Cancer

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N113

What is the nurse’s role in cancer prevention?

Healthy People 2020

- Healthy People provides science-based, 10-year national objectives for promoting health and preventing disease.
- Currently, Healthy People 2020 is leading the way to achieve increased quality and years of healthy life and the elimination of health disparities.
Cancer

- Reduce the number of new cancer cases as well as the illness, disability, and death caused by cancer.

Objectives New to Healthy People 2020
- Increase the proportion of cancer survivors who report physical health-related quality of life similar to the general population.
- Decrease incidence of invasive
  - Colorectal
  - Uterine cervical
  - Late-stage disease breast cancer

Objectives, cont.
- Increase the proportion of men who have discussed with their health care provider whether or not to have a prostate-specific antigen (PSA) test to screen for prostate cancer.

(www.healthypeople.gov)

Prevalence and Incidence of Cancer

- Cancer is the 2nd most common cause of death after heart disease
- Both incidence & death rates from all cancers gradually declining
  - California, only state with decreasing lung cancer in women

(www.cdc.gov/nchs/fastats/deaths.htm)
Types of Cancer within Different Ethnic Groups

- The cancer incidence & mortality rate are highest in African Americans.
- Overall incidence rates for all racial & ethnic populations combined ↓ by 0.8% per year from 1999 through 2005 in both sexes combined.
- The top 3 cancer sites were the same among all racial & ethnic groups, with some variation in rank order.

2008 Estimated US Cancer Deaths

<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung &amp; bronchus</td>
<td>294,120</td>
<td>271,530</td>
</tr>
<tr>
<td>Prostate</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Leukemia</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Esophagus</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>All other sites</td>
<td>24%</td>
<td></td>
</tr>
</tbody>
</table>

- 26% Lung & bronchus
- 15% Breast
- 9% Colon & rectum
- 6% Pancreas
- 6% Ovary
- 3% Non-Hodgkin lymphoma
- 3% Leukemia
- 3% Uterine corpus
- 2% Liver & intrahepatic bile duct
- 2% Brain/ONS
- 25% All other sites

Barriers on Cancer Prevention

- Socioeconomic factor, i.e. low-income population
  - Lack of health insurance
  - Inability to pay fee-for-service
  - Limited health care access
  - Poverty, not race accounts for 10 to 15% lower survival rate from cancer in many cultural groups
- Knowledge level of risk factors, screening procedures and guidelines
Barriers on Cancer Prevention, cont.

- Psychosocial
  - anxiety, embarrassment, dependency, inferiority, pessimism
- Cultural beliefs & practices
  - Fear of cancer leading to fatalism
    - Asians' belief: “If one gets cancer, it is God’s punishment; God’s plan; bad karma.”
  - Complimentary Alternative Medicine (CAM)

Barriers on Cancer Prevention, cont.

- Level of acculturation
- Health care provider’s enthusiasm to communicate need for compliance

Cancer Prevention

- Reduction of cancer mortality by reducing the incidence of cancer
- Accomplished by
  - avoiding carcinogen or altering its metabolism
  - pursuing lifestyle or dietary practices that modify cancer-causing factors or genetic predispositions
  - medical intervention (chemoprevention) to treat precancerous lesions

(NCI, 2008)
Role of the Nurse on Cancer Prevention

**Primary Prevention**
- Health promotion activities that are focused on protecting against the occurrence of cancer
- Teaching patients about healthy lifestyle behaviors
  - Strong association between tobacco use & cancer of many sites
  - Examples of modifiable cancer risk factors

**Secondary Prevention**
- Health behaviors that promote early diagnostic, treatment, & limited disability
  - Genetic testing for high-risk individuals
  - Enhanced surveillance
  - Screening, i.e. FOBT, Pap test
Role of the Nurse

Tertiary Prevention
- Rehabilitation after a disease or condition already exists to minimize disability & help the person to live productively with limitations
- Aimed at minimizing disease progression & disability

Role of the Nurse
- Community outreach
  - Seven warning signs of cancer: CAUTION
  - Occupational surveillance programs
  - Annual physical examinations

Nursing Diagnoses
- Alteration in health maintenance
- Health seeking behaviors
- Anxiety
- Fear
- Ineffective individual coping
- Altered role performance
- Impaired social interaction
Common Terminology in Cancer

- **Neoplasm**
  - A new and abnormal formation of tissue, as a tumor or growth

- **Carcinogenesis**
  - Transformation of normal cells into cancer cells, often as a result of chemical, viral, or radioactive damage to genes

- **Carcinogen**
  - Any substance or agent that produces cancer or increases the risk of developing cancer

- **Oncogenesis**
  - Tumor formation and development

(From Taber’s, 2009)

How do stem cells become differentiated tissue?

**Stem cells**

- Predetermined, undifferentiated cells in human tissues
- Stem cells of particular tissue will ultimately differentiate and become mature, functioning cells of that tissue & only that tissue.

**Stem cells, cont.**

- Stem cell theory proposes that the loss of intracellular control of proliferation results from a mutation of stem cells
- Stem cells are target or origin of cancer development
Cell Cycle Time

Five-stage process of reproduction that occurs in both normal & malignant cells

Significance of Cell Cycle Time

- Length of total cell cycle varies with the specific type of cell.
- The amount of time required for a cell to move from one mitosis to another mitosis varies.
- A shorter cell cycle time results in higher cell kill with exposure to cell cycle-specific agents (chemotherapy).

Cell Cycle Time, cont.

Clinical implication: combination chemotherapy
Normal Cells **Change** to Cancer Cells

**Cellular differentiation**
- Normally, there is an orderly process that progress from a state of immaturity to state of maturity
- As cells differentiate & mature, they are capable of performing only specific functions

**Cancer cells de-differentiation**
- Differentiated cell reverting to a previous undifferentiated state
- Genetic mutation

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**Proto-oncogenes**
- Normal cellular genes that are important regulators of normal cellular processes
- Normally, genetic “lock” keeps cell in its mature state
- Carcinogen can “unlocked,” resulting to revert the process of de-differentiation
- **Mutations** in proto-oncogenes cause the cell to become malignant

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**Proto-oncogene**

<table>
<thead>
<tr>
<th>Proto-oncogene</th>
<th>cancer-inducing agent (UV light, chemicals)</th>
<th>cancerous phenotype</th>
<th>Proto-oncogene</th>
<th>cancerous phenotype</th>
<th>Proto-oncogene</th>
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</table>
Tumor Suppressor Genes

- Suppress tumor cell growth
- Opposite of proto-oncogenes

Tumor Suppressor Gene

Illustration shows how \( p53 \) tumor suppressor is regulated in DNA damage and attempt to resolve crosstalk and alterations of transforming growth factor-\( \beta \) (TGF-\( \beta \)) pathway in breast cancer.

Carcinogens

- “Cancer promoters”
- Any substance or agent that produces cancer or increases the risk of developing cancer
- Carcinogens may be radiation, chemical, or viral
Radiation Carcinogens

- Exposure to radiation can cause cellular DNA damage by a physical release of energy
  1. Ionizing radiation - e.g. diagnostics & therapeutic sources
     - Damage to the cell by this source is usually repaired & no mutation results
     - Malignancy can occur when damage affects proto-oncogenes or tumor suppressor genes
     - Children, fetuses, & elderly are at higher risk

Radiation Carcinogens, cont.

2. Ultraviolet radiation (UVR)
   - Complete carcinogen
   - Sources: sunlight, tanning salons, industrial sources like welding arcs & germicidal lights
   - Risk of carcinogenesis
     - Prolong exposure
     - Hereditary diseases characterized by inefficient DNA repair
     - Skin pigmentation - the greater amount of melanin, the greater is the protection against UVR

Chemical Carcinogens

- Chemical substances that alter DNA
  Examples
    - Alkylating antineoplastic agents - cyclophosphamide, nitrogen mustard, nitrosoureas
    - Aromatic hydrocarbons - soot, pitch, coal tar, benzene
    - Tobacco products - cigarette smoke, chewing tobacco, snuff
    - Inorganic compounds - asbestos, chromates, nickel
Viral Carcinogens

- Infect the DNA, resulting in proto-oncogene changes & cell mutation
- Effects modified by:
  - Age - the very young & elderly are more susceptible
  - Immunocompetence - many viruses are oncogenic only if the host is immunocompromised

Viral Carcinogens, cont.

- Examples of viruses:
  - Human papillomavirus – cervical CA
  - Hepatitis B – hepatocellular carcinoma
  - Epstein-Barr virus – Burkitt’s lymphoma

Immune System

- The system is composed of lymphatic tissues, organs, & physiological processes that identify an antigen as abnormal or foreign, & prevent it from harming the body.
- Immune surveillance against cancer
  - theory that proposes recognition & destruction of cancer cells by the immune system
**Immunologic Surveillance**

- Surveillance occurs via recognition of tumor-associated antigens (TAAs).
  - TAAs mark some cancer cells as foreign or “non-self”

**Immunologic Surveillance**

- The immunologic functions are continuous.
- It is proposed that malignant transformation occurs continuously, & destroyed by the immune response.
- Surveillance prevents transformed cells from developing into clinically detectable tumors.

**Immunologic Surveillance, cont.**

**Cytotoxic T cells**
- Play a dominant role in resisting tumor growth; capable of killing tumor cells
- Important in the production of cytokines

**Natural killer cells**
- Directly “lyse” tumor cells spontaneously without any prior sensitization

**B lymphocytes**
- Produce specific antibodies that bind to tumor cells & can kill these cells by complement fixation & lysis
Immunological Surveillance, cont.

Monocytes
- Phagocytic white cells derived from stem cells; circulates in the blood stream for 24 hrs. then move into the tissues, where they mature.

Macrophages
- Mature monocytes
- One of the first lines of defense in the inflammatory process
- Phagocytoses that engulf foreign antigens & cell debris
- Secrete cytokines & colony-stimulating factors

Failure of Immune Response

Reasons
1. Constitutional factors
   - Age - an immature or senescent immune system
   - Tumor burden
     - Too little - insufficient to stimulate response
     - Too much - overwhelms the immune system

Failure of Immune Response cont.

- Cancer cells may:
  - Suppress immune activity
  - Shield the cell from recognition
  - Resemble normal cells & thus escape detection = Immunological surveillance escape
Failure of Immune Response cont.

2. Iatrogenic factors

- Immunosuppressive drug therapy, e.g. steroids, alkylating agents, cyclosporine
- Radiation-induced suppression of immune response

3. Genetic predisposition

- Certain cancers may be inherited; mechanism is unclear in many cases
- Examples: Wilm's tumor, familial polyposis coli, multiple endocrine neoplasia

Genetic Link in “Cancer Families”

- Cancer has a multifactorial etiology with several genetic, environmental, & personal factors interacting to produce a malignancy.
- Genetic alterations are at the very core of cancer development, although most cancer is not the result of an inherited germline alteration.
  - It is believed that only 10% of cancers have a strong genetic link.

Genetics, cont.

- Most cancer is associated with genetic alterations that occur in single cells sometime during the life of an individual.
- A malignant tumor arises after a series of genetic mutations have accumulated.
Carcinogenesis

- Three-stage theory of causation (carcinogenesis) is the most widely used explanation of the process by which a normal cell is transformed into a cancer cell.
- **Initiation**
- **Promotion**
- **Progression**
  - Metastasis

Cancer Development

**Initiation**

- A carcinogen (cancer-causing agent) damages the DNA by changing a specific gene. This may result in:
  - Undergo repair (thus, no initiation occurs)
  - Become permanently changed (mutated) but do not cause cancer unless subsequently exposed to threshold levels of cancer promoters
  - Become transformed (mutated) & produce a cancer cell line if the initiator is a complete carcinogen

Cancer Development, cont.

**Promotion**

- Process by which carcinogens are subsequently introduced, resulting in one of the following changes:
  - **Reversible damage** to the proliferation mechanism of the cell
  - Effects of cancer promoting factors may be inhibited by:
    - Cancer-reversing agents, e.g. antioxidants
    - Host's effective immune system
    - Time or dose limit on the exposure to the promoter
Promotion, cont.
- Irreversible damage to the proliferation mechanism, resulting in cancer cell transformation
- Time frame
  - Time between exposure to initiators & promoters & development of cancer is quite variable
  - May depend upon dosage & length of exposure

Cancer Development, cont.

Progression
- Characterized by increase growth rate of the tumor, as well as increase invasiveness & metastasis
- Invasion-
  - cells continue to divide; increase bulk, pressure, & secretion of enzymes resulting to local spread & invasion of surrounding structures

Progression, cont.

Metastasis
- Production of secondary tumors at distant sites
- Routes:
  - Seeding throughout the body cavity, i.e. peritoneal
  - Dissemination via the lymphatic system
  - Via blood capillaries & veins – most common form of metastasis
Metastasis, cont.

- Most common sites:
  - Bones, lungs, liver, CNS

- Clinical implications
  - Metastasis is the major cause of death from cancer
  - Most tumors have begun to metastasize at the time of detection

Common Screening Tests

- Examples of cancer-related studies
  - Cytology, e.g. Pap test
  - Sigmoidoscopy, colonoscopy
  - Guaiac for occult blood
  - Mammogram
  - CEA, AFP, CA-125, PSA, etc. as cancer markers
  - Genetic markers
  - Bone marrow examination
  - Biopsy
Nursing Process

Diagnostic Phase

- The best & most effective treatment for cancer is prevention.
- Early detection of cancer & effective therapy can result in decreased morbidity & mortality.
- Diagnostic plan includes health history, identification of risk factors, physical examination, & specific diagnostic studies.

Diagnostic, cont.

Biopsy

- Definitive means of diagnosing CA
- Histologic examination of a piece of tissue from the suspicious area by a pathologist
- To determine if the tissue is benign or malignant
- Types of biopsy: fine needle aspiration (FNA), incisional, excisional
- Biopsy result can take 72 hrs. to come out
Histologic Analysis Classification

- Grading of tumors through the appearance of cells & degree of differentiation

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Cells differ slightly from normal cells (mild dysplasia) &amp; are well differentiated</td>
</tr>
<tr>
<td>II</td>
<td>Cells are more abnormal (moderate dysplasia) &amp; moderately differentiated</td>
</tr>
<tr>
<td>III</td>
<td>Cells are very abnormal (severe dysplasia) &amp; poorly differentiated</td>
</tr>
<tr>
<td>IV</td>
<td>Cells are immature &amp; primitive (anaplasia) &amp; undifferentiated; cells of origin is difficult to determine</td>
</tr>
</tbody>
</table>

Extent of Disease Classification

- Clinical staging – classifying the extent & spread of disease process

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Cancer in situ</td>
</tr>
<tr>
<td>I</td>
<td>Tumor limited to the tissue of origin; localized tumor growth</td>
</tr>
<tr>
<td>II</td>
<td>Limited to local spread</td>
</tr>
<tr>
<td>III</td>
<td>Extensive local &amp; regional spread</td>
</tr>
<tr>
<td>IV</td>
<td>Metastasis</td>
</tr>
</tbody>
</table>

PET Scan

(Positron Emission Tomography)
TNM Classification

- Standardization of the clinical staging of cancer by the International Union Against Cancer (UICC)
- Utilizes 3 parameters: tumor size (T), degree of regional spread to the lymph nodes (N), & metastasis (M)
- Refer to Lewis, p. 269

<table>
<thead>
<tr>
<th>Primary Tumor (T)</th>
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</thead>
<tbody>
<tr>
<td>T&lt;sub&gt;0&lt;/sub&gt;</td>
<td>No evidence of primary tumor</td>
</tr>
<tr>
<td>T&lt;sub&gt;n&lt;/sub&gt;</td>
<td>Carcinoma in situ</td>
</tr>
<tr>
<td>T&lt;sub&gt;1-4&lt;/sub&gt;</td>
<td>Ascending degrees of increase in tumor size &amp; involvement</td>
</tr>
<tr>
<td>T&lt;sub&gt;x&lt;/sub&gt;</td>
<td>Tumor cannot be measured or found</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regional Lymph Nodes (N)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>N&lt;sub&gt;0&lt;/sub&gt;</td>
<td>No evidence of disease in lymph nodes</td>
</tr>
<tr>
<td>N&lt;sub&gt;1-4&lt;/sub&gt;</td>
<td>Ascending degrees of nodal involvement</td>
</tr>
<tr>
<td>N&lt;sub&gt;x&lt;/sub&gt;</td>
<td>Regional lymph nodes unable to be assessed clinically</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distant Metastases (M)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M&lt;sub&gt;0&lt;/sub&gt;</td>
<td>No evidence of distant metastases</td>
</tr>
<tr>
<td>M&lt;sub&gt;1-4&lt;/sub&gt;</td>
<td>Ascending degrees of metastatic involvement of the host, including distant nodes</td>
</tr>
<tr>
<td>M&lt;sub&gt;x&lt;/sub&gt;</td>
<td>Cannot be determined</td>
</tr>
</tbody>
</table>

Nursing Care during Cancer Workup

- Education
  - Diagnostic procedures
  - "When will the results come out?"
  - Doctor’s responsibility to explain the results and plan of care
- Psychosocial support
  - Health care team
  - Family & significant others
Independent & Collaborative Care for Cancer Patients

Cancer Decision Tree Treatment

Goal of Cancer Treatment

1. Cure

- Expectation after the treatment, patient will be free of cancer & will have a normal life span
- Permanent remission
- 5-year landmark to define cancer survivors – free of disease 5 years from diagnosis or from the completion of treatment
  - Not true for all cancers

Goal of Cancer Treatment, cont.

2. Control

- Limit the growth & spread of disease
- Cancers are not usually cured; considered to be chronic
- Maintenance therapy
- Patient is expected to have a period of symptom-free time
Goal of Cancer Treatment, cont.

3. Palliation
- Relief or control of symptoms
- Maintenance of a satisfactory quality of life
- Life span is not expected to be extended
- Examples
  - Debulking of tumor
  - Colostomy
  - Laminectomy
  - Radiation therapy for bone metastasis

Oncological Multidisciplinary Team
- Medical oncologist
- Radiation oncologist
- GYN oncologist
- Pathologist
- RNs, oncology nurses
- Palliative care
- Respiratory therapist
- Dietitian
- PT, OT, Speech therapist
- Case manager
- Social worker

Cancer Treatment Modality

Surgery
- Oldest form of cancer treatment
- Current trend
  - Less radical surgery
  - Adjuvant or “additional” therapy after surgery
  - Decision on adjuvant tx is based on tumor type, stage, comorbidities, & preferences
Nursing Intervention: Surgery as Treatment Modality

- Post operative care specific to the surgery
  - Hemodynamics
  - Parameters monitoring
- Psychological support
  - Therapeutic communication
- Collaboration with other health care professionals

Cancer Treatment Modality, cont.

Radiation Therapy (XRT)

- Approximately 50% of clients treated for cancer are treated with XRT during the course of disease
- Goals of XRT include delivering a precise dose of ionizing radiation to defined volume of tissue & minimizing the dose on the normal tissue in the treated volume
- Aims of XRT: Cure, Control, Palliation

Radiation, cont.

Methods of delivery of XRT

1. Local tx
   - Teletherapy
     - External beam RT, wherein the precise dose is delivered to the client from outside the body
   - Brachytherapy
     - Beta particles & gamma rays from sealed radioactive sources
Brachytherapy

Radiation, cont.

2. Systemic tx
   □ Radiopharmaceutical treatment via IV, oral, or into a body cavity

Nursing Intervention: Radiation as Treatment Modality

- Client education & intervention to incorporate client & family in care
- Interventions to minimize the S/E’s of XRT
  □ Perform nursing assessment & interventions related to the area that is being treated
    - Skin Care
    - Fatigue
    - Nutrition
Nursing Intervention: Radiation as Treatment Modality, cont.

- Interventions to maximize radiation protection & safety with the “sealed” & “unsealed” source of XRT
  - Utilize the principles of TIME, DISTANCE, & SHIELDING

Chemotherapy

- Treatment of choice for malignancies of the hematopoietic system & for solid tumors that have metastasized regionally or distally
- Application of chemotherapy is based on the concepts of cell life cycle, cell cycle time, growth fraction, & tumor burden
- Goals are cure, control, palliation
Chemotherapy, cont.

Side Effects & Patient Care

- Nausea & vomiting, diarrhea, anorexia, 
- Stomatitis, mucositis
- Easy fatigability, generalized weakness
- Alopecia
- Sexuality
- Chemotx adverse reaction

Side Effects & Patient Care

- Neutropenia
  - Nadir – lowest point of blood cell levels after cancer treatment; occurs 7 to 14 days post chemotx
  - Risk for infection
- Anemia
  - Generalized weakness, SOB on minimal exertion

Nursing Interventions

- Monitor CBC as ordered
- Report critical changes in patient assessment parameters to physician
  - Signs & symptoms of infection, Temp > 100.5 °F
- Teach patient & family on infection precautions
  - personal hygiene, hand washing, "oncology diet"
- Teach SQ administration of "growth factors" for home use
- Blood transfusion for moderate to severe anemia (per doctor’s order)
Side Effects & Patient Care
- Thrombocytopenia
  - Risk for bleeding

Nursing Interventions
- Avoid invasive procedures
  - Venipunctures, IM, SQ, enemas, rectal temperatures, suppositories, bladder catheterization, NGT
- Prevent constipation
- Use soft toothbrush, electric razor
- Teach safety measures to prevent bleeding when performing ADLs
- Platelets transfusion as ordered (≤ 20,000/mm³)

Chemotherapy, cont.
Alteration in self concept R/T
- Alopecia
- Cachectic condition
- Patient’s own grieving process

Strengthen client’s support system
- Family, friends, significant others
- Cancer support groups

Occupational Precautions when Caring for Chemotherapy Patients
- Chemotherapy administration is done by chemotherapy certified nurse
- Personal protective equipment (PPE)
  - Chemo gloves, gown, mask, & goggles when administering chemotherapy
- Disposal of used chemotherapy IV bags, tubings, & syringes
- Specific precautions on patient’s body fluids
- "Spills"
Biological Modifiers

- Agents or approaches that change the relationship between the tumor & the host by modifying the biologic response of the host to tumor cells with a resultant therapeutic effect

- Goals
  - Cure (primary tx, e.g. interferon alpha for CML)
  - Control, maintenance (after chemotx, e.g. interferon alpha for multiple myeloma or lymphoma)
  - Combination tx
  - Supportive tx (e.g. growth factors – Procrit, Neupogen, Neumega)

Current Trends

**Stem cell**
- Any cell that can give rise to more specifically differentiated daughter cells
- Stem cells can be harvested from bone marrow (BM), peripheral blood, or umbilical cord
- It is used in hematological transplants

Current Trends, cont.

**Bone marrow transplantation (BMT)**
- Transplantation of bone marrow from one individual (allografting) to a recipient who is genetically different, or
- Transplanting marrow back into the person from which the blood cells are originated (autografting)
- Autologous marrow is preferred to avoid graft-versus-host disease (GVHD)
Stem cell banking at birth

- Stem cells from umbilical cord may be utilized if a match is found through the Cord Blood Registry, or if the baby is believed to be a match with a family member who requires an allogeneic transplant.
- Related & unrelated cord blood cells are harvested at birth from volunteer donors & are cryopreserved at a designated cord blood bank.

Stem cell banking at birth, cont.

- The cells are transported to the recipient’s transplant center, thawed, & infused on the day of transplant.

Peripheral stem cell banking

- Peripheral blood stem cell from donor (allogeneic) or client (autologous) is harvested & processed.
- Processed marrow is placed in a blood administration bag for cryopreservation or immediate infusion.
Bone Marrow Transplantation

- Harvested from iliac crest

- Marrow preparation
  - marrow is filtered, purged of tumor cells, & processed for cryopreservation

Bone Marrow Transplantation, cont.

- Preparation of marrow recipient
  - High dose chemotx & radiation

Bone Marrow Transplantation, cont.

- Marrow transfusion
  - Donor or patient’s stored bone marrow is thawed & infused through a central venous catheter
Gene Therapy

Current Trends, cont.

- Experimental treatment that involves introducing genetic material (DNA or RNA) into a person’s cells to fight disease
- Gene therapy is being studied in clinical trials (research studies with humans) for many different types of cancer and for other diseases
- First disease approved for treatment with gene therapy was adenosine deaminase (ADA) deficiency.

Gene Therapy, cont.

Approaches

- Target healthy cells to enhance their ability to fight cancer
- Target cancer cells to destroy them, prevent their growth, or make them more sensitive to chemotherapy & XRT
- Replace missing genes or altered genes with healthy genes
- Insert a gene to healthy cells to make them more resistant to side effects of high dose chemotherapy

Gene Therapy

Genes are transferred into cells via carrier or vector, i.e. viruses
Levels of Care

- Critical care
- Acute care
- Medical/Surgical unit, Oncology unit
- Hospice
  - Skilled nursing facilities
  - Home care

Elderly Cancer Patient

- Over a third of cancers are diagnosed in people over 75 years old
- Research shows cancer in elderly people is less likely to be diagnosed & treated than in young people
  - More sensitive to toxic drugs used in chemo
  - Risks associated with surgery increase with age
  - "Nothing can be done"
  - Access to personal & medical services
    - "Age scrap limits"

- Cancer is a disease in which we can never have the luxury of looking back and saying, "I wish I would have..."

- Until the time, we discovered "that magic drug, that magic bullet that would destroy cancer cells, but steer clear of other normal cells," we would have to lay greater stress on prevention of cancer through awareness about what causes it.  
  
  - Prof. Tim Hunt, Nobel prize winner