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Cancer Rehabilitation Core Concepts

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- Assistant Professor – Oakland University, Rochester Michigan
- Education Coordinator- Beaumont Health, Troy Michigan

Speaker Introduction

- Chris Wilson PT, DScPT, DPT, GCS
- Author of APTA Positions on Medical Necessity Position and Role of PT in HPC
- World Confederation for PT – Hospice and Palliative Care Coordinator
- APTA Hospice Palliative Care Special Interest Group Chair
- Graduate Certificate in Oncology Rehabilitation from Oakland University, Rochester MI
- Multiple publications and presentations in Palliative Care and Chronic Disease PT

Objectives

Upon completion of this session, the participant will be able to:

- Describe at least three advances in management of the patient with cancer and the rehabilitation implications.
- Describe at least three ways the multidisciplinary team is incorporated into rehabilitation services, in the cancer continuum of care.
- List at least three modifications to the evaluation and at least three modifications to the interventions based on the patients medical conditions.
- Outline at least three concepts related to exercise prescription that identifies rehab needs in the patient with cancer.

The Facts

- 1.68 million people were diagnosed with cancer in 2016
- 14.5 million individuals are currently living with cancer diagnosis
- 41% of people in the United States will be diagnosed with cancer at some point in their lifetime
- Overall survivals from 2012 to 2018 was greater than 65%
- Women have a 1 in 3 chance of developing cancer in their lifetime and men have a 1 in 2 likelihood
- In 2016, 595,690 people died of cancer = 1,630 cancer deaths/day
- Cancer is the second most common cause of death in the U.S.
- By 2030, cancer will be the major cause of death in the U.S.

Overview of Common Types of Cancer

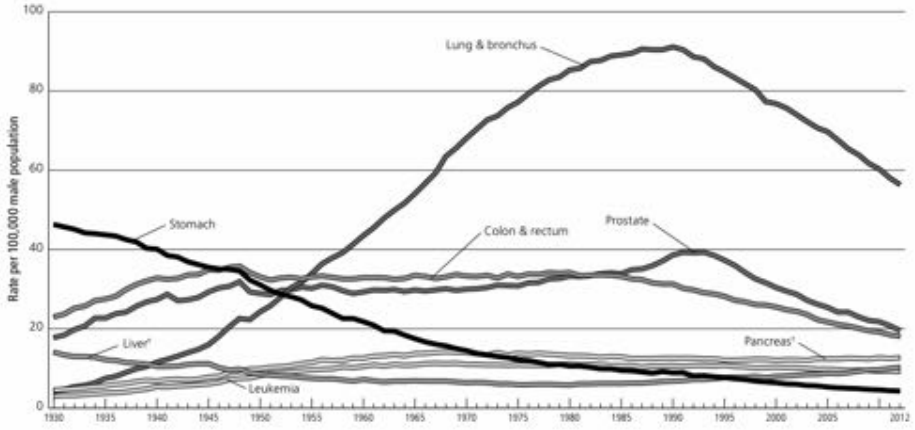
Leading Sites of New Cancer Cases and Deaths – 2015 Estimates

Estimated New Cases*		Estimated Deaths	
Male	Female	Male	Female
Prostate 220,800 (26%)	Breast 231,840 (29%)	Lung & bronchus 86,380 (28%)	Lung & bronchus 71,660 (26%)
Lung & bronchus 115,650 (14%)	Lung & bronchus 105,590 (13%)	Prostate 27,540 (9%)	Breast 40,290 (15%)
Colon & rectum 69,090 (8%)	Colon & rectum 63,610 (8%)	Colon & rectum 26,100 (8%)	Colon & rectum 23,600 (9%)
Urinary bladder 56,320 (7%)	Uterine corpus 54,870 (7%)	Pancreas 20,710 (7%)	Pancreas 19,850 (7%)
Melanoma of the skin 42,670 (5%)	Thyroid 47,230 (6%)	Liver & intrahepatic bile duct 17,030 (5%)	Ovary 14,180 (5%)
Non-Hodgkin lymphoma 39,850 (5%)	Non-Hodgkin lymphoma 32,000 (4%)	Leukemia 14,210 (5%)	Leukemia 10,240 (4%)
Kidney & renal pelvis 38,270 (5%)	Melanoma of the skin 31,200 (4%)	Esophagus 12,800 (8%)	Uterine corpus 10,170 (4%)
Oral cavity & pharynx 32,670 (4%)	Pancreas 24,120 (3%)	Urinary bladder 11,510 (4%)	Non-Hodgkin lymphoma 8,310 (3%)
Leukemia 30,900 (4%)	Leukemia 23,370 (3%)	Non-Hodgkin lymphoma 11,480 (4%)	Liver & intrahepatic bile duct 7,520 (3%)
Liver & intrahepatic bile duct 25,510 (3%)	Kidney & renal pelvis 23,290 (3%)	Kidney & renal pelvis 9,070 (3%)	Brain & other nervous system 6,380 (2%)
All sites 848,200 (100%)	All sites 810,370 (100%)	All sites 312,350 (100%)	All sites 277,280 (100%)

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

Age Adjusted Cancer Death Rates

Figure 1. Trends in Age-adjusted Cancer Death Rates* by Site, Males, US, 1930-2012

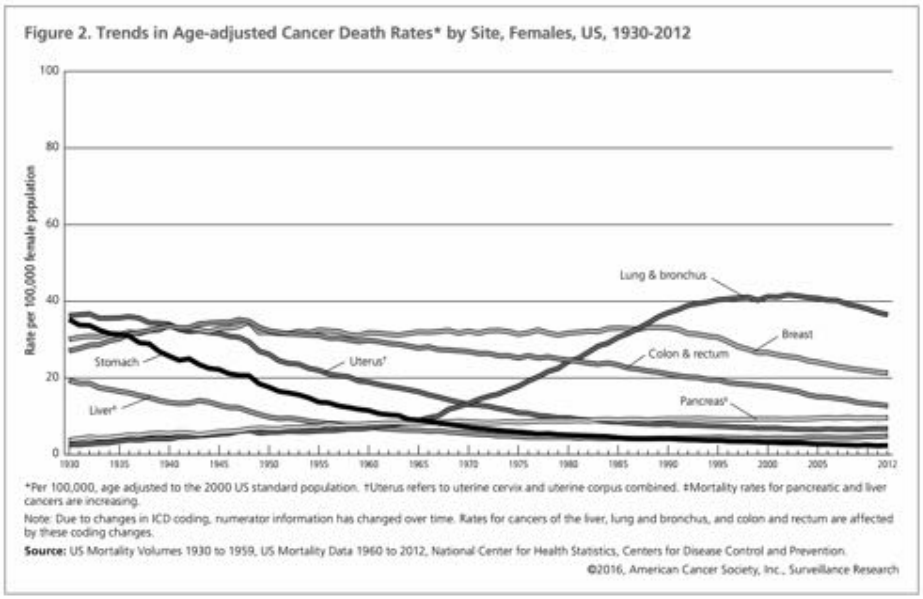


*Per 100,000, age adjusted to the 2000 US standard population. †Mortality rates for pancreatic and liver cancers are increasing.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

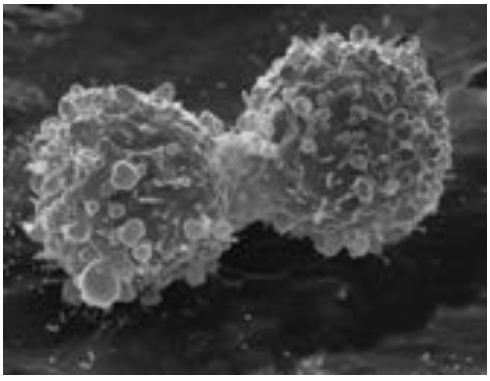
Source: US Mortality Volumes 1930 to 1959 and US Mortality Data 1960 to 2012, National Center for Health Statistics, Centers for Disease Control and Prevention.

Age Adjusted Cancer Death Rates



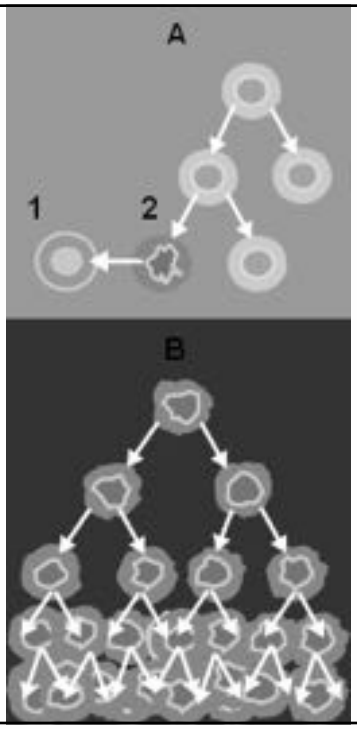
Cancer Pathology

- Tumor type
- Tumor size
- Lymph node status
- Hormone receptor status
  - (estrogen, progesterone, androgens)
- Cellular grade
- Her 2/neu status
- Skin, lymphatic, vascular invasion



https://upload.wikimedia.org/wikipedia/commons/b/b7/Normal_cancer_cell_division_from_NIH.png

https://upload.wikimedia.org/wikipedia/commons/b/b7/Normal_cancer_cell_division_from_NIH.png

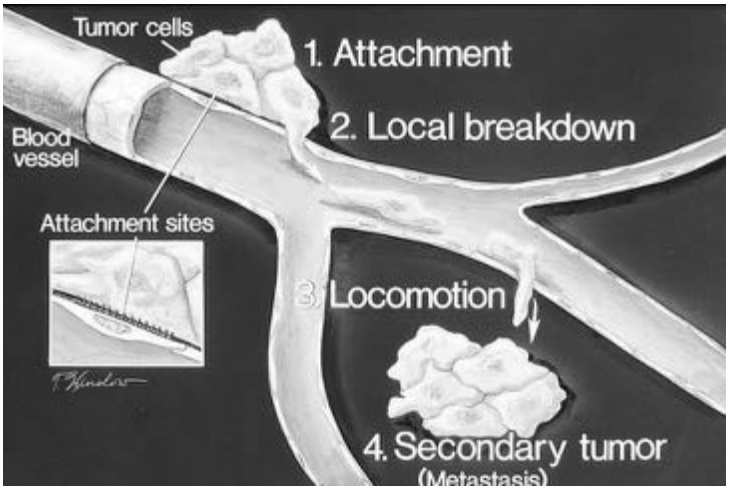


Brief Review of Cancer Staging[5]

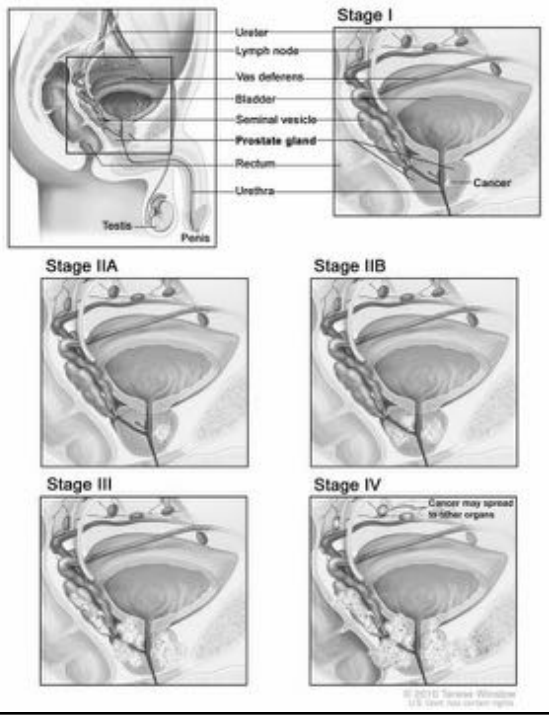
- "The TNM staging system assesses tumors in three ways:
  - Extent of the primary tumor (T)
  - Absence or presence of regional lymph node involvement (N)
  - Absence or presence of distant metastases (M)
- Once T, N, and M are determined, a stage of I, II, III, or IV is assigned, with stage I being early and stage IV being advanced disease."

- Example – Breast CA[6]
  - Stage I – Localized disease
  - Stage II – Axillary node involvement
  - Stage III – Advanced regional disease without metastasis
  - Stage IV - Distant Metastases
- $T_3N_2M_0$

Metastatic Change



https://commons.wikimedia.org/wiki/File:How_metastasis_occurs_illustration.jpg



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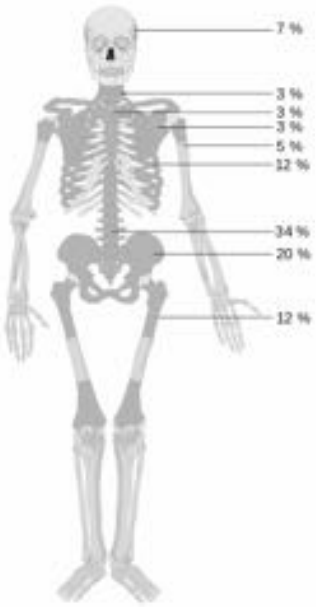
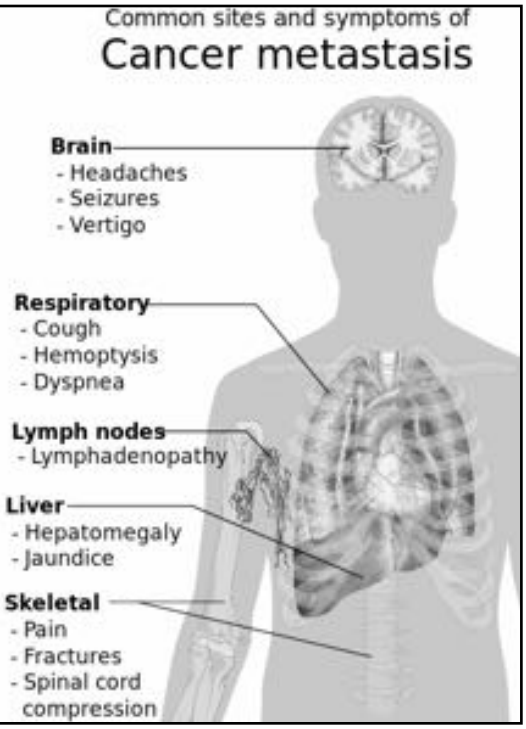


https://upload.wikimedia.org/wikipedia/commons/thumb/b/b1/Bone_metastasis_average_distribution_01.svg/248px-Bone_metastasis_average_distribution_01.svg.png

Screening for metastasis

- Any cancer survivor should be monitored for metastatic disease
- If cancer is in past medical history (even if in remission), metastatic recurrence should be considered if new symptoms occur
- May only require monitoring but sometimes referral and workup

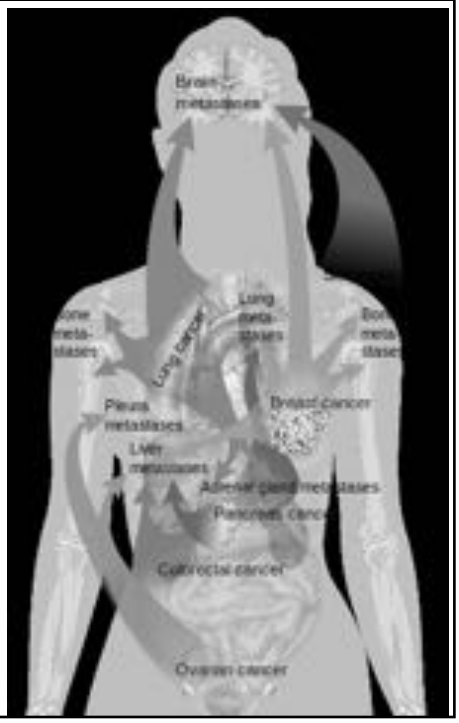
https://upload.wikimedia.org/wikipedia/commons/thumb/b/bd/Symptoms_of_cancer_metastasis.svg/438px-Symptoms_of_cancer_metastasis.svg.png



Common Sites of Metastatic Change

- Lung cancer, mainly to adrenal glands, brain, and bone
- Breast cancer, mainly to bone, liver, lung and brain.
- Colon cancer, mainly to liver.
- Pancreatic cancer, mainly to liver and lungs.
- Melanoma, mainly to brain
- Ovarian cancer, mainly to pleural cavity and liver
- Prostate cancer (in males) usually metastasizes to the bones

https://upload.wikimedia.org/wikipedia/commons/thumb/7/7e/Metastasis_sites_for_common_cancers.svg/299px-Metastasis_sites_for_common_cancers.svg.png



Cancer Treatments

Local vs. Systemic Treatments

Brief Review of Cancer Treatments and Side Effects

- **Chemotherapy**
  - **"Adjuvant** - Chemo to destroy left-over (microscopic) cells that may be present after the known tumor is removed by surgery"
  - **"Neoadjuvant -** may be given to attempt to shrink the cancer so that the surgical procedure may not need to be as extensive
  - **"Induction** - given to induce a remission"
  - **"Consolidation** - Chemotherapy given once a remission is achieved. The goal of this therapy is to sustain a remission"
  - **"Palliative -** is given specifically to address symptom management without expecting to significantly reduce the cancer"
- "Over 50 different chemotherapy medications, most are given by IV but some can be given orally"
  - Ex: carboplatin, cisplatin, Gemzar, Cytoxan, Taxol.

www.chemocare.com

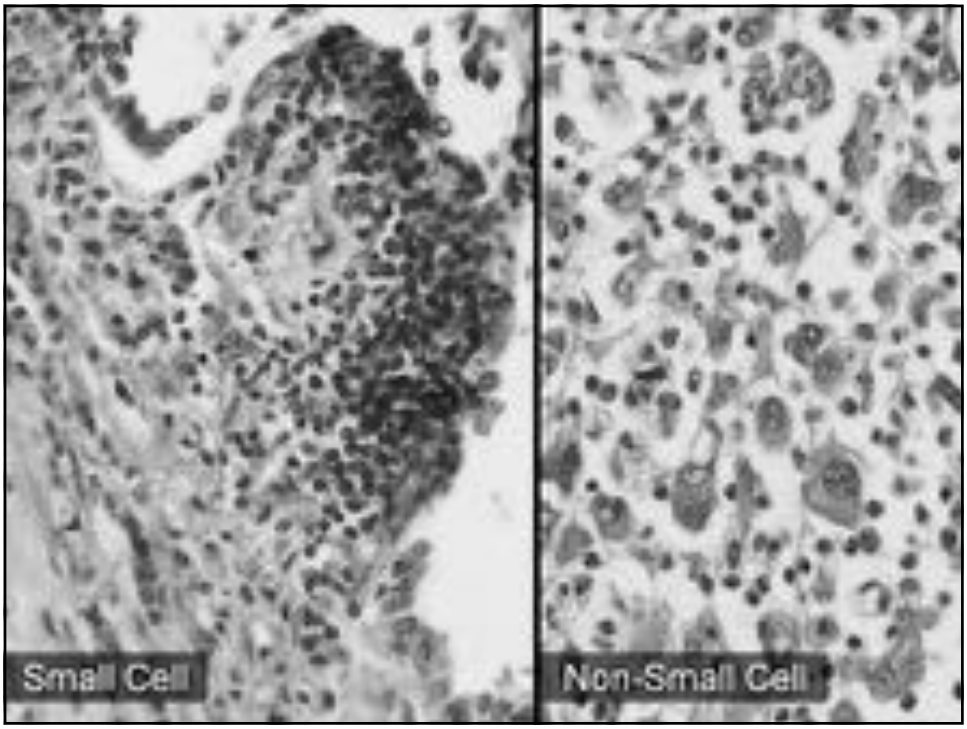
Brief Review of Cancer Treatments and Side Effects

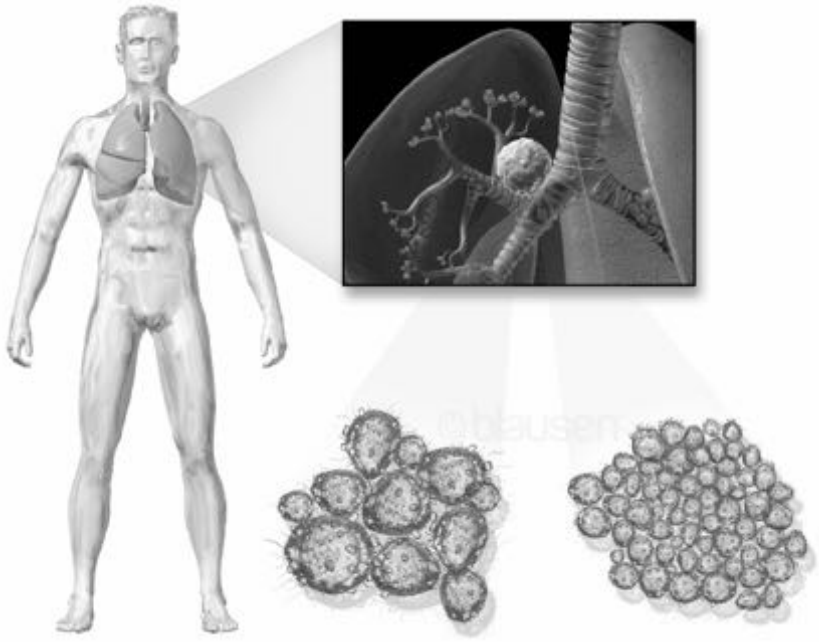
- **Surgery**
  - may experience slower healing and infection, what structures affected
- **Radiation**
  - xrays, gamma rays, protons, electrons, etc
  - Side Effects: immunosupression, fragile skin, adhesions, vomiting, diarrhea, fatigue, avascular necrosis, radiation myelitis
  - Radiosensitizers and Radioprotector medications
- **Brachytherapy**
  - placement of radioactive seeds in or near tumor to shrink it
- **Hormonal therapy**
  - systemic therapy commonly used in breast and prostate cancer to slow growth or prevent recurrence of cancer
- **Monitoring**
  - "Watchful waiting" - controversial

Lung Cancer

- Second most commonly diagnosed cancer in men and women
- Leading cause of death in men and women
- Stage 1 – 4
- Usually diagnosed in more advanced stages
- Difficult to screen for
- Frequently metastasizes to the brain

https://commons.wikimedia.org/wiki/Category:Gross_pathology_of_small-cell_lung_cancer#/media/File:Small_cell_carcinoma_(3931938372).jpg

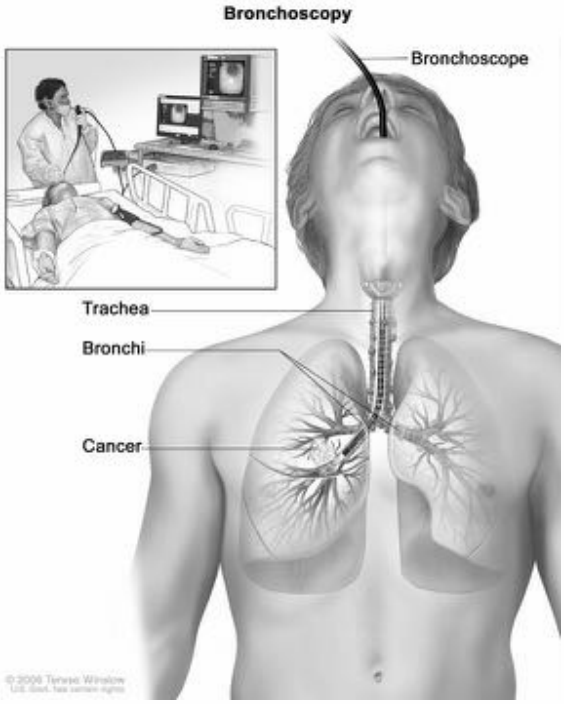




https://upload.wikimedia.org/wikipedia/commons/c/ca/Blausen_0619_LungCancer.png

Broncho-scopy

- Often used to diagnose or investigate for primary lung cancers
- May be able to biopsy from bronchoscopy



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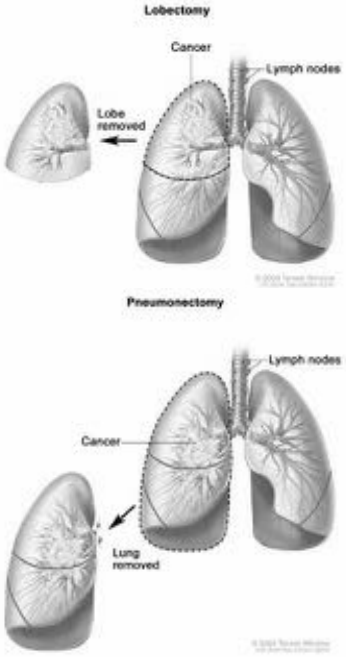
Lung cancer surgery



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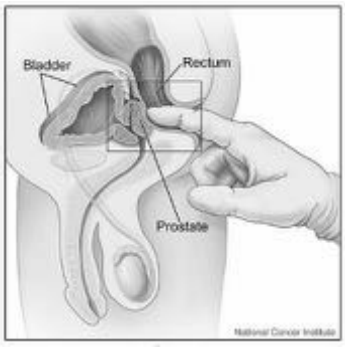
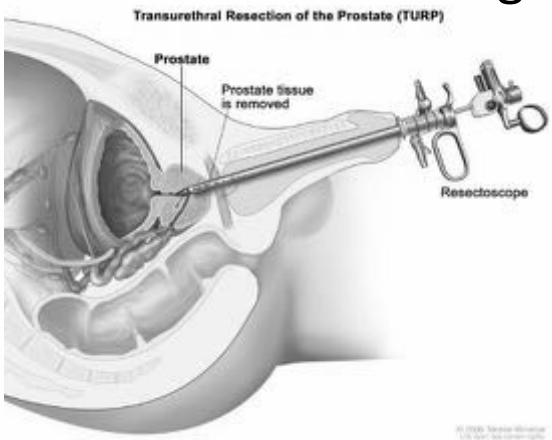
https://commons.wikimedia.org/wiki/File:Lobectomy_-_surgery_of_romoval_of_lung_tomor.JPG

Prostate Cancer

- Most commonly diagnosed cancer in men
- Second leading cause of cancer deaths
- Early detection with PSA screening and digital rectal exams
- Sensitive to androgen deprivation therapy at times



Prostate cancer surgery



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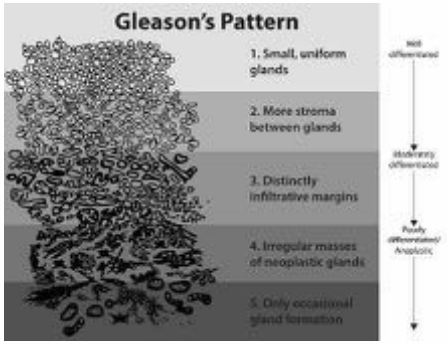
Prostate Cancer Grading

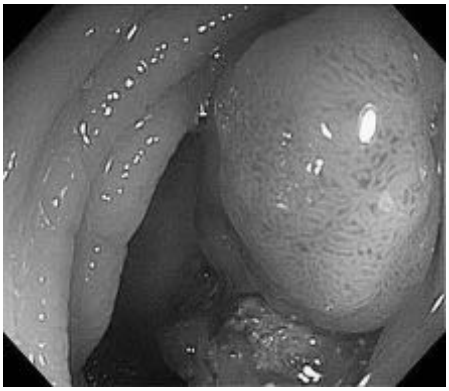
- A pathologist looks for cell abnormalities and "grades" the tissue sample from 1 to 5.
- The sum of 2 Gleason grades is the Gleason score.
- These scores help determine the chances of the cancer spreading
- They range from 2, less aggressive, to 10, a very aggressive cancer.
- Gleason scores helps guide the type of treatment.

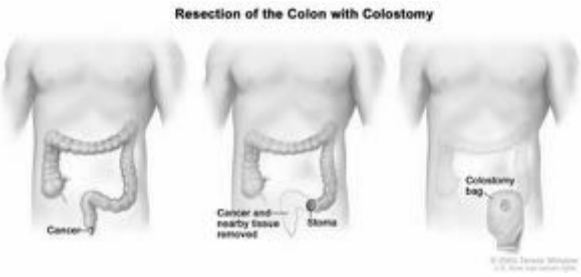


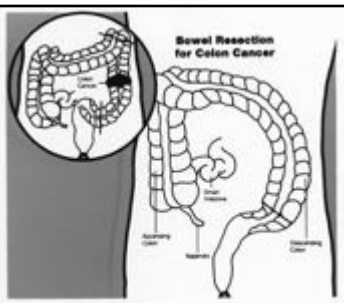
https://commons.wikimedia.org/wiki/File:Gleasonscore.jpg

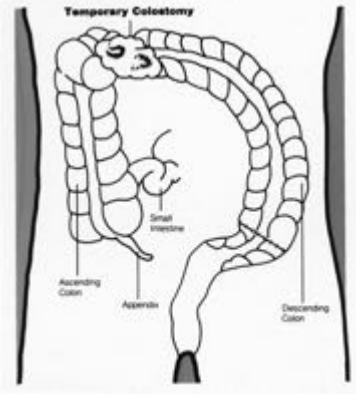
Colorectal Cancer

- Third most common cancer
- Third leading cause of cancer deaths
- Very effective screening
- Screening can lead to prevention







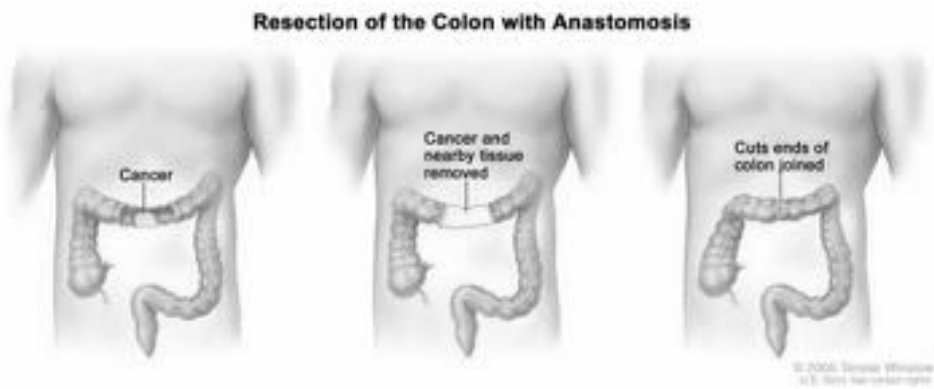


- Common Surgical Treatments for Colon Cancer
  - Colon Resection
  - Colostomy

The Web site of the National Cancer Institute (http://www.cancer.gov).The Web site of the National Cancer Institute (http://www.cancer.gov).

https://upload.wikimedia.org/wikipedia/commons/thumb/d/d5/Bowel_resection_and_temporary_colostomy_illustration.jpg/402px-Bowel_resection_and_temporary_colostomy_illustration.jpg

Colorectal anastomosis



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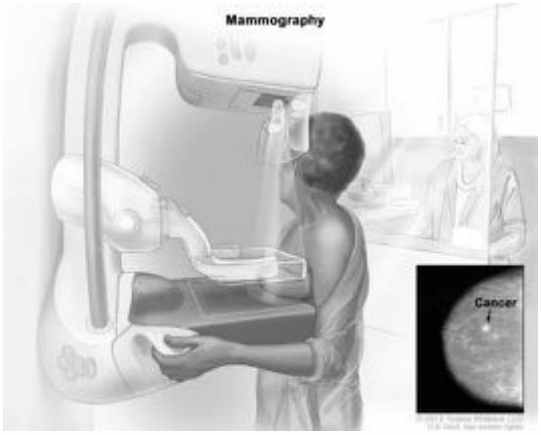
- Review of Breast Anatomy
- Ducts
- Lobes and Lobules (aka glands)
- Muscle
- Pec Major
- Pec Minor
- Ribs
- Lymphatic supply

https://commons.wikimedia.org/wiki/File:Breast_anatomy_normal.jpg#/media/File:Breast_anatomy_normal.jpg

Breast cancer

- Most commonly diagnosed cancer in women
- Second leading cause of cancer deaths
- There are more breast cancer survivors than any other kind of cancer



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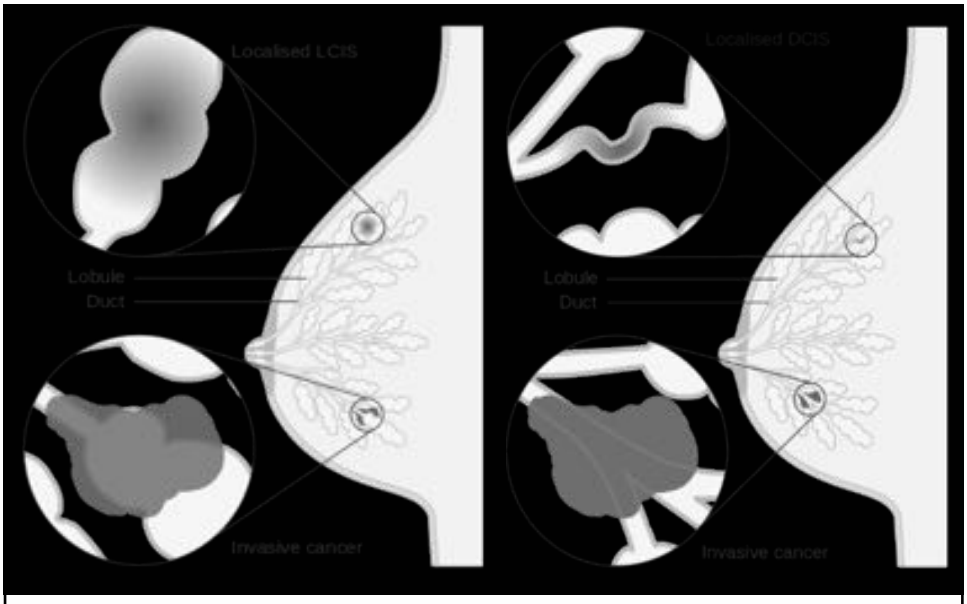
Types of Breast Cancer

- Invasive breast cancers
  - Invasive Ductal (Infiltrating ductal – IDC)
    - 70%
    - Medullary
    - Mucinous
    - Tubular
  - Invasive Lobular (Infiltrating lobular – ILC)
    - 15%
  - Inflammatory (IBC)
- Non-Invasive Breast Cancers
  - Ductal carcinoma in situ
  - Lobular carcinoma in situ



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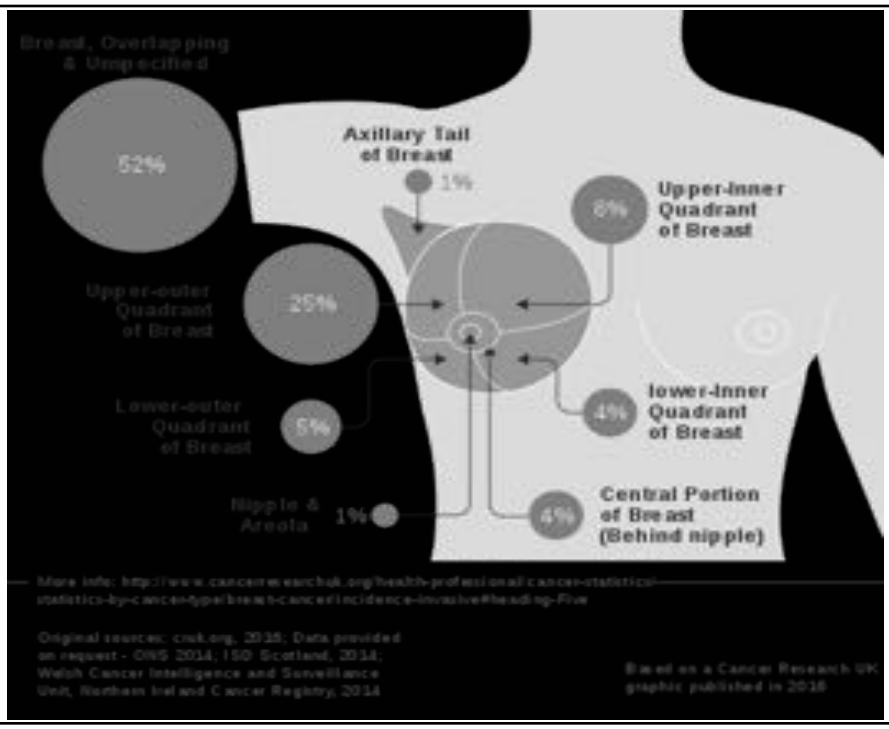
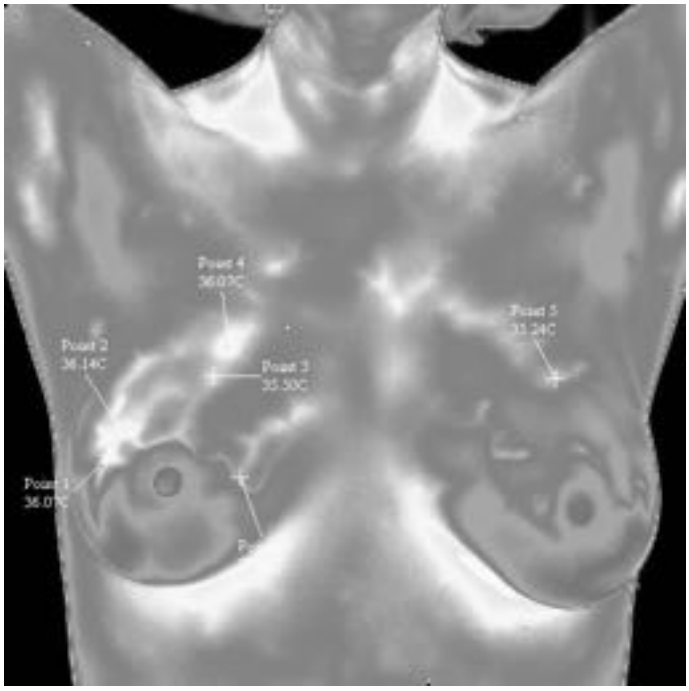
https://upload.wikimedia.org/wikipedia/commons/thumb/7/77/Diagram_showing_ductal_carcinoma_in_situ_%28DCIS%29_CRUK_115.svg/652px-Diagram_showing_ductal_carcinoma_in_situ_%28DCIS%29_CRUK_115.svg.png





https://commons.wikimedia.org/wiki/Category:Breast_cancer#/media/File:BreastCancerRightSampleI.jpg

Inflammatory breast cancer of the left breast with redness, peau d'orange, and inverted nipple

https://visualsonline.cancer.gov/retrieve.cfm?imageid=7199&dpi=72&fileformat=jpg

Cancer as a Chronic Disease?

- Cancer has become perceived as a chronic disease with long term effects and late effects
- Growing need for:
  - Screenings
  - Awareness
  - Diagnosis and treatment of:
    - Musculoskeletal
    - Cardiovascular
    - Functional Problems
  - Prevention of late effects

Definition of Cancer Survivorship

- The National Coalition for Cancer Survivorship (NCCS)[1] pioneered the definition of survivor as:
  - From the time of diagnosis and for the balance of life, a person diagnosed with cancer is a survivor
  - This expansive definition of "survivor" includes people who are dying from untreatable cancer
  - NCCS later expanded the definition of survivor even further to include family, friends and voluntary caregivers who are affected by the diagnosis in any way

Association of Community Cancer Centers Guidelines

→ ACCC recommends health promotion and wellness:

SECTION 9
Rehabilitation Services

Guideline I
Comprehensive rehabilitation services are available to cancer patients and their families through the entire cancer care continuum from diagnosis through survivorship.

Rationale
Cancer is a chronic disease that may require adjustment in the physical, social, financial, and emotional aspects of life in order to maximize independence and quality of life within medical status. Professionals experienced in rehabilitation are best suited to meet these needs of cancer patients.

Reference: http://accc-cancer.org/publications/pdf/publications_cpguidelines.pdf

Chemotherapy

- A systemic treatment
- The use of drugs IV or oral to kill rapidly dividing cells – "cytotoxic"
- Kills both cancer cells and normal cells
- Some chemos are cardiotoxic

- Cells Targeted by Chemotherapy
  - Rapidly dividing cells
  - Cancer cells
  - Hair follicle cells
  - Cells of the esophagus and stomach
  - Blood cells
    - Mainly white and red cells

Chemotherapy

- Multiple drugs given together or in sequence
- Given every two to three weeks
- Drug combination determined by:
  - Age
  - Pathology
  - Tumor size
  - Lymph node status
  - Co-morbidities

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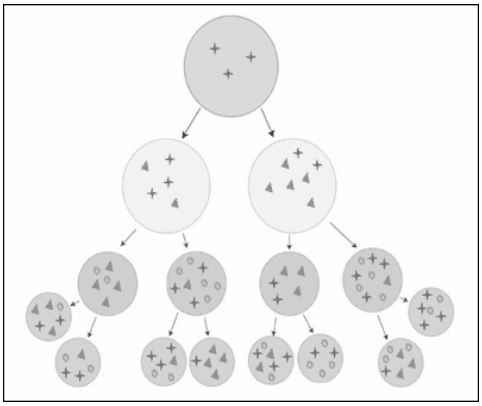
Chemotherapy Side Effects

- Fatigue
- Decreased WBC and Immunosuppression
- Hair loss
- Nausea, vomiting and malnutrition
- Neuropathies
- Pulmonary fibrosis
- Renal dysfunction
- Arrhythmias
- Ataxia and Weakness
- Mental fogginess
  - AKA Chemobrain

Common Chemotherapy Drugs

- Adriamycin (doxorubicin)
- Cytoxin (cyclophosphamide)
- Taxol (paclitaxel)
- Taxotere (docetaxel)
- Carboplatin
- Gemzar
- Xeloda
- Navelbine
- Epirubicin

Tumor heterogeneity



- Every cell of any particular cancer originated from the same "mother" cell.
- By the time a one–centimeter cancer is detected, the millions of cells that make up the lump have become distant relatives
- Responsive to treatments at different times

Cardiotoxicity

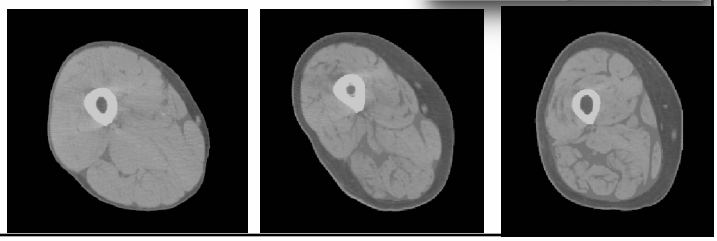
- Certain chemotherapeutic drugs can weaken and damage the heart muscle.
- Most common drug is Adriomycin
- Symptoms: Dyspnea on exertion, persistent cough, edema in feet, difficulty with breathing even at rest
- MUGA scan- monitors the efficiency with which the heart pumps

Physical Activity for Cardiotoxicity

- Aerobic Exercises
  - Treadmill
  - Bike
  - Gentle strengthening
- Expect impaired cardiac output
  - Normal cardiac output?
- Very similar rehabilitation approach as for a myocardial infarction
  - Close monitoring of HR, BP, SpO_2
  - Use of Borg RPE
    - 6-20 rating
  - Incremental progression of exercise

Osteopenia and Sarcopenia

- Some chemotherapy can cause bone and muscle wasting
- **BONE LOSS – osteopenia/osteoporosis**
  - Weight bearing exercises
  - Walking
  - Weight lifting
- **MUSCLE LOSS - sarcopenia**
  - Weight training

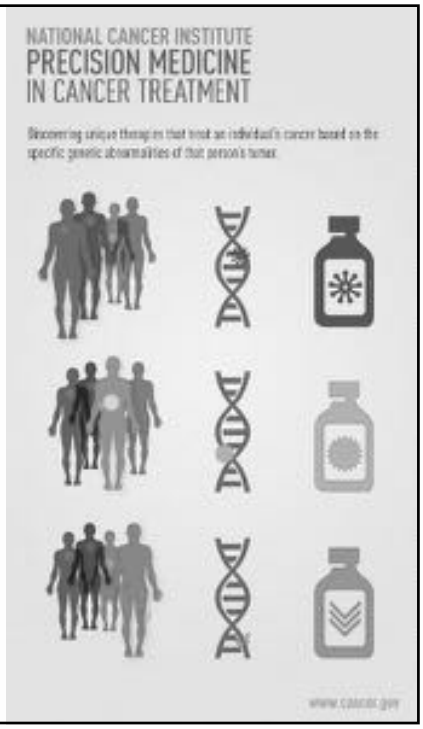


Hearing loss and Chemotherapy

- Signs of ototoxicity from chemotherapy
  - Dizziness
  - Tinnitus
    - Ringing, buzzing, or pulsing in the ears
  - Hearing loss
    - Hearing may continue to decrease even after chemotherapy treatments end
- The most common chemotherapy drugs that cause ototoxicity
  - Cisplatin
  - Carboplatin

Targeted/ Hormonal Therapies

- Are IV and oral drugs designed to change the hormonal or biological environment of the cancer cell and therefore restricting growth.
- These drugs are “cytostatic.”
  - Estrogen / Testosterone blockers
  - Herceptin
  - Avastin
  - Bisphosphonates



Radiation Therapy

- Controls tumor growth and promotes tumor shrinkage by damaging DNA in the nucleus of the cancer cell
- Relatively small doses given over a long period of time to allow the normal tissues to recover.
- Can cause fatigue, reduced RBC and WBC and Platelet counts, nausea and vomiting, skin changes and fibrosis
- Tissue tolerance to radiation
  - Acute – while undergoing treatment (1-4 months)
  - Intermediate – up to 4-12 months
  - Chronic – 1 year up to 8 years

Treatment Planning

- CT images from Sim transferred to planning software (Pinnacle)
- Physician contours (outlines) the target/tumor volumes and surrounding normal structures
- RT prescription dose determined
- Dosimetrist and Physicist work to come up with a treatment plan
- Physician approves plan

How is RT prescribed?

- Conventional RT
  - Dose (in Gray) is selected based on tumor type, location, goals of treatment
  - Divided into “fractions”, delivered daily (M-F) until total Rx dose achieved
  - Can be 2-8 weeks of RT total
- Stereotactic Body Radiation Therapy (SBRT)
  - RT delivered in 1-5 high-dose fractions
  - More conformal treatments
  - Used for lung, spine, adrenal, brain
- Standard treatments delivered daily, Monday-Friday
  - For SBRT, about every 2-3 days
  - Total of 2-8 weeks

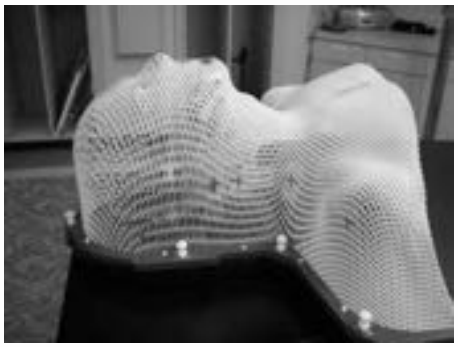
What sites is RT used for?

- CNS: brain and spine
- Head & Neck
- Breast
- Lung
- GI: esophagus, gastric, pancreatic, biliary, colon, rectum, anus
- Gyn: cervical, uterine, vaginal, vulvar
- GU: prostate, bladder, testicular, urethral
- Sarcomas
- Skin cancers
- Pediatrics
- Bone metastases from any primary

Immobilization during Sim

- Immobilization is necessary to ensure the patient has an identical set-up for each treatment
- Type of immobilization depends on the site being treated and the goals of treatment

Blue bag immobilization for an upper C-spine SBRT case

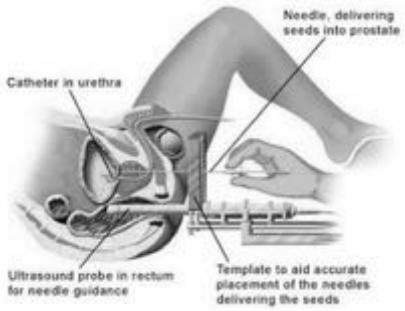


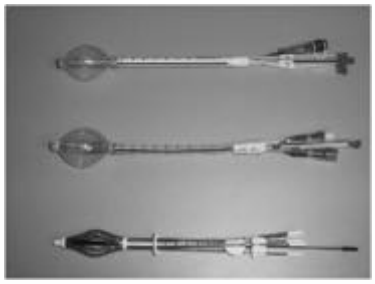
Head & Neck or Brain Aquaplast mask

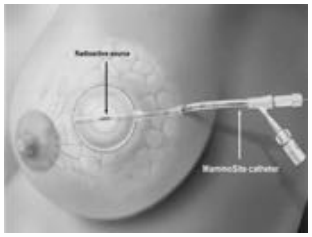
Breast immobilization

Linear Accelerator

Brachytherapy Devices







Gamma Knife Stereotactic Radiosurgery

Proton Therapy

- External beam radiation treatment delivered using protons as opposed to photons
- Advantages: protons have a finite range in tissue, can spare more normal tissue
- Indications: pediatrics, re-treatments
- Also used for other sites when indicated (CNS, prostate)

Implications of Radiation

- Skin will burn
  - Desquamation
- Mild to severe fatigue
- Tissue fibrosis
  - 6–36 months post radiation
- May aggravate lymphedema and cording
- Increase in lymphedema risk
- Potential weakness at site

Rehabilitation Needs

- Fatigue
- Weakness or numbness
- Poor endurance
- Balance or postural changes
- Joint stiffness
- Pain
- Difficulty with ambulation
- Scar tissue restriction
- Lymphedema
- Decreased range of motion

Acute and Late RT Toxicity

- RT toxicities are highly dependent on the body/tumor site being treated
- Varying degrees of RT-related toxicity are seen
- Acute toxicities managed throughout treatment course, assessed at weekly on-treat visits
- Late toxicity managed/assessed at follow-up visits, can require referral to PT/OT

Acute Side Effects

Brain

- Fatigue
- Alopecia
- Scalp itching/irritation/skin changes
- Nausea/vomiting
- Headaches
- Balance difficulties
- Other focal CNS findings

Head and Neck

- Fatigue
- Skin changes in the treatment field – erythema, hyperpigmentation, itching, dryness
- Nausea/vomiting/changes in bowel habits
- Weakness, difficulty with ambulation
- Back pain

Radiation for Breast Cancer

- Done for nearly all lumpectomies
- Done for some mastectomies
- Entire chest wall radiated
- Axillary & supraclavicular nodes spared unless ~ 4 or more positive lymph nodes.
- Administered daily for ~ 33 treatments

- Acute Side Effects
  - Skin reaction – erythema, hyperpigmentation, itching, desquamation
  - Breast or arm swelling
  - Decreased range of arm motion
  - Tightness in the axilla/chest wall
  - Fatigue

Acute Side Effects – GI, GU, Gyn

- GI
  - Nausea, vomiting, abdominal pain, decreased appetite, diarrhea, rectal discomfort, skin changes, bloating, fatigue
- GU
  - Dysuria, frequency, nocturia, diarrhea, rectal discomfort, fatigue
- Gyn
  - Dysuria, frequency, vaginal discomfort, diarrhea, skin changes, fatigue

Acute Side Effects – Lung, Bone, Sarcoma

- Lung
  - SOB, chest discomfort, cough, esophagitis, dysphagia, skin changes, fatigue
- Bone Mets
  - Pain, bone fractures, fatigue
- Sarcomas (extremities)
  - Swelling, pain, skin changes, decreased range of motion, fatigue

Movement Disorders after Radiation

- Decreased ROM
- Delayed pain
- Delayed breast swelling
- Delayed soft tissue dysfunction
- Decreased strength
- Fatigue

Physical Therapy after Radiation

Interventions

- Flexibility/ROM program
  - Rx for anterior chest, lateral chest and axilla
    - Stretching
    - Manual therapy
- Strength program
- Aerobic exercise
- Address upcoming treatment(s)

Goals

- Maximize/maintain ROM
- Maximize tissue mobility
- Minimize fatigue
- Maximize functional level
- Teach HEP for delayed radiation effects

Brachial Plexopathy

- Rare late effect of RT to the neck, chest, or axillary region
- Signs/symptoms
  - Tingling/numbness of the arm or fingers
  - Severe pain
  - Muscle weakness or paralysis
- Focus of treatment
  - Pain reduction, strengthening, preserve ROM, limit lymphedema

Lymphedema

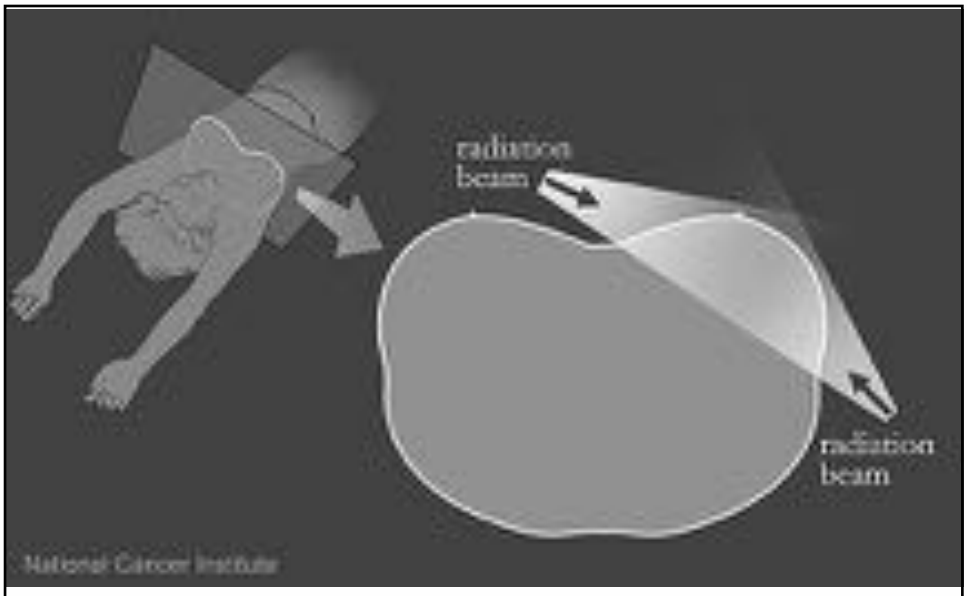
- Localized fluid retention and tissue swelling caused by compromised lymphatic system
- Limits ROM, tissues at risk for infection
- Signs/symptoms
  - Edema, heaviness, pain in affected area
  - Decreased range of extremity motion
- Treatments
  - Decongestive therapy, compression, exercise, PT
  - Early prevention and management is important

Fibrosis

- Fibrosis can develop following RT/surgery due to scar tissue formation
- Can cause restriction and decreased ROM
- Common sites affected
  - Extremities
  - Neck
  - Mouth (trismus)

Chronic dysphagia

- Causes
  - Fibrosis of tissue
  - Swelling or narrowing of esophagus
  - Physical changes following surgery
  - Mucositis or xerostomia
- Concerns for the oncologist
  - Aspiration
  - Decreased PO intake, weight loss, nutritional issues
- Management
  - Referral to speech pathology



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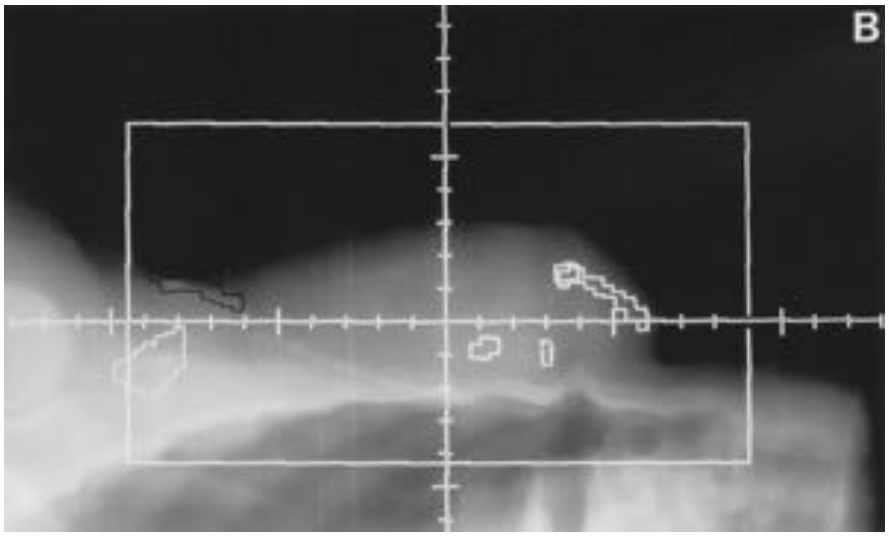
Radiation Simulation



Palliative Radiation

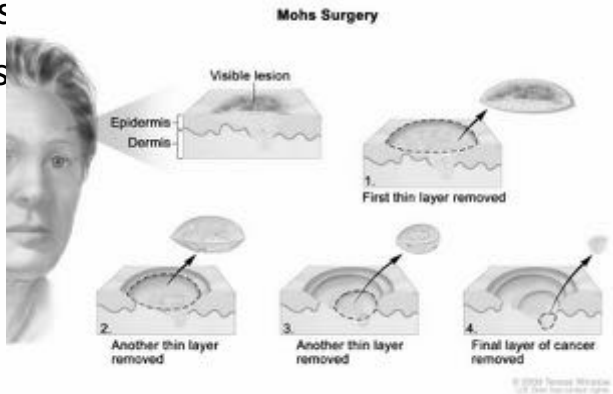
- Palliative treatments are not intended to cure.
- Instead, they relieve symptoms and reduce the suffering caused by cancer.

- Examples of palliative radiation therapy are:
  - Brain radiation to shrink mets or neoplasms to minimize dysfunction
  - Spine or bony tumor or mets which can cause pain or paralysis
  - Esophageal tumor, which can interfere with a patient's ability to eat and drink

BREAST CANCER SURGERY AND PHYSICAL THERAPY IMPLICATIONS

Surgical Margins

- Clean Margins
- Close Margins
- Dirty Margins



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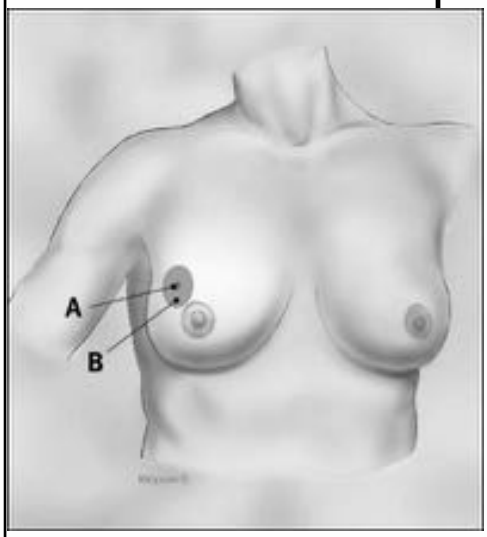
Breast Cancer Surgery

- Breast-Conserving Surgery (Lumpectomy)
  - Removal of tumor and a clean margin
- Mastectomy
  - Removal of all breast tissue and possibly the fascia over the chest muscle
- Axillary node dissection
  - Removal of sentinel node
  - Level I axillary node
- Reconstruction

Lumpectomy

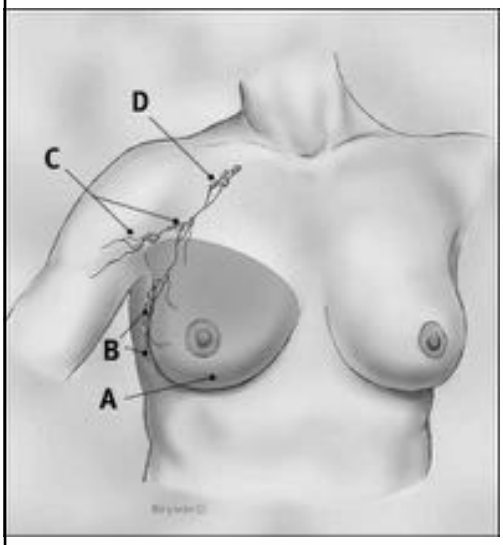


- Lumpectomy:
  - removal of the tumor and a clean margin

Also known as:

- Partial Mastectomy
- Breast Conserving Surgery
- Segmental Mastectomy
- Quadrantectomy

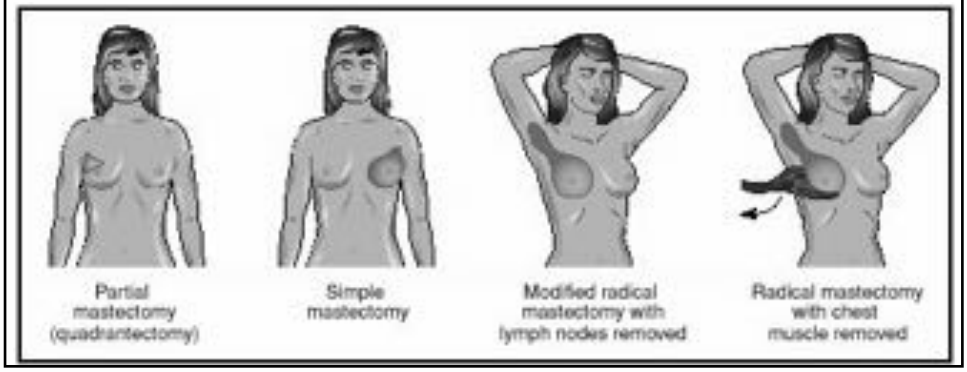
Mastectomy



- **UNILATERAL**
  - only affected side
- **BILATERAL**
- **SKIN SPARING**
  - take nipple and breast tissue.
  - Elliptical shape.
- **NIPPLE SPARING**
  - Tumor < 2cm
  - Tumor > 2 cm away from nipple
  - prophylactic

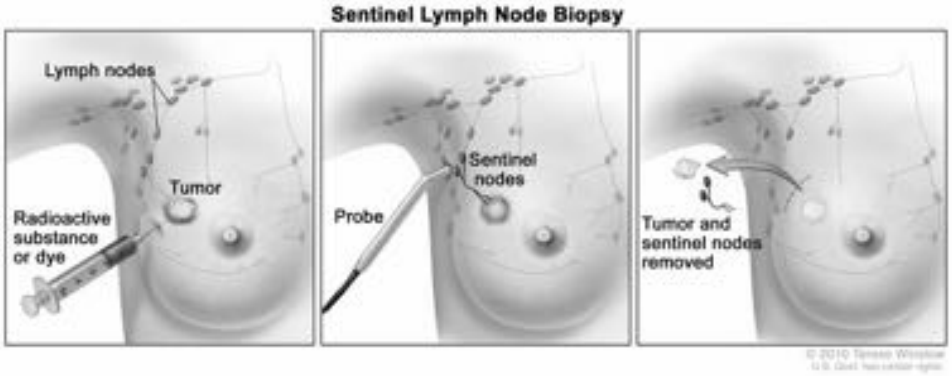
Mastectomy

- Removal of all breast tissue
  - Total (simple) Mastectomy
  - Total Mastectomy with sentinel node biopsy
  - Modified Radical Mastectomy
  - Radical mastectomy



Lymph Node Biopsy

- Sentinel lymph node biopsy
- Axillary dissection
  - Removal of some of the level I and level II lymph



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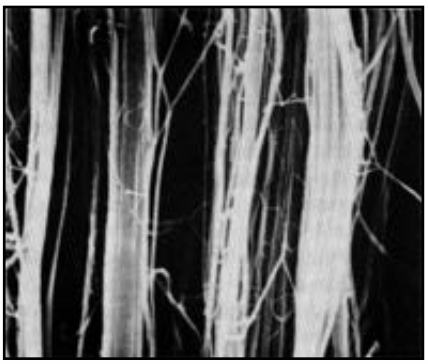
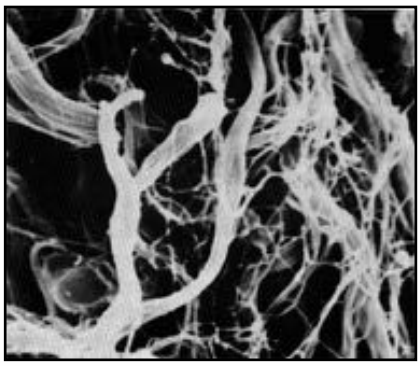
Normal Connective Tissue



Scar Tissue (at 2 weeks)



Source: Injury and Repair of the Musculoskeletal Soft Tissues

Post-surgical Dysfunctions

- Pain
- Swelling
- Decreased ROM
- Decreased Strength
- Soft tissue restrictions and shortening
- Postural changes
- Loss of function
- Cording
- Presents risk for infection & lymphedema

EVIDENCE BASED BEST PRACTICE IN CANCER REHAB PROGRAMS

Rehabilitation goals

- Eliminate pain
- Restore joint mobility
- Restore/maximize tissue flexibility
- Restore strength
- Restore ADL, vocational, recreational activity
- Fatigue, chemobrain
- Safe reintroduction to activity
- Educated in infection & lymphedema risk reduction

Common Physical Problems after Cancer Treatment

- Pain
- Swelling
- Decreased ROM
- Cording
- Strength loss
- Soft tissue tightness
- Soft tissue restrictions
- Risk for infection & lymphedema
- Fatigue
- Bone loss
- Muscle loss
- Neuropathy
- Weight gain
- Postural changes
- Loss of normal function

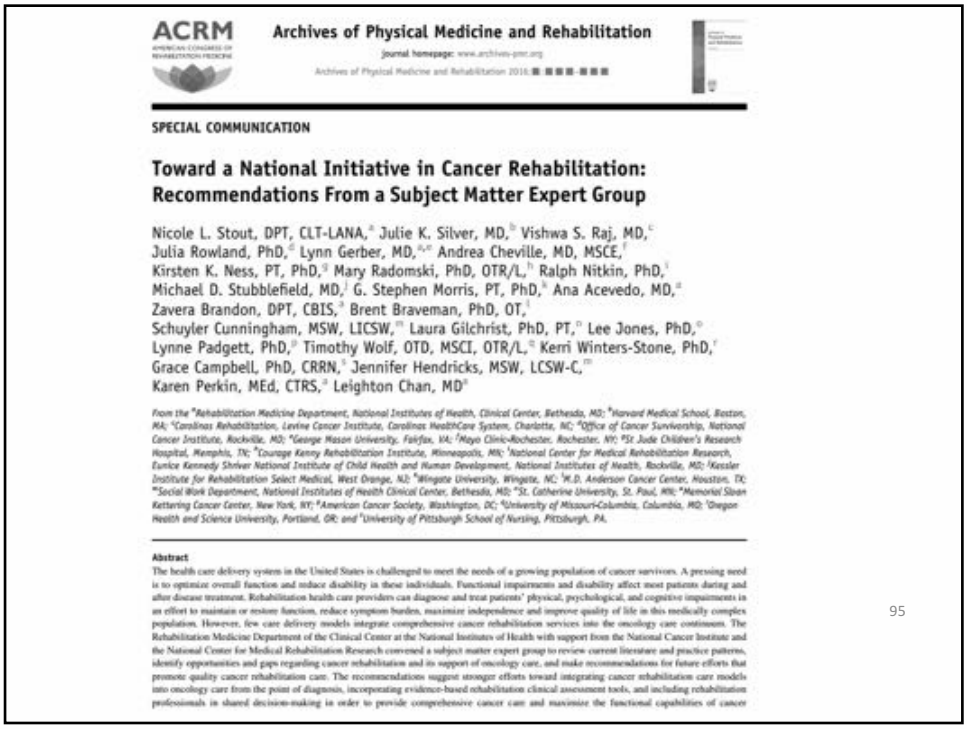
Who Needs Cancer Rehabilitation?

- People who have had or will have:
  - Surgery
  - Chemotherapy
  - Radiation
  - Remission
  - Terminal illness

  - This is everyone…

Cancer Rehabilitation

- Postoperative rehabilitation and education
- Safe return to ADL, work, recreation
- Exercise prescription during and after chemo
- Exercise prescription during and after radiation
- Musculoskeletal treatment throughout cancer care
- Assessing for late effect movement dysfunctions
- Lymphedema treatment if indicated
- Follow up on long term and late effects



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SPECIAL COMMUNICATION

Toward a National Initiative in Cancer Rehabilitation: Recommendations From a Subject Matter Expert Group

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Abstract

The health care delivery system in the United States is challenged to meet the needs of a growing population of cancer survivors. A pressing need is to optimize overall function and reduce disability in these individuals. Functional impairments and disability affect most patients during and after disease treatment. Rehabilitation health care providers can diagnose and treat patients' physical, psychological, and cognitive impairments in an effort to maintain or restore function, reduce symptom burden, maximize independence and improve quality of life in this medically complex population. However, few care delivery models integrate comprehensive cancer rehabilitation services into the oncology care continuum. The Rehabilitation Medicine Department of the Clinical Center at the National Institutes of Health with support from the National Cancer Institute and the National Center for Medical Rehabilitation Research convened a subject matter expert group to review current literature and practice patterns, identify opportunities and gaps regarding cancer rehabilitation and its support of oncology care, and make recommendations for future efforts that promote quality cancer rehabilitation care. The recommendations suggest stronger efforts toward integrating cancer rehabilitation care models into oncology care from the point of diagnosis, incorporating evidence-based rehabilitation clinical assessment tools, and including rehabilitation professionals in shared decision-making in order to provide comprehensive cancer care and maximize the functional capabilities of cancer

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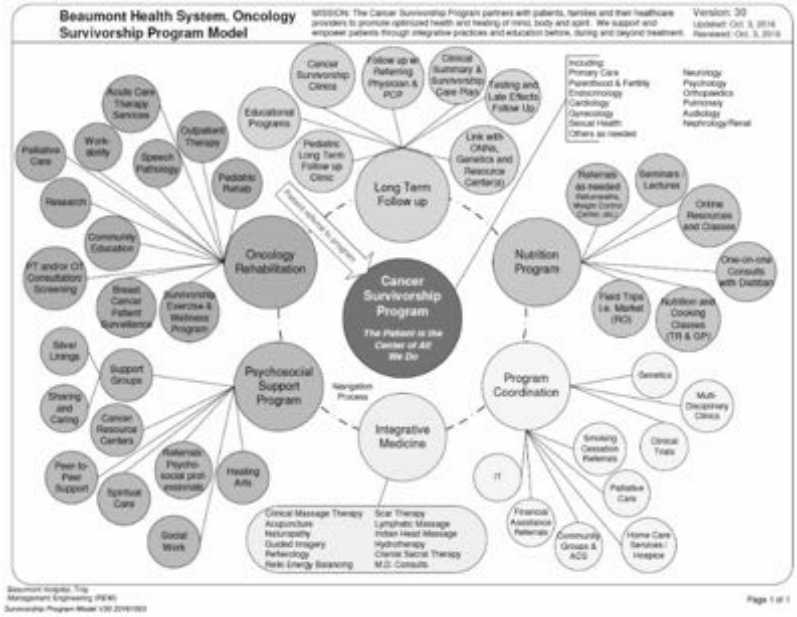
IOM Survivorship Care Plan Components and relevance to rehab providers

- Stout et al – NIH 2016

Table 1 Institute of Medicine survivorship care plan components and relevance to rehabilitation providers

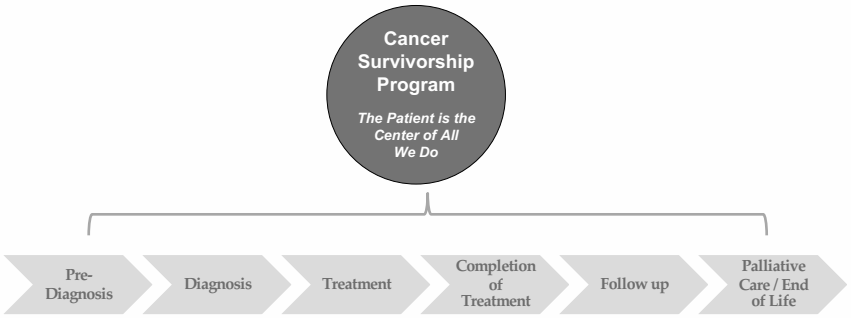
IOM Care Plan Component	Rehabilitation Practice Relevance
Patient demographic information	Aware
Diagnosis, tissue information, stage, biomarkers	Aware
Prognosis	Aware
Treatment goals (curative/palliative)	Aware
Initial treatment plan, antineoplastic treatments	Aware
Expected response to treatment	Aware
Treatment benefits and harms; toxicity screening and management, short and late effects	High Impact
Quality of life and patient experience	High Impact
Plan for who will take responsibility for aspects of the patients care	Participatory and Impactful
Advance care plans; legal documents	Aware
Estimated total costs and out-of-pocket costs	Aware and Impactful
Plan for addressing psychosocial needs; vocation, disability	High Impact
Survivorship plan; treatment summary, follow-up surveillance, and risk reduction and health promotion	Participatory and Impactful

Cancer Survivorship Program



Oncology Rehabilitation Program Components

Trajectory of the Illness of Cancer

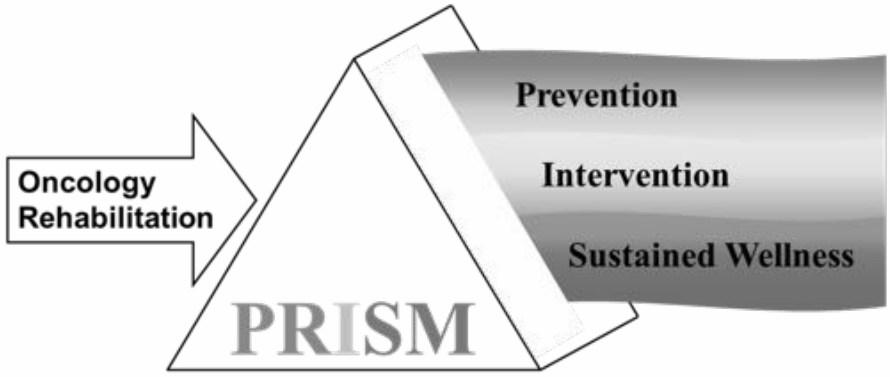


Functional Side Effects from Cancer Treatment

- Acute
  - 7-10 days from first treatment
  - Up to 90 days post treatment
- Long-term
  - 10+ days from first treatment
  - To 6-18 months post treatment
  - May be permanent
- Late-term
  - 5-20 years post treatment

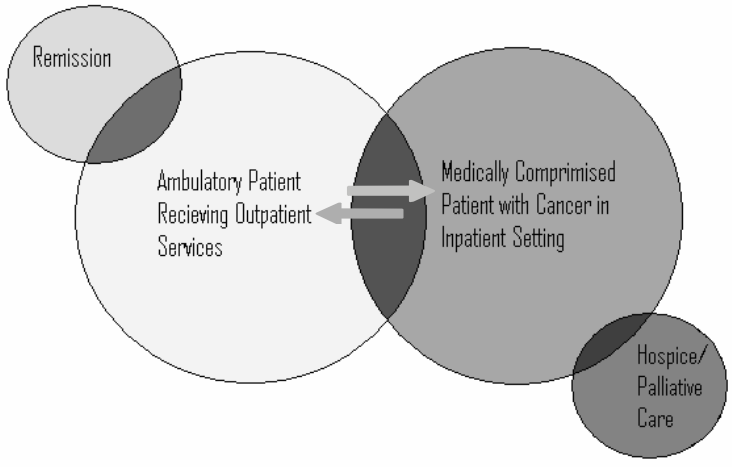
PRISM Model of Care

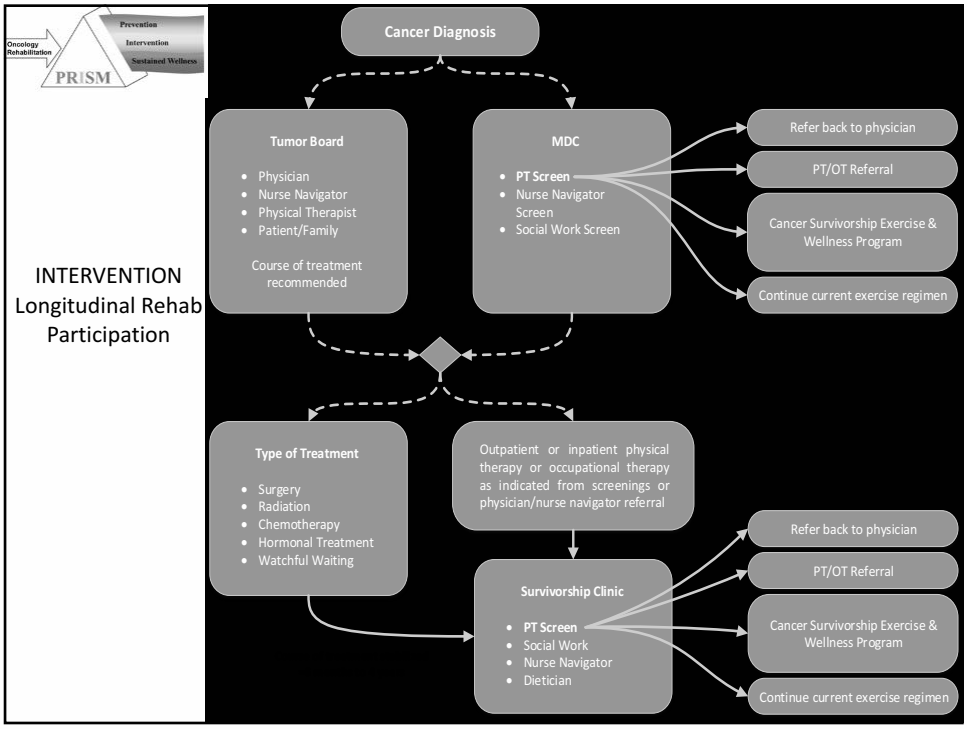
"Empower patients to maintain their own health and commitment to healing, through an individualized exercise and wellness program" = PRISM

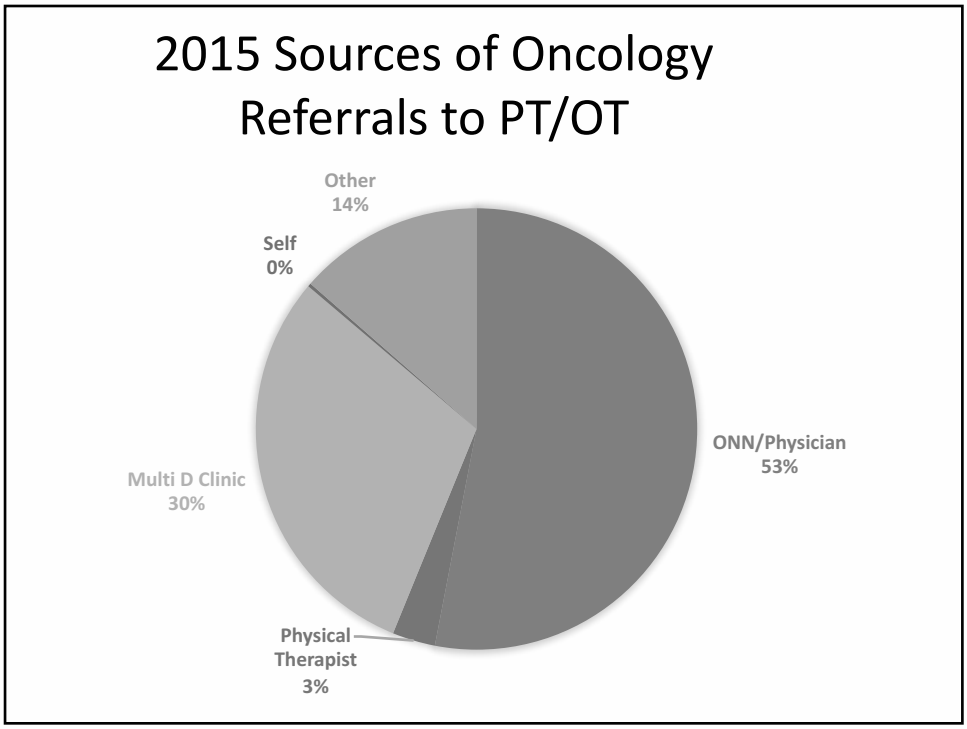


Beaumont

Patient Client Distribution




Oncology Rehabilitation
Prevention
Intervention
Sustained Wellness
PRISM
INTERVENTION
Longitudinal Rehab
Participation
Cancer Diagnosis
Tumor Board
Physician
Nurse Navigator
Physical Therapist
Patient/Family
Course of treatment recommended
MDC
PT Screen
Nurse Navigator Screen
Social Work Screen
Refer back to physician
PT/OT Referral
Cancer Survivorship Exercise & Wellness Program
Continue current exercise regimen
Type of Treatment
Surgery
Radiation
Chemotherapy
Hormonal Treatment
Watchful Waiting
Outpatient or inpatient physical therapy or occupational therapy as indicated from screenings or physician/nurse navigator referral
Survivorship Clinic
PT Screen
Social Work
Nurse Navigator
Dietician
Refer back to physician
PT/OT Referral
Cancer Survivorship Exercise & Wellness Program
Continue current exercise regimen


2015 Sources of Oncology Referrals to PT/OT
Other 14%
Self 0%
ONN/Physician 53%
Multi D Clinic 30%
Physical Therapist 3%

Evaluations and treatments

- Evaluation
  - Screen can become an evaluation if straight forward and no lymphedema supplies needed
  - If screen done previously w/ history and subjective history already obtained, then measurements are obtained and increased treatment provided (manual and compression bandaging for lymphedema; education and exercise for oncology)
- Treatment Plan
  - Based on lymphedema or oncology needs

Clinical pearls of wisdom for other cancer clinicians

- Becoming creative with supplies and their resources for the financially challenged pts (nearly everyone)
- Learning to cope with death (helping pts as well as yourself)
- Differences between Cancer care and "traditional therapy"
- Treating the patient systemically to address impairments that affect their entire body, not just isolated regions
- You are establishing a long term relationship w/ patients that are cancer survivors
  - You help them wherever they are at in the Survivorship continuum
  - You are their go-to practitioner when function breaks down
  - Help them learn how/when to re-enter the system/cycle

Treating the Cancer Survivor

- Cardiovascular testing to ensure appropriate exercises intensity and safety
- Individualized exercises prescription with home exercise program
- Patient education
  - Late effects of treatment
  - Life long exercise and monitoring
- Cancer survivorship program

Beaumont

Beaumont Health
Rehabilitation & Dialysis Center
PT/OT Clinic
44300 Dequindre Rd.
Sterling Heights, MI 48314

Phone (248) 964-0700
Fax (248) 964-4020

Men's Urology Cancer Survivorship Exercise & Wellness Group-Troy

Purpose:
The purpose of the Cancer Survivorship Exercise & Wellness program is to offer our cancer patient population the ability to continue exercising in a supervised environment after being discharged from formal therapy or by means of other recommendations, i.e., physician referral, as a venue towards sustainable wellness.

Participants that are eligible for this program:
- Any patients that are discharged from skilled therapy
- Physician referred patients following receiving a screening and completed activity prescription by a physical therapist
- Having a pre-existing or current cancer diagnosis
- Demonstrate physical independence or a caregiver/aide will be required to participate if the participant requires physical assistance to perform the exercises
- Demonstrate the ability to learn the use of the necessary equipment: bands, dumbbells, exercise machines and/or physio-ball

Where:
Beaumont Rehab & Dialysis Center
44300 Dequindre Road
Cardio/Pulmonary gym, 2nd floor
Sterling Heights, MI 48314

When: Tuesday/Thursdays from 6:00-7:00 pm

Cost: **$49** for 6 classes. Prepayment required in the PT/OT clinic, 1st floor

Instructor: Traci Daniels, Licensed Physical Therapist Assistant and Certified Lymphedema Therapist

Cancer Survivorship Exercise and Wellness Program

Start taking steps to improve the quality of your health with the Beaumont Cancer Survivorship Exercise and Wellness program. From the time of diagnosis, our program brings patients and health care providers together to promote optimized health and healing of mind, body and spirit through integrative practices and education before, during and after cancer treatment.

The programs are offered in a state-of-the art exercise facility and are designed by physical and occupational therapists who are experts in cancer wellness, exercise and rehabilitation care. Speech and language pathologists are also members of the rehabilitation team.

Supervised exercise program

Overseen by a clinician, this exercise and wellness program promotes fun, fitness, function and friendship for people before, during or after cancer treatment.

Physical, occupational and speech therapy

If you require an evaluation or more specialized care, traditional therapy provided by skilled Beaumont professionals is available at several convenient locations.

Multidisciplinary clinic program

Therapists work closely with oncology nurse navigators, physicians and dietitians to manage and coordinate care for each patient. This collaborative approach allows survivors to hear multiple, evidence-based opinions on how to manage their disease. Multidisciplinary cancer clinics are the preferred practice model for many health care systems in the U.S. and Europe, and have shown to lead to excellent outcomes and improved patient satisfaction.

Pre-habilitation and cancer surveillance

Cancer survivors will meet with a therapist to proactively reduce the likelihood of the physical impact of cancer or the side effects of the treatment. The therapist will develop a program to improve function and the exercise capacity of survivors. The goal is to decrease or prevent the likelihood of some anticipated physical problems, such as decreased strength and range of motion, decreased tissue flexibility, lymphedema, chronic fatigue and urinary and fecal incontinence or urge

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Functional Outcome Tools in Cancer Rehab

NIH Recommended outcome measures

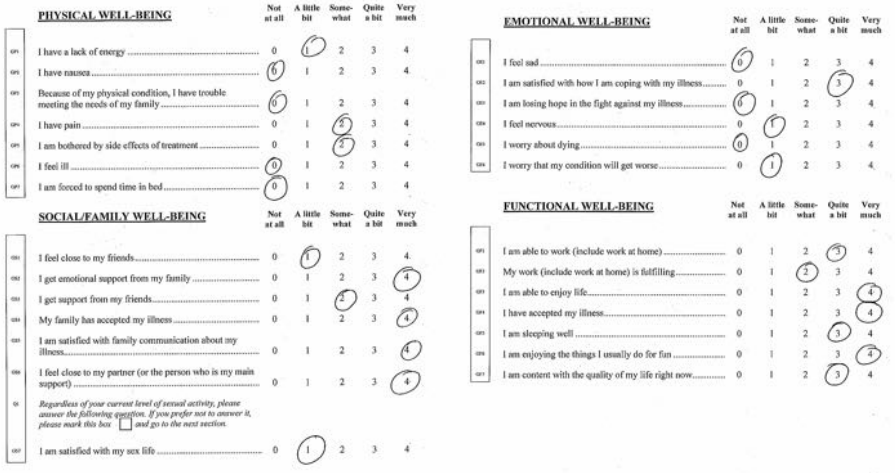
Stout et al. – NIH 2016

- ECOG Performance Status
- FIM
- Patient Reported Outcome Measurement Information System
  - Physical function and mobility
  - Cancer bank — physical function
  - Applied cognitive abilities and general concerns
  - Ability to participate in social roles and activities
  - Upper extremity function
- Neuro-QoL
  - Upper extremity function
  - Lower extremity function
  - Cognitive function
  - Ability to participate in social roles and activities
- Activity Measure for Post-Acute Care, computer adapted testing
  - Basic mobility, daily activities, applied cognitive
- Reintegration to Normal Living Index

Abbreviation: ECOG, Eastern Cooperative Oncology Group.

What is the FACT-G

- Acronym meaning =
  - Functional
  - Assessment of
  - Cancer
  - Therapy -
  - General
    - (meaning appropriate for all cancer diagnosis and chronic diseases)
- A quality of life instrument (QOL)
- Measures 4 different domains
  - Physical well-being
  - Social/family well-being
  - Emotional well-being
  - Functional well-being
- Scores quality of life
  - 0 = Lowest quality of Life
  - 108 =High quality of Life



PHYSICAL WELL-BEING

	Not at all	A little bit	Some-what	Quite a bit	Very much
I have a lack of energy	0	1	2	3	4
I have nausea	0	1	2	3	4
Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3	4
I have pain	0	1	2	3	4
I am bothered by side effects of treatment	0	1	2	3	4
I feel ill	0	1	2	3	4
I am forced to spend time in bed	0	1	2	3	4

SOCIAL/FAMILY WELL-BEING

	Not at all	A little bit	Some-what	Quite a bit	Very much
I feel close to my friends	0	1	2	3	4
I get emotional support from my family	0	1	2	3	4
I get support from my friends	0	1	2	3	4
My family has accepted my illness	0	1	2	3	4
I am satisfied with family communication about my illness	0	1	2	3	4
I feel close to my partner (or the person who is my main support)	0	1	2	3	4
Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box ☐ *and go to the next section.*					
I am satisfied with my sex life	0	1	2	3	4

EMOTIONAL WELL-BEING

	Not at all	A little bit	Some-what	Quite a bit	Very much
I feel sad	0	1	2	3	4
I am satisfied with how I am coping with my illness	0	1	2	3	4
I am losing hope in the fight against my illness	0	1	2	3	4
I feel nervous	0	1	2	3	4
I worry about dying	0	1	2	3	4
I worry that my condition will get worse	0	1	2	3	4

FUNCTIONAL WELL-BEING

	Not at all	A little bit	Some-what	Quite a bit	Very much
I am able to work (include work at home)	0	1	2	3	4
My work (include work at home) is fulfilling	0	1	2	3	4
I am able to enjoy life	0	1	2	3	4
I have accepted my illness	0	1	2	3	4
I am sleeping well	0	1	2	3	4
I am enjoying the things I usually do for fun	0	1	2	3	4
I am content with the quality of my life right now	0	1	2	3	4

When To Refer: Subscales

Research has determined that 3-5 point change indicates a clinically important difference and should be considered a red flag and a reason for referral.

Subscale	Range of Scores	If score falls in this range, consider referal refer:
Physical Well-Being	0-28	0-24* (high score is good)
Social/Family Well-Being	0-28	0-24* (high score is good)
Emotional Well-Being	0-24	0-19* (high score is good)
Functional Well-Being	0-28	0-24* (high score is good)

* Use your clinical experience and expertise along with suggested referral range in making a clinical decision to refer a patient to rehab or social work.

Where to refer based on FACT-G Scores

- Functional
  - PT/OT
- Social/Emotional
  - Cancer Center
  - Social Work
  - Spiritual Support
- Physical
  - Physician

Beaumont

For Functional Well-Being Referral, please contact one of the following locations for services:

Beaumont Medical Center, Sterling Heights
Rehabilitation and Dialysis Center
44100 Dequindre
Sterling Heights, MI 48314
Phone: 248-964-0700
Fax: 248-964-4020

Beaumont Health Center
4949 Coolidge Highway
Royal Oak, MI 48073
Phone: 248-655-5700
Fax: 248-655-5701

Beaumont Medical Center, Macomb Township
15989 Hall Road, Suite 150
Macomb, MI 48044
Phone: 586-416-8430
Fax: 586-416-8440

West Bloomfield Medical Bldg.
6900 Orchard Lake Road
West Bloomfield, MI 48322
Phone: 248-855-7411

Beaumont Health and Wellness Center, Rochester Hills
1555 East South Blvd., Suite 120
Rochester Hills, MI 48307
Phone: 248-267-5650
Fax: 248-267-5637

Beaumont Grosse Pointe Woods
20411 Mack Ave
Grosse Pointe Woods, MI 48230
Phone: 313-881-3632
Fax: 313-881-3638

For Social/Emotional Well-Being Referral, please contact one of the following locations for services:

Rose Cancer Center, Royal Oak
3601 W. Thirteen Mile Road
Royal Oak, MI 48073
Phone: 248-551-1339
Open Monday through Friday, 8am to 4:30pm

Grosse Pointe Cancer Center
248-551-1399

Wilson Cancer Center, Troy
44344 Dequindre Rd.
Sterling Heights, MI 48314
Phone: 248-964-3430
Open Monday through Friday, 8am to 4:30pm

For Spiritual Support, please contact one of the following locations for services:

Beaumont Health, Troy
Reverend Rick Cryderman
Phone: 248-964-3405

Beaumont Health, Royal Oak
Father D. Carl Buso
Phone: 248-551-0239

Beaumont Health, Grosse Pointe
Father Richard Bartosiak
Phone: 313-473-1497

For Physical Well Being, please contact your physician

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Programs for the Medically Compromised Patient in an Inpatient Setting

• Need therapists who are dedicated to oncology area as their primary practice area

• Establish a personal relationship and trust with physicians, nurses, patients, multidisciplinary team

• Non-direct care time just as valued as direct treatment time

Common reasons for admission to hospital

- Initial diagnosis and workup
  - Variable receptiveness to therapy but “plant the seed”
- Chemotherapy treatments
  - “well visit”
- Related sequelae
  - ex. UTI, sepsis, confusion, dehydration, nausea, diarrhea, vomiting, weakness, falls
- Unrelated medical issue
  - still placed on oncology floor
- Decline in status or worsening of cancer
  - re-evaluate patient needs or functional status

Bone Metastases and Tumors

- Breast, prostate, renal, thyroid, and lung carcinomas commonly metastasize to bone[5]
- Osteolytic bone mets more commonly cause long bone fx than osteoblastic[8]
- Bisphosphonates are commonly prescribed to inhibit osteoclast mediated bone-resorption[8]
- Orthopedic evaluation and radiographic studies
- Prophylactic internal fixation favorable outcomes vs after pathologic fx
  - If unable, radiotherapy and NWB may be prescribed
- Bone mets should prompt conversation with primary oncologist

Bone Metastases/Tumors and Therapy

- **In any cases of cancer, therapists should be vigilant for bone metastases[9]**
- Conservative management of WB and resistive forces/manual therapy until risk of fracture of bone mets established
- Therapists can and should prompt for radiographs if concern for mets or unexplained pain
- **<u>Risk Factors for Imminent Fracture:</u>**
  - Pain
    - Especially with movement
  - Anatomical site
    - translational forces
    - WB bones
  - Size of metastasis
    - When 50% of cortex destroyed, fx rate ~80%[9]
  - Cortical lesions >2.5–3.0 cm
  - Unresponsive to radiation

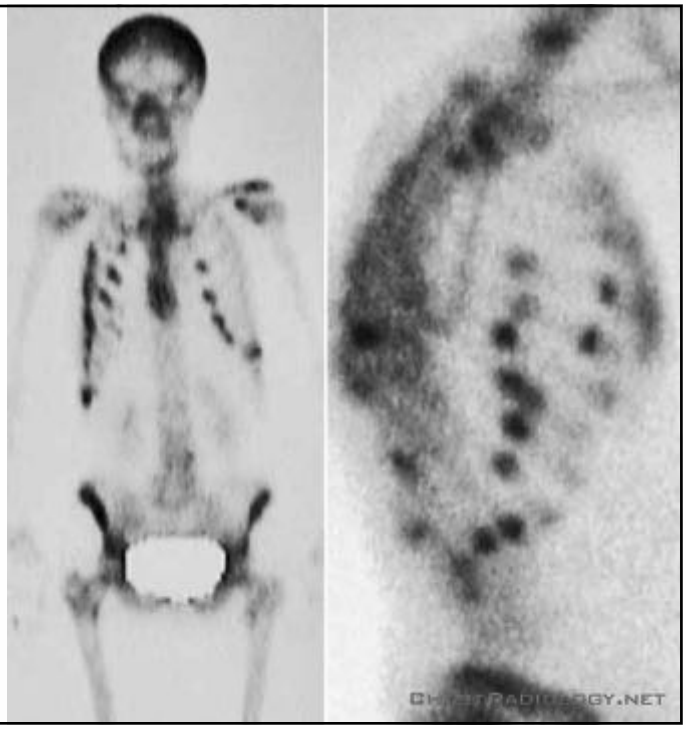
Bone Metastases/Tumor Guidelines

- >50% cortex involved
  - No exercises
  - touch down or non-weight bearing
  - use crutches, walker
  - active ROM exercise (no twisting)
- 25–50% cortex involved
  - No stretching
  - partial weight bearing
  - light aerobic activity
  - avoid lifting/straining activity
- 0–25% cortex involved
  - Full weight bearing

- "Bone metastases in the shaft of the humerus of a bronchial carcinoma with cortical destruction in both planes."
- Chestradiology.net

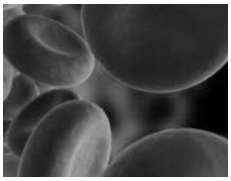
Destruction of the right vertebral arch and the transverse processes of L3 as well as a large paravertebral soft tissue tumor

- Diffuse skeletal metastases.
- Rib metastases on the right side.
- Left-sided pseudolesions at the costo-chondral transition, which are caused by microfractures in Osteoporosis.



Blood levels and exercise

- Platelets and thrombocytopenia
  - Normal 140,000-400,000
  - 50-140k low intensity exs and aerobic exs
  - 30-50k recommend AROM and walking unless at high fall risk
  - < 25k therapy and mobility contraindicated



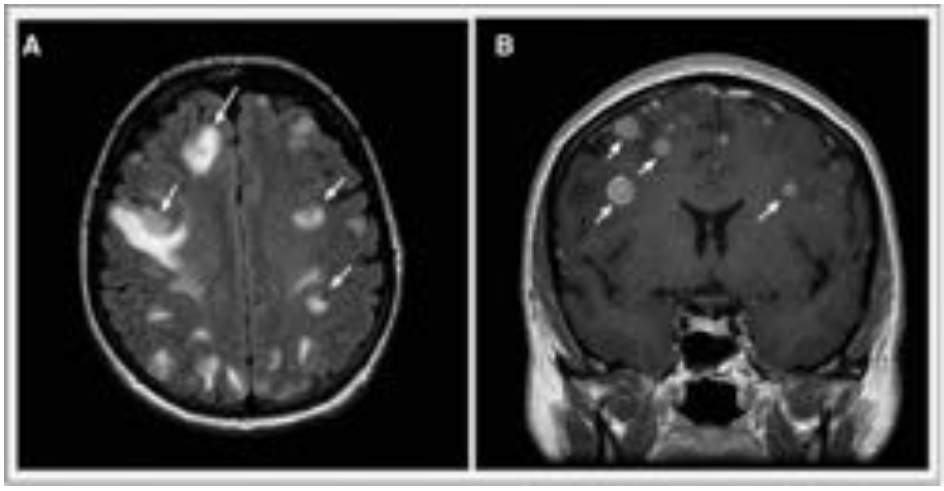
- Neutropenia – increased infection risk
  - patient should wear mask outside of room
  - Therapists should wear mask in room
- Hemoglobin
  - ♀ normal – 12-16 mg/dl
  - ♂ normal – 14-17mg/dl
  - 8-10mg/dl – exs intolerance
  - <7-8 mg/dl – bedrest unless very close monitoring

Brain Metastases

"Brain metastases should be included in differential diagnosis of any cancer patient in whom new neurologic symptoms or signs develop"

- ~8%–10% occurrence of brain mets in adults with CA[11]
- Majority of brain mets from:
  - lung CA (40%–50%)
  - breast CA (15%–25%)
  - melanoma (5%–20%)
- Historical standard of care:
  - corticosteroids
  - whole brain radiation therapy
- Common symptoms of brain mets:
  - Headache
  - Seizures
  - Paralysis or focal weakness
  - Altered mental status
  - Ataxia
- Therapists can expect some recovery of function if radiation, chemo, steroids effective

Brain mets from adenocarcinoma of lung



Emotional and Psychological Issues

- Monitor oncology staff and therapists for emotional overload – watch for burnout
- Mourning process and encourage sharing with colleagues, Social Work, Pastoral Care, friends
- Family dynamics in times of stress
- At times, near the end stage of life, therapy services are often fixated on as “the last hope” or when therapy not tolerated, as the final catalyst to transition to hospice/palliative care

Hospice and Palliative Care

- APTA endorses the inclusion of the following concepts in hospice and palliative care:
  - Continuity of care and the active, compassionate role of therapists and assistants
  - Rights of all individuals to have appropriate and adequate access to PT/OT, regardless of medical prognosis or setting
  - An interdisciplinary approach, including timely and appropriate therapy involvement, especially during transitions of care or during a physical or medical

Therapists Role in Hospice and Palliative Care

- Common misunderstandings about therapists role in Hospice/Palliative Care
- "Aggressive therapy" and "No therapy" are not the only options
- Focus to avoid interruption in rehabilitation care
- Even **more** sensitive to patient wishes/comfort

- Shift focus to:
  - quality of life
  - anticipatory future disability and equipment needs
  - "bucket list" assistance
  - Prevention of pressure ulcers, contractures, immobility pain
  - Family/caregiver education and support/consultation

Fatigue Facts

- Fatigue is the most common side effect of cancer treatment.
- Fatigue is the most distressing side effect
- Fatigue is often undertreated due to more pressing medical priorities or expectations
- Patients tend to under report their fatigue

- Cancer related fatigue is not relieved by rest
- Reported in 70-100% of persons undergoing CA Rx
- 30 – 50% of patients report fatigue lasting months to years after concluding treatment.

- ACS 2011

What the research says

- Exercise is safe during chemo and radiation.
- Exercise is helpful to exercise during radiation and chemotherapy.
- Exercise should be encouraged
- Exercise is under-utilized
- Exercise is safe with advanced disease.
- Exercise is recommended with palliative care and end of life

Takeaways and Conclusions

- Cardiotoxicity
- Cancer Related Fatigue
- Chemobrain
- Chemotherapy side effects
- Exercise testing
- Lab Values (acute and outpatient)
- Palliative care
- Radiation side effects and positioning

QUESTIONS?

Acknowledgements

- All images accessed via The Web site of the National Cancer Institute, Wikimedia images or Creative Commons unless otherwise cited
  - The Web site of the National Cancer Institute (http://www.cancer.gov).
  - https://commons.wikimedia.org/wiki/Commons:Reusing_content_outside_Wikimedia
  - http://creativecommons.org/licenses/

For Further Information

- Beaumont Health System
  - www.beaumont.edu
- Healthcare Advisory Board
  - www.advisoryboardcompany.com
- Association of Community Cancer Centers
  - www.accc-cancer.org
- American Physical Therapy Association – Oncology Section
  - www.oncologypt.org
- American College of Surgeons – Commission on Cancer
  - www.facs.org/cancer

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