

Definitions

- Neoplasm: abnormal mass with no useful purpose.
- Benign: harmless, unless space-occupying. If it is located near a vital structure it can be harmful.
- Malignant: harmful mass capable of invasion
- Cancer: refers to malignant neoplasms

Benign	Malignant
Slow growing, expansive	Proliferate rapidly
Localized	Infiltrative patterns, metastasize to nearby tissues
Encapsulated	No enclosing capsule
Rarely recur	May recur
Regular in shape	Irregular shape
Well differentiated	Poorly differentiated
Slight vascularity	Significant vascularity

Properties of Cancer

- Disease of the cell
- Mechanisms controlling growth is altered
- Invasive
- Spreads to surrounding tissues

Epidemiology

In 2007 there were 1.4M new cancer diagnoses. Approx. 10.1 million Americans are living with a history of cancer. Interestingly the incidence of cancer is increasing but perhaps this doesn't necessarily mean there is more cancer. It may just be an issue of diagnostic methods that are more precise, the increased use of screening exams, improved data collection procedures, more accurate reports and longer life spans.

Trends in Cancer

Median age of cancer diagnosis is 67 years. From 1995 - 2002 the incidence was stable in males and there was a 0.3% increase in females. Mortality rates for all cancers decreased 1.1% annually from 1999 - 2002

Risk Factors...

- Tobacco is the #1 cause of cancer-preventable death in the world. It is responsible for increased cancers of: lung, mouth and esophagus.
 - Obesity
 - Poor Diet (red & processed meat over plant foods)
 - Inadequate Physical Activity (< 30 min./day)
 - Drugs & chemicals
 - Sexual activity (women who start sexual activity early and have multiple partners run the increased risk of cervical cancer d/t the potential for developing HPV which is often a precursor to cervical cancer.)
 - Alcohol
 - Age
 - Genetic predisposition
 - Immune dysfunction
- Risk factors, cont'd*
- Hormones
 - Viruses
 - Radiation

- UV-A & UV-B rays
- What about Stress? Stress & the relationship to neoplasms is still being investigated. We definitely know that ↑ stress compromises the immune system.

Note that hormones can be “feeders” for tumors...you will hear the term “estrogen dependent tumor”. This is why women of child-bearing age who get breast cancer, uterine or ovarian cancer have a very grim prognostic outcome.

7 Warning Signs of Cancer “CAUTION”

- Change in bowel or bladder habits
- A sore that does not heal
- Unusual bleeding or discharge
- Thickening or lump in breast or elsewhere
- Indigestion or difficulty swallowing
- Obvious change in a wart or mole
- Nagging cough or hoarseness

Pathophysiology (may add more here)

- Begins at the molecular level
- Cancer is many diseases (not sure what she means by this)
- Cells that are transformed, but are able to multiply and grow
- May begin with a mutation
- Change from normal to neoplastic cell is a process
- Occurs over many years

Carcinogenesis

Transformation of normal cells into cancer cells. It involves four stages: Initiation, promotion, malignant conversion and progression.

- Initiation occurs when a carcinogen damages DNA. This causes changes in the structure and function of the cell at the genetic or molecular level. This damage may be reversible or may lead to genetic mutation. The mutation may or may not lead to cancer.
- Promotion occurs with additional insults to the cell that results in further damage to the cell.
- Malignant conversion. If the insult continues, then malignant conversion occurs.
- Progression is when the cells are increasingly malignant in appearance and behavior, and develop into invasive cancer with metastasis to distant organs or system.
- Currently scientists are focusing on the underlying biology of the process of carcinogenesis. They have undertaken the identification of ONCOGENES. Oncogenes are genes that when mutated or expressed at abnormally high levels contribute to converting a normal cell into a cancer cell. An oncogene is a gene that has sustained some genetic damage and thus produces a protein capable of cellular transformation. As a result of this research, scientists have begun developing better treatments. New chemotherapy drugs known as BIOTHERAPIES are becoming the standard in addition to surgery, chemotherapy and radiation.

Cell Differentiation

- Occurs in the embryonic phase & enables stem cells to become nephrons or hepatocytes or alveoli or neurons.
- Normal cells have well-organized structure, similar cellular components.
- Cancer cells come in variable sizes & shapes
- Notes: In a cancer cell, the nuclei may be abnormally large or there may be multiple nuclei. There may be an abnormal number of chromosomes or an abnormal arrangement of the chromosomes (aneuploidy). This finding is an unfavorable prognostic indicator.
 - Cancer cells have some properties that enable us to not only identify them, but treat them.
 - Benign masses are very well differentiated from normal tissue. The body encapsulates it off and prevents it from invading other tissues
 - Malignant masses are poorly differentiated from normal tissues and the body has difficulty recognizing that the malignant tissue is not its own.

Cancer Cell Properties

- Heterogeneity: There may be a number of variations of the malignant cell...won't all look the same and they'll mutate in different ways. This is caused by random mutations during tumor progression. One chemo may work on one type of

cell...but may take other drugs to work on the other cell types. This is why they are now using combination chemotherapy. You use more than one drug, but can use lower doses of each one

- Cell membrane changes: Results in production of enzymes that actually allow and enable the cancer to spread and interact with the outside tissues and invade it.
- Tumor specific antigens on the cell surface: Some tumors express more of an antigen than is expressed by normal cells. These TSAs can be used as a dx tool such as prostate surface antigen (PSA). Basically, the antigens tell us the cancer is there before we would otherwise be able to find it. For example, when the PSA starts to rise we know the pt is at risk for cancer in the prostate. Embryonic antigen is another one that the cells often put out. For example, if a woman has been treated for ovarian cancer, she will get a yearly screen for this antigen. It tells us if the cancer is coming back.
- Functional changes: Cancers occupy space (when in the brain this is very dangerous, can lead to increased ICP!), and they also use up nutrients from the host. So, one of the things we see is weight loss b/c the cancer is drawing in all the nutrients the person is taking in. If the tumor is functioning it will do so abnormally as in the case of thyroid cancer (hyperthyroidism).
- Uncontrolled growth: Cancer cells have no inhibition of growth, and are almost always in a continuous process of cell-division. This continuous growth results in a term known as “doubling time.” The doubling time of a malignant tumor can vary from weeks to months. This distinguishes slow-growing cancers like prostate cancer from rapidly growing cancers like breast cancer (breast cancer has a doubling time of 100 days.)
- Metastasis: Normal cells stick to other normal cells from which they arise. So for example normal breast tissue cells are not found anywhere else in the body...they all “stick together.” Malignant cells do not stick to other cells and are more mobile than normal cells. So malignant cells have the ability to spread from the original site to distant organs. This of course, is called metastasis. This is a major characteristic of cancer cells and the reason why many cancer treatments do not succeed.
- Angiogenesis is the ability of the cancer to secrete substances that stimulate blood vessel growth and allow the tumor to create its own circulation and nutrient supply.
- Failure of apoptosis (apoptosis is cellular suicide): Normal cells have a code in them that tells them when to die...cancer cells don't have that, they live on and on and on. In addition, they never shrink or get phagocytized or digested by macrophages. They manage to avoid all those triggers that tell them to go off and die d/t their genetic damage/mutation.

Tumor Burden

- Metastatic tumors put severe stress on the affected person. We look at the size and mass of each tumor, and that tells us what your “tumor burden” is...how much it is affecting your system.
- Fewer metabolic resources are available for normal cells. So, the larger the mass or the greater the number of mass, the less chance you have of surviving that.
- When the total burden of the tumor approaches 1 kg, the tumor is potentially lethal. This is the “open and close” person in surgery. :-)

Immune system's job:

- Recognize a pathogen as foreign. A tumor cell is a type of pathogen.
- Mount a response to eliminate the pathogen.

Preventing Carcinogenesis

- Cancer cells arise continually. We are bombarded by these things every day and we fight them off!
- Immune cells recognize these cells and destroy them via T cells, Lymphocytes, Macrophages, Antigens
- The immune defenses are not always effective. The system may be unable to recognize cancer cells as foreign or to mount an immune response for several reasons.

Why does immune system fail?

- Immature system (infants)
- Old or weak immune system...can't fight cancer at the molecular level.
- Malnutrition
- Chronically ill (COPD, DM, RA, autoimmune diseases)
- Tumor burden may overwhelm it
- Cancer cells disguise themselves as normal cells
- Some cancer cells produce substances that shield them (i.e., fibrin)...especially neoplasms! The tumor necrosing factors and cytokines and WBC can't even get to the cancer cells.

- Interesting tidbit: the incidence of malignancy increases with the use of immunosuppressive drugs after organ transplant. Chemotherapy and radiation can also suppress the immune system.
- A malignant mass of 1cm or greater can overwhelm even a healthy immune system. Woah!

Carcinogens

- Radiation: natural sources, diagnostic or therapeutic sources
- Chemicals: tobacco/compute pack-years, occupational hazards, gasoline, high-tension lines
- Viruses: HPV, EBV & H-pylori (a bacteria that causes stomach ulcers...a set-up for gastric cancer)
- Other physical agents: (i.e., hormones, genetics)

Preventing Cancer (see notes)

- Prevention: Lifestyle behaviors that limit exposures
 - Smoking cessation, dietary habits, alcohol consumption, increasing physical activity, limiting sun exposure, modifying sexual practices and decreasing exposure to environmental carcinogens.
- Secondary prevention is also referred to as early detection: skin inspection, mammograms, pap smears, occult blood testing, endoscopy and chest x-rays. If caught early, premalignant lesions can be removed, arrested or reversed!
- The American Cancer Society estimates that 75% of all cancers in the US could be cured if all available screening tests and self examination methods were practiced routinely.

Approaches to Cancer Prevention

- Education: Client's perception of susceptibility to developing cancer
- Regulation: Prohibiting sale of tobacco
- Host modification: Possible vaccines, chemoprevention to prevent or reverse carcinogenesis once cancer has been identified

Types of Cancers...

- Adenocarcinoma: arises from glandular tissues (includes cancers of the breast, lung, thyroid, colon, pancreas)
- Carcinoma: composed of epithelial cells, tissues lining organs (skin, uterus, breast, esophagus, mouth)
- Sarcoma: cancer of the connective tissue (cartilage, bone, muscle or fat)
- Lymphoma: originating from the lymphatic system
- Leukemia: malignant disease of the blood-forming organs
- Glioma: glial cells of the central nervous system (in the brain, typically very deadly)
- Melanoma: malignancy of the melanocytes
- Hepatomas: malignancies of the liver
- Carcinoma in situ: pre-invasive epithelial tumors with glandular or squamous cell origins (means it's confined and at an early stage...we can get rid of these!)

Staging Cancers

- Grading a cancer is to determine the malignancy
- Grade 1-4: deviate minimally from normal cells to very aberrant
- Staging a cancer is to determine the extent of the cancer
 - Stage 1= small cancer found only in the organ where it started
 - Stage 2= larger cancer that may or may not have spread to the lymph nodes
 - Stage 3= larger cancer that is also in lymph nodes
 - Stage 4= cancer in a different organ from where it started
- TNM
 - T – Primary Tumor (where is the primary tumor located, how big is it?)
 - N – Involvement of Lymph Nodes (number and location of lymph nodes involved)
 - M – Metastasis (the cancer has moved and invaded another tissue)

Plasias:

Hyperplasia=physiological proliferation...basically lots of cell growth

Metaplasia = cells look a "little different" due to cell type conversion....hard for immune system to recognize as foreign

Dysplasia = more poorly organized, maturational abnormality
Neoplasia = Cancer is the end result...few "normal" cells remain

Physiologic Effects of Cancer...

- Results of Obstruction or Pressure
 - Urine retention from prostate tumors
 - Intracranial pressure – gliomas (get horrible headaches, increased ICP and all the problems that causes)
 - Anoxia and necrosis of tissues...leads to organ function failure
 - Loss of organ function: liver, kidneys, lungs
- Hematologic Alterations
 - Abnormal function of blood cells
 - Loss of normal immune processes
 - Pancytopenia: lower counts of all indices of CBC (anemia of chronic disease)
 - GI tumors disrupt absorption of Vit B12 d/t loss of intrinsic factor (leads to pernicious anemia and get "megaloblastic anemia"...big fat RBCs that don't carry oxygen well!)
 - Growing tumors divert resources needed by bone marrow to produce RBCs
- Infection
 - Tumor invades and connects two incompatible organs (i.e., fistula between bowel & bladder)
 - Destroys viable tissue so metabolic processes are altered, tissue is easily infected
 - Tumors may become necrotic. When they do they leak toxins...can lead to necrotizing fasciitis.
 - Septicemia may result
- Anorexia – Cachexia Syndrome
 - Unexplained rapid weight loss can be 1st symptoms
 - Triggered by pain, infection, depression, or side effects of chemo (cause nausea and depression)
 - Neoplastic cells divert nutrition
 - Metabolic changes reduce client's appetite
 - Stress causes increased serum glucose, which also depresses appetite
 - Taste and smell are altered
 - Malignancy ↑ metabolic rate → catabolism
- Paraneoplastic Syndrome (tumor is secreting a hormone)
 - Endocrine: ectopic hormone production
 - Breast, ovarian, renal cancers cause ectopic parathyroid hormone sites leading to hypercalcemia (huge constipation is the presenting factor)
 - Oat cell (usually found in lung) may produce ectopic insulin, PTH, ADH and ACTH (SIADH is often caused by oat cell carcinoma)
 - Hematologic abnormalities: anemia, thrombocytopenia and coagulopathies
- Acute Pain
 - Well defined pattern, very malignant pain that is tough to treat
 - Common signs and symptoms
 - Identified with hyperactivity of autonomic system
- Chronic Pain
 - Lasts more than 6 months
 - Lacks objective manifestations
 - Results in personality changes
 - Loss of functional abilities. For example bone metastasis often occurs in the back and this is horrible back pain.
 - Disruption of lifestyle
- Physical Stress: Immune system mounts an all out assault on the foreign invader.
 - Chemical mediators (tumor necrosing factors, IgA...)
 - Hormones and enzymes
 - Blood cells
 - Antibodies
 - Proteins

- Inflammatory and immune responses
- Notes: these protective responses also mobilize fluid, electrolytes and nutritinal systems. This massive effort requires tremendous energy. If the neoplasm is small enough, the immune system can destroy it and a tumor will never manifest. A neoplasm of 1 cm is enough to overwhelm most immune systems; however, the body will continue to try to fight it until it reaches the stage of exhaustion and is no longer capable. This is why many pts present with fatigue, weight loss, anemia, dehydration and altered blood chemistries.
- Psychological Stress
 - Many see cancer as a death sentence. This is not true anymore...we have to help them work through this grief and see the hope that is there r/t new treatments.
 - Experience overwhelming grief
 - Some feel guilt, cancer is punishment for past behaviors
 - Feeling powerless / hopeless
 - Fear of the outcome, pain, death
 - Body image concerns
 - Sexual dysfunction, felt but unexpressed

Commonly Occurring Cancers

• Breast Cancer

- Usually discovered by clinical mass or mammogram
- Mass is hard, irregular, non-tender
- Often in tail of breast (over by armpit)
- There may be: nipple discharge, nipple retraction, dimpling or puckering of overlying skin, change in the size or texture of breast
- Breast Cancer Types
 - Non Invasive: carcinoma in situ is confined to ducts or lobules
 - Invasive: infiltrating cancerous cells penetrated tissue outside ducts or lobules
 - Inflammatory: swelling, erythema and invasion of dermal lymphatics
- Breast Cancer: Predicting Survival
 - Tumor size
 - Presence of lymph nodes
 - Presence of hormone receptors (negative is what you want)
 - 20% recur
- Breast Cancer: Treatment
 - Lumpectomy
 - Mastectomy
 - Breast reconstruction
 - Radiation: external beam (smaller dose than what was used in the past)
 - Chemotherapy: adjuvant & hormonal (need to shut down the estrogen to that cancer)

• Colon & Rectal Cancer

- Majority are adenocarcinomas (solid mass cancers)
- 40-50% are in the rectum
- 20-35% are in sigmoid colon
- 16% are in ascending colon
- 8% are in transverse colon
- Signs of Colorectal Cancer
 - Changes in bowel habits; excessive flatulence
 - Blood in stool
 - Indigestion
 - Weight loss and fatigue
- Treatment for Colorectal Cancer
 - Surgery: colon resection with temp colostomy
 - Chemo therapy

- Radiation therapy
- Survival of Colorectal Cancer
 - Any metastases negatively impacts survival
 - Frequent follow up is needed after treatment
- **Prostate Cancer**
 - 95% are adenocarcinomas
- Causes of prostate cancer
 - Endogenous hormones
 - Possibly by some environmental factors
- Signs of prostate cancer
 - Frequent, painful urination, hematuria (BPH can be a precursor to cancer)
 - If a man has hematuria without pain we assume it is bladder cancer until proven otherwise.
 - See changes in bladder control around beginnings of Stage II
 - Bone, joint & back pain
 - Fatigue and weight loss
- Survival for prostate cancer:
 - Transitional zone involvement is less aggressive
 - Metastatic disease negatively impacts prognosis
 - Cancer is usually slow growing, so catch it early and take care of it!
- Treatment for prostate cancer
 - TURP (part of the prostate removed)
 - Prostatectomy (entire prostate removed)
 - Radiation: external beam
 - Chemotherapy
 - Watch and wait
 - Note: PSAs are routine at age 65 (tests for the prostate surface antigen)
- **Brain Cancer** (dangerous even if benign b/c they take up space)
 - Intracerebral tumors (spread out tentacles, and are hard to get to and treat without damaging brain tissue)
 - brain or neurons
 - blood vessels
 - connective tissues
 - Extracerebral tumors (easier to get to!)
 - meningiomas
 - acoustic nerve neuromas (deep inside the ear...we can get to these). First sign is dizziness!
 - pituitary tumors will cause radical changes in the endocrine system...ADH, aldosterone, TSH, oxytocin, etc. To get to this tumor you go through the nose...cool!
 - pineal gland tumors
 - Note that the classification for benign vs malignant is not differentiated in brain cancer because it is the surgical accessibility of the tumor that dictates prognosis and survivability: Astrocytomas are much more operable than glioblastomas...astrocytomas have a 50-70% survival rate and glioblastomas have 20% survivability.
- Brain Cancer: Early Signs & Symptoms
 - Headache
 - Seizures
 - Nausea
 - VOMITING (increased ICP causes vomiting)
- Brain Cancer: Late Signs & Symptoms
 - Impaired cognitive skills
 - Short term memory loss
 - Speech difficulties
 - Sensory and motor deficits
 - Visual changes
 - Personality changes
 - Dizziness that is persistent (especially acoustic neuromas)
 - Loss of sphincter control

- Brain Cancer: Treatment
 - Surgery: possible placement of chemotherapy wafers in the brain to target neoplasm
 - Radiation therapy
 - Laser therapy
 - Intraoperative hyperthermia (heating up the tumor to get it to shrink)
 - Chemo therapy (systemic)
 - Stereotactic therapy: gamma knife (a form of laser surgery)
 - Photodynamic therapy
- **Lung Cancer**
 - Types
 - Small cell (Oat cell) this one is very tough to treat!
 - Non small cell
 - Squamous cell
 - Adenocarcinomas
 - Mixed
 - Death Rates (see map...mostly in the southeast U.S.)
- Lung Cancer: Signs & Symptoms
 - Persistent cough that changes
 - Multiple respiratory ailments (constant bronchitis, PNAs). Lung cancer can “hide” behind infiltrate on CXR...so you need to repeat the CXR after the PNA is cleared up just to be sure there isn’t a cancer there)
 - Dyspnea and wheezing
 - Clubbed fingernails (will also see on COPD, but it’s really dramatic on lung cancer pt). This is a result of disease that causes you to be hypoxic. The body’s response is to try to make more RBCs and you become polycythemic. So, if the kidneys are working and you can make EPO and the bone marrow responds to that, you will become polycythemic, and all those fat RBCs make the blood viscous and thick. When it gets to the tiny capillaries in the fingers, it gets stuck there, so the capillaries flatten out and enlarge to let those RBCs get through there...you get clubbing of the fingers!
 - Hemoptysis
 - Weight loss, dysphagia and fatigue
- Lung Cancer: Survival
 - Best for carcinoma in situ
 - We find it early with CXR
 - Invasion of adjacent lymph nodes is worst prognosis
- Lung Cancer: Treatment
 - Surgery
 - Laser therapy (mostly debulks tumors)
 - Radiation therapy: external beam
 - Chemotherapy
- **Blood Cancers**
 - **Multiple Myeloma:** The cells infiltrate the bone marrow and produce abnormal and excessive amounts of immunoglobulin (myeloma protein). Accumulation of these cells in the marrow disrupts RBC, leukocyte and platelet production, which leads to anemias, increased vulnerability to infection and bleeding tendencies. In late stages, there is an increase in cytokine production which plays an important role in bone destruction. As a result, the patient often presents with bone or back pain. The bone cell destruction leads to hypercalcemia which can cause renal problems and failure along with GI problems (nausea and anorexia) and neurologic manifestations (confusion).
 - Immunocompromised
 - African Americans
 - Males
 - 70 yo
 - Multiple Myeloma S/S
 - Bone & joint pain with movement (back pain is very common!)
 - Hypercalcemia (causes GI problems and renal problems)

- Pathologic fractures – compression fractures
- Vertebral collapse
- Renal failure
- Anemia
- Coagulation disorders
- Peripheral neuropathy
- Confusion & altered mental status
- Treatment of Multiple Myeloma
 - There's no cure.
 - We can treat some symptoms, but 1/3 don't respond & die within weeks (how sad)
 - Chemotherapy
 - Corticosteroids
 - Immunotherapy
 - Bone marrow transplant
 - Radiation therapy
- Leukemia & Lymphoma
 - Cancers of the hematopoietic system
 - Proliferative cancers...not good!
 - Lymphoma - lymphoid tissue
- Leukemia (cancer of the bone marrow)
 - Leukemia: Risk Factors
 - Genetic factors: Especially in the chronic forms
 - Exposure to radiation & chemicals (benzenes, hydrocarbons)
 - Congenital abnormalities (Downs syndrome)
 - Primary immunodeficiency
 - Leukemia Pathophysiology
 - A control factor is missing:
 - Uncontrolled proliferation of leukocytes (WBCs) They are uncontrolled and do not mature. They are not effective as working as an immune-competent agent. Normal bone marrow is replaced by immature and undifferentiated leukocytes or blast cells.
 - Blast cell proliferation (precursors to leukocytes). Not effective in fighting disease, but can take over and replace the effective WBCs, at the same time depressing RBCs. These cells literally crowd out the bone marrow and cause cellular proliferation of the other cell lines to cease. "Blast Crisis" when the pt gets into this stage.
 - Massive accumulation of immature nonfunctional cells or blasts...leads to pancytopenia.
 - Acute leukemias include: difference is at the molecular level. Has to do which type of cell becomes proliferative
 - Acute lymphoblastic leukemia (ALL) See more often in children than adults
 - Acute myeloid leukemia (AML) See more often in adults than children
 - Acute Lymphocytic Leukemia
 - ALL is most common in children
 - Usually a result of radiation, chemicals, drugs or viruses.
 - S/S: malaise, fatigue, neutropenia, fever, bone pain, bleeding, bruising.
 - Also look for changes in CBC, look for lymph nodes that are swollen
 - Prognosis: complete remission 80-90% (yay!)
 - Treatment: BMT or stem cell transplantation, induction therapy with chemotherapy
 - Acute Myeloid Leukemia (the adult version)
 - AML Etiology: radiation, chemicals, drugs & viruses
 - S/S: anemia, malaise, fatigue, FUO, bone pain, thrombocytopenia, bleeding.
 - Prognosis: Patients over 70 are intolerant of chemo induction therapy. WBC >100,000 increases mortality.
 - Treatment: Induction therapy, monoclonal antibodies, BMT, stem cell transplant.
- Chronic Leukemias
 - Chronic myeloid leukemia: starts off slower, can usually be treated pretty easily with chemo and BMT
 - Chronic lymphoblastic leukemia

- Both have a relatively slow course (15 years)
- CML enters a blast crisis that resembles ALL.
 - Median survival is <6 months
 - 85% die during blast crisis
- Leukemia: Manifestations
 - Severe infections (infections most people don't get if they are immunocompetent)
 - Anemia (Hgb are down in 7-8 range)..leads to fatigue, malaise, hypoxia, bleeding from gums, ecchymoses, petechiae, retinal hemorrhages.
 - Increased metabolic rate
 - Weakness, pallor, & weight loss
 - Headache, disorientation
 - Enlarged organs (spleen, liver)
 - Hyperuricemia (kidney stones)
 - Lymphadenopathy (non-tender, painless) and bone pain.
 - Supraclavicular painless lymph nodes are problematic...going to get biopsy of those guys.
- Lymphoma: Originates from the lymphatic system
 - Two Types:
 - Hodgkins lymphoma: enlarged lymph nodes & biopsy shows distinctive large cell (Reed-Sternberg cells)
 - Non-Hodgkins lymphoma: more common form. Similar to Hodgkins, but without a Reed-Sternberg cell.
 - Hodgkins Lymphoma
 - Risk Factors
 - Probable viral cause such as Epstein Barr
 - 2- to 3-fold increase in Hodgkins in clients with history of mononucleosis
 - Genetic predisposition: Young adults 26-31yo; More frequent in Jewish; Siblings have 2 to 5x the risk.
 - Hodgkins: Clinical Manifestations
 - Painless lymphadenopathy, commonly in supraclavicular, cervical, mediastinal areas
 - Non productive cough
 - Mediastinal mass on CXR
 - Pericardial effusion
 - JVD based on changes in heart d/t tumor sitting there
 - Unexplained weight loss; night sweats & fevers of unknown origin
 - Hodgkins: Treatment
 - Chemotherapy combinations (can use lower doses of each drug)
 - MOPP (combo therapy)
 - ABVD – less side effects (this one used the most now)
 - BMT & stem cell transplantation
 - 70-80% survival rate with chemotherapy (yippee!)
 - Non Hodgkins Lymphoma
 - Increase in incidence 1973-91 attributed to increase in AIDS
 - 60 times more common in patients with AIDS
 - Men are affected more often than women
 - Higher in whites
 - Increased incidence in the 50s & 60s
 - Aggressive disease that needs high-dose therapy! Tougher to treat, and pt is likely to be immuno-deficient to begin with, so very tricky.
 - Non Hodgkins: Risk Factors
 - Immunodeficiency states
 - Auto immune disorders (such as SLE, RA)
 - Infectious agents
 - Viral cause is implicated: Herpes
 - H pylori infection (bacterial)
 - Non Hodgkins: Pathophysiology
 - Abnormal proliferation of neoplastic lymphocytes

- Cells fixed at 1 phase of development...they have arrested development and do not mature through the normal stages. As a result they are ineffective and they also proliferate and take over normal cells.
- Mechanical obstruction of enlarged lymph nodes
- Lymphocytic infiltration of abdomen or pharynx
- Non Hodgkins: Clinical Manifestations
 - Generalized lymphadenopathy: painless
 - Night sweats
 - Fever
 - Weight loss
 - Hepatomegaly / Splenomegaly
- Non Hodgkins: Management
 - Radiation Therapy (the use of high-energy ionizing radiation to treat a variety of cancers)
 - External beam radiation therapy is delivered from a source placed at some distance from the target site. The advantage is skin sparing effect b/c the maximum effect of radiation occurs at tumor depth and not on the skin surface.
 - Internal radiation therapy involves the placement of radioisotopes directly into or near the tumor, or into systemic circulation. Can be sealed source or unsealed (systemic)
 - Sealed source radiation therapy (also called "brachytherapy"). The radioactive substances are kept in place within the organ which is being treated.
 - Note: radiation destroys a cell's ability to reproduce, also induces apoptosis. Rapidly dividing cells are more vulnerable to radiation than slowly-dividing cells. Luckily, normal cells have greater ability to repair sublethal DNA damage from radiation.
 - Chemotherapy: CHOP: cyclophosphamide, hydroxydaunorubicin, vincristine & prednisone is considered first line therapy.
 - The goals of chemotherapy are to cure, control or palliate. Chemo is used when the disease is widespread, the risk of undetectable disease is high and the tumor cannot be resected and is resistant to XRT.

Nursing Management of Cancer Patients

- Nursing Care: Chemotherapy
 - Requires administration by specially trained RNs (the chemo drugs are highly toxic!)
 - Standards can be found in Oncology Nursing Society's Cancer Chemotherapy Guidelines.
 - Assessing complications is very important:
 - CBC, electrolytes
 - Watch for extravasation (watch IVs for patency)
 - Care is taken in vein selection (may not have good veins)
 - Neutropenia (highly susceptible to infection)
 - Care of venous access devices
- Side Effects of Treatment
 - Altered oral mucous membranes
 - Inspect oral cavity daily
 - Instruct patient regarding proper oral care
 - Moistening gauze or toothettes instead of toothbrush (esp if plt count's <40,000)
 - Rinse with normal saline QID
 - Avoid commercial mouthwashes (don't want alcohol)
 - Cleanse mouth before and after meals
 - Provide a bland, soft diet to prevent trauma to the oral cavity and maintain oral hygiene.
 - Stomatitis: Instruct patient to report S/S:
 - Burning
 - Pain
 - Areas of redness
 - Open lesions on the lips
 - Pain with swallowing
 - Intolerance to temperature extremes

- Tx for stomatitis: Nursing treatment: normal saline rinses q 2 hours except while sleeping, use soft toothbrush or toothette, avoid use of dentures except during meals, moisten lips with a lubricant, avoid spicy foods or extreme temperature foods, also avoid foods that are difficult to chew, consider a topical anesthetic agent.
- Altered nutrition related to depressed appetite, nausea, and vomiting
 - Monitor accurate I and O
 - Nutritional assessment
 - Monitor nutritional labs: serum albumin, glucose, H/H, total protein & magnesium
 - Assess for s/s of malnutrition: Muscle wasting, edema, changes in hair and skin
 - Provide good oral care, give antiemetics and appetite stimulants
 - Encourage small, frequent meals that are high in calories and protein
 - Increase activity levels as tolerated
 - Provide environment suitable for eating...pain free, relaxed, clean, no unpleasant odors
- Potential for infection related to myelosuppression (more stuff in notes r/t neutropenic precautions)
 - Infection control practices:
 - Monitor and record vital signs.
 - Assess for S/S of infection, notify MD immediately.
 - Obtain cultures prior to administering antibiotic therapy.
 - Administer antibiotics as prescribed.
 - Neutropenic precautions if needed (usually instituted with WBC of < 0.5)
 - avoid contact with those who have known or recent infection or vaccination. Private room, avoid rectal or vaginal procedures (temperatures, examination, medications)
 - Administer stool softeners to prevent straining
 - Meticulous oral hygiene
 - Avoid use of straight edge razor
 - Avoid raw meat or fish, fresh fruit and vegetables; No fresh flowers or plants.
 - Change solutions per protocol
 - Avoid IM injections
 - Strict aseptic technique when inserting medical devices
 - GOOD HANDWASHING
- Fatigue related to chemotherapy, anemia, hepatotoxicity, anorexia
 - Monitor ability to do ADLs.
 - Encourage frequent rest periods.
 - Assess nutritional intake.
 - Administer blood products per protocol.
 - Monitor I and O along with electrolytes.
 - Treat pain and discomfort.
- Body Image Disturbance related to alopecia, role changes, sexual function
 - Assess pt. feelings, coping abilities
 - Validate concerns
 - Advocate for participation in support groups and decision making
 - Facilitate a sense of control
 - Facilitate coping process
 - Prevent depersonalization (“Mr. Jones”, not “leukemia pt in 38”)
 - Instruct patient in self care – promote independence
- Potential for fluid volume deficit related to nausea, vomiting, diarrhea
 - Assess bowel pattern
 - Record frequency of vomiting & diarrhea
 - Establish and maintain IV access
 - Administer fluids per protocol & order
 - Record accurate I/O
 - Monitor serum electrolyte values
 - Monitor for skin breakdown (can be a huge issue for cancer pt)

- Administer anti-emetic and anti-diarrhea. agents per orders
- Potential for bleeding related to bone marrow suppression, hepatotoxicity
 - Monitor platelet counts.
 - Monitor LFT and coagulation studies
 - Assess for s/s of bleeding
 - Minimize venipunctures
 - Avoid rectal temperatures
 - Apply direct pressure to injection sites
 - Oral hygiene with soft toothbrush
 - Avoid commercial mouthwashes, straight edged razors, file nails, etc.
- Pain related to chemo, induced pancreatitis or neuropathy
 - Assess pain, using scale (1-10)
 - Assess discomfort characteristics to determine possible source of pain
 - Assess contributing factors: fear, anxiety, depression...
 - Patient to avoid irritants (housecleaning fumes and noise, provide rest periods, no perfume)
 - Humidify the air
 - Administer analgesics
 - Analgesics prior to procedures
 - Positioning, ice, heat, relaxing environment

Other Common Nursing Dx

Altered tissue perfusion
Decreased cardiac output
Potential for impaired gas exchange
Ineffective airway clearance
Impaired skin integrity
Ineffective coping
Knowledge deficit

Nursing. Care: Radiation Therapy

- Provide education.
- Minimize side effects (effects are felt/seen 10-14 days after treatment)
 - Skin reactions, alopecia
 - Mucositis, Xerostomia (dry mouth), Radiation caries (dental caries d/t radiation)
 - Esophagitis, Dysphagia
 - N/V, diarrhea, fatigue
 - Cystitis, urethritis
 - Bone marrow suppression. Areas of greatest risk are pelvic region, sacrum, skull, lumbar and thoracic spine, ribs, shoulder region and sternum
- Skin care within treatment field:
 - Keep the skin dry
 - Don't wash treatment area until permitted. Then wash gently, no hot water
 - Don't remove lines or ink marks on skin
 - Avoid lotions, powders, creams, alcohol and deodorants on treated skin
 - Avoid tape to treatment site
 - Electric razors only
 - Avoid direct sunlight (be aware of windows in their room)

Black, Joyce M., and Jane Hokanson Hawks. *Medical-Surgical Nursing: Clinical Management for Positive Outcomes - Single Volume (Medical Surgical Nursing- 1 Vol (Black/Luckmann))*. St. Louis: Saunders, 2009. Print.

Brady, D. (2009, November). *Care of the Patient with Cancer. Advanced Med/Surg. Lecture conducted from CSU Sacramento, Sacramento.*

Deglin, Judith Hopfer, and April Hazard Vallerand. *Davis's Drug Guide for Nurses, with Resource Kit CD-ROM (Davis's Drug Guide for Nurses)*. Philadelphia: F A Davis Co, 2009. Print.

Kelly, K. (2009, November). *Care of the Patient with Cancer. Advanced Med/Surg. Lecture conducted from CSU Sacramento, Sacramento.*

Medical-Surgical Nursing Made Incredibly Easy! (Incredibly Easy! Series). Philadelphia: Lippincott Williams & Wilkins, 2008. Print.

Nettina, Sandra M. *Lippincott Manual of Nursing Practice*. Philadelphia: Lippincott Williams & Wilkins, 2006. Print

Pagana, Kathleen Deska, and Timothy J. Pagana. *Mosby's Diagnostic and Laboratory Test Reference*. St Louis, Missouri: Mosby, 2009. Print.

Springhouse. *Pathophysiology Made Incredibly Easy! (Incredibly Easy! Series)*. Philadelphia: Lippincott Williams & Wilkins, 2008. Print