

# Rehab Techniques in Oncology

## Workbook

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## TABLE OF CONTENTS

CANCER AS A CHRONIC DISEASE .....	- 2 -
DIAGNOSIS OF CANCER .....	- 2 -
TREATMENTS FOR CANCER .....	- 3 -
SURGERY .....	- 3 -
CHEMOTHERAPY .....	- 3 -
RADIATION.....	- 7 -
IMMUNOTHERAPY .....	- 8 -
ANTI-ANGIOGENIC THERAPY.....	- 9 -
HORMONAL THERAPY .....	- 9 -
AUTOLOGOUS PERIPHERAL STEM CELL TRANSPLANT (SCT) .....	- 9 -
ALLOGENEIC TRANSPLANT .....	- 10 -
LAB VALUES .....	- 11 -
MEDICAL CONTRAINDICATIONS FOR EXERCISE .....	- 12 -
BREAST CANCER .....	- 13 -
MULTIPLE MYELOMA .....	- 18 -
LEUKEMIA AND LYMPHOMA .....	- 20 -
BRAIN CANCER.....	- 22 -
OVARIAN, UTERINE AND CERVICAL.....	- 24 -
PROSTATE AND TESTICULAR .....	- 26 -
GASTROINTESTINAL: COLORECTAL, PANCREATIC AND LIVER.....	- 27 -
HEAD AND NECK.....	- 29 -
LUNG.....	- 31 -
MELANOMA.....	- 33 -
SARCOMA .....	- 35 -
EXERCISE RECOMMENDATIONS .....	- 36 -
INTERVAL EXERCISE LOG AND PROTOCOL .....	- 38 -
PERFORMANCE INDICATORS.....	- 41 -
ASSESSMENT .....	- 44 -

## **REMEMBER!**

This book is designed with the purpose of providing guidelines for trained professionals. Techniques suggested for treatment should only be performed within your scope of practice.

## **CANCER AS A CHRONIC DISEASE**

- There are 191,300 new cases of cancer expected in Canada in 2014.<sup>1</sup>
- Cancer is the leading cause of morbidity (impairment and dysfunction) due to complications from the disease and the treatments (adverse sequela of surgery, radiation and chemotherapy).
- Based on 2009 estimates, the lifetime probability of a Canadian developing cancer is 2 in 5 (45% men, 41% women).<sup>1</sup>
- Based on 2009 estimates, 1 out of 4 Canadians (29% men, 24% women) is expected to die from cancer.<sup>1</sup>

## **DIAGNOSIS OF CANCER**

**Palpable mass or lump:** a mass or lump capable of being examined by touch

**Lumbar puncture:** puncture of the subarachnoid space in the lumbar region of the spinal cord to withdraw cerebrospinal fluid or inject anesthetic drugs—called also *spinal tap*<sup>2</sup>

**X-ray:** electromagnetic radiation used to examine, treat, or photograph the human body

**Pap smear:** a method or a test based on it for the early detection of cancer especially of the uterine cervix that involves staining exfoliated cells by a special technique which differentiates diseased tissue<sup>2</sup>

**Mammography:** X-ray examination of the breasts (as for early detection of cancer)<sup>2</sup>

**Endoscopy or colonoscopy:** examination of the colon

**Magnetic Resonance Imaging (MRI):** a non-invasive diagnostic technique that produces computerized images of internal body tissues and is based on nuclear magnetic resonance of atoms within the body induced by the application of radio waves<sup>2</sup>

**Computed Tomography (CAT):** a sectional view of the body constructed by computed tomography—called also *CT scan*<sup>2</sup>

**Biopsy:** the removal and examination of tissue, cells, or fluids from the living body<sup>2</sup>

**Ultrasound:** the diagnostic or therapeutic use of ultrasound and especially a non-invasive technique involving the formation of a two-dimensional image used for the examination and measurement of internal body structures and the detection of bodily abnormalities—called also *echography, sonography, ultrasonography*<sup>2</sup>

**Positron Emission Topography (PET):** radioactive glucose is injected through IV, and then the scanner rotates around the body and highlights areas where metabolism rates are higher. Tumours show up brighter because they are more active and take up more glucose than normal cells.

**Hormone Receptors Assays:** an examination to determine the presence, absence of hormone receptors

## **TREATMENTS FOR CANCER**

### **SURGERY**

Cancer surgery is the removal of primary tumour and the tissue surrounding that tumour. The goal of surgery is to get a clear margin meaning any tumour cells are > 1 cm from the margin of the surgery.

Palliative surgery is used to relieve pain and/or correct obstructions.

Lymph Node Dissection is performed on a lymph node bed adjacent to a tumour. Lymph Node Dissection is a standard procedure with carcinomas.

A sentinel node is what is thought to be the closest lymph node or nodes to a cancerous tumour. The sentinel node biopsy begins with the injection of dye and radioactive tracer that will expose the superficial lymph nodes. The nodes that 'light up' or are 'hot' will be resected and sent to a lab for evaluation. Usually between one to three nodes are considered the sentinel nodes and removed. If the sentinel nodes are positive or contain cancer, a surgeon will proceed to lymph node dissection. If the sentinel nodes are negative, or do not contain cancer the non-sentinel lymph nodes are spared. Sentinel node dissection reduces secondary morbidities such as lymphedema, loss of range of motion, cording syndrome and functional restrictions.

### **CHEMOTHERAPY**

The goal of chemotherapy is to affect cancer cell proliferation by damaging DNA with the least possible harm to normal cells. Chemotherapy targets the rapidly dividing cells such as; hair, nails, connective tissue, white blood cells, red blood cells and mucosal cells. There are more than fifty different kinds of chemotherapy with differing mechanisms for destruction of cancer cells and they have varying side effects. Chemotherapy can be administered orally, intravenously, intramuscularly and/or intrathecally. Some local and systemic effects of chemotherapy include nausea, vomiting, diarrhea, bone marrow suppression, neuropathies and skin rashes.

## CHEMOTHERAPY - CONTINUED

Example of a chemotherapy regime for a patient with breast cancer:

### AC<sup>3,4</sup>

Doxorubicin (Adriamycin) 60 mg/m<sup>2</sup> iv d1

Cyclophosphamide ((Cytosan) 600 mg/m<sup>2</sup> iv d1

Q3w (every 3 weeks) x 4 cycles

### T<sup>5</sup>

Docetaxel (Taxotere) 75 mg/m<sup>2</sup> iv over 30-60 min d1

Cyclophosphamide (Cytosan) 600 mg/m<sup>2</sup> iv over 30-60 min d1

Q3w (every 3 weeks) x 4 cycles

CHEMOTHERAPY	SIDE EFFECTS	USED TO TREAT
Vincristine	Blurred vision, constipation, altered gait, headache, joint pain, nerve changes, swelling in hands and feet, generalized weakness	Leukemia and Lymphoma
Dactinomycin	Malaise and fatigue, fever, hypocalcemia, growth retardation, infection, dysphagia, anorexia, nausea, vomiting, diarrhea, abnormal liver test, anemia, bone marrow suppression, alopecia, erythema	Testicular Cancer and Sarcoma
Cyclophosphamide	Cough, fever or chills, lower back pain, missing menstruation, painful urination, dizziness, confusion, joint pain, shortness of breath, swelling of hands and feet, weakness	Leukemia Lymphoma
Doxorubicin (Adriamycin, Anthracycline)	Blood in urine or stool, blistering on hands or feet, fever and chills, cough, facial swelling, headache, low blood pressure, lower back pain, painful urination, pinpoint red spots on skin, sore throat and lips	Breast cancer Heck and Neck Leukemia

CHEMOTHERAPY	SIDE EFFECTS	USED TO TREAT
Cisplatin	Nausea and vomiting, kidney, numbness and tingling of the hands and feet, changes in hearing, temporary taste alterations, lowered resistance to infection, bruising and bleeding, anemia, loss of appetite	Prostate Bladder Ovarian Head and Neck Lung Testicular
Carboplatinum	Lowered resistance to infection, bruising and bleeding, anemia, nausea and vomiting, loss of appetite, fatigue and general feeling of weakness	Ovarian Lung Head and Neck
Bleomycin	Fever and chills, skin changes, loss of appetite, sore mouth, changes in nails, hair loss, sensitivity of skin to sun, changes to the lung	Hodgkin’s Lymphoma Squamous Cell carcinomas Testicular
Carmustine	Lowered resistance to infection, bruising and bleeding, anemia, nausea and vomiting, liver and lung changes	Brain Tumour Lymphoma Multiple Myeloma
Flurouricil (5FU)	Sore mouth, diarrhea, gritty eyes and blurred vision, skin changes, lowered resistance to infection, bruising and bleeding, anemia, hair loss, changes to the nails, rashes, increased production of tears	Colorectal
Paclitaxel (Taxol)	Lower resistance to infection, lower blood pressure, changes in heart rate, abdominal pain, liver changes, skin changes, lowered resistance to infection, bruising and bleeding, anemia, hair loss, nerve changes	Ovarian Breast Lung

CHEMOTHERAPY	SIDE EFFECTS	USED TO TREAT
Ifosfamide	Blood in urine or stool, cough, lower back pain, pinpoint red spots on skin, bleeding or bruising, agitation	Testicular Breast Lung Sarcoma Cervical Ovarian Lymphoma
Bortezomib (Velcade)	Thrombocytopenia, fatigue, weakness, nausea, vomiting, diarrhea, neuropathy, hypotension	Multiple Myeloma
Thalidomide	Clots, constipation, neuropathy, fatigue, rash, neutropenia, hypocalcemia, edema, dyspnea	Multiple myeloma
Add any additional Chemotherapy as needed.		

\*This is not an extensive list.

## RADIATION

Radiation destroys local cancer cells by inhibiting cell growth and division. Radiation is often used to insure clear margins around a surgical site and prevent residual cancer cells from metastasizing. Radiation is also used to preserve bone integrity, for pain management and alleviation of spinal cord compression or nerve entrapment. The total dose of radiation is spread over time, e.g. women with breast cancer may receive 2 Gy per day, 5 days per week for 5 weeks, which would give a total of 50 Gy.

MEASURED IN Gy (GREY)	EFFECTS
40 Gy	Skin damage
50 Gy	Bone damage
60 Gy	Soft tissue and fascia damage
70 Gy	Muscle and tendon damage
*over 40 Gy causes desquamate (slough off and scar laying down)	

STAGING OF SKIN IMPAIRMENT <sup>6</sup>		
Acute	1-4 months	Desquamate and healing of superficial tissue
Sub-acute	4-12 months	Microcellular changes, fibrosis of vasculature and lymphatics, adhesions to collagen
Chronic	1-8 years	Progressive immobility and adhesion of tissue

Side effects of radiation that may affect rehabilitation include:

- Immunosuppression
- Soft tissue fibrosis
- Burns
- Delayed wound healing
- Edema
- Central nervous system (CNS) changes
- High levels of fatigue secondary to hemoglobin changes
- Strangulated lymphatics



## IMMUNOTHERAPY

There are several types of immunotherapy, including monoclonal antibodies, non-specific immunotherapies, and cancer vaccines.

### Monoclonal Antibodies

When the body’s immune system detects antigens, it produces antibodies. Monoclonal antibodies are made in a laboratory, and when they are given to patients, they act like the antibodies the body produces naturally. When monoclonal antibodies attach to a cancer cell, they may accomplish the following goals:

- Allow the immune system to destroy the cancer cell
- Prevent cancer cells from growing rapidly
- Deliver radiation directly to cancer cells
- Diagnose cancer
- carry other cancer drugs directly to cancer

Examples

- Rituximab (Rituxan)
- Trastuzumab (Herceptin)

### Non-Specific Immunotherapies

Like monoclonal antibodies, non-specific immunotherapies also help the immune system destroy cancer cells. Most non-specific immunotherapies are given after or at the same time as another cancer treatment, such as chemotherapy or radiation therapy. However, some non-specific immunotherapies are given as the main cancer treatment.

Two common non-specific immunotherapies are:

**Interferons:** help the immune system fight cancer and may slow the growth of cancer cells

**Interleukins:** help the immune system produce cells that destroy cancer

THERAPY	SIDE EFFECTS	USED TO TREAT
Rituxan	Allergic like reactions, mouth sores, myalgia, arthralgia, bronchospasm, dizziness, skin rash, increase sweating, nausea, peripheral edema, asthenia	Lymphoma
Interferon	Flu-like symptoms, fatigue, skin irritation, dizziness, depression and emotional changes, hair loss, altered fertility, reduction in blood cell formation, effects on circulation	Melanoma
Herceptin	Flu-like symptoms, tumour pain, headaches, heart changes, diarrhea	Breast Cancer

## ANTI-ANGIOGENIC THERAPY

Anti-angiogenic agents are used to prevent or slow the growth of cancer by blocking the formation of new blood cells. These agents do not kill cancer. Avastin (Bevacizumab) is an example of this therapy used in metastatic colorectal cancer and non-small cell lung cancer. Side effects from this drug include delayed wound healing, bleeding and hypertension.

## HORMONAL THERAPY

Hormonal therapies are only used in hormonally driven cancers such as breast and prostate. They are used to prevent the sex hormones from impacting the cancers growth. Selective Estrogen Receptor Modulator (SERM) prevents estrogen from binding to the cell. Tamoxifen is an example of a SERM drug used in pre-menopausal women. Aromatase Inhibitors prevent androgen from producing estrogen by blocking the enzyme aromatase (Arimidex and Femara). The aromatase inhibitor is often used in post-menopausal women. Luteinizing hormone releasing hormone (LHRH) lowers the amount of testosterone and is used in prostate cancer. Side effects from hormone therapy include GI symptoms, hypertension, weight gain, osteoporosis, altered mental state and joint problems.

THERAPY	SIDE EFFECTS	USED TO TREAT
Tamoxifen	Nausea and indigestion, weight gain, changes to period, depression, tiredness, blood clots, visual problems	Breast cancer
Arimidex	Hot flashes and sweats, vaginal dryness, hair thinning, skin rashes, vaginal bleeding, joint pain, muscular stiffness, risk of osteoporosis	Breast cancer

## AUTOLOGOUS PERIPHERAL STEM CELL TRANSPLANT (SCT)

Autologous SCT is when a patient receives their own harvested stem cells at a later date.

Who gets an autologous SCT?

- Patients with Lymphoma who do not go into remission
- Patients with Hodgkin’s disease who do not go into remission
- Patients with relapsed disease
- Patients with Myeloma with the goal of extending remission

Rationale for Autologous Transplant

- Intensified regimens treat the tumour but can damage the bone marrow
- Stem cells support and rescue the patient from severe myelosuppression
- Eligibility Criteria includes; age, performance status of 0-2 (ECOG), adequate organ function.

## AUTOLOGOUS PERIPHERAL STEM CELL TRANSPLANT (SCT) - CONTINUED

### Steps to the Autologous Peripheral Stem Cell Transplant

- Mobilization of stem cells
- Stem cell harvest (1-2 days), takes about 8-9 hours, frozen in liquid nitrogen.
- High dose chemotherapy (BEAM chemotherapy or Melphalan)
- Reinfusion of stems cells
- Recovery

## ALLOGENEIC TRANSPLANT

- Refers to bone marrow or stem cells obtained from a donor intended for infusion into another person. Donor’s immune cells seek and destroy recipient disease.
- Used in leukemia and lymphoma
- Patients have a 25% chance of having a sibling match or other donors may come from Bone Marrow Donors Worldwide. Human leukocyte antigen (HLA) typing of volunteers/unrelated donors are updated to an international database on a monthly basis from 41 countries.
- Criteria for Allogeneic Transplant includes; HLA compatibility, gender, age, Cytomegalovirus (CMV)\* status (leading cause of infection), ABO (blood group) compatibility, health considerations.
- Complications: mucositis, CNS problems, cardiac and pulmonary problems, Hepatic sinusoidal obstruction syndrome (VOD), nausea, vomiting, infection, febrile neutropenia, Graft versus Host Disease (effects skin, liver, GI).

\* *Cytomegalovirus is in the herpes family. It may cause extreme sickness or even death for a patient receiving a transplant.*

Table 1: Allogeneic transplant summary

MYELOABLATIVE (BONE MARROW)	NON-MYELOABLATIVE (STEM CELL)
<ul style="list-style-type: none"> <li>• Full transplant</li> <li>• High dose chemotherapy</li> <li>• 6 radiation treatments</li> <li>• Less graft vs host disease</li> <li>• Hospitalization (4-6 weeks)</li> </ul>	<ul style="list-style-type: none"> <li>• Mini transplant</li> <li>• Immunosuppressive chemotherapy</li> <li>• 1 radiation</li> <li>• Done as outpatient</li> <li>• More Graft vs Host disease</li> </ul>

### Graft Versus Host Disease

- The T cells of the donor attack the health cells of the patient
- Acute vs chronic (after 100 days)
- Organ involvement includes; skin, liver and GI

## LAB VALUES

### THROMBOCYTOPENIA

A patient with Thrombocytopenia will have a low platelet count which can result in bruising, fatigue and bleeding.

Normal platelets 150-400 X 10<sup>9</sup>/L

PLATELET LEVEL	ACTIVITY LEVEL
50-150 X 10 <sup>9</sup> /L	Restive exercise, biking, ambulation
30-50 X 10 <sup>9</sup> /L	Active range of motion, ambulation
20-30 X 10 <sup>9</sup> /L	Light exercise (no resistance)
<20 X 10 <sup>9</sup> /L	Activities of daily living, reduce risk of falls

Goodman 2003

### HEMOGLOBIN

Hemoglobin is a protein in red blood cells that carries oxygen.

Normal Hemoglobin levels are 130-150 g/L in males and 120-140 g/L in females.

HEMOGLOBIN LEVEL	ACTIVITY LEVEL
100-120 g/L	Aerobic exercise as tolerated
80-100 g/L	Ambulation as tolerated, monitor for shortness of breath, weakness and light headedness.
<80 g/L	Limited activity

### NEUTROPENIA

Absolute Neutrophil Count (ANC); neutrophils are the precursors to the white blood cells and help to predict infection risk.

A normal neutrophil count is from 2.5 to 8 X 10<sup>9</sup>/L. A patient would be considered neutropenic with a neutrophil count of <2.0 X 10<sup>9</sup>/L. The degree of neutropenia is as follows:

Mild	>1.0 and <1.5 X 10 <sup>9</sup> /L
Moderate	>0.5 and <1.0 X 10 <sup>9</sup> /L
severe	<0.5 X 10 <sup>9</sup> /L

When a patient is neutropenic they do not have the typical signs of infection. The most reliable sign will be a fever (38 degrees). Neutropenic patients with a fever need medical attention immediately.

## MEDICAL CONTRAINDICATIONS FOR EXERCISE

All of the following require attention from an oncologist: <sup>7</sup>

- Anemia (Hemoglobin less than 80 g/L)
- Thrombocytopenia (platelets less than  $50 \times 10^9/L$ )
- Absolute neutrophil  $1.0 \times 10^9/L$  or less
- Fever of 38 or greater
- Severe nausea and vomiting
- Shortness of breath on exertion or at rest
- Unrelieved pain
- Extreme fatigue
- Severe muscle wasting
- Dizziness

Cancer Pain (when to send your patient back to the doctor)

- Any pain that does not change within two therapy sessions
- Unchanged or unrelenting pain
- Pain that is out of proportion to the demands of the task
- Pain with weight bearing
- Night pain
- Pain associated with neurological changes

Cancers with potential bone metastasis:

- Breast
- Lung
- Thyroid
- Kidney
- Prostate
- Multiple Myeloma

## BREAST CANCER

Among women living in Canada, breast cancer is an important disease in terms of incidence, morbidity and mortality. Improved survival of women with breast cancer has resulted in many women with problems that warrant rehabilitation. These problems can include; fatigue, cardio toxicity, changes in body composition and lymphedema. Individuals with breast cancer will make up a large proportion of the people in your Cancer Rehabilitation Program.

**Ductal Carcinoma in Situ (DCIS):** Malignant lesion confined to the ductal tissue.

**Lobular Carcinoma in Situ (LCIS):** Rarely malignant tumour that arises from the epithelial cells in the breast tissue.

**Infiltrating Ductal Carcinoma (IDC):** The most common type of breast cancer (70-80%). Invades through the basement membrane of the ducts and the surrounding tissue.

**Infiltrating Lobular Carcinoma (ILC):** Less than 15% of invasive breast cancers. Tends to be multi-focal throughout the breast and commonly moves into the lymph nodes.

**Hormone Receptors:** The presence of estrogen and progesterone nuclear steroid receptors (ER and PR) on the tumour cell impacts growth. ER and PR positive tumours have better prognosis compared to triple negative cancer (negative for estrogen, progesterone and Her2/nue).

**Human Epidermal Growth Factor (Her 2/nue):** Her2/nue protein over expression is associated with a poor prognosis (20-30%). Herceptin is the drug used to target and decrease the tendency towards over expression.



**Figure 1: Numerous sequelae following breast cancer treatments**

**Inflammatory Breast Cancer:** Cancer cells grow in and block lymph vessels in the breast (<5% of all breast cancers). Estimated five year survival is 20%.

Lymph Node dissection is performed on a lymph node bed adjacent to a tumour. Lymph node dissection is a standard procedure with breast cancer. There is significant morbidity associated with axillary (armpit) node dissection, which include functional limitations of the upper extremity and shoulder.

## BREAST CANCER: REHABILITATION CONSIDERATIONS

**Scar adherence:** The scar may adhere to the underlying fascia or muscles of the chest wall. Pain and discomfort will be felt when the arm is moved away from the body.

**Cord/Webbing Syndrome:** Attributed to lymphovenous injury during axillary node dissection due to tissue

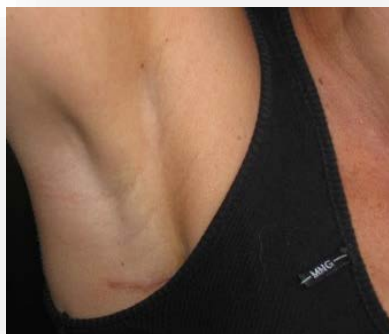


Figure 3: Cord/webbing syndrome

retraction and positioning. Scar will build up in the axillary or armpit where the lymph nodes have been dissected. This scar can adhere to part of the lymphatic network. When the arm is moved in a position that pulls the structures tight a cord will be felt along the arm. In some cases the tight cord is visible.

**Rotator Cuff** surgery, radiation can occur to the could be in the micro tearing, well as limited



Figure 4: Rotator cuff injury

**Postural Dysfunction:** Following breast cancer treatment the anterior structures (pectoralis and upper trapezius) of the body tend to become short and tight while the posterior structures (middle and lower trapezius) tend to become elongated and weak. This causes postural problems resulting in neck and shoulder pain. This can limit the individuals' ability to carry out normal activities of daily living. If the posture problems exist for an extended period of time, chronic pain may be associated with lifting the arm overhead and/or carrying objects.



Figure 2: Scar adherence

**Frozen Shoulder (Adhesive Capsulitis):** Secondary to radiation and/or immobility the four rotator cuff muscles (Teres Minor, Subscapularis, Supraspinatus and Infraspinatus) could become tightened and decrease the motion at the shoulder. Usually the drastic in external rotation then then flexion. There is often with this lack of range.

**Injury:** Due to positioning in and/or lymphedema, damage rotator cuff muscles. Damage form of inflammation and/or This damage will cause pain as range of motion.

## BREAST CANCER: REHABILITATION CONSIDERATIONS - CONTINUED

**Lymphedema:** Secondary to lymph node dissection and radiation the arm can fill with fluid and become heavy and painful.

**Reconstruction:** TRAM (Trans-Rectus Abdominus Muscle) and DIEP (Deep Inferior Epigastric Perforator). It is important for the clients and the staff to understand these surgeries and their restrictions.



Figure 5: Lymphedema

### EXERCISE

- Wand exercises (active assistive range of motion)
- Postural exercises (chin tuck and retractions)
- Stretches (pectoralis muscle stretch, arm pit sniff, sun tanner and low load prolonged stretches)
- Mid and lower trapezius work
- External rotation
- Push ups on wall (at different angles)
- Bicep curl
- Tricep extension
- Lat pull-down
- Row

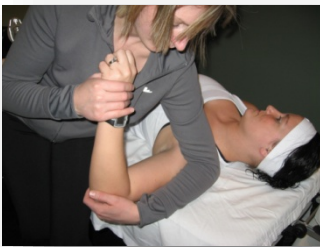
- Focus on scapular position
- Strengthen posterior structures
- Stretch anterior structures



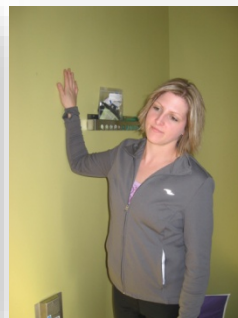
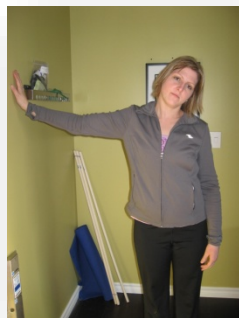
## BREAST CANCER: MANUAL THERAPY

**Scar Massage:** Apply moderate pressure using the second and third finger as you move up and down along the length of the scar. Applying vitamin E cream to finger tips will reduce friction at the scar and help minimize discomfort. Scar massage should be done daily for 3 minutes. Scar massage should be reviewed by the therapist on a weekly basis.

**Dural Stretch (Therapist):** With the patient in supine, instruct patient to keep their nose in line with their belly button. Grasp arm, depress shoulder, abduct humerus, rotate at shoulder, extend elbow, extend wrist then extend fingers (DARE: depression, abduction, rotation, extension). Repeat with opposite arm. Repeat three alternating repetitions on each arm.



**Dural Stretch (Patient):** Stand sideways with palm on wall at shoulder height. Side bend head away from wall. Slowly step away from wall as you extend elbow. Repeat with opposite arm. Repeat three alternating repetitions on each arm.



**Mobilizations:** With patient lying supine grasp affected arm. Giving gentle traction to the shoulder joint move humeral head anteriorly, stretching the capsule of the joint. Grade 1 and 2 mobilizations are used to help with pain and are often considered oscillations. Grade 3-4 mobilizations are more aggressive and are used to stretch the capsule and should only be used when traction of the shoulder joint is pain free.

### BREAST CANCER: MANUAL THERAPY - CONTINUED

**Contract/Relax:** The muscle that is being stretched will first be contracted against resistance for 10 seconds, then the contraction is released and a stretch of that same muscle will be held for 30 seconds. For example, to stretch the tricep muscle the patient will lay supine with the therapist holding the arm. The arm will be moved into flexion until resistance is felt. Next the patient will push against the therapist, contracting the tricep muscle (10 seconds). Then the contraction will be released and the therapist will passively move the arm into more flexion to stretch the tricep for 30 seconds. This treatment can be repeated three times in each therapy session.

**Manual Arm and Neck Stretches:** With the patient relaxed, the therapist determines the tight muscle and passively stretches it; holding each stretch for approximately 30 seconds.

**Lymphedema Management:** The therapist will have to be trained in Lymphedema management but the basic parts of treatment include bandages, massage and exercise.

**Myofascial Release:** The therapist will have to be trained in myofascial release techniques to perform this manual therapy. This is key manual therapy technique used to release tight cords.

### NOTES

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## MULTIPLE MYELOMA

With multiple myeloma, the cells that are usually affected are the plasma cells (a type of white blood cell). A cancerous plasma cell is called a myeloma cell. Myeloma is called “multiple” since there are frequently multiple areas in the bones where tumors develop. Myeloma affects the places where bone marrow is normally active; the spine, skull, pelvic bone, rib cage and the areas around the hips and shoulders.

Healthy plasma cells make antibodies while myeloma cells cannot make functioning antibodies, but instead produce a cloned protein known as a “monoclonal protein”. Unlike other types of cancer, myeloma can present patients with many strange complications because myeloma cells release proteins and other chemicals into the bone marrow and blood stream.

## REHABILITATION CONSIDERATIONS

**Vertebral Fractures and Instability:** The effects in the bone marrow include the reduction in blood count production and damage to surrounding bone. The net result can lead to anemia, infection, bone pain, bone fractures and elevated blood calcium. The myeloma cells activate osteoclasts (cells that destroy bone) and block osteoblast (cells that repair bone). This can lead to osteoporosis, lytic lesions, fracture or collapse of the vertebra.

**Back Pain:** Muscle spasm and nerve impingement can be caused secondary to fractures and bone loss in the vertebral column all resulting in back pain.

**Postural Dysfunction:** The anterior structures of the body tend to become short and tight while the posterior structures tend to become elongated and weak. This causes postural problems resulting in neck and shoulder pain. This can limit the individuals’ ability to carry out normal activities of daily living. If the posture problems become chronic, pain may be associated with lifting the arm overhead and/or carrying objects.

**Neurological Compromise (Hypercalcemic):** May cause weakness, confusion and fatigue.

## EXERCISE

- Strengthening – posterior structures:
  - Seated row
  - Rotator cuff
  - Shoulder retractions
  - Chin tucks
  - Core
  - Chest
  - Anterior deltoid
- Balance and balance disc
- Gait training
- Proprioception

Spinal Caution

- No twisting
- No turning
- No extension

## MULTIPLE MYELOMA: MANUAL THERAPY

**Neck Stretches:** The leader will perform manual neck stretches in supine on plinth. The client often needs a wedge pillow or elevation of the head and shoulders to stabilize a kyphotic posture.

**Anterior Shoulder Stretch:** The patient lays supine on the plinth. The therapist crosses their hands and places their palms on the patients anterior shoulder capsule. As the patient breathes out, the therapist applies gentle downward pressure to the shoulder and holds for 10 seconds. Then repeat this process for three repetitions.

**Dynamic Balance:** These activities should always be monitored or spotted by a trained therapist to reduce the risk of falls and injury. Remember this population is more susceptible to fracture.

## NOTES

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## LEUKEMIA AND LYMPHOMA

Leukemia is a cancer of the blood forming organs that results from abnormal white blood cell production in the bone marrow. Acute leukemia involves the immature cells that interfere with the production of normal mature cells seen in the bone marrow or the blood. Chronic leukemia involves the mature white blood cells that do not function normally and are unable to fight infection.

Lymphomas are cancers that develop from the lymphocytes, cells of the body's immune system. Non-Hodgkin's Lymphoma makes up 5% of all the cancers and 85% of all the lymphomas. Hodgkin's lymphoma accounts for 15% of all lymphomas and 1% of all cancers. Clinical features of lymphoma include; fever, weight loss, night sweats, lymphadenopathy, myelosuppression and central nervous system (CNS) involvement.

## REHABILITATION CONSIDERATIONS

**Graft-Versus-Host Disease (GVHD):** Acute GVHD has a clinical presentation of dermatitis, hepatitis and gastroenteritis. Chronic GVHD presents after 100 days involving essentially every organ. Primary involvement is the skin and the liver. GVHD is a side effect from allogeneic stem cell transplant. The donor cells attack the host (person with cancer). Chronic GVHD may present like scleroderma in the skin and warrant therapy interventions.

**Changes in Blood Work:** Chemotherapy and radiation can affect the immune system and/or blood counts resulting in low hemoglobin, platelets and white blood cells.

**Fatigue:** Due to high levels of fatigue some individuals may have to discontinue cancer treatments, the doses of treatment may be limited and/or Quality of Life may be impaired.

**Neuropathy:** Numbness, tingling and/or pins and needles in the hands and feet are often associated with the chemotherapy regimens given for leukemia and lymphoma.

## EXERCISE

- Large muscle groups
  - Row
  - Chest press
  - Lat pull down
  - Lunges
  - Squat
- Balance on Bosu™
- Balance disc
- Cardio – ball
- Proprioception
- Challenge cardio

Know blood counts (see lab values on page 11)

## MANUAL THERAPY

**Trigger Release:** With the patient in supine the therapist will palpate for trigger points. A trigger point is a tight area in the muscle. The therapist will use their finger to apply perpendicular pressure to the trigger.

**Neck Stretches:** The therapist will determine the neck muscles that need to be stretch. For best results the patient is supine on a plinth. All stretches should be passive and held for 30 seconds.

**Dural Stretch-Upper Body (Therapist Stretch):** With the patient in supine, instruct patient to keep their nose in line with their belly button. Grasp arm, depress shoulder, abduct humerus, rotate at shoulder, extend elbow then extend wrist then extend fingers (DARE, depression, abduction, rotation, extension). Repeat with opposite arm. Repeat three alternating repetitions on each arm.

**Dural Stretch-Upper Body (Patient Stretch):** Stand sideways with palm on wall at shoulder height. Side bend head away from wall. Slowly step away from wall as you extend elbow. Repeat with opposite arm. Repeat three alternating repetitions on each arm.

**Dural Stretch-Lower Body (Patient Stretch):** The patient sits at edge of plinth. The patient slumps over with chin resting on chest. Slowly the patient extends the knee; dorsiflexes the ankle and extends the toes. The patient should feel a pulling sensation in the back of leg. Alternate left and right leg three times each session. Move slowly through these motions to reduce nerve irritation.

**Dynamic Balance:** Dynamic balance activities should always be monitored or spotted by a trained therapist to reduce the risk of falls and injury.

## NOTES

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## **BRAIN CANCER**

The most common types of brain tumours in adults are Low Grade Glioma, Glioblastoma Multiforme (GBM) and Meningioma. Most are treated with surgery, radiation and an oral chemotherapy agent called Temozolomide. Treatment also includes the use of steroids to decrease swelling in the brain. Steroid treatment causes proximal muscle weakness, loss of balance and loss of function. Weaning from the steroid can also be a challenging time for the patient.

Some other challenging parts of rehabilitation for clients with brain tumours are their behavioral changes. These include potential loss of judgment, impulsiveness and memory loss.

## **REHABILITATION CONSIDERATIONS**

**Balance:** When the client is being weaned from steroids there is a major role for rehabilitation to improve balance and coordination.

**Paralysis:** Depending on the area of the brain affected, there could be loss of motor ability in any area of the body.

**Gait Problems:** Ataxia, drop foot and lower extremity weakness can cause significant difficulties with gait.

**Core Weakness:** Secondary to prolonged bed rest, individuals can experience extreme loss in core stabilizers.

**Loss of Short Term Memory:** Patients with brain tumours may have difficulty remembering exercises and therefore have less carryover from one session to the other.

## **EXERCISE**

- In sitting:
  - Tricep extension
  - Bicep Curl
  - Lat Pull down
  - Row
  - Hamstring curl
  - Leg extension
  - Calf Raises
  - Hip Abduction and Adduction
- Postural

- Modify cardio activities if one limb is not functioning properly
- Constant “hands-on” guarding

## BRAIN CANCER: MANUAL THERAPY

**Hand Therapy:** Help to build dexterity and range of motion.

### Gait Training

#### Balance Exercises (close supervision required):

- Braiding
- Tandem walking
- Single leg Stance
- Standing with eyes closed
- In sitting using soft cushion or balance disc
- Bosu™
- Walking on balance beam (use 2 by 4 plank)
- Backwards walking
- Perturbations

## NOTES

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## OVARIAN, UTERINE AND CERVICAL

Ovarian cancer is known as the silent killer because the ovaries are situated deep in the pelvis, early stages may cause no symptoms, and therefore ovarian cancer is frequently diagnosed in the later stages. The most important factor to prognosis is the stage of the tumour, its grade and whether or not it can be completely removed. Surgery is the mainstay of treatment but often radiation and chemotherapy are used after recurrence.

Cancers of the uterus and cervix mostly spread to retroperitoneum and may present with lymphostasis in the lower extremities. Uterine and cervical cancer sequela may include urinary incontinence, pelvic pain and radiation fibrosis.

## **REHABILITATION CONSIDERATIONS**

### **Poor Fitness Levels**

**Polyneuropathy:** Generalized disorder of peripheral nerves resulting in changes in sensation.

**Fatigue:** Due to high levels of fatigue some individuals may have to discontinue cancer treatments. The doses of treatment may be limited and/or Quality of Life may be impaired.

**Lower Extremity Swelling or Lymphedema:** Swelling caused by cancer of the lymph nodes in the groin or damage from radiation and/or surgery.

**Back Pain:** Many patients experienced diffuse back pain secondary to prolonged bed rest and/or radiation and/or referred pain from organs.

## **EXERCISES**

- Interval training
- General Stretching Program
- Ball Exercises
- Balance Disc
- Cardio on Ball
- Pelvic floor muscle re-education

Be aware of back pain and refer to oncologist when needed

## OVARIAN, UTERINE AND CERVICAL: MANUAL THERAPY

### Manual Techniques to Reduce Back Pain

#### Lymphedema Management

**Fibrosis Management:** vaginal dilators (must be a trained therapist to perform these treatments).

#### Balance Exercises (close supervision required):

- Braiding
- Tandem walking
- Single leg Stance
- Standing with eyes closed
- In sitting using soft cushion or balance disc
- Bosu™
- Walking on balance beam (use 2 by 4 plank)
- Backwards walking
- Perturbations

## NOTES

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## **PROSTATE AND TESTICULAR**

Prostate cancer can be easily detected at early stages due to the test known as the PSA (Prostate Specific Antigen) and clinical exam. Prostate cancer can be easily cured if detected early, small and slow growing. 100% cure rate in early stages and 1 to 3 year survival in metastatic disease.

Testicular Cancer starts in the cells of the testicles. There are two main types (seminomas and non-seminoma; teratomas) of testicular cancer that are treated differently but successfully.

## **REHABILITATION CONSIDERATIONS**

### **Poor Fitness Levels**

**Polyneuropathy:** Generalized disorder of peripheral nerves resulting in changes in sensation.

**Fatigue:** Due to high levels of fatigue some individuals may have to discontinue cancer treatments, the doses of treatment may be limited and/or Quality of Life may be impaired.

**Back Pain:** Many patients experienced diffuse back pain secondary to prolonged bed rest and/or radiation and/or referred pain from organs.

## **EXERCISES**

- Interval training
- General Stretching Program
- Ball Exercises
- Balance Disc
- Keel exercises

Be sure to include pelvic floor muscle exercises i.e. Keel exercises

## **MANUAL THERAPY**

- **Manual techniques to reduce back pain**
- **Lymphedema management**

## **NOTES**

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## GASTROINTESTINAL: COLORECTAL, PANCREATIC AND LIVER

Colon and rectal cancer are often slow growing tumours that start on the inside wall of the bowel and then grow through the wall to the lymph nodes. The size of the tumour does not affect the prognosis as much as the stage that often determines the outlook.

Pancreatic cancer accounts for 2-3% of all cancer cases but is the fourth most prevalent cause of cancer deaths. All stages of pancreatic cancer have an average five year survival of 5.1%.

Liver cancer is rarely a primary site of cancer, however it is a commonly a site for metastasis.

GI Cancer Sequela: anorexia, weight loss, abdominal distension, diarrhea, vomiting and fatigue. Rehabilitation focuses on maintaining mobility and function, pain control, lumbar stabilization and pelvic floor muscle re-education.

## REHABILITATION CONSIDERATIONS

### Pain

**Abdominal Incision and Potential for Hernias:** Secondary to the large abdominal incisions and colostomy bags, the transverse abdominal muscles can be very weak and potentially resulting in herniation.

**Core Weakness:** Lower back and abdominal weakness resulting in pain and/or injury. Core weakness can make it difficult for patients to perform activities of daily living.

**Dumping Syndrome:** The bowel quickly evacuates, giving the client little to no warning.

**Electrolyte Imbalances:** Can result in muscle cramping and more severely into heart problems.

### Dehydration

### Nausea and Vomiting

## EXERCISES

- Core Stability
- Balance: balance disc, Bosu™, ball exercise
- Abdominal and hip flexibility
- Lumbar stabilization
- Emphasis on cardiovascular training, specifically interval training

- Treat pain in and around surgical site
- Increase F.I.T.T. when safe for client (goal of 18 METs per week)

## COLORECTAL, PANCREATIC AND LIVER: MANUAL THERAPY

- **Balance Exercises (close supervision required):**
  - Braiding
  - Tandem walking
  - Single leg Stance
  - Standing with eyes closed
  - In sitting using soft cushion or balance disc
  - Bosu™
  - Walking on balance beam (use 2 by 4 plank)
  - Backwards walking
  - Perturbations

### NOTES

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## HEAD AND NECK

Head and neck cancer is a heterogeneous group of diseases. This type of cancer can be located in the oral cavity (40%), larynx (25%), oro/hyopharynx (15%) and salivary glands (7%). This cancer can be very aggressive locally and have distant metastasis with overall survival of 30 – 40%. Treatment includes radiation and chemotherapy. A feeding tube is often inserted prior to therapy to help maintain weight and nutrition.

### REHABILITATION CONSIDERATIONS

**Shoulder Dysfunction:** Decreased scapular stabilization causing migration of the scapula anteriorly on the thorax. Weakness in the mid and lower trapezius will have significant impact on the biomechanics of the shoulder (winging of the scapula). Long term dysfunction can result in impingement of the rotator cuff muscles and entrapment of the nerves.

#### Limited cervical range of motion

**Radiation Fibrosis:** Abnormal production of protein and fibrin. Risk Factors include: type and dose of radiation, age, health, co-morbidities

#### Temporal Mandibular Joint Problems

#### Increase/Decreased Saliva

**Pain:** Shoulder pain is reported more often than actual neck pain.

#### Scar mobility

### EXERCISE

- Optimal positioning for the scapula; encourage the use of mirrors, Leukotape for biofeedback and verbal cuing for posture.
- Wand exercises for the shoulder: active assistive range of motion will offer a gentle stretch to tissue while healing the scar with a unidirectional fiber organization.
- Rotator Cuff strengthening
- Pectoral stretching
- Wall push up at different angles
- Shoulder ROM
- Neck stretching exercises, myofascial release
- TMJ exercises
- Avoid overzealous exercise

Aggressive stretching is often counterproductive in this population

## HEAD AND NECK: MANUAL THERAPY

**Manual Shoulder Stretches:** Avoid prolonged static and dynamic scapulothoracic depression and retraction with upright and recumbent postures. Avoiding these postures will reduce tautness on the pectorals, latissimus dorsi and trapezius muscles.

**Manual Neck Stretches:** With the patient relaxed, the therapist determines the tight muscle and passively stretches it; holding each stretch for approximately 30 seconds.

### Lymphedema Management of the Neck and Face

**Mobilizations:** With patient lying supine, grasp affected arm. Give gentle traction to the shoulder joint, move humeral head anteriorly stretching the capsule of the joint. Grade 1 and 2 mobilizations are used to help with pain and are often considered oscillations. Grade 3-4 mobilizations are more aggressive and are used to stretch the capsule and should only be used when traction of the shoulder joint is pain free.

**Contract/Relax:** The muscle that is being stretched will first be contracted against resistance for 10 seconds, then the contraction is released and a stretch of that same muscle will be held for 30 seconds. For example, to stretch the tricep muscle the patient will lay supine with the therapist holding the arm. The arm will be moved into flexion until resistance is felt. Next the patient will push against the therapist, contracting the tricep muscle (10 seconds). Then the contraction will be released and the therapist will passively move the arm into more flexion to stretch the tricep for 30 seconds. This treatment can be repeated three times in each therapy session.

**Scar Massage:** Apply moderate pressure using the second and third finger as you move up and down along the length of the scar. Applying vitamin E cream to finger tips will reduce friction at the scar and help minimize discomfort. Scar massage should be done daily for 3 minutes. Scar massage should be reviewed by the therapist on a weekly basis.

**Dural Stretch:** With the patient in supine, instruct patient to keep their nose in line with their belly button. Grasp arm, depress shoulder, abduct humerus, rotate at shoulder, extend elbow then extend wrist then extend fingers (DARE: depression, abduction, rotation, extension). Repeat with opposite arm. Repeat three alternating repetitions on each arm.

### Low Load Prolonged Stretching of the Anterior and Posterior Capsules of the Shoulder

#### TMJ Mobilizations

## NOTES

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## LUNG

Cancer of the lung is the most common type of cancer worldwide. It is almost always fatal, and is the chief cause of death from cancer. About 90-95 percent of lung cancers are either small-cell or non-small-cell carcinoma. Small cell lung cancer accounts for 10-15 per cent of all lung cancers. Small cell lung cancer had distinct clinical characteristics including its aggressive nature, diffuse nature, early metastasis and over all poor prognosis. Non-small cell lung cancer can be divided into Squamous cell carcinoma and adenocarcinoma.

Surgical resection is indicated in early stages on non-small cell lung cancer. Surgery is called a thoracotomy and can be a wedge resection (small part of the lung), lobectomy (right lung has three lobes the left lung has two lobes) or a pneumonectomy (removal of the entire lung). All of these surgeries have a large incision that can cause many comorbidities following surgery. Patients may experience scar adhesions, pain and loss of range of motion at the shoulder.

## REHABILITATION CONSIDERATIONS

- Shortness of breath and poor lung capacity
- Decreased exercise tolerance
- Persistent cough
- Weight loss
- Generally feeling unwell
- Scar Adherence (scars often located at back of rib cage)
- Potential shoulder limitations secondary to the scar
- Tightness in the rib cage
- Poor posture
- Pain

## EXERCISE

- Small bouts of cardio
- Exercises begin in sitting
- Balance
- Breathing techniques
- Extension of thoracic spine and flexion of shoulder
- Axial rotation; diagonal patterns with band
- Postural exercises: Shoulder retractions and chin tucks

Small bouts of cardio  
secondary to shortness of  
breath on exertion



## LUNG: MANUAL THERAPY

**Scar Massage:** The scar massage is best when the client is sitting in a chair bent over the plinth, exposing the scar and giving a gentle stretch to the skin on the back. Apply moderate pressure using the second and third finger as you move up and down along the length of the scar. Applying vitamin E cream to finger tips will reduce friction at the scar and help minimize discomfort. Scar massage should be done daily for 3 minutes. Scar massage should be reviewed by the therapist on a weekly basis.

**Rib Springing:** As the client relaxes in supine, the therapist grasps the rib cage with both hands. As the client inhales and then exhales, the therapist gently performs a springing action at the ribs.

## NOTES

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## MELANOMA

Melanomas are cancerous growths of the melanocytes (pigment producing) cells of the body. In some cases melanoma is a very aggressive type of cancer and has a high tendency to spread to other areas of the body. Often surgeons choose to do a lymph node dissection of the closest group of nodes to reduce the chance of metastases. The unfortunate result of this resection is often Lymphedema.



## REHABILITATION CONSIDERATIONS

- Lymph node dissection resulting in lymphedema
- Skin and muscle flaps used to close wounds
- Major surgical scarring.
- Pain
- Proximal strains due to increased size of limbs
- Fatigue
- Joint pain and immobility



## MELANOMA: EXERCISES

- Controlled strength training exercises; monitoring the angle at the hip to reduce cutting off lymphatic flow at the groin.
- Small bouts of cardio (interval training)
- Joint ROM

Lymphedema is a major issue!

Limbs with lymphedema must be bandaged during exercise

## MANUAL THERAPY

- Lymphedema management
- Pain control
- Scar mobilization
- Myofascial release techniques
- Active Release techniques

## GUIDE FOR MANAGEMENT AFTER SURGERY FOR THE MELANOMA AND LYMPH NODE RESECTION

Immediately Post Op:

- ROM of unaffected joints
- Core Stability (patients will be supine with limb elevated for 80% of the time)
- Deep Breathing
- Gentle ROM of Affected limb and joints

8 to 12 weeks After Surgery (when surgeon gives the go ahead):

- Scar Massage
- Affected joint stretching
- Interval training
- Spinning (biking with no resistance)
- Lymphedema management and skin care
- Pain control
- Strengthening
- Core stability and lower back exercises

## NOTES

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## **SARCOMA**

Sarcomas are relatively uncommon but can be very aggressive with a high tendency to spread particularly to the lung. Surgery is done with limb salvage in mind; however body anatomy and mechanics are often changed with the removal of these tumours. Sixty percent of sarcomas are in the lower extremity.

### **REHABILITATION CONSIDERATIONS**

- Balance
- Pain
- Muscle wasting
- Proximal muscle weakness
- Core weakness

### **EXERCISES**

- Therapists must read Operating Room reports to determine what muscles are still remaining and in what orientation
- Doctor’s restrictions are necessity for this population
- Core stability
- PNF (Proprioceptive Neuromuscular Facilitation) Patterns
- Interval training

Aggressive stretching is often counterproductive in this population

### **MANUAL THERAPY**

Refer to doctors’ orders due to varying surgical options.

### **NOTES**

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## EXERCISES RECOMMENDATIONS

### **ONCOLOGY EXERCISE PARAMETERS<sup>8</sup> (USING THE F.I.T.T. PRINCIPLE)**

Frequency: 3-5 days/week

Intensity (moderate): any of the following

- 60 to 80% of max heart rate (MHR)
  - MHR = 220-age
- 50 to 70% of VO2 max or heart rate reserve (HRR)
  - $HRR = (MHR - HR\ rest)(\%) + HR\ rest$
- Borg rate of perceived exertion 11-14
- Modified Borg 4-7

Time: 35 minutes to one hour

Type: Interval training (combination of aerobic and strength training)

### **RATE OF PERCEIVED EXERTION SCALE (RPE):**

BORG SCALE		MODIFIED BORG SCALE	
SCALE	PERCEPTION OF EFFORT	SCALE	PERCEPTION OF EFFORT
6	20% effort	0	No Breathlessness* At All
7	30% effort - Very, very light (Rest)	0.5	Very Very Slight (Just Noticeable)
8	40% effort	1	Very Slight
9	50% effort - Very light - gentle walking	2	Slight Breathlessness
10	55% effort	3	Moderate
11	60% effort - Fairly light	4	Some What Severe
12	65% effort	5	Severe Breathlessness
13	70% effort - Somewhat hard - steady pace	6	
14	75% effort	7	Very Severe Breathlessness
15	80% effort - Hard	8	
16	85% effort	9	Very Very Severe (Almost Maximum)
17	90% effort - Very hard	10	Maximum
18	95% effort		
19	100% effort - Very, very hard		
20	Exhaustion		

## EXERCISES RECOMMENDATIONS – CONTINUED

Example for 60–80% MHR for a 65 year old female with a resting heart rate of 70 bpm.

$$\text{THR} = (220 - \text{age})0.6 \text{ to } (220 - \text{age})0.8$$

$$\text{THR} = 155(0.6) \text{ to } 155(0.8)$$

$$\text{THR} = 93 \text{ bpm to } 124 \text{ bpm}$$

Therefore the Target heart rate is 93 bpm to 124 bpm

Example for 50–70% of HRR for a 65 year old female with a resting heart rate of 70 bpm.

$$\% \text{HRR} = (\text{MHR} - \text{HR rest})(\%) + \text{HR rest}$$

$$50\% \text{ HRR} = (155 - 70)(0.5) + 70$$

$$50\% \text{ HRR} = 85(0.5) + 70$$

$$50\% \text{ HRR} = 112.5 \text{ bpm}$$

and

$$70\% \text{ HRR} = (155 - 70)(0.7) + 70$$

$$70\% \text{ HRR} = 85(0.7) + 70$$

$$70\% \text{ HRR} = 129.5 \text{ bpm}$$

Therefore the Target heart rate is 113 bpm to 129.5 bpm

## BENEFITS OF INTERVAL TRAINING:<sup>9</sup>

- Lowers cardiac stress
- Lower rate of perceived exertion scores
- Keeps patient motivated

## **INTERVAL EXERCISE LOG AND PROTOCOL**

The Interval Exercise Log is to be used in conjunction with the Interval Training Protocol. Based on the information provided on the Interval Exercise Protocol, therapists prescribe appropriate exercises and write them in the top row of the Interval Exercise Log. Therapists will then assign an appropriate number of repetitions and sets by filling in the information on the corresponding day on the Interval Exercise Log. Clients will then perform their prescribed exercises and keep track of their progress by filling in the boxes on the Interval Exercise Log. Clients will complete dates on both forms so their progress can be tracked.

Therapists are to use page 2 of the Interval Exercise Protocol to write the client's code, goals and to chart any comments that would be helpful to themselves or other therapists.

**INTERVAL EXERCISE LOG**

**Interval Exercise Log**

Name:		Target Heart Rate									
Day	Date	Balance	Cardio	Cardio	Cardio	Cardio	Cardio	Cardio	Cardio	Cardio	Stretch
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											



**INTERVAL EXERCISE PROTOCOL**

**Interval Training Protocol**

Name: \_\_\_\_\_

Day	Date	Aerobic	Interval	# of Exercises	Reminder
1		5 x 3 min		4	Zip up the abdominals!
2		5 x 3 min		4	Focus on shoulder stabilization.
3		5 x 3 min		4	Increase your workout by adding another set.
4		5 x 3 min		5	
5		4 x 5 min	20 sec. fast, 40 sec. moderate pace	5	Progress you workout by increasing the number of repetitions.
6		4 x 5 min		5	Focus on breathing.
7		4 x 5 min		5	
8		4 x 5 min	30 sec. fast, 30 sec. moderate pace	6	Increase your workout by slowing down each repetition. "Count up, 2, 3, down, 2, 3."
9		5 x 5 min		6	
10		5 x 5 min		6	
11		5 x 5 min		6	You have completed half of the Program! Good Job!
12		5 x 5 min	60 sec. fast, 60 sec. moderate pace	6	
13		5 x 5 min		6	Focus on breathing.
14		5 x 6 min		6	Start balance exercises
15		5 x 6 min	60 sec. fast, 45 sec. moderate pace	6	Start giving homework
16		5 x 6 min		6	
17		5 x 6 min		6	Now try advanced core stability!
18		5 x 6 min		6	
19		5 x 6 min		6	
20		5 x 6 min		6	

## **PERFORMANCE INDICATORS**

- The purpose of performance indicators is to allow the therapist and client to evaluate change over time.
- Try to use real performance indicators; there are many tools out there that are free for clinical use. Some examples may include; Edmonton Symptom Assessment Score (ESAS), Functional Assessment of Cancer Therapy Tools (FACT) and the SF-36.
- Two examples of performance indicators Jodi Steele uses are the Brief Fatigue Inventory and the Patient Specific Functional Scale.

## PERFORMANCE INDICATORS CONTINUED

### Brief Fatigue Inventory

Assessment     Discharge     Follow-up

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Throughout our lives, most of us have times when we feel very tired or fatigued. Have you felt unusually tired or fatigued in the last week?     Yes     No

1. Please rate your fatigue (weariness, tiredness) by circling the one number that best describes your fatigue right NOW.												
No fatigue	0	1	2	3	4	5	6	7	8	9	10	As bad as you can imagine
2. Please rate your fatigue (weariness, tiredness) by circling the one number that best describes your USUAL level of fatigue during the past 24 hours.												
No fatigue	0	1	2	3	4	5	6	7	8	9	10	As bad as you can imagine
3. Please rate your fatigue (weariness, tiredness) by circling the one number that best describes your WORST level of fatigue during the past 24 hours.												
No fatigue	0	1	2	3	4	5	6	7	8	9	10	As bad as you can imagine
4. Circle the one number that describes how, during the past 24 hours, fatigue has interfered with your:												
A. General Activity												
Does not interfere	0	1	2	3	4	5	6	7	8	9	10	Completely interferes
B. Mood												
Does not interfere	0	1	2	3	4	5	6	7	8	9	10	Completely interferes
C. Walking Ability												
Does not interfere	0	1	2	3	4	5	6	7	8	9	10	Completely interferes
D. Normal work (includes both work outside the home and daily chores)												
Does not interfere	0	1	2	3	4	5	6	7	8	9	10	Completely interferes
E. Relations with other people												
Does not interfere	0	1	2	3	4	5	6	7	8	9	10	Completely interferes
F. Enjoyment of life												
Does not interfere	0	1	2	3	4	5	6	7	8	9	10	Completely interferes

## PERFORMANCE INDICATORS CONTINUED

### The Patient-Specific Functional Scale

#### Initial Assessment

Please identify up to three important activities that you are unable to do or are having difficulty with as a result of your cancer. Today, are there any activities that you are unable to do or having difficulty with because of your cancer?

#### Follow-up Assessments

When you were initially assessed, you identified that you had difficulty with the activities listed below. Today, do you still have difficulty with the listed activities? Please score each item in the list.

#### Patient-specific activity scoring scheme (Point to one number)

0	1	2	3	4	5	6	7	8	9	10
Unable to Perform Activity										Able to perform activity at the same level as before injury or problem

	Initial	Transition	Follow-up
Activity	Date:	Date:	Date:
1.			
2.			
3.			
4.			
5.			
Additional			
Additional			
<b>Examples</b>			
<b><i>Vacuuming</i></b>	<b><i>0 – not able to do, too much pain</i></b>	<b><i>4 – able to do a little at a time</i></b>	<b><i>8 – almost at pre-cancer ability</i></b>
<b><i>Walking the dog</i></b>	<b><i>5 – unable to go as far or as long</i></b>	<b><i>8 – abler to go further</i></b>	<b><i>10 – back to pre-cancer ability</i></b>

Total score = sum of the activity scores/number of activities  
 Minimum detectable change (90%CI) for average score = 2 points  
 Minimum detectable change (90%CI) for single activity score = 3 points

PSFS developed by: Stratford, P., Gill, C., Westaway, M., & Binkley, J. (1995). Assessing disability and change on individual patients: a report of a patient specific measure. *Physiotherapy Canada*, 47, 258-263.

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## ASSESSMENT

### **Assessment Form**

**Therapist Name:** \_\_\_\_\_ **Date Started:** \_\_\_\_\_  
**Client Name:** \_\_\_\_\_ **Sex:** M \_\_\_ F \_\_\_ **Age** \_\_\_\_\_  
**Diagnosis:** \_\_\_\_\_  
**Stage:** \_\_\_\_\_ **Grade:** \_\_\_\_\_  
**Oncologist:** \_\_\_\_\_ **Surgeon:** \_\_\_\_\_

History of Current Condition

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Chemotherapy                       Radiation                       Hormone Therapy  
 Other: \_\_\_\_\_

Current Functional Limitations

Personal Care:
Vocational:
Recreation:
Sleep:
Driving:
Intimacy (physical/emotional):

Past Medical History

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**ASSESSMENT - CONTINUED**

Social History

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Exercise History

Previous Gym Experience \_\_\_\_\_

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Medication

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Investigations

X-Ray: \_\_\_\_\_

CT: \_\_\_\_\_

EMG: \_\_\_\_\_

Other: \_\_\_\_\_

Observation

Posture: \_\_\_\_\_

Gait: \_\_\_\_\_

Tone: \_\_\_\_\_

Spasm \_\_\_\_\_

AROM(PROM)

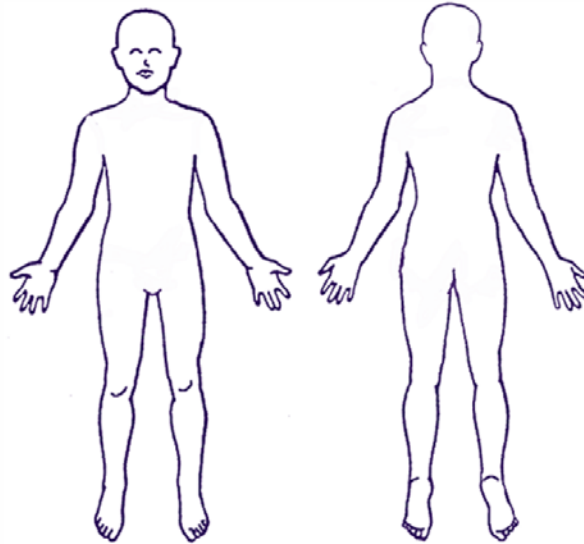
Joint	Shoulder		Hip		Knee	
	(L)	(R)	(L)	(R)	(L)	(R)
Movement						
Flexion						
Extension						
Abduction						
Adduction						
Int. rotation						
Ext. rotation						
HBH						
HBB						

Neurological

Myotomes:
Dermatomes:
Reflexes:
Polyneuropathy:
Balance:

## ASSESSMENT CONTINUED

### Location of Pain and Paraesthesias



### Current Symptoms

1	_____	Sharp	Dull	Ache	Throb	Burning	Superficial	Deep	Other
	_____	Eased By:		Ice	Heat	Meds	Rest	Nothing	
	_____	Aggravated By:		_____					
2	_____	Sharp	Dull	Ache	Throb	Burning	Superficial	Deep	Other
	_____	Eased By:		Ice	Heat	Meds	Rest	Nothing	
	_____	Aggravated By:		_____					
3	_____	Sharp	Dull	Ache	Throb	Burning	Superficial	Deep	Other
	_____	Eased By:		Ice	Heat	Meds	Rest	Nothing	
	_____	Aggravated By:		_____					
4	_____	Sharp	Dull	Ache	Throb	Burning	Superficial	Deep	Other
	_____	Eased By:		Ice	Heat	Meds	Rest	Nothing	
	_____	Aggravated By:		_____					

**ASSESSMENT CONTINUED**

Lymphedema Measurement (centimeters)

Arm	MCPs	Wrist	10cm Below Lat. Epicondyle	15cm Above Lat. Epicondyle
Left				
Right				

Leg	MTP	Ankle	10cm Below Lat. Femoral Condyle	10cm Above Lat. Femoral Condyle
Left				
Right				

Grip Strength

	Trial 1	Trial 2	Trial 3
Left (kg):	_____	_____	_____
Right (kg):	_____	_____	_____

Palpation

\_\_\_\_\_

\_\_\_\_\_

Client Goals

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Impression (Leader)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Treatment Plan

- Pain Control Modalities: \_\_\_\_\_
- Interval Training Exercise Protocol: \_\_\_\_\_
- Manual Therapy and/or Mobilization: \_\_\_\_\_
- Lymphedema Management: \_\_\_\_\_
- Cord Syndrome - Stretch: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

Consent Given

- Yes       No

Therapist Signature \_\_\_\_\_



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<sup>1</sup> Canadian Cancer Society [www.cancer.ca](http://www.cancer.ca)

<sup>2</sup> Taken directly from [www.merriam-webster.com/medlineplus](http://www.merriam-webster.com/medlineplus)

<sup>3</sup> Muss HB et al. Standard chemotherapy (CMF or AC) versus capecitabine in early-stage breast cancer (BC) patients age 65 or older: results of CALGB/CTSU 49907. 2008 ASCO annual meeting. Abstract 507

<sup>4</sup> Fisher, B et al. Treatment of axillary lymph node-negative, estrogen receptor-negative breast cancer: updated findings from National Surgical Adjuvant Breast and Bowel Project clinical trials. J Natl Cancer Inst 2004; 96:1823

<sup>5</sup> Jones SE et al. Phase III trial comparing doxorubicin plus cyclophosphamide with docetaxel plus cyclophosphamide as adjuvant therapy for operable breast cancer. J Clin Oncol 2006; 24:5381

<sup>6</sup> Cooper et al. Int J radiat Onc Biol Phys 1995

<sup>7</sup> Courneya KS, Keats MR, Turner AR. Physical Exercise and quality of life in cancer patients following high dose chemotherapy and autologous bone marrow transplantation. Psycho-Oncology 9(2):127-136, 2000.

<sup>8</sup> Courneya K.S, and J.R. Mackey and L.W. Jones. 2000 Coping with cancer: Can exercise help? Physicians and Sports Medicine. 28(5):49-73.

<sup>9</sup> Meyer, Katharina Med. Sci Sports & Exercise 2001;33(4):525-31