



**OVERVIEW OF
BREAST CANCER
TREATMENTS**
Susan Palmer, PT

CANCER INCIDENCE



In 2010

- 1,529,560 people in the U.S. are estimated to be diagnosed with some type of cancer
- This does not include non-invasive cancers
- Cancer is second most common cause of death in U.S.
- Only heart disease exceeded cancer
- Cancer accounts for nearly 1 of every 4 deaths in the U.S.

2010 ESTIMATED US CANCER CASES

Men- 789,620 new cases	Women- 739,940 new cases
◦ 28 % Prostate	◦ 28% Breast
◦ 15% Lung	◦ 14% Lung
◦ 9% Colon & Rectum	◦ 10% Colon & Rectum
◦ 7% Urinary Bladder	◦ 6% Uterine
◦ 5% Melanoma	◦ 5% Thyroid
◦ 4% Non-Hodgkin Lymphoma	◦ 4% Non-Hodgkin Lymphoma
◦ 4% Kidney	◦ 4% Melanoma
◦ 3% Oral Cavity & Pharynx	◦ 3% Kidney
◦ 3% Leukemia	◦ 3% Ovary
◦ 3% Pancreas	◦ 3% Pancreas

PROBABILITY (%) OF DEVELOPING CANCER

Site	Women	Risk
All sites		1 in 3
Breast		1 in 8
Lung		1 in 13
Colorectal		1 in 20
Uterine corpus		1 in 40
Non-Hodgkin Lymphoma		1 in 52
Melanoma		1 in 56
Urinary Bladder		1 in 84
Leukemia		1 in 92
Uterine cervix		1 in 145

U.S. MORTALITY RATES 2010 ESTIMATED CANCER DEATHS

Men	Women
299,200 Deaths	207,290 Deaths
1) Lung: 86,220 or 29%	1) Lung: 71,080 or 26%
2) Prostate: 32,050 or 11%	2) Breast: 39,840 or 15%
3) Colorectal: 26,580 or 9%	3) Colorectal: 24,790 or 9%

Estimated 569,490 people will die of cancer this year, nearly 1500 people per day

5 YEAR SURVIVAL RATES (%)

Sites	1975-1977	1984-1986	1999-2005
All sites	50	54	68
Breast	75	79	90
Colon	52	59	66
Leukemia	35	42	54
Lung	13	13	16
Melanoma	82	87	93
Non Hodgkin's Lymphoma	48	53	69
Ovary	37	40	46
Pancreas	3	3	6
Prostate	69	76	100
Rectum	49	57	69

BREAST CANCER

- A woman is diagnosed with breast cancer every 2 minutes
- A woman dies of breast cancer every 13 minutes



BREAST CANCER IN 2010

- Estimated
 - 207,090 new cases of invasive breast cancer
 - 54,010 new cases of in situ breast cancer
 - 1970 new cases of male breast cancer
 - 40,230 breast cancer deaths
 - 39,840 women
 - 390 men

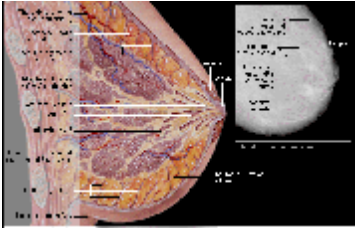


TYPES OF BREAST CANCER

- Non-invasive breast cancers
 - Ductal carcinoma in situ (DCIS)
 - Lobular carcinoma in situ (LCIS)
- Invasive breast cancers
 - Invasive ductal (IDC)
 - Invasive lobular (ILC)
 - Inflammatory (IBC)



TYPES OF BREAST CANCER



STAGING

• TNM staging

- T = Tumor
- N = Node
- M = Metastasis

T3 N2 M0

- Stage 0 - 100% survival rate
- Stage I - 98% survival rate
- Stage II - 88% survival rate
- Stage III - 49- 56% survival rate
- Stage IV - 16% survival rate

MEDICAL TREATMENTS BREAST CANCER

- Surgery
- Radiation
- Chemotherapy
- Hormonal and Biological Therapies

MEDICAL TREATMENTS
BREAST CANCER

- ☉ Surgery
 - Localized treatment
 - Mastectomy: removal of all breast tissue
 - ☉ Total or simple mastectomy
 - ☉ Total mastectomy with sentinel node biopsy
 - ☉ Modified radical mastectomy
 - ☉ Radical mastectomy



MEDICAL TREATMENTS
BREAST CANCER

- ☉ Radiation
 - Local treatment
 - ☉ Use high energy rays to kill cancer cells
 - ☉ Entire chest wall radiated
 - ☉ Administered daily for ~33 treatments
 - ☉ Done for nearly all lumpectomies and some mastectomies



MEDICAL TREATMENTS
BREAST CANCER

- ☉ Chemotherapy
 - Systemic treatment
 - ☉ The use of IV or oral drugs to kill rapidly dividing cells
 - ☉ Multiple drugs given together or in sequence
 - ☉ Drug combinations determined by age, pathology, tumor size, lymph node status and other comorbidities
 - ☉ Kills both cancer and normal cells



MEDICAL TREATMENTS
BREAST CANCER

- ⦿ **Hormonal/Biological Therapies**
 - Systemic treatment
 - ⦿ IV or oral drugs designed to change the hormonal or biological environment of the cancer cells
 - ⦿ Restricting their growth
 - ⦿ Estrogen Blockers
 - ⦿ Herceptin
 - ⦿ Biophosphonates



COMMON PHYSICAL PROBLEMS

- ⦿ **Surgery and radiation complication**
 - Pain
 - Swelling
 - Decreased ROM
 - Strength loss
 - Soft tissue tightness
 - Soft tissue restrictions
 - Risk for infection and lymphedema



COMMON PHYSICAL PROBLEMS

- ⦿ **Chemo and hormonal therapy complications**
 - Fatigue
 - Bone loss
 - Muscle loss
 - Neuropathy
 - Weight gain
 - Postural changes
 - Loss of normal function



COMMON PHYSICAL PROBLEMS

- ⦿ Lymphedema
 - Potential serious complications
 - Swelling of ipsilateral arm and trunk
 - Stagnation of protein rich fluid which occurs when lymphatic vessels are impaired
 - 15 to 20% of women undergoing treatment for breast cancer will develop some type of swelling



COMMON PHYSICAL PROBLEMS

- ⦿ Common Complaints of Lymphedema
 - Pain
 - Numbness and tingling
 - Functional deficits
 - ⦿ Decreased ROM
 - ⦿ Decreased Strength



TREATMENT OPTIONS

- ⦿ Exercise
 - Flexibility
 - PRE's
 - Aerobic cross training
- ⦿ Manual Therapy
- ⦿ Compression Garment
- ⦿ Compression Bandages
- ⦿ Sequential Pneumatic Devices



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

☉ Exercise

- Lymph flow is accelerated by pressure and tension in lymph vessels
 - ☉ Pulsation of nearby arteries
 - ☉ Contraction of nearby musculature
- Abdominal breathing
 - ☉ Enhance lymph flow into thoracic duct and at the area of the subclavian juncture
- Muscle activity
 - ☉ Increase both lymph flow and venous



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

☉ Ledue, Peeters and Bourgeois - 1990

- Repeated isodynamic muscle contractions with the limb bandaged accelerated lymphatic drainage

☉ Lane Worsley and McKenzie - 2005

- Lymph flow has been shown to increase to levels approximately 2-3 fold higher with exercise than at rest



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

☉ Harris and Niesen - 2000

- 20 females who had received axillary dissection were systematically measured while competing in the vigorous sport of dragon boat racing
- None of the women showed a clinically significant difference between the ipsilateral and contralateral extremities



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

- McKenzie and Kalda – 2003
 - 14 females with unilateral lymphedema
 - Randomized
 - Exercise group
 - Control group
 - Both groups wore compression garment while awake
 - No changes were found in arm circumference or arm volume as a result of exercise program



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

- Ahmed, Thomas, Yee and Schmitz - 2006
 - Randomized controlled trial
 - Weight training and lymphedema
 - 85 Female with breast cancer
 - Exercise group – strength training program 2x/6 mo
 - Control group
 - 6 month exercise program did not increase the risk or exacerbate symptoms of lymphedema



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

- Bicego, Brown and Ruddick – 2006
 - Review of studies that examined the effects of various exercise programs
 - 8 Studies reviewed
 - Exercise neither initiated or exacerbated lymphedema
 - Recommended more rigorous studies should be conducted.



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

- McNeely, Campbell, Courneya and Mackey – 2009
 - Assesses the effects of an acute bout of exercise on upper-limb volume and other lymphedema related symptoms
 - 23 women who regularly participated in dragon boat racing
 - Results found that limb volume increased in both limbs but the difference between limbs remained stable.



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

- Ahmed, Thomas, Yee and Schmitz – 2006
 - Randomized control trial
 - 45 women participated in upper and lower body weight training 2 x per week for 6 months
 - 13 women had prevalent lymphedema at baseline
 - Results suggest that a 6 month intervention of resistance exercise did not increase the risk for or exacerbate symptoms of lymphedema



EVIDENCE-BASED TREATMENTS
EXERCISE & LYMPHEDEMA

- Chan, Lui and So – 2010
 - Quantitative review of randomized control trials
 - Exercise programs on shoulder mobility and lymphedema in postoperative patients with breast cancer having axillary lymph node dissection
 - 6 studies reviewed
 - Early rather than delayed onset of training did not affect the incidence of lymphedema
 - Early introduction to exercise decreased the deterioration in shoulder ROM.



EVIDENCE-BASED TREATMENTS
MANUAL THERAPY & LYMPHEDEMA

☛ **Manual Therapy**

- Ledue O, Bourgeois P, Ledue A – Progress in Lymphology XI 1988
- Williams AF, Vadgama A, et al –European Cancer Care 2002
- Anderson L, Jorjis I, et al – Acta Oncological 2000
- Williams AF, Vadgama A, Franks PJ, Mortimer PS Eur J Cancer Care 2002
- William Wilburn and Rockson – BMC Cancer 2006
- Vignes, Porcher, et al – Breast Cancer Res Treat 2007
- Hamner JB, Fleming MD – Ann Surg Oncol 2007



EVIDENCE-BASED TREATMENTS
MANUAL COMPRESSION DEVICE & LYMPHEDEMA

☛ **Compression Garment and Bandages**

- Leduc O, Peeters A, Bourgeois P – Progress in Lymphology XII 1990
- Badger CM, Peacock JL, Mortimer PS – Cancer 2000
- Johansson K, Albertsson M, et al – Lymphology 1999
- McNeely ML, Magee DJ, et al – Breast Cancer Res Treat 2004
- Hamner JB, Fleming MD – Ann Surg Oncol 2007
- Damstra RJ, Partsch H – J Vasc Surg 2009



EVIDENCE-BASED TREATMENTS
PNEUMATIC COMPRESSION DEVICES AND LYMPHEDEMA

☛ **Sequential Pneumatic Devices**

- Leduc A, Leduc O – European Journal of Lymphology and related problems 1990
- Dini D, DelMastro L, et al – Annual Oncology 1998
- Johansson K, Lie E, et al – Lymphology 1998
- Szuba A, Achalu R, Rockson SG – Cancer 2002



COMMON PHYSICAL PROBLEMS

- ◉ Decreased ROM and soft tissue restrictions
 - Due to surgery or radiation
 - ◉ Numbness and tingling
 - ◉ Lymphedema and lymphatic cording
 - ◉ Tissue fibrosis
 - ◉ Breast reconstruction
 - ◉ Pectoralis muscles
 - ◉ Scar Tissue



EVIDENCE-BASED TREATMENTS SHOULDER ROM

- ◉ Keays, Harris, Lucyshyn and Macintyre – 2008
 - Examine effects of Pilates exercised on shoulder ROM, pain, mood and UE function
 - Results
 - ◉ Modest effect in improving shoulder abd. and ER ROM
 - ◉ Statically significant improvements in shoulder IR and ER ROM in one participant with metastatic disease
 - ◉ Unable to assess outcomes for pain, mood and UE function
 - ◉ Pilates exercises may be effective and safe exercise options



EVIDENCE-BASED TREATMENTS SHOULDER ROM

- ◉ McNeely, Campbell, Ospina, et al – 2010
 - Review randomized control trials
 - Effectiveness of exercise interventions in preventing or improving upper-limb dysfunction due to breast cancer treatments
 - 24 studies and 2132 participants
 - 10 studies examined early versus delayed implementation of exercises
 - ◉ Early exercise was more effective in short term recovery of shoulder flexion ROM
 - ◉ Early exercises also resulted in statically significant increase in wound drainage volumes



EVIDENCE-BASED TREATMENTS
SHOULDER ROM

- **McNeely, Campbell, Ospina, et al – 2010**
 - 14 studies examined the effect of structured exercise compared to usual care
 - 6 studies were conducted post-operatively, 3 studies during adjuvant treatments and 5 following cancer treatments
 - Structured exercise in post operative period significantly improved shoulder flexion ROM in short term
 - Physical therapy treatment yielded additional benefit for shoulder function post intervention and 6 month follow up
 - No evidence of increase risk for lymphedema from exercise



EVIDENCE-BASED TREATMENTS
SHOULDER ROM

- **Kilgour, Jones and Keyserlingk – 2008**
 - Pilot study
 - Effects of self-administered home based exercise program to regain shoulder mobility immediately following surgery
 - 27 women randomly assigned
 - Home based exercise group
 - Shoulder flexibility stretching exercises
 - Usual care group
 - Home based exercise program is an effective way to improve shoulder flexibility and ROM during the immediate 2 week period following surgery



EVIDENCE-BASED TREATMENTS
SHOULDER ROM & FATIGUE

- **Lee, Kang, Kim, et al – 2010**
 - Pilot randomized control trial
 - Effects of a scapula-oriented exercise program
 - 32 women randomized in 2 groups
 - Scapula-oriented exercise group
 - General exercise group
 - 1 session per week for 8 weeks
 - Scapula-oriented exercise group showed improvements in pain, physical function, social function and global QOL
 - General exercise group showed improvements in fatigue and shoulder ROM



EVIDENCE-BASED TREATMENTS
SHOULDER ROM & FATIGUE

- Eyigor, Karapolat, Yesil, et al – 2010
 - Randomized control trial
 - Impact of pilates exercise on physical performance, flexibility, fatigue, depression and quality of life
 - 52 participants randomized in 2 groups
 - Pilates exercise group
 - Pilates exercises and home exercises
 - Control group – home exercise only
 - Pilates exercises are effective and safe in female breast cancer patients



COMMON PHYSICAL PROBLEMS

- Other problems include
 - Pain
 - Decreased strength
 - Fatigue
 - Bone loss
 - Depression



EVIDENCE-BASED TREATMENTS
QOL

- Bicego, Brown, Raddick, et al – 2009
 - Systematic review
 - Examine the effects of exercise on quality of life (QOL) in women living with breast cancer
 - 13 studies included
 - Results
 - Strong evidence exercise positively influences QOL
 - Exercise can be an effective strategy to improve QOL
 - In women living with breast cancer



EVIDENCE-BASED TREATMENTS
STRENGTH, FATIGUE & QOL

- Spence, Heesch and Brown – 2010
 - Systematic review
 - Health effects of exercise during cancer rehab
 - 10 studies reviewed
 - Aerobic and resistance-training exercise interventions
 - Exercise type, frequency, duration and intensity varied
 - Results
 - Improvement in physical functioning, strength, physical activity levels, quality of life, fatigue, immune functions, hemoglobin concentrations, potential markers for recurrence and body composition



EVIDENCE-BASED TREATMENTS
SHOULDER ROM, FATIGUE & QOL

- Hwang, Chang, Shim, et al – 2008
 - Examined whether supervised moderate intensity exercise could decrease complications that occur during radiotherapy
 - 40 women randomized in 2 groups
 - Exercise group- supervised moderate intensity exercise
 - Control group – self shoulder stretching exercises
 - Objective measures
 - World Health Organization Quality of Life – BREF (WHOQOL – BREF)
 - Brief fatigue inventory (BRI)
 - Shoulder range of motion (ROM)



EVIDENCE-BASED TREATMENTS
SHOULDER ROM, FATIGUE & QOL

- Hwang, Chang, Shim, et al continued
- Exercise group
 - Increase in WHOQOL- BREF and shoulder ROM
 - Decrease in BFI and pain score
- Control group
 - Decrease in WHOQOL – BREF and shoulder ROM
 - Increases in BFI and pain score
- Statistically significant difference between groups



EVIDENCE-BASED TREATMENTS
STRENGTH & FATIGUE

☉ De Backer, Schep, Backx, Vreugdenhil and Kuipers – 2009

- Systematic review
 - ☉ Resistance training in post treatment phase
 - ☉ Training methods
 - ☉ Physical outcomes
- Positive training effects
 - ☉ Cardiopulmonary
 - ☉ Muscle functions
 - ☉ Peak oxygen uptake
 - ☉ One rep max
- No effects on body composition, endocrine and immune function or haematological variables



EVIDENCE-BASED TREATMENTS
CARDIOPULMONARY FUNCTION

☉ Kim, Kang and Park – 2009

- Meta-analysis
- Examine the effectiveness of aerobic exercise intervention on cardiopulmonary function and body composition
- 10 of 24 studies reviewed met inclusion criteria
- Aerobic exercise significantly improved cardiopulmonary function
 - ☉ Absolute VO2 max, relative VO2 peak and 12 minute walk test
- Aerobic exercise significantly improved body composition
 - ☉ Body fat %



EVIDENCE-BASED TREATMENTS
CARDIOVASCULAR & MUSCULAR ENDURANCE

☉ Sprod, Hsieh, Hayward and Schneider – 2010

- Compare the physiological and psychological outcomes following 3 and 6 month exercise program in breast cancer survivors
- 114 participants – 3 groups
 - ☉ 29 participants- 3 month prescriptive, individualized exercise
 - ☉ 68 participants - 6 month prescriptive, individualized exercise
 - ☉ 17 participants - sedentary controls



EVIDENCE-BASED TREATMENTS
CARDIOVASCULAR & MUSCULAR ENDURANCE

- Sprod, Hsieh, Hayward and Schneider continued
 - Improvements in cardiovascular endurance, fatigue, and symptoms of depression in participants in 3 and 6 month exercise intervention groups
 - Additional improvements in pulmonary function and muscular endurance in participants in 6 month group
 - Control group showed no signs of improvement in cardiovascular endurance, pulmonary function muscular endurance or fatigue



EVIDENCE-BASED TREATMENTS
FATIGUE

- Hsieh, Sprod, Hydock, et al – 2008
 - Effects of supervised exercise training on cardiopulmonary function and fatigue
 - 96 breast cancer survivors – 4 groups
 - 22 - surgery alone
 - 30 - surgery and chemotherapy
 - 17 - surgery and radiation
 - 27 - surgery , chemotherapy and radiation
 - Developed individualized exercise prescription and 6 month exercise intervention



EVIDENCE-BASED TREATMENTS
FATIGUE

- Hsieh, Sprod, Hydock, et al continued
 - Results
 - Moderate intensity, individualized, prescriptive exercises maintains or improves cardiopulmonary function with reductions in fatigue regardless of treatment type
 - Survivors receiving combination of chemotherapy and radiation following surgery benefit to a greater extent as a result of an individualized exercise intervention



EVIDENCE-BASED TREATMENTS
ERYTHROCYTES

- Barclay – 2009
 - Effects of aerobic exercise on erythrocytes levels in breast cancer survivor
 - Randomized control trial
 - 20 women – 2 groups
 - Aerobic exercise group
 - Control stretching group
 - Aerobic group showed increases in peak VO₂, red blood cell counts, hematocrit and hemoglobin levels



EVIDENCE-BASED TREATMENTS
BONE MINERAL DENSITY

- Waltman, Twiss, Ott, et al – 2010
 - Examine whether 24 months of weight training exercises enhanced the effectiveness of risedronate, calcium and vitamin D in maintaining or improving bone mineral density (BMD)
 - 223 breast cancer survivors randomly assigned
 - Exercise plus medication group
 - Medication group
 - Both groups showed significant improvements in BMD, but women who also exercised had additional increases in BMD



EVIDENCE-BASED TREATMENTS
BARRIERS TO EXERCISE

- Blaney, Lowe-strong, Rankin, et al
 - Explore the barrier and facilitators of exercise among mixed sample of patients with cancer-related fatigue
 - Five focus groups conducted with 26 participants
 - 3 main categories
 - Exercise barrier
 - Exercise facilitators
 - Motivators of exercise
 - Exercise facilitators identified may provide solutions to the barriers may assist in executing and maintaining an exercise routine.



PHYSICAL THERAPY

- Physical therapist role
 - Education, information and support
 - Individualized exercise programs based on the needs of each patient
 - Relieving symptoms of pain, weakness and fatigue
 - Psychosocial needs
 - Anxiety, depression, stress, fear
 - Discomfort and activity adjustment
 - Recurrence and death
 - Most women diagnosed with breast cancer will survive and will need support to return to every day life.

PHYSICAL THERAPY

- Considerations for exercise program design
 - Stage of disease
 - Treatment protocols
 - Side effects of treatments
 - Exercise tolerance
 - Physical abilities
 - Exercise barriers, facilitators and motivators
 - Acute or chronic limitations

REFERENCES

- American Cancer Society. Cancer Facts & Figures 2010. Atlanta: American Cancer Society; 2010. <http://www.cancer.org/acs/groups/content/nho/documents/document/acspc-024113.pdf>
- An introduction to the management of breast cancer lymphedema: An evidence based approach lecture, October 2009, Plymouth Meeting, PA.
- Physical therapy treatment for the patient with breast cancer lecture, October 2008, O'Fallon IL.
- Chan DN, Lui LY, So WK. Effectiveness of exercise programmes on shoulder mobility and lymphoedema after axillary lymph node dissection for breast cancer: systematic review. *J Adv Nurs*. 2010 Sep;66(9):1902-14.
- Eyigor S, Karapolat H, Yesil H, Uslu R, Durmaz B. Effects of pilates exercises on functional capacity, flexibility, fatigue, depression and quality of life in female breast cancer patients: a randomized control study. *Eur J Phys Rehabil Med*. 2010 May 6.
- McNeely ML, Campbell K, Ospina M, et al. Exercise intervention for upper-limb dysfunction due to breast cancer treatment. *Cochrane Database Syst Rev*. 2010 June 16;6:CD005211.

REFERENCES

- Lee SA, Kang JY, Kim YD, et al. Effects of a scapula-oriented shoulder exercise programme on upper limb dysfunction in breast cancer survivors: a randomized control pilot trial. *Clin Rehabil.* 2010 Jul;24(7):600-13.
- Keays KS, Harris SR, Lucyshyn JM, Macintyre DL. Effects of pilates exercises on shoulder range of motion, pain, mood, and upper extremity function in women living with breast cancer: a pilot study. *Phys Ther.* 2008 Apr;88(4):494-510.
- Ahmed RL, Thomas W, Yee D, Schmitz KH. Randomized controlled trial of weight training and lymphedema in breast cancer survivors. *J Clin Oncol.* 2006 Jun 20;24(18):2765-72.
- McNeely ML, Campbell KL, Courneya KS, Mackey JR. Effects of acute exercise on upper-limb volume in breast cancer survivors: a pilot study. *Physiother Can.* 2009 Fall;61(4):244-51.
- Kilgour RD, Jones DH, Keyserlingk JR. Effectiveness of a self-administered, home-based exercise rehabilitation program for women following a modified radical mastectomy and axillary node dissection: a preliminary study. *Breast Cancer Res Treat.* 2008 May;109(2):285-95.

REFERENCES

- Bicego D, Brown K, Ruddick M, Storey D, Wong C, Harris SR. Effects of exercise on quality of life in women living with breast cancer: a systematic review. *Breast J.* 2009 Jan-Feb;15(1):45-51.
- Kim CJ, Kang DH, Park JW. A meta-analysis of aerobic exercise interventions for women with breast cancer. *West J Nurs Res.* 2009 Jun;31(4):437-61.
- De Backer IC, Schep G, Backx FJ, Vreugdenhil G, Kuipers H. Resistance training in cancer survivors: a systematic review. *Int J Sports Med.* 2009 Oct;30(10):703-712.
- Spence RR, Heesch KC, Brown WJ. Exercise and cancer rehabilitation: a systematic review. *Cancer Treat Rev.* 2010 Apr;36(2):185-94.
- Hwang JH, Chang HJ, Shim YH, Park WH, Park W, Huh SJ, Yang JH. Effects of supervised exercise therapy in patients receiving radiotherapy for breast cancer. *Yonsei Med J.* 2008 Jun 30;49(3):443-50.

REFERENCES

- Sprod LK, Hsieh CC, Hayward R, Schneider CM. Three versus six months of exercise training in breast cancer survivors. *Breast Cancer Res Treat.* 2010 Jun;121(2):413-9.
- Hsieh CC, Sprod LK, Hydock DS, Carter SD, Hayward R, Schneider CM. Effects of a supervised exercise intervention on recovery from treatment regimens in breast cancer survivors. *Oncol Nurs Forum.* 2008 Nov;35(6):909-15.
- Waltman, NL, Twiss JJ, Ott CD, Gross GJ, Lindsey AM, Moore TE, Berg K, Kupzyk K. The effect of weight training on bone mineral density and bone turnover in postmenopausal breast cancer survivors with bone loss: a 24-month randomized controlled trial. *Osteoporos Int.* 2010 Aug;21(8):1361-9.
- Blaney J, Lowe-Strong A, Rankin J, Campbell A, Allen J, Gracey J. The cancer rehabilitation journey: Barriers to and facilitators of exercise among patients with cancer-related fatigue. *Phys Ther.* 2010 Aug;90(8):135-47.

REFERENCES

- Droulin JS, Young TJ, Beeler J, Byrne K, Birk TJ, Hryniuk WM, Hryniuk LE. Random control clinical trial on the effects of aerobic exercise training on erythrocyte levels during radiation treatment for breast cancer. *Cancer*. 2006 Nov 15;107(10):2490-5.
- Leduc O, Peeters A, Bourgeois P. Bandages: scintigraphic demonstration of its efficacy on colloidal protein reabsorption during muscle activity. *Progress in Lymphology* XII, 421-423, 1990.
- Lane K, Worsley D, McKenzie D. Exercise and the lymphatic system: implications for breast-cancer survivors. *Sports Med* 35(6), 2005
- Harris SR, Niesen-Vertommen SL. Challenging the myth of exercise-induced lymphedema following breast cancer: a series of case reports. *J Surg Oncol* 2000, 74.
- McKenzie DC, Kalda AL. Effect of upper extremity exercise on secondary lymphedema in breast cancer patients: a pilot study. *J Clin Oncol* 2003,21:3.

REFERENCES

- Ahmed RL, Thomas W, Yee D, and Schmitz K. Randomized controlled trial of weight training and lymphedema in breast cancer survivors. *J Clin Oncol* 2006, 24.
- Bicego D, Brown K, Ruddick M, et al. Exercise for women with or at risk for breast cancer-related lymphedema. *Phys Ther* 2006, 86.
