



# POSITION STATEMENT OF THE NATIONAL LYMPHEDEMA NETWORK

By *NLN Medical Advisory Committee*

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## TOPIC: EXERCISE

Exercise presents several considerations for individuals with lymphedema and for those at risk for developing lymphedema.

### *It is the position of the NLN that:*

- ❖ Exercise is an integral part of a healthy lifestyle
- ❖ “Lymphedema” exercises (remedial exercises) are standard components of Phase I and Phase II complex decongestive therapy (CDT) (Refer to NLN Lymphedema Treatment Position Paper)
- ❖ The majority of individuals with lymphedema can safely perform aerobic and resistive exercise using the affected body part(s) when:
  - Compression garments are worn
  - The affected body part is not exercised to fatigue
  - Appropriate modifications are adopted to prevent trauma and overuse
- ❖ The majority of individuals who are at risk for developing lymphedema can safely perform aerobic and resistive exercise using the “at risk” body part when exercises are:
  - initiated at a low intensity
  - increased gradually
- ❖ It is not clear in individuals at risk for lymphedema whether a garment is necessary, but it may be helpful.
- ❖ Concern regarding the adverse effects of exercise should be determined by lymphedema severity or risk.\*

### *Types of Exercise: Lymphedema-related Benefits and Risks*

#### **“Lymphedema,” Remedial Exercise**

Lymphedema exercise involves active, repetitive, non-resistive, motion of the involved body part. Exercise in Phase I and II CDT is performed with compression on the involved extremity. Lymphedema exercise enhances the efficacy of the muscle pump and promotes venous and lymphatic return.

Studies: Lymphedema exercises have been formally studied and shown to significantly reduce limb swelling.<sup>1-3</sup>

Potential Benefits: Lymphedema exercises promote lymph flow which can reduce limb swelling.

Potential Risks: If performed improperly or without appropriate compression lymphedema exercises may worsen limb swelling.

#### **Flexibility/Stretching Exercise**

Flexibility exercises include a wide range of activities that stretch muscles and connective tissue to preserve range of motion. Flexibility exercises can minimize scarring and joint contractures which may lessen lymph flow. Flexibility exercises should be performed slowly and progressed gradually.

Studies: Flexibility exercises have not been formally studied in individuals with or at risk for lymphedema.

Potential Benefits: When performed appropriately, flexibility exercises can preserve range of motion, prevent joint contractures, and enhance lymph flow.

Potential Risks: Overly vigorous stretching may cause tissue injury and inflammation producing lymphatic overload and lymphedema. Aggressive stretching is contraindicated except for very limited circumstances.

### **Resistive Exercise**

Resistive exercises are performed repetitively against an opposing load to enhance muscle power, stamina and tone. Resistive exercise may reduce limb volume when used as an adjunct to compression therapy.<sup>4</sup> Resistance, generally in the form of weights, should be introduced at a low level and increased gradually with close monitoring for injury, overuse and swelling. Modifications to minimize the potential harmful effects of exercise and improve safety include: 1. adequate rest intervals between sets; 2. avoidance of constant gripping of hand weights, equipment, or bands; 3. application of compression in the form of garments or bandages. The amount of compression may need to be adjusted to prevent increased swelling.

Studies: Resistive exercise has been formally studied in “at risk” individuals, and when begun at a low level and increased gradually, has not been found to trigger or worsen lymphedema.<sup>4-9</sup> An isolated study in lymphedema patients suggests that resistive exercise, in the absence of compression, may lead to increased lymph accumulation and eventually worsen limb swelling.<sup>10</sup>

Potential Benefits: Resistive exercise may enhance lymph flow and prevent limb swelling from muscle overuse.

Potential Risks: Strength training increases local blood flow and metabolic waste production. These effects increase the demand on the lymphatic system, potentially triggering or worsening limb swelling.

### **Aerobic Conditioning**

Aerobic conditioning (“cardio” exercise) is typically performed continuously using large muscle groups in a repetitive fashion at 60% - 75% of an individual’s maximum heart rate.<sup>11</sup> Walking, jogging, cycling, and swimming are examples of aerobic conditioning.

Studies: Aerobic conditioning has been formally studied on a limited basis and has not been associated with lymphedema in “at risk” individuals during short-term follow up of 1 year.<sup>7, 12</sup>

Potential Benefits: Aerobic conditioning enhances cardiovascular fitness, effective weight management and overall health and may specifically benefit lymphedema patients by improving venous and lymph flow.<sup>3</sup>

Potential Risks: Increased blood flow and deposition of metabolic waste in areas at risk for, or with established, lymphedema which may increase lymph swelling.

### ***For Individuals with Lymphedema***

#### **Exercise as lymphedema treatment (“Remedial exercise”):**

Remedial exercise is an integral part of CDT, the current standard of care for lymphedema reduction and long-term management.<sup>13, 14</sup> Exercise enhances lymphatic function through increased lymph and flow. Exercise in Phase I CDT is performed with short-stretch compression bandages on the involved body part to reduce lymph production and maximize the influence of muscle contractions. During Phase II CDT, remedial exercises should be performed on a regular basis with garments or bandages in place.

#### **Considerations for designing an exercise program:**

Exercise causes both positive and negative physiological effects in the lymphatic system and surrounding tissues. The balance between positive and negative effects must be considered on an individual basis when designing an exercise program. Positive effects include increased lymph flow. This increase will vary depending on the condition of each individual’s lymphatic system. Negative effects of exercise may include accumulation of waste products and lymph fluid in the body tissues, as well as the potential for tissue trauma and inflammation.

Exercise programs should be strategically designed to maximize the positive effects and minimize the negative effects. Potential considerations include lymphedema location, areas of reduced lymph flow, other medical conditions, prior level of physical activity, overall health of the individual and environmental conditions(e.g. hot weather, high altitude).

### ***For Individuals at Risk for Lymphedema***

#### **Definition of Individuals at Risk for Lymphedema**

Individuals at risk for lymphedema have not displayed signs and symptoms of lymphedema but may have sustained damage to their lymphatic systems through surgical lymph node removal or irradiation.<sup>15</sup> Additionally, “at risk” individuals may have surgical incisions in the vicinity of lymph transport vessels. Individuals who have family members with hereditary lymphedema may also be at risk. An individual’s risk of lymphedema may change over time depending on weight gain, degree of radiation-induced scarring, and other factors.

#### **Exercise Guidelines for Individuals at Risk for Lymphedema**

Although lymphedema may not be evident, in “at risk” individuals the lymphatic system may function well below the normal range.<sup>16</sup> Exercise may trigger lymphedema by increasing lymph production to the point that it exceeds the lymphatic system’s ability to remove fluid. Local inflammation from overuse or trauma may contribute as well. Temporary overload may not produce immediate swelling. However repeated episodes may add up and lead to chronic lymphedema.

Sub-clinical lymphatic impairment cannot be reliably measured. Thus, an individual’s exact lymphedema risk cannot be estimated and controversy persists as to which individuals should use compression garments during exercise. Current understanding of the underlying physiology provides strong support for use of compression garments. However, these issues have yet to be tested in clinical trials. “At risk” individuals may reduce their risk of developing lymphedema during exercise by wearing a well-fitted compression garment.

#### ***Key Points to Remember Regarding Exercise***

- ❖ Before starting any exercise program individuals should be medically cleared
- ❖ For individuals with lymphedema, adequate compression should be utilized in the form of compression bandages or garments
- ❖ Individuals at risk for developing lymphedema may consider obtaining a compression garment
- ❖ Compression garments should be:
  - measured by an individual trained and experienced in fitting compression garments
  - at least Class I for upper extremity support
- ❖ A hand piece, either a glove or gauntlet, is necessary when wearing a compression sleeve.
- ❖ Exercise adjustments may be indicated for individual medical needs or frequent lymphedema flare ups.
- ❖ Performing exercise beyond an individual’s usual duration or intensity may trigger or worsen lymphedema.
- ❖ Exercise should be started gradually, increased cautiously and stopped for pain, increased swelling or discomfort.

## REFERENCES

1. Boris M, Weindorf S, Lasinski B, Boris G. Lymphedema reduction by noninvasive complex lymphedema therapy. *Oncology (Williston Park)*. Sep 1994;8(9):95-106; discussion 109-110.
2. Foldi E, Foldi M, Weissleder H. Conservative treatment of lymphoedema of the limbs. *Angiology*. Mar 1985;36(3):171-180.
3. Foldi M FE. *Textbook of Lymphology*. Munchen: Urban & Fisher; 2003.
4. Johansson K, Tibe K, Weibull A, Newton RC. Low intensity resistance exercise for breast cancer patients with arm lymphedema with or without compression sleeve. *Lymphology*. Dec 2005;38(4):167-180.
5. Ahmed RL, Thomas W, Yee D, Schmitz KH. Randomized controlled trial of weight training and lymphedema in breast cancer survivors. *J Clin Oncol*. Jun 20 2006;24(18):2765-2772.
6. Cheema B, Gaul CA, Lane K, Fiatarone Singh MA. Progressive resistance training in breast cancer: a systematic review of clinical trials. *Breast Cancer Res Treat*. Jul 12 2007.
7. Courneya KS, Segal RJ, Mackey JR, et al. Effects of aerobic and resistance exercise in breast cancer patients receiving adjuvant chemotherapy: a multicenter randomized controlled trial. *J Clin Oncol*. Oct 1 2007;25(28):4396-4404.
8. McKenzie DC, Kalda AL. Effect of upper extremity exercise on secondary lymphedema in breast cancer patients: a pilot study. *J Clin Oncol*. Feb 1 2003;21(3):463-466.
9. Turner J, Hayes S, Reul-Hirche H. Improving the physical status and quality of life of women treated for breast cancer: a pilot study of a structured exercise intervention. *J Surg Oncol*. Jun 1 2004;86(3):141-146.
10. Lane KN, Dolan LB, Worsley D, McKenzie DC. Upper extremity lymphatic function at rest and during exercise in breast cancer survivors with and without lymphedema compared with healthy controls. *J Appl Physiol*. Sep 2007;103(3):917-925.
11. Fletcher GF, Balady G, Blair SN, et al. Statement on exercise: benefits and recommendations for physical activity programs for all Americans. A statement for health professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology, American Heart Association. *Circulation*. Aug 15 1996;94(4):857-862.
12. Basen-Engquist K, Taylor CL, Rosenblum C, et al. Randomized pilot test of a lifestyle physical activity intervention for breast cancer survivors. *Patient Educ Couns*. Dec 2006;64(1-3):225-234.
13. Bernas MJ, Witte CL, Witte MH. The diagnosis and treatment of peripheral lymphedema: draft revision of the 1995 Consensus Document of the International Society of Lymphology Executive Committee for discussion at the September 3-7, 2001, XVIII International Congress of Lymphology in Genoa, Italy. *Lymphology*. Jun 2001;34(2):84-91.
14. *Best Practice for The Management of Lymphoedema, International Consensus*. London: MEP Ltd; 2006.
15. Meek AG. Breast radiotherapy and Lymphedema. *Cancer*. Dec 15 1998;83(12 Supple American):2788-2797.
16. Goltner E, Gass P, Haas JP, Schneider P. The importance of volumetry, lymphoscintigraphy and computer tomography in the diagnosis of brachial edema after mastectomy. *Lymphology*. Sep 1988;21(3):134-143.