagitis, dyspepsia, severe N/V, diarrhea. Contraindicated with malnutrition. Decreased WBC (increased risk of infection), decreased platelets, anemia, decreased albumin; increase alk. phosphatase, SGOT, SGPT, bil, LDH; decreased T3 & T4.

Medication: Doxorubicin

Action: Cell cycle specific for the S phase of cell division. Antineoplastic activity may be due to binding to DNA by intercalating between base pairs resulting in inhibition of synthesis of DNA and RNA by template disordering and steric obstruction.

Nutritional Concerns: Insure adequate hydration. Anorexia, weight loss. Dry mouth, dysphagia, glossitis, stomatitis, esophagitis, acute N/V, GI ulceration, diarrhea. Avoid alcohol. Decreased WBC (increased risk of infection), decreased platelets, anemia, hyperglycemia, decrease Ca++; increase alk. phosphatase, SGOT, SGPT, bil, PT

Medication: Tamoxifen

Action: Antiestrogen believed to compete with estrogen for estrogen-binding sites in target tissue (breast). Also blocks uptake of estradiol.

Nutritional Concerns: Take Ca++ or Mg++ supplement separately from enteric-coated tab by 2 hrs. Anorexia, weight loss. N/V. Increased serum Ca++, SGOT, bil, Alk phos, BUN, and creat; decrease total cholesterol, LDL, WBC, and platelets.

Medication: Prednisone

Action: Corticosteroid

Nutritional Concerns: Take with food to decrease GI effects. Low sodium, high protein diet. Possibly need to increase K+, Vits A, C, D, Ca++, P. Esophagitis, N/V, dyspepsia. Increase appetite, weight gain. Negative N balance & myopathy d/t pro catabolism. Ca++ wasting, LT use associated w/ osteoporosis/necrosis. Increase Folate requirement. Avoid alcohol.

Medical treatment of disease

Chemotherapy with above drugs
Endocrine therapy (Tamoxifen for postmenopausal women. Premenopausal women may be Tamoxifen or ovary removal). After response and disease progression postmenopausal women may be treated w/ progestin (megestrol acetate or medroxyprogesterone acetate) or aminoglutethimide

Surgical treatment of disease

Radical mastectomy: breast removed along with pectoralis muscles and some overlying skin, with en bloc resection of all axillary contents.
Modified radical mastectomy: pectoralis major muscle often left, less skin and lymph nodes removed.
Extended radical mastectomy: en bloc resection of internal mammary nodes along with a portions of ribs and sternum. Both of above not commonly used today.
Simple or **total mastectomy:** removal of breast and small amount skin

Surgical procedures aimed at saving some of the breast are:
Wide excision
Lumpectomy or tylectomy
Segmental mastectomy
Quandrantectomy

All of the above remove the neoplasm along with some normal surrounding tissue.
Radiotherapy
Adjuvant therapy-radiotherapy given after mastectomy
Primary radiotherapy-radiotherapy given after breast-conserving surgery
Lymph node dissection

Nutritional treatment of disease

Energy needed to prevent excess weight loss and meet high metabolic needs: BEE x 1.5
CHO about 55% total kcals to spare pro
Fat about 30% or less. Excess fat may suppress immune system and affect medication effectiveness or exasperate CA in patient
PRO required to provide essential amino acids and Nitrogen for tissue re-growth, healing, and rehab. Needs are 1.5 to 2.0 g/kg BW if surgery occurs, however, needs should be

based on albumin if no surgery. 80 to 200 grams PRO per day may be needed depending on state of malnutrition
Vit/min supplement may be needed d/t chemotherapy or lack of eating. Try using whole foods, but supplement if necessary
Adequate fluids needed to help flush system of dead CA cells and drug metabolites.
Encourage 100% fruit juices (good nutrient density and increases fluid intake)
Small multiple meals throughout the day is encouraged (crackers, boost, etc… should be present in patients room at all times to promote food intake). Those whose appetite decreases throughout the day may need emphasis on morning feedings.
"Go with the flow with CA patients" getting them to eat something is better than eating nothing.
Fatty foods should be given at end of meals d/t satiety power

Nutritional treatment involving Chemo/Radiation/Immunotherapy/Marrow Transplant

For mild hypercalcemia, rehydrate w/normal saline. Work on hydrating patient. Severe hypercalcemia-treat w/ bisphosphonate. Calcitonin may be needed before bisphos administration. DO NOT RESTRICT CALCIUM!
Patients w/myelosuppression (neutropenia) need "safe food diet", well cooked foods and avoid potentially contaminated foods. Sterility is crucial. Avoid foods such as raw meats, unpasteurized foods, raw fruits/veg, Brewer's yeast, dry/fresh spices added after cooking, herbal supplements.
For patients with acute GI toxicity and nausea-a clear, cold non-acidic liquid, light and low fat diet should be given. Milk products, cream soups, fried foods, sandwiches containing lunch meats, and sweet desserts should be avoided.
Patients with dry mouth (decreased salivation) should have a soft, non-irritating diet; tea with lemon, juices, Popsicle's, carbonated drinks. Saliva stimulants (gum, candy) and frequent saline rinses and artificial saliva can be given. Dry foods, meats, bread products, bananas, very hot foods, and booze should be avoided.
Patients with dysguesia need regular diet w/many cold foods; milk products; experiment with foods. Fruit-flavored supplements and well-tolerated spices are good. Avoid red meats, chocolate, coffee and tea d/t metallic tastes.
Patients w/hypogeusia need strong flavored (spicy) foods; emphasize aroma and texture. Flavored supplements and saline rinses often is good. Bland, unsalted foods should be avoided.
Patients who have early satiety need a high caloric, nutrient dense foods. Meat, fish, whole milk products, creamed vegetables should be given. Calorically dense supplements, such as Boost™ or Ensure™, may be needed. Avoid low calorie milk products and other low calorie foods.
Constipation may occur from some antineoplastic drugs. A regular diet with extra fiber and fluid is required. Avoiding gas-forming foods is essential.
Patients on corticosteroids may need extra K, Ca++, and protein
TPN administration if metabolic abnormalities prevent using gut. TPN solution should be high CHO, low fat, low-oxalate, lactose-free, high protein. Medications should be given to decrease intestine motility. B12, folic acid, vits A, E, and K supplements should be given to prevent deficiency

Immunotherapy patients may have decreased appetite d/t colony-stimulating factors. Push small frequent meals.
Patients receiving marrow transplant usually need enteral or TPN support following implant to meet increased energy and protein needs. Bland liquids, soft foods, salivary stimulants, sauces and gravies needed before transplant
GVHD patients need oral feedings consisting of isotonic low-fat, lactose-free beverages to compensate for intestinal enzyme loss from body's response to surgery.
VOD patients require concentrated parenteral nutrients, judicious fluid and electrolyte monitoring, and frequent adjustments to micro/macro nutrients. BCAA supplements may be used for encephalopathy (but most likely not needed b/c of antibiotics and low food intake)-less ammonia
PEM must be watched closely. Enough Kcals should be given to prevent gluconeogenesis and promote anabolism
TPN unlikely to help patients with advanced cancer that is unresponsive to Chemo/radiation therapy
TPN should be given to severely malnourished pt's in whom GI toxicities will prevent oral intake more than 1 week
Avoid TPN in those undergoing aggressive anticancer therapy
5-HT receptor antagonists may serve to treat acute emesis
Timing of meals is necessary to prevent food aversions. Use scapegoat food before therapy.
Nasogastric or nasoenteric tubes should be used for short-term use.
Commercial milk/soy based formulas meet most needs. Patients w/multiple malabsorption problems may need elemental or peptide based formula. Glutamine may be needed in higher amounts.
TPN solutions should not contain more than 25-30% of kcals from fat.
Frequent monitoring of fluids and electrolytes crucial
Pt's should avoid alcohol while taking Chemo meds.
Decreased absorption of fat, B12, Ca++, and Folate with Methotrexate. May need to supplement if intake food intake inadequate.
Increased thiamin requirement w/Fluorouracil. May need supplement, probably not considering thiamin abundance in foods.
Tamoxifen- Take Ca++ or Mg++ supplement separately from enteric-coated tab by 2 hrs.
Prednisone is an optional drug that is taken often with chemotherapy. It should be taken with food to decrease GI effects. Low sodium, high protein diet. Possibly need to increase K+, Vits A, C, D, Ca++, P.