Cancer
By Josie Hepworth
Overview

~ Definition
~Epidemiology
~Clinical Aspects
~Treatment
~Effects of Exercise
~Exercise Testing and Prescription
~Summary
~Test
~References
Definition

~ A group of more than 100 diseases in which cells in a part of the body begin to grow out of control. Although there are many kinds of cancer, they all start because abnormal cells grow out of control.

~ Growing out of control and invading other tissues are what makes a cell, a cancer cell.
Cells become cancer cells because of damage to DNA. Normally when DNA gets damaged the cell either repairs the damage or the cell dies. In cancer cells, the damaged DNA is not repaired, but the cell doesn’t die like it should. Instead, this cell goes on making new cells that the body doesn’t need. These new cells will all have the same damaged DNA as the first cell does. And thus, CANCER.
Crash Course

**Carcinoma:** invasive malignant tumor consisting of transformed epithelial cells, Carcinoma in situ (CIS) is a small, localized carcinoma that has not yet invaded through the epithelial basement membrane.

**Sarcoma:** arises from transformed connective tissue cells

**Melanoma:** malignant tumor of melanocytes, melanocytes are cells that produce the color of skin

**Myeloma:** cancer of plasma cells, a type of white blood cell normally responsible for the production of antibodies

**Bone osteosarcoma:** an aggressive cancerous neoplasm, most common histological form of primary bone cancer.

**Leukemia:** type of cancer of the blood or bone marrow characterized by an abnormal increase of white blood cells
Epidemiology

Prevalence

~ Cancer prevalence is not a measure of how common a cancer is. This number is the cancer incidence, which is the number of people newly diagnosed with cancer in a given time.

~ Prevalence is affected both by the incidence of a cancer and by how long people normally live with the disease.

~ Cancer is responsible for about 25% of all deaths in the U.S., and is a major public health problem in many parts of the world.

Americans have a 41% probability of developing cancer in their lifetime.
## Epidemiology
### Prevalence

<table>
<thead>
<tr>
<th>TYPE</th>
<th>TOTAL</th>
<th>MALES</th>
<th>FEMALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>2,605,000</td>
<td>13,000</td>
<td>2,592,000</td>
</tr>
<tr>
<td>Cervix</td>
<td>247,000</td>
<td>0</td>
<td>247,000</td>
</tr>
<tr>
<td>Kidney</td>
<td>281,000</td>
<td>165,000</td>
<td>117,000</td>
</tr>
<tr>
<td>Larynx</td>
<td>90,000</td>
<td>72,000</td>
<td>18,000</td>
</tr>
<tr>
<td>Leukemias</td>
<td>244,000</td>
<td>137,000</td>
<td>107,000</td>
</tr>
<tr>
<td>Lung and bronchus</td>
<td>371,000</td>
<td>173,000</td>
<td>198,000</td>
</tr>
<tr>
<td>Melanoma of skin</td>
<td>793,000</td>
<td>385,000</td>
<td>408,000</td>
</tr>
<tr>
<td>Pancreas</td>
<td>33,000</td>
<td>16,000</td>
<td>17,000</td>
</tr>
<tr>
<td>Prostate</td>
<td>2,276,000</td>
<td>2,276,000</td>
<td>0</td>
</tr>
<tr>
<td>Stomach</td>
<td>66,000</td>
<td>37,000</td>
<td>28,000</td>
</tr>
<tr>
<td>Testis</td>
<td>196,000</td>
<td>196,000</td>
<td>0</td>
</tr>
<tr>
<td>Thyroid</td>
<td>434,000</td>
<td>96,000</td>
<td>338,000</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>535,000</td>
<td>395,000</td>
<td>140,000</td>
</tr>
<tr>
<td>Childhood cancer (age 0-19)</td>
<td>270,000</td>
<td>139,000</td>
<td>131,000</td>
</tr>
</tbody>
</table>
Clinical Aspects

Signs/Symptoms

~ SIGNS/ SYMPTOMS NOT GENERIC - BUT CANCER SPECIFIC

As a cancer grows, it can begin to push on nearby organs, blood vessels, and nerves. This pressure causes some of the signs and symptoms of cancer. Cancer cells release substances into the bloodstream that cause symptoms which are not usually linked to cancer.

A thickening or lump in the body
A new mole or a change in an existing mole
A sore that does not heal/ skin changes
Hoarseness or a cough that does not go away
Changes in bowel or bladder habits
Discomfort after eating
A hard time swallowing
Weight gain or loss with no known reason
Unusual bleeding or discharge
Feeling weak or very tired
Fever/ Pain
LOOK FOR DANGER SIGNS IN PIGMENTED LESIONS OF THE SKIN
Consult your dermatologist immediately if any of your moles or pigmented spots exhibits:

A  Asymmetry—one half unlike the other half.

B  Border irregular—scalloped or poorly circumscribed border.

C  Color varied from one area to another; shades of tan and brown; black; sometimes white, red or blue.

D  Diameter larger than 6mm as a rule (diameter of pencil eraser).
Some types of cancer can be found before they cause symptoms. Checking for cancer in people who have no symptoms is called screening.

**Imaging Tests**
- Mammograms
- Computed Tomography (CT)
- X-Rays
- MRI

**Laboratory Tests**
- Interpreting Laboratory Test Results (Tissue)
- Pap Test
- Prostate-Specific Antigen (PSA) Test
- Tumor Markers (Blood)

**Other Testing Information**
- Gene Testing
- Proteomics and Cancer
Clinical Aspects
Screening/ Staging

~ Identify abnormalities in asymptomatic individuals (screening does not diagnose cancer)
~ Analysis of tissue sample diagnoses cancer
~ Staging is essential in determining choice of therapy

TNM system: Tumor, Node, Metastasis
Size of tumor
Involvement of lymph nodes
Presence of metastases

Stages 1- 4:
1 & 2 Confined
3 Locally advanced
4 Distant metastases
Clinical Aspects
Complications

~ Many complications come from cancer and cancer treatments that affect QOL and daily activity by attitude, ability, or willingness

Depression: attitude toward activity
Nausea/Vomiting: ability to stay healthy
Sleep disorders: willingness to stay active
Pain: attitude, ability, and willingness
Anorexia: ability to exert energy
Fatigue: attitude, ability, willingness
Treatment

~ Surgery
   The art, practice, or work of treating diseases, injuries, or deformities by manual or operative procedures; medical branch

~ Radiation
   The process in which energy is emitted as particles or waves. Local treatment that affects cancer cells only in the treated area

~ Chemotherapy
   Taking one or more of a type of drug that interferes with the DNA of fast-growing cells into the body

~ Immunotherapy
   Use of the immune system to reject cancer. The main premise is stimulating the patient's immune system to attack the malignant cells that are responsible for the disease
**COUNTERTHINK**

*FACT: CHEMOTHERAPY CHEMICALS CAUSE PERMANENT DAMAGE TO THE HEART, LIVER AND KIDNEYS.*

*WHOA! EASE UP ON THE CHEMO, NURSE. THAT'S HOW MUCH WE USE TO EUTHANIZE HORSES.*
# Treatment

## Effects of Surgery and Medication

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>ACUTE</th>
<th>CHRONIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery</td>
<td>Pain, fatigue, limited ROM</td>
<td>Pain, nerve damage</td>
</tr>
<tr>
<td>Radiation</td>
<td>Pain, skin irritation, inflammation</td>
<td>Scar tissue buildup, fractures</td>
</tr>
<tr>
<td>Chemo</td>
<td>Fatigue, nausea, weight gain, anemia</td>
<td>Nerve damage, bone loss</td>
</tr>
<tr>
<td>Immuno</td>
<td>Skin changes, flu symptoms</td>
<td>Myopathy, nerve damage</td>
</tr>
</tbody>
</table>

~ All can cause: depression, mood changes, sense of control is altered, unsteady balance, decreased quality of life, extreme fatigue, and scar tissue
# Treatment

## Effects of Medication

<table>
<thead>
<tr>
<th>Medication Type</th>
<th>Side Effects</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimetabolites</td>
<td>Fatigue, anorexia, nausea, anemia</td>
<td></td>
</tr>
<tr>
<td>Antitubulin</td>
<td>Muscle pain, neuropathy, fatigue</td>
<td></td>
</tr>
<tr>
<td>Alkylator</td>
<td>Fatigue, anorexia, nausea, anemia</td>
<td></td>
</tr>
<tr>
<td>Anthracycline</td>
<td>Cardiotoxicity, vomiting</td>
<td></td>
</tr>
<tr>
<td>Platinum Salt</td>
<td>Sensory and motor neuropathy</td>
<td></td>
</tr>
<tr>
<td>Glucocorticoid</td>
<td>Fat redistribution, muscle weakness, osteoporosis</td>
<td></td>
</tr>
<tr>
<td>Hormonal Therapy</td>
<td>Weight gain, fatigue</td>
<td></td>
</tr>
<tr>
<td>Antiestrogen</td>
<td>Hot flashes, weight gain, loss of muscle mass</td>
<td></td>
</tr>
<tr>
<td>Antiandrogen</td>
<td>Osteoporosis, fatigue, weight gain</td>
<td></td>
</tr>
<tr>
<td>Lutenizing Hormone</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Chemotherapy*  
*Oral*  
*I.V.*
Effects of Exercise

Regular exercise has a positive effect on the general health of people with diseases or chronic conditions, and can lessen the severity of emotional disorders by giving the person a sense of greater control.
Exercise Testing

~Depending on functional capacity of a patient, exercise testing can be performed using standard protocols
~Prior to testing; obtain history of diagnosis/treatment, assess for adverse effects of cancer treatment, consider how cancer/therapy affect performance, modify and interpret results accordingly, and request physician clearance
~Tests that can be used to determine exercise capacity;
  6-12 minute walk test
  Arm ergometry GXT
  Isotonic or isokinetic muscular test
  Functional tests
  Gait analysis test
  Goniometry
  Balance tests

~ All exercise test are specific to symptoms and conditions of each patient
Prior to exercise programming and prescription;
Asses patients current medical condition
Develop a program that accommodates to changes from cancer/treatment
Know where the patient is in treatment schedule/cycle
Recognize new or worsening symptoms
Know cancer specific emergencies
Asses risks from effects of cancer that can increase risk of exercise
Adjust program for commodities that could interfere
Modify exercise program based on current medical condition
## EX RX

### Survivors/ Non-treatment

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aerobic</strong></td>
<td>3-5 days a week, 40-60% VO$_2$R, 20-60 minute session</td>
</tr>
<tr>
<td></td>
<td><em>Walking, rowing, cycling, aquatic aerobics</em></td>
</tr>
<tr>
<td><strong>Strength</strong></td>
<td>2-3 days a week, 40-60% 1RM, 20-30 minute session</td>
</tr>
<tr>
<td></td>
<td>1-3 sets of 3-5 reps building to 8-15 reps, RPE 11-13</td>
</tr>
<tr>
<td></td>
<td><em>Free weights, machines, isokinetic machines, resistance bands, circuit training</em></td>
</tr>
<tr>
<td><strong>Flexibility</strong></td>
<td>5-7 days a week, 20-30 seconds per stretch, 2-4 reps</td>
</tr>
<tr>
<td></td>
<td><em>Stretching</em></td>
</tr>
<tr>
<td><strong>Functional</strong></td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td><em>ADLs, gait and balance exercise</em></td>
</tr>
</tbody>
</table>
## EX RX
### During treatment

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aerobic</strong></td>
<td>1-2 days a week, low intensity, 10-15 minute sessions &lt;br&gt; <em>Walking</em></td>
</tr>
<tr>
<td><strong>Strength</strong></td>
<td>1 day a week, low intensity, 1 set of 2-4 reps, muscle activation exercises &lt;br&gt; <em>Isometric contractions</em></td>
</tr>
<tr>
<td><strong>Flexibility</strong></td>
<td>5-7 days a week, 20-30 seconds per stretch, 2-4 reps &lt;br&gt; <em>Stretching</em></td>
</tr>
<tr>
<td><strong>Functional</strong></td>
<td>Daily depending on fatigue status &lt;br&gt; <em>Stirring, standing to sitting, sitting to standing, touching toes, twisting, bending knee sit</em></td>
</tr>
</tbody>
</table>

RX by Dr. Allger of Huntsman Cancer Center
**Ex Rx**

**Goals**

Receiving treatment: preserve and improve function
Survivors: return to a healthy, active lifestyle and make exercise an integral part of everyday life, extend survival
Recurrent disease: maintain mobility and independence in the home

~ Distinct issues must be addressed in exercise programming for persons who are actively receiving treatment versus survivors

Please note: the optimal frequency, duration, and time course of adaption to aerobic and resistance exercise training in cancer patients are not known
Summary

~ Cancer is a major cause of death in America and the world
~ Screening is a preventative way to decrease our risk

FREE SKIN CANCER SCREENING AVAILABLE!!
Call 851-7538 for an appointment

~ It can be controlled in some cases, in others it results as terminal
~ Quality of life can be increased for all cases via treatment and lifestyle changes
~ Exercise is beneficial to cancer survivors and patients
~ They can be tested and prescribed exercise programs-needs dependent

MANY ORGANIZATIONS PARTICPATE IN EXERCISIE BASED AID
2011 Relay For Life of Utah State University UT - April 15, 2011
The Gateway Mall 5k Salt Lake City -May 7, 2011
UTAH VALLEY MARATHON: Marathon or half marathon - June 11, 2011
The Karnofsky Performance Status Scale (KPS) is a method of quantifying the functional status of cancer patients. It is used to determine whether they can receive chemotherapy, whether dose adjustment is necessary, and as a measure for the required intensity of palliative care (assistance).

Rating the ability of a person to perform usual activities, evaluating a patient's progress after a therapeutic procedure, and determining a patient's suitability for therapy.

11 point rating scale: 100 Normal Functioning - 0 Dead
References


Dr. Allger, of Huntsman Cancer Institute (2011).


