

# Literature Review of Causative and Non-causative Risk Factors for Breast Cancer-Related Lymphedema

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## Introduction

- Secondary lymphedema is a concern for both cancer survivors and their providers
- Risk factors associated with breast cancer-related lymphedema (BCRL) have become controversial due to conflicting guidelines and evidence
- The purpose of this literature review was to outline the most recent evidence-based causative and non-causative factors associated with BCRL to establish a knowledge base for clinicians to better understand, diagnose, and educate patients.

## Causative Risk

### Axillary Surgery

- Axillary Lymph Node Dissection (ALND) has increased risk with number of lymph nodes removed<sup>1-3</sup>
- Sentinel Lymph Node Biopsy (SLNB) has decreased risk compared to ALND<sup>1</sup>

### Elevated BMI

- BMI of  $\geq 25$  kg/m<sup>2</sup> poses risk for BCRL<sup>1,4-6</sup>

### Cellulitis

- Cellulitis increases BCRL and BCRL increases risk for further infections<sup>1</sup>

### Lack of Breast Reconstruction Surgery

- Patients who did not undergo reconstruction were more likely to develop BCRL<sup>1</sup>

### Timing of Breast Reconstruction Surgery

- Delayed increases risk compared to immediate reconstruction<sup>1</sup>

### Regional Lymph Node Radiation (RLNR)

- Risk increases when RLNR is combined with ALND or SLNB surgery<sup>1</sup>

## Non-Causative Risk

### Air Travel

- No significant increased risk in patients who underwent: unilateral breast cancer surgery,<sup>1,4,10,12-15</sup> bilateral breast cancer surgery,<sup>1,4,10,12,13</sup> or ALND<sup>1,4,5,10,11,13</sup>
- No risk for increase in arm volume with altitude, number and duration of flights<sup>4,12</sup>
- Further research needed regarding use of compression garments in flight

### Blood Pressure Measurement

- No increased risk of BCRL for unilateral or bilateral breast cancer surgery and ALND<sup>1,3,4,12-14,16,17</sup>

### Weight Training

- No increased risk with safe performance of resistance exercise during and following breast cancer treatment<sup>19</sup>

### Insect Bites

- No research supporting insect bites as a causative factor

## Conclusion

- These findings, in conjunction with patient-specific medical advice, may improve risk-reduction practices for breast cancer survivors.
- This information is intended for the development of both continuing education within the MaineHealth Breast Work Group and for evidence-based patient education tools for BCRL risk reduction practices.

## Methods

- An extensive literature review of forty-two studies published from 2009-2019 of BCRL risk factors was conducted via referencing online databases.
- Due to lack of new evidence, seminal articles published prior to 2009 were referenced.
- An annotated bibliography was created trichotomizing each risk factor as **causative**, **non-causative**, or **insufficient evidence** to support recommendation.

## Insufficient Evidence

### Extreme Temperature Exposure

- Sunburns increase risk for BCRL<sup>6,28</sup>
  - No evidence on the effectiveness of sunscreen use to prevent inflammation<sup>6</sup>
- Saunas increase risk when skin damage is present on the affected limb<sup>4,13</sup>
- Hot tubs not considered to affect risk of BCRL<sup>4,6</sup>
- Hot tubs and Saunas pose potential risk if not properly sanitized

### Limb Positioning

- Limb elevation is not sufficient for lymphedema management<sup>6</sup>
- Prolonged sitting and standing increases venous pressure and interstitial fluid<sup>6</sup>
- Crossing the legs decreases venous return thus increasing venous pressure<sup>6</sup>

### Needle Sticks

- Hospital skin puncture/venipuncture inconclusive<sup>13,31</sup>
- Blood draws and intravenous infusions are associated with minimal risk<sup>12,32</sup>
- Diabetes finger stick and vaccinations are causative<sup>27,29</sup>
- Minimal risk with needle sticks in the ipsilateral arm
  - Increased risk if radical mastectomy performed prior to the needle stick<sup>4,6,13,27-30</sup>

### Weight Loss

- Weight loss due to dietary advice reduced BCRL<sup>24</sup>
- Increased risk if post-operative gain or loss of  $>10\%$  per month<sup>25</sup>

### Adjuvant and Neoadjuvant Chemotherapy

- More research needed to determine the risk associated with adjuvant and neoadjuvant chemotherapy<sup>1-3</sup>

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## References

