

# Oncology

## *Breast Cancer*



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## Preface

To the Physiotherapy class of 2013, attending lecturers and invited guests, this complementary booklet augments our short-course presentation in the field of oncology, concentrating particularly on the care of breast cancer.

Delegates attending this short-course will benefit from an introductory overview of the terminology and classification of breast cancer and principle issues in its treatment. Commonly available physiotherapy treatment options will be reviewed, particularly in relation to exercise prescription, management of complications and palliative care.

Throughout our short course we will emphasise the importance of effective communication with MDT, patients and their families to ensure optimum care is provided.

We trust that the following short-course and information booklet will add to your knowledge around the area of breast cancer care and enhance your skills as a developing clinician.

*John Allen, Clodagh Burrell, Clara Caplice, Deirdre Collins, Patrick McGreal & Joanne Purcell.*

## Learning Objectives

1. To describe the pathophysiology of cancer with a primary focus on breast cancer.
2. To outline the breast cancer provision of services and care pathways in Ireland and abroad.
3. To give a comprehensive description of the role of the physiotherapist and exercise provision in the care of breast cancer patients.
4. To outline and describe the role of the physiotherapist in the management of complications commonly experienced by breast cancer patients.
5. To give a synopsis of the role of the MDT in breast cancer care.
6. To discuss possible medical oncological emergencies and to educate the physiotherapist in how to deal with such emergencies.
7. To give an overview of the psychosocial impact of breast cancer diagnosis and treatment on a breast cancer patient.
8. To discuss the long-term management of breast cancer patients in terms of return to work and the prevention of cancer recurrence.
9. To give a brief overview of outcome measures used by physiotherapists in the management of breast cancer patients.
10. To summarise effective communication methods that may be helpful when treating breast cancer patients.
11. To promote a holistic approach to the care of breast cancer patients.



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## Chapter 1: Introduction to Cancer



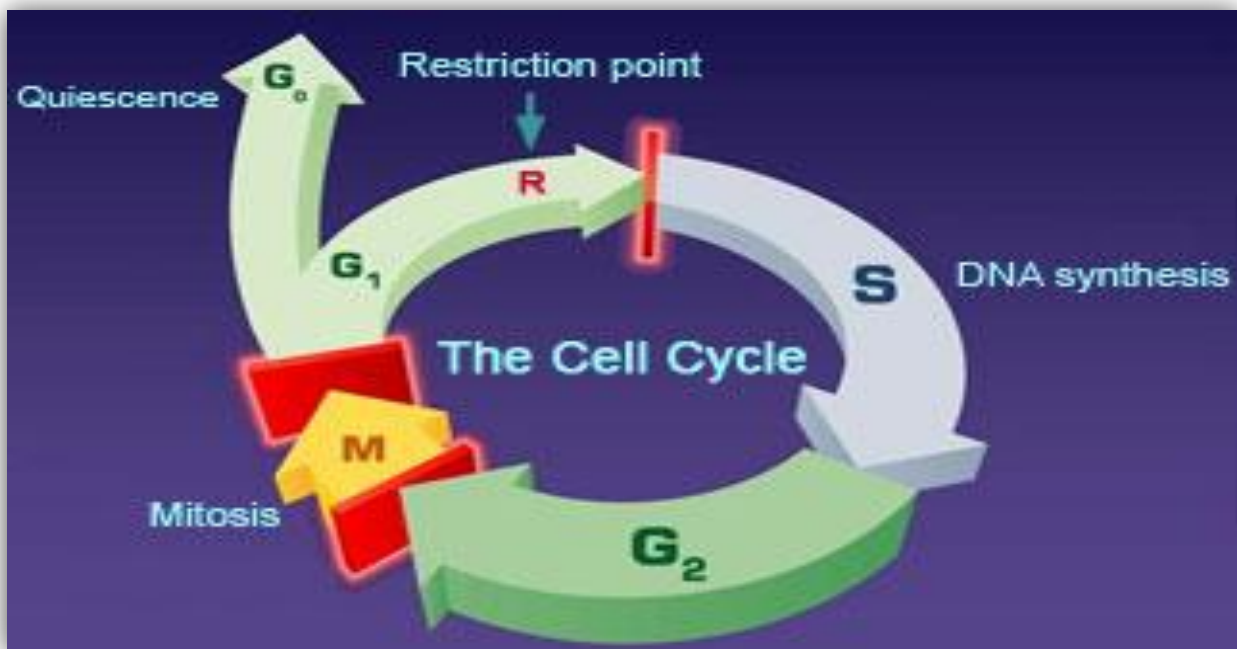
### Physiology of a normal cell

#### The Cell Cycle

The cell cycle, or cell-division cycle, is the series of events that take place in a cell leading to its division and duplication (replication). It consists of four phases;

- 1) **M phase - Mitosis** is an ongoing process and consists of the following stages:
  - *Prophase* - Chromosomes are visible, spindle fibres form, nuclear envelope dissolves
  - *Metaphase* - Chromosomes line up in the middle of the cell
  - *Anaphase* - Chromosome pairs separate to different sides by the spindle fibres.
  - *Telophase* - New nuclei are formed around each grouping of Chromosomes
  - *Cytokinesis* - The cytoplasm is split in two, forming two new cells
- 2) **G1 phase** - period of growth and activity.
- 3) **S phase - Synthesis** - stage where DNA replication occurs
- 4) **G2 phase** - continued growth, building of spindle fibres and centrioles, both structures needed for mitosis phase.

*Figure 1. Cell Cycle*



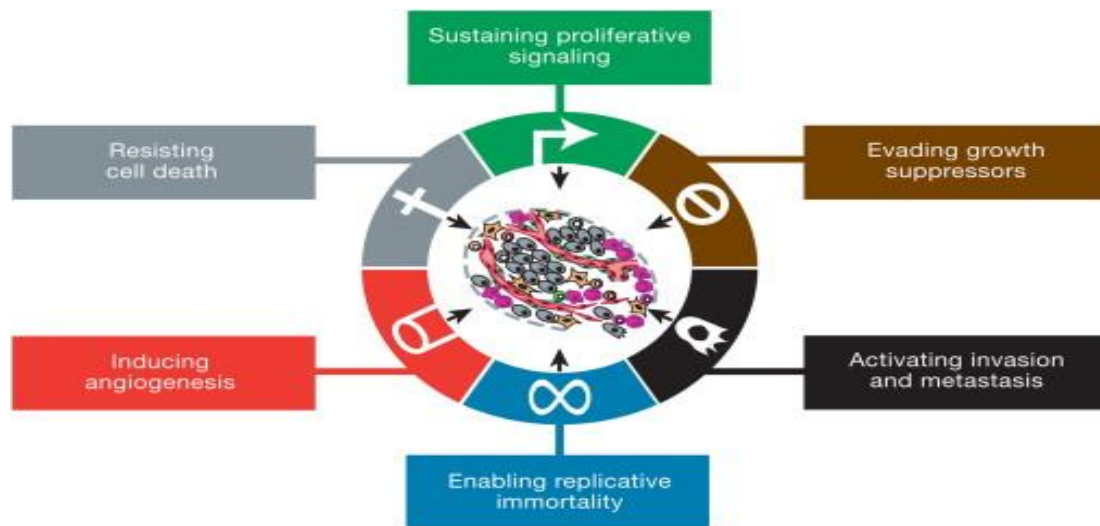
(Langthorne *et al*, 2007)



## Pathogenesis of Cancer:

Cancer cells differ from their normal cells in that they have abnormal regulation. Six hallmarks form a principle that provides a logical framework for comprehending the diversity of neoplastic diseases. As normal cells progress to a neoplastic state, they acquire these hallmark capabilities.

**Figure 2. The Hallmarks of Cancer**



- 1) **Sustaining Proliferation:** Cancer cells have the ability to sustain chronic proliferation without external stimulation. Normal tissues carefully control the production and release of growth-promoting signals, through proto-oncogenes, thereby ensuring a homeostasis of cell number and maintenance of normal tissue structure and function. In cancer cells, the change of pro-oncogenes to oncogenes promotes self-sufficient cell growth.
- 2) **Evading Growth Suppressors:** Tumour suppressor genes prevent cell growth. Cancer cells can overcome these resulting in tumour cell growth.
- 3) **Resisting Cell Death (apoptosis):** The proliferation of cancer cells may be enhanced by mutations in genes that regulate programmed cell death.
- 4) **Enabling Replicative Immortality:** Cancer cells require extensive replicative potential to generate macroscopic tumours. Telomeres at the end of chromosomes shorten during cell division. Once shortened beyond a specific point in normal cells, proliferation stops. In cancer cells, telomere shortening is averted by the enzyme telomerase, enabling widespread self-replication.



- 5) **Sustained Angiogenesis:** Like normal tissues, tumours require nutrients and oxygen as well as an ability to remove metabolic wastes and carbon dioxide to survive. Through angiogenesis, a vascular system is generated for continued tumour growth and metastasis.
- 6) **Activating Invasion and Metastasis:** Cancer cells can spread beginning with cells breaking free from the primary tumour, entering into nearby blood and lymphatic vessels, through the lymphatic systems and blood vessels to produce a secondary tumour at a further location.

(Langthorne *et al*, 2007)



## Types of cancer

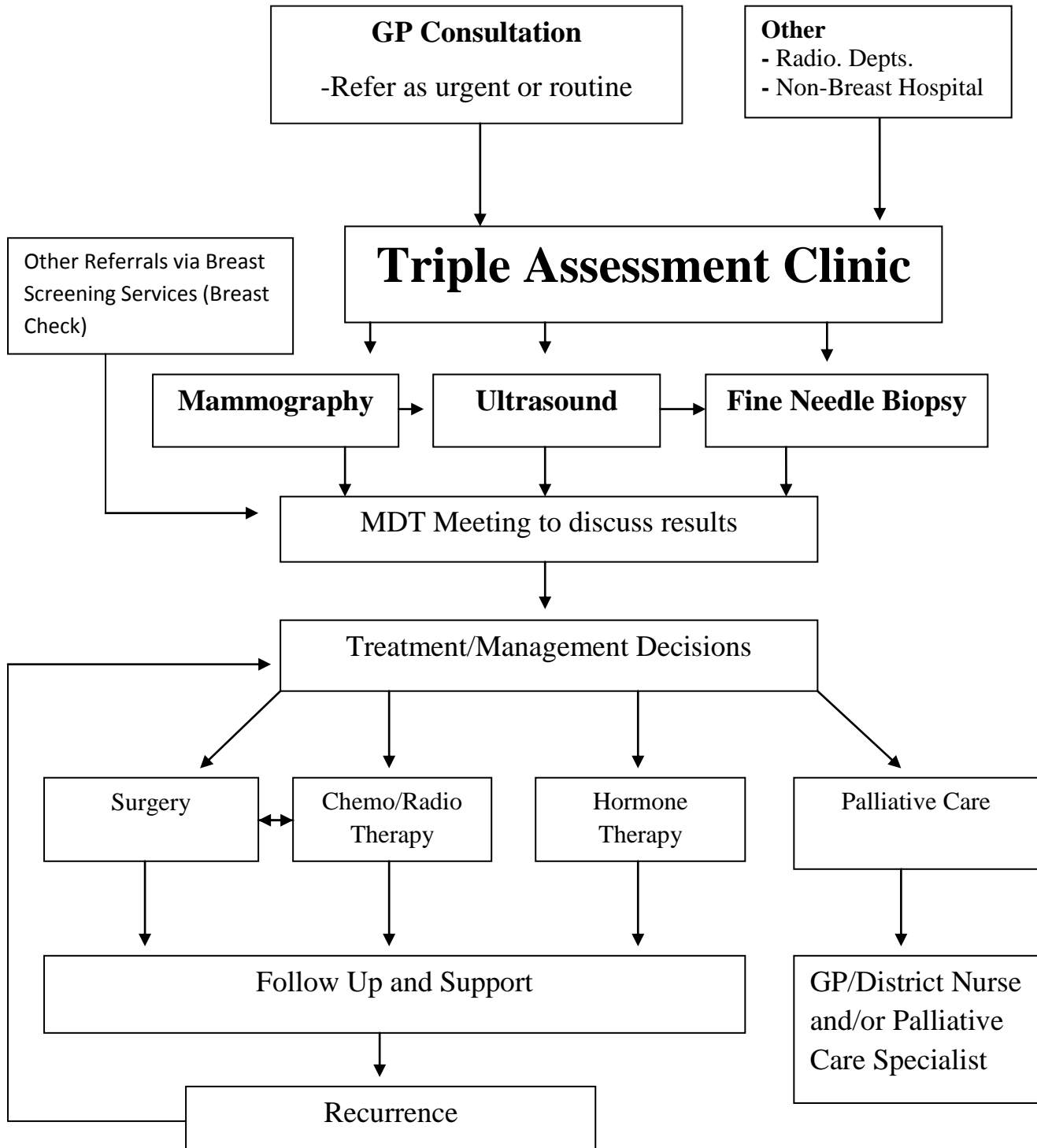
### The main categories of cancer include:

- Carcinoma - cancer that begins in the skin or in tissues that line or cover internal organs.
- Leukaemia - cancer that starts in blood-forming tissue such as the bone marrow and causes large numbers of abnormal blood cells to be produced and enter the blood.
- Sarcoma - cancer that begins in bone, cartilage, fat, muscle, blood vessels, or other connective or supportive tissue.
- Lymphoma and myeloma - cancers that begin in the cells of the immune system.
- Central nervous system cancers - cancers that begin in the tissues of the brain and spinal cord.

## Chapter 2: Care Pathway for Breast Cancer



### Care Pathways in Ireland



## **HSE National Cancer Control Programme (NCCP)**

The best outcomes for cancer patients are achieved when the initial diagnosis, treatment plan, surgery and radiotherapy are carried out by multi-disciplinary teams. In 2007 the Health Service Executive (HSE) established a National Cancer Control Programme for the entire population. Under the NCCP, eight cancer centres within four managed cancer control networks were created. All initial diagnosis and surgery will take place in these cancer centres. Chemotherapy and follow up care will be delivered more locally, according to care plans set at the cancer centres.

Cancer centres aim to reform and restructure services to improve patient outcomes. The NCCP ensures a programmatic approach to cancer control through the application of evidence based practice to clinical practice and all other components of cancer control.

### **Cancer Centres**

#### **HSE Dublin North East**

- Beaumont Hospital
- Mater Misericordiae Hospital

#### **HSE South:**

- Cork University Hospital
- Waterford Regional Hospital

#### **HSE Dublin Mid-Leinster**

- St. James's Hospital
- St. Vincent's Hospital

#### **HSE West**

- University Hospital Galway
- Limerick Regional Hospital

NCCP covers community oncology, ensuring greater involvement of GPs and Primary Care teams to help patients in relation to health information, prevention, diagnosis, treatment, follow-up and support.

### **BreastCheck**

Under the NCCP, BreastCheck became the first national screening service provider worldwide to offer a fully digital mammography service to cover all locations across Ireland. It offers breast screening services free of charge to women who are aged between 50-64, repeat breast screening within an interval of 21-27 months. BreastCheck further plans to roll out screening to 64-69 year olds and to lower screening age to 47 in the coming years.

## **Information on other country care pathways:**

### ***America***

- <http://www.cancer.gov/cancertopics/pdq/treatment/breast/healthprofessional>
- [http://www.memorialcare.org/medical\\_services/breast-care/pdf/nccn-guidelines-breast.pdf](http://www.memorialcare.org/medical_services/breast-care/pdf/nccn-guidelines-breast.pdf)

### ***Australia***

- [http://www.nhmrc.gov.au/\\_files\\_nhmrc/publications/attachments/cp76.pdf](http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/cp76.pdf)
- [http://www.health.nt.gov.au/Cancer\\_Services/CanNET\\_NT/Cancer\\_Pathways/index.aspx](http://www.health.nt.gov.au/Cancer_Services/CanNET_NT/Cancer_Pathways/index.aspx)
- <http://www.breastservices.lmha.com.au/guidelines/clinicalpathwaydayprocedure.pdf>

### ***Canada***

- <http://www.phac-aspc.gc.ca/cd-mc/publications/cancer/obcsp-podcs05/pdf/breast-cancer-report-eng.pdf>
- <http://www.cbcf.org/Pages/default.aspx>

### ***England***

- <http://www.cscn.nhs.uk/uploads/networkgrp/20111028093028-CSCCN-Breast-Cancer-Pathway-of-Care-2011.4-Revised-27-10-11.pdf>
- <http://pathways.nice.org.uk/pathways/early-and-locally-advanced-breast-cancer>

### ***New Zealand***

- <http://www.midlandcancernetwork.org.nz/file/fileid/41071>
- [http://www.nsu.govt.nz/files/NSU/1140\\_Loryn\\_Scanlan.pdf](http://www.nsu.govt.nz/files/NSU/1140_Loryn_Scanlan.pdf)

### ***Singapore***

- <http://www.bcf.org.sg/home/index.php>
- <http://www.nccs.com.sg/PatientCare/WhatisCancer/TypesofCancer/Pages/Breast-Cancer.aspx?p=/PatientCare>

## Chapter 3: Breast Cancer



### Cancer prevalence in Ireland in women

|                        |       |
|------------------------|-------|
| Breast                 | 32.3% |
| Colorectal             | 11.4% |
| Other invasive cancers | 9.8%  |
| Lung                   | 9.5%  |
| Melanoma               | 4.7%  |
| Corpus uteri           | 4.3%  |
| Lymphoma               | 4%    |
| Ovary                  | 3.8%  |
| Cervix                 | 3.5%  |
| Non-Hodgkin's          | 3.4%  |
| Pancreas               | 2.6%  |
| Stomach                | 2.2%  |
| Kidney                 | 1.9%  |

**Table 1. Percentage prevalence of cancer in Ireland on 31/12/2008 by cancer site in women (1 year prevalence) (NCRI 2011)**

Breast cancer has a prevalence of 125.4 per 100,000, a risk of 10% and makes up 32.3% of all invasive cancers which makes it the number 1 ranked cancer among women in Ireland. It has a death rate of 27.2 per 100,000 making it the second highest cancer mortality rate, number 1 being lung cancer. Incidence rate and mortality rate in comparison to our European counterparts leave us ranked in 4<sup>th</sup> place for both.

Further information on Irish statistics available from the NCRI:

**<http://www.ncri.ie/ncri/index.shtml>**



### Types of breast cancer

*Ductal:* Cancer forms in the milk ducts

*Lobular:* Cancer originates in milk producing lobules ([www.breastcancer.org](http://www.breastcancer.org))

### **Ductal Carcinoma in Situ (DCIS)**

DCIS is the most common type of non-invasive breast cancer. Non-invasive means it hasn't spread beyond the ducts into surrounding breast tissue. This has a high survival rate, best detected with a mammogram. With DCIS, one is at higher risk for the cancer reoccurring or for developing a new breast cancer.

### **Invasive (or Infiltrating) ductal carcinoma (IDC)**

This is the most common type of breast cancer (80%), starting in the ducts, breaks through a wall and invades the fatty tissue of the breast. IDC can metastasize through the lymphatic system and bloodstream. IDC also affects men.

### **Invasive (or Infiltrating) lobular carcinoma (ILC)**

ILC is the second most common type of breast cancer (10%), a cancer that starts in the lobules but like IDC, can metastasize to other parts of the body. This type of cancer is harder to detect by mammogram in comparison to IDC.

### **Inflammatory breast cancer (IBC)**

IBC is uncommon and accounts for 1-3% of all breast cancer cases in the United States. IBC presents as a reddening and swelling of the breast instead of a distinct lump. It may also give a thick, pitted appearance resembling an orange peel. Due to lack of a lump, a mammogram may not be useful. IBC has a poorer prognosis due to it being mistaken for an infection having a higher rate of metastasize and difficulty in diagnosis.

### **Triple Negative Breast Cancer**

Usually IDC whose cells lack oestrogen and progesterone receptors and don't have an excess of the HER2 protein on their surfaces. This form of cancer tends to be more aggressive and harder to treat than others and has a higher prevalence in younger women and African-American women.

### **Lobular carcinoma in situ (LCIS)**

LCIS means that cells inside the lobules have started to become abnormal. This raises a person's risk of developing cancer but is not a cancer itself. LCIS is usually diagnosed before menopause present in both breasts and is extremely uncommon in men.

### **Paget 's disease of the nipple**

This cancer starts in the breast ducts, spreads to the nipple surface and then the areola. It makes up 1% of all cases of breast cancer. The nipple and areola often appear crusted and red, with the possibility of bleeding and oozing. This is often related to either DCIS or IDC, with treatment often requiring a mastectomy. May also occur in men.

Further information on rarer types of breast cancer:

<http://www.cancer.org/cancer/breastcancer/detailedguide/breast-cancer-breast-cancer-types>



### **Etiology and Risk Factors of Breast Cancer**

The aetiology of several breast cancers is unknown, however several characteristics or risk factors appear to increase the probability of a woman developing breast cancer. These include:

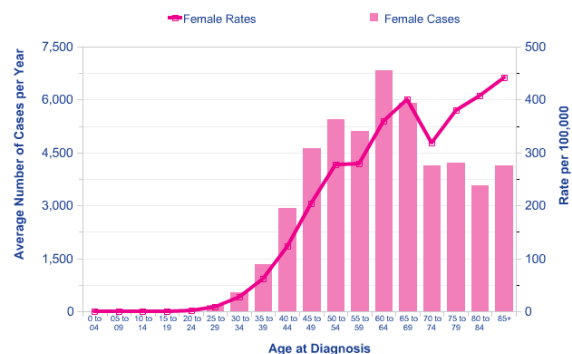
- Female Gender
- Age
- Personal history of cancer
- Family history of cancer and genetics
- Hormonal Factors
- Benign Breast Disease
- Obesity and Dietary Fat
- Radiation exposure

#### **Female Gender**

Breast cancer accounts for over 32% of all invasive cancers in women and only 1% in men.

#### **Age**

The risk of breast cancer increases with age, with breast cancer extremely rare in those under 20 years, however incidence rates increase sharply and become substantial before 50 years.



#### **Personal History of Cancer**

Previously diagnosed breast cancer increases the risk by 4 times of breast cancer in the opposite breast. Previous ovarian, endometrial or colon cancer have been associated with a 1-2 times increased risk over the general population.

### **Family History of Cancer**

Those with a family history (mother, sister, or daughter) of breast cancer are between 2-4 times more likely to develop breast cancer.

Female carriers of a mutation of the BRCA1 or BRCA2 tumour suppressor genes have a significant lifetime risk of developing breast cancer, although only 10% of breast cancer cases are associated with genetic mutations.

### **Hormonal Factors**

- Early menarche (before 12), late menopause (after 55) and greater total duration of regular menses are associated with an increased risk of breast cancer.
- Nulliparity (having no children) and first full-term pregnancy after 30 is associated with an increased risk of breast cancer.
- Oral Contraceptives or hormone replacement therapy can increase the risk of breast cancer especially when HRT includes the addition of progestin and use is prolonged (over 5 years).
- Lactation- a pooled from almost 50 studies from 30 countries shows that an overall reduction in risk of 4% is associated per 12 months of breast feeding for all parous women.

### **Benign Breast Disease**

- Fibrocystic changes (FCCs) constitute the most frequent benign disorder of the breast. Such changes generally affect premenopausal women between 20 and 50 years of age.
- Non proliferative lesions including cysts, papillary apocrine change and epithelial-related calcifications when found alone are not generally associated with increased risk of breast cancer.
- Proliferative lesions without atypia, increased growth of epithelial cells in the ductal or lobar tissue of the breast can result in 1.5-2 times increased risk of breast cancer.
- Proliferative lesions with atypia, proliferation of abnormal looking cells within ducts or lobules results in a 2-4 times increased risk of breast cancer.

### **Radiation Exposure**

Women exposed to ionizing radiation of the chest have been shown to be at an increased risk of developing breast cancer.

### **Obesity and Dietary Fat**



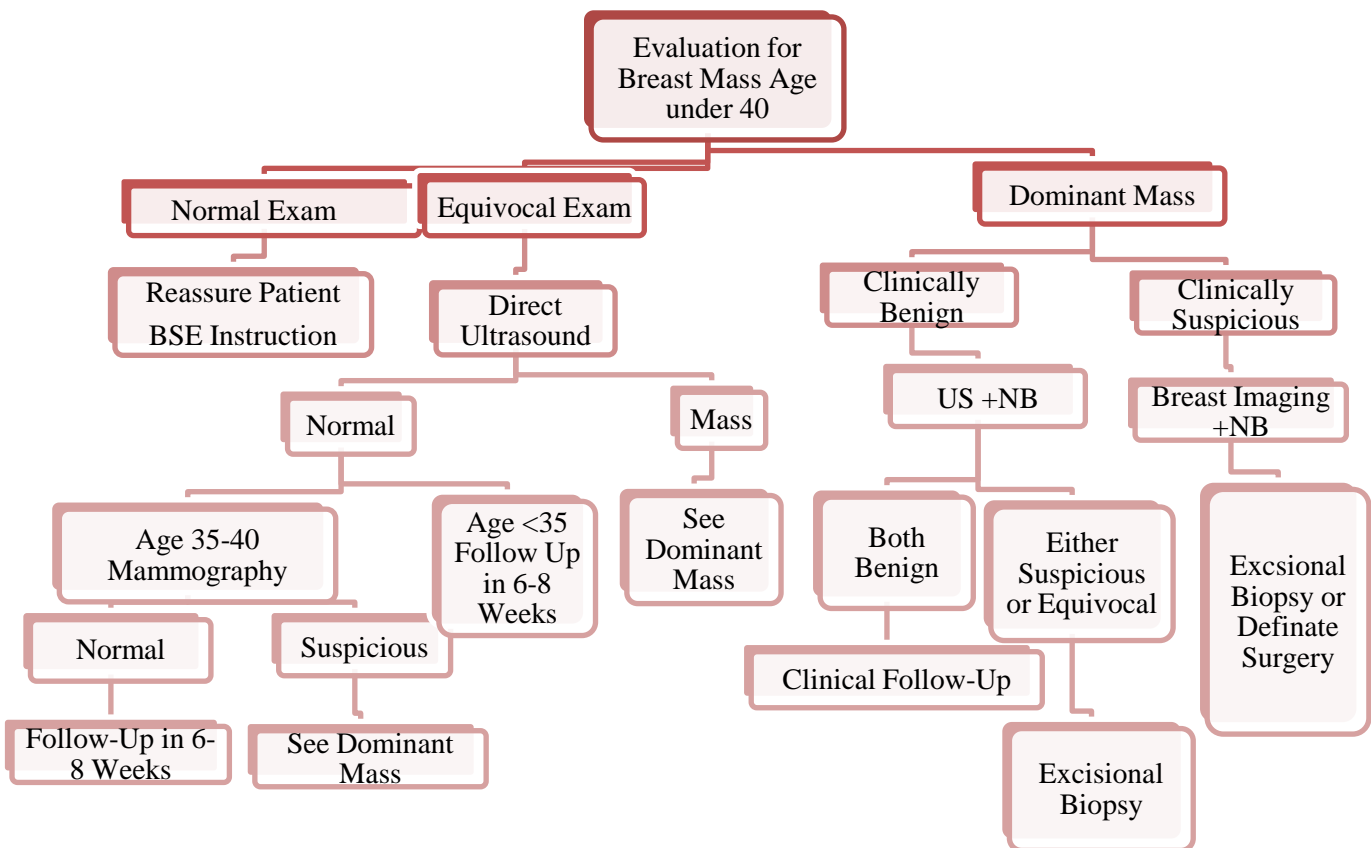
Obesity occurs in approximately 60% of patients at diagnosis of breast cancer and a further 60-75% gain weight during treatment. The majority of studies indicate that being obese is a poor prognostic factor and are associated with less favourable nodal status as well as increased risk of contralateral disease, recurrence, co-morbid disease and overall mortality (Doyle *et al*, 2006).

Obesity is associated with higher levels of insulin and other hormones in both pre and post menopausal women. Insulin and related proteins have been shown to increase the risk of cancer diagnosis and increase risk of cancer recurrence two-fold. Other metabolic hormones play a role between obesity and breast cancer recurrence. In pre menopausal women high levels of insulin like growth factor (IGF-1) are at increased risk of developing breast cancer, and this hormone has a central role in disease development and progression (Ligibel 2001).



## Diagnosis

### Diagnosis Pathway



**Figure 3.** Management of a woman younger than 40 years with the complaint of a breast mass. US= Ultrasound, NB= Needle Biopsy (core/fine needle aspiration), BSE= Breast Self Exam

### **Clinical History**

A careful baseline history is the first step of the breast examination, including questions regarding menstrual status and breast cancer risk factors, findings and changes to a breast mass.

### **Physical Examination**

The physical breast examination is a step by step process that should be carried out by an experienced practitioner, examining each breast, nipple and regional nodes through observation and palpation in both the erect and supine position.

Skin oedema of the breast erythema (skin reddening) or a palpable breast mass, nipple retraction, asymmetry or changes of the character of the skin and regional node presence, size and character should all be noted.

36% of self detected breast masses are confirmed on surgeon examination and therefore physical breast examination is vital to avoid more invasive diagnostic tools such as biopsies.

([www.breastcancer.org](http://www.breastcancer.org), Langhorne *et al*, 2007)

### **Common Structures Mistaken for Breast Mass during the Physical Exam**

- Normal Glandular Tissue
- Nodular Tissue
- Defect due to prior biopsy
- Tissue at the edge of breast/areola
- Costochondral Junctions
- Prominent Ribs
- Tendon of Pectoralis Major

### **Malignant Tumours: Clinical Findings on Physical Examination**

- Solitary
- Irregular Hard
- Adherent to adjacent structures and breast tissue
- Skin Changes
- Lymphadenopathy
- Nipple Retraction
- Pathologic Nipple Discharge

Typical symptoms of a dominant breast mass during a physical exam, skin dimpling, nipple changes, nipple changes or a three dimensional structure with indistinct but discrete borders and asymmetrical to the opposite breast are not infallible and should not be used alone for diagnosis of a dominant breast mass.

## Other Causes of Dominant Breast Mass

**Table 2. Other causes of breast masses**

|   | <b>Presentation</b>  | <b>Diagnosis</b>  | <b>Treatment</b>  |
|---|--|---|---|
| <i>Cystic Mass</i>  | <i>Firm/rubbery,</i>   | <i>Direct Ultrasound/<br/>Aspiration</i>  | <i>Aspiration, Follow-Up in<br/>6-8 weeks, Excisional<br/>Biopsy (if aspiration<br/>bloody)</i> |
| <i>Fibroadenomas<br/>(Common in women<br/>under 40 years)</i> | <i>Non-tender, round,<br/>macrolobulated masses<br/>that are firm/ rubbery.</i>  | <i>Triple Test Evaluation<br/>(Physical Exam,<br/>Mammography and Fine<br/>Needle Aspiration)</i>                             | <i>Observation/follow-up<br/>studies, complete<br/>surgical excision</i>                        |
| <i>Hematoma</i>   | <i>Ecchymosis (blood below<br/>subcutaneous tissue)<br/>painful tender mass.</i>   | <i>Breast Imaging-<br/>mammography</i>  | <i>Supportive garments,<br/>analgesics and needle<br/>biopsy (if malignancy<br/>suspected)</i>  |
| <i>Fat Necrosis</i>   | <i>Small, firm, painless, ill<br/>defined breast masses<br/>usually post penetrating<br/>trauma<br/>(lumpectomy/breast<br/>reconstruction)</i> | <i>Difficult to distinguish from<br/>carcinoma.<br/>Mammography/ultrasound<br/>and a clear history of<br/>related trauma.</i> | <i>Observation of mass.</i>   |
| <i>Hamartoma</i>  | <i>Soft- differ only slightly to<br/>surrounding breast<br/>parenchyma</i>   | <i>Mammography/ excisional<br/>biopsy if not visualised by<br/>mammography</i>  | <i>Surgical Excision</i>  |

(Langhorne, 2007)

### Mammography

Mammography is a screening or diagnostic tool used to detect breast masses or microcalcifications in women by using low energy X-Ray's that are often not palpable during a physical exam. During a mammography each breast is placed between two plates and compressed so that a clear image is obtained. During a screening mammography 2 X-Rays are taken of each breast of asymptomatic women to detect change at a preclinical stage, this is the primary role of mammography. After analyzing mammographic images, radiologists classify findings into five categories (see table). Any calcification found on mammographic examination needs further examination.

## American College of Radiology Breast Imaging Reporting and Data System (BI-RADS) Assessment Categories

| Category | Definition  |
|----------|---|
| 0        | Incomplete assessment; need additional imaging evaluation, prior mammograms for comparison, or both |
| 1        | Negative; normal mammographic study   |
| 2        | Benign findings   |
| 3        | Probably benign findings; initial short-interval follow-up suggested                                |
| 4        | Suspicious abnormality; biopsy should be considered   |
| 5        | Highly suggestive of malignancy; appropriate action should be taken                                 |
| 6        | Known biopsy-proven malignancy; appropriate action should be taken                                  |

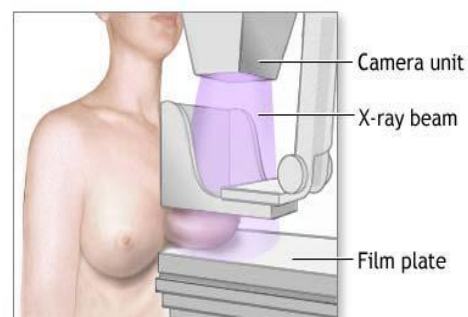


(www.breastcancer.org)

### Screening Mammography

Breast cancer can be diagnosed at an early and highly curable stage by the use of mammography, with screening-detected breast cancer having a 30% higher survival rate than symptomatic patients.

American Cancer Society and American College of Radiology guidelines for screening for breast cancer and appropriate use of mammography state:



In mammography, each breast is compressed horizontally, then obliquely and an x-ray is taken of each position

ADAM

### **Asymptomatic Women**

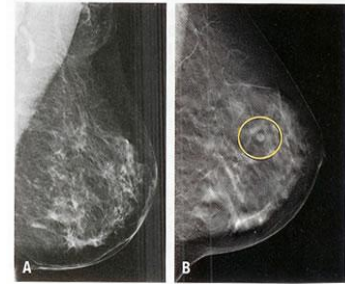
- Women of 20 years of age or older should perform Breast Screening Examination monthly.
- Women age 20 to 40 should have a physical breast examination every 3 years.
- Women age 40 should have baseline mammogram.
- Women 40 years and older should have a mammogram and physical breast exam every year.

### **Symptomatic Women**

- Any women experiencing signs or symptoms of breast cancer or unusual changes to the breasts should have a thorough breast examination including mammography and ultrasound despite age, to determine whether cancer is present.

### **Diagnostic Mammography**

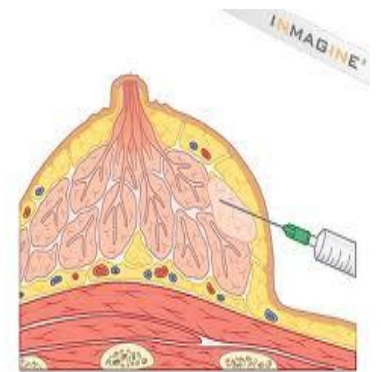
Diagnostic mammography is used to evaluate individuals with abnormal clinical findings to potentially characterize possible abnormalities detected by screening. A diagnostic mammography includes additional views such as spot compression or magnification views for a more detailed report.



### **Fine Needle Aspiration**

Fine Needle Aspiration (FNA) is a diagnostic technique of tumours and has widely used in the diagnosis of breast lesions.

Its sensitivity is 65-98% and specificity is 34-100% in diagnosing breast lesions (Irish Cancer Society, 2011). The palpable breast mass is trapped and a fine needle is slowly inserted into the mass. After several advances within the mass along multiple planes the needle is withdrawn and the specimen is placed on a slide for investigation.



### **Core Needle Biopsy**

Cone Needle Biopsy (CNB) provides material for histological evaluation. This technique is often used when there is no skilled cytopathologist to evaluate results from an FNA. CNB has the ability to distinguish between invasive cancer from ductal carcinoma in situ unlike FNA.

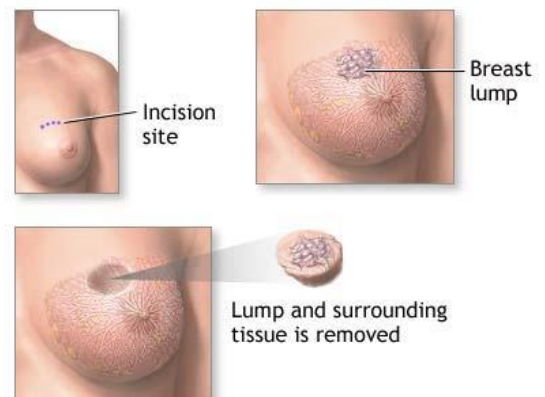
### **Stereotactic Biopsy**

An FNA or CNB that is guided by mammography for more accurate localisation of the breast mass is called a stereotactic biopsy.

### **Excisional Biopsy**

Excisional Biopsy is the complete surgical removal of a palpable breast lesion and is indicated if Needle biopsy is not feasible or if it is non-diagnostic or discordant with imaging results. Depending on the likelihood of malignancy, a rim of surrounding normal breast tissue can be removed.

The patient is usually under local anaesthetic and



sedation with placement of the incision determined by both oncologic and cosmetic considerations. Langer's lines are natural lines of skin tension and creasing and incisions along them produce optimal cosmetic results. The breast lesion is removed and the biopsy cavity is examined for further abnormality or suspect lesions.

(Irish Cancer Society, 2011)

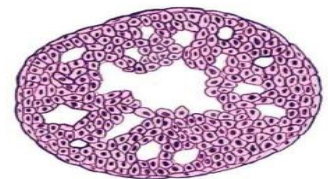
## **Pathology Report**

Below are the main sections of a pathology report for a breast cancer patient:

Non Invasive and  
Invasive Breast Cancer

### **1. Non-invasive or invasive breast cancer**

Non-invasive breast cancers stay within the ducts/lobules. Invasive cancers grow into the surrounding breast tissue.



### **2. Rate of cell growth**

### **3. Cell Grade**

A 1-3 Grade Scale with Gr 1 cells slightly different to normal cells and Gr 3 cells appearing very different to normal cells and growing in a rapid and disorganised pattern.

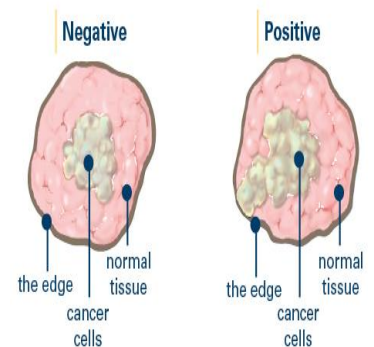
### **4. Tumour Necrosis (Cell death)**

This is often a sign of a rapidly growing aggressive form of breast cancer.

### **5. Size of Tumour**

### **6. Surgical Margins**

The surgeon examines the rim of the tissue removed (surgical margin). If there are no cancerous cells on the outer rim of the removed tissue it is described as **clear**, if there are cancerous cells present it is called **positive** and if there are cancerous cells close to the edge it is called **close**.



### **7. Vascular or Lymphatic Invasion**

Describes whether the cancerous cells have infiltrated the vascular/lymphatic system supplying the breast.

### **8. Ploidy**

Diploid cancer cells have the same amount of chromosomes as normal cells and tend to be slower growing, less aggressive cells. Aneuploid cancer cells have too many/too little amount of chromosomes and tend to be rapid growing aggressive cells.

## 9. Hormone Receptor Status

Hormone receptor status determines if hormone therapy would be appropriate.

## 10. HER2 Status

HER2 is a gene that when dysfunctional can play a role in the development of breast cancer. Breast cancers that are HER2 positive tend to grow faster and are more likely to spread than those that are HER2 negative.



## Stages of Breast Cancer

**Table 3. Breast cancer stages**

| Stage | TNM  | Description   |
|-------|--|---|
| 0     | Tis N0 M0  | In ductal carcinoma in situ (DCIS), abnormal cells are in the lining of a breast duct, nodules are not involved and no metastases   |
| IA    | T1 N0 M0   | Tumour is no more than 2 cms and has not spread to the lymph nodes.   |
| IB    | T0 N1 M0<br>T1 N1 M0                                     | Tumour is no more than 2 cms and cancer cells are found in lymph nodes.   |
| IIA   | T0 N1 M0<br>T1 N1 M0<br>T2 N0 M0                         | Tumour is no more than 2 cms and has spread to underarm lymph nodes. Or, tumour is between 2-5 cms, but the cancer hasn't spread to underarm lymph nodes.   |
| IIB   | T2 N1 M0<br>T3 N0 M0                                     | Tumour is 2-5 cms across and has spread to underarm lymph nodes. Or, the tumour is > 5 cms across, but hasn't spread to underarm lymph nodes.   |
| IIIA  | T0 N2 M0<br>T1 N2 M0<br>T2 N2 M0<br>T3 N1 M0<br>T3 N2 M0 | Tumour is < 5 cms across, and has spread to underarm lymph nodes that are attached to each other or nearby tissue. Or may have spread to lymph nodes behind the breastbone. Or it is > 5 cms across and has spread to underarm lymph nodes that may be attached to each other or nearby tissue. Or may have spread to lymph nodes behind the breastbone but not spread to underarm lymph nodes. |
| IIIB  | T4 N0 M0<br>T4 N1 M0<br>T4 N2 M0                         | Tumour can be any size and has grown into the chest wall or the skin of the breast. The breast may be swollen or have lumps. It may have spread to underarm lymph nodes, and these lymph nodes may be attached to each other or nearby tissue. Or it may have spread to lymph nodes behind the breastbone.  |
| IIIC  | Any T N3<br>M0   | Tumour can be any size, and it has spread to lymph nodes behind the breastbone and under the arm. Or has spread to lymph nodes above or below the collarbone.   |
| IV    | Any T Any<br>N M1  | Tumour can be any size and cancer cells have spread to other parts of the body.   |

*T = Status of primary tumour, N = Regional lymph nodes, M = Distant metastases*

*(Singletory and Connelly, 2006)*





## Psychological impact of a breast cancer diagnosis

The obtaining of a cancer diagnosis is a very emotional time for a woman, the following are common reactions:

- Shock and blame
- Fear, anxiety and panic
- Anger and resentment
- Depression and denial
- Sadness
- Uncertainty and loneliness
- Fatigue
- Vulnerability

Expressive coping and actively processing emotions is of benefit to patients at the time of diagnosis. It leads to lower medical appointments due to cancer related morbidities plus a higher quality of life (Stanton *et al*, 2002). However the expression of fear and anxiety is associated with lower quality of life and higher depression (Lieberman and Goldstein 2006).

The New Zealand cancer foundation provides a variety of methods for dealing with such a stressful time in a person's life:

<http://www.cancernz.org.nz/assets/files/Emotions&Cancer-LINKS.pdf>



## Breast Cancer in Men

Less than 1% of all breast cancers occur in men with a rate of 1 in 1,000. Due to the rarity of this condition, it is often over looked and when found, is at an advanced stage. Signs and symptoms, diagnosis and treatment options are all the same as those previously described.

### Risks

- Increasing age: Median age for men with breast cancer is 67.
- High oestrogen levels
- Klinefelter Syndrome: The presence of higher female hormones.
- A strong family history of breast cancer or genetic alterations
- Radiation exposure: Previous radiation therapy before the age of 30 has been shown to cause higher rates of male breast cancer.

Further information is available at: [http://www.breastcancer.org/symptoms/types/male\\_bc](http://www.breastcancer.org/symptoms/types/male_bc)



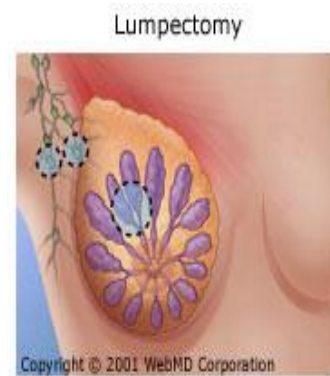
## Chapter 4: Treatment Options and the MDT



### Breast Surgery

#### 1) Lumpectomy

Lumpectomy is the removal of the breast tumour and some of the normal tissue that surrounds it. After lumpectomy, all the tissue removed from the breast is examined carefully to see if cancer cells are present in the margins. If cancer cells are found in the margins, additional surgery (re-excision) will be performed to remove the remaining cancer.



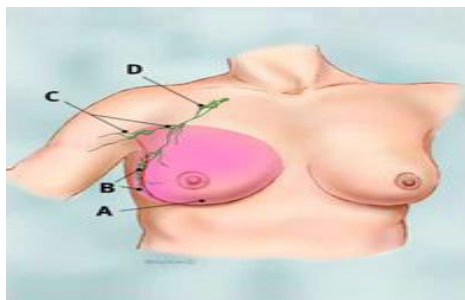
#### 2) Mastectomy:

##### *Simple/Total Mastectomy*

The entire breast is removed, excluding muscles underneath the breast and lymph nodes.. Sometimes both breasts are removed (a double mastectomy), often as preventive surgery in women at very high risk for breast cancer.

##### *Modified Radical Mastectomy*

Involves the removal breast tissue and axillary lymph nodes (B and C in illustration). No muscles are removed from beneath the breast.



**A:** pink highlighted area indicates tissue removed at mastectomy

**B:** axillary lymph nodes: levels I

**C:** axillary lymph nodes: levels II

**D:** axillary lymph nodes: levels III

##### *Radical Mastectomy*

Entire breast, axillary lymph nodes, and the pectoral muscles are removed. Less extensive surgery (such as modified radical mastectomy) has been found to be just as effective and so radial mastectomies are now rarely performed. However, this operation may still be done for large tumours that are growing into the pectoral muscles under the breast.

### ***Partial Mastectomy***

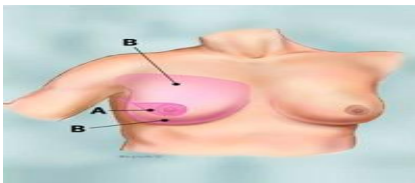
The removal of the cancerous part of the breast tissue and some normal tissue around it.

### ***Subcutaneous (“Nipple Sparing”) Mastectomy***

All of the breast tissue is removed, but the nipple is left alone.

### ***Skin Sparing Mastectomy***

Technique that preserves as much of the breast skin as possible during simple, total, or modified radical mastectomy to provide the skin needed for immediate reconstruction. Only the skin of the nipple, areola, and the original biopsy scar are removed to create a small opening for removal of the breast tissue.



**A = Area of skin removed during procedure**

**B = Breast tissue that is removed through small opening created at A**

### **Lymph node surgery**

#### ***Axillary lymph node dissection (ALND)***

Lymph nodes are removed (between 5 and 40 but usually less than 20) from the axilla and checked for cancer spread. Usually done at the same time as the mastectomy or lumpectomy, but can also be performed after through a separate incision. ALND increases the chance that the patient will have lymphoedema after surgery.

#### ***Sentinel lymph node biopsy (SLNB)***

To lower the risk of lymphoedema, SLNB may be used as an alternative to ALND. This procedure is a way of learning if cancer has spread to lymph nodes without removing as many of them. In this procedure the first lymph node to which a tumour is likely to drain is removed (known as the sentinel node). If there is no cancer in the sentinel node, it's very unlikely that the cancer has spread to other lymph nodes, so no further lymph node surgery is needed. The patient can avoid the potential side effects of a full ALND.

*(Wang et al 2011, [www.breastcancer.org](http://www.breastcancer.org), [www.cancer.org](http://www.cancer.org))*



## Non-musculoskeletal complications after surgery

### 1) Wound Infection:

Incidence rates for postoperative wound infections are variable and range from 3% to 19% (Morrow *et al*, 2009). Infection of the mastectomy wound may progress to late postoperative lymphoedema of the arm (Morrow *et al*, 2009). Risk factors include; open biopsy before mastectomy, obesity, diabetes, increase in age and prolonged suction catheter drainage (Vitug and Newman, 2007).



### 2) Seroma:

A seroma is a collection of serous fluid within a surgical cavity that is clinically evident. (Banerjee *et al*, 2001). After mastectomy, seromas occurs in the dead space beneath the elevated skin flap in approximately 30% of cases (Hashemi *et al*, 2004). Risk factors include; increase in age, BP and BMI (Van Bommel *et al*, 2011). Recent research recommends that in the presence of a seroma, arm mobility should be allowed immediately after surgery but structured physiotherapy exercise should be delayed until at least one week post-operatively (Shamley *et al*, 2005, Shcutz *et al*, 1997).

### 3) Tissue Necrosis:

Bland and Copeland, 2004 observed an incidence of 21% for minor and major necrosis of mastectomy skin flaps with associated wound infection (Banerjee *et al*, 2001).

### 4) Neuro-Vascular Structures Injuries and Phantom Breast Pain:

- Injury to the brachial plexus is a rare complication of mastectomy. The patient usually experiences moderate pain in the shoulder and arm in the immediate postoperative period (Kroner *et al*, 1992). The patient may note hyperesthesia and paraesthesia, as well as occasional "phantom" hyperesthesia in the mastectomy site (Stubblefield and Custodio 2006).
- Phantom breast syndrome is a continued sensory presence of the breast after it has been removed. It presents as a non-painful phantom sensation such as itching, nipple sensation, and premenstrual-type breast discomfort. There is currently a lack of high quality literature around the physiotherapy management of phantom breast syndrome however treatment generally involves education and analgesics (Stubblefield and Custodio 2006).



## Musculoskeletal Complications after surgery

### Upper Limb Morbidity in Breast Cancer

- Anything from 10-60% of women report some UL morbidity in 6 months -5 years after breast cancer surgery (Hayes *et al*, 2012).
- In general, there is scant evidence for physiotherapy beyond studies specific to lymphoedema.
- The commonly used clinical approach to treating UL morbidity includes gentle ROM exercises, stretching, and myofascial stretching, as well as dry needle techniques.
- Identification of analgesic positions or activities is important for self-management, and a gradual, progressive mobility program should be put in place. Physiotherapists will also be part of an ongoing multidisciplinary pain management programme.

### Problems:

UE dysfunctions in Breast Cancer:

- Subacromial Impingement Syndrome
- Adhesive Capsulitis (frozen shoulder) – idiopathic or traumatic (post-surgery) or result of recurrence
  - 2/52 post op onset: 86% post ALND, 45% SLND (Leidienous *et al*, 2003)
  - Better prognosis post surgery than resulting from recurrence of Ca Breast
- Rotator Cuff Disease
- Myofascial Dysfunction Lateral epicondylitis (tennis elbow)
- Scapular winging secondary to damage of long thoracic nerve during surgery
- Shamley *et al* (2007) found decreased muscle activity on EMG 3.3 yrs post treatment in serratus anterior, upper traps and rhomboids on the affected side.
- Increased risk of UE morbidity with mastectomy, radiation therapy, ALND

### Causes:

- Surgery
  - Higher risk of UE morbidity after mastectomy versus breast conserving techniques
  - Axillary lymph node dissection associated with more frequent complications
  - Injury to the intercostal brachial or thoracodorsal nerve occurs in 80-100% of patients undergoing axillary dissection and is the major cause of axillary pain.

- Post op pain: Adoption of abnormal analgesic and protective postures → altered scapulohumeral rhythm and changes in muscle lengths around shoulder → myofascial dysfunction of muscles
- Immobility & atrophy
- Issues such as infection may worsen/prolong wound pain and cause restrictive scarring/adhesions of underlying tissues in the chest wall.
- Radiotherapy
  - Abnormal postures held
  - Pectoralis tightness due to soft tissue damage
- Lymphoedema
  - Asymmetrical accumulation of fluid and weight on the involved shoulder
  - Greater load on the Rotator Cuff and its tendons
  - Tension overload
- A systematic review (Levangie and Drouin, 2009) found moderate to large losses in ROM for shoulder flexion and abduction in breast cancer patients after treatment (surgery +/- radiotherapy)
- Ebaugh *et al* (2011) cite causes as including post surgical pain, atrophy, neuropraxia, motor control alterations



**Table 4. Treatment of Complications**

| <b>MSK complaint</b> | <b>Caused by:</b>                         | <b>Treatment:</b>  | <b>Evidence:</b>  |
|----------------------|---|--|---|
| Scapular Winging     | Radiotherapy Surgery<br>Reconstruction    | Stretching; Strengthening;<br>Postural education                     | Ah Lee <i>et al</i> , 2010;<br>Macleod and Koelling<br>2011           |
| Decreased ROM        | Surgery<br>Reconstruction<br>Radiotherapy | Stretching; Progressive<br>ROM;<br>Manual techniques                 | De Rezende et al 2006<br>(RCT) Cheville et al<br>2008 Todd et al 2008 |
| Frozen shoulder      | Surgery<br>Radiotherapy<br>Reconstruction | Pain management, Early<br>Stretching/ROM exercises,<br>strengthening | Păcurar et al 2011<br>Cheville et al 2008                             |

|   |   |   |                   |  |
|---|---|---|-------------------|--|
| Myofascial Pain (Trigger Points)                | Surgery<br>Radiotherapy<br>Reconstruction           | Stretching,<br>Myofascial<br>Techniques, Strengthening              | Manual<br>Release | Păcurar et al 2011                                 |
| Altered scapulothoracic and glenohumeral motion | Surgery<br>Radiotherapy                             | Strengthening<br>Posture  | Stretching        | Ah Lee et al 2010 (RCT)<br>Macleod & Koelling 2011 |
| Subacromial Impingement Syndrome                | Pectoralis tightness due to surgery or radiotherapy | Strengthening<br>Posture<br>Muscle activation<br>pattern adjustment | Stretching        | (Păcurar et al 2011)                               |

### **Musculoskeletal Physiotherapy Interventions Post Surgery**

- Nerve injuries may resolve over several months without therapeutic intervention; however, muscle recruitment pattern, flow-on effect to surrounding musculature, and use of the arm may be permanently altered without intervention.
- Most patients will receive radiotherapy after surgery. **An important goal of physiotherapy, therefore, is to achieve adequate ROM for radiotherapy to start as soon as possible.** This requires 140-150 degrees of shoulder flexion.
- Use range of motion exercises to enhance tissue extensibility and promote normal movement patterns and should be encouraged indefinitely to avoid tissue contracture and concomitant alterations to the joint mechanics of the shoulder. Manual techniques such as myofascial release have also been considered useful in improving tissue extensibility and enhancing mobility.

#### **After discharge:**

- Patients should be advised to use their limb as normally as possible
- The unaffected limb should be used for heavier or repetitive tasks e.g. vacuuming, lifting, for the first 4-6 weeks
- Exercises should be performed at least once a day for the first year, or two years if radiotherapy has been received post-op
- Patients are advised not to drive for at least 2 weeks after the operation (consult with MDT for local practices)

- Most leisure activities, including swimming, can be started 2 months after surgery, provided the wound has healed. Confirm with surgeon in each site as they may have their own preferences.

**Todd *et al* (2008):** conducted a randomised single-blind control trial of 116 women undergoing surgery that included axillary node dissection for early breast cancer.

- The control group completed the standard protocol of full shoulder range of movement exercises starting within 2 days of surgery. The intervention group completed an alternative programme limiting movements to less than 90 degrees in all planes for the first week postoperatively before progressing to the standard protocol.
- Lymphoedema rates were significantly lower in the intervention group (n=6 versus 16). There were no significant differences between groups for other musculoskeletal morbidities, however abduction limitation was -11.2 degrees in the control group versus 2.9 degrees in the intervention group at one year (p=0.06).
- Details of exercise protocol below:

The following exercises should be started after surgery and continued for one week:

- Shoulder girdle elevation (shrugging)
- Elbow flexion/extension
- Pronation/supination with elbows extended and shoulders abducted to 45 degrees
- Hands touching anterior shoulder (full elbow flexion); flex shoulders to 90 degrees
- Hands touching anterior-lateral shoulder (full elbow flexion); abduct to 90 degrees
  - Repeat exercises four times a day
  - Build from 3 to 5 repetitions
  - Slow movements
  - Hold 5 second stretch; then try to push further to increase range (except last 2 exercises)

Progress to the following after one week, provided wound is healing well:

- Grasp hands; full shoulder flexion
- Full shoulder abduction; touch hands at end of range
- Hands on ears; medial/lateral rotation
- Extend shoulders with straight arm; flex elbows for medial rotation stretch (hands behind back)
  - Repeat exercises four times a day

- Build from 3 to 5 repetitions
- Slow movements
- Hold 5 second stretch; then try to push further to increase range (except last 2 exercises)
- When full movement returns repeat the exercises once a day for one year after surgery. [\(<http://www.lymphoedemaleeds.co.uk>\)](http://www.lymphoedemaleeds.co.uk)

A recent review recommended a pre-operative visit to obtain baseline measures, screen for post-operative risk factors (age, BMI, co-morbidities such as diabetes), educate the patient, and teach the post-operative exercises; an early post-operative visit to evaluate recovery progress and to detect any issues such as decreased ROM, AWS, weakness, or pain that may warrant extra treatment; and ongoing follow-up after cessation of treatment to evaluate the compounding effects of adjuvant therapy and additional reconstructive surgery on upper limb morbidity as well as identifying and addressing late developing morbidities.

**Table 5. Physiotherapy regime following surgery**

| <b>Immediately post-op</b>  | <b>@ 1-3 weeks</b>   | <b>@ 3-6 weeks: adjuvant therapy started</b>                       |
|---|--|--|
| Deep breathing, relaxation, and simple postural exercises of chin tucks and backward shoulder rolls to decrease apprehension and pain, improve postoperative pulmonary function, and prepare the patient for progression.                           | PT not indicated for all patients. We see only ones referred to us from surgical, medical, and radiation oncologists, nurse practitioners etc.                 | Aim for full ROM   |
| Shoulder ROM exercises including self-ROM, pendulum exercises, cane stretches, wall-walking and pulleys (towel or bathrobe belt over an opened door edge) within comfort range. 5 repetitions 3–4 times a day, gradually decrease to a twice a day. | Examine incision(s) for erythema, healing, bruising, fluid formation, and signs of infection. Correct and continue relaxation techniques and gentle stretches. | Initiate strengthening with theraband or light weights (4-6 weeks) |
| Distal upper extremity exercises are  | Once drain(s) are removed,   | Skin stretching and  |



|  |   |  |
|--|---|--|
| included but not stressed.                 | progress exercises by increasing range and hold times. Include bilateral and unilateral active movement, cane stretches, horizontal abduction, “praying child”, wall walking, and pulleys | scar tissue massage if wound is healed (4-6 weeks) |
| Additional chest PT if needed.             | Assess strength of serratus anterior  |  |
| Initial mobility – bed transfers etc       | Postural education  |  |
| Discouraging “imaginary sling” positioning | Reassurance re safety of exercise and that sensory changes are normal and may get worse before resolving  |  |
| Education                                  | Education re possible skin changes, lymphoedema   |  |
|  | Assess arm volumes and ROM for radiotherapy   |  |
|  | Encourage aerobic exercise such as walking  |  |

(Levangie and Drouin 2009, Ebaugh *et al*, 2011, Păcurar *et al*, 2011, McAnaw and Harris 2002)



## Chemotherapy

### Background

Chemotherapy is a systematic therapy that uses drugs to kill cancer cells both at the original site and any other sites in the body to which they may have spread. A complete chemotherapy treatment is made up of several cycles. One cycle entails a treatment period (could be one day, a few days in a row or every other day for a set period) followed by a recovery period during which no treatment is given. The number of cycles in a regimen and the duration of each regimen varies depending on the drugs used, but most take 3-6 months to complete.

## **Indications**

- Chemotherapy is used to treat:
  - Stage I, IIA and IIB and some stage III invasive breast cancers to destroy residual cancer cells post surgery and to reduce the risk of recurrence (adjuvant therapy)
  - Advanced (metastatic) breast cancer to destroy or damage the cancer cells
  - In some cases, chemotherapy is given before surgery to shrink the cancer
- Chemotherapy is given to nearly every woman in whom the cancer has spread to the lymph nodes
- Chemotherapy is often recommended in premenopausal women or if the cancer is hormone-receptor-negative and HER2-positive, as a more aggressive treatment because breast cancer is itself generally more aggressive in these patient groups.

## **Side effects**

### ***Cardiotoxicity***

Cardiac events associated with chemotherapy vary from mild transient blood pressure and/or electrocardiographic ECG changes to more serious arrhythmias, myocarditis, pericarditis, myocardial infarction and cardiomyopathy, which may end in left ventricular dysfunction (LVD) or congestive heart failure (CHF).

Cardiotoxicity can be treated with:

- Diuretics
- ACE inhibitors
- Beta-blockers
- Digitalis drug
- In severe cases, a heart transplant may be needed

### ***Palmar-Plantar Erythrodysesthesia (PPE)***

Skin reaction that occurs when medication leaks out of capillaries damaging the tissues, usually on the palms of the hands and soles of the feet.

Symptoms include:

- Numbness
- Tingling, burning,
- Redness
- Swelling
- Discomfort
- Tenderness
- Rash
- Cracked, flaking, or peeling skin
- Blisters, ulcers, or sores
- Intense pain

- Difficulty walking or using your hands

Patients should be advised **not** to exercise with this condition so therefore physiotherapist must liaise with doctor before starting an intervention.

**Table 6. Other side effects of chemotherapy that physiotherapy can influence**

| Symptom                             | Physiotherapy Role                    |
|-------------------------------------|---------------------------------------|
| Appetite Changes                    | Advise Exercise and weight management |
| Bone and joint pain                 | Pain relieving techniques             |
| Anxiety and Depression<br>Insomnia  | Relaxation, advise exercise           |
| Cognitive Impairment (Chemo-brain)  | Simple HEP(pictures), liaise with MDT |
| Constipation                        | Advise exercise                       |
| Dehydration                         | Advice re. fluid intake               |
| Fatigue                             | See section on fatigue                |
| Infection                           | Extra care with infection control     |
| Lung problems (PE, dyspnoea, cough) | Monitor exercise prescription         |
| Menopause                           | Advise Exercise                       |
| Myalgia                             | Pain relieving techniques             |
| Osteoporosis                        | Exercise prescription                 |
| Weakness and weight changes         | Exercise prescription                 |
| Ototoxicity                         | Balance Training                      |
| Neuropathy                          | See section on neuropathies           |
| Oedema                              | Advise on PRICE                       |

Furthermore, physiotherapists should be aware of and liaise with MDT regarding the following side effects;

- Abdominal Pain
- Anaemia
- Bleeding/bruising
- Blood clots
- Dizziness
- Dysphagia
- Fever
- Headaches
- Tinnitus
- Nausea/vomiting
- Nose bleeds

### **Psychological Impact**

#### *Anxiety and Depression*

42% of early stage breast cancer patients experience anxiety, depression or adjustment disorders (Kissane *et al*, 1998). Supervised group exercise significantly reduces depression and anxiety levels in a wide range of cancer patients undergoing chemotherapy (Midtgaard *et al*, 2005).

#### *Sexuality*

Breast surgery as well as chemotherapy, can induce a change in “body image, femininity, power of seduction and sexuality”, which can adversely affect the patient’s relationship with their partner (Hannoun-Levi 2005).



## **Radiotherapy**

### **Background**

Radiotherapy works by using high-energy beams of radiation to destroy the DNA of cells in its path. This radiation damage slows or stops the growth of the cells.

External radiotherapy: delivered by a machine, most commonly a linear accelerator.

Internal radiotherapy: a radioactive pellet is placed inside the body, close to the tumour, for a set amount of time.

### **Indications/Uses**

- 1) **Adjuvant (after surgery)**: Lumpectomy followed by whole breast radiation is often referred to as “breast preservation surgery” and is very common. It is recommended if the cancer is at an early stage, 4 cm or smaller, located in one site, removed with clear margins. It is also recommended after a mastectomy if:

- The cancer is 5 centimetres or larger.
  - The cancer had invaded the lymph channels and blood vessels in the breast.
  - The removed tissue has a positive margin of resection.
  - Four or more lymph nodes were involved or, in premenopausal patients, at least 1 lymph node was involved.
  - The cancer has invaded the skin.
  - A Cochrane review by Goodwin et al (2009) found that the addition of post-operable radiotherapy to chemotherapy reduced the risk of recurrence of either DCIS or invasive cancer in the treated breast by 51%.
- 2) **Before Surgery (Neoadjuvant):** used to shrink large tumours and enable better preservation of breast tissue or to make surgery easier to perform.
  - 3) **Palliative:** to reduce symptoms/complications of metastatic breast cancer, e.g. if a lung metastasis is blocking an airway causing dyspnoea.
  - 4) **Radical:** used alone to attempt to “cure” the cancer.

### **Timing**

- Usually after chemotherapy.
- External radiation usually starts about 3-6 weeks post op. It is usually given on most days of the week for 5-7 weeks in an outpatient setting, but this may differ between patients.
- Partial-breast radiation is usually given immediately post op.
- Intra-operative radiation is given just after the cancer has been removed.

### **Side effects**

- Skin colour changes
- Itching, burning, blistering, peeling, irritation/discomfort/pain over radiation site
- Chest pain
- Fatigue
- Low white blood cell count
- Cardiac complications
- Pulmonary complications (especially pulmonary fibrosis)
- Although now considered very rare, brachial plexopathies have historically been shown to develop up to 20 years post radiotherapy (Hayes *et al*, 2012).

- A Cochrane review in 2009 cited the potential long-term side effects of radiotherapy as vascular disease, lung damage/inflammation, development of lung cancer, or osteoradionecrosis (bone damage resulting in bone death at radiation site).

### **Psychological Impact**

Patients can have high levels of anxiety prior to starting radiotherapy. The most common source of anxiety for women is the effects of radiation on their future health (Halkett et al 2012).

Patients tend to have a better experience of radiotherapy than they expect and so their anxiety decreases once treatment is over (Halkett *et al*, 2012; Rahn *et al*, 1998)



## **Hormone Therapy**

### **Background/ Indications**

Cancer cells can be similar to or very dissimilar from normal cells in appearance and structure. Normal breast cells have oestrogen and progesterone receptors on their surface. When these hormones, particularly oestrogen, connect to the receptors, breast cells are stimulated to grow and divide. Some breast cancer cells will still have oestrogen and/or progesterone receptors on their surface. If the receptors are present, the cancer is said to be “receptor positive” for that hormone.

- About 80% of breast cancers are oestrogen-receptor positive.
- About 65% of oestrogen-receptor-positive breast cancers are also progesterone-receptor-positive.
- About 13% of breast cancers are oestrogen-receptor-positive and progesterone-receptor-negative.
- About 2% of breast cancers are oestrogen-receptor-negative and progesterone-receptor-positive.

Therefore, the growth of oestrogen-receptor positive tumours will be stimulated by oestrogen. Hormone therapy for Breast Cancer, also called Anti-Oestrogen therapy, works in two ways: to lower the amount of oestrogen in the body, and/or to block the action of oestrogen at the breast tissue by blocking the hormone receptors. Therefore, hormone therapy will only work on cancers which are hormone receptor positive.

The aims of hormone therapy are:

- To slow the growth and spread of advanced/metastatic breast cancer
- To prevent recurrence of early stage breast cancer in survivors
- To lower the risk of developing hormone-receptor positive breast cancer in women with a high (genetic) risk.

### **What type of patient receives what type of hormone therapy?**

#### Pre-menopause:

Before menopause the body's oestrogen is made primarily in the ovaries. The amount of oestrogen in the body, therefore can be lowered by shutting down the ovaries. This can be temporarily induced by drugs which are given as injections every few months, or permanently by surgical removal of the ovaries (oophorectomy). Women who are at high risk of developing breast cancer may choose to have a prophylactic oophorectomy to reduce the risk of hormone-receptor positive breast cancer. In women with early-stage hormone-receptor-positive breast cancer, oophorectomy plus 5 years of tamoxifen can increase the chances of 10 year disease-free survival from 47-66% and 10 year overall survival from 49-82% compared with surgery alone (Love *et al*, 2008).

#### Post-menopause:

After menopause, the ovaries stop producing oestrogen, but it is still made by aromatase. Hormone therapy in these women therefore focuses on stopping this process from occurring by use of aromatase inhibitors, and by blocking the action of oestrogen at the breast tissue.

#### Hormone Therapy and Obesity

Ewertz *et al* (2010) in a large, retrospective study found hormone therapy was less effective in obese women than lean women who had breast cancer. Since oestrogen is synthesized in adipose tissue after menopause, there is an excess of oestrogen in obese post-menopausal women (Ket *et al*, 2003). Obesity is also correlated with decreased plasma levels of sex-hormone-binding globulin, which naturally restricts the biologic activity of oestrogen (Sinicrope & Dannenberg 2010).

### **Types of drugs**

- Aromatase inhibitors (Arimidex, Aromasin, Femara): only used post-menopause, as they don't stop ovaries producing oestrogen. Lowers total amount of oestrogen produced in the body.
- Selective Oestrogen Receptor Modulators (Tamoxifen, Evista, Fareston): block oestrogen receptors only in the breast tissue. Used for pre- and post-menopausal women.
- Oestrogen Receptor Downregulators (Faslodex): block oestrogen receptors like SORMs; change shape of receptors so they are less effective; reduce number of receptors. Given when cancer is unresponsive to other hormone therapies

**Table 7. Side effects of Hormone Therapy**

|                        | Arimidex | Aromasin | Femara | Tamoxifen | Evista | Fareston | Faslodex |
|------------------------|----------|----------|--------|-----------|--------|----------|----------|
| <i>Bone/joint pain</i> | yes      | yes      | yes    |           | yes    | yes      |          |
| <i>Osteoporosis</i>    | yes      | yes      | yes    |           |        |          |          |
| <i>Bone thinning</i>   | yes      | yes      | yes    |           |        |          |          |
| <i>Nausea</i>          | yes      |          | yes    | yes       |        | yes      | yes      |
| <i>Vomiting</i>        | yes      |          | yes    |           |        |          | yes      |
| <i>Hot flashes</i>     | yes      | yes      | yes    | yes       | yes    | yes      | yes      |
| <i>Weakness</i>        | yes      | yes      |        |           |        |          |          |
| <i>Fatigue</i>         | yes      | yes      | yes    | yes       |        |          |          |
| <i>Headache</i>        |          | yes      |        | yes       |        |          | yes      |
| <i>Insomnia</i>        |          | yes      |        |           | yes    |          |          |



|                                     | <b>Arimidex</b> | <b>Aromasin</b> | <b>Femara</b> | <b>Tamoxifen</b> | <b>Evista</b> | <b>Fareston</b> | <b>Faslodex</b> |
|-------------------------------------|-----------------|-----------------|---------------|------------------|---------------|-----------------|-----------------|
| <i>Sweating</i>                     |                 |                 |               |                  | yes           | yes             |                 |
| <i>Dizziness</i>                    |                 |                 | yes           |                  |               | yes             |                 |
| <i>Drowsiness</i>                   |                 |                 | yes           |                  |               |                 |                 |
| <i>High cholesterol</i>             |                 |                 | yes           |                  |               |                 |                 |
| <i>Weight gain</i>                  |                 |                 | yes           |                  |               |                 |                 |
| <i>Blood clots</i>                  |                 |                 |               | yes              | yes           |                 |                 |
| <i>Stroke</i>                       |                 |                 |               | yes              | yes           |                 |                 |
| <i>Endometrial cancer</i>           |                 |                 |               | yes              |               | yes             |                 |
| <i>Increased bone / tumour pain</i> |                 |                 |               | yes              |               | yes             |                 |
| <i>Mood swings</i>                  |                 |                 |               | yes              |               | yes             |                 |
| <i>Depression</i>                   |                 |                 |               | yes              |               |                 |                 |
| <i>Hair thinning</i>                |                 |                 |               | yes              |               |                 |                 |
| <i>Constipation</i>                 |                 |                 |               | yes              |               |                 | yes             |
| <i>Dry skin</i>                     |                 |                 |               | yes              | yes           | yes             |                 |
| <i>Loss of libido</i>               |                 |                 |               | yes              |               |                 |                 |
| <i>Leg cramps</i>                   |                 |                 |               |                  | yes           |                 |                 |

|                                     | <b>Arimidex</b> | <b>Aromasin</b> | <b>Femara</b> | <b>Tamoxifen</b> | <b>Evista</b> | <b>Fareston</b> | <b>Faslodex</b> |
|-------------------------------------|-----------------|-----------------|---------------|------------------|---------------|-----------------|-----------------|
| <i>Swelling</i>                     |                 |                 |               |                  | yes           | yes             |                 |
| <i>Flu-like symptoms</i>            |                 |                 |               |                  | yes           |                 |                 |
| <i>Hypercalcaemia</i>               |                 |                 |               |                  |               | yes             |                 |
| <i>Rash</i>                         |                 |                 |               |                  |               | yes             |                 |
| <i>Vaginal discharge / bleeding</i> |                 |                 |               |                  |               | yes             |                 |
| <i>Vision problems</i>              |                 |                 |               |                  |               | yes             |                 |
| <i>Dry eyes</i>                     |                 |                 |               |                  |               | yes             |                 |
| <i>Diarrhoea</i>                    |                 |                 |               |                  |               |                 | yes             |
| <i>Sore throat</i>                  |                 |                 |               |                  |               |                 | yes             |
| <i>Back pain</i>                    |                 |                 |               |                  |               |                 | yes             |
| <i>Abdominal pain</i>               |                 |                 |               |                  |               |                 | yes             |
| <i>Injection site pain</i>          |                 |                 |               |                  |               |                 | yes             |

### **Psychological Impact**

- Premature menopause induced by adjuvant therapy is associated with poorer quality of life, decreased sexual functioning, menopausal symptom distress, psychosocial distress related to fertility concerns in premenopausal breast cancer patients

- Psychosocial distress is common in women who experience loss of fertility; loss of choice to have more children, or any children.
- Younger women more vulnerable to a decrease in emotional well-being, psychological distress, anxiety, feelings of unmet needs, concerns about finances, work, and poor self image than older women



### Complementary Therapies

These are also many complementary therapies that help to promote well-being and manage symptoms related to breast cancer and its treatment:

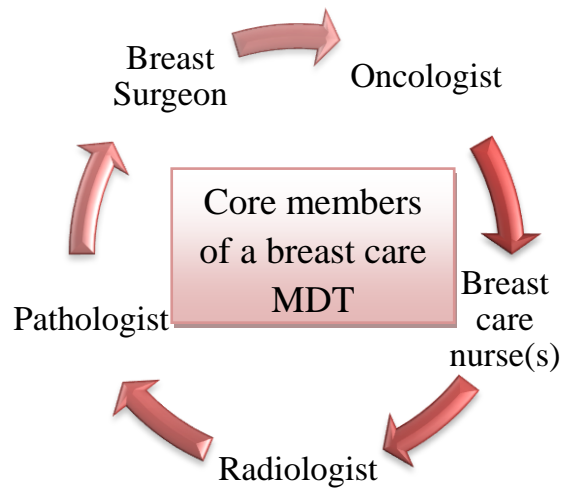
- |                                 |                      |
|---------------------------------|----------------------|
| • Acupuncture                   | • Nutrition Therapy  |
| • Aromatherapy                  | • Reflexology        |
| • Art Therapy                   | • Reiki              |
| • Autogenic Training            | • Relaxation Therapy |
| • Biofeedback                   | • Self Help Groups   |
| • Cognitive Behavioural Therapy | • Shiatsu            |
| • Colour Therapy                | • Spiritual Healing  |
| • Creative Writing              | • Stress Management  |
| • Dance Therapy                 | • Tai Chi            |
| • Energy Healing                | • Visualisation      |
| • Gentle Massage                | • Yoga               |
| • Hypnotherapy                  | • Meditation         |
| • Music Therapy                 |                      |

(Philips 2011)

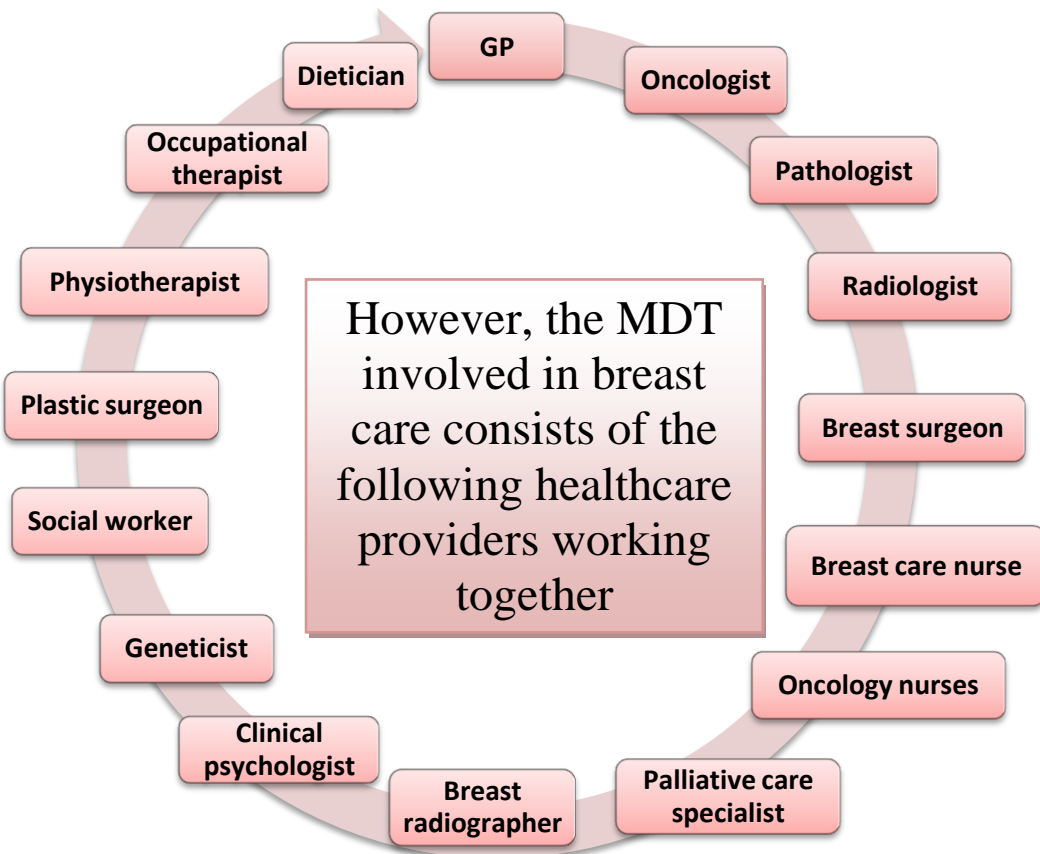


### Multidisciplinary Team

Multidisciplinary Team (MDT) care is associated with improved breast cancer survival (Kesson *et al* 2012). NICE guidelines (2002) recommend that women should be treated by a multidisciplinary team. MDTs result in improved clinical decision making, enhanced quality of care, better patient care and evidence-based treatment decisions (Sani *et al*, 2012).



**Figure 4. Core MDT members involved in breast cancer care**



**Figure 5. Multi-disciplinary team members involved in breast cancer care**

### **Oncologist:**

There are three main types of oncologists in breast cancer care:

- Medical oncologist: specializes in cancer drugs e.g. chemotherapy
- Surgical oncologist: specializes in the surgical aspects of cancer, including a biopsy and removal of the tumour, surrounding tissue, and occasionally, lymph nodes
- Radiation oncologist specializes in treating cancer with radiation therapy (NICE, 2002)

### **Role**

- Explain cancer diagnosis and stage to the patient and their family
- Discuss the treatment options and recommendations regarding the best course of treatment
- Help to maintain the patient's quality of life
- Manage pain and other symptoms/side effects e.g. constipation, nausea, vomiting, depression and fatigue. (American Society of Clinical Oncology, 2013)

### **Breast Care Nurse Role**

- Wound management
- Management of lymphoedema and the fitting of prostheses
- Providing emotional support
- Education about breast cancer, it's treatment and side effects
- Coordination of patient care
- Liaison and communication with MDT (Watts *et al*, 2011)

### **Dietician**

The role of a healthy diet in cancer prevention is well documented and it is widely accepted that a poor diet, lack of exercise, smoking and excessive alcohol consumption can increase an individual's risk of developing cancer (Davies *et al*, 2011). Healthy eating can reduce cancer risk, recurrence and help reduce lymphoedema volume (McNeely *et al*, 2011). Dieticians devise diet plans that aim to

- Ensure patients are as lean as possible within the normal range of body weight
- Avoid weight gain and increase in waist circumference

This is achieved through:

- Limiting consumption of energy-dense foods
- Consuming 'fast foods' sparingly

- Eating mostly foods of plant origin
- Eating at least 5 portions of various non-starchy vegetables and fruit a day
- Eating relatively unprocessed cereals(grains) and/or pulses(legumes) with every meal
- Limiting refined starchy foods
- Limiting intake of red meat and avoiding processed meat
- Limiting consumption of salt

(World Cancer Research Fund/American Institute for Cancer Research, 2007)

Dieticians also treat and provide advice on side effects of breast cancer treatments: nausea, mouth soreness, taste changes, constipation, diarrhoea, weight gain/loss, bone health and other specific dietary considerations due to co morbidities (Breast Cancer Care 2009)

### **Occupational Therapist:**

**Role:** To facilitate patients to achieve maximum functional performance, both physically and psychologically, in everyday living regardless of their life expectancy (Penfold 1996).

- Assessment and practice of ADL's: self-care tasks (e.g. wash, bath, dress, etc.), productivity (household tasks, work) or leisure activities.
- Transfer assessment and practice
- Equipment provision
- Home assessments
- Pressure care: assessment and provision of pressure relieving cushions to minimize the risk of pressure areas
- Relaxation training and stress/anxiety/breathlessness management
- Fatigue management: advice about life style management and energy conservation.
- Referral to and liaison with community staff
- Support groups and educational programmes: provide information about coping strategies, addressing body image
- Splinting/orthotics: assessment for and fabrication of hand and foot splints
- Encouraging patients to engage in meaningful leisure activities
- Treatment of brachial plexopathy e.g., sensory retraining
- Create an inviting, nonclinical environment



(Vockins 2004; Lattanzi *et al*, 2010)



## Specialist Opinions

### **Anne Merrigan: Surgical Oncologist in Breast Cancer (Specialist ) in MWRH**

- Spoke about the importance of the physiotherapy role as part of the MDT and in the provision of pre-operative exercises.
- Addressed the rising levels of obesity in Ireland and the impact this has on breast cancer risk.
- Focused on cancer care pathways in Ireland and the route of breast cancer diagnosis.
- Emphasised the positive effects physiotherapy has on regaining shoulder ROM and function following surgery.
- Stated that lymphoedema bandaging in the treatment of lymphoedema is often a shared role between physiotherapists and nursing staff.
- Discussed the advice she gives to patients following surgery regarding pain, numbness and

### **Karen McCreesh (Physiotherapist and lecturer in UL)**

- Outlined the importance of recognising red flags related to cancer such as constant non-remitting pain, night pain, weight loss in outpatient physiotherapy settings.
- It is also helpful to be aware of where secondary tumours tend to spread to for breast cancer that is the thoracic spine and lungs, so we should be

### **Angela Ryan (Senior physiotherapist in Milford Hospice)**

- Empathised that treatment is patient specific in palliative care
- Spoke about barriers to treatment: disease progression, fatigue, pain.
- Stated the main goal of treatment in palliative care is focused on maintenance rather

### **Sinead Cobbe (Senior physiotherapist in palliative care in Milford Hospice)**

- Demonstrated how to perform lymphoedema bandaging on breast cancer patients.
- Stated that patients are often quite self-conscious about lymphoedema and have difficulties with self image.
- Reported that patients report very high levels of pain following radiotherapy burns; physiotherapy often focuses on desensitising

## Chapter 5: Barriers



### 1) Lymphoedema

#### Background

#### The Lymphatic System

The lymphatic system is a one-way drainage system, which works in close synergy with the cardiovascular system. It is composed of a vast network of lymph vessels and lymph nodes.

#### **Lymph vessels:** (Absorption)

A network of thin vessels that transport lymph and lymphocytes (white blood cells that fight infection and the growth of tumours) throughout the body.

#### **Lymph nodes:** (Filtration)

Small, bean-shaped structures located along the lymph vessels. Their function is to filter lymph and store lymphocytes. Lymph is filtered through several lymph nodes where it is inspected for foreign substances.

#### **Lymphatic Ducts:** (Drainage)

Eventually, the lymph vessels empty into the lymphatic ducts which drain into one of the two subclavian veins. Lymph drains from the lower limbs into the lumbar lymphatic trunk. The lymphatic vessels of the left arm drain into the left subclavian lymphatic trunk and lymph channels of the right arm drain into the right subclavian lymphatic trunk.

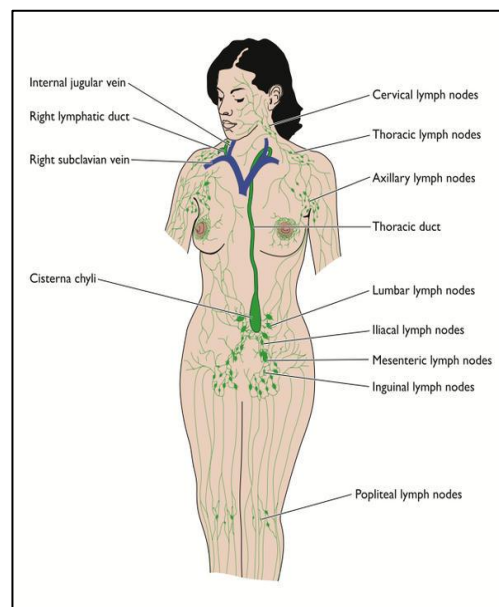
**Useful Link:** <http://www.youtube.com/watch?v=Kh-XdNnTZUo>

**Clinical Significance:** The extensive nature of the lymphatic network allows it to serve as a way for cancer cells to spread throughout the body. If the lymph nodes are not successful in destroying cancer cells, the nodes may become sites of secondary tumours.

(National Cancer Institute 2011, Lymphoedema Framework 2006, Vander *et al* 1994)

#### Lymphoedema

Lymphoedema is a condition marked by the accumulation of fluid in the tissue surrounding capillaries due to impaired lymph flow. ***Breast Cancer Related Lymphoedema*** is the build up





of fluid in the upper extremity due to impairment of the lymph vessels following removal of the axillary lymph nodes and possibly exacerbated by radiation treatment (Smith and Miller, 1998). Lymphoedema has been reported to occur within days and up to 30 years after breast cancer treatment but most commonly occurs within 12 months post-surgery.

(Lacomba *et al*, 2010, Wang and Oliver 2010, Cormeir *et al*, 2010)

### **Incidence and Risk Factors**

The overall incidence of arm lymphoedema can range from 8% to 56% at 2 years after breast cancer treatment (Paskett *et al*, 2007).

**Table 8. Incidence and Risk Factors for Lymphoedema following breast cancer treatment**

| <b><u>Article</u></b>              | <b><u>Risk Factors</u></b>  | <b><u>Incidence</u></b> |
|------------------------------------|---|-------------------------|
| Thomas-MacLean <i>et al</i> , 2008 | <ul style="list-style-type: none"> <li>- &gt;5 lymph nodes removed</li> <li>- Postoperative infection</li> <li>- Radiation to axilla</li> </ul>   | 12%                     |
| Hayes <i>et al</i> , 2008          | <ul style="list-style-type: none"> <li>- Upper body symptoms at baseline</li> <li>- Older age</li> <li>- More extensive surgery or node removal</li> <li>- Sedentary lifestyle</li> <li>- Higher BMI</li> </ul> | 8-28%                   |
| Park <i>et al</i> , 2008           | <ul style="list-style-type: none"> <li>- Higher staging</li> <li>- Radical mastectomy</li> <li>- Axillary node dissection</li> <li>- Radiotherapy</li> <li>- BMI &gt;25 kg/m<sup>2</sup></li> </ul>             | 24.9%                   |
| Paskett <i>et al</i> , 2007        | <ul style="list-style-type: none"> <li>- Greater number of nodes removed</li> <li>- Chemotherapy</li> <li>- Obesity</li> </ul>  | 32%-54%                 |

**Early signs and symptoms – What to look out for?**

- Decreased upper extremity mobility
- Skin tightness
- Feeling of “heaviness” in the upper extremity
- Clothes and jewellery tighter on affected arm
- Numbness in upper extremity

**Table 9. Staging of lymphoedema (classification of severity):**

|                       |   |
|-----------------------|---|
| <b><u>Stage 0</u></b> | Lymphatic function is reduced, lymphoedema is present but is not apparent on physical examination   |
| <b><u>Stage 1</u></b> | Early accumulation of fluid that is relatively high in protein content. Swelling may subside with limb elevation. “Pitting” of the skin may occur.  |
| <b><u>Stage 2</u></b> | Tissue fibrosis develops. Limb elevation alone rarely reduces tissue swelling. “Pitting” is manifest.   |
| <b><u>Stage 3</u></b> | A severe increase in irreversible swelling may develop, along with skin changes, such as thickening of the skin, fat deposits, and warty over-growths. The tissue is hard (fibrotic) and “pitting” is absent. |

(Lymphoedema Framework 2006)

**Diagnosis:** Early stage lymphoedema is often difficult to diagnose and differentiate from other causes of swelling. In almost all cases an in-depth medical history and physical examination are enough to make a diagnosis. An MRI scan may be useful to confirm diagnosis or for differential diagnosis.

**Assessment**

**Table 10. Lymphoedema Assessment**

| Subjective   | Objective  |
|--|--|
| <ul style="list-style-type: none"> <li>• Current symptoms: Daily pattern, frequency, intensity, duration</li> <li>• Pain</li> <li>• Functional Impairments, dominant hand</li> <li>• History of Oedema, previous treatment?</li> <li>• Altered sensation</li> <li>• Past Medical History: Length of time since surgery/Other co-morbidities</li> <li>• Social History (body image and psychosocial)</li> </ul> | <p>(Always compare to other side)</p> <ul style="list-style-type: none"> <li>• Range of motion</li> <li>• Increase in upper limb volume/circumference</li> <li>• <b>Skin condition:</b> <ul style="list-style-type: none"> <li>- broken/fragile/shiny/ulcerated/blisters</li> <li>- Infection</li> <li>- Warmth/cold</li> <li>- Pitting</li> <li>- Stemmers sign</li> <li>- Lymphorrea</li> <li>- Papillomatosis</li> </ul> </li> </ul> <p style="text-align: right;">} (See below)</p> <ul style="list-style-type: none"> <li>• <b>Arterial signs:</b> <ul style="list-style-type: none"> <li>- Cyanosis</li> <li>- White colour of limb on elevation</li> <li>- Slow capillary refill</li> </ul> </li> <li>• <b>Vascular Assessment:</b> <ul style="list-style-type: none"> <li>- Pulses</li> <li>- Sensation</li> <li>- Blood Pressure</li> </ul> </li> </ul> |
| <ul style="list-style-type: none"> <li>• Stemmer’s sign = a fold of skin that cannot be raised when pinched and lifted up at base of middle finger is indicative of lymphoedema</li> <li>• Lymphorrea = leakage of lymph fluid from skin surface.</li> <li>• Papillomatosis = development of warty growths on skin consisting of dilated lymphatics and fibrosis tissue.</li> </ul>                            |  |



(Lymphoedema Framework 2006)



## **Measuring Lymphoedema**

Increase in tissue volume of the upper limb is calculated by circumference measurement (Devoogdt *et al*, 2011). Chen *et al*, (2008) found it a reliable measure for assessing arm volume in breast cancer patients. Taylor *et al*, (2006) found that a narrow tape gives more accurate results.

### **Table 11. Technique to measure circumference of upper limb:**

Ensure the limb is supported and in a straight position. No tension should be applied to the tape during measurement.

- Around the dorsum of the hand
- Around the wrist
- 10cm below the olecranon process
- 10cm above the olecranon process
- Repeat with the other arm



(Limb-to-limb difference: >2cm difference at any of the 4

### **Table 12. NICE Guidelines 2009 for Management of Lymphoedema**

#### **Management**

#### **4 Cornerstones of Care**

- 1) Manual Lymph Drainage
- 2) Compression Garments
- 3) Exercise
- 4) Skin Care

- 1.5.1 Assess patients with lymphoedema for treatable underlying factors before starting any lymphoedema management programme.
- 1.5.2 Offer all patients with lymphoedema complex decongestive therapy (CDT) as the first stage of lymphoedema management.
- 1.5.3 Consider using multilayer lymphoedema bandaging (MLLB) for volume reduction as a first treatment option before compression hosiery.
- 1.5.4 Provide patients with lymphoedema with at least two suitable compression garments. These should be of the appropriate class and size, and a choice of fabrics and colours should be available.
- 1.5.5 Provide patients with lymphoedema with clear, written information and the contact details of local and national lymphoedema support groups.

- 1) **Manual Lymphatic Drainage:** A manual technique to remove excess fluid and protein from the tissues. It consists of light, rhythmical strokes performed in the direction of normal lymphatic flow. MLD stimulates lymphangions to increase their activity, which results in a decompression and emptying of obstructed lymphatic channels. Care must be taken not to direct the fluid into the affected axilla. Usually, it is performed for 45-60 minutes, 4 days a week for 2-4 weeks (acute phase of treatment) (Chiefertz and Hanley, 2010). MLD still remains a much specialised area and requires specialised training. Overall, the efficacy of MLD remains to be proved, but there is no doubt that it is of immense value in providing psychological and symptomatic benefits (Lymphoedema Framework 2006).

Link to MLD courses in conjunction with MLD Ireland:

[http://www.mldireland.com/courses\\_events.html](http://www.mldireland.com/courses_events.html)

- 2) **Compression Bandaging:** Multi-layered bandaging of the affected limb. This is a precise and accurate procedure using specific bandages and interfacing materials that provide external support to the skin. The gradient compressive forces push the lymphatic fluid from the interstitium into the lymph vessels increasing lymph reabsorption and stimulating lymphatic transport. In the acute phase (0-5 days) short-stretch bandages are used to reduce limb volume. Their efficiency is increased when exercises are done in conjunction due to dual-action of muscle pump and compression. The bandages also help to maintain the reductions achieved with MLD and may even cause further reduction. Once limb volume is reduced substantially, patient is fitted for a compression garment to maintain the achieved volume.

(Korpan, 2011; Lymphoedema Framework 2006; Kligman 2004)

- 3) **Exercise:** Decongestive exercises are most effective if performed while the patient wears compression garments or bandages. Exercise should consist of both range of motion/flexibility and strengthening and should be specific to each individual.

- Immediate post-op initiation of ROM ex can improve UL mobility, shoulder function and QoL (Cinar *et al*, 2008; Kilgour *et al*, 2008; Gordon *et al*, 2005).
- Resistance exercise causes a reduction in lymphoedema and an increase in physical fitness, body composition and self-esteem (Courneya *et al*, 2007, Ahmed *et al*, 2006).
- Abdominal breathing exercises are also beneficial in facilitating lymphatic flow. (Lymphoedema Framework, 2006).

**Table 13. Exercise Guidelines for patients with lymphoedema**

| Type      | Session Length (min) | Sessions per week | No. of weeks | Comments   |
|-----------|----------------------|-------------------|--------------|--|
| ROM       | 40-60                | 3-5               | 8-12         | Focus on shoulder abduction, external rotation and flexion movements. Options include direct anatomic plane movements, scapular plane movements, or functional and combined movements (e.g., hand behind head, which will combine all movements)   |
| Strength  | 30-60                | 2                 | 8-12         | Resistive exercises should address all the main upper extremity muscle groups. Use 1-RM to determine each patient's lifting weight; patients should exercise at 60%-70% of estimated 1-RM Two sets of 8-12 repetitions per exercise; increase weights when the patient can perform 12 repetitions with minimal difficulty. |
| Endurance | 45                   | 3-5               | 8-12         | Target heart rate should be 60%-80% of heart rate reserve (Karvonen formula) or 3-5 on the Borg Rate of Perceived Exertion   |

*ROM = Range of Motion, 1RM = 1 repetition maximum*

(Cheifetz & Haley, 2010)

**Note:** Special precaution should be taken after breast cancer surgery as patients are advised to avoid heavy lifting for 4-6 weeks after surgery.

**4) Skin Care:** Skin care and hygiene play an essential part in the treatment of lymphoedema. Daily skin cleansing with antibacterial washes and neutral balanced PH lotions will help to eliminate possible bacterial and fungal growth and so minimise the possibility of repeated attacks of cellulitis or lymphangitis. Educating patients has a key role in maintaining good skin care. Patients should be advised to:

- Aim to prevent infections: Keep skin clean and dry, moisturise daily using PH neutral cream e.g. E45
- Be vigilant and avoid damage to skin e.g. cuts, injections and acupuncture to affected arm. Wear gloves when doing duties, shave with electric razor, treat cuts with antiseptic lotion.
- Avoid extreme heat e.g. sauna/sunburn (lack of strong evidence to support this)

(Lymphoedema Framework 2006)

**Table 14. Outcomes of treatment for lymphoedema**

| <b>Intervention</b>                   | <b>Outcomes</b>                       | <b>Total no. of studies</b> | <b>No. of high quality studies</b> | <b>Level of Evidence for benefits</b>  |
|---------------------------------------|---------------------------------------|-----------------------------|------------------------------------|--|
| MLD                                   | Symptoms: Pain, heaviness, discomfort | 3                           | 0                                  | No evidence of benefit   |
|                                       | QoL                                   | 1                           | 0                                  | No evidence of benefit   |
| Aerobic Exercise                      | Symptoms: Pain, tenderness            | 2                           | 1                                  | Strong evidence (Schmitz 2009)   |
|                                       | QoL                                   | 2                           | 1                                  | Strong evidence (Tidar 2009)   |
| Deep mechanical oscillations with MLD | Symptoms: Pain, Swelling              | 1                           | 1                                  | Moderate evidence for benefit for pain and swelling in short term (4wks) (Jahr et al, 2008)                      |
|                                       | Lymphoedema Volume                    | 1                           | 1                                  | Moderate evidence for short term benefits (Jahr et al, 2008)   |
| Upper Limb Exercise                   | Lymphoedema volume                    | 3                           | 2                                  | strong evidence of neutral impact (Schmitz, 2009) (Tidhar, 2009)   |
| Compression Bandaging                 | Lymphoedema volume                    | 1                           | 1                                  | Moderate evidence of benefit for both upper and lower extremities in both the short and long term (Badger, 2000) |

*(McNeely et al 2011)*

### **Kinesio Taping and Lymphoedema – New Treatment Approach**

Some lymphoedema therapists are beginning to use Kinesio tape as part of the treatment plan for lymphoedema. The theory is that the tape can mimic the effect of **MLD**, stimulating the movement of lymph by stretching the skin wherever it is placed. However, its effectiveness hasn't been widely studied ([www.breastcancer.org](http://www.breastcancer.org)). Chou *et al*, (2012) carried out a single case study on a patient with unilateral secondary malignant breast – cancer lymphoedema and found that kinesio taping could be another choice for contraindicating pressure therapy patients instead of compressive bandaging, however it should not replace it. Furthermore,

Tsai *et al*, 2009 found that there was no significant difference between kinesio taping and bandaging for the treatment of cancer-related lymphoedema.

**Table 15. Evidence for kinesio taping in breast cancer patients with lymphoedema**

| Study                                   | Subjects                             | Intervention  | Outcome measures   | Conclusion  | Strengths/Limitations  |
|---|--------------------------------------|---|--|---|--|
| <b>Tsai et al 2009</b><br>(pilot study) | 41(20 bandaging ; 21 kinesio taping) | 30mins MLD, 1hour pneumatic compression, exercises for 20 mins and short stretch bandage/kinesio tape applied (patients told to keep it on as long as possible) | - Water-displacement volumetric measurements and circumference measurements<br>-Water composition of the UL<br>-Lymphoedema-related symptoms (not validated)<br>-HRQoL (scale not validated for lymphoedema) | Patients reported using the Kinesio tape was comfortable and convenient in daily activities. However, there were more wounds that occurred for those in the Kinesio tape group. | They excluded patients whose condition could be reasonably expected to improve/worsen e.g. active cancer/symptoms for less than 3 months<br><br>Small sample size<br><br>No p-values for baseline data |

**Useful Link:** Lymphoedema Framework of Best Practice Guidelines (2006) accessible at: [www.woundsinternational.com/pdf/content\\_175.pdf](http://www.woundsinternational.com/pdf/content_175.pdf)





## **2) Axillary Web Syndrome (AWS)**

Axillary Web Syndrome is the presence of a network of visible fibrous cords underneath the axillary skin and is hardened and painful upon performance of shoulder abduction. The network is always present in the axilla and extends along the medial face of the ipsilateral arm, frequently below the cubital cavity and occasionally until the base of the thumb.

Overall, this syndrome has been poorly researched. The incidence of AWS after axillary lymph-node dissection was evaluated in a prospective study by Lacomba *et al*, (2009). Altogether 56 out of 116 patients who underwent axillary lymph-node dissection were found to have axillary web syndrome (incidence of 48.3%).

### **Physiology**

The main hypothesis relating to AWS pathology is lymph vein rupture during the axillary node dissection surgical procedure. It is unrelated to the number of lymph nodes compromised or with the stage of the illness.

### **AWS and Physiotherapy**

Physiotherapists often manage patient care relating to AWS, but there are currently no formal physiotherapy guidelines on which to base therapy interventions.

A case report carried out by Fourie and Robb (2009), reported on the physiotherapy management of AWS on a patient who experienced sudden loss of shoulder movement and development of axillary cords 22 days after mastectomy and axillary dissection. The management included manual therapy, mostly using soft tissue treatment techniques, combined with education and advice. Pre-morbid range of movement was achieved within 11 treatments, spread over 3 weeks and after 16 weeks the patient experienced no pain. Furthermore, the patient returned to full-time employment after the seventh treatment by a physiotherapist. This shows that physiotherapy may prove beneficial in limiting subsequent shoulder dysfunction in patients with AWS however; results of this study must be interpreted with caution. Further research is needed to develop a standardised treatment approach for AWS.



### **3) Brachial Plexopathy**

Radiation damage of the nerves or metastatic invasion of the plexus causing localised ischemia and failure of cell proliferation. This results in fibrosis of the vasa nervorum (small arteries supplying blood to peripheral nerves) (Ahmad *et al*, 1999). Radiation-induced brachial plexopathy can occur when radiotherapy is directed at the chest, axillary region, thoracic outlet, or neck. The radiation dose, treatment technique, and concomitant use of chemotherapy all demonstrate significant association with the development of radiation injury to the brachial plexus (Bajrovic *et al*, 2004).

#### **Incidence of Brachial Plexopathy.**

- Incidence of less than 0.5% in breast cancer patients (Eksioglu *et al*, 2007).
- Onset occurs typically between 1 – 4 years post treatment (can occur up to 35 years post treatment) (Eksioglu *et al*, 2007).
- Two thirds of the patients diagnosed with radiation-induced brachial plexopathy appear to have a stable course over months to years with a gradual worsening of paresthesia and pain. One third of patients deteriorate rapidly and exhibit significant weakness, lymphoedema, and pain (Johansson *et al*, 2002).

#### **Signs and Symptoms**

- Numbness
- Paraesthesia
- Dysesthesia
- Swelling and weakness of the arm
- Motor deficits of the ipsilateral upper extremity

#### **On Examination**

- Neurologic findings in the C5-C6 myotomes and dermatomes, as well as diminished deep tendon reflexes supplied by C5-C6.
- CT scanning of the brachial plexus may reveal a diffuse infiltration of the tissue planes.
- MRI often reveals low signal intensity on T2-weighted images; minimal changes are found with gadolinium.

**Figure 6. Modified LENT-SOMA scale**

| Modified LENT-SOMA scale |   |
|--------------------------|---|
| Grade 1                  | Mild sensory deficits, no pain, no treatment required                                 |
| Grade 2                  | Moderate sensory deficits, tolerable pain, mild arm weakness                          |
| Grade 3                  | Continuous paraesthesia with incomplete paresis, pain medication required             |
| Grade 4                  | Complete paresis, excruciating pain, muscle atrophy, regular pain medication required |

### **Treatment**

- Information- empower patients to help themselves cope with the condition.
- Weakness - Assign therapeutic exercise to enhance flexibility and strength of the shoulder girdle, paracervical and parathoracic muscles. Progressive graded exercises plus muscle re-education along with mobilisation and stretching exercises can be used to maintain ROM and strength.
- Pain - Medication especially adjuvant analgesics will be used in treatment. Pain relieving techniques such as heat, ice, TENS, and massage may also be control pain.
- Functional care – Advice on positioning, splinting, use of supportive equipment like slings.
- Surgery – Decompression and revascularisation of nerve tissue. Nerve blocks may be considered in severe cases.

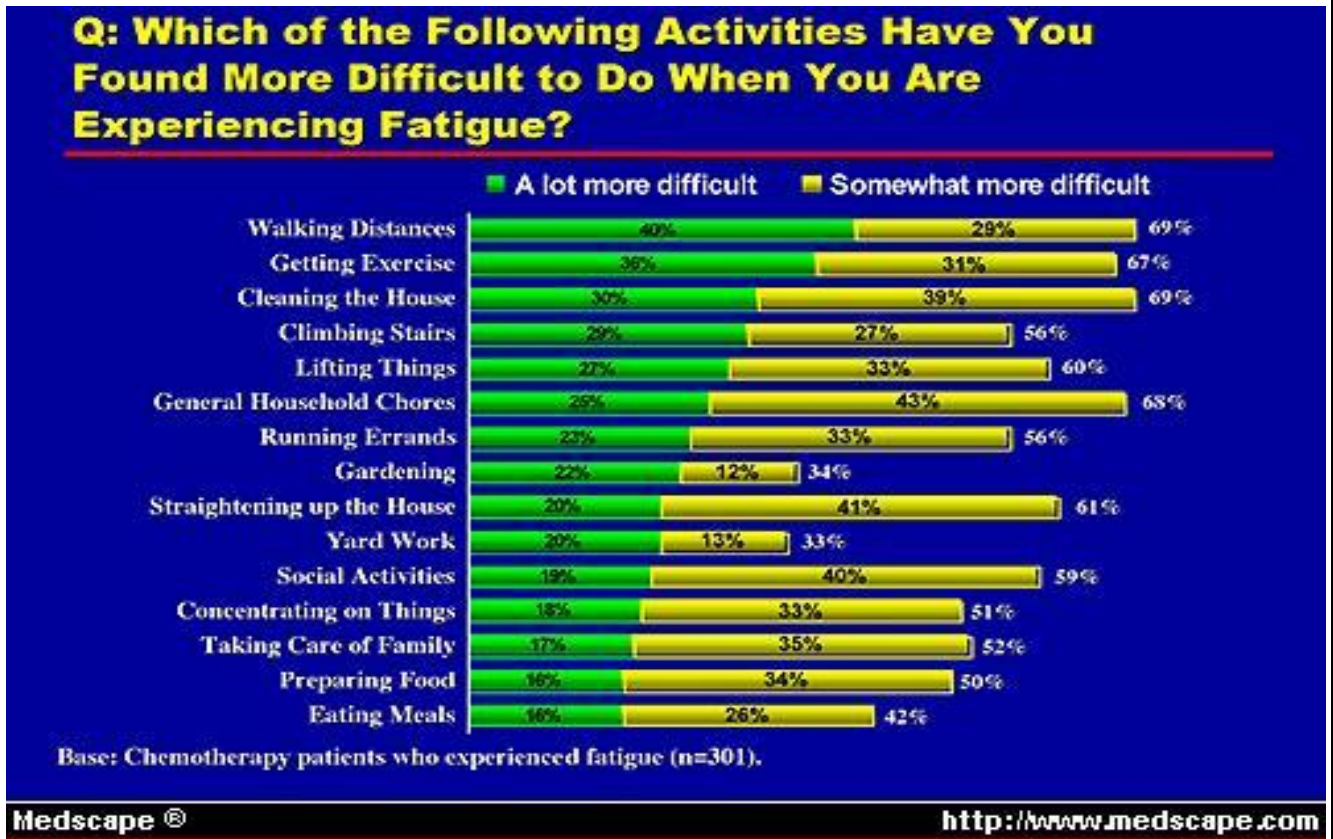
(Cancer Network 1996; Medscape 2012)



### **4) Cancer Related Fatigue**

Cancer- related fatigue (CRF) is “a distressing and persistent, subjective sense of physical, emotional and/or cognitive tiredness related to cancer or cancer treatment that is not proportional to recent activity and that interferes with usual functioning” (National Comprehensive Cancer Network, NCCN, 2009). CRF is the most frequently reported symptom by cancer patients, affecting 70-100% of the cancer population (ISCP, 2012). CRF has a profound impact on QoL as patients become too tired to participate in usual activities and normal social roles.

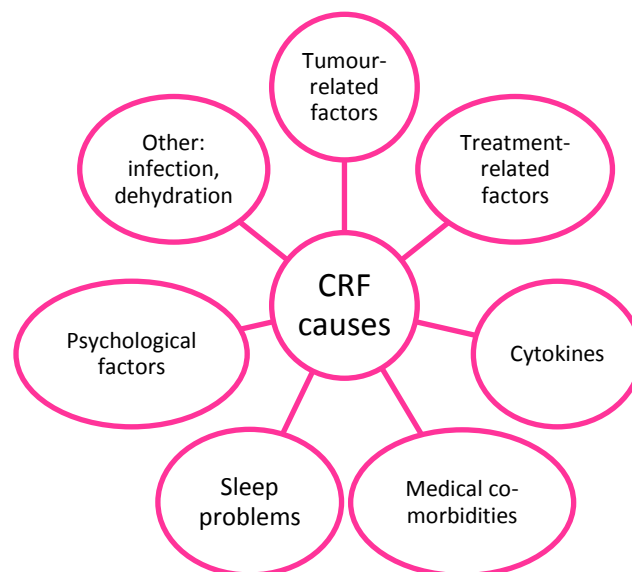
**Figure 7. Impact of CRF**



(Curt *et al* 2000)

**Causes of CRF**

**Figure 8. Causes of CRF**



- **Tumour-Related factors:** primary fatigue is hypothesised to be related to the tumour itself.
- **Treatment-related factors:**
  - Chemotherapy: fatigue begins within the first few days after therapy is started and diminishes in the week thereafter, only to recur again with the next cycle of chemotherapy.
  - Radiation therapy: fatigue starts abruptly within a few hours after treatment and subsides shortly thereafter. Fatigue has been noted to decrease in the first 2 weeks after localized treatment for breast cancer but then to increase as radiation therapy persists into week 4. It then decreases again 3 weeks after radiation therapy ceases. Administration of chemotherapy and radiotherapy for malignancy causes a specific fatigue syndrome..
  - Surgery is another common cause of fatigue in patients with cancer.
- **Cytokines:** significant positive correlations have been found between fatigue and circulating levels of inflammatory markers (Schubert *et al*, 2007).
- **Co-morbid medical conditions:** cardiac or renal failure, hypothyroidism, hepatic, dyspnoea, anaemia, cachexia may contribute to CRF.
- **Sleep problems:** strong correlations have been reported between fatigue and sleep disorders in patients with cancer.
- **Psychological factors:** anxiety, emotional stress and depression correlate with CRF. (Radbruch *et al*, 2008; ISCP 2012)

### **Treatment of CRF**

Management of CRF is cause specific when conditions known to cause fatigue can be identified and treated. When specific causes cannot be identified, pharmacological and non-pharmacological treatment should still be carried out.

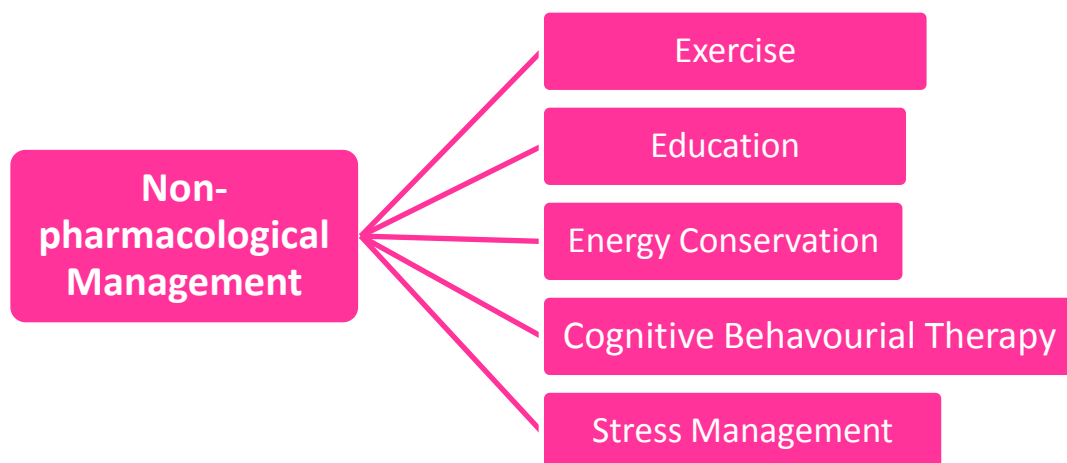
### **Pharmacological intervention**

- Exclude treatable causes
- **Anaemia:** Erythropoietin, Darbopoietin

Both stimulate red blood cell production and are prescribed to improve anaemia in patients receiving chemotherapy. A meta-analysis of 10 studies (n = 2226 patients) evaluating erythropoietin in anaemic cancer patients undergoing chemotherapy indicated that erythropoietin was superior to placebo (Minton *et al*, 2008).

- Modafinil a CNS stimulant, improves wakefulness. Fatigue severity and measures of quality of life were significantly improved following 1 month of treatment with modafinil (Carroll *et al*, 2007).
- Glucocorticosteroids: improve quality of life and reduce fatigue in patients with cancer (Carroll *et al*, 2007)
- Psychostimulant medications enhance alertness, attention, and vigilance, and reduce fatigue (Carroll *et al*, 2007).
- Progestational steroids, a type of hormone therapy used to treat cancer, and paroxetine, a medicine used to treat depression and anxiety disorders, were no better than placebo in the treatment of cancer-related fatigue (Minton *et al*, 2008).
- Depression: antidepressants improve depression but have no effect on fatigue in patients receiving chemotherapy (Carroll *et al*, 2003).

### Non-pharmacological Management



**Figure 9. Non-pharmacological management of CRF**

#### Exercise:

Recent guidelines state exercise training is safe during and after cancer treatments and results in improvements in physical functioning, quality of life, and cancer-related fatigue in several cancer survivor groups (ACSM, 2011).

- During Treatment: 7 RCTS (Evidence B). Four showed a significant positive effect. Three showed no effect or failed to achieve statistical significance (Schmitz *et al*, 2010).

- After treatment: 9RCTS (Evidence B). Four observed that exercise improved fatigue, four observed no significant effect, one RCT observed worse fatigue after exercise compared to a control group (Schmitz *et al*, 2010).

| Article                                      | During/after treatment     | Results   |
|--|----------------------------|---|
| Cramp & Byron-Daniel 2012<br>Cochrane Review | During and after treatment | Exercise was more effective than the control intervention in reducing CRF. Aerobic exercise was more effective than resistance training.                          |
| Puetz and Herring 2012<br>(Meta analysis)    | During and after treatment | <a href="#">Exercise</a> significantly reduced CRF during and following <a href="#">cancer</a> treatment  |
| Velthuis et al 2010<br>(Meta analysis)       | During treatment           | Home-based exercise lead to a small reduction in CRF whereas supervised aerobic exercise showed a medium, significant reduction in CRF compared with no exercise. |

**Physiotherapist perspective;** 78% of physiotherapists recommend and/or use exercise for CRF management; 74% teach other strategies, mainly energy-conserving techniques (79%).

**Barriers:** The most common barrier encountered by therapists in recommending and/or using exercise was related to the lack-of-exercise guidelines for patients with CRF (71%).

(Donnelly *et al*, 2010)

**Education:**

All patients should be educated about fatigue and its causes, especially patients commencing likely fatigue-inducing therapy (such as radiation and chemotherapy), prior to the onset of CRF. Patients should also be educated if they experience fatigue, it may be a side-effect of the treatment and not automatically a sign that the treatment is not successful or that the disease is evolving. Advice to monitor fatigue levels using a diary can be helpful (NCCN, 2012).

**Energy Conservation:**

Energy conservation is defined as “the deliberate and planned management of one’s personal energy resources to prevent their depletion” (NCCN, 2012). It encompasses a common sense approach that helps patients to prioritize and pace activities, and to delegate less essential activities if they are experiencing moderate-to-severe fatigue. A useful plan is to maintain a daily and weekly diary that allows the patient to ascertain peak energy periods.

Patients receiving an energy conservation and management (ECAM) intervention reported significantly lower fatigue compared with a control focused on nutrition examining the effect on CRF (Barsevick *et al*, 2004).

### **Cognitive Behavioural Therapy (CBT)**

Patients should be counselled about coping and educated on how to deal with CRF.

**Table 16. Evidence for CBT in patients with breast cancer**

| <b>Article</b>   | <b>Intervention</b>   | <b>Results</b>  |
|--|---|---|
| Duijts <i>et al</i> 2011<br>(Meta-analysis)            | Behavioural techniques (cognitive therapy, relaxation techniques, counselling, social support, hypnosis, and biofeedback)<br><br>Exercise                           | Behavioural techniques improved CRF, depression, anxiety and stress during and after treatment. Physical exercise interventions improved CRF, depression, body-image and HRQoL. |
| Goedendorp <i>et al</i><br>(2009)<br>(Cochrane Review) | Psychosocial interventions (education, self-care, coping techniques, and learned activity management)   | 7 of 27 studies reviewed showed a significant reduction in fatigue  |
| Kangas <i>et al</i> (2009)<br>(Meta-analysis)          | Psychosocial interventions: restorative approaches, supportive-expressive, and cognitive-behavioural therapy.<br>Exercise: multimodal exercise and walking programs | 119 studies. Both provided reductions in CRF. No significant differences between interventions  |

### **Stress Management**

Patients should take action to reduce their stress levels (Langhorne *et al*, 2007). Identifying for each individual what has been helpful in managing stress prior to their diagnosis may help



the patient recognise what option to explore first in dealing with his or her emotions regarding the malignancy. Relaxation techniques, meditation and distractions such as games, music, reading or seeing visitors are all ways that patients can reduce their level of attentional CRF (Mock *et al*, 2000)

|  | <b>Study</b>                                | <b>Participants</b>   | <b>Groups</b>   | <b>Types of exercise</b>  | <b>Outcome measures</b>  | <b>Conclusion</b>   | <b>Implications for Practice</b>   | <b>Limitations</b>   |   |
|--|---|---|---|---|--|---|--|--|---|
|  | Cramp & Byron-Daniel (2012) Cochrane Review | Exercise for the management of cancer-related fatigue in Adults<br>-56 studies included (28 breast cancer specific) | -In total 4,068 participants.<br>-Adults with CRF<br>-Participants may have been actively receiving treatment, in long-term follow-up or palliative care. | Compared exercise groups to usual care group (i.e. no specific exercise programme prescribed) or an alternative treatment | Aerobic exercise, strength training and flexibility exercises.   | 1. Patient-reported fatigue<br>2. Time spent exercising<br>3. Aerobic capacity<br>4. Quality of life<br>5. Anxiety and Depression<br>6. Self-efficacy | Physical exercise can help to reduce fatigue both during and after treatment for cancer. The benefits of exercise on fatigue were observed specifically for people with breast cancer and prostate cancer. | Exercise should be considered as one component of a management strategy for fatigue that may include a range of other interventions. | -Allocation concealment(selection bias) low-unclear risk of bias<br>-Blinding of outcome assessment (detection bias) high risk of bias<br>-Selective reporting (reporting bias) low risk of bias<br>-Small number of participants in several studies. |
|  | Puetz <i>et al</i> , 2012 (Meta analysis)   | Differential effects of exercise on cancer related fatigue during and following treatment: a meta analysis.         | 70 studies involving 4,881 cancer patients during or following treatment.   | Compared exercise groups to non-exercise groups   | Not reported   | Not reported  | Exercise significantly reduced CRF during and following treatment.   | Improvements were largest in trials with longer rest duration between treatment completion and exercise initiation.                  | -Lacked adequate information regarding types of exercise.<br>-Under-reporting of adherence levels.<br>-10% of studies didn't have a well validated fatigue outcome measure  |
|  | Velthuis <i>et al</i> 2010 (Meta analysis)  | The effect of physical exercise on cancer related fatigue during cancer treatment: a meta-analysis of RCTs.         | 18 studies (12 breast cancer) totalling 1,109 participants  | Compared exercise to control group (usual care)   | 9 investigated effects of home based exercise<br>9 investigated effects of supervised exercise programme | Piper Fatigue Scale, FACT-F, FACT-A, Profile of Mood States, Brief Fatigue Inventory, Symptom Assessment Scale.                                       | Supervised aerobic exercise is a promising and feasible therapy in the management of CRF.  | Supervised aerobic exercise programmes are most promising in the short term in reducing CRF.   | -Average score of all studies 5.5 on PEDRO and medium risk of bias  |

**Table 17. Effects of exercise on fatigue in cancer patients**



## 5) Pain

Chronic pain after cancer surgery may occur in up to 50% of patients.

Risk factors include:

- 1) Young age
- 2) Chemotherapy
- 3) Radiotherapy
- 4) Poor post-operative pain control
- 5) Certain surgical factors.



The neurophysiology of cancer pain is complex: it involves inflammatory, neuropathic, ischemic and compression mechanisms at multiple sites. Knowledge of these mechanisms and the ability to decide whether a pain is nociceptive, neuropathic, and visceral or a combination of all three will lead to best practice in pain management.

Types of Pain:

1. Acute pain; brief, intense, and arises suddenly, limits activities almost immediately. Medication is prescribed as needed for a short period of time until the episodes of pain subside.
2. Persistent or chronic pain; lasts for long periods of time. It can be an uncomfortable ache that is always there, or a much more intense feeling of physical distress or suffering that makes it impossible to focus on anything else.

### Pain Relief For Breast Cancer Pain

- Non-narcotic Analgesics (non- opioids)
- Narcotic Analgesics (opoids)
- Coanalgesics
- Topical Analgesics
- Nerve Blocking Strategies
- Nerve Stimulation
- Physiotherapy

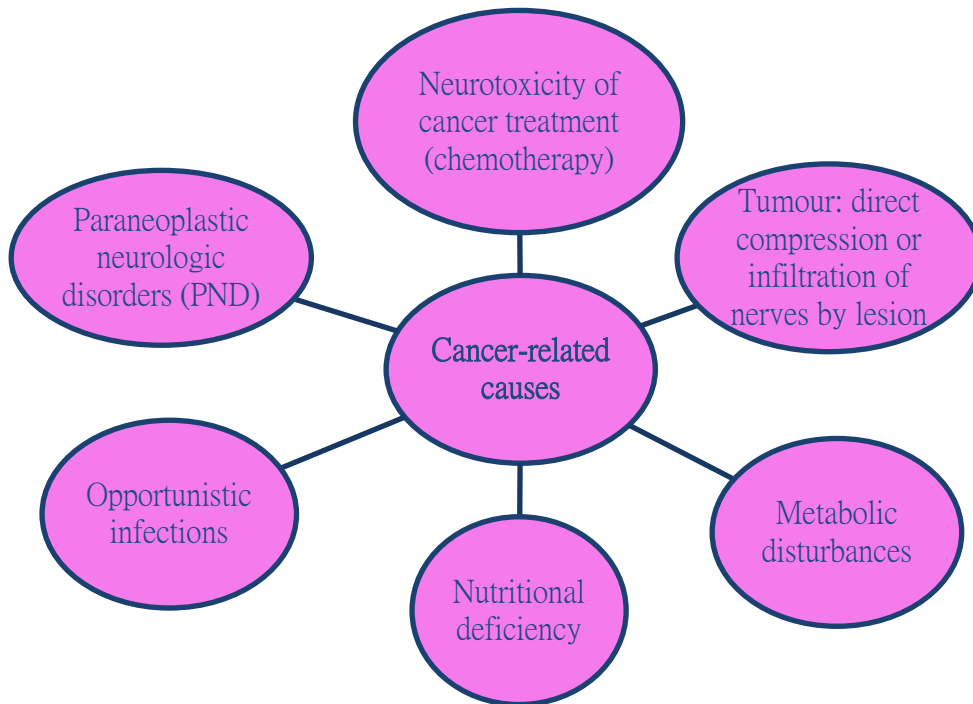
### Role of Physiotherapy

- Strategies for preventing and treating lymphoedema (see lymphoedema section)
- Manual stretching and soft tissue massage
- Information about exercise programs designed to build strength and range of motion.



## 6) Peripheral Neuropathy

Peripheral neuropathy, is defined as the condition arising from the damage and dysfunction of the peripheral nerves. Consequences of neuropathy can be severe for patients with cancer and may result in reduced quality of life, disability, and potentially shorter survival. Chemotherapy- induced peripheral neuropathy (CIPN) is the most widely reported type of neuropathy seen in cancer patients (Stubblefield *et al*, 2009)



### Neurotoxicity Mechanisms of Chemotherapy

Most neurotoxic drugs used in chemotherapy cause axonal damage. Small sensory fibres are affected early and most frequently by chemotherapeutic agents. Because these nerves have little capacity for regeneration, damage to them is responsible for the predominance of sensory symptoms found in CIPN. Motor nerves are generally less frequently or seriously affected by neurotoxic chemotherapy. Motor nerves that have survived a chemotherapeutic insult have the capacity for distal sprouting and reinnervation of muscle fibres that have lost their innervation (Stubblefield *et al*, 2009).

## Signs and Symptoms

### **Sensory:**

- Paraesthesia
- Dysesthesia (Abnormal sensations like tingling, pain, numbness)
- Cold sensitivity
- Burning, freezing, lancination, shock-like, or electric pain
- Normal touch can be perceived as painful (allodynia),
- Hyperpathia (sensations that would normally be painful experienced as excruciating)

### **Motor:** (uncommon and usually milder)

- Mild weakness in the lower limbs.
- Diminished/absent ankle reflexes
- Altered proprioception which can lead to accidents or falls.

### **Autonomic:** (impairment is rare, but may include)

- Constipation
- Orthostasis
- Urinary dysfunction
- Sexual dysfunction
- Low blood pressure
- Irregular heartbeat

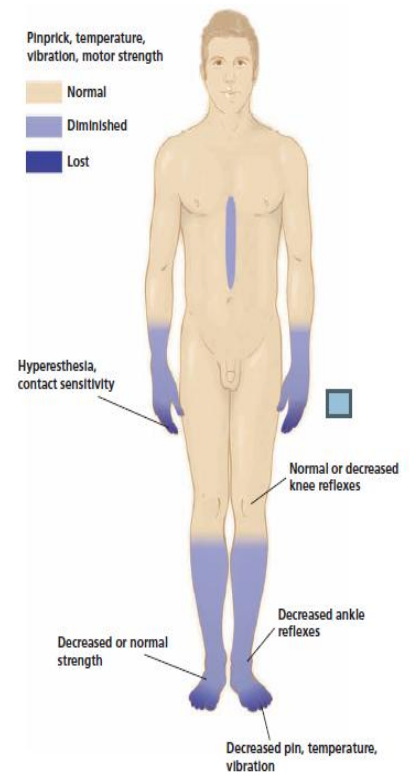
### Differential Neuropathies (Transferrable skills)

- PND
- Carpal tunnel syndrome
- Diabetic Neuropathy
- Metabolic Neuropathy
- Charcot-Marie-Tooth disease

CIPN has a number of diagnostic features that can help physicians distinguish it from other neuropathies including:

- Symmetrical, distal, length-dependent “glove and stocking” distribution
- Predominantly sensory symptoms (especially pain) rather than motor symptoms
- Onset after administration of chemotherapy, which may be progressive, rapid, or “coasting”
- Dose-dependent

(Stubblefield *et al*, 2009)



**Table 18. Chemotherapeutic drugs and anticancer biologics frequently reported as associated with symptomatic neuropathy.**

| <b>Drug</b>  | <b>Clinical Manifestation</b>  | <b>Recovery</b>  |
|--|--|--|
| Cisplatin<br>Carboplatin<br>Oxaliplatin                | Symmetrical painful parenthesis or numbness in a stocking-glove distribution, sensory ataxia with gait dysfunction   | Partial, symptoms may progress for months<br>Oxaliplatin: Resolution in 3 months, may persist longer |
| Oxaliplatin  | Cold-induced painful dysesthesia   | Resolution within a week   |
| Vincristine,<br>vinblastine,<br>vinorelbine, vindesine | Symmetrical tingling parenthesis, loss of ankle stretch reflexes, constipation, occasional weakness, gait dysfunction  | Resolution usually within 3 months, may persist for vincristine                                      |
| Paclitaxel<br>Docetaxel<br>Abraxane                    | Symmetrical painful parenthesis or numbness in stocking-glove distribution, decreased vibration or proprioception, occasionally weakness, sensory ataxia, and gait dysfunction |  |
| Bortezomib   | Painful parenthesis, burning sensation, occasional w weakness, sensory ataxia, and gait dysfunction. Rare autonomic dysfunction including orthostatic hypotension              | Resolution usually within 3 months, may persist  |
| Xabepilone   | Painful parenthesis, burning sensation   | Resolution in 4–6 weeks  |
| Thalidomide  | Symmetrical tingling or numbness, pain.<br>Occasionally weakness, sensory ataxia, and gait dysfunction   | May persist for over 1 year  |
| Lenalidomide<br>(thalidomide analog)                   | Similar to thalidomide   | Unclear  |

(Hauseer *et al*, 2006; Park *et al*, 2008)

## **Evaluation**

A gold standard for evaluating CIPN has not been defined. The assessment methods available include clinical evaluation (grading systems), objective testing, and patient questionnaires.

### **Objective Testing**

Neurophysiologic tests such as electromyography (EMG), nerve conduction studies (NCS), and quantitative sensory tests (QST) are used. Limitations to these include cost and the need for subspecialty expertise.

### **Clinical Assessment**

Patient history should include associated comorbidity, personal and family history of neuropathy, alcohol use and other toxic exposures, and any CIPN experienced during previous treatment. Physical examination should describe clinical features of the neuropathy, such as sensory abnormalities, deep tendon reflex dysfunction, motor weakness, pain characteristics, autonomic symptoms, and most importantly, functional impairment.

**Table 19. CIPN grading scales**

| <b>Commonly Used Physician-Based Grading Scales for Evaluation of CIPN</b> |  |  |  |   |                |
|--|--|--|--|---|----------------|
| <b>Scale</b>   | <b>Grade 1</b>   | <b>Grade 2</b>   | <b>Grade 3</b>   | <b>Grade 4</b>  | <b>Grade 5</b> |
| <b>WHO</b>   | Paresthesias and/or decreased tendon reflexes  | Severe paraesthesias and/or mild weakness                                      | Intolerable paresthesis and/or marked motor loss   | Paralysis   | N/A            |
| <b>ECOG</b>  | Decreased deep tendon reflexes, mild parenthesis or constipation                             | Absent deep tendon reflexes, severe paresthesis or constipation, mild weakness | Disabling sensory loss, severe peripheral neuropathic pain, severe weakness, bladder dysfunction | Respiratory dysfunction secondary to weakness, obstipation requiring surgery, paralysis confining patient to bed/wheelchair | N/A            |
| <b>NCI-CTCAE sensory</b>   | Asymptomatic: loss of deep tendon reflexes or paraesthesia but not interfering with function | Sensory alteration or parenthesis interfering with function but not with ADLs  | Sensory alteration or parenthesis interfering with ADLs  | Disabling   | Death          |

|                           |   |   |  |  |       |
|---------------------------|---|---|--|--|-------|
| <b>NCI-CTCAE</b><br>motor | Asymptomatic, weakness by exam/testing only | Symptomatic weakness interfering with function but not with ADL | Weakness interfering with ADL: bracing or assistance to walk indicated | Life threatening: disabling (e.g. paralysis) | Death |
|---------------------------|---|---|--|--|-------|

(Stubblefield *et al*, 2009)

## Key Points to Report during Clinical Assessment of CIPN

### Physical Assessment

- Sensory assessment: light touch, vibration, proprioception, pin-prick, temperature
- Deep tendon reflex: presence, absence, diminishment
- Motor weakness
- Related musculoskeletal abnormalities (e.g., hammertoes, high or flattened arches)

### Functional Assessment

- Getting up and straight-line walking (observe gait and balance)
- Name writing
- Buttoning
- Performing ADLs

## Prevention of CIPN

**Table 20. Proposed Agents for Preventing CIPN**

| Drug              | Mechanism of Action  | Evidence   |
|-------------------|--|--|
| Vitamin E         | Antioxidant/minimizes neuronal damage                                      | CIPN incidence and severity reduced (Argyriou et al 2005)  |
| Calcium/Magnesium | Facilitates Na channel function; binds oxalate (metabolite of oxaliplatin) | CIPN incidence reduced (Nikcevich et al 2008)              |
| Glutamine         | Upregulation of nerve growth factor  | CIPN incidence reduced (Wang et al 2007)                   |
| N-acetylcysteine  | Antioxidant; increases blood concentrations of glutathione                 | Incidence of grade 2-4 neuropathy reduced (Lin et al 2006) |
| Oxcarbazepine     | Inhibits high-frequency firing of nerves; modulates ion channels           | Neuropathy incidence reduced (Argyriou et al 2006)         |



Systematic Review showed several of the above agents have potentially encouraging results for alleviating neuropathy, however, data is inconclusive (Albers *et al*, 2007).

### **Treatment**

To date, no approved effective treatment is available for CIPN, although a number of medications are useful for pain control (see pain management section). Currently, the general approach to pain medication for CIPN is to choose an agent based on the clinician's experience and expectation of efficacy and safety.

### **Sensory Symptom Management:**

As with pain medications, most evidence supporting neurostimulation came from studies on diabetic or other types of neuropathy.

**Spinal cord stimulation (SCS):** involves the surgical placement of electrodes into the epidural space that can send non-noxious electrical stimulation across the spine to displace the painful sensation. SCS has been shown to provide good pain relief in patients with CIPN (Cata *et al*, 2004). Long-term effects up to 8 years are reported. However, it is an invasive technique that includes the risks and costs of surgery.

**Transferable skills:** SCS has been shown to provide good pain relief in patients with other types of neuropathy e.g. peripheral neuropathy, diabetic neuropathy (Daousi *et al*, 2005; Kumar *et al*, 1996; Tesfaye *et al*, 1996).

European Federation of Neurological Societies (EFNS 2007): SCS is efficacious in failed back surgery syndrome (FBSS) and complex regional pain syndrome (CRPS) (level B recommendation).

### **Transcutaneous electrical nerve stimulation (TENS):**

High-frequency TENS may be better than placebo (level C) (EFNS 2007). Nine small trials involving patients with neuropathic pain generally associate TENS with a positive effect on pain control (Cruccu *et al*, 2007).



### **Acupuncture:**

Based on the theory that needle insertion and manipulation at specific acupuncture points in the body induces signals in afferent nerves that subsequently regulate spinal signal transmission and neural pain perception (Wang *et al*, 2008 in NCCN 2009).

**Table 21. Evidence for acupuncture**

| <b>Article</b>                        | <b>Intervention</b>                 | <b>Outcome</b>   |
|---------------------------------------|-------------------------------------|--|
| Donald et al (2011)<br>Clinical trial | six weekly acupuncture sessions     | 82% of patients reported an improvement in symptoms.<br><br>Some patients also reported a reduction in analgesic use and improved sleeping patterns. |
| Alimi et al (2003) RCT                | Acupuncture or placebo intervention | At 2 months, pain intensity decreased significantly by 36% from baseline with acupuncture versus 2% with placebo.                                    |

### **Motor Symptom Management:**

#### **LL strengthening:**

9-hour weekly training program over 6 weeks increased muscular strength by an average of 41% in 70 cancer patients undergoing chemotherapy (Quist *et al*, 2006).

#### **Balance Rehabilitation:**

Gait training and lower limb resistance training help significantly improve balance in diabetic patients compared with a control exercise regimen (Richardson *et al*, 2001). Exercises included toe raises, heel raises and wall slides.

#### **Assistive Devices:**

Assistive devices including canes, walkers, wheelchairs, and ankle-foot orthoses may also be provided if required. Patients with PN who used a straight cane, touch of a vertical surface, or semi-rigid ankle orthoses demonstrated significantly less step width variability and range than under baseline conditions (Richardson *et al*, 2004).

**Table 22. Safety Warnings for patients with CIPN** (also follow contraindications in exercise section)

| <b>Footwear</b>                                   | <b>Orthosis</b>                                  | <b>Household Environment</b>   |
|---|--|--|
| Avoid heels                                       | Watch out for skin abrasion                      | Protect against thermal stress (reduce hot water temperature, wear gloves) |
| Grip surface on shoes                             | Wear protective clothing underneath the orthosis | Keep rooms well-lit  |
| Velcro straps if having difficulty with shoelaces | Select good shoes with proper support,           | Remove loose rugs  |
| Watch out for skin abrasion, blisters             | Remove if pain occurs                            | Use non-skid bath mats   |

**Useful link for the management of neuropathies in cancer care:**

[http://www.nccn.org/JNCCN/PDF/2009\\_management\\_of\\_neuropathy\\_in\\_cancer.pdf](http://www.nccn.org/JNCCN/PDF/2009_management_of_neuropathy_in_cancer.pdf)

## Chapter 6: Oncological Medical Emergencies (Transferrable Skills)



### 1) Superior Vena Cava Syndrome (SVCS)

SVCS arises when the superior vena becomes occluded or compressed, causing severe reduction in venous return from the head, neck and upper extremities.

Compression caused by:

- Obstruction
- Invasion
- Thrombosis
- Or fibrosis of the vessel



Lung cancer accounts for 85% of all incidences, malignant lymphomas of non-Hodgkin's origin are the second main cause, other primary mediastinal tumours like thymoma or germ cell tumours make up <2% of occurrences.

Frequent use of a long term venous catheter has also shown to increase the risk of a SVCS.

#### Signs & Symptoms

- Neck and Facial Swelling (especially around the eyes)
- Hoarseness
- Headaches
- Dyspnoea
- Nasal congestion
- Cough
- Epistaxis
- Head Fullness and Pressure Sensation
- Hemoptysis
- Dizziness
- Proptosis
- Dysphagia
- Stridor
- Arm Oedema
- Venous Distension in neck and thorax
- Syncope

\*Symptoms often get worse leaning forward or lying down.

#### Diagnosis

CT scan is best for diagnosing as can differentiate between extrinsic compression by a tumour and intravascular thrombosis. Also can be used to show location of obstruction and help as a guide for fine needle aspiration biopsy.

## Management

- Therapy for the underlying neoplastic disease
- Supplemental O<sub>2</sub>, Diuretics, Head Elevation, Corticoids can be used for symptom relief.
- If SVCS was caused by a central venous catheter, removal plus anti-coagulants should be the desired treatment.
- Superior Vein Caval Stenting can provide rapid relief of symptoms, normally used when chemo/radiotherapy fail, however these have to be left in for remainder of patient's life.



## 2) Pericardial Tamponade

The accumulation of pericardial fluid causing haemodynamic instability.

### Causes

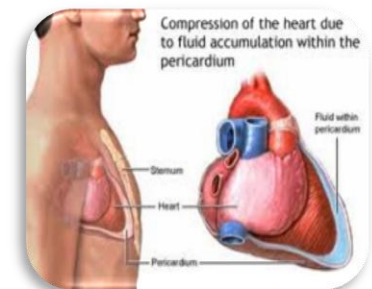
- Obstruction of lymphatic drainage
- Excess fluid secretion from tumour nodules on pericardial surfaces

### Differential Diagnosis of Pericardial Effusion

- Non-malignant e.g. drug or radiation –induced pericarditis
- Hypothyroidism
- Uraemia
- Infection
- Autoimmune Disease

### Signs & Symptoms

- SOB
- Chest pain
- Orthopnea
- General Weakness
- Tachycardia
- Hypotension
- Jugular Vein Distention
- Oedema



## Diagnosis

Two-dimensional echocardiography is the best way of diagnosing and cytological examination is done to confirm neoplastic invasion.

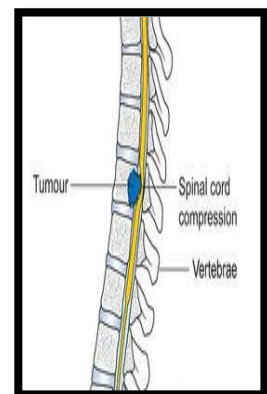
## Treatment Options

- Pericardiocentesis plus sclerosing agents like bleomycin or tetracycline
- The creation of a pericardial window
- Complete pericardial stripping
- Systematic chemotherapy



### 3) Malignant Spinal Cord Compression

Compression is caused by extradural metastases from tumours involving the spine. Bone metastases of thoracic (70%), lumbar (20%) or cervical (10%) regions may cause a cord injury. It presents in 5-10% of all cancer patients throughout the course of their disease. 80% of patients able to walk pre diagnosis will continue to do so after treatment. Only 10% unable to walk pre diagnosis will recover the ability to mobilise post treatment



## Signs & Symptoms

- Localised back pain
  - May increase overnight
  - Does not improve with common analgesics
  - Worsens with recumbence or with manoeuvres
  - Worsens with increased pressure e.g. coughing, sneezing or straining
  - \*Worsens in the supine position\*
- Tenderness over area of bony metastases

## Diagnosis

- An accurate history and physical examination are key
- A neurological exam including motor, sensory and autonomic aspects

- Urinary retention or constipation need to be explored for late stage damage
- Abnormalities present on plain radiographs
- MRI is the is the best method as it specifies the area of compression and helps plan the radiation fields

### **Treatment**

- Radiation therapy plus dexamethasone is the standard protocol
- Surgical decompression

Complete resection of a vertebral body when only a single vertebra is involved



## **4) Hypercalcaemia**

Occurs in 10% of advanced solid tumours; most common in lung, breast, head, neck and renal cancers. Severe hypercalcaemia (>13 mg/dl) is linked to a short survival time of several weeks to a few months.

### **Causes**

- Bone metastases due to increased release of calcium from bone as a result of osteoclastic activity
- Increased parathyroid hormone-related protein production
- Calcitriol secretion

### **Signs & Symptoms**

**(Serum calcium levels >2.6 mmol/l)**

- |               |                |
|---------------|----------------|
| • Dehydration | • Confusion    |
| • Fatigue     | • Bone Pain    |
| • Malaise     | • Polydypsia   |
| • Anorexia    | • Polyuria     |
| • Nausea      | • Constipation |
| • Vomiting    | • Weakness     |

**(Serum calcium level >3.5 mmol/l)**

- Neurological symptoms

- Confusion
- Sleepiness
- Lethargy
- Coma (normally leads to death)

### **Treatment Options**

- Treatment must be indicated, it is not appropriate in refractory patients and those with a low possibility of survival
- Initial therapy includes IV fluids plus a biphosphonate (potent inhibitors of bone reabsorption)
- Solution of saline should also be infused to combat the dehydration
- Glucocorticoids can be used in patients with lymphoma



## **5) Increased Intracranial Pressure (ICP)**

Caused by brain metastases which are most common in lung, brain and melanoma cancers. The tumour mass plus surrounding oedema may produce hydrocephalus and as the mass increases, various herniation syndromes may start.

### **Signs & Symptoms**

- Headaches
- Nausea
- Vomiting
- Seizures
- Behavioural changes
- Focal neurological changes

### **Diagnosis**

- CT scan normally performed
- MRI is the best option but CT scan is normally done due to rapid results needed for unstable patients

### **Treatment**

- Should begin immediately, comprised of hyperventilation, mannitol and steroids



- Whole-brain irradiation is the standard treatment if multiple nodules of brain metastases are present
- Surgery plus radiation is an option if single brain metastases present

(Cervantes and Chirivella, 2004)

## Chapter 7 Exercise in Breast Cancer

Exercise is increasingly being promoted as a feasible, therapeutic intervention in patients with breast cancer (Maryam *et al*, 2010; Spence *et al*, 2010). However, less than 22% of cancer survivors are physically active and breast cancer survivors have the lowest rate of physical activity of all cancer survivors (Courneya *et al* 2008).



### Safety/Precautions of Exercise in Breast Cancer

**Table 22. Precautions and contraindications for exercise in breast cancer patients**

| <u>Precautions</u>  | <u>Contraindications</u>   |
|---|--|
| Pts with severe anaemia- delay exercise until improved.   | Women with immediate UL problems secondary to treatment should seek medical care to resolve the issues before UL exercise. |
| Extremely high intensity exercise may transiently increase upper respiratory tract infection                          |  |
| Low white blood cell count– avoid gyms and public places  | Diastolic blood Pressure <45mmHg or > 100mmHg.   |
| Swimming pools – avoid during radiotherapy  | Pulse at rest >100 beats per minute  |
| Severe fatigue – do 10 mins stretching daily  | Temperature >38°C; respiration frequency >20 per minute  |
| Peripheral neuropathy/ataxia – may benefit more from stationary bike than treadmill                                   | Infections requiring treatment with antibiotics  |
| Fracture risk following hormonal therapy or patients with osteoporosis or bony metastases- avoid high impact activity | B thrombocytes <50×10 <sup>9</sup> /l (platelets levels)   |

Individuals with cardiac conditions will require modifications and increased supervision.

B leucocytes  $<1.0 \times 10^9/l$  (White Blood Cell levels)

Patients with lymphoedema- wear a well-fitting compression garment

Patients with indwelling catheters- avoid water or other microbial exposures that may result in infections, as well as resistance training of muscles in the area of the catheter to avoid dislodgment.

(Adason *et al* 2009; Courneya 2003; Doyle *et al* 2006; Nieman 2000; ACSM 2009; Schmitz *et al* 2010)

**Pre- exercise screening prior to exercise:**

- Liaise with MDT re suitability and safety from cardiac, immune and bone health perspective. Discern likelihood of treatment-induced cardiotoxicity and bony metastases.
- Analyse recent Haemoglobin levels
- Medical and cancer history - type of cancer, stage & grade of cancer, type of Rx, side effects, medical/other follow-up, complications after surgery/Rx
- Pulmonary function results including O<sub>2</sub> saturations
- Resting and exercise cardiovascular parameters (HR, BP, MAP)
- Cardio-respiratory endurance (e.g. 6 minute walk test, VO<sub>2</sub>peak)
- Flexibility/ROM
- Muscular endurance
- Muscle strength(1 RM, hand grip strength using dynamometer)
- Body composition (BMI/waist circumference)
- Fatigue, QoL and psychological indices (fatigue, QoL scales)
- Evaluation of peripheral neuropathies and musculoskeletal morbidities
- Evaluation of arm/shoulder morbidity (e.g. DASH, lymphoedema scales)
- Obtain patient's perceptions of their main problems at the moment and what they hope to achieve from physiotherapy. This will direct assessment, treatment plan, education needs and goal setting, as well as giving you an idea of the patient's motivation level.

(Clutter Snyder *et al*, 2009; ACSM 2009)



## Benefits of Exercise in breast cancer patients

### Physical Activity

#### Description

Physical activity levels reduce significantly after diagnosis and often remain low until adjuvant treatment is completed (Mutrie *et al*, 2007).

#### Studies

Jones *et al*, 2004 n=450

Mutrie *et al*, 2007 n=177

Mutrie *et al*, 2012

Schneider *et al*, 2007 n=113

#### Outcome

Exercise, especially a combination of resistance and aerobic can improve physical activity in breast cancer patients during treatment and this can be maintained at a 5 year follow up.

### Quality of Life

#### Description

Breast cancer patients have to deal with the physical and psychological side effects of treatment resulting in a substantial impact on QoL.

#### Studies

Campbell *et al*, 2005 n=22; Cadmus *et al*, 2009 n=50; Courneya *et al*, 2007 n=223; Courneya *et al*, 2008 n=55; Headley *et al*, 2004 n=38; Mutrie *et al*, 2007 n=177; Segal *et al*, 2001 n=123 Stage I-II; Adamsen *et al*, 2009 n=235; Schmitz *et al*, 2010; Courneya and Friedenreich 1999 n=24; McNeely *et al*, 2006 n=14

#### Outcome

Category B evidence that exercise improves QoL. 5 RCT's found exercise had no significant improvement, however 1 long term study found it improved QoL after adjuvant treatment.

## Mental Health

### Description

1.5-50% of cancer patients suffer from depression and 20-50% from anxiety.

These patients often experience increased physical side effects and more difficulty managing these side effects, and often experience overall reduced QoL.

### Studies

Badger *et al*, 2007 n=98; Cadmus *et al*, 2009 n=50; Courneya *et al*, 2007 n=223; Jones *et al*, 2004 n=450; Mutrie *et al*, 2007 n=177; Courneya and Friedenreich 1999 n=24 ; Doyle *et al* 2006 Guidelines; Saxton and Daley *et al*, 2010

### Outcome

Exercise can potentially yield a reduction in cancer related depression and anxiety however the higher quality studies found no change.

## Physical Capacity

### Description

Cancer treatment can cause cardiovascular toxicity, pulmonary toxicity resulting in shortness of breath, decreased total lung capacity and decreased diffusion capacity.

### Studies

Kim *et al*, 2006 n=41; Mutrie *et al*, 2007 n=177; Adamsen *et al*, 2009 n=235; Schneider *et al*, 2007 n=113; Schmitz *et al*, 2010; Saxton and Daly 2010; Courneya and Friedenreich 1999 n=24; McNeely *et al* 2006 n=14 .

### Outcome

Category A evidence exercise maintains and improves cardiovascular fitness and pulmonary fitness. Combined aerobic and resistance exercise, 3 sessions per week for 60 minutes provided the best outcomes.



## Other benefits of exercise in breast cancer patients

**Table 23. Evidence for exercise**

| LEVEL A EVIDENCE  | LEVEL B EVIDENCE  |
|---|---|
| <b>Safety Regarding Lymphoedema:</b> 7 RCTs have shown that UE exercise (aerobic and/or resistance training) does not contribute to the onset or worsening of lymphoedema.  | <b>Body Size and Body Composition:</b> assessed in 16 exercise interventions. Half of the studies showing statistically significant positive effects related to body size or body composition.  |
| <b>Muscular Strength:</b> 6 resistance and aerobic-based exercise trials for post-treatment breast cancer survivors assessed changes in both upper and lower body muscle strength have observed significant positive effects. | <b>Fatigue:</b> 9 RCTs assessed the effects of exercise training on fatigue after breast cancer treatment. 4 observed improved fatigue, 4 observed no significant effect of exercise compared with no exercise, and 1 observed worse fatigue after an exercise intervention than with exercise. |
| <b>Flexibility.</b> 6 RCTs tested whether exercise would improve flexibility in breast cancer survivors. The effect was significant in 5 of the studies.  |   |

(Drouin *et al* 2006; Adamsen *et al* 2009; Schneider *et al* 2007; Saxton and Daly 2010)



## Exercise Prescription

### FITT principle for pre-treatment

Very limited research as physiotherapy role is limited. Focus mainly on education if you meet patient before treatment.

- Aerobic: **Frequency:** twice a week  
**Intensity:** 65–85% of HR<sub>max</sub>  
**Time:** 30–50 minutes  
**Type:** Supervised stationary bicycle, cross-trainer, or treadmill
- Resistance: **Frequency:** twice a week  
**Intensity:** 60–80% 1Rep<sub>max</sub>  
**Time:** 12–20 repetitions X 3 sets  
**Type:** Supervised weighted fitness equipment using large multijointed muscle groups in arms, shoulders, chest, abdomen, back, hips, and legs



(Timmerman *et al* 2011)

### **FITT principle for during breast cancer treatment:**

- Warm up: 5-10 minutes (Low intensity aerobic exercise and stretching)
- Aerobic exercise: **Frequency:** Supervised 2-3 times per week and Home Based Exercise 2-3 times per week for duration of cancer treatment  
**Intensity:** Moderate 50-70% age adjusted HR Max  
**Type:** walking, cycling, aqua walking, cycle ergometry, seated repetitive motion exercise for Stage IV Patients if unable to tolerate mobilising.  
**Time:** 20-30 minutes per session, 12weeks to 6 months.
- Resistance Exercise: **Frequency:** Supervised 2-3 times per week with 1-2 Home based sessions  
**Intensity:** 50-70% 1 RM. Begin at 8-10 reps, when able to do 10 reps progress to 12. When this is achieved increase by 5% of 1 RM and begin with 8-10 reps again.  
**Type:** upper and lower limb strengthening exercises  
**Time:** 30-40 minutes per session, 12 weeks to 6 months

Note: Patients with axillary lymph node dissection given 2 sets of 15 reps UE exercises with light weights and progressed slowly once there are no symptoms of lymphoedema.

### **FITT Principle for after Breast Cancer Treatment:**

- Warm up and cool down: 5-15 minutes
- Aerobic Exercise: **Frequency:** 3-5 times per week  
**Intensity:** 50 – 70% HRR (based on baseline fitness level)  
**Type:** Walking, cycling, sedentary bike.  
**Time:** 30mins per session, for 8-12 weeks
- Resistance exercise **Frequency:** 2-3 times per week  
**Intensity:** Start at 12-15 reps or 80% of 1 RM.  
**Type:** Supervised program of weights  
**Time:** 6 weeks



(If a break is taken, back off the level of resistance by 2 wk worth for every week of no exercise (e.g., a 2-wk exercise vacation = back off to resistance used 4 wk ago).

### Always Adhere to the Principles of Exercise Prescription!



**Specificity:** Tailor type of exercise, as well as intensity, based on the patient's functional limitations and objective findings

**Overload, Progression:** In order to elicit training adaptations, the intervention must *continually* challenge the pt to do more than they normally do.

**Reversibility:** it is important to encourage life-long changes in exercise habits, rather than merely performing a set 8 week intervention.

#### Key citations for exercise section:

(Courneya *et al* 2007; Haines *et al* 2010; Milne *et al* 2008; Lee *et al* 2010; ACS 2006; Drouin *et al* 2006; Kim *et al* 2006; Mutrie *et al* 2007; Adamsen *et al* 2009; Schneider *et al* 2007; Schmitz *et al* 2010; Courneya and Friedenreich 2008; McNeeley *et al* 1999; Van Waart *et al* 2010)

**Table 24. Critical Appraisal for Exercise Interventions**

| Study                     | Subjects   | Intervention   |  |   |                         | Outcome measures   | Conclusion  | Strengths/Limitations   |
|---------------------------|--|--|--|---|-------------------------|--|---|---|
|                           |  | Activity   | Intensity  | Duration  | Frequency               |  |   |   |
| <b>Adamsen et al 2009</b> | <p><b>Group 1</b><br/> <b>Control</b> : 134 patients with a variety of cancer diagnosis, mean age 47.2 years</p> <p><b>Group 2</b><br/> <b>Intervention:</b> 135 patients with a variety of cancer diagnosis, mean age 34.3 yrs. 119 Breast Cancer Patients Included Baseline comparability. 73 M: 196 F</p> | <p><b>Group 1:</b><br/> Conventional Medical Care</p> <p><b>Group 2: 3</b><br/> Resistance exercise sessions, 3 stationary bike aerobic exercise sessions, 2 body awareness sessions (relaxation techniques, yoga, stretching)</p> | <p><b>Resistance</b><br/> 70% 1RM</p> <p><b>Aerobic:</b><br/> 90% max Heart Rate</p> | <p><b>Resistance</b><br/> - 45 minutes</p> <p><b>Aerobic-</b><br/> 15 minute warm-up/cool down session</p> <p>90 Body Awareness session<br/> minute session</p> | 5 days/week for 6 weeks | Assessed at baseline and post intervention<br>EORTC QLQ-C30<br>SF-36<br>VO2 Max<br>Muscular Strength | Small to medium clinically significant change in fatigue levels in intervention group.<br>No significant improvement if global health status of QoL.<br>Small to medium effect on general wellbeing especially vitality.<br>Physical capacity and muscular strength significantly improved. | Random allocation: Yes<br>Concealed allocation: Yes<br>Baseline comparability: Yes<br>Blind subjects: No<br>Blind therapists: No<br>Blind assessors: No<br>Adequate follow-up: Yes<br>Intention-to-treat analysis: Yes<br>Between-group comparisons: Yes<br>Low Risk of Bias 7/10 Pedro |



|                                 |   |  |  |   |   |  |   |   |
|---------------------------------|---|--|--|---|---|--|---|---|
| <p><b>Mock et al, 2005</b></p>  | <p><b>Group 1:</b><br/><b>Control</b> 59 patients with Stage I-III Breast Cancer<br/>Mean Age 51.6<br/><b>Group 2</b><br/><b>Intervention:</b><br/>60 patients with Stage I-III Breast Cancer, mean age 51.3 yrs.<br/>All female patients currently undergoing adjuvant therapy</p> | <p><b>Group 1:</b><br/>Conventional Medical Treatment<br/><b>Group 2:</b> Home based walking intervention and information booklet and video educating of exercise prescription</p> | <p>Walking: 60-70% of max Heart Rate (No measure of intensity)</p> | <p>15 minute sessions progressed to 30 minutes as training progressed</p> | <p>5-6 times per week for as long as adjuvant treatment lasted.</p> | <p>Assessed at baseline and at the end of adjuvant therapy.<br/>Piper Fatigue Scale<br/>12 MWT<br/>SF-36 Physical Activity Questionnaire</p> | <p>No differences in fatigue levels between groups.<br/>Trends towards increase in physical function and activity and 12 minute walking distance.<br/>Results effected by the fact that 38% of usual care group exercised and 28% of exercise group did not exercise.</p> | <p>Random allocation: Yes<br/>Concealed allocation: Yes<br/>Baseline comparability: Yes<br/>Blind subjects: No<br/>Blind therapists: No<br/>Blind assessors: No<br/>Adequate follow-up: Yes<br/>Intention-to-treat analysis: Yes<br/>Between-group comparisons: No<br/>Medium Risk of Bias 5/10<br/>Pedro</p> |
| <p><b>Mutrie et al 2007</b></p> | <p><b>Exercise group:</b> 101 patients with early stage</p>   | <p><b>Exercise group:</b> 2 Supervised aerobic and resistance exercise classes and</p>   | <p>50-70% of adjusted HR max.</p>                                  | <p>45 mins. 5-10 minute warm up</p>                                       | <p>3 days/week for 12 weeks</p>                                     | <p>Assessed at base line, 12 weeks and 6 months.</p>   | <p>Intervention group showed benefits in physical and</p>   | <p>Random allocation: Yes<br/>Concealed allocation: Yes<br/>Baseline comparability: Yes<br/>Blind subjects: No</p>  |

|                            |   |  |   |   |                               |   |   |  |
|----------------------------|---|--|---|---|-------------------------------|---|---|--|
|                            | breast cancer, mean age 51.3 yrs.<br><b>Control group:</b> 102 patients with early stage breast cancer, mean age 51 yrs.<br>All Patients female currently undergoing adjuvant therapy | 1 additional home based exercise session. (walking, cycling, low impact aerobics, muscle strengthening or circuits)<br><b>Control group:</b> routine medical management. | Patients supervised to ensure appropriate intensity maintained. | 20 minutes of exercise and cool down/relaxation period. |                               | FACT-G<br>Beck Depression Inventory<br>BMI<br>Scottish Physical Activity Questionnaire.<br>12 MWT<br>Shoulder Mobility Test | psychological functioning in comparison with the control group.<br>Benefits were maintained at 6 month follow up with the exception of self reported physical activity. QoL was unchanged at 12 weeks but showed a statistically significant improvement at 6 months. | Blind therapists: No<br>Blind assessors Yes<br>Adequate follow-up Yes<br>Intention-to-treat analysis: Yes<br>Between-group comparisons: Yes<br>Low Risk of Bias 8/10 Pedro |
| <b>Schwartz et al 2007</b> | <b>Group 1</b><br><b>Control:</b> 23 patients with Stage I-III Breast Cancer  | <b>Group 1-</b> Usual medical management.<br><b>Group 2:</b> Aerobic Exercise- Home  | <b>Group 2:</b> Moderate intensity, symptom limited,            | <b>Group 2:</b> 15-30 minutes                           | 4 times per week for 6 months | Measured at baseline and 6 months:<br>12 MWT<br>Muscular  | Osteopenia was observed in 39% of usual care patients, 19% of resistance  | Random allocation: Yes;<br>Concealed allocation: No;<br>Baseline comparability: Yes;<br>Blind subjects: No;<br>Blind therapists: No;                                       |

|                  |   |   |   |       |           |                     |  |   |
|------------------|---|---|---|-------|-----------|---------------------|--|---|
|                  | <p>Mean Age, 46.26</p> <p><b>Group 2 Aerobic</b></p> <p>Exercise: 22 patients with Stage I-III Breast Cancer, Mean Age 48.32.</p> <p><b>Group 3 Resistance</b></p> <p>Exercise: 21 patients with Stage I-III Breast Cancer, Mean age 50.1. All subjects were women undergoing adjuvant therapy.</p> | <p>Based walking/jogging.</p> <p><b>Group 3:</b> Resistance Exercise- Home Based weight bearing theraband exercise for major upper limb and lower limb muscle groups.</p> | <p>measured by Borg Breathlessness and accelerometer.</p> <p><b>Group 3:</b> 8 exercise 2 sets of 8-10 reps. Progressed through theraband colour and grip position on band.</p> |       |           | <p>Strength BMD</p> | <p>exercise patients and 9% of aerobic exercise patients. Weight bearing aerobic exercise significantly reduced Bone Loss in the lumbar Spine in comparison to usual care suggesting that cancer treatment and inactivity declines BMD in this population.</p> | <p>Blind assessors: No; Adequate follow-up: Yes; Intention-to-treat analysis: Yes; Between-group comparisons: Yes</p> <p>Moderate Risk of Bias 6/10 Pedro</p> |
| <b>Drouin et</b> | <b>Group 1:</b>   | <b>Group 1:</b> Individual  | <b>Group 1:</b>   | 20-45 | 3-5 times | Outcomes            | Intervention   | Random allocation: Yes  |

|                                   |   |   |   |   |                                      |  |   |  |
|-----------------------------------|---|---|---|---|--------------------------------------|--|---|--|
| <p><b>al 2006</b></p>             | <p><b>Aerobic Exercise-</b> 13 patients with Stage I-III Breast Cancer, Mean Age 49.4<br/><b>Group 2: Flexibility Stretching-</b> 8 patients with Stage I-III Breast Cancer Mean Age 51.9 All subjects were receiving Radiation therapy</p> | <p>Home Based <b>Aerobic</b> waking exercise intervention.<br/><b>Group 2: Flexibility stretching control</b> group stretching Cervical and thoracic spine and upper and lower limbs.</p> | <p>50-70% of heart rate max measured by HR monitors<br/><b>Group 2:</b> Cervical and thoracic spine and upper and lower limbs. Stretching</p> | <p>minutes</p>  | <p>per week for 7 weeks</p>          | <p>measured at baseline and 7 weeks post intervention: Erythrocyte Measures VO2 Peak</p> | <p>group prevented declines in erythrocyte measures and a positive correlation between aerobic capacity and erythrocyte levels was found.</p> | <p>Concealed allocation: No<br/>Baseline comparability: Yes;<br/>Blind subjects: No<br/>Blind therapists: No<br/>Blind assessors: No<br/>Adequate follow-up: Yes;<br/>Intention-to-treat analysis: No<br/>Between-group comparisons: Yes<br/>Moderate Level of Bias<br/>5/10 Pedro</p> |
| <p><b>Courneya et al 2007</b></p> | <p><b>Group 1: Usual Care-</b> 82 patients with Stage I-III Breast cancer mean age 49</p>   | <p><b>Group 1-</b> Usual medical care provided.<br/><b>Group 2-</b> Resistance exercise training for 8 major muscle</p>   | <p><b>Group 2-</b> 60% VO2 Peak for week 1-6, 70% VO2 peak Week</p>   | <p><b>Group 2-</b> 15 minutes exercise week 1-3 and increased</p> | <p>3 times per week for 18 weeks</p> | <p>Assessed at baseline, during the middle of chemotherapy treatment, at the end of</p>  | <p>Improvements in self esteem seen in both exercise groups<br/>Aerobic exercise preserved aerobic</p>  | <p>Random allocation: Yes<br/>Concealed allocation: Yes<br/>Baseline comparability: Yes;<br/>Blind subjects: No<br/>Blind therapists: No<br/>Blind assessors: No</p>   |

|  |  |   |   |   |  |  |  |   |
|--|--|---|---|---|--|--|--|---|
|  | <p><b>Group 2: Resistance</b><br/>Exercise- 82 patients with Stage I-III Breast cancer mean age 49.5</p> <p><b>Group 3: Aerobic</b><br/>Exercise- 78 patients with Stage I-III Breast cancer mean age 49. All subjects were women undergoing chemotherapy treatment.</p> | <p>groups of the upper and lower limbs.</p> <p><b>Group 3-</b> Aerobic exercise Training, cycle ergometer, treadmill or elliptical training.</p> <p>All exercise interventions were supervised in a hospital setting.</p> | <p>7-12 and 80% VO2 Peak thereafter.</p> <p><b>Group 3-</b> 60-70% of estimated 1RM and progressed by 10% when a subject could complete 12 repetitions.</p> | <p>by 5 minutes every 3 weeks until exercise time reached 45 minutes.</p> <p><b>Group 3-</b> 2 sets of 8-12 repetitions</p> |  | <p>chemotherapy and at 6 month follow-up</p> <p>FACT-A</p> <p>Rosenberg Self-Esteem Scale</p> <p>Centre for Epidemiological Studies Depression Scale</p> <p>Spielberger State Anxiety Inventory</p> <p>Rosenberg Self-Esteem Scale</p> <p>VO2 Max</p> <p>Muscular Strength</p> <p>Whole Body Weight</p> <p>Body Fat</p> <p>Lean Mass</p> | <p>fitness and body fat levels- compared to an increase in usual care group.</p> <p>Resistance exercise statistically improved lean mass and muscle strength and reduced chemo complication rates however this is unclear as to why as it goes against previous studies.</p> | <p>Adequate follow-up: Yes</p> <p>Intention-to-treat analysis: Yes</p> <p>Between-group comparisons: Yes</p> <p>Low Level of Bias</p> <p>7/10 Pedro</p> |
|--|--|---|---|---|--|--|--|---|



## Exercise goals as per ACSM Guidelines

### Pre – Treatment Goals:

|                         |  |
|-------------------------|--|
| <b>Education Goals</b>  | Educate re <ul style="list-style-type: none"> <li>• Expected postoperative course including drains, bandaging, sensory changes, ADLs</li> <li>• Early exercises, precautions, and progression</li> <li>• Lymphoedema risks, symptoms, etc</li> </ul> |
| <b>Assessment Goals</b> | <ul style="list-style-type: none"> <li>• Baseline bilateral shoulder Ax and Hx of shoulder problems</li> <li>• Identify pts at high risk of Rx complications/side-effects</li> </ul>   |
| <b>Treatment Goals</b>  | <ul style="list-style-type: none"> <li>• Demonstrate post-operative exercises</li> <li>• Optimise cardio-vascular fitness and strength</li> </ul>  |

(McAnaw and Harris 2002; Timmermann *et al* 2011)

### During treatment goals:

| <b>Short Term Goals</b>  | <b>Long Term Goals</b>  |
|--|---|
| <ul style="list-style-type: none"> <li>• Maintain or improve physical activity and functioning</li> <li>• Reduce incidence of fatigue</li> <li>• Maintain QoL</li> </ul> | <ul style="list-style-type: none"> <li>• Improve self efficiency with exercise</li> <li>• Improve cardiorespiratory, endocrine, neurological, muscular, cognitive, and psychosocial outcomes</li> <li>• Reduce incidence of treatment side effects</li> <li>• Maintain body size and composition</li> </ul> |

### Post treatment goals:

| <b>Short Term Goals</b>  | <b>Long Term Goals</b>   |
|--|--|
| <ul style="list-style-type: none"> <li>• To regain and improve physical function, aerobic capacity, strength and flexibility</li> <li>• To improve body image and QOL</li> <li>• To improve body composition</li> <li>• To improve cardiorespiratory, endocrine, neurological, muscular, cognitive, and psychosocial outcomes</li> </ul> | <ul style="list-style-type: none"> <li>• To improve QoL</li> <li>• To reduce, attenuate, and prevent long-term and late effects of cancer treatment</li> <li>• Potentially to reduce or delay recurrence or a second primary cancer</li> </ul> |



## Adherence/Barriers to exercise

| <b>Treatment related barriers</b> | <b>Life-related barriers</b> | <b>Motivation related barriers</b>     |
|-----------------------------------|------------------------------|--|
| - Feeling sick                    | - Vacation                   | - Lack of time                         |
| - Chemotherapy day                | - Flu                        | - Home exercise                        |
| - Fatigue                         | - Transportation problems    | - Lost interest                        |
| - Vomiting                        | - Lack of childcare          | - Forgetting                           |
|                                   | - Time constraints           | - Lack of education regarding benefits |

(Courneya *et al* 2008; Larrison *et al* 2008; Milne *et al* 2007)

### **Simple steps to overcome barriers to exercise adherence**

- **Inform** breast cancer patients fully about the importance of exercise and its benefits in breast cancer. (Jones *et al* 2004).
- Fatigue: prescribe **low-to-moderate intensity, interval exercise** and exercise when fatigue is at its lowest (De Paleviille *et al* 2007).
- Time barriers: hold exercise classes in **venues accessible by public transport** and timetable classes at times agreed on by participants (Markes *et al* 2006).
- Exercise enjoyment can be increased by **taking participants' exercise preferences into account** and by varying the mode of exercise. Set patient-centred goals. Group exercise sessions may also increase exercise enjoyment (Markes *et al* 2006).
- Other compliance issues such as nausea, pain, infections are out of control of exercise specialists and will most likely require pharmacological or medical interventions



## Transferrable Skills – Exercise and Prostate Cancer

Prostate cancer survivors often experience a very high rate of morbidity caused by cancer and its treatments (Baumann *et al*, 2012). Side effects are particularly associated with Androgen Deprivation Therapy (ADT) which is commonly used to treat localised, advanced and systematic prostate cancer in conjunction with chemotherapy and radiotherapy.

### Side effects

- Increased levels of fatigue
- Erectile dysfunction
- Anxiety
- Urinary incontinence: 5–74% of operated patients are affected
- Depression
- Sleep disorders
- Low self esteem
- Decreased Quality of Life

(Mishra *et al* 2012; Keogh and MacLeod 2012, Baumann *et al*, 2012)

### Side effects specific to ADT

- Hot flushes
- Erectile Dysfunction
- Increased risk of metabolic syndrome
- Greater risk of developing cardiovascular disease
- Decreased balance and increased incidence of falls
- Decreased muscle strength (24% less than aged match controls)
- Reduced aerobic capacity (7% less aerobic fitness compared with aged matched controls)
- Increased body fat
- Deterioration of bone health

(Baumann *et al*, 2012; Keogh and MacLeod 2012; Galvao *et al* 2009)

### Benefits of exercise for prostate cancer survivors

Current research shows that exercise improves:

- Incontinence
- Aerobic fitness
- Fatigue
- Body constitution
- QoL
- In addition, they contribute to shorter duration of hospitalization, less psychological and emotional distress, depression, and anxiety (Baumann *et al* 2012).
- Muscle mass and strength
- Flexibility
- Body image
- Self-esteem



## Components of exercise

**Table 25: Recommendations for clinical exercising with prostate cancer patients**

| Exercise                  | Pelvic floor/sphincter training (PFST)   | Endurance training  | Resistance training   |
|---------------------------|--|---|---|
| Aims                      | Improving incontinence, QoL  | Reduce fatigue and medicaments side effects<br>Improving physical fitness, QoL  | Reduce fatigue and medicaments side effects<br>Improving physical fitness, QoL  |
| Begin                     | 4 weeks pre-op<br>During radiation and ADT<br>48 h after removal of the catheter   | Pre-op<br>During radiation and ADT<br>48 h post-op: low intensities<br>6 weeks post-op: intensive and extensive training possible; however, intensity depends on the degree of incontinence | Pre-op<br>During radiation and ADT<br>48 h post-op: low intensities<br>6 weeks post-op: intensive and extensive training possible; however, intensity depends on the degree of incontinence |
| Duration                  | Approx. 12 weeks, if the patient is continent after removal of the catheter<br>6 to 12 months, if the patient is not continent after removal of the catheter | Lifelong  | Lifelong<br><br>At least 12 weeks to achieve an effect  |
| Sessions                  | 3–4 sessions per day   | 2–3 sessions per week   | 2–3 sessions per week   |
| Intensity                 |  | 60–80% of the HR <sub>max</sub><br>50–75% of the VO <sub>2</sub> max  | 60–85% of the 1-RM  |
| Length, sets, repetitions | 10–15 contractions per session, no more than 90 contractions per day<br>Time of contraction, 5–10 s<br>Time of relaxation, 10–20 s                           | 15 min with 75–80% of the max. performance<br><br>30–45 min with 60–70% of the max. performance   | 7–8 full-body exercises<br><br>2–4 sets<br>6–12 repetitions<br>3–4 sets with 10–12 repetitions at 60–70% of the 1-RM<br>2–3 sets with 6–8 repetitions at 75–85% of the 1-RM                 |

*HR<sub>max</sub>* maximum heart rate, *PFST* pelvic floor/sphincter training, *pre-op* prior to surgery, *post-op* after surgery, *1-RM* one repetition maximum, *VO<sub>2</sub>max* maximal oxygen uptake, *QoL* quality of life, *ADT* androgen deprivation therapy

(Baumann *et al* 2012)

**Table 26: Recommendations exercise guidelines for men receiving ADT**

| Exercise type   | Frequency      | Intensity                             | Amount                                  |
|---|----------------|---------------------------------------|---|
| Resistance<br>i.e. weight machine, free weights       | 2–3 times/week | 50–70% one repetition maximum         | 8–12 repetitions 2–4 sets               |
| Aerobic<br>i.e. walking, treadmill, bicycle, swimming | 3–5 times/week | 55–90% maximal heart rate (220 — age) | 15 minutes; progress to over 30 minutes |

Note: Adapted from: Galvão and Newton, 2005<sup>58</sup> and Galvão *et al.*, 2007.<sup>59</sup>

(Keogh and MacLeod 2012)



## **Transferable Skills: Exercise and Lung Cancer**

Lung cancer has become one of the most prevalent forms of cancer due to exposure to etiologic agents and increasing life span. Given improved screening, improved prognosis following diagnosis and the aging population, the number of people living with lung cancer in the community is growing (Granger et al 2011).

### **Types of Lung Cancer**

Lung cancer occurs in multiple histological types and is generally divided into:

- NSCLC (Non small-cell lung cancer)
  - Squamous cell carcinoma
  - Adrenocarcinoma
  - Large cell carcinoma
- SCLC (Small cell lung cancer)

### **Symptoms of Lung Cancer**

Presentation of lung cancer is divided into two major categories:

| <b>Respiratory Related Symptoms</b> | <b>Metastases-Related Symptoms</b> |
|-------------------------------------|------------------------------------|
| Cough                               | Anorexia                           |
| Dyspnoea                            | Weight Loss                        |
| Chest Pain                          | Fatigue                            |
| Haemoptysis                         | Back/Shoulder Pain                 |
| Repeated Chest Infections           | Decline in General Health          |

### **Treatment of Lung Cancer**

Treatment of lung cancer generally depends on the type and stage of lung cancer.

The 5 Year Survival rate of 14% for NSCLC and 3% for SCLC must be considered with treatment choices.

**Table 27. Treatment of different types of lung cancer**

| <b>Cancer Type</b>                     | <b>Treatment</b>   |
|--|--|
| <b>NSCLC Early Stage Disease</b>       | Surgery (Lobectomy/ Greater Resections)<br>Post Operative Chemotherapy   |
| <b>NSCLC Loco-Regional Disease</b>     | Chemotherapy and Radiotherapy combined treatment   |
| <b>Advanced and Metastatic Disease</b> | 3-4 cycles of chemotherapy improves survival and reduces palliative symptoms. Generally has a short term effect.   |
| <b>SCLC</b>                            | Chemotherapy with delayed radiotherapy treatment.<br>Prophylactic Cranial Irradiation (Radiotherapy) if the patients achieve response to above to reduce CNS metastases. |

**Exercise Tests**

VO2 max exercise testing is routinely performed using standard cycle ergometry or treadmill testing. Other types of exercise testing includes:

- Stair climbing (>5 flights of stairs=VO2 max >20 ml.kg.min, < 1 flight = VO2 max <10 ml.kg.min)
- Shuttle walk test
- 6 minute walk test (Beckles *et al*, 2003)

**Benefits of Exercise for Lung Cancer Patients**

A systematic review by Granger *et al* (2011) showed the following benefits of exercise for lung cancer patient before and after surgery:

- Improved exercise capacity.
- Improvements in cancer related fatigue
- Early stage lung cancer generally showed no change in HRQoL while advanced cancer patients showed no deterioration in HRQoL after exercise intervention
- Improvements in breathlessness, pain and cough, however, due to the poor methodological quality of the majority of the studies these results must be interpreted with caution.

Other benefits:

- 15-22% improvement in peak aerobic capacity following a pre-operative exercise rehabilitation programme
- Significant improvement in 6 minute walking distance and peak cycling power output

(Spruit *et al* 2006; Cesario *et al* 2007; Jones *et al* 2007)

### **Exercise Components**

Pre and Post operative exercise interventions at moderate to high intensity have been shown to be safe and feasible for lung cancer patients who are eligible for lung resection (Bobbio *et al* 2008).

### **Pre-Operative Programme**

| <b>Frequency</b>                                 | <b>Intensity</b>  | <b>Type</b>                                   | <b>Time</b>   |
|--|---|---|---|
| 5 Times per week for until surgical intervention | 60% of baseline peak aerobic capacity progressing to 65% and finally involving 1 interval session involving 30 seconds at peak aerobic capacity followed by a 60 seconds break for 15 minutes | Aerobic Exercise (Supervised Cycle Ergometry) | 20 minutes progressing to 30 minutes after 4 weeks of exercising. |

(Jones *et al* 2007)

### **Post Operative Programme**

| <b>Frequency</b>   | <b>Intensity</b>  | <b>Type</b>  | <b>Time</b>                                       |
|--|---|--|---|
| 8-14 weeks or duration of hospital stay prior to surgical intervention | 60% of peak baseline power progressing to 70-80% peak power output. | Aerobic Exercise (Supervised cycle ergometry, treadmill walking) | 20-30 minutes sessions, 4 days per week.          |
| 8-14 weeks or duration of hospital stay prior to surgical intervention | 60% of 1RM  | Resistance Training (Upper and Lower Limb main muscle groups)    | 3x15 repetitions, 2 non-consecutive days per week |

(Cesario *et al* 2007; Spruit *et al* 2006)

## Chapter 8: Breast Reconstruction

### Introduction

Breast reconstruction surgery rebuilds the breast mound so that it is about the same size and shape as before. The nipple and the areola can also be added. Most women who have had a mastectomy can have reconstruction. Women who have had a lumpectomy may not need reconstruction ([www.breastcancer.org](http://www.breastcancer.org)).

### Implants

Tissue expansion followed by removal of the expander and placement of a permanent implant is the most common form of reconstruction in the US. Implants do not cause ptosis (droop) but are more suited for women with small to moderate sized breasts and those who undergo skin sparing mastectomy's to reduce ptosis associated with larger breasts.

The implant used is a silicone shell filled with saline solution. The US Food and Drug Administration reported a possible link between these implants and a rare form of lymphoma (anaplastic large-cell lymphoma ALCL). Other reports suggest that silicone implants can rupture and the saline contents seep out resulting in immune system diseases. Despite these reports there is a lack of strong evidence confirming these links and these implants continue to be used routinely.



### Types of Surgeries

#### *1) One Stage Immediate Breast Reconstruction Surgery*

Performed with mastectomy. Reservations that immediate reconstruction can delay post-op therapy or subsequent surveillance for recurrence have been refuted by several studies.

Benefits:

- Immediate reconstruction can offer technical, aesthetic and economical advantages.
- More comfortable in the case of implants as there is less need for expanding of underlying chest skin.
- Excess skin saved by skin sparing mastectomy can provide the most natural look and feel, which is lost in delayed non skin-sparing techniques.
- Although post-mastectomy radiation can result in increased complications due to reconstruction, the reconstruction is usually maintained.

## 2) *Two-stage Reconstruction or Two-stage Delayed Reconstruction Surgery*

Most commonly completed if breast implants are used. The skin post mastectomy is allowed to heal, an expander is placed under the chest wall skin and muscles and slowly expanded over a 6 month period. The expander is then replaced by a silicone gel implant. For tissue flap procedures delayed techniques, scar formation with resulting stiffening and contracture of the skin may distort the breast shape. Mastopexy (breast lift) is almost always needed in a delayed reconstruction.

### **Tissue Flap Procedures**

#### **TRAM (Transverse Rectus Abdominis Muscle) Flap**

This procedure uses skin and fatty tissue from the lower abdomen to replace skin and breast tissue removed by the mastectomy. The flap uses the rectus abdominis muscle as a channel for blood flow to supply the overlying subcutaneous fat and skin. This can be achieved by 2 procedures:

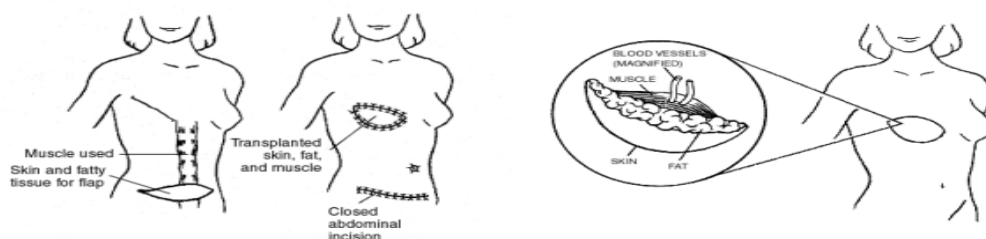
- 1) ***Pedicled TRAM*** uses the rectus muscle on one side maintaining the blood flow supplied by the superior epigastric vessels to replace the breast tissue.

#### **Contraindications**

- Previous abdominoplasty
- Previous TRAM
- Relative Contraindications
- Age
- Upper abdominal incision with previous division of rectus muscle
- General Medical Health
- Smoking
- Obesity
- Abdominal Surgery

2) ***Free TRAM*** involves removing the flap along with the deep inferior epigastric vessels and connecting these vessels with the thoracodorsal vessels through microanastomosis.

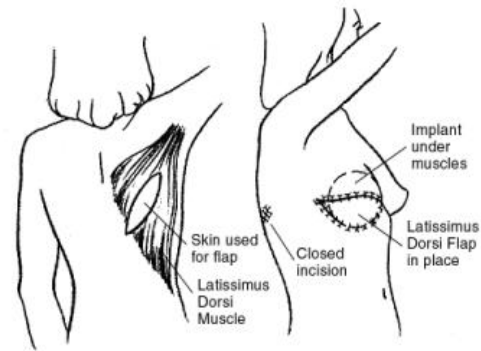
- No studies show a free TRAM is superior to a pedicled TRAM, however, many patients contraindicated for a pedicled TRAM can undergo a free TRAM successfully.
- Both procedures replace the lost breast tissue with similar tissue achieving a more natural look than an implant.



TRAM flap incisions The tissue used to rebuild the breast shape

## Latissimus Dorsi Flap

Part of the latissimus dorsi muscle and overlying skin and fatty tissue are tunneled from the patients back to cover the entire breast anteriorly. A skin paddle technique called a “fleur de lis” is performed to reduce scarring and is usually posited over the future nipple reconstruction site. The thoracodorsal nerve supplying latissimus

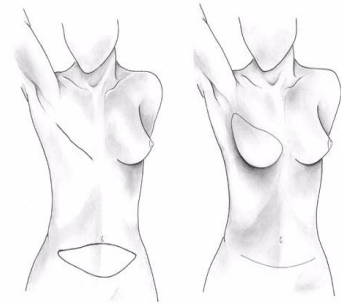


Latissimus dorsi flap

dorsi is preserved to maintain muscle volume for a more natural breast appearance. An implant is routinely used along with the latissimus dorsi flap as there is not enough tissue.

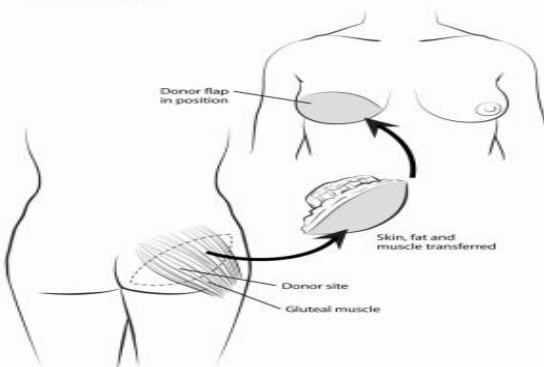
## DIEP (Deep Inferior Epigastric Artery Perforator) Flap

Very similar procedure to a TRAM free flap, however, it uses more skin and subcutaneous tissue from the abdomen as opposed to the rectus abdominis muscle, almost like a tummy tuck. This procedure results in less abdominal muscle weakness than the conventional TRAM.



Donor tissue site for DIEP flap After DIEP flap

### GAP flap surgery Gluteal free flap surgery



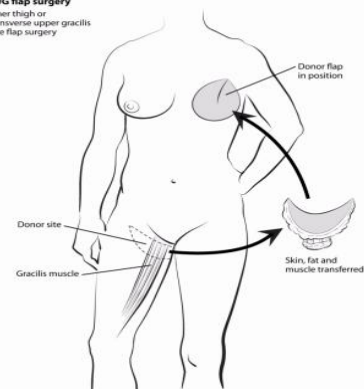
## Gluteal Free Flap

Gluteal Free Flap or GAP (Gluteal Artery Perforator) uses the gluteal muscles to replace the lost breast tissue, through a procedure similar to a free TRAM. This is often an option for women contraindicated for the above procedures.

## TUG (Transverse Upper Gracilis) Flap

This procedure is similar to a free TRAM and a GAP where skin, fat and the upper part of the gracilis muscle are removed from the inside of the thigh to replace lost breast tissue. It is often reserved for women with large thighs as there is a limited amount of tissue to harvest in

### TUG flap surgery Inner thigh or transverse upper gracilis free flap surgery



most women. Due to the location of the donor site there is often issues with healing however they tend to be minor and easily treated.

### **Nipple and Areola Reconstruction**

This is the final stage of breast reconstruction. It is typical to complete nipple and areola reconstruction post chemotherapy or 2-3 months post reconstruction. Symmetric position, height, width and pigmentation are the ultimate goals. The graft for the nipple can be harvested from many sites including the groin and transferred to the reconstructed breast mound. The area around the nipple is then tattooed to match the pigmentation of the opposite areola. Skin and areola sparing mastectomy's can also be performed for immediate reconstruction procedures.

(Harris *et al*, 2004; Roje *et al*, 2009; [www.cancer.org](http://www.cancer.org))



## **Complications of Reconstructive Surgery**

### **Complications of Latissimus Dorsi Flap**

#### *Seroma formation*

- 72-95% complication rate.
- Seroma formation is a difficult problem to prevent and treat with possible sequale including wound infection, flap necrosis and dehiscence (wound breaking open).
- Treatment options include using subcutaneous fascia sutures during wound closure, corticosteroid administration and drainage.

#### *Other complications*

- Wound hypertrophic scarring (15-28%)
- Haematoma (5-15%)
- Minor latissimus dorsi weakness
- When the tissue graft is combined with implantation then it carries the same risks and complications associated with implantation.

### **Implications for Physiotherapy**

- Women are advised to avoid strenuous arm exercises for 6–8 weeks if the anterior axillary fold has been reconstructed (Berger *et al* 1998).
- Shoulder ROM exercises usually begin after 1-2 weeks post reconstruction



- Physiotherapist should advise the patient on upright posture and education that back pain usually resides after 5-7 days.
  - After 6 weeks strengthening exercises can begin but is important to avoid unsupported body weight UL exercises.
  - Weight limit of 5kg until 12 weeks post op.
  - Patients can anticipate returning to work in 3–6 weeks, resuming exercise or sports in 2–4 months.
- (Burgic *et al*, 2010)

### Complications of TRAM Flap

Below are the complications that can occur during a free and pedicle TRAM and also during implantation (Alderman *et al*, 2001). The risk of total flap loss is reported to be as low as 1-3% in both pedicle and free TRAM reconstruction.

Frequency of Complications, by Type of Reconstruction

| Complication                         | Implants |      | Pedicle TRAM Flaps |      | Free TRAM Flaps |      |
|--------------------------------------|----------|------|--------------------|------|-----------------|------|
|                                      | No.      | %    | No.                | %    | No.             | %    |
| Back pain                            | 1        | 1.3  | 4                  | 2.2  | 4               | 6.0  |
| Hernia/abdominal wall laxity         | —        | —    | 14                 | 7.8  | 8               | 11.9 |
| Lymphedema                           | 3        | 3.8  | 10                 | 5.6  | 3               | 4.5  |
| Capular contracture                  | 12       | 15.2 | —                  | —    | —               | —    |
| Implant shift                        | 1        | 1.3  | —                  | —    | —               | —    |
| Wound dehiscence                     | 3        | 3.8  | 10                 | 5.6  | 1               | 1.5  |
| Partial flap loss (fat necrosis)     | 5        | 6.3  | 29                 | 16.2 | 10              | 14.9 |
| Total flap loss                      | 0        | —    | 2                  | 1.1  | 1               | 1.5  |
| Anastomotic thrombosis               | —        | —    | —                  | —    | 4               | 6.0  |
| Implant failure                      | 3        | 3.8  | —                  | —    | —               | —    |
| Infection                            | 28       | 35.4 | 21                 | 11.7 | 12              | 17.9 |
| <i>Clostridium difficile</i> colitis | 0        | —    | 1                  | 0.5  | 0               | —    |
| Hematoma/seroma of the breast        | 4        | 5.1  | 7                  | 3.9  | 6               | 9.0  |
| Hematoma/seroma of the abdomen       | —        | —    | 7                  | 3.9  | 3               | 4.5  |
| Abdominal wall necrosis              | —        | —    | 3                  | 1.7  | 0               | —    |
| Cardiac/pulmonary complications      | 1        | 1.3  | 6                  | 3.4  | 6               | 9.0  |

### Abdominal Wall weakness

- One of the major complications of a TRAM reconstruction
- Incidence reported to be approximately 8% for a pedicled TRAM and 12% for a free TRAM.
- 27% of women undergoing a TRAM report decreased aerobic performance and 24% report decreased ability while playing tennis due to abdominal wall weakness (Monterio *et al*).
- Abdominal wall weakness is further decreased if a bilateral rectus abdominis harvest is completed.
- The DEIP reconstruction has lower rates of abdominal wall weakness and hernia due to the graft containing only subcutaneous tissue and skin.

### **Implications for Physiotherapy**

Ideally, patients who are to undergo the TRAM procedure are evaluated preoperatively and instructed in a program of specific abdominal strengthening exercises based on abdominal strength. Unfortunately, research on the effect of preoperative abdominal wall strengthening programs on outcome following the TRAM procedure is lacking.

- Abdominal strengthening exercises usually begin several weeks after surgery.
- Lifting and sit-ups are not permitted until 6 weeks after surgery.
- The time frame will depend on healing and is determined on an individual basis by the surgeon.
- To facilitate optimal trunk strengthening, exercises should be designed for co-contraction of the oblique, transversus abdominis, and multifidus muscles.
- Due to the risk of cardiopulmonary complications post TRAM reconstruction, therapists should instruct the patient to complete calve exercises, deep breathing exercises and specific chest physiotherapy directly post-op.

(Alderman et al 2001)



### **Psychosocial Issue: Body image**

A growing body of evidence suggests that changes in body image after breast cancer and its treatment may have direct effects on sexuality, sexual response, sexual roles, and relationships (Ganz *et al* 2002). The alterations in body image occur when there is a discrepancy between the way someone formerly perceived herself and how she now sees herself as a result of cancer and its treatment (Hoopwood 1993).

- One-third of women who had undergone prophylactic mastectomy felt less ‘feminine’ and a smaller minority experienced more serious body image concerns (Hopwood *et al* 2000).
- Women who underwent breast conserving surgery had a significantly more positive body image than those who had undergone mastectomy (Curan *et al* 1998).

### **Asking about body image concerns**

Clinicians should be alert to a woman’s body image concerns throughout treatment. They should explore whether the woman has significant concerns about the impact of treatments on her body or self by asking questions.

**Table 28. Psychological Impact of Breast Cancer Treatment**

| <b>Study</b>  | <b>Outcome measures</b>   | <b>Outcome</b>  |
|---|---|---|
| <p>‘Partial Mastectomy and Breast Reconstruction: A Comparison of their Effects on Psychosocial Adjustment, Body Image, and Sexuality’<br/>(Schover et al 1995)</p> | <p>Questionnaires completed 4 years post partial mastectomy or immediate reconstruction after mastectomy.</p>   | <p>- Women who had undergone chemotherapy had more sexual dysfunction, poorer body image, and more psychological distress.</p> <p>-Factors predictive of greater psychosocial distress included troubled marriage, poor body image, sexual dissatisfaction, less education, and treatment with chemotherapy.</p>  |
| <p>‘Role of Breast Reconstructive Surgery in Physical and Emotional Outcomes Among Breast Cancer Survivors’<br/>(Rowland et al 2000)</p>                            | <p>1,957 breast cancer survivors completed a number of standardized measures of health-related quality of life, body image, and physical and sexual functioning</p> | <p>-Women in both mastectomy groups complained of more physical symptoms related to their surgeries than women in the lumpectomy group.</p> <p>-The psychosocial impact of type of primary surgery for breast cancer occurs largely in areas of body image and feelings of attractiveness, women receiving lumpectomy experienced more positive outcomes.</p> |

## Chapter 9: Long Term Management

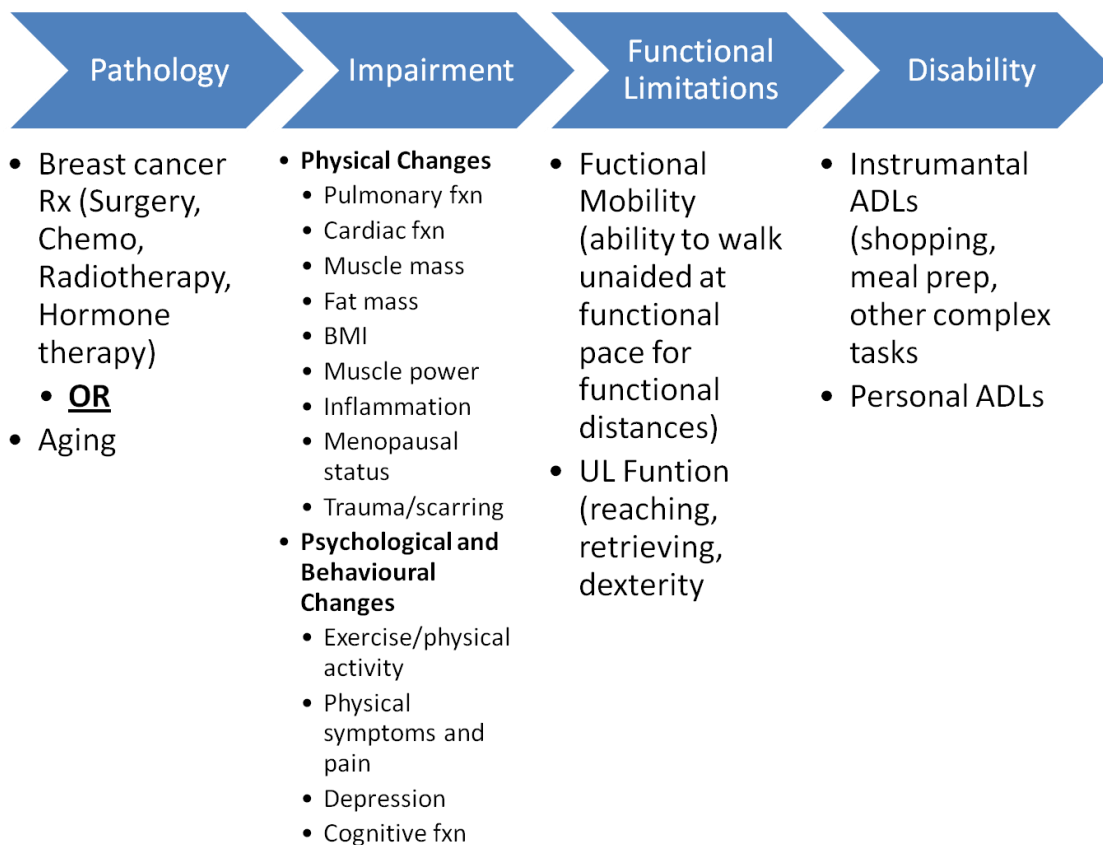
Based on the exercise principles of “reversibility” and “diminishing returns”, it is important that we educate patients so that they can carry on their exercise programme after discharge and become life-long exercisers.



### Continuation of Exercise

Most adults, especially women, prefer moderate intensity to vigorous intensity exercise, and are more likely to continue moderate exercise in the long-term (Pinto and Maruyama 1999). 98% of cancer survivors preferred recreational exercises rather than exercising in a gym (Jones and Courneya 2002). This shows the importance of patient preference when prescribing exercise, especially in the long-term.

**Figure. 10 Difficulties encountered by breast cancer survivors**



Adapted from Schmitz *et al* (2007)

Refer to ACSM guidelines (2009) for FITT principle on exercise goals:

- Aerobic exercise of moderate intensity for 30 minutes 5 days of the week
- Resistance exercise within the context of what they can perform when discharged. Aim for 1–2 sets (of 8–12 repetitions) of 8–10 different resistance large-muscle group exercises at moderate intensity, 2 or 3 non-consecutive days per week (Jones and Demark-Wahnefried 2006).
- Flexibility as per ACSM guidelines for healthy adults (ACSM, 2009).

### **Benefits:**

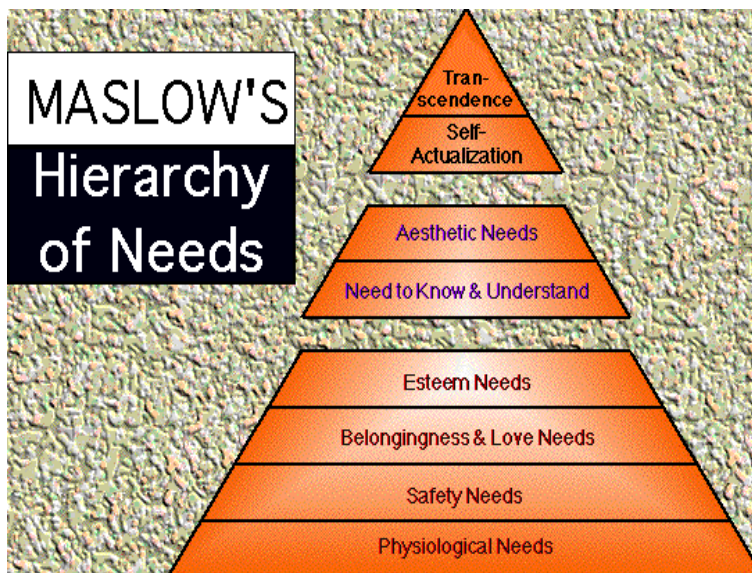
- Higher physical health
- Decreased mortality risk from breast cancer (Kendall *et al* 2005; Holmes *et al* 2005) [However, 62.9% of cancer survivors were not meeting the recommended amounts of exercise at 2-10 years post diagnosis (Blanchard *et al* 2008)].



## **Motivation**

A Cochrane review of exercise in breast cancer patients recommended that because effective exercise interventions require behavioural change to improve adherence and sustainability, “strategies for behaviour change should underpin these interventions” (Markes *et al* 2009).

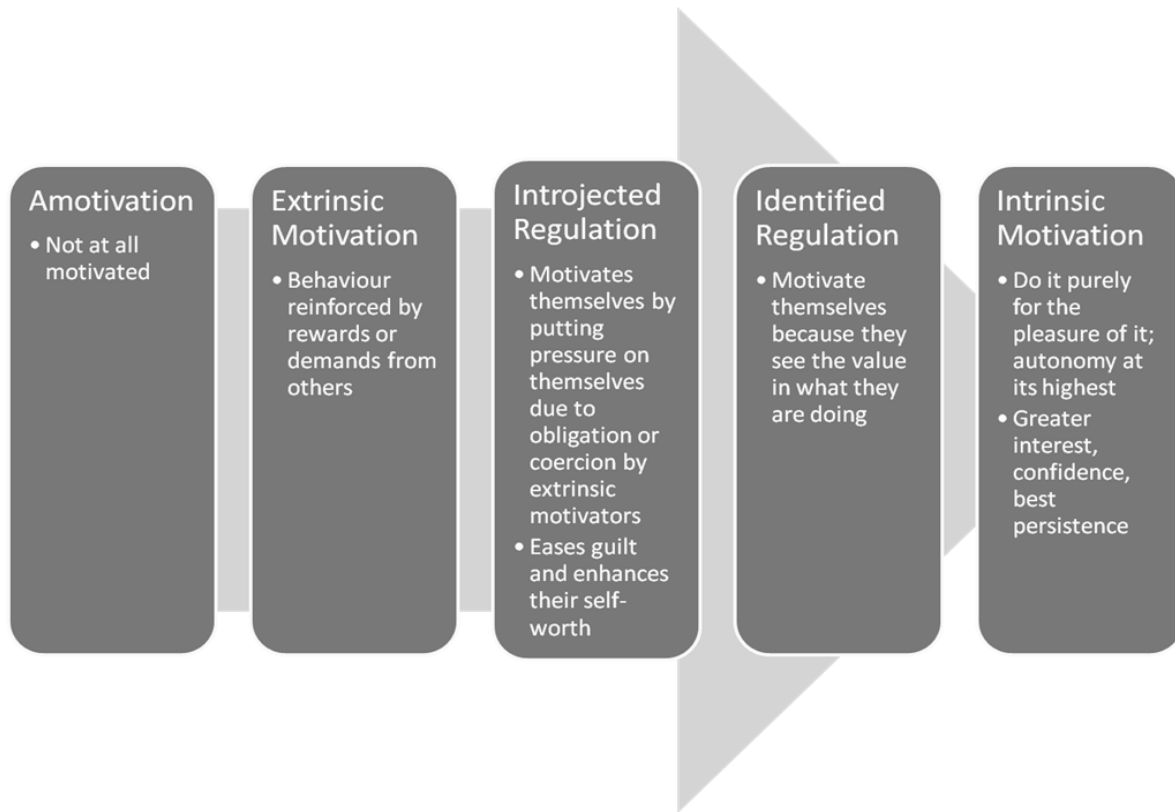
### **Levels of Motivation**



(Maslow 1954; Maslow & Lowery 1998)

- 1) Physiological: hunger, thirst, bodily comforts, etc.
- 2) Safety/security: out of danger
- 3) Belongingness and Love: to be accepted
- 4) Esteem: to achieve, be competent, gain approval and recognition.
- 5) Cognitive: to know, understand, and explore
- 6) Aesthetic: symmetry, order, and beauty
- 7) Self-actualization: to find self-fulfilment and realize one's potential
- 8) Self-transcendence: to help others find self-fulfillment and realize their potential.

### Figure 11. Self-Determination Theory



The more autonomous the level of motivation, the higher adherence to exercise will be (Wilson, cited in Milne et al 2008).

### Incorporating this into patient education in breast cancer

- Beginning exercise interventions immediately after adjuvant treatment can lead to increased autonomy in motivation by 12 weeks (Milne et al 2008).
- Amotivated patient
  - Set definite goals, praise achievements, involve family/carer to encourage exercise
  - Enforce absolute importance of exercise
  - Educate re short and long-term benefits of exercise (keeping in mind Maslow's pyramid and attempt to appeal to every level)
  - Find a type of exercise that the patient enjoys.



### Return to Work

57% of cancer survivors reduce hours of work after diagnosis by >4hrs/week. 81% attributed this to cancer. 20% changed job duties (Steiner et al 2008). Individuals who reduced their job duties/hours, there was a higher prevalence of psychosocial issues such as fear, boredom,

anxiety, depression and feeling useless (Steiner et al 2008). However, in a Canadian study of breast cancer survivors, there was no significant reduction of work parameters. Only slightly more breast cancer survivors became unemployed in the 3 year follow-up compared to the controls (21% versus 15%) (Maunsell et al 2004).

Geographical, cultural and socioeconomic factors may play a role in prevalence in return to work, however, we as physiotherapists should be aware of the potentially adverse psychosocial effects of unemployment, enquire as to whether return to work is important to the patient and incorporate return to work into goals and treatment plan.

**Table 29. Factors that influence Return to Work**

| <b>Barriers</b>   | <b>Facilitators</b>  |
|---|--|
| Emotional: <b>guilt, unrealistic expectations</b>   | Support from co-workers, employers, and/or occupational health dept.   |
| Fatigue   | Placing value on work  |
| Patients treated with chemotherapy  | Absence of long-term side effects  |
| Slow/insufficient recovery  | <b>Support of family/friends/health professionals/other breast cancer survivors</b>  |
| <b>Co-morbidities</b>   | <b>Confidence</b>  |
| Lower productivity than co-workers  | Financial necessity; expiring sick leave pay   |
| Stigma at work  | Having a variety of skills/competencies  |
| Unrealistic expectations of employers and lack of support                                     | <b>Input/control over RTW plan</b>   |
| Job contents: <b>physical (heavy workload)</b> and mental (stressful/requiring concentration) | Coping strategies such as accepting and explaining limitations, disclosing diagnosis and treatment, <b>avoiding stress</b> and being realistic towards supervisors and colleagues about patients' work capacity. |
| <b>Negative attitudes of health professionals</b>   |  |

\*Factors in bold are those which physiotherapists can influence

(Tamminga et al 2012; Steiner 2008; Mehnert and Koch 2013)

## Targeting Interventions

- Determine whether RTW is important for your patient, and what factors act as barriers/facilitators.
- Change modifiable factors within the context of the MDT (Mehnert and Koch 2013).
- Make a clear, comprehensive RTW plan that includes tasks, hours, and responsibilities so that all stakeholders will be informed (Tamminga et al 2012).
- Target treatment to address any long-term side effects that may be acting as barriers to RTW (e.g. fatigue, weakness, etc.).
- Provide support and encouragement within the context of the MDT (Tamminga et al 2012).



## Breast Cancer Recurrence

With improving treatments and advances in knowledge, a high survival rate exists and most women go on to live full lives without any complications.

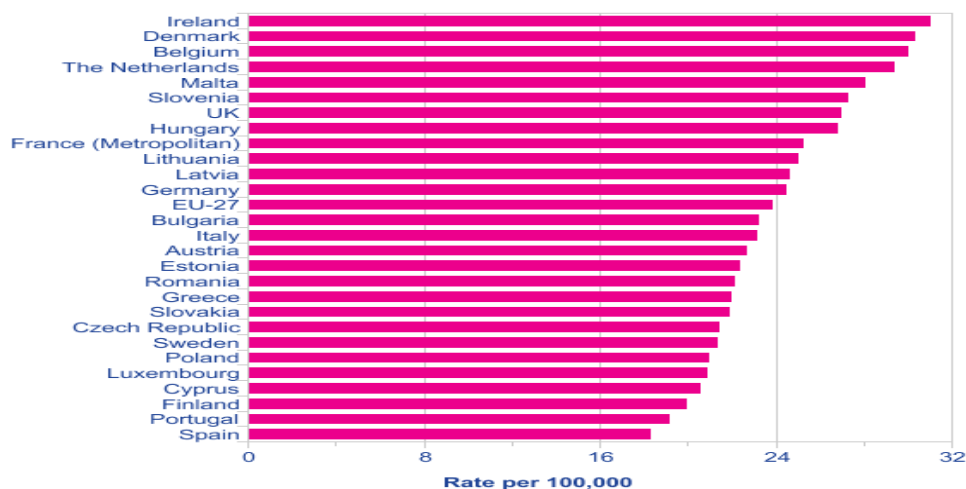
**Figure 11. Survival Rates**

| Sex    | Relative Survival (%) |                     |                  |
|--------|-----------------------|---------------------|------------------|
|        | 1 Year<br>2005-2009   | 5 Year<br>2005-2009 | 10 Year<br>2007* |
| Female | 95.8                  | 85.1                | 77               |

(Cancer Research UK 2012)

However Ireland has the highest mortality rates in Europe in terms of breast cancer.

**Figure 12. Breast cancer mortality rates in Europe**



(Cancer Research UK 2012)



### **Risk factors for recurrence**

- Lymph node involvement
- Tumour size
- Histological grade: how abnormal the cancer cells look and how fast they are growing.
- HER2/neu status: the presence of this gene responsible for encoding a growth-promoting protein which helps control how cells divide and repair themselves.
- Vessel vascular invasion: presence of cancerous cells within the walls of the cancer cells.
- Hormone receptor status
- Proliferation index: The Ki-67 protein has been shown to correlate highly with high rates of proliferation and survival rates
- Age: Higher rate of recurrence in females under 35 years at initial diagnosis
- Initial treatment: Higher rate of recurrence in women who had breast conserving surgery and those who do not receive radiation therapy post lumpectomy.

(Mayo Clinic, 2013)

### **Types of recurrence**

- *Local recurrence* (uncommon) is recurrence of cancerous cells at the site of the original tumour. Normally as a result of failure of the initial treatment, especially with breast-conserving therapies. Treated with a full mastectomy.
- *Regional recurrence* (2-5% of all breast cancer cases) is more serious, cancerous cells can appear in chest muscles, the internal mammary lymph nodes under the breast bone or in the nodes above the collarbone and around the neck. Treatment is dependent on the success of previous treatments.
- *Distant recurrence*: lowest survival rate. 65-75% of cases, cancerous cells metastasise from axillary lymph nodes to bone. Treatment is dependent on chance of survival.

## Guidelines

**Table 30. Follow-up care advised for post breast cancer treatment to diagnose recurrence**

| <b>Recommended by American Society of Clinical Oncology</b>               | <b>Not recommended for surveillance</b> |
|---|---|
| Periodic history and physical examination                                 | Routine blood tests                     |
| Annual mammography  | Imaging studies                         |
| Monthly self-breast examination   | Tumour markers                          |
| Annual gynaecologic follow-up   | FDG-PET                                 |
| Patient education regarding symptoms of recurrence                        | Breast MRI                              |
| Referral to genetic counsellor if at high risk for familial breast cancer |   |

(Tolaney and Winer, 2007)

A patient should be referred to her GP if any of the following signs are present

- New pain
- Weight loss
- Shortness of breath
- Changes or new lumps in breast or surgical scar or chest wall

### **Psychosocial Aspects of Recurrence**

The first diagnosis is a very distressing time for a patient but even post treatment, the cancer leaves long-term psychological effects.

*Emotions felt at time of a recurrent diagnosis:*

- Patients cope surprisingly well
- Some do display depressive symptoms relating to loss of hope, anxieties and fear of death
- Others show raises in stress levels and an urgent need to adapt for increased disability

(Weisman and Worden 1985; Anderson et al 2005, cited in Kissane et al 2010)

### **Patient advice on coping with recurrence:**

- *Be informed:* Find out how to be pro-active about treatments, decision making and preventative strategies in order to gain control over your condition.
- *Get support:* Talking is a sign of strength, can help both emotionally as well as informative. Family, friends, support groups or your MDT can all offer advice and support.
- *Take time* for yourself.
- *Focus* your energy on the positives instead of worrying about the future.

## Chapter 10: Palliative Care

Palliative care is the active total care of patients whose disease is not responsive to curative treatment. The goal of palliative care is to prevent and relieve suffering and to support the best possible quality of life (QoL) for patients and their families, regardless of the stage of the disease or the need for other therapies (WHO 1990).



### Physiotherapy and Palliative Care

Physiotherapy is now regarded as part of the multidisciplinary palliative team. Physiotherapy aims to improve patient's QoL by helping them to achieve their maximum potential of functional ability and independence or gain relief from distressing symptoms (NICE 2004).

#### Safe, effective physiotherapy intervention involves:

- Thorough assessment and regular reassessment of the patient's physical status with an acute awareness of their psychological, social and spiritual well-being
- An awareness of the multidimensional nature of symptoms such as pain, dyspnoea, and fatigue
- Adopting a holistic approach to their assessment and management
- Appropriate goal setting according to the patients needs
- Modification of goals as the patient's condition changes
- Clear and sensitive communication with the patient, carers and MDT (Doyle et al 2005)

#### Evidence:

Cobbe and Kennedy (2012) evaluated physiotherapy practice in an Irish hospice in order to inform practice internationally. The study found that:

- 65% of palliative patients were referred for physiotherapy
- The most common interventions were gait re-education, transfer training, and exercise.
- 53% of these patients were eventually discharged home; 47% died of whom 52% received physiotherapy in the last week of life.

Lowe *et al* (2009) examined the role of physical activity as a supportive care intervention in palliative cancer patients.

- This review concluded that some palliative cancer patients are willing and able to tolerate physical activity interventions, with some patients demonstrating improvement in supportive care outcomes post intervention.
- The potential role for physical activity as a supportive care intervention is promising and further feasibility studies are needed to substantiate preliminary findings.

Paltiel *et al* (2009) carried out a qualitative study to examine palliative patients' experiences of participation in a physical group exercise program

- Themes identified regarding perception of the group were a sense of belonging and commitment.
- In relation to group setting, patients found an empowering group enhanced coping and also reported that public gyms were an unsuitable setting for exercise due to low self-esteem and fatigue.
- Therefore, this study indicates that an individually adjusted group exercise program, with competent leaders, can provide a setting to enhance psychological well-being in cancer patients with life expectancy below 1 year.



## **Psychosocial issues in palliative care**

Psychosocial care addresses the psychological experiences of loss and facing death for patients. It involves the spiritual beliefs, culture, and values of those concerned and the social factors that influence their experience (Jeffery, 2003).

### **Psychosocial assessment**

Healthcare professionals need to assess individual strengths, coping styles and stress.

Physiotherapy assessment should include:

- Assessing how the illness has changed the life of the individual, their coping strategies, and their sources of support
- Discussion of their hopes and expectations
- The impact the disease has had on their relationships and concepts of body image that may identify psychosexual issues which need addressing
- Physiotherapists should maintain autonomy during assessment

## Chapter 11: Communication in Cancer Care

### Aim

To equip physiotherapists with the skills required to communicate sensitively and effectively with cancer patients (ISCP 2013). Difficulties in communication are among the most frequently reported problems of cancer patients (Wright et al 2002).

### Benefits of good communication for the patient

- Better relationships with healthcare workers
- Better compliance to treatment
- Greater sense of empowerment regarding decision-making
- Improved reports of pain control, psychological functioning and rates of patient recovery  
(Stewart 1996, Fallowfield and Jenkins 2004)

### Benefits of good communication for staff

- Reduction of incidence of clinical error
- Better able to cope with difficult emotional situations
- Less likely to be the subject of a difficult complaint
- Increased job satisfaction (ISCP, 2013)



## Patient-centred verbal communication

|   |   |
|---|---|
| <b>Exchanging information</b>                 | <ul style="list-style-type: none"><li>• Provide information in a non-dominant tone of voice</li><li>• Help patients evaluate and utilize resources</li><li>• Explore beliefs and information needs and preferences of patient</li><li>• Facilitate understanding, application, and recall of information</li></ul>  |
| <b>Fostering healing relationships</b>        | <ul style="list-style-type: none"><li>• Discuss roles and responsibilities</li><li>• Be honest and open with patients</li><li>• Build trust so patient will trust clinician's competence, skills, knowledge</li><li>• Express of care, empathy and commitment</li></ul>   |
| <b>Managing uncertainty</b>                   | <ul style="list-style-type: none"><li>• Clearly define what patient is uncertain about</li><li>• Assess and understand the reasons for uncertainty</li><li>• Develop emotion-focused/problem-focused management strategies</li></ul>  |
| <b>Recognizing and responding to emotions</b> | <ul style="list-style-type: none"><li>• Identify and explore emotions</li><li>• Assess depression, anxiety, and psychological distress often associated with diagnosis</li><li>• Validate emotions and express empathy, sympathy, and reassurance</li><li>• Providing tangible help for dealing with emotions</li></ul>   |
| <b>Making decisions</b>                       | <ul style="list-style-type: none"><li>• Communicate openly about decisions that need to be made, the support available and the decision process</li><li>• Preparing for and deliberating about the choices</li><li>• Make decision with patient input and implement an action plan</li><li>• Assess decision quality and reflect on option taken</li></ul>  |
| <b>Enabling patient self-management</b>       | <ul style="list-style-type: none"><li>• Assess where patient is at in their interest, level of motivation and ability to self-manage</li><li>• Share and advise: let the patient expresses his or her needs and priorities, then share guidance on how to achieve these</li><li>• Prepare and assist in teaching self-care skills e.g. stress management</li><li>• Arrange any follow-up required to ensure patient is able to self-manage</li><li>• Provide patients with a choice of self-management strategies</li></ul> |
| <b>Time and behaviours</b>                    | <ul style="list-style-type: none"><li>• Clinicians should spend enough time communicating information to patients to ensure full comprehension of information.</li><li>• Information should be communicated in a private setting</li></ul> <p>All team members and the patient should display the following behaviours whilst communicating: courtesy, respect and skills such as attentive listening and not interrupting.<br/>(McCormack et al 2011)</p>  |



## Non-Verbal Communication

The manner in which information is provided to patients is just as influential on patient recall and understanding as the content delivered (Fallowfield and Jenkins 1999).

Patient satisfaction is higher when clinicians:

- Smiled a lot
- Increased eye contact
- Leaned forward
- Used an expressive tone of voice and face
- Gestured (Griffith *et al* 2003)

## Listening

It is important to actively listen to the patient. The important behavioural aspects of effective listening are:

### **S-O-L-E-R**

- **Sit** squarely in relation to the patient
- Maintain an **Open** position
- **Lean** slightly towards the client
- Maintain **Eye** contact with the patient
- **Relax** around the patient (Egan 1990)

## Barriers to effective listening:

- Temptation to tell them what to do, as opposed to letting them share their feelings
- Not enough time to listen, share feelings, experiences
- A feeling of vulnerability and fear of what the patient may ask

(Donoghue and Siegel 2005)



## Responding to difficult emotions

### 1) Acute emotional distress

Acute stress disorder is present in almost one third of patients after diagnosis (Kangas *et al* 2007). A distressed patient may be one who is demanding, unable to make decisions or angry (Bylund *et al* 2006; Knobf 2007).

Patients exhibit a range of emotions post diagnosis including, mood changes such as:

- Worry
- Sadness
- Anger
- Fear of recurrence
- Concerns with body image
- Sexuality
- Employment
- Relationship issues

### Responses of the clinician to emotional distress

- Listen; ask open ended questions and show care, compassion and interest.
- Allow time to understand the experience and gain insight into what may have prompted their response
- Take care not to use distancing techniques or strategies that indicate that the emotional response is unwelcome.
- Provide support

### Defensive behaviours to be avoided by clinicians

- Asking closed questions
- Asking leading questions
- Interrupting the patient, changing the subject, cutting the patient short
- Giving premature reassurance or advice
- Become irritable or angry
- Concentrating on physical symptoms and ignoring psychological symptoms

(Philip & Kissane, 2010)

## 2) Dealing with Anger

Patients with cancer are forced to deal with many potential and real losses (Kissane, 1994). Clinicians meeting anger may feel threatened, become defensive or, indeed, angry in response. These reactions are generally considered unhelpful as they are likely to result in an escalation of the patients anger (Cunningham, 2004).

(Philip & Kissane, 2010)

### Strategies for communicating with angry patients

- **Preparation:** Be clear about clinical details and investigation results prior to meeting the patient. Make time.
- **Listen:** Using open ended questions, allow the narrative to unfold. Develop a shared understanding of the experience, and develop shared goals from this point.
- Offer an **empathic** acknowledgment of the emotions expressed.
- **Involve** experienced clinicians.
- If anger persists, **reconsider** your approach.



### 3) **Denial**

Denial is a common reaction following cancer diagnosis, especially when life threatening. After being told their diagnosis, approximately 20% of patients deny they have cancer; 26% partially suppress awareness of implementing death and 8% demonstrate complete denial (Greer, 1992).

#### **Strategies and communication skills for clinicians**

- Exclude misunderstanding or inadequate information
- Determine whether denial requires management
- Explore emotional background to fears
- Provide information tailored to the needs of the patient and clarify goals of care
- Be aware of cultural and religious issues
- Monitor the shifting sand of denial as the disease progresses
- Aim to increase a person's self esteem, dignity, moral and life meaning

(Greer 1992; Watson *et al* 1984; Erbil *et al* 1996; Schofield *et al* 2003)

#### **Useful Link for communication skills in cancer care:**

**<http://pro.mountvernoncancernetwork.nhs.uk/assets/Uploads/documents/ParticipantHandbookv21.pdf>**

## Chapter 12: Outcome Measures



### Lymphoedema

#### **LYMQOL: lymphoedema specific outcome measure for QOL**

- Lymphoedema may have an adverse effect on a patient's QOL.
- LYMQOL is a validated lymphoedema specific outcome measure for QOL (Keeley et al 2010).
- 24 questions cover 4 domains measured on a Likert Scale from 1 - 4:  
Symptoms, body image, function and mood

Available

at:

[http://www.lymphormation.org/downloads/JoL\\_Quality\\_of\\_Life\\_Measures.pdf](http://www.lymphormation.org/downloads/JoL_Quality_of_Life_Measures.pdf)



### Cancer Related Fatigue

#### **Brief Fatigue Inventory (BFI)**

- 9 items, 0–10 numeric scale
- Measures severity and impact of fatigue during previous 24 hours
- Validated in cancer patients
- Short and easy to complete
- Disadvantages:
  - Limited to severity assessment
  - Cut off between severity levels is unclear (Mendoza *et al*, 1999)

#### **The Functional Assessment of Cancer Therapy (FACT-F)**

- 13-item uni-dimensional scale assessed on a 5-point scale of 0–4
- Measures physical fatigue over the past 7 days
- Assesses both fatigue and its consequences
- Sensitive to change
- Valid and reliable
- Disadvantages:
  - Full scale is long
  - Items biased toward patients with anaemia (Yellen *et al*, 1997)

### **Revised Piper CRF Scale (PFS)**

- 22 items assessed on an 11-point scale (0-10)
- Characterizes fatigue in 4 dimensions: behavioural severity, sensory, mood and affective meaning.
- Validated in patients with cancer (Wu *et al*, 2001)

### **Quick CRF Assessment Scale (QFAS)**

- 17 items assessed on a 0-10 scale
- Characterizes fatigue on 5 primary symptoms: sleep disturbance, pain, anxiety, nausea and vomiting, and depression
- Easy to follow
- Includes a section to assess other possible contributing factors such as electrolyte imbalance, haemoglobin levels and thyroid function (Quick and Fonteyn, 2005)



## **Shoulder**

### **Disabilities of the Arms, Shoulder, and Hand (DASH)**

- Developed by Hudak *et al* (1996)
- Highly recommended; DASH has good psychometric properties and good clinical utility; has been used in research on individuals with or post breast cancer
- DASH has proven validity, test-retest reliability and responsiveness

Available at: <http://www.dash.iwh.on.ca/>

(Beaton *et al*, 2001; Perdomo *et al*, 2013)

### **Goniometry**

- To measure active/passive ROM
- Good psychometric properties and clinical utility
- Good intra-rater reliability ICC: Flexion (0.40-0.91), Abduction 0.69 (0.37-0.92)
- Easy to perform clinically.
- Requires standardization of measurement technique, patient position and documentation (Perdomo *et al*, 2013)



## Palliative

### Palliative Care Outcome Scale (POS)

- POS is a patient reported and health care reported outcome measure
- 10 items assessing physical symptoms, emotional, psychological and spiritual needs
- An additional question provides patients with the opportunity to list their main problem/s
- Acceptable test/re-test reliability
- Good internal consistency
- It has demonstrated construct validity
- Completion time: mean time 6.9 minutes
- Scores: scores from 0 (no effect) to 4 (overwhelming)
- Widely used palliative care measure

Available at: <http://pos-pal.org/maix/background.php>

### Edmonton Symptom Assessment Scale

- Developed by Kaasa et al 1997
- 10-item patient-rated symptom visual analogue scale developed for use in symptom assessment of palliative care patients.
- Symptoms include pain, activity, nausea, depression, anxiety, drowsiness, lack of appetite, well-being, and shortness of breath.
- There is an optional tenth symptom, which can be added by the patient.
- Takes approximately 5 minutes to complete
- The ESAS has demonstrated good internal consistency, criterion and con-current validity
- Good internal validity and criteria validity with very good intra-rater reliability

Available at: [http://www.npcrc.org/usr\\_doc/adhoc/painsymptom/esas.pdf](http://www.npcrc.org/usr_doc/adhoc/painsymptom/esas.pdf)

(Chang *et al*, 2000)



## Psychological Measures

### Hospital Anxiety and Depression Scale (HADS)

- Devised by Zigmond and Snaith in 1983 to identify possible anxiety disorders and depression among patients in non psychiatric hospital clinics.
- It is divided into an Anxiety subscale (HADS-A) and a Depression subscale (HADS-D) both containing seven intermingled items.

- Good to very good concurrent validity of HADS
- Sensitive to change in cancer patients
- Takes approximately 2-6minutes to complete

Available at: <http://www.abiebr.com/node/410>

(Bjelland *et al*, 2002)

**Beck Depression inventory:**

<http://www.cawt.com/Site/11/Documents/Members/Evaluation/BeckDepressionInventory1.pdf>

**General Health Questionnaire-28:** [http://epibasket.org/product.php?id\\_product=51](http://epibasket.org/product.php?id_product=51)

**Center for Epidemiologic Studies-Depression Scale:** <http://cesd-r.com/>

(Vordermaier *et al*, 2009)



**Quality of Life**

*European Organisation for Research & Treatment of Cancer Breast Cancer* – Quality of Life Questionnaire-Core 36 (EORTC QLQ-C36)

- Developed in 1987 by Aaronson et al
- Measures quality of life amongst breast cancer patients.
- Average time required to complete the questionnaire is 11 minutes
- The QLQ-C30 incorporates nine multi-item scales:
  - Five functional scales (physical, role, cognitive, emotional, and social)
  - Three symptom scales (fatigue, pain, and nausea and vomiting)
  - One global health and quality-of-life scale
  - Several single-item symptom measures are also included
- Appropriate for self-administration
- Applicable across a range of cultural settings.
- Reliable and valid measure of the quality of life of cancer patients (Aaronson *et al*, 1993)

Available at [http://groups.eortc.be/qol/sites/default/files/img/slider/specimen\\_qlq-c30\\_english.pdf](http://groups.eortc.be/qol/sites/default/files/img/slider/specimen_qlq-c30_english.pdf)

## Chapter 13: Financial and Psychological Supports



### Patient Financial Supports

Social benefit entitlements are available, to find out which ones your patient are entitled to, call the Irish Cancer Society's free phone on 1 800 200 700

- Illness Benefits – payment from the Department of Social Protection to insured people who cannot work due to illness, benefits last for two years.
- GP visit card – Means tested, if the patient falls within the band of having a higher income rate than allowed for a medical card but is still below a certain limit
- Supplementary Welfare Allowance – additional allowance if your income falls below a certain level due to an illness
- Medical Card entitlements (specific to cancer services)
  - Free GP services
  - Free prescribed drugs and medicines
  - Free appliances e.g. wig/hairpiece or colostomy bags
  - Free inpatient, outpatient and community services
  - Free maternity and infant care services
- Sick pay for cancer patients is 6 months on full pay and 6 months on half pay within the public service
- Drugs Payment Scheme – limit of 132 euro on cost of prescribed drugs and appliances
- Tax Relief – This can be claimed on medical expenses not covered by the state or your insurer
- Irish Cancer Society Night Nursing Service - Night nurses are provided free of charge for up to 10 nights if you need end of life care at home. They aim at providing practical support and reassurance during this tough time.
- Irish Cancer Society also provides financial assistance to certain patients who cannot avail of any other benefits



### Carer's Support

- Carer's Allowance – a payment for low income earners who are providing full time care and attention to a patient.
- Carer's Benefit – payment made to an insured person who leaves the workforce to care for someone who needs full time care

- Respite Care Grant - payment of €1,375 given to carers once a year for them to spend as they wish
- Carer's Leave – This law keeps your job open for you to return to work after your return from being a carer.



## Other Programmes to Support Cancer Patients

### Travel2Care scheme

This scheme helps patients who are suffering from genuine financial hardship with travel costs due to travelling to a cancer centre. The NCCP funds this Travel2Care scheme, which is administered by the Irish Cancer Society.

### Care to drive programme

Care to Drive is a volunteer-led transport initiative in which the Irish Cancer Society recruits and trains volunteers to drive patients to and from their chemotherapy appointments. The service is free to patient and the hospital. It is not yet nationally available.

It is currently available in the following hospitals:

- St. James's Hospital, Dublin
- St. Vincent's University Hospital, Dublin
- Mater Misericordiae University Hospital, Dublin (public)
- Letterkenny General Hospital
- Sligo General Hospital
- Mid Western Regional Hospital, Limerick
- Portiuncula Hospital, Ballinasloe
- Adelaide and Meath Hospital, Tallaght

These are means tested schemes; the patient can be assessed by a social worker in the partner hospital or the nurse administering their chemotherapy treatment who can refer them on to the service. Tax relief can also be claimed back on travelling costs for insured cancer patients.



## Patient Psychological Supports

A list of available support services can be found on [www.europadonna.ie/content/support](http://www.europadonna.ie/content/support)  
Over 30 options are available. Many of them are free offering the choice to speak to specialist breast care nurses or breast care counsellors.

Other available useful sites full of information, insight and support:

- Action Breast Cancer (Irish Cancer Society) [www.cancer.ie/action](http://www.cancer.ie/action)
- Breakthrough Breast Cancer [www.breakthrough.org.uk](http://www.breakthrough.org.uk)
- Nation Cancer Institute [www.cancer.gov/cancertopics/types/breast](http://www.cancer.gov/cancertopics/types/breast)
- Rethink Breast Cancer [www.rethinkbreastcancer.com](http://www.rethinkbreastcancer.com)
- Young Survival Coalition [www.youngsurvival.org](http://www.youngsurvival.org)
- Fertile Hope [www.fertilehope.org](http://www.fertilehope.org)

Many of the above links can put you in contact with support groups, medical advice, counselling services etc.

The Irish Cancer Society provides a directory of available cancer support services in Ireland:

[http://www.cancer.ie/sites/default/files/content-attachments/irish\\_cancer\\_society\\_a5\\_directory\\_2012.pdf](http://www.cancer.ie/sites/default/files/content-attachments/irish_cancer_society_a5_directory_2012.pdf)





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## Appendices

### 6.1. Sample shoulder exercises

## Set A Exercises

The following exercises should be started after surgery and continued for one week.

- Repeat exercises four times a day
- Do each exercise 3 times at first and build up to 5 times each.
- Do the exercises as a slow stretch.
- Each separate exercise should take to the count of 5 to complete.

1a



1b



2a



2b



# Set A continued

3a



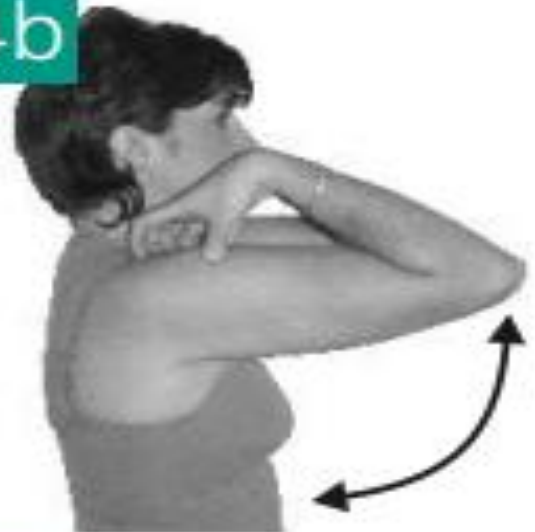
3b



4a



4b



5a



5b



# Set B Exercises

After you have been at home for one week and as long as your wound is healing you can progress your exercises.

- Do each exercise 3 times at first and build up to 5 times each
- Do the exercise as a slow stretch.
- Each separate exercise should take to the count of 5 to complete
- When full movement returns repeat the exercises once a day for one year after surgery.



## Set B continued

3a



3b



4a



4b

