


*1<sup>st</sup> Annual MSKCC Cancer Rehabilitation Symposium*

**The Role of Contemporary Treatments in Lymphedema Management**

Jeannette Zucker, PT, DPT, CLT-LANA, WCC, CSCS, CKTP  
June 1, 2013



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Cancer Center

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This presenter has no conflict of interest to report regarding any commercial product/manufacture that may be referenced during this presentation.



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Objectives

- Knowledge of how Kinesiotape® can contribute to positive clinical outcomes in lymphedema management.
- Knowledge of the role, risks, and benefits of low level laser therapy in the lymphedema setting.
- Knowledge of how fascial restriction and scar tissue negatively impacts lymphatic flow and how to address these impairments.



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Kinesiotaping®




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What is Kinesiotape®?¹

- Polymer elastic strand wrapped by 100% cotton
  - Air-permeability, quick-drying, comfort
- Wavy acrylic adhesive
  - Lifts skin, moisture escape
  - Heat-activated
- Color:
- Width: 1, 2, or 3 inches




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Properties of Kinesiotape® ¹

- Thickness same as epidermis
- Tape can get wet
- Longitudinal stretch
- Reduces muscle fatigue
- Relaxes soft tissue for improved lymph flow
- Decreased pain and swelling




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Indications<sup>1</sup>

- Improves circulation
- Reduces inflammation
- Improves lymphatic flow
  
- Diminishes scar tissue
- Restores normal fascia
- Relieves pain
- Corrects muscle function
- Assists with increased ROM



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Mechanisms of Action

- Gate Control Theory
- Stretch of skin pulls on anchoring filaments
- Space creation results in negative pressure<sup>1</sup>
- Elongation of fascial fibers
- Decreases fibroblasts



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General Guidelines<sup>1</sup>

- Prep the skin
- Round all corners
  - Prevents tape from catching
  - Prolongs use of tape
- Muscle / tissue should be on stretch
  - Maximizes comfort
  - Prevents retraction
- No tension at base and tail ends
- Paper-off tension is usually sufficient
- Rub for warmth to maximize adherence



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Direction & Application

- To improve circulation and lymphatic flow
- To relieve pain
- To reduce inflammation
  
- Base is anchored in the direction of drainage, tape is pulled in opposite direction so that the rebound of the elasticity is toward the base.




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Billing

- Depends on what was primarily performed during the session
  
- Can incorporate time spent on taping into other CPT codes e.g.:
  - 97140 – Manual Therapy
  - 97112 – Neuro-muscular Re-education
  - 97110 – Therapeutic Exercise
  
- Can bill separately




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Precautions and Considerations<sup>1</sup>

- |                           |                                 |
|---------------------------|---------------------------------|
| • Sensory deficits        | • Fragile skin (radiation)      |
| • Suspicion of DVT        | • Pregnancy                     |
| • Malignancy              | • Adhesive sensitivity          |
| • CHF                     | • Kidney disease                |
| • Cellulitis              | • Asthma / respiratory problems |
| • Impaired skin integrity | * Carotid arteries              |




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Kinesiotape® Research

*“Kinesiotaping group produced a significantly faster reduction in edema compared to manual lymphatic drainage.”<sup>2</sup> (p.46-54)*



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Kinesiotape® Research

*“Kinesiotape could replace the bandage for patients who had poor compliance with bandage use after 1-month intervention.”<sup>3</sup> (p. 1353-60)*



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Digital Lymphedema



MSKCC photo



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Mild Lymphedema



MSKCC photo

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Promoting Lymph Drainage Underneath Bandages



MSKCC photo

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Head and Neck Lymphedema



MSKCC photo

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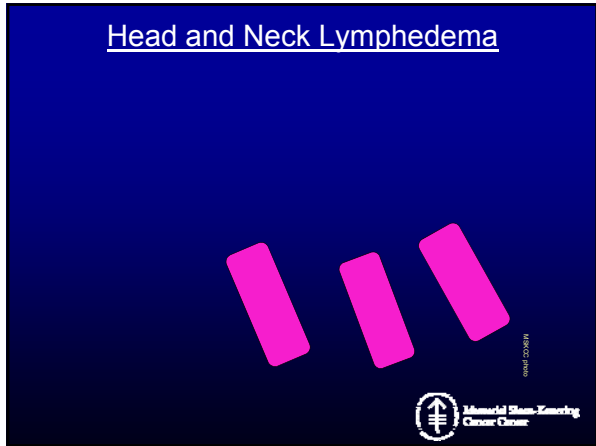
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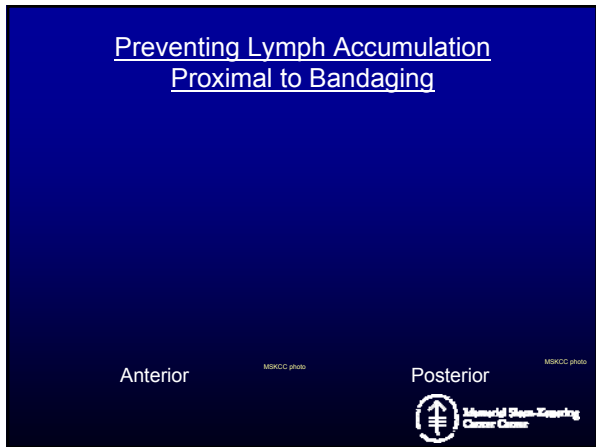
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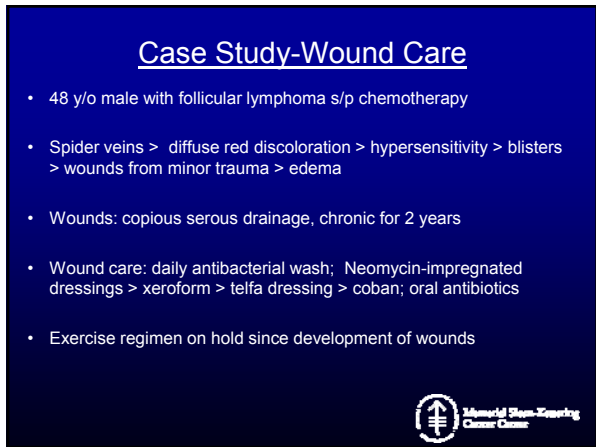
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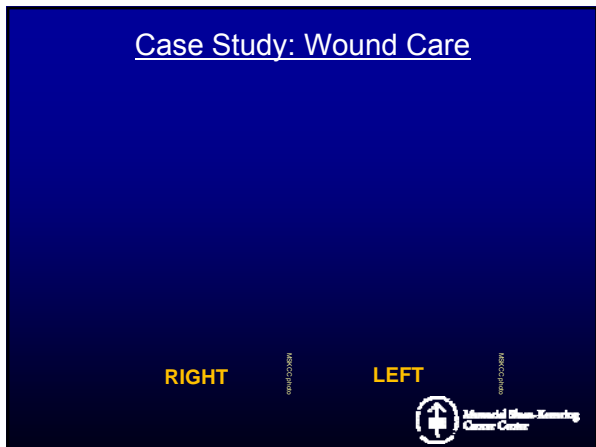
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**Case Study: Wound Care**  
*Physical Therapy Intervention – Week 1*

- Discontinued antibacterial wash (rx PRN)
- Discontinued antibacterial dressing (rx PRN)
  - Adaptic dressing
- Bandaging
- Kinesiotaping



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**Case Study**  
*Physical Therapy Intervention*

- Discontinued antibacterial wash (rx PRN)
- Discontinued antibacterial dressing (rx PRN)
  - Adaptic dressing
- Manual lymphatic drainage
- Compression: bandaging & garment
- Therex
- Kinesiotaping



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**Case Study: Wound Care**  
*PT Intervention – 1 week after eval and treat*

**RIGHT** MEMORIAL SLOAN-KETTERING **LEFT** MEMORIAL SLOAN-KETTERING



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Case Study-Wound Care  
*PT Intervention – 3 weeks after eval and treat*

RIGHT LEFT



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Case Study: Wound Care  
*PT Intervention – 16 weeks after eval and treat*



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Kinesiotape® for Fascial Restriction & Edema Video



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Laser Therapy



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Low Level Laser (LLL) Therapy

- Light Amplification by the Stimulated Emission of Radiation
  - first described by Albert Einstein<sup>4</sup>
  - LLL developed in 1968 by Dr. Endre Mester<sup>4</sup>
- Aka Cold Laser
- Power output between 50 and 300 mW<sup>5</sup>



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LLL – Mechanism of Action<sup>6</sup>

- Cellular level
  - ↑ phagocytosis
  - ↑ angiogenesis
  - ↑ proliferation of fibroblasts & keratinocytes
- Damaged cells respond more readily to absorbed light



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### LLL – Mechanism of Action<sup>6</sup>

Molecular level

- Stimulation of Ca influx and mitosis rate
- ↑ expression of Heat-Shock-Proteins
- ↑ ATP synthesis
- ↑ formation of mRNA
- ↑ protein secretion
- FGF, TGF- $\beta$ , IL-6, and PDGF, VEGF



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### Physiological Effects of LLL<sup>4</sup>

- Promotion of wound healing
  - Angiogenesis
  - ↑ macrophage activity
  - ↑ fibroblast proliferation
  - ↑ leukocyte activity



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### Physiological Effects of LLL<sup>4</sup>

- Pain reduction
  - ↑ endorphins
  - ↑ nitric oxide
  - ↑ acetylcholine
  
  - ↓ bradykinin
  - ↓ pain fiber activity
  - ↓ inflammation



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### Physiological Effects of LLL<sup>4</sup>

- Decreased inflammation
  - ↑ ATP, cytochrome & leukocyte activity
  - Angiogenesis
  - Prostaglandin synthesis
  - ↑ superoxide dismutase
  - ↓ Interleukin-1
  - Electrolyte rebalancing
  - Protein gradient changes



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### LLL for Lymphedema<sup>7</sup>

- RianCorp's LLL is the only one FDA- approved
  - LTU-904 models operate at a wavelength of 904 nm
  - Class 1 lasers > eye-safe



www.riancorp.com



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### FDA Classification of Lasers<sup>8</sup>

FDA Class	Laser Product Hazard	Product Examples
<b>I</b>	Considered non-hazardous. Hazard increases if viewed with optical aids (magnifiers, binoculars, telescopes)	Laser printers, CD players, DVD players
<b>IIa</b>	Hazard increases when viewed directly for long periods of time and if viewed with optical aids.	Bar code scanners
<b>IIIa</b>	Depending on power and beam area, can be momentarily hazardous when directly viewed or when staring at the beam with an unaided eye. Risk of injury increases with optical aids.	Laser pointers
<b>IIIb</b>	Immediate skin hazard from direct beam and immediate eye hazard when viewed directly.	Laser light show projectors, industrial lasers, research lasers
<b>IV</b>	Immediate skin hazard and eye hazard from exposure to either direct or reflected beam; may also present a fire hazard.	Same as IIIb, LASIK eye surgery lasers



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Application<sup>5</sup>

- Treatment 1.0-4.0 J/cm<sup>2</sup>
- Treat area:
  - Lymph node regions in affected area
  - Entire affected area



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Application<sup>6</sup>

- LLLT for acute lymphoconcentration ↑ lymph flow, blood flow, and solvent material which can permeate the wall of the lymph vessel to relieve the state of lymphoconcentration
- There should be proximal priority



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Practical Guidelines for LLL & Lymphedema

- LLL should not be used in isolation nor should the first treatment choice
- Full MLD sequence is a pre-requisite
- LLL is not reimbursable by most insurance carriers, so perform MLD concurrently
- When in doubt, practice conservatively



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Contraindications

- Avoid directing into eyes
- Active implants



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Additional Precautions & Contraindications<sup>9</sup>

- Pregnancy
- Cancer
- Thyroid disorders
- Children
- Diabetes
- Epilepsy



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LLL for Fascial Restriction

MSKCC photo MSKCC photo



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LLL for Pain



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Laser Therapy Video



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Laser Therapy Research

*"LLLT may be effective in reducing arm circumference and pain...as an adjuvant therapy alongside standard treatment methods".<sup>10</sup> (p.90-94)*



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### Laser Therapy Research

*“Two cycles of laser treatment were found to be effective in reducing the volume of the affected arm, extracellular fluid, and tissue hardness in approximately 33% of patients with postmastectomy lymphedema at 3 months after treatment”.*<sup>11</sup> (p. 1114-22)



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### Scar Tissue & Fascial Restriction



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### Dimpled Scar & 6 Weeks After Kinesiotaping®

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© 2013 MSKCC



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Kinesiotape® for Complicated Scar Lines



© 2011 Kinesio



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Radiation Fibrosis Syndrome<sup>12</sup>

- Induction of apoptosis
  - Free radical-mediated DNA damage
- Other overlapping factors
  - Mediated by cytokines, chemokines, growth factors
    - Activation of coagulation system
    - Inflammation
    - Epithelial regeneration
    - Tissue remodeling



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Radiation Fibrosis Syndrome<sup>12</sup>

- Vascular endothelial dysfunction
  - Loss of vascular thrombo-resistance
    - Decreased fibrinolysis
    - Increased expression tissue factor, von Willebrand factor
    - Decreased prostacyclin, thrombomodulin
  - Presence of local fibrin formation
    - Intravascularly
    - Perivascular area
    - Extracellular matrix



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Kinesiotaping® for Fascial Restrictions

MSKCC photo



MSKCC photo  
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Myofascial Release Video

MSKCC photo



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Fascia Video



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### Conclusion

- Kinesiotape® can be an effective adjunct to traditional lymphedema / decongestive therapy.
- Low-level laser therapy may prove to be an effective intervention when traditional therapy is insufficient.
- LLL has not shown any significant side effects or safety concerns, use judiciously nonetheless.
- Addressing skin and fascial mobility is essential to success in lymphedema control.



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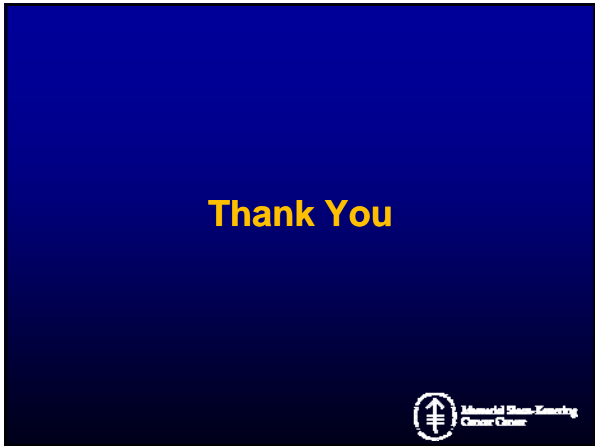
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