

## References and Acknowledgements for Pathways Fall 2018

### **Low Level Laser Therapy for Lymphedema by Sapphire Kroetsch BKin, Courtney Whitehead BScKin, and Margaret McNeely PT, PhD.**

#### References

1. Chow J. Low Level Laser Therapy. [Course Notes: PTher 555 ]; 2018.
2. Haesler E. Evidence Summary: managing lymphoedema: low level laser therapy. . Wound Practice and Research 2016;24(2):119-21.
3. Ridner SH, Poage-Hooper E, Kanar C, Doersam JK, Bond SM, Dietrich MS. A pilot randomized trial evaluating low-level laser therapy as an alternative treatment to manual lymphatic drainage for breast cancer-related lymphedema. Oncol Nurs Forum. 2013;40(4):383-93.
4. Ahmed Omar MT, Abd-El-Gayed Ebid A, El Morsy AM. Treatment of post-mastectomy lymphedema with laser therapy: double blind placebo control randomized study. J Surg Res. 2011;165(1):82-90.
5. Laser Therapy for Lymphedema Breast Cancer.org; 2012 [Available from: <https://www.breastcancer.org/treatment/lymphedema/treatments/laser.>]
6. Cooper R. Lymphoedema patients undergoing low level laser therapy (LLLTT) United Kingdom: NHS; 2018 [Available from: [http://www.icid.salisbury.nhs.uk/ClinicalManagement/Vascular/Pages/LymphoedemaPatientsUndergoingLowLevelLasertherapy\(LLLTT\)PI1260.aspx.](http://www.icid.salisbury.nhs.uk/ClinicalManagement/Vascular/Pages/LymphoedemaPatientsUndergoingLowLevelLasertherapy(LLLTT)PI1260.aspx.)]
7. Baxter GD, Liu L, Petrich S, et al. Low level laser therapy (Photobiomodulation therapy) for breast cancer-related lymphedema: a systematic review. BMC Cancer. 2017;17(1):833.
8. Davey R. Lymphedema laser therapy inches closer to clinical utility 2018 [Available from: [https://torontophysiotherapy.ca/lymphedema-laser-therapy-inches-closer/#Laser\\_therapy\\_for\\_lymphedema\\_new\\_data.](https://torontophysiotherapy.ca/lymphedema-laser-therapy-inches-closer/#Laser_therapy_for_lymphedema_new_data.)]
9. Kaviani A, Fateh M, Yousefi Nooraie R, Alinagi-zadeh MR, Ataie-Fashtami L. Low-level laser therapy in management of postmastectomy lymphedema. Lasers Med Sci. 2006;21(2):90-4.
10. Kozanoglu E, Basaran S, Paydas S, Sarpel T. Efficacy of pneumatic compression and low-level laser therapy in the treatment of postmastectomy lymphoedema: a randomized controlled trial. Clin Rehabil. 2009;23(2):117-24.
11. Lau RW, Cheing GL. Managing postmastectomy lymphedema with low-level laser therapy. Photomed Laser Surg. 2009;27(5):763-9.
12. Maiya AG, Olivia E, Dibya A. Effect of low energy laser therapy in the management of post-mastectomy lymphoedema. Physiother Singap. 2008;11(1):2-5.
13. Storz MA, Gronwald B, Gottschling S, Schope J, Mavrova R, Baum S. Photobiomodulation therapy in breast cancer-related lymphedema: a randomized

placebo-controlled trial. *Photodermatol Photoimmunol Photomed.* 2017;33(1):32-40.

14. Carati CJ, Anderson SN, Gannon BJ, Piller NB. Treatment of postmastectomy lymphedema with low-level laser therapy: a double blind, placebo-controlled trial. *Cancer.* 2003;98(6):1114-22.

**Table 3. Characteristics of Included Studies**

Study	Sample size/ Population	Low Level Laser treatment (n = number analyzed)	Comparison/ control treatment (n = number analyzed)	Outcomes	Results by measure
Ahmed Omar, 2011[4]  Egypt	N= 50 Breast cancer  Age= mean age 54.1 years  Breast cancer surgery including axillary node dissection for stages 2 or 3.	n= 25 LLLT: the axillary and arm areas; 3x/week for 12 weeks (36 sessions); 20 minutes  Daily exercise & compression garment: 20 hours daily (pressure of 40-60 mmHg).	n= 25 Sham laser (placebo group)  Daily exercise & compression garment: 20 hours daily (pressure of 40-60 mmHg).	Limb volume Limb circumference Shoulder mobility Hand grip  Measurements: every 4wk for 12 wk (4 total including baseline)	Limb volume decline in placebo at weeks.  Shoulder and abduction grip strength statistically significantly greater with LLLT.
Carati, 2003[14]  Australia	N = 61 Breast cancer  Mean age: 64 years	n = 26 LLLT: block 8 treatments followed by 8 week rest; second block 8 treatments	n = 27 Sham laser: block 8 treatments; followed by 8 week rest; single block of 8 treatments	Limb volume using Perometer Bioimpedance Tonometry Shoulder range of motion & ADLs Symptoms, QoL	No significant difference between placebo laser or with laser for ROM  <i>NB: Follow-up pooling of data from cross-over study</i>
Kaviani, 2006[9]  Iran	N = 11 Breast cancer  Mean age: 51.2 years	n = 4 LLLT: 5 points to axilla; 3x/week for 3 weeks; 8 week break; 3x/week for 3 weeks	n = 4 Sham laser: same conditions as per LLLT group	Limb circumference Pain score ROM Symptoms: heaviness Desire to continue treatment	No statistically significant difference reported due to small sample size in Figure for

	MRM & RT				
Kozanoglu, 2009[10]  Turkey	N = 50 Breast Cancer  Mean age: 48.3 years  MRM with complete AND & RT	n = 23 LLLT: 3 points antecubital fossa & 7 points to axilla; 12 sessions over 4 week period (3x/ week): 20 minutes/ session;  Daily limb exercise, hygiene & skin care	n = 24 Pneumatic compression: 20 sessions over 4 week period; 2 hours duration/ session; pressure 60 mmHg  Daily limb exercise, hygiene & skin care	Circumference measures Pain Symptoms: heaviness, tightness, parasthesia & weakness ROM Grip strength  Measurements: baseline, post-treatment, 3, 6 & 12 months	Significant between groups circumference measurement treatment follow-up in group  Significant change scores months in group
Lau, 2009[11]	N = 21 Breast Cancer  MRM with RT or CT  Mean Age: Treat – 50.9 yrs Control – 51.3 yrs	n = 11 LLLT: 12 sessions of LLLT in 4wk applied axillary region; 20 minutes / session	n = 10 No treatment & no concurrent treatment during the study.  Reassessment at 4 & 8 wk	Arm Volume by Volumeter Tonometry Pain & ADLs: DASH	Significant arm volume LLLT at 8-wk  Tonometry significantly laser group softening.  Between groups DASH not significant.
Maiya, 2008[12]  India	N = 20 Breast Cancer  Mean age: not stated  MRM & RT	n = 10 LLLT: different points in axillary region; 34 mins/ day for 10 treatments.  Upper extremity exercise program	n = 10 Upper extremity exercise program: no details  Compression garment	Circumference at 2 points: 15 cm proximal and 10 cm distal to lateral epicondyle -Symptoms: pain	Baseline arm not provided statistical analysis performed

Ridner, 2013[3]  United States	N= 46 Breast Cancer  Age: 21+ Mean age: 66.6 years	n= 15 LLLT (Class 1) for 20 minutes: 20-30 seconds per point in each grid; 10 treatment sessions  n= 15 20 minutes of manual lymphatic drainage (MLD) followed by 20 minutes LLLT: 10 treatment sessions  Compression bandaging was applied after each treatment	n= 16 Manual lymphatic drainage for 40 minutes. 8 treatment sessions.  Compression bandaging was applied after each treatment	Limb volume Extracellular fluid Psychological symptoms Physical symptoms QOL  Measurements: baseline & end of study	No statistical group difference found in volume  No statistical group difference in physical, psychological symptoms
Storz, 2017[13]  Germany	N = 40  MRM or BCS  Mean Age: Treat – 61.06 Control – 59.37	n= 20 LLLT: 2 times / wk for 4 wks; 10 minutes delivered to whole axilla	n=20 Sham laser (placebo)	Limb volume difference Lymphedema-related pain Grip strength QOL	No significant improvement in limb volume, QOL, strength.

## **Lymphedema and Related Symptoms By: Sheila H. Ridner, PhD, RN, FAAN**

### **Acknowledgements**

#### **Funding**

- American Cancer Society-MRSG-07-012-01-CPPB
- Martha Rivers Ingram Endowed Chair
- NIH
  - UL1RR024975
  - UL1TR00045
  - F31 NR07854-02
- Oncology Nursing Society Foundation
- Vanderbilt University School of Nursing
- Tactile Systems Technology

#### **Assistance**

- Jie Deng, PhD, RN, FAAN
- Mary Dietrich, PhD
- Jennifer Doersam, MS
- Deonni Stollendorf, PHD, RN

### **References**

1. <https://www.merriam-webster.com/dictionary/symptom>. Retrieved June 29,2018
2. Ramos, S. M., O'Donnell, L.S. & Knight, G.(Oct 1999) Edema volume, not timing, is the key to success in lymphedema treatment. *The American Journal of Surgery*, 178(4), 311-315.
3. Ridner, S. H. & Dietrich, M. S. (Oct 2015). Development and validation of the lymphedema symptom and intensity survey-arm. *Supportive Care Cancer*, 23(10), 3103-12. doi: 10.1007/s00520-015-2684-y. PMID: 25752884, PMCID: PMC4554806.
4. Ridner, S. H. (Nov 2005). Quality of life and a symptom cluster associated with breast cancer treatment-related lymphedema. *Supportive Care in Cancer*, 13(11), 904-911. doi: 10.1007/s00520-005-0810-y. PMID: 15812652
5. Ridner, S. H., Bonner, C. M., Deng, J., & Sinclair, V. G. (Jan-Feb 2012). Voices

- from the Shadows: Living with lymphedema. *Cancer Nursing*, 35(18), E18-26. doi: 10.1097/NCC.0b013e31821404c0. PMID: 21558848, PMCID: PMC3172392.
6. Rhoten, B. A., Radina, M. E., Adair, M., Sinclair, V., & Ridner, S. H. (Feb 2015) Hide and Seek: Body image-related issues for breast cancer survivors with lymphedema. *Journal of Women's Health Issues and Care*, 4(2). doi: 10.4172/2325-9795.1000180.
  7. Ridner, S. H., Sinclair, V., Deng, J., Bonner, C., Kidd, N., Dietrich, M.S. (Dec 2012). Breast cancer survivors with lymphedema: Glimpses of our daily lives. *Clinical Journal of Oncology Nursing*, 16(6), 609-614. doi: 10.1188/12.CJON.609-614. PMID: 23178353
  8. Stollendorf, D. P., Dietrich, M. S., & Ridner, S. H. (June 2016) Symptom frequency, intensity, and distress in patients with lower limb lymphedema. *Lymphatic Research and Biology*. 14(2), 78-87. PMID: 26824629.
  9. Deng, J., Radina, E., Fu, M. R., Armer, J. M., Cormier, J. N., Thiadens, S. R., Weiss, J., Tuppo, C. M., Dietrich, M. S., & Ridner, S. H. (Mar 2015). Self-care status, symptom burden, and reported infections in individuals with lower-extremity primary lymphedema. *Journal of Nursing Scholarship*, 47(2), 126-34. doi: 10.1111/jnu.12117. PMID: 25475008.
  10. Ridner, S. H., Dietrich, M. S., Niermann, K., Cmelak, A., Mannion, K., & Murphy, B. A. (Dec 2016). A Prospective Study of the Lymphedema and Fibrosis Continuum in Patients with Head and Neck Cancer. *Lymphatic Research and Biology*. 14(4): 198-205 doi:10.1089/lrb.2016.0001, PMID: 27305456. PMCID: PMC5178009.
  11. Murphy, B. A. & Ridner, S. H. (2010). Late effect laryngeal oedema/lymphoedema. *Journal of Lymphoedema*, 5(2), 92-93.
  12. Deng, J., Ridner, S. H., & Murphy, B. A. (Jan 2011). Lymphedema in patients with head and neck cancer. *Oncology Nursing Forum*, 38(1), E1-E10. doi: 10.1188/11.ONF.E1-E10. PMID: 21186146
  13. Deng, J., Ridner, S. H., Dietrich, M. S., Wells, N., Wallston, K. A., Sinard, R. J., Cmelak, A. J., & Murphy, B. A. (Feb 2012). Prevalence of secondary lymphedema in patients with head and neck cancer. *Journal of Pain and Symptom Management*, 43(2), 244-252. doi: 10.1016/j.jpainsymman.2011.03.019. PMID: 21802897
  14. Deng, J., Ridner, S. H., Dietrich, M. S., Wells, N., Wallston, K. A., Sinard, R. J., Cmelak, A. J., & Murphy, B. A. (Nov 2012). Factors associated with external and internal lymphedema in patients with head and neck cancer. *International Journal of Radiation Oncology, Biology, Physics*, 84(3), e319-28. doi: 10.1016/j.ijrobp.2012.04.013. PMID: 22652102
  15. Deng, J., Murphy, B. A., Dietrich, M. S., Wells, N., Wallston, K. A., Sinard, R. J., Cmelak, A. J., Gilbert, J., Ridner, S. H. (Jul 2013). Impact of secondary lymphedema after head and neck cancer treatment on symptoms, functional status, and quality of life. *Head and Neck*, 35(7), 1026-35. doi: 10.1002/hed.23084. PMID: 22791550, PMCID: PMC4017911
  16. Jackson, L. K., Ridner, S. H., Deng, J., Bartow, C., Mannion, K., Niermann, K., Gilbert, J., Dietrich, M. S., Cmelak, A. J. & Murphy, B. A. (Sept 2016). Internal

Lymphedema Correlates with Subjective and Objective Measures of Dysphagia in Head and Neck Cancer Patients. *Journal of Palliative Medicine*, 19(9): 949-956 doi:10.1089/jpm.2016.0018. PMID: 27227341. PMCID: PMC5011629.

17. Deng, J., Ridner, S.H., Rothman., Murphy, B.A., Sherman, K., Moore, L., Hall, K., & Weiner, B. (Dec 2016) Perceived symptom experience in head and neck cancer patients with lymphedema. *Journal of Palliative Medicine*. 19(123): 1264-1274 doi:10.1089/jpm.2016.0174. PMID: 27617837.
18. Ridner, S. H. (2009). The psycho-social impact of lymphedema. *Lymphatic Research and Biology*, 7(2), 109-112. doi: 10.1089/lrb.2009.0004. PMID: 19534633, PMCID: PMC2904185.
19. Ridner, S. H., Fu, M. R., Wanchai, A., Stewart, B. R., Armer, J. M. & Cormier, J. N. , (July-Aug 2012). Self-management of lymphedema: a systematic review of the literature from 2004 to 2011. *Nursing Research*, 61(4), pp.291-299. doi: 10.1097/NNR.0b013e31824f82b2. PMID: 22565103