New insights on:

- Lipedema
- Night-time compression

JOBST Symposium
Room Acapulco: Friday, 14th June, 12:15 – 13:15

Focusing on two major topics of compression therapy, the JOBST Symposium presents:

A) Lipedema – a necessary paradigm shift
Tobias Bertsch, Földi Clinic, Specialist Clinic for Lymphology, European Center for Lymphology, Black Forest, Germany

B) Looking at night-time compression from three angles: doctor, therapist and patient - based on experiences from a US therapist and a German prospective observation study on JOBST Relax
Tobias Bertsch, Földi Clinic, Specialist Clinic for Lymphology, European Center for Lymphology, Black Forest, Germany
Linda S. Roherty, PT, CLT-LANA, Oncology and Lymphedema Rehab Specialist, Advocate Sherman Hospital, Elgin, IL, USA

Lunch boxes plus a JOBST space snack will be served in front of the symposium room (Acapulco).
Welcome

Dear Colleagues & Participants,

It is an honour and pleasure to welcome you to the 9th International Lymphoedema Framework Conference in downtown Chicago, USA. This is the first time the conference is being held in the United States.

We are proud to have this conference co-hosted by the American Lymphedema Framework Project (ALFP). The ALFP was the first country framework to be established and join the International Lymphoedema Framework (ILF) umbrella of national frameworks in 2008. Their support of the international lymphedema community through systematic reviews, helped produce the ILF Best Practice Position Documents: Compression Therapy and Surgical Interventions.

Today, the ILF network includes 14 different frameworks around the world. Almost all of them will be represented here at the conference.

The 2019 conference scientific committee and faculty includes an impressive roster of opinion experts in the field across a wide range of disciplines including lymphology, genetics, pathology, oncology, dermatology, surgery, imaging, psychology, wound care and more.

This 2019 International Lymphoedema Conference brings together clinicians, researchers, industry providers, healthcare providers, advocacy groups and patients, with the goal of sharing knowledge and furthering lymphology for the benefit of all those affected by lymphedema and related disorders. The meeting is multidisciplinary and patient focused: with an emphasis on improving lymphedema outcomes through innovation and collaboration.

Welcome to Chicago!

Best regards,

On behalf of the ILF and ALFP Organising and Scientific Committees
Objectives
2019 International Lymphoedema Conference
Improving Lymphedema Outcomes through Innovation and Collaboration

LEARNING OBJECTIVES
At the end of the conference delegates will be able to:

- Describe the general anatomy, physiology, pathology, and anomalies of the lymphatic system
- Describe at least three of the latest basic and clinical research findings in the field of lymphology
- Describe at least 2 recent advances in lymphedema diagnostics and imaging
- Recognize different opinions impacting risk reduction practices and balance evidence based vs. clinical experience
- Identify the impact that obesity plays in lymphedema and lipedema: both from a scientific and clinical perspective
- Recognize the challenges of compression and how to adapt for clinical practice
- Describe at least 3 surgical approaches to the treatment of lymphedema
- Describe 3 elements unique to treatment of children with lymphedema
- Recognize the impact to quality of life that lymphedema patients experience
- Identify recent innovative and promising approaches to lymphedema management
- Describe the role of genetics and related structural and functional issues in the lymphatic system
- Describe how international and USA lymphedema projects and studies can impact change through international collaboration

ACCREDITATION STATEMENT
This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the University of Chicago Pritzker School of Medicine and International Lymphoedema Framework. The University of Chicago is accredited by the ACCME to provide continuing medical education for physicians.

CREDIT DESIGNATION STATEMENT
The University of Chicago Pritzker School of Medicine designates this live activity for a maximum of 23 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.
ABOUT THE ILF

ILF was established as a UK charity in 2009. The framework developed from a project aiming at bringing together the main stakeholders involved in the management of lymphoedema in the United Kingdom in 2002, but ILF rapidly spread to become an international project with an objective to support individual countries develop a long-term strategy for lymphoedema management.

The success of the UK Lymphoedema Framework in improving the management of this condition in Great Britain has led many international Lymphoedema experts to express an interest in the Framework Methodology and Spirit. This is why Christine Moffatt CBE and her team decided to set up the International Lymphoedema Framework (ILF) as a charity.

The choice of charitable status is a strong message to the lymphoedema community on the ethos and vision that govern the Framework. It is also a guarantee of the independence of the ILF in the ethical use of its resources and its capacity to actively contribute to the improvement of the management of lymphoedema worldwide and especially in developing countries.

For more information about the ILF, please visit www.lympho.org

ABOUT THE ALFP

The American Lymphedema Framework Project (ALFP) is a national multidisciplinary collaborative initiative developed under the leadership of Professor Jane Armer, PhD, RN, Director, and Dr. Joseph Feldman, MD, CLT-LANA, Co-Director, along with Professor Christine Moffatt, PhD, RN, Clinical Director of the International Lymphoedema Framework (established in the United Kingdom), Dr. Janice Cormier, ALFP Executive Committee member, and nationally recognized clinical experts and investigators in the field of lymphedema. Headquarters for the ALFP are located at the University of Missouri Center for Lymphedema Research, Practice, and Health Policy.

The mission of the ALFP is to improve the management of lymphedema and related disorders in the United States while contributing to global international advancement. This will be achieved by defining best practices of lymphedema management and developing a minimum data set to improve lymphedema outcomes. The ALFP will establish a leadership role in lymphedema risk reduction, treatment, education, health policy, and research. These outcomes will be achieved through a partnership among all lymphedema stakeholders, including patients, healthcare professionals, researchers, industry representatives, and third-party payers.

ORGANISING COMMITTEE

Tonny Karlsmark
Copenhagen, Denmark – ILF

Anna Kennedy
Toronto, CA – ILF

Bonnie Lasinski
Pawleys Island, South Carolina ALFP

Julia Rodrick
Springfield, Illinois – ALFP

Kathryn Thrift
Dallas, Texas – ALFP

Joan White
Atlanta, Georgia – ALFP

SCIENTIFIC COMMITTEE

David Keast
Ontario, Canada – ILF

Anna Kennedy
Toronto, Canada – ILF

Susan Nørregaard
Copenhagen, Denmark – ILF

Neil Piller
Adelaide, Australia – ILF

Isabelle Quéré
Montpellier, France – ILF

Melanie Thomas
Cardiff, UK – ILF

Jane Armer
Columbia, Missouri – ALFP

Marcia Beck
Kansas City, Missouri – ALFP

Michael Bernas
Fort Worth, Texas – ALFP

Joseph Feldman
Chicago, Illinois – ALFP

Mei Fu
New York, New York – ALFP

CONFEREE HSE SECETARIAT

C/O CAP Partner
Nordre Fasanvej 113, 2.
DK-2000 Frederiksberg
Denmark
Tel: +45 70 20 03 05
E-mail: info@cap-partner.eu
General information

CONFERENCE VENUE
Hyatt Regency Chicago
151 East Wacker Dr
Chicago, IL 60601 USA

CONFERENCE LANGUAGE
The conference will be held in English.

NAME BADGES
For security reasons, all participants (including delegates, exhibitors, speakers and volunteers) must wear their name badge in the conference area at all times to gain access to the sessions and Exhibit Hall. Please ensure your badge is visible.

ENTITLEMENTS
Registration for the conference includes admission to the conference programme for the applicable days. Patient registration includes admission to the patient sessions indicated on the programme, coffee breaks and lunch, conference bag and abstract book.

CERTIFICATE OF ATTENDANCE & ACCREDITATION
Certificates of attendance can be downloaded from the conference website under registration after the event. You will receive an email with more details and the link to download.

Participants wishing to obtain a CME designated certificate should visit the conference website (under Registration). You will be guided through the credit claiming process with the appropriate links to the University of Chicago CME site.

An email with detailed instructions including the conference website link will be sent after the conference to all participants.

Credit Designation Statement
The University of Chicago Pritzker School of Medicine designates this live activity for a maximum of 23.0 AMA PRA Category I Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.
LUNCH AND COFFEE BREAKS
Lunch and coffee are available in the Exhibition Hall (Regency Ballroom C&D) and in the foyer. See programme for exact time of breaks.

POSTER SESSION
Posters are displayed in the foyer, Hong Kong and San Francisco rooms starting on Thursday morning, and ending at the end of the lunch hour on Friday afternoon. Poster sessions will be held during two different breaks to allow delegates to ask questions of the poster presenters, who will stand by their posters at specific times.

The poster session times are as follows:

- Odd numbered posters
  - Thursday 3.15 - 3.45pm
- Even numbered posters
  - Friday 10.00 - 10.30am

INFORMATION FOR POSTER PRESENTERS

Poster mounting
Posters can be mounted 13 June 2019 from 7.30 am when the registration starts. The venue will provide all necessary equipment to mount the posters.

Poster removal
Posters can be removed after Friday 14 June at 1:30 (at the end of the lunch break).

Visit the poster area
Participants are encouraged to visit the poster area during the coffee and lunch breaks. Participants can attach their business card to the poster and expect to be contacted by the author during the congress or later as appropriate.

SPEAKER INFORMATION
Please bring your presentation on a USB to the session room before your session starts. We recommend that you upload your presentation at least 30 minutes before your session. You can get help with the upload, if necessary. Unless otherwise agreed all presentations will be deleted after the conference in order to secure that no copyright issues will arise at the end of the conference.

WIFI
Free WiFi is provided, courtesy of Essity. Network: JOBST, password: Relax

MOBILE PHONES
All mobile phones and other electronic devices must be on silent mode during the sessions.

LOST AND FOUND
Found items should be returned to the registration desk. If you lose something, please report to this desk for assistance.

CONFERENCE SECRETARIAT
CAP-Partner
Nordre Fasanvej 113
2000 Frederiksberg C
Denmark
Tel: 0045 70 20 03 05
www.cap-partner.eu

CONFERENCE WEBSITE
www.2019ilfconference.org

PARKING
There is valet parking at the hotel for $69 overnight and self-parking for $49 overnight.

Dietary Restrictions
If you indicated specific dietary restrictions, any special lunches will be labelled.
General information

BUSINESS OFFICE
The Hyatt Hotel’s business office is located in the East Tower, Exhibit Level. It is inside the Riverside Exhibit Hall.

<table>
<thead>
<tr>
<th>Opening hours for the business center</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday through Friday</td>
<td>6.00am - 7.00pm</td>
</tr>
<tr>
<td>Saturday through Sunday</td>
<td>7.00am - 6.00pm</td>
</tr>
</tbody>
</table>

EXHIBITION

<table>
<thead>
<tr>
<th>Exhibition Hours</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday 13 June</td>
<td>Includes welcome reception within the exhibit area from 5.30-7pm</td>
</tr>
<tr>
<td>Friday 14 June</td>
<td>7.30pm-5.30pm</td>
</tr>
<tr>
<td>Saturday 15 June</td>
<td>7.30am-3.30pm</td>
</tr>
</tbody>
</table>

Social programme

WELCOME RECEPTION

<table>
<thead>
<tr>
<th>Date</th>
<th>13 June 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>5.30 - 7.00 pm</td>
</tr>
<tr>
<td>Place</td>
<td>Exhibit area and conference foyer</td>
</tr>
</tbody>
</table>

Included in the registration fee
The welcome reception will be held right after the last session on Thursday 13 June in the exhibit area. Here you can enjoy drinks and hors d’oeuvres while catching up with colleagues and viewing the exhibit area.
Make sure to be there – it will be an evening full of networking and a good start to the ILF 2019 conference. If you registered for this event, you will have received a ticket.

CONFERENCE DINNER

<table>
<thead>
<tr>
<th>Date</th>
<th>14 June 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>6.30-9.30 pm</td>
</tr>
<tr>
<td>Place</td>
<td>Mystic Blue Cruises, Navy Pier</td>
</tr>
</tbody>
</table>

Not included in the registration fee
The conference dinner will take place on the cruise boat Mystic Blue, which will depart from Navy Pier and sail for two hours on Lake Michigan. Navy Pier is a 20 minute walk from the Hyatt conference hotel. Transportation will be provided to Navy Pier with buses departing from the hotel west tower lobby at 6pm. Boarding at the boat will be from 6.30pm. The boat sails at 7pm sharp and will be dockside again by 9pm. The boat will still be accessible until 9.30pm when final disembarkation is required.

Navy Pier offers many restaurants, bars and boutiques – so feel free to explore the area on a walk after the Mystic Blue cruise ends. Transportation back to the hotel is at your own leisure and at your own expense, but is only a quick taxi ride. Dinner tickets can be purchased at $85USD per person and includes a dinner buffet and two drinks. Additional drinks will be available for purchase.

ILF RUN AROUND THE GLOBE

<table>
<thead>
<tr>
<th>Date</th>
<th>15 June 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>07.30-08.30 am</td>
</tr>
<tr>
<td>Place</td>
<td>The lobby / Hyatt Regency Hotel</td>
</tr>
</tbody>
</table>

Not included in the registration fee
Support ILF by running with medi during ILF 2019! There will be two routes to choose from:
• 2 km / 1.24 miles
• 5 km / 3.11 miles

Everyone knows how important exercise is in the treatment of Lymphoedema and Lipoedema and how great it is to move together in a fantastic environment!
In addition to organizing a scientific workshop, medi (gold sponsor) will organize for the second time during the ILF conference a sportive walk/run to promote exercise, on Saturday 15 June 2019.
The start is at 7.30am on Saturday morning. We are going to run along the beautiful “Navy Pier”. There will be two routes to choose from: the choice is between 2 or 5 km routes for all participants. Running, walking, or both! Meeting point: 07:15 at the hotel west tower lobby.

It would be an honor to run together, for a healthier you and a healthier us. Also, warm greetings from your medi-team, who is already looking forward to welcoming everyone in Chicago.
The registration fee is $10 USD and all the money will go towards benefiting developing countries attending future ILF conferences. Don’t hesitate and join, it is not about who is the fastest, but who is willing to participate! In return medi will sponsor the running shirts and stockings from CEP.
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.30 - 8.30</td>
<td>Registration and Exhibit Hall</td>
</tr>
<tr>
<td>8.30 - 10.15</td>
<td>PLENARY I</td>
</tr>
<tr>
<td></td>
<td>Chairs: Christine Moffatt / Jane Armer</td>
</tr>
<tr>
<td></td>
<td>Welcome Message from Conference Co-hosts: ILF and ALFP</td>
</tr>
<tr>
<td></td>
<td>Risk Reduction Practices</td>
</tr>
<tr>
<td></td>
<td>A point/counterpoint discussion</td>
</tr>
<tr>
<td></td>
<td>Speakers: Judith Nudelman and Alphonse Taghain</td>
</tr>
<tr>
<td>10.15 - 10.45</td>
<td>Refreshment Break and Exhibit Hall</td>
</tr>
<tr>
<td>10.45 - 12.15</td>
<td>PLENARY II</td>
</tr>
<tr>
<td></td>
<td>Chair: Mike Bernas</td>
</tr>
<tr>
<td></td>
<td>Lymphatics in Health and Disease</td>
</tr>
<tr>
<td></td>
<td>Speaker: Guillermo Oliver</td>
</tr>
<tr>
<td></td>
<td>Advances in Diagnostics</td>
</tr>
<tr>
<td></td>
<td>Speaker: Mike Bernas</td>
</tr>
<tr>
<td>12.15 - 1.45 pm</td>
<td>Lunch and Exhibit Hall</td>
</tr>
<tr>
<td>1.45 - 3.15 pm</td>
<td>PLENARY III</td>
</tr>
<tr>
<td></td>
<td>Chair: Christine Moffatt</td>
</tr>
<tr>
<td></td>
<td>Chronic Wounds and Lymphoedema</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Compression Challenges</td>
</tr>
<tr>
<td></td>
<td>Speaker: Gavin Hughes</td>
</tr>
<tr>
<td>3.15 - 3.45 pm</td>
<td>Refreshment Break and Exhibit Hall</td>
</tr>
<tr>
<td>3.45 - 5.15 pm</td>
<td>ABSTRACT SESSION</td>
</tr>
<tr>
<td></td>
<td>Chair: Mike Bernas</td>
</tr>
<tr>
<td></td>
<td>Imaging &amp; Diagnostics including Assessment</td>
</tr>
<tr>
<td>5.30 - 7.00 pm</td>
<td>WELCOME RECEPTION</td>
</tr>
<tr>
<td></td>
<td>A Abstract Submissions</td>
</tr>
<tr>
<td></td>
<td>B Abstract Submissions</td>
</tr>
<tr>
<td></td>
<td>C Abstract Submissions</td>
</tr>
<tr>
<td></td>
<td>D Abstract Submissions</td>
</tr>
<tr>
<td>5.30 - 7.00 pm</td>
<td>WELCOME RECEPTION</td>
</tr>
<tr>
<td></td>
<td>A Abstract Submissions</td>
</tr>
<tr>
<td></td>
<td>B Abstract Submissions</td>
</tr>
<tr>
<td></td>
<td>C Abstract Submissions</td>
</tr>
<tr>
<td></td>
<td>D Abstract Submissions</td>
</tr>
<tr>
<td></td>
<td><strong>POSTER PRESENTATIONS: Session I (odd numbered posters)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>OPEN SPACE DISCUSSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Susan Noerregaard</td>
</tr>
<tr>
<td></td>
<td>Developing ILF Outcome Measures</td>
</tr>
</tbody>
</table>

* non CME activity
Programme  Friday, June 14

**REGENCY BALLROOM A-B**

<table>
<thead>
<tr>
<th>Time</th>
<th>REGENCY A</th>
<th>REGENCY B</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.30 - 8.30</td>
<td>Registration and Exhibit Hall</td>
<td></td>
</tr>
<tr>
<td>8.30 - 10.00</td>
<td><strong>PLENARY IV</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chair: Wouter Hoelen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obesity and Its Impact: A Scientific and International Perspective</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Tobias Bertsch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obesity: A Clinical and North American Perspective</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Paula Stewart</td>
<td></td>
</tr>
<tr>
<td>10.00 - 10.30</td>
<td>Refreshment Break and Exhibit Hall</td>
<td></td>
</tr>
<tr>
<td>10.30 - 12.00</td>
<td><strong>PLENARY V</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chair: Christine Moffatt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lymphedema: Newer Treatment Options Through Research</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Stanley Rockson</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LIMPRESS: Elucidating the Global Problem of Lymphedema</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Christine Moffatt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outcome Measures Project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Susan Noodegaard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Isowing ALFP projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaker: Jane Armer</td>
<td></td>
</tr>
<tr>
<td>12.00 - 1.30 pm</td>
<td>Lunch and Exhibit Hall</td>
<td></td>
</tr>
<tr>
<td>1.30 - 3.00 pm</td>
<td><strong>ABSTRACT SESSION</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chair: Pinar Borman</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Service Delivery &amp; Patient Carer Engagement</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>E</strong> Abstract Submissions</td>
<td></td>
</tr>
<tr>
<td>3.00 - 3.30 pm</td>
<td>Refreshment Break and Exhibit Hall</td>
<td></td>
</tr>
<tr>
<td>3.30 - 5.00 pm</td>
<td><strong>ABSTRACT SESSION</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chair: Marina Cestari</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obesity &amp; Lymphedema/Lipedema</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>G</strong> Abstract Submissions</td>
<td></td>
</tr>
<tr>
<td>6.00 - 9.30 pm</td>
<td><strong>BUS DEPARTURE for CRUISE / OPTIONAL CONFERENCE DINNER AND ENTERTAINMENT</strong> all delegates invited (signup required)</td>
<td></td>
</tr>
</tbody>
</table>

**ACAPULCO**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00 - 9.00</td>
<td><strong>SPONSORED SYMPOSIUM</strong></td>
</tr>
<tr>
<td></td>
<td>Lohmann &amp; Rauscher</td>
</tr>
<tr>
<td></td>
<td>Self-Care Lymphedema management</td>
</tr>
<tr>
<td></td>
<td>Justine Whitaker</td>
</tr>
<tr>
<td>9.00 - 10.15</td>
<td><strong>PLENARY SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Wouter Hoelen</td>
</tr>
<tr>
<td></td>
<td>Obesity and Its Impact: A Scientific and International Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tobias Bertsch</td>
</tr>
<tr>
<td></td>
<td>Obesity: A Clinical and North American Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Paula Stewart</td>
</tr>
<tr>
<td>10.30 - 11.00</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Michael Bernas</td>
</tr>
<tr>
<td></td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kathleen Francis</td>
</tr>
<tr>
<td></td>
<td>Risk Reductions/Precautions</td>
</tr>
<tr>
<td></td>
<td>Speaker: Melanie Thomas</td>
</tr>
<tr>
<td>11.30 - 12.30</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Michael Bernas</td>
</tr>
<tr>
<td></td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kathleen Francis</td>
</tr>
<tr>
<td></td>
<td>Risk Reductions/Precautions</td>
</tr>
<tr>
<td></td>
<td>Speaker: Melanie Thomas</td>
</tr>
<tr>
<td>12.30 - 13.30</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>2.00 - 3.00 pm</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>3.00 - 4.00 pm</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>4.00 - 5.00 pm</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>5.00 - 6.00 pm</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>6.00 - 9.00 pm</td>
<td><strong>BUS DEPARTURE for CRUISE / OPTIONAL CONFERENCE DINNER AND ENTERTAINMENT</strong> all delegates invited (signup required)</td>
</tr>
</tbody>
</table>

**TORONTO**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00 - 9.00</td>
<td><strong>SPONSORED SYMPOSIUM</strong></td>
</tr>
<tr>
<td></td>
<td>Jobst</td>
</tr>
<tr>
<td></td>
<td><strong>3M</strong></td>
</tr>
<tr>
<td>9.00 - 10.15</td>
<td><strong>PLENARY SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Wouter Hoelen</td>
</tr>
<tr>
<td></td>
<td>Obesity and Its Impact: A Scientific and International Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tobias Bertsch</td>
</tr>
<tr>
<td></td>
<td>Obesity: A Clinical and North American Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Paula Stewart</td>
</tr>
<tr>
<td>10.30 - 11.00</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Michael Bernas</td>
</tr>
<tr>
<td></td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kathleen Francis</td>
</tr>
<tr>
<td></td>
<td>Risk Reductions/Precautions</td>
</tr>
<tr>
<td></td>
<td>Speaker: Melanie Thomas</td>
</tr>
<tr>
<td>11.30 - 12.30</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Michael Bernas</td>
</tr>
<tr>
<td></td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kathleen Francis</td>
</tr>
<tr>
<td></td>
<td>Risk Reductions/Precautions</td>
</tr>
<tr>
<td></td>
<td>Speaker: Melanie Thomas</td>
</tr>
<tr>
<td>12.30 - 13.30</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Michael Bernas</td>
</tr>
<tr>
<td></td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kathleen Francis</td>
</tr>
<tr>
<td></td>
<td>Risk Reductions/Precautions</td>
</tr>
<tr>
<td></td>
<td>Speaker: Melanie Thomas</td>
</tr>
<tr>
<td>13.00 - 14.00</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>14.00 - 15.00</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>15.00 - 16.00</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>16.00 - 17.00</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Robert Hoelen</td>
</tr>
<tr>
<td></td>
<td>Lower Limb Assessment</td>
</tr>
<tr>
<td></td>
<td>Speaker: Keith Harding</td>
</tr>
<tr>
<td></td>
<td>Lymphedema and Infection</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tony Karlsmark</td>
</tr>
<tr>
<td>17.00 - 20.00</td>
<td><strong>BUS DEPARTURE for CRUISE / OPTIONAL CONFERENCE DINNER AND ENTERTAINMENT</strong> all delegates invited (signup required)</td>
</tr>
</tbody>
</table>

**NEW ORLEANS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.30 - 9.30</td>
<td><strong>P L E N A R Y IV</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Wouter Hoelen</td>
</tr>
<tr>
<td></td>
<td>Obesity and Its Impact: A Scientific and International Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tobias Bertsch</td>
</tr>
<tr>
<td></td>
<td>Obesity: A Clinical and North American Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Paula Stewart</td>
</tr>
<tr>
<td>9.30 - 10.30</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Michael Bernas</td>
</tr>
<tr>
<td></td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kathleen Francis</td>
</tr>
<tr>
<td></td>
<td>Risk Reductions/Precautions</td>
</tr>
<tr>
<td></td>
<td>Speaker: Melanie Thomas</td>
</tr>
<tr>
<td>10.30 - 11.30</td>
<td><strong>POSTER PRESENTATIONS:</strong></td>
</tr>
<tr>
<td></td>
<td>Session 2 (even numbered posters)</td>
</tr>
<tr>
<td>11.30 - 12.30</td>
<td><strong>P L E N A R Y V</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Wouter Hoelen</td>
</tr>
<tr>
<td></td>
<td>Obesity and Its Impact: A Scientific and International Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Tobias Bertsch</td>
</tr>
<tr>
<td></td>
<td>Obesity: A Clinical and North American Perspective</td>
</tr>
<tr>
<td></td>
<td>Speaker: Paula Stewart</td>
</tr>
<tr>
<td>12.30 - 13.30</td>
<td><strong>INTERACTIVE SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Michael Bernas</td>
</tr>
<tr>
<td></td>
<td>Anatomy &amp; Physiology</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kathleen Francis</td>
</tr>
<tr>
<td></td>
<td>Risk Reductions/Precautions</td>
</tr>
<tr>
<td></td>
<td>Speaker: Melanie Thomas</td>
</tr>
</tbody>
</table>

* non CME activity
# Programme Saturday, June 15

## REGENCY BALLROOM A-B

<table>
<thead>
<tr>
<th>Time</th>
<th>REGENCY A</th>
<th>REGENCY B</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.30 - 8.30</td>
<td>Registration and Exhibit Hall</td>
<td>Registration and Exhibit Hall</td>
</tr>
<tr>
<td></td>
<td>MEDI FUNDRAISING RUN (meet in hotel west tower lobby)</td>
<td>MEDI FUNDRAISING RUN (meet in hotel west tower lobby)</td>
</tr>
<tr>
<td>9.00 - 10.30</td>
<td><strong>PLENARY VI</strong></td>
<td><strong>PLENARY VI</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Christine Moffatt / Joseph Feldman</td>
<td>Chair: Christine Moffatt / Joseph Feldman</td>
</tr>
<tr>
<td></td>
<td>Welcome Message and awards</td>
<td>Welcome Message and awards</td>
</tr>
<tr>
<td></td>
<td>Thriving with Lymphedema</td>
<td>Thriving with Lymphedema</td>
</tr>
<tr>
<td></td>
<td>Speaker: Sophia Hanson</td>
<td>Speaker: Stanley Rockson</td>
</tr>
<tr>
<td></td>
<td>The Changing Field of Lymphatics</td>
<td>The Changing Field of Lymphatics</td>
</tr>
<tr>
<td></td>
<td>Speaker: Stanley Rockson</td>
<td>Speaker: Stanley Rockson</td>
</tr>
<tr>
<td>10.30 - 11.00</td>
<td>Refreshment Break and Exhibit Hall</td>
<td>Refreshment Break and Exhibit Hall</td>
</tr>
<tr>
<td>11.00 - 12.30</td>
<td><strong>PLENARY VII</strong></td>
<td><strong>PLENARY VII</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Mike Bernas</td>
<td>Chair: Mike Bernas</td>
</tr>
<tr>
<td></td>
<td>Primary Lymphoedema and the Diagnostic Algorithm</td>
<td>Primary Lymphoedema and the Diagnostic Algorithm</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kristiana Gordon</td>
<td>Speaker: Kristiana Gordon</td>
</tr>
<tr>
<td></td>
<td>Lymphedema/Lipedema and Nutrition</td>
<td>Lymphedema/Lipedema and Nutrition</td>
</tr>
<tr>
<td></td>
<td>Speaker: Paula Stewart</td>
<td>Speaker: Paula Stewart</td>
</tr>
<tr>
<td>12.30 - 1.30</td>
<td>Lunch and Exhibit Hall</td>
<td>Lunch and Exhibit Hall</td>
</tr>
<tr>
<td>1.30 - 3.00</td>
<td><strong>ABSTRACT SESSION</strong></td>
<td><strong>ABSTRACT SESSION</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Sandro Michelini</td>
<td>Chair: Marcia Beck</td>
</tr>
<tr>
<td></td>
<td>Innovative and Promising Approaches</td>
<td>Risk Reduction</td>
</tr>
<tr>
<td></td>
<td>i Abstract Submissions</td>
<td>J Abstract Submissions</td>
</tr>
<tr>
<td>3.00 - 3.30</td>
<td>Refreshment Break and Exhibit Hall</td>
<td>Refreshment Break and Exhibit Hall</td>
</tr>
<tr>
<td>3.30 - 5.00</td>
<td><strong>CLOSING PLENARY VIII</strong></td>
<td><strong>CLOSING PLENARY VIII</strong></td>
</tr>
<tr>
<td></td>
<td>Chair: Neil Piller</td>
<td>Chair: Neil Piller</td>
</tr>
<tr>
<td></td>
<td>Innovative and Promising Approaches</td>
<td>Innovative and Promising Approaches</td>
</tr>
<tr>
<td></td>
<td>Speaker: Neil Piller</td>
<td>Speaker: Neil Piller</td>
</tr>
<tr>
<td></td>
<td>Ongoing projects and future vision of the ILF and ALFP</td>
<td>Ongoing projects and future vision of the ILF and ALFP</td>
</tr>
<tr>
<td></td>
<td>Closing Remarks</td>
<td>Closing Remarks</td>
</tr>
<tr>
<td></td>
<td>Announcement of ILF 2020 Conference</td>
<td>Announcement of ILF 2020 Conference</td>
</tr>
</tbody>
</table>

## ACAPULCO

### PATIENTS JOIN OPENING PLENARY SESSION

## TORONTO

### REFRESHMENT BREAK AND EXHIBIT HALL

## NEW ORLEANS

### PATIENTS JOIN CLOSING PLENARY SESSION

## CONCURRENT SESSION

Chair: Isabelle Queré
Paediatric Lymphoedema Workshop

### Abstract Submissions i

## ABSTRACT SESSION

Chair: Sandro Michelini
Innovative and Promising Approaches

### Abstract Submissions k

## ABSTRACT SESSION

Chair: Marcia Beck
Risk Reduction

### Abstract Submissions j

## ABSTRACT SESSION

Chair: Anna Kennedy
Community Organization & Education Initiatives

### Abstract Submissions l

## ABSTRACT SESSION

Chair: Bonnie Lasinski
Surgical Interventions

### Abstract Submissions m

## ABSTRACT SESSION

Chair: Kathleen Thrift
Self-Management & Risk Reduction Tips

### Abstract Submissions o

## ABSTRACT SESSION

Chair: Jay Granzow
Ask the Expert

### Abstract Submissions n

## ABSTRACT SESSION

Chair: Neil Piller
Innovative and Promising Approaches

### Abstract Submissions p

## ABSTRACT SESSION

Chair: Kathleen Thrift
Self-Management & Risk Reduction Tips

### Abstract Submissions q

## ABSTRACT SESSION

Chair: Jay Granzow, Kathleen Thrift, Tobias Bertsch
Obesity and Lymphedema

### Abstract Submissions r

## ABSTRACT SESSION

Chair: Neil Piller
Innovative and Promising Approaches

### Abstract Submissions s

## ABSTRACT SESSION

Chair: Kathleen Thrift
Self-Management & Risk Reduction Tips

### Abstract Submissions t

## ABSTRACT SESSION

Chair: Jay Granzow, Kathleen Thrift, Tobias Bertsch
Obesity and Lymphedema

### Abstract Submissions u

## ABSTRACT SESSION

Chair: Neil Piller
Innovative and Promising Approaches

### Abstract Submissions v

## ABSTRACT SESSION

Chair: Kathleen Thrift
Self-Management & Risk Reduction Tips

### Abstract Submissions w

## ABSTRACT SESSION

Chair: Jay Granzow, Kathleen Thrift, Tobias Bertsch
Obesity and Lymphedema

### Abstract Submissions x

## ABSTRACT SESSION

Chair: Neil Piller
Innovative and Promising Approaches

### Abstract Submissions y

## ABSTRACT SESSION

Chair: Kathleen Thrift
Self-Management & Risk Reduction Tips

### Abstract Submissions z
Plenary I: In Support of Lymphedema Risk-reduction Behaviors.
Judith Nudelman

Lymphedema is a clinical diagnosis, with variable onset and an often-unpredictable and dynamic clinical course, so any data may have inconsistent interpretation. Empiric, measurable definitions of lymphedema are inherently arbitrary and large, randomized control trials are almost nonexistent. Clinical experience is relevant in a clinically-defined disease. Risk factors vary throughout the literature, and not all risk factors identified to-date are modifiable. True risk involves damage to both the lymphatic system and the vigor of the lymphatic system. Risk-reduction behaviors involve both patient behaviors and medical intervention. Risk-reduction behaviors involve truly-informed decision-making, and should include the medical value of interventions that damage lymphatics, as well as patient behaviors. Clinicians and patients are united in their desire for optimal survivorship and functional outcomes with minimal morbidity, so consensus, patient education, and shared decision-making are imperative.

Plenary I: Precautionary measures: the need for evidence-based guidelines
Alphonse Taghian

For decades of clinical practice, providers have instructed patients undergoing breast cancer surgery to minimize the risk of developing breast cancer-related lymphedema (BCRL) by avoiding blood pressure measurements, infusions, injections in and on the at-risk arm; using compression sleeves during air travel; and avoiding temperature extremes. These recommendations evolved from an abundance of caution given limited knowledge of BCRL, but not from sound clinical proof. Given the BCRL risk is lifelong and patients are fearful of its development, patients report strict adherence to these guidelines. However, there are situations wherein adherence to these guidelines is burdensome for patients. Over the past decade, evidence has been evolving regarding precautionary measures. The Lymphedema Research Program at Massachusetts General Hospital has systematically approached precautionary measures research through literature review, data collection, and the generation and publication of evidence. This research has impacted clinical practice and current guidelines. Research to date and the current state of precautionary measures will be objectively summarized and recommendations for future work in this area will be made. The goals of establishing evidence-based guidelines are to ensure that practitioners can best guide patients as to their individual risk, helping patients to make safe decisions whilst minimizing risk of BCRL and maximizing quality of life. An open dialogue is encouraged to help forward this work.

Plenary II: Lymphatics in Health and Disease
Guillermo Oliver

Essential for homeostasis, the lymphatic vasculature regulates tissue fluid levels, immune function, and the absorption of lipids from the intestinal tract. This vascular network also provides immune defense, protecting the body from bacteria or viruses. In the last few years the lymphatic network has been shown to also be involved in the development and progression of diseases such as obesity, hypertension, glaucoma, cardiovascular diseases and neurological disorders. Defects in the lymphatic vasculature contributes to several chronic inflammatory conditions, including rheumatoid arthritis, inflammatory bowel disease, asthma, chronic airway inflammation, atopic dermatitis, and psoriasis. I will summarize some of these recent findings and present new results aiming to identify biomarkers of lymphatic malfunction.

Plenary II: Advances in Diagnostics
Michael Bernas

This session will review some current technologies in use as well as explore technologies on the near horizon. The focus will be on practical uses of technologies with the understanding of limited resources and opportunities that may not allow widespread utilization. Basic principles will be explored to generate the strengths and weaknesses of various technologies so that participants can develop a good understanding of current diagnostic technologies for assessing multiple forms of lymphedema.
Wounds are a common and challenging clinical problem. Similarly, Lymphoedema is a common and challenging clinical problem. Many patients have to deal with both conditions and as such have a direct impact on each other. The frequency with which wounds and lymphoedema occur is only just being realized. As such there are significant challenges and opportunities for improving understanding and management of patients with these conditions. There are a wide range of diseases that result in wounds that are difficult to treat and the same is true for patients with lymphoedema. It is unlikely that effective treatment choices will be made until a clinician has made a diagnosis of the underlying disease and control of factors that are modifiable that are present that are delaying healing.

The increasing awareness of veno-lymphoedema as a cause for non-healing lower limb ulcers is an example of the need for wound healing clinicians and lymphoedema specialists to work together. The challenge of delivering care to patients with complex clinical problems will only be addressed when an appropriately skilled team of clinicians come together to focus on individual patients problems. The comprehensive assessment, accurate diagnosis and effective treatment choice for each patient will lead to much improved care of patients and an inter or multi disciplinary approach is essential for patients with these problems. Building of teams is essential if progress is to be made in this area of clinical practice.
Historically, lymphedema has been viewed by patients, scientists, and clinicians as a pathological failure of tissue plumbing. Newer insights into the disease pathogenesis suggest that the circulatory failure in lymphedema is a late consequence of tissue inflammation. These insights have the capacity to identify new and effective treatment resources. Lymphatic repair is complex and can be augmented both pharmacologically and surgically. Research is leading to enhanced approaches in both arenas.

Christine Moffatt

For those who study the lymphatic system, and for those who administer medical care to lymphatic patients, it is an inescapable conclusion that lymphedema is a disorder that is a commonly encountered, difficult, universal medical problem. Nevertheless, paradoxically, medical practitioners and the lay public alike persistently and erroneously believe lymphedema to be a rare disorder, or one of only historical interest.1 Accordingly, reliable incidence and prevalence data for lymphedema have been elusive or nonexistent. Published prevalence estimates for the population generally derive from extrapolations related to the soft data surrounding the relevant cancers and infections that predispose to acquired lymphedema.2–4 Data derived from health care databases, although helpful, likely underestimate the magnitude of disease burden through under-reporting of relevant diagnostic codes by the responsible health care professionals.5 Without data to support the extensive impact of this disease, supportive responses from government, industry, and third-party payers are not forthcoming,1 all of which serves to perpetuate this individual and public health problem.

Thanks to groundbreaking efforts undertaken by the International Lymphoedema Framework (ILF), this paradoxical and problematic information gap has been addressed. The ILF, an international organization dedicated to the problems of the lymphedema community, has coordinated and completed the Lymphedema Impact and Prevalence—International Lymphoedema Framework (LIMPRINT) project, an international study designed to define the scope and impact of chronic edema across the international landscape, with the intent of creating an evidence base to support the development of, and reimbursement for, lymphedema services. Coordinated by ILF through its participating national frameworks, the study was conducted in 40 sites distributed through 9 countries. The international data set of >13,000 patients was supported by an electronic data capture system and validated data collection tools.

The preliminary analysis of this extensive data set was presented at the Seventh International Conference of the ILF in Siracusa, Italy in 2017. It is a great privilege for Lymphatic Research and Biology to communicate here the results of this monumental undertaking that illuminates, in very objective terms, the disease burden and population risk of chronic edema throughout the world. Through the 17 articles published in this issue of the journal, the entire scope of the project can be appreciated. In this issue, the authors have documented the concept of the study and development and validation of the methodology, which has permitted estimation of the prevalence of chronic edema and lymphedema in the acute hospital setting, in specialist lymphedema services, and in community nursing services. The clinical and ethical challenges of vulnerable populations are addressed, as are the health-related quality-of-life and sociological concerns.

The global reach of this project is represented through analysis of the data derived from Australia, Canada, Denmark, Japan, Turkey, and the United Kingdom, respectively. Finally, in a very unique and instrumental analysis, three final articles address the unique challenges related to the problem of lymphedema management in children and adolescents.

The work of ILF is laudable and invaluable. With the availability of this incisive data set, one can envision a paradigm shift in which the international health care approach to chronic edema and lymphedema will arrive at more equitable solutions for this large segment of the non-healthy population. It is a distinct honor for this journal to convey the results of LIMPRINT to the scientific medical literature.
Lymphatics

Plenary VI: The Changing Field of Lymphatics

Stanley Rockson

Lymphatic science has suffered from decades of relative neglect, but the future is bright. Over the last ten years, there has been a remarkable growth of insights into the development, structure, function, and pathology of the lymphatic circulation. These developments have led to exciting changes in governmental support for research, medical publication and practice.

Plenary VI: Thriving with Lymphedema

Sophia Hanson

I was diagnosed with primary lymphedema when I was fifteen. It gripped me suddenly one afternoon after cross country practice. My left ankle ballooned painfully, swelling to twice its size. I thought I had just sprained it, but didn’t remember falling. What followed this startling onset was six months of medical tests, scans, doctors, and sleepless nights. No one knew what was wrong with me—a healthy, skinny varsity cross country runner with no detectable injuries.

When I was diagnosed with lymphedema, I was initially relieved. The relief of having a diagnosis was quickly overshadowed by dread. No one knew if my lymphedema was going to get worse, if it was going to spread to other parts of my body, if I would be disabled by it. It was terrifying, and I was decidedly alone. Not only did the majority of my peers not understand what lymphedema was, the majority of lymphedema patients were much older than me. I had no one to connect with, no one to tell me it was going to be okay. Just a promise that I would always have a clunky swollen leg and a beige stocking to match, and that was assuming things didn’t deteriorate.

Now, as I approach my twenty-third birthday, I can say with absolute confidence that lymphedema has neither ruined nor dominated my life. In fact, it is merely a small facet of my identity. Due to my relatively quick diagnosis, access to treatment, and diligent management of my condition, my lymphedema remains in check. Thus, I remain a prime example of why early access to affordable treatment is so critical, something my mother, a physician, and I spent several years advocating for with the Lymphedema Treatment Act. Ultimately, what I want to assure fellow patients, particularly the young ones, is that it is possible to lead a full and happy life with lymphedema. You have lymphedema—it doesn’t have you.

Plenary VII: An Update on Primary Lymphoedema and the Diagnostic Algorithm

Kristiana Gordon

Primary lymphoedema occurs as a result of a genetic predisposition causing the lymphatic system to fail to develop normally, or to be maintained adequately, causing abnormal drainage of lymph which results in swelling of the affected region. Primary lymphoedema may occur as an inherited condition, or less commonly as part of a complex syndromic disorder (Connell, Brice et al 2010). A patient with primary lymphoedema may only have problems with swelling, but some forms of primary lymphoedema occur in association with other health problems e.g. congenital heart disease, systemic/internal lymphatic abnormalities (fluid around the heart or lung), or very rarely haematological malignancy (leukaemia).

Primary lymphoedema is not one disease, but the presenting feature of several distinct clinical entities. Historically, primary lymphoedema was categorised into three groups depending on the patient’s age at onset of swelling; lymphoedema congenita (presenting at birth), praecox (pubertal onset) or tarda (onset after 35 years of age). Mutations in several genes are known to cause primary lymphoedema. Some, but not all, of these genes have been shown to play a role in lymphangiogenesis (the process of developing and maintaining a healthy lymphatic system). The discovery of these gene mistakes has changed our diagnostic approach in the clinic, which is now based on clinical phenotyping (the process of associating a patient’s lymphoedema with other health problems) and genotyping (DNA tests looking for the underlying causal gene mistake) in addition to age of onset of swelling.

Our experience and research has led us to realise that primary lymphoedema can be broadly divided into five different categories. Causal gene mistakes have been identified for a number of disease subtypes within the five categories. We have developed a colour-coded diagnostic pathway that describes specific primary lymphoedema phenotypes and guides the clinician on gene tests that may be available for their patient (Connell, Gordon et al 2013).

The diagnostic pathway helps the clinician to offer appropriate genetic testing (assuming the underlying gene mistake is known), and screen and treat for associated health problems. Patients and families benefit hugely from receiving a formal genetic diagnosis of their primary lymphoedema as it allows the clinician to confidently predict the clinical prognosis and offer screening for family members. In addition, use of this pathway has facilitated our discovery of new causative genes, as we analyse and compare the DNA of patients with similar patterns of lymphoedema and other health problems. We are hopeful that this ongoing research will aid the development of improved treatment options.

References:

Plenary VII: Lymphedema, Lipedema and Nutrition

Paula Stewart

The audience will learn how lymphedema and lipedema differ from each other. Further we will explore how lipedema specifically can evolve into a lipo-lymphedema. Finally, we will turn our focus to what is known about the impact of diet on the development and management of lymphedema and lipedema.

Plenary VIII: Innovative and promising approaches

Neil B Piller

We cannot be (and should never be) content with where we are today in terms of lymphoedema presentation and the reasons for it, its early identification, treatment and management, their costs and its associated sequelae and their impact on quality of life.

We are not perfect and we are likely to always lack the wide range of clinical trial information to inform us about what is 100% best for our patients, but we have other sources of information which can guide us. This Conference has given some of those information points and we will act on them, but what is most important is to look to the future.

What can we do to reduce the risk of lymphoedema development, how can we detect it earlier, how do we ensure targeted and appropriately sequenced treatment and what can we do to best acknowledge the patient and their problem as being unique and personal and yet ensure they feel supported and together?

We have improved surgical and radio-therapeutical options, we have better understanding of the genetics behind lymphoedema development and are using bio-impedance and other techniques to detect small and subtle changes in a limb. We are better able to target treatments with the use of Indocyanine Green and we are better able to sequence them with improved understanding of the tissue changes which occur. But we don’t have all the answers yet, but they are out there, and it’s often other fields and young researchers which lead us to them. Come and listen to our innovative and promising approaches session and see your and our future – who knows you could be part of the leading edge in it!
**Abstract Submissions  Thursday, June 13**

**ABSTRACT SESSION IMAGING & DIAGNOSTICS INCLUDING ASSESSMENT**

1. Reliability of Circumferential Measurements for Assessment of Upper Extremity Lymphedema
   Yuanlu Sun

2. Assessing segmental limb volume changes for early detection of breast cancer-related lymphedema
   Kayla M. Daniell

3. Ultrasound - Better in hand than dismissed out of hand
   W. Jungkunz

4. Comparison of Dielectric and L-Dex Values of Patients after Breast Cancer Surgery: A Pilot Study
   Yeşim Bakar

5. Tissue dielectric measures on the trunk in women with and without trunk lymphedema
   Linda Koehler

**ABSTRACT SESSION CONSERVATIVE TREATMENT INCLUDING COMPRESSION**

1. Effectiveness and dosing of early CLT treatment in a screening-based cohort of patients at high risk of breast cancer-related lymphedema
   Cheryl Brunelle

2. Positive outcomes observed with the incorporation of compression bra and specialized pad to address swelling and tissue fibrosis following treatment for breast cancer
   Suzie Ehmann

3. Protocol of a randomised controlled trial regarding the effectiveness of fluoroscopy-guided manual lymph drainage for the treatment of breast cancer-related lymphoedema
   Tessa De Vrieze

4. Exercise in patients with cancer-related lymphedema in the lower limbs. Results from a feasibility trial on High Intensity Interval Training (HIIT) with and without compression garments
   Merete Celano Wittenkamp

5. Do women with lower-limb lymphedema use more ankle muscle co-contraction to maintain balance during quiet standing?
   Nancy St-Onge

**ABSTRACT SESSION PSYCHOSOCIAL & QUALITATIVE RESEARCH**

1. Parenting a Child with Primary Lymphedema: A Continuum of Protection
   Elise Rodina

2. Multifactorial challenges to engagement in lymphoedema management: Disengaged patients' perspectives from a metropolitan hospital outpatient clinic in Australia
   Linda Khong

3. Living with Leg Lymphedema: Exploring the Quality of Life and Disease Education of Individuals Experiencing Cancer-Related Leg Lymphedema
   Catharine Bowman

4. A qualitative study of the experiences of women with lipoedema in Scotland
   Anne Williams

5. Breast cancer-related lymphedema and quality of life: A qualitative analysis over years of survivorship
   Allison Anbari

6. Risk Factors Associated with Increased Fear of Breast Cancer-Related Lymphedema and Avoidance Behaviors
   Tessa C. Gillespie

**ABSTRACT SESSION HEALTH ECONOMICS**

1. Cost-Effectiveness Analysis of Prospective Surveillance Versus an Impairment-Based Model of Care for Breast Cancer-Related Lymphedema
   Stephen Patrice
Abstract Submissions  Friday, June 14

**E  Friday 1.30-3.00 pm**

**ABSTRACT SESSION SERVICE DELIVERY & PATIENT CARER ENGAGEMENT**

1. Lymphoedema after breast cancer treatment - Primary Preventive Protocol: five years follow-up
   Marina Cestari

2. Prevention and Education through Healthy Leg Clinics in Primary Care
   Pippa McCabe

3. The Development of Key Performance Indicators using the Delphi Technique for a Regional Lymphoedema Service in Ireland.
   Meadbh McSweeney

4. The effect of early intervention on early stage of breast cancer-related lymphedema
   Qian Lu

5. Interval regimen affords increased patient concordance and compliance for optimal oedema management system
   Karen Bock

6. The only way for treating lymphedema is Multi disciplinary approach
   Tim Decock

7. Effectiveness of a combined approach of team work in a complex case of localized multiple elephantiasis
   Marina Cestari

**F  Friday 1.30-3.00 pm**

**ABSTRACT SESSION OUTCOME MEASURES**

1. Normative data of breast Tissue Dielectric Constant (TDC) using the LymphScanner
   Jane Wigg

2. Reliability of the MoistureMeter D compact device and the pitting test to determine local tissue water in subjects with breast cancer-related lymphoedema
   Nele Devoogdt

   Tessa De Vrieze

4. Bone loss in the affected forearm patients with breast cancer-related lymphedema: a controlled study
   Secil Vural

   Jane Wigg

6. A preliminary analysis of patients screened for early breast cancer-related lymphedema using volumetric arm measurements and bioimpedance spectroscopy: A complementary role
   Tessa C. Gillespie

7. A pilot study exploiting 3D scanning technology in lymphoedema for accurate measurements of volume and shape
   Cheryl Pike

8. Revision of the Casley-Smith MLD routine based on ICG scanning
   Cheryl Pike

**G  Friday 3.30-5.00 pm**

**ABSTRACT SESSION OBESITY & LYMPHEDEMA/LIPEDEMA**

1. Stadiation of Lipedema by the clinical and instrumental support
   Sandro Michelini

2. Women with lipedema have leaky capillary dermal skin vessels compared to controls
   Marisol Allen

3. Chronic pain in lipoedema: are there indicators for nociceptive, neuropathic or central sensitization pain?
   Wouter Hoelen

4. The clinical characteristics of lipedema patients and awareness about lipedema in a group of patients referred to a lymphedema unit
   Pinar Borman

5. The Effect of Lipedema on Gait - a Case-Control Study
   Polly Armour

6. Diagnosed: Now what?
   Andrea Brennan

7. Body Mass Index (BMI) Trends over Seven Years for Persons with Breast Cancer-Related Lymphedema (BCRL)
   Allison Anbari

**H  Friday 3.30-5.00 pm**

**ABSTRACT SESSION SURGERY/BASIC SCIENCE AND BIOLOGY**

1. Development of lymphatic wire for detection of lymph collectors in treatment of peripheral lymphedema
   Jiro Maegawa

2. Aligned Nanofibrillar Collagen Scaffolds Can Treat Induced Lymphedema in Rats
   Tatiana Zaitseva

3. Acquired lymphatic pump failure and therapeutic restoration in a mouse model of lymphedema
   Brandon Dixon

4. Phenotypic aspects of primary lymphoedema in CELSR1 mutations
   Sandro Michelini

5. Physical and surgical treatment in primary and secondary lymphoedema: clinical results
   Sandro Michelini
I. Saturday 1.30-3.00 pm

**ABSTRACT SESSION INNOVATIVE AND PROMISING APPROACHES**

1. Artificial drainage of lymphatic fluid: towards the clinical testing of an implantable pump for the treatment of chronic edema
   Valentina Triacca

2. Intermittent Pneumatic Compression and the Effect of Different Compression Sequencing for Treating Lower Limb Lymphoedema
   Nyree Dunn

3. Are compression therapists too superficial? Quantifying limb compression through pressure measurements at the skin surface.
   Neil Piller

4. Patterns of Lymphedema Symptomatology: Phenotypic and Biomarker Characterization
   Mei Fu

5. Digital Therapy for Chronic Pain Following Breast Cancer Treatment
   Mei Fu

6. The Pelvic Floor’s Involvement in Genital Lymphedema and So Much More
   Shelley DiCocco

K. Saturday 1.30-3.00 pm

**ABSTRACT SESSION PEDIATRIC**

1. Challenges in the world of pediatric lymphedema
   Catherine McCuaig

2. The clinical and demographic characteristics of pediatric lymphedema patients: a multicenter study-preliminary report
   Pinar Borman

3. Lymphoedema Network Wales Children and Young Adult’s Service Audit
   Cheryl Pike

4. The use of lymphoscintigraphy in the investigation of pediatric lymphedema
   Cathrine McCuaig

J. Saturday 1.30-3.00 pm

**ABSTRACT SESSION RISK REDUCTION**

1. Prevention of Lymphoedema after Axillary Clearance (ANC) by External Compression Sleeves Randomised Trial Results of PLACE trial
   Nigel Bundred

2. Risk factors for cording in patients treated for breast cancer and at risk for breast cancer-related lymphedema
   Cheryl Brunelle

3. Bioimpedance spectroscopy and limb volume measurement in the early detection of upper limb lymphoedema after axillary node clearance for breast cancer.
   Vaughan Keeley

4. Postoperative Weight Fluctuations May Increase Risk of Breast Cancer Related-Lymphedema
   Sacha Roberts

5. Identifying risk factors for low-volume breast cancer-related lymphedema: results from a prospective screening program
   Alphonse G. Taghian

6. Early compression therapy and individualized exercise in women treated for gynecological cancer: preliminary findings of a pilot randomized controlled trial
   Shirin Shallwani

L. Saturday 1.30-3.00 pm

**ABSTRACT SESSION COMMUNITY ORGANIZATION & EDUCATION INITIATIVES**

   Elizabeth Anderson

2. 2009-2019: A decade of making a difference in the Canadian lymphedema community
   Anna Kennedy

3. Shaping lymphoedema research in the UK: a British Lymphology Society Scientific Committee Initiative
   Rhian Noble-Jones

4. Knowledge of the lymphatic system and of effective self-MLD
   Margareta Haag

5. Possible risk factors for cellulitis experience in lymphoedema patients in Japan: secondary analysis using national LIMPRINT database
   Gojiro Nakagami

6. Identifying risk factors for low-volume breast cancer-related lymphedema: results from a prospective screening program
   Alphonse G. Taghian

7. Opportunities and challenges of performing on-site human subjects research at patient-friendly medical conferences
   Polly Armour

   Suzie Ehmann
# Poster abstracts

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>First name</th>
<th>Last name</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Nutrition Guidelines for the Management of Lymphedema</td>
<td>Jean</td>
<td>LaMantia</td>
</tr>
<tr>
<td>P2</td>
<td>Lymphoedema management activity in urban area, Tanzania</td>
<td>Cecilia</td>
<td>Uisso</td>
</tr>
<tr>
<td>P3</td>
<td>Can TDC (tissue dielectric constant) measurements be used to detect edema / dermal fluid in lipoedema patients</td>
<td>Katinka</td>
<td>Rutjens</td>
</tr>
<tr>
<td>P4</td>
<td>Scaling Up Treatment of Chronic Lymphedema Secondary to Wuchereria bancrofti Infection in Tanzania.</td>
<td>Omega</td>
<td>Edwards</td>
</tr>
<tr>
<td>P5</td>
<td>Usefulness of functional assessment of post-mastectomy patients qualified for breast reconstruction procedure using patients own tissue - a preliminary report.</td>
<td>Rita</td>
<td>Hansdorfer-Korzen</td>
</tr>
<tr>
<td>P6</td>
<td>Impact of Breast Cancer-related Lymphedema on Survivors' Return to Work and Quality of Life in Ghana</td>
<td>Miriam</td>
<td>Owusu Sekyere</td>
</tr>
<tr>
<td>P7</td>
<td>The Influence of Breast Cancer-related Lymphedema on Survivors’ Return-to-Work</td>
<td>Yuanlu</td>
<td>Sun</td>
</tr>
<tr>
<td>P8</td>
<td>Healthy Legs Class-A Step Forward in the Management of Chronic Leg Oedema</td>
<td>Lynne</td>
<td>Whiteside</td>
</tr>
<tr>
<td>P9</td>
<td>Reduced tissue fibrosis with addition of textured compression garments to edema management program</td>
<td>Karen</td>
<td>Bock</td>
</tr>
<tr>
<td>P10</td>
<td>The use of night time garments for chronic edema management impacts patients’ quality of life and edema management</td>
<td>Suzie</td>
<td>Ehmann</td>
</tr>
<tr>
<td>P11</td>
<td>Technologies for Personalized Nutrition</td>
<td>Chuck</td>
<td>Ehrlich</td>
</tr>
<tr>
<td>P13</td>
<td>Relationship between contents of breast cancer treatments and lymphatic venous anastomosis in the patients with breast cancer related lymphedema</td>
<td>Midori</td>
<td>Tsukagashi</td>
</tr>
<tr>
<td>P14</td>
<td>Lymphedema-flow: What are you for me? Friend or enemy?</td>
<td>Marielena</td>
<td>Papageorgiou</td>
</tr>
<tr>
<td>P15</td>
<td>Efficacy and safety of compression bandages for chair-bound elder persons with chronic leg edema in a Japanese special nursing home: a pilot study</td>
<td>Terumi</td>
<td>Ueda</td>
</tr>
<tr>
<td>P16</td>
<td>Uncompromised Compression</td>
<td>W.</td>
<td>Jungkunz</td>
</tr>
<tr>
<td>P17</td>
<td>Appropriation of Evidence for Guidelines</td>
<td>Janet</td>
<td>Massey</td>
</tr>
<tr>
<td>P18</td>
<td>Compression Therapy - Practical Problems and Innovative Solutions</td>
<td>Arun</td>
<td>Gogia</td>
</tr>
<tr>
<td>P19</td>
<td>Adopting a new e-communication approach</td>
<td>Jane</td>
<td>Rankin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>First name</th>
<th>Last name</th>
</tr>
</thead>
<tbody>
<tr>
<td>P20</td>
<td>Lymphoedema Network Northern Ireland: 10 Year review and 5 Year Forward Plan</td>
<td>Jane</td>
<td>Rankin</td>
</tr>
<tr>
<td>P21</td>
<td>How many lymphedema patients have problems with foot and toe?</td>
<td>Angelique</td>
<td>wiene van Ooijen</td>
</tr>
<tr>
<td>P22</td>
<td>Graded negative pressure: Does it have a place in the CDT treatment model?</td>
<td>Paula</td>
<td>Donahue</td>
</tr>
<tr>
<td>P23</td>
<td>Use of Kinesiotape in the management of neck lymphedema after oropharyngeal carcinoma</td>
<td>Virtu</td>
<td>Arora</td>
</tr>
<tr>
<td>P24</td>
<td>Declining and low reimbursement rates may become a limiting factor to physical therapists providing community-based lymphedema care in the private practice setting</td>
<td>Maureen</td>
<td>McBeth</td>
</tr>
<tr>
<td>P25</td>
<td>Role of Complete Decongestive Therapy (CDT) in Chronic Venous Leg Ulcer (VLU) Healing</td>
<td>Virtu</td>
<td>Arora</td>
</tr>
<tr>
<td>P26</td>
<td>National Lymphoedema Framework Ireland - Childrens Lymphoedema Camp</td>
<td>Norah</td>
<td>Kyne</td>
</tr>
<tr>
<td>P28</td>
<td>Finger swelling resulting from distal lymphatic abnormality following axillary surgery</td>
<td>Nadia</td>
<td>Van Diepen</td>
</tr>
<tr>
<td>P29</td>
<td>Lipedema: The challenges and the Frustrations - Treatment options</td>
<td>Linda-Anne</td>
<td>Kahn</td>
</tr>
<tr>
<td>P31</td>
<td>A Faculty Survey on the Status of Lymphology Education in Entry-Level Doctorate Physical Therapy Programs</td>
<td>David</td>
<td>Doublestein</td>
</tr>
<tr>
<td>P32</td>
<td>The prevalence of lymphedema related symptoms in women treated with radiotherapy for gynecological cancer in South Africa</td>
<td>Lize</td>
<td>Maree</td>
</tr>
<tr>
<td>P33</td>
<td>Streptococcal Sex Syndrome- An Unusual Complication of Lymphoedema</td>
<td>Bernadette</td>
<td>Hannon</td>
</tr>
<tr>
<td>P35</td>
<td>A Case Study of the treatment of an individual with complex abdominal lymphedema</td>
<td>Vivian</td>
<td>Dim</td>
</tr>
<tr>
<td>P36</td>
<td>Case report to demonstrate the need for selection criteria for optimal adjustable Velcro wrap prescription</td>
<td>Karen</td>
<td>Bock</td>
</tr>
<tr>
<td>P37</td>
<td>Feasibility of MOBIDERM® use a self-bandage by secondary lower lymphedema patients: A case study.</td>
<td>Mihoeh</td>
<td>Katayama</td>
</tr>
<tr>
<td>P38</td>
<td>A new compression garment for patients with primary lymphoedema?</td>
<td>Justine</td>
<td>Whitaker</td>
</tr>
</tbody>
</table>
**Poster abstracts**

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>First name</th>
<th>Last name</th>
</tr>
</thead>
<tbody>
<tr>
<td>P39</td>
<td>Can a new compression garment improve tissue health?</td>
<td>Justine</td>
<td>Whitaker</td>
</tr>
<tr>
<td>P40</td>
<td>Lower extremities with oedema and daytime activities among elderly individuals in a nursing home: preliminary study</td>
<td>Aya</td>
<td>Sato</td>
</tr>
<tr>
<td>P41</td>
<td>Lipedema and diets, does it work?</td>
<td>Ellen</td>
<td>Kuijer-Kuip</td>
</tr>
<tr>
<td>P42</td>
<td>Implementation of patients care activities parallel with Mass Drugs Administration (MDA) in Tanzania endemic areas</td>
<td>Wilfred</td>
<td>Mandara</td>
</tr>
<tr>
<td>P43</td>
<td>Significant Improvement in Quality of Life After Treatment of Lower Extremity Lymphedema with Negative Pressure Application</td>
<td>Adrien</td>
<td>MacKenzie</td>
</tr>
<tr>
<td>P44</td>
<td>Secondary leg lymphedema development and delayed wound healing after Coronary Artery Bypass Graph surgery vein harvesting in an at risk limb: CDT management with wound healing in 2 weeks</td>
<td>Ann</td>
<td>DiMenna</td>
</tr>
<tr>
<td>P45</td>
<td>Sclerosis of papillomatosis</td>
<td>Sandrine</td>
<td>Mestre Godin</td>
</tr>
<tr>
<td>P46</td>
<td>Reduction Kit versus Short Stretch Bandaging Outcomes in the Reduction Phase of Complete Decongestive Therapy: Case Report</td>
<td>Jamie</td>
<td>Carlson</td>
</tr>
<tr>
<td>P47</td>
<td>Limited usability of lymphoscintigraphy in follow-up of primary lymphedema</td>
<td>Rita</td>
<td>Hansdorfer-Korzon</td>
</tr>
<tr>
<td>P48</td>
<td>Limited usability of lymphoscintigraphy in follow-up of primary lymphedema</td>
<td>Rita</td>
<td>Hansdorfer-Korzon</td>
</tr>
<tr>
<td>P49-62</td>
<td>Outcome Measures Survey Posters from various countries</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Compression Garments**

from the Leader in “Ready To Wear” Therapeutic Torso Compression for Edema and Lymphedema

**SHIRTS AND VESTS**
- Andrea Shirt - Style 960
  - Full torso with Axilla Pads
  - White

**SHAPEWEAR**
- Slimmer - Style 910
  - Full torso
  - White, Nude, Black

**BRAS**
- Compression Bra - Style 790
  - Underarm, breast and back
  - White, Latte, Black

866.251.0076  www.wearease.com
### Sponsor directory

#### Platinum sponsors

<table>
<thead>
<tr>
<th>Stand</th>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B20</td>
<td>JOBST</td>
<td>JOBST, an Essity brand. JOBST aims to improve the quality of life for those suffering from venous and lymphatic diseases. It provides a number of compression garments designed to offer highly effective, therapeutic compression for the management of diseases including varicose veins, deep vein thrombosis, chronic venous insufficiency, peripheral edema and lymphedema. This includes the extensive JOBST product range, which comprises ready-to-wear, custom-fit, circular-knit and flat-knit garments for the upper and lower limbs. More information at: <a href="http://www.jobst.com">www.jobst.com</a>. BSN medical and JOBST were acquired by Essity AB (former SCA) in April 2017.</td>
</tr>
</tbody>
</table>

#### Gold sponsors

<table>
<thead>
<tr>
<th>Stand</th>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C02</td>
<td>Medi</td>
<td>Medi is one of the world’s leading manufacturers of compression hosiery. medi supplies medical compression and antiembolism stockings, lymphedema sleeves, wound care products and orthopaedic products.</td>
</tr>
</tbody>
</table>

#### Silver sponsors

<table>
<thead>
<tr>
<th>Stand</th>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A02</td>
<td>Juzo</td>
<td>At Juzo, we put all our experience and passion into developing medical aids that accompany patients during their treatment. Our compression garments, supports and orthoses are manufactured using state-of-the-art technologies and offer patients a tailored solution to their specific needs. We employ around 1000 people worldwide and offer products for the areas of lymphology, phlebology, scar therapy and orthopedics which are manufactured at the headquarters in Aichach (Germany) and being exported to over 60 countries. We are giving our best every day to ensure that our products improve the patients’ quality of life and provide lasting relief for their symptoms.</td>
</tr>
<tr>
<td>A14</td>
<td>Cizeta Medicali</td>
<td>Cizeta Medicali S.p.A. is the italian leader manufacturer of medical stockings, with a policy based on a continuous research of new solutions for venous and lymphatic deseases, identified in innovative and high quality products, certified by prestigious International institutions.</td>
</tr>
</tbody>
</table>

#### Bronze sponsors

<table>
<thead>
<tr>
<th>Stand</th>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B10</td>
<td>Tactile Medical</td>
<td>Tactile Medical is a leader in developing and marketing at-home therapy devices for the treatment of lymphedema and chronic venous insufficiency. Our unique offering includes advanced, clinically proven pneumatic compression devices, as well as continuity of care services provided by a national network of product specialists and trainers, reimbursement experts, patient advocates, and clinicians. Tactile Medical takes pride in the fact that our efforts help increase clinical efficacy, reduce overall healthcare costs and improve the quality of life for patients with chronic conditions.</td>
</tr>
<tr>
<td>B04</td>
<td>Lympha Press</td>
<td>For over 35 years, Lympha Press® has produced the most-well regarded dynamic compression therapy products distributed around the world. Our devices and patented garments have helped patients all over the world deal with lymphedema and venous insufficiency and improve their quality of life. Lympha Press offers the world’s most versatile and advanced dynamic compression therapy systems with proven clinical evidence in over 20 peer-reviewed publications. Results oriented patient care is at the forefront of our focus. Patient testimonies attest to the quality of our products and the service they receive from Lympha-Press teams around the world.</td>
</tr>
</tbody>
</table>
### Exhibitors

<table>
<thead>
<tr>
<th>Stand</th>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C12</td>
<td>Delfin Technologies</td>
<td>Delfin Technologies Ltd has specialized in the assessment of tissue properties in skin and subcutis. In lymphology, the MoistureMeterD devices, LymphScanner and SkinFibroMeter are unique devices for quick and easy detection and tracking of superficially localized lymphedema and tissue fibrosis.</td>
</tr>
<tr>
<td>A12</td>
<td>BioCompression Systems</td>
<td>Bio Compression Systems is the leading manufacturer of pneumatic compression devices for the treatment of lymphedema, venous insufficiency, wound care, arterial disease, DVT prophylaxis, post-op edema, and sports injuries. Our devices are available with a wide variety of garments including adjustable, custom, and over the shoulder. In addition to these products, we manufacture compression pumps, and garments for deep vein thrombosis prophylaxis and the BioCryo System providing cold and compression for acute sports injuries and post-op edema. The Bio Arterial Plus System is a pneumatic compression treatment for diabetic foot ulcers and ischemic disease of the lower extremities.</td>
</tr>
<tr>
<td>C04</td>
<td>LymphaTouch</td>
<td>LymphaTouch Inc. is the Finnish medical device manufacturer behind the unique negative pressure LymphaTouch® treatment device. The device is designed to support lymphatic drainage. The negative pressure generated by the device helps improving lymphatic circulation in the treated area. In addition to negative pressure, LymphaTouch® has a mechanical high frequency vibration feature.</td>
</tr>
<tr>
<td>B24</td>
<td>Thonic Innovation</td>
<td>Our patented hybrid technology Fast’n Go range has been developed to meet the needs of self-banding patients and homecare carers: simple, fast and safe application of a bandaging system with reproducible levels of compression and high stiffness. Founded in 2015, Thonic Innovation is, without any doubt, the smallest “global” company in the field of compression therapy and we are quite proud to say that Fast’n Go is currently distributed in France, Japan, Germany, Belgium, The Netherlands, Turkey, ... and we are looking for a distributor in North America. Come and see us at our booth (It will take you less than a minute to see an arm self-banded !). Thonic Innovation is an ISO 15485:2016 certified company.</td>
</tr>
<tr>
<td>A08/ A10</td>
<td>Thuasne</td>
<td>Founded in 1847, THUASNE is a globally recognized creator, manufacturer and distributor of wearable medical devices, including braces, supports and medical garments. Thuasne has developed innovative lymphedema solutions, adapted to the different stages of this pathology. The MOBIDERM anti-edema device, supported by medical evidences, intends to improve the flow of lymphatic fluid and the drainage of the limb. MOBIDERM technology can be used within reducing bandages or incorporated into mobilising garments. Our recent innovative MOBIDERM AUTOFIT solutions provide easy to put on and comfortable garments, to optimise the long term control of lymphedema and to enhance patient’s autonomy.</td>
</tr>
<tr>
<td>B28</td>
<td>Lymphedivas</td>
<td>Lymphedivas is dedicated to providing medically advanced compression garments for men and women with lymphedema that will inspire them to feel strong and confident.</td>
</tr>
<tr>
<td>C10</td>
<td>Dr. Vodder School</td>
<td>The Dr. Vodder School and Academy are authorised by the Vodders to teach the original, unadulterated Dr. Vodder method of Manual Lymph Drainage. Our international training program is the worldwide MLD gold standard. Our training in MLD and Combined Decongestive Therapy has developed over the past 47 years and is taught in 22 countries in many languages. Many thousands of health care practitioners are certified in the treatment of lymphedema and related pathologies.</td>
</tr>
</tbody>
</table>

---
### Lohmann & Rauscher

Lohmann & Rauscher is your trusted partner in compression therapy and advanced wound care solutions. Lohmann & Rauscher has a 160-year history as a well-recognized and respected global manufacturer and supplier of compression therapy solutions and innovative wound care products. We are an industry leader in the treatment of lymphedema, chronic edema and venous edema by providing the most extensive line of compression therapy products, which includes Bandaging and the Solaris Collection of garments and wraps. L&R’s comprehensive product portfolio of world-class brands such as Debrisoft®, Suprasorb®, Rosidal®, TributeNight™, and ReadyWrap™ are trusted for their effectiveness and quality. Visit www.lohmann-rauscher.com for more information.

### Luna Medical

Luna Medical, Inc. is a JCAHO accredited, durable medical equipment company solely dedicated to providing medical compression products nationwide. We have maintained family ownership for 25 years with our corporate headquarters located in the heart of Chicago. Our professional, friendly, personable and proficient team takes all the responsibility in advocating for insurance coverage for patients diagnosed with Lymphedema and Chronic Venous Disease. Luna is contracted In-Network with commercial insurance companies/networks nationwide, offers a Private Pay Match Program for patients paying out of pocket and can bill Health Savings/Flex Spending accounts. We function as the extension team to lymphedema treatment programs nationwide and most importantly, understand the physical, psychological and financial implications that Lymphedema and Venous Disease patients experience when dealing with home management. Patients need a system of support to take control of these chronic conditions. Luna Medical is here to meet the long-term needs of the Lymphedema Community.

### Huntleigh

As a proud member of the Arjo family, we believe that great healthcare is always a collective effort. The greatest contribution we can provide to patients, and the professionals who care for them, is confidence. This is what we have been striving for since 1979, with innovative solutions in vascular care, fetal and patient monitoring. Solutions that can assist clinicians in improving outcomes and enhancing patient wellbeing. Whether it’s the safe delivery of a new life, improving the day-to-day quality of life or monitoring life’s vital signs, we aim for clinical excellence and improved performance, for life.

### Wear Ease

Wear Ease, Inc. designs products for recovery from surgery and related side effects of lymphedema, edema, and limited mobility. The leader in “ready to wear” therapeutic torso compression garments for lymphedema.

### AIROS Medical

AIROS™ Medical, Inc. is a medical technology manufacturer, designer, and specification developer specializing in compression therapy. Our team of engineers, regulatory experts, and clinical partners create medical devices that improve quality of life for patients battling lymphatic and venous disorders. Our product line includes the intuitive, easy-to-use AIROS 6 and AIROS 8 Sequential Compression Devices, as well as various-sized garments fitted to ensure effective upper and lower extremity therapy. We collaborate with physicians, therapists, and clinicians to drive high compliance of our proven, adjunctive, device-driven compression therapy allowing patients to live healthier, more mobile lives.
## Exhibitor directory

<table>
<thead>
<tr>
<th>Stand</th>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B08</td>
<td>American Vein and Lymphatic</td>
<td>The American Vein &amp; Lymphatic Society (AVLS), formerly the American College of Phlebology, is the largest association for physicians and allied health professionals concerned with the diagnosis and treatment of venous and lymphatic disorders, such as varicose and spider veins, venous ulcers and DVT. Comprised of about 2,000 members, the AVLS is a forum to exchange medical knowledge, best practices and the latest treatment options, as well as offering continuing live and online education and training aimed at improving the quality of patient care. For over 30 years, the AVLS has been an advocate for the advancement of vein and lymphatic care through education, resources and research.</td>
</tr>
<tr>
<td>B12</td>
<td>East Coast Innovative Concepts</td>
<td>ECIC is focused on providing easy, inexpensive ways to overcome the challenge of donning and doffing compression stockings, arm sleeves, and tubular bandaging. Patients gain independence and are more likely to adhere to treatment advice when they can easily put on and take off their compression garments without assistance. Come by our table to try out the EZY-AS, Sock-ez, and our new EZY-Glove. See for yourself how much easier donning and doffing can be for your patients. Since our founding in 2010, our products have been embraced by health professionals in the world of lymphedema, phlebology, wound care, podiatry, orthopedics, prosthetics, and home care. Please visit our website at <a href="http://www.ezyasabc.net">www.ezyasabc.net</a> or contact us at 207-351-1487.</td>
</tr>
<tr>
<td>B06</td>
<td>Absolute Medical</td>
<td>Absolute Medical, Inc. exists to provide support and guidance throughout the lymphedema management process. We are experts at fitting compression garments, working with insurance companies, and educating you on the best product for your needs.</td>
</tr>
<tr>
<td>B18</td>
<td>Twinery</td>
<td>MAS Holdings is South Asia’s largest manufacturer of intimate wear and sportswear, counting over 30 years of experience working alongside leading apparel brands in the US and EU. As the source of innovation for MAS, Twinery combines knowledge of the human body with unparalleled expertise in fabrics and textiles to launch novel solutions that champion consumer needs. We specialize in next-to-skin technology manufacturing. Our latest launch SpryngMed (Portable active compression device) counts over 3 years of research among patients and medical experts and its patented compression pattern is designed to deliver circulation enhancement and relief that is effective and accessible.</td>
</tr>
<tr>
<td>B30</td>
<td>Limbo/Xpandasox</td>
<td>The LimbO waterproof protector helps patients bathe and shower without getting dressings wet. Restores quality of life and avoids wet dressings and the risk of infection. LimbOs are 100% waterproof, easy to use, non-constrictive and available in a range of sizes. Bulk orders welcome. USA Tel: 1 866 348 4091</td>
</tr>
<tr>
<td>B14</td>
<td>Lympha Technology</td>
<td>LymphaTech has developed a novel 3D measuring system to enhance the standard of care for patients suffering from and at-risk of developing lymphedema and other swelling diseases. LymphaTech’s easy-to-use mobile system standardizes the measurement process and reduces inter-operator variability by 75%, resulting in accurate volume and circumference measurements in less than 60 seconds.</td>
</tr>
</tbody>
</table>
3M™ Coban™ 2 Two-Layer Compression System

Comfortable compression. Applied to life in motion.

Visit booth C14 to see a wrapping demonstration and learn how Coban 2 Compression System can make a difference in your practice.

Request more information about Coban 2 Compression System for lymphedema: engage.3M.com/ILF

3M and Coban are trademarks of 3M. © 3M 2019.
[1] RELIABILITY OF CIRCUMFERENTIAL MEASUREMENTS FOR ASSESSMENT OF UPPER EXTREMIT Y LYMPHEDEMA

Yuanlu Sun1, Jane Armer2

1 University of Missouri-St. Louis, College of Nursing, Columbia, United States
2 University of Missouri Sinclair School of Nursing, Sinclair School of Nursing, Columbia Mo, United States

Introduction: A valid and reliable measurement method to assess limb volume change is essential in lymphedema detection and management. Due to convenience and economy, circumferences of the affected and contralateral limbs are the most frequently-used method to detect and quantify lymphedema. However, circumferential assessment is often described as less reliable, as compared to other limb volume measurement approaches, such as water displacement and perometry.

Aim: The aim of this study was to examine the reliability of serial circumferential measurement using a flexible non-stretch tape measure and a rigorously-developed training protocol for assessing upper extremity volume change.

Method: Each of four well-trained limb volume assessors repeated circumferential measurements on hands and at four centimeter increments from wrist to axilla three times on both unaffected arms of the same “healthy model”. The measurements were conducted monthly. In the same year, the same assessors also performed repeated-circumferential measurements on 106 breast cancer survivors using the same protocol (three times during each visit). Measurement data of fifteen anatomic locations on each limb (thirty total locations on both limbs) were included in this data analysis. Software SAS 9.4 (2013) was used in conducting the analysis.

Results: The intraclass correlation coefficients (ICCs) were high among the four assessors in the measurement of the “healthy model” across the twelve months (ICCs: mean= 0.999, SD=0.000287). The variability of the three repeated measurements was low on the healthy model across anatomic locations (SD_LSMEAN ranges from 0.028 to 0.177), based on the references from existing studies. The variability of the repeated measurements was larger on the breast cancer survivors (Figure 2), compared to the repeated measurements on the healthy model (Figure 1). The variability of repeated measurements was not statistically different between anatomic locations of the limbs on the healthy model (F=0.84, p=0.629, df=14, 45) in the laboratory (Figure 3), but was significant on the actual breast cancer survivors (F=10.36, p<0.0001, df=14, 915) in the clinical settings (Figure 4).

Conclusions: Both inter- and intra-rater reliability of circumferential measurement can be acceptably high with well-trained assessors. The intra-rater reliability of the circumferential method may be somewhat diminished and the consistency of this method may vary by anatomic locations on the limbs when performed on actual patients. Emphasis on adequate training and regular assessment of intra- and inter-rater reliability is key.


Kayla M. Daniel1, Sacha Roberts1, Tessa C. Gillespie1, Cheryl Brunelle1, Alphonse G. Taghian1

1 Massachusetts General Hospital, Radiation Oncology, Boston MA, United States
2 Massachusetts General Hospital, Physical and Occupational Therapy, Boston MA, United States

Introduction: Breast cancer-related lymphedema (BCRL) affects approximately 20% of patients treated for breast cancer (BC), and prospective screening for BCRL has allowed for early detection. To improve effectiveness and timeliness of early detection, it is important to consider that arm volume changes may not be uniform.

Aim: To evaluate how segmental assessment of limb volume changes may improve detection of BCRL.

Method: We analyzed data from a cohort of women treated for BC who were prospectively screened for BCRL with a perometer and symptoms assessments pre-operatively and throughout follow-up. Limb volume changes were calculated using the relative volume change (RVC) formula. The final cohort includes 55 unilaterally-affected patients who experienced a maximum RVC 5-<10% and reported symptoms related to BCRL. Anatomical landmarks of each upper extremity were identified using preoperative perimeter measurements, and RVC was calculated for five segments of the arm using the measurement at which the patient presented with RVC 5-<10%. The segments assessed include: head to axilla, wrist to axilla, wrist to olecranon process (OP), OP to axilla, and the segment 10 centimeters distal to 10 centimeters proximal to the OP (OP±10 cm). Generalized estimating equations were applied to determine factors associated with developing RVC ≥10% in any segment.

Results: In this cohort, 34.5% (19/55) patients had at least one segment with an RVC ≥10% despite an overall RVC 5-<10%. Many of these patients experienced RVC ≥10% in the op-to-axilla segment (n=14), followed by the OP±10 cm segment (n=5) and the wrist-to-OP segment (n=4). Univariate analysis showed that predictors of having an RVC≥10% in at least one segment were history of axillary lymph node dissection (ALND) (OR: 5.27, p-value: 0.011), and reporting at least five (4.36, p-value: 0.028) or six (7.76, p-value: 0.007) BCRL-associated symptoms. History of regional lymph node radiation (RLNR) was borderline significant (OR: 3.04, p-value: 0.076). On multivariate analysis, history of ALND with RLNR (OR: 6.24, p-value: 0.018) was a significant predictor of RVC ≥10% in at least one arm segment, and ALND without RLNR (OR: 7.20, p-value: 0.069) and having a BMI ≥30kg/m2 at baseline (OR: 4.18, p-value: 0.076) were borderline significant.

Conclusions: Over 1/3 of patients had RVC ≥10% in one or more segments despite their overall RVC being 5-<10%. Therefore, assessing segmental limb volume changes may be effective in detecting BCRL early, especially considering that predictors of having RVC ≥10% in any segment include ALND, RLNR, and reporting BCRL-associated symptoms.
[3] ULTRASOUND - BETTER IN HAND THAN DISMISSED OUT OF HAND

W. Jungkunz1, Janet Massey2

1 Praxis Dr Jungkunz, Zwolle, Germany
2 Concuria GmbH, Karben, Germany

Introduction: For lymphoedema, the ideal imaging tool should extend and confirm clinical judgement. It should be reliable, non-invasive, give reproducible results and not be expensive. It should certainly do no harm. Ultrasonic diagnostic allows the consistency and elasticity of skin to be assessed, confirming the clinical initial diagnosis. Its use in follow-up provided a record which can be quantified.

Aim: This presentation will describe the German randomised controlled studies in primary lymphoedema which have confirmed the usefulness of the measurement of skin layer thicknesses assessed by serial 18MHz ultrasound probe readings.

Method: Based on his 35-year experience from hospital and his own out-patient practice, the author is able to review and quantify the effectiveness of ultrasound diagnosis and follow-up in patients with lymphoedema.

Results: The doppler ultrasound with an 18MHz head is an ideal teaching tool for staff, students, technicians and the patient. Serial readings over time are used to follow progression (such as decrease and increase in fibrosclerosis in the various skin layers) and, if needed, challenge the patient’s statement that they have been wearing their compression garments.

Conclusions: All qualifying doctors now have had hands-on exposure to ultrasound in emergency, abdominal, obstetrics and gynaecological diagnosis. Physicians from India for example are really surprised that ultrasound is not used routinely in General Practice. It still may take time to convince dermatologists to use serial measurements of skin thicknesses for the diagnosis and follow up of compression therapy in lymphoedema. Lymphologists in Germany are moving towards this as a requirement for health insurer payment is introduced.

References


Yeşim Bakar1, Alper Tuğral2

1 Abant Izzet Baysal University School of Physical Therapy and Rehabilitation, Izmir Bakişehir University Faculty of Health Sciences Department of Physiotherapy and Rehabilitation, Bolu, Turkey
2 Abant Izzet Baysal University School of Physical Therapy and Rehabilitation Bolu, Bolu, Turkey

Introduction: Breast cancer related lymphedema (BCRL) is a debilitating condition which can manifest after breast cancer surgery. Current reports indicated that 25-40% of breast cancer survivors suffer from BCRL as a main long-term complication. Since this condition is chronic, early detection and management of BCRL have been gaining attention in the last decade. Trend is choosing a safe and objective measurement tools in order to assess BCRL existence. In this regard, Tissue Dielectric Constant (TDC) measurement has been accepted as a safe and objective method to track changes locally due to directly related to tissue fluid. In addition, Bio Impedance Analyze (BIA) method is also accepted as a useful tool to assess BCRL only if it covers segmental measurement instead of whole-body measurement. Choosing the most appropriate method is crucial in both tracking early changes along with the follow ups.

Aim: To conduct a comparative pilot study regarding which method (TDC vs SOZO® BIA) would be more reliable to diagnose patients in which have already diagnosed whether they have BCRL or not.

Method: 12 female breast cancer survivors included in this pilot study. 8 cm proximal, 6 cm distal reference points from cubital fossa, 10 cm inferior point of the axilla were marked in both upper extremities prior to TDC measurements. 0.5, 1.5, 2.5- and 5.0-mm depth probes were used to measure dielectric values. Thereafter, women who were eligible for L-Dex measurements were measured with the SOZO® device.

Results: 12 breast cancer survivors (54±14.93year, BMI:29.81±5.15 kg/m2) four of them had been diagnosed with BCRL. 7 of 12 women were eligible to be measured in SOZO® BIA while all of them completed the TDC measurements. When compared to L-Dex and TDC values between patients with and without BCRL, all TDC values achieved four different depth probes were found significant except for “thorax” reference point (p<0.05, range 0.008-0.042). While in L-Dex measurements, there was also significant difference found (p=0.018).

Conclusions: It was found that both devices were in capable of to specify patients with and without BCRL, however, it still needs to be thoroughly studied regarding their cut-off points and other factors. Nevertheless, this is the pilot study which shows both devices are safe and reliable to detect changes in patients with BCRL along with follow up to detect BCRL in early settings.
[5] TISSUE DIELECTRIC MEASURES ON THE TRUNK IN WOMEN WITH AND WITHOUT TRUNK LYMPHEDEMA

Linda Koehler¹

¹ University of Minnesota, Rehabilitation Medicine, Minneapolis, United States

Introduction: Women are at risk of developing trunk lymphedema following breast cancer surgery. There are no standardized methods to quantify trunk lymphedema therefore clinicians rely on subjective assessment to diagnose trunk lymphedema. Tissue dielectric constant (TDC) values are quantifiable measures that may be able to quantify and help diagnose trunk lymphedema.

Aim: 1) Compare TDC trunk measures with subjective assessment for trunk lymphedema in women with and without trunk lymphedema following breast cancer surgery, and 2) Explore the potential utility of using TDC in the early detection of trunk lymphedema.

Method: This prospective longitudinal study observed women with and without trunk lymphedema following breast cancer surgery through 78 weeks. Trunk TDC measures were taken bilaterally on the lateral trunk at 2, 4, 12, and 78 weeks following surgery. Women were subjectively assessed for trunk lymphedema at 78 weeks by a lymphedema expert. The trunk TDC measures were compared to the subjective assessment through two sample Student’s-t-test and repeated measures analysis of variance.

Results: Trunk lymphedema was identified in 15 of the 32 women (47%) at 78 weeks through subjective assessment. Trunk TDC measures were statistically higher on the ipsilateral side compared to the contralateral side in women identified with trunk lymphedema at 78 weeks and all earlier visits. Women without trunk lymphedema had statistically higher trunk TDC measures on the ipsilateral side at 2 weeks but none of the subsequent visits.

Conclusions: This study demonstrates TDC is able to quantify post-surgical edema, trunk lymphedema, and potentially detect the early onset of lymphedema development following breast cancer surgery. The TDC method has potential utility as a diagnostic tool in clinical practice in adjunct to clinician experience and expertise in making lymphedema assessments and treatment decisions. Further research is needed to understand the full utility of the TDC method for diagnostic, predictive, and prescriptive use.

[6] EFFECTIVENESS AND DOSING OF EARLY CLT TREATMENT IN A SCREENING-BASED COHORT OF PATIENTS AT HIGH RISK OF BREAST CANCER-RELATED LYMPHEDEMA

Cheryl Brunelle¹, Sacha A. Roberts², Tessa C. Gillespie², Kayla M. Daniell², Alphonse G. Taghian²

¹ Massachusetts General Hospital, Physical and Occupational Therapy, Boston MA, United States
² Massachusetts General Hospital, Radiation Oncology, Boston MA, United States

Introduction: Current guidelines recommend screening and early intervention for breast cancer-related lymphedema (BCRL); however, there is a lack of evidence surrounding ideal treatment threshold, parameters and dosing. During the reduction phase, complete de-congestive therapy five times weekly is the standard recommendation, which is extremely burdensome to patients from a time and financial standpoint, and Certified Lymphedema Therapist (CLT) and clinical resources remain scarce. Efforts to clarify best practice treatment parameters and dosage resulting in improved patient outcomes are needed.

Aim: This study aims to report results of early diagnosis and treatment of BCRL from within a prospective BCRL screening program in order to identify treatment parameters and dosing and to make recommendations for further research supporting BCRL early diagnosis and intervention.

Method: This study is comprised of 32 patients treated for breast cancer at highest risk of BCRL (axillary lymph node dissection and regional lymph node radiation) referred to CLT with lymphedema 5-10% or >10%, with perometry measurements at beginning and end of the CLT episode. Successful outcome was defined as no progression of BCRL (relative volume change (RVC) or weight adjusted change (WAC)), and patients were stratified by progression vs. no progression. Kruskal-Wallis one-way analysis of variance was used to compare medians.

Results: Patient groups were not statistically different in terms of BMI or age at baseline (p=0.41, p=0.93 respectively), or immediate reconstruction. Of note, 18 of 32 patients had RVC/WAC of 5-<15% at the beginning of treatment, with the remainder beginning treatment at >15%. Of the total cohort, 24 improved with CLT, with an average reduction in RVC/WAC of 7.9% (from beginning to end average RVC/WAC 16.8% to 8.9%). With treatment, 19 patients reached RVC/WAC of <10%, with 10 reaching <5%. Of the 24 patients who improved with treatment, 23 reached final reduction without MLD and multiple layer wrapping (i.e. with compression sleeve, exercise and education only), with a treatment frequency of 1.88 visits per month.

Conclusions: Screening for BCRL allows earlier diagnosis, and early treatment may allow for lower treatment dosing, whilst maintaining patient outcomes. This would decrease treatment burden for patients and improve efficiency of CLT resources. No change in practice is recommended at this time from this small study. However, this is hypothesis-generating, and a prospective cohort is recommended which integrate symptoms, clinical exam and objective measures to identify treatment parameters leading to best patient outcomes and resource allocation for patients with BCRL.
[7] POSITIVE OUTCOMES OBSERVED WITH THE INCORPORATION OF COMPRESSION BRA AND SPECIALIZED PAD TO ADDRESS SWELLING AND TISSUE FIBROSIS FOLLOWING TREATMENT FOR BREAST CANCER

Jacqueline Suzie Ehmann1
1 Atrium Health Stanly, Edema Management Program, Albemarle, United States

Introduction: Management of breast cancer related lymphedema has been primarily focused on treatment options to address arm and hand swelling with very little focus on breast or trunk swelling that can accompany treatment for breast cancer.1 This is evident by the paucity of research focused on the incidence of lymphedema in this area as well as the lack of treatment options beyond generic mastectomy bras.2 3

Aim: Observation study to objectively evaluate the impact of incorporation of a medical compression bra and pad to facilitate drainage of excess lymphatics into the treatment regimen during three phases (acute, sub-acute, chronic) of healing following surgery for breast cancer.

Method: 8 breast cancer survivors who presented with swelling and/or complaints of discomfort in the breast or chest wall referred to lymphedema therapist and fit with specialized compression bra and pad. Outcome data including self-report of pain and swelling, tissue density constant (TDC) measurements, circumferential measurements, skin fold thickness and photographic progress were documented at regular intervals.

Results: Subjective improvement of symptoms of swelling and pain were observed in all patients. Other subjective reports included reduced stiffness in affected area, and reduced heaviness. Pain in the affected area was reduced by >50%. Reduction in tissue edema was observed in all patients. Changes in TDC were inconsistent between subjects except for those in the late phase of healing in which was observed steady decline in values.

Conclusions: There is benefit for the inclusion of a compression bra and specialized pad to address swelling in the breast and chest wall that is observed following treatment for breast cancer. Additional study is warranted to identify the optimal utilization as well as to better understand the pathophysiologic impact of the specialized pad under the compression bra.


Tessa De Vrieze1, Nick Gebruers3, Ines Nevelsteen1, Sarah Thomis4, Wiebren A.A. Tjalma5, Patrick Neven6, Jean-Paul Belgrado4, Liesbeth Vandermeeren7, Nele Devoogdt1
1 KU Leuven - University of Leuven, Dpt of Rehabilitations Sciences, Leuven, Antwerpen, Belgium
2 Universiteit Antwerpen, Rehabilitation Sciences, Antwerp, Belgium
3 Ku Leuven, Leuven, Belgium
4 Uz Leuven, Vascular Surgery, Leuven, Belgium
5 UAntwerpen, Antwerp, Belgium
6 Université Libre de Bruxelles, Clinique de Lymphologie, Bruxelles, Belgium
7 Lymphology Clinic of Brussels - Chu St-Pierre, Brussels, Belgium

Introduction: Lymphoedema is a dreadful complication following breast cancer therapy. The consensus treatment for breast cancer-related lymphoedema (BCRL) is the decongestive lymphatic therapy. This is a two-phase treatment and combines different treatment modalities including skin care, manual lymphatic drainage (MLD), compression therapy and exercise. However, a meta-analysis, including 6 randomised controlled trials (Huang et al., 2013), and a Cochrane systematic review (Ezzo et al., 2015) have questioned the effectiveness of MLD. The meta-analysis showed an overall additional benefit of MLD to the treatment of BCRL of 75 ml, while the systematic review revealed that the individual contribution of MLD was limited to 7%. A possible explanation is that in previous studies MLD has been applied blind, without knowledge of patient-specific lymphatic routes of transport. In addition, the MLD hand manoeuvres used by the therapists in previous studies, possibly did not optimally stimulate lymphatic transport. Recently, near-infrared fluorescence imaging has been introduced to visualise the superficial lymphatic network which allows MLD at the most needed location.

Aim: The aim of the present study is to determine the effectiveness of the fluoroscopy-guided MLD, additional to the other parts of the decongestive lymphatic therapy and compared to the traditional or a placebo MLD, in the treatment of BCRL

Study Design: A three-arm double-blinded randomised controlled trial will be conducted in different university hospitals in Belgium. Based on a sample size calculation, 201 participants with chronic BCRL stage 1 or 2 of the arm or hand, with at least 5% difference between both sides (corrected for hand dominance) need to be recruited. All participants receive the standard treatment: skin care, compression therapy and exercises. The intervention group additionally receives fluoroscopy-guided MLD. One control group additionally receives the traditional “blind” MLD and a second control group receives a placebo MLD. All subjects receive 3 weeks of daily intensive treatments and 6 months of maintenance treatment. Follow-up period is 6 months. The primary outcomes are the reduction in lymphoedema volume of the arm/ hand and the change in stagnation of lymph fluid at level of the shoulder/ trunk.
Conclusions: Relevant.

Methods: Measurements and Bio Impedance Spectroscopy (BIS).

Volume and extracellular fluid in the lower limbs of each participant were monitored after lymphedema were assessed on a numeric rank scale (NRS). Acute changes in the weight, volume, and continued investigation of muscular activation, co-contraction, and their subsequent impact on weight distribution in women with lower-limb lymphedema.

Aim: The primary objective of this investigation was to establish whether weight distribution and muscular co-contraction are altered during a standing balance task, while secondary objectives included assessing ability to complete activities of daily living and fall risk in women with lower-limb lymphedema.

Method: Ten women (53.0 +/- 9.3 yrs) with either primary or secondary lower-limb lymphedema and ten controls (50.8 +/- 9.5 yrs) participated to this study. Testing consisted of a standing balance task where five, minute-long, trials were performed on a Matscan pressure mat while muscle activation was used to estimate co-contraction at the ankles. Blinding was not possible.

Severe lymphedema and ten controls (50.8 +/- 9.5 yrs) participated to this study. Testing consisted of a standing balance task where five, minute-long, trials were performed on a Matscan pressure mat while muscle activation was used to estimate co-contraction at the ankles. Blinding was not possible.

Feasibility was assessed by recruitment rate, completion rate, acceptability and satisfaction with the intervention. In addition, changes in self-reported symptoms related to lymphedema were assessed on a numeric rank scale (NRS). Acute changes in the weight, volume, and extracellular fluid in the lower limbs of each participant were monitored after each exercise session, assessed by Dual Energy X-ray Absorptiometry (DXA), circumferential measurements and Bio Impedance Spectroscopy (BIS).

Results: Significantly greater (p=0.05) ankle co-contraction was found in women with lower-limb lymphedema, with values in the lymphedema group close to two times those of controls (56.2% in affected limb and 60.8% in non-affected limb in the lymphedema group vs. 35.6% in dominant limb and 38.1% in nondominant limb in the control group). Compared to the control group, the lymphedema group had significantly lower scores relating to completing activities of daily living, and the Berg Balance Scale to assess fall risk.

Conclusions: Results from this investigation suggest that physical activity and ability to complete activities of daily living in women with lower-limb lymphedema are impaired while the effects of lymphedema lead to greater amounts of muscular co-contraction during quiet standing. Future research should focus on examining the effectiveness of specific interventions to improve physical activity in women with lower-limb lymphedema and continued investigation of muscular activation, co-contraction, and their subsequent impact on weight distribution in women with lower-limb lymphedema.
Introduction: Parents of children with primary lymphedema (LE) have reported helplessness, frustration, and grief due to lack of support from medical professionals with regard to diagnosis, lack of knowledge, and ineffective referrals to specialists. These struggles are exacerbated as children reach adolescence. In general, research has shown that parents of children with chronic conditions are at an increased risk for experiencing higher levels of stress and depression. Parents who experience excessive stress are more prone to negative mood, which has been shown to correlate with child behavioral problems. Family functioning in the context of parenting a child with a chronic condition can be impacted in the areas of communication, roles, and affective involvement. These parents may also be inclined to be overly protective of their children due to concerns about possible injury or exacerbation of their condition. Parents do not simply fall into the categories of being extremely overprotective versus more unguarded as some may fall in between. Factors that have been found to influence this continuum include parents’ education level, gender of the child, and age of the parent.

Aim: To investigate the lived experiences of parents who have children that have been diagnosed with primary lymphedema.

Method: Data were collected using quantitative surveys and semi-structured interviews. These data were combined into “cases” for each child and parent. Qualitative data were coded using an a priori codebook. Codes were then subject to discussion by the research team who identified a pattern of parenting styles. Parents’ approach to parenting fell along a continuum from ‘Free Range Parents’ (unguarded, relaxed, open) versus ‘Bubble Wrap Parents’ (overprotective, anxious, worried).

Results: Participants were 27 parents of children with primary LE who were primarily white, female, and highly educated. Participants were from six different countries with the majority originating from the United States. Free Range parents tended to be older and be more likely to have female children compared to Bubble Wrap parents. No patterns were identified relating to gender of parent, age of child, parents’ education level, or country of origin. The anchors of this continuum of parenting will be presented with examples from interviews.

Conclusions: Parents of children with primary LE have a range of approaches to parenting their children. Implications for clinical practice and intervention with these parents and children will be discussed.
Abstract Session Psychosocial and qualitative research


Catharine Bowman¹, Lori Radke², George Francis³, Devesh Oberoi¹, Linda Carlson¹

¹ University of Calgary, Calgary, Canada
² Alberta Health Services, Calgary, Canada
³ University of Calgary, Division of Clinical Neurosciences, Department of Physical Medicine and Rehabilitation, Calgary, Canada

Conclusion: Outcomes will be used to build a working theory, exploring the lymphedema experience and triangulating several factors that may impact QOL. If data demonstrate LEL impacts QOL, follow-up intervention studies could be implemented to improve care and education within community settings. Furthermore, if data reveal consistent strategies suggested by healthcare providers to improve LEL education and care, programs focused upon these strategies could be implemented.

Introduction: Lymphedema is a chronic condition characterized by regional bodily fluid accumulation of protein-rich interstitial fluid. A widespread cause of lymphedema is cancer-related therapy, which disturbs lymphatic integrity, resulting in swelling and inflammation. These symptoms are debilitating and burdensome, posing a substantial threat to patients’ quality of life (QOL).

Aim: The purpose of this study is to evaluate the impact of lymphedema on the QOL of patients with cancer-related, lower-extremity lymphedema (LEL) and explore healthcare provider perspectives on LEL. The objectives are to: 1) assess patients’ QOL and lymphedema knowledge; 2) evaluate the impact of previous and current management strategies; 3) assess patient interest in additional treatments, and 4) explore healthcare provider lymphedema knowledge, referral practices, and suggested interventions to improve care.

Methods: The design is mixed methods with qualitative and quantitative measures. Participants include two study populations: the Lymphedema Group, consisting of cancer-related LEL patients, and the Healthcare Provider Group, including physicians/nurses working within tumour groups at-risk for lymphedema. Self-report questionnaires and semi-structured interviews were used to triangulate perspectives from both groups. Purposive sampling was used to recruit participants for interviews.

Participants: Patients-Inclusion criteria included diagnosis with cancer-related LEL and residence within Alberta, Canada. Those experiencing cancer or undergoing active cancer treatment were excluded from the study.

Healthcare Providers-Physicians and nurses working within oncology services were included. Participants required the ability to refer/aid in the referral of patients to local lymphedema clinics.

Procedures: Patients completed a questionnaire focusing on QOL, anxiety, and depression. Interviews focused upon QOL, social, physical and emotional aspects of lymphedema, diagnosis, treatment, and lymphedema knowledge/resource availability before and after cancer treatment. Healthcare providers completed an interview regarding referral practices, lymphedema-related knowledge/education, and strategies for improving care.

Results: Data from 13 participants have been collected. Means and standard deviations will be calculated for continuous variables and compared to published norms. Literature comparisons will also be used to evaluate levels of anxiety, depression, and QOL. Cross-comparisons between cancer types and sexes will be made using independent-samples T-tests. Inductive thematic analysis will be used for qualitative data.
A QUALITATIVE STUDY OF THE EXPERIENCES OF WOMEN WITH LIPOEDEMA IN SCOTLAND

Anne Williams1, Isobel MacEwan2
1 Queen Margaret University, Edinburgh, Edinburgh, United Kingdom
2 Talk Lipoedema, Edinburgh, United Kingdom

Introduction: Lipoedema is a fat and connective tissue disorder associated with symmetrical proliferation of diet-resistant inflammatory fat tissue, mainly in the limbs and buttocks. Effective self-care is key to improving symptoms, and minimising lipoedema progression (Wounds UK 2017).

Evidence from online surveys has shown that living with lipoedema presents many challenges (Fetzer and Fetzer 2016). There has been limited exploration of the qualitative experiences of living with lipoedema, how women perceive and self-manage their condition, and what support is required.

Aim: To explore the perceptions and self-care experiences of Scottish women living with lipoedema of different stages.

To identify self-care outcomes and support strategies relevant to women with lipoedema.

Method: The study, informed by social constructionism, was undertaken in partnership with Talk Lipoedema, with recruitment via Talk Lipoedema social media. Ethical approval was obtained from the university ethics committee. Semi-structured interviews with women living with lipoedema were undertaken by an experienced researcher. A focus group was also convened to further explore the data from the interviews. Interviews and focus group were recorded and transcribed verbatim, and thematic analysis undertaken.

Results: A total of 24 women were interviewed, including those with lipoedema of: stage 1 (n=3); stage 2 (n=8); stage 3 (n=7); stage 4 (n=6). Eight women took part in the focus group, including seven of those already interviewed, and an additional woman (stage 1 lipoedema). Their ages ranged from 28 to 74 years and most had developed lipoedema around puberty. Key themes that will be presented include: the lipoedema trajectory/being different; the wasted years; emotional baggage/managing the spiral of self-loathing; ‘you have lipoedema but there is nothing we can do for you’; trigger moments and crisis points; how much more do you want me to do?; sod you kind of attitude; family support; professional supported self-care after the diagnosis; strengths of peer support; those who went before and the future generations.

Conclusions: The findings further illuminate the devastating impact that lipoedema may have on women as they manage the demands of their family and working lives. Women predominately find support and information through third sector organisations. Professional NHS support services for women in Scotland are inequitable and inadequate, but the research findings provide directions for future developments.

Introduction: Patients treated for breast cancer (BC) with axillary surgery or radiation remain at a lifelong risk for breast cancer-related lymphedema (BCRL). Studies have shown that BCRL negatively affects quality of life; accordingly, many patients fear developing BCRL and seek to minimize risk.

Aim: To identify factors associated with increased fear of BCRL and subsequent avoidance behaviors.

Method: 926 women treated for BC with unilateral surgery and 253 women treated with bilateral surgery were prospectively screened for BCRL with arm volume measurements and symptom questionnaires to assess for BCRL (defined as a relative volume change (RVC) ≥10%). Fear scores and avoidance scores were calculated at each visit by averaging the response to questions assessing fear and avoidance taken from the Survey of Arm Care Following Breast Cancer. Univariate and multivariate analyses assessed for factors associated with fear and avoidance levels.

Results: 2,531 unilateral and 943 bilateral questionnaires were analyzed with a median of 2.7 and 3.7 surveys answered per patient respectively. Median time of survey competition was 18.6 months and 16.5 months after preoperative baseline. Patients who underwent bilateral surgery were more likely to demonstrate fear (OR: 2.07; p<0.001) and avoidance (OR: 2.08; p<0.001) than patients treated with unilateral surgery. For patients treated with unilateral surgery, post-operative (≤3 months post-surgery) fear was associated with greater baseline fear (OR: 8.58; p<0.001) and postoperative avoidance was associated with greater preoperative avoidance (OR: 23.1; p<0.006) and axillary lymph node dissection (ALND) OR: 5.61; p<0.001). Patients who underwent unilateral surgery demonstrated greater fear at follow-up when they had demonstrated greater baseline fear (OR: 4.57; p<0.001), had an ALND (OR: 1.86; p<0.028) or regional lymph node radiation (RLNR; OR: 1.90; p=0.009), or were younger than 55 at diagnosis (OR: 0.64; p<0.001). Follow-up avoidance scores were associated with increased baseline avoidance (OR: 6.75; p<0.001), having had an ALND instead of a sentinel lymph node biopsy (OR: 2.76; p<0.001), having had an RVC of 5%–10% (OR: 1.63; p=0.009), and being younger than 55 (OR: 0.69; p=0.041). At follow-up, bilateral surgery patients demonstrated increased fear when they had increased baseline fear (OR: 19.9; p=0.001) and demonstrated increased avoidance when they had an ALND (OR: 1.58; p=0.004) or a BMI ≥30 kg/m² (OR: 1.59; p=0.021).

Conclusions: Patients demonstrate fear of BCRL and subsequent avoidance behaviors both postoperatively and after treatment. Practitioners should monitor patients for fear and avoidance levels preoperatively and maximize evidence-based education to mitigate patient fear and avoidance.
Introduction: In the laboratory of lymphology the decision was taken to focus the attention on patients who have undergone breast cancer surgery which included patients at risk of developing lymph stasis in the homolateral arm.

Aim: Five years ago the author planned a preventive protocol in order to avoid lymphoedema onset in patients who have undergone breast cancer surgery and after five-year follow-up, the conclusions have been drawn.

Method: The protocol which was carried out on 143 patients, consisted of three steps:
Step 1. Lymphologist and physiotherapist joint assessment of patients which included a clinical evaluation, a centimetric-volumetric measurement of compared arms, an ultrasound assessment to evaluate the sub-cutaneous tissue, shoulder functionality evaluation through abbreviate Costant-Murley shoulder score, the request for lymphoscintigraphy exam.
Step 2. The opening of a rehabilitative project and the inclusion of patients in four different directions:
- Individual Shoulder Rehabilitation Treatment which included patients with limited shoulder functionality,
- Individual Treatment of complications onset after breast cancer surgery and/or radiotherapy,
- Individual Lymphology Sitting which included patients with initial dermal back-flow, highlighted through lymphoscintigraphy exam.
Step 3. It included all patients who had or not had undergone individual treatments and consisted in two phases:
- a. Informative Group: consisted of simple information about lymphoedema and preventive measures. This included informal conversation with patients and active listening to patients’ problems,
- b. Physical Activity Group: consisted of respiratory training, stretching exercises, gymnastic exercises, relaxation techniques, improving awareness through movement based upon Feldenkrais Method.
The follow-up was required for all patients.

Results: In the first 2 years, lymphoedema onset in 4 patients during the 1st year was noted (the patient came out of follow-up after oedema onset) and 7 patients of 139 remaining during the 2nd year (the patient came out of follow-up after oedema onset). At the end of the 2nd year, 34 patients without oedema, decided not to continue the follow-up; the lymphologist asked them to contact the service immediately after oedema onset, but none of them called during the following 3 years. During the remaining 3 years, no lymphoedema onset was noted in the remaining patients until the end of the follow-up.

Conclusions: Lymphoedema is a physical, psychological and social disease, and with this awareness, the author planned a preventive protocol which highlighted its usefulness in order to prevent lymphoedema onset (oedema onset: 11 patients out of 143) and the physical-psychological well-being achieved through the early and holistic care.

Conclusions:

**PROTOCOL: FIVE YEARS FOLLOW-UP**

Marina Cestari

1 O.U. Territorial Rehabilitation NHS Umbria2, Terni, Italy

[18] LYMPHOEDEMA AFTER BREAST CANCER TREATMENT - PRIMARY PREVENTIVE PROTOCOL: FIVE YEARS FOLLOW-UP

Introduction: In 2009 an overhaul of Lymphoedema Services in Northern Ireland to provide dedicated lymphoedema services to both cancer and non-cancer related lymphoedema patients took place across the province. In the past 10 years the landscape of chronic oedema, lymphoedema and lipoedema has broadened significantly; demand for services has far exceeded capacity. This coupled with reduced management of chronic oedema in primary care, lead to inappropriate referrals into lymphoedema and tissue viability services. This project aimed to scope and rectify these problems with the development of healthy leg clinics based in general practitioners (GP) practices.

**Aim:**

Estimate the number of simple chronic oedema patients requiring management

- Develop and implement a pathway for these patients, skilling up GP staff and pharmacists
- Reduce inappropriate referrals to tissue viability and lymphoedema services
- Prevent costly conditions eg. cellulitis, leg ulcers and lymphoedema
- Reduce prescribing of inappropriate hosiery, diuretics and antibiotics

**Method:** An initial scoping project was undertaken to review GP coding for patients presenting with leg oedema, develop a pathway and patient information leaflets, and gather staff and patient opinions on management of leg oedema.

Results from this were developed into a funding proposal to establish healthy leg clinics in GP practices supported by a chronic oedema liaison therapist.

**Results:**

The project has now been running for 10 months and 19 practices are involved. In the first 8 practices 53 GP’s, pharmacists and practice nurses were trained, and 35 clinics booked.

For the first 22 patients seen in the pilot study prescribing savings of £597 per year were calculated through the correct prescribing of hosiery. Furosemide had been commenced in 6/22 of the patients identified. De-prescribing potentially reduced adverse effects of long term diuretic use.

A life impact scale was used to capture patient outcomes, 70% patients were “very pleased with the service”, reporting the best aspect as the opportunity to get information on how to help their condition. All patients found the negative impact of their swelling was reduced as a result of the care received.

**Conclusions:**

This project has demonstrated benefits in patient and staff education/awareness, prescribing savings, appropriate de-prescribing and patient satisfaction.

Measurement of long range data (reduction in referrals to secondary care, and prevention of complex conditions) have not been possible to achieve within the project time frame, however, early management and increased patient/clinician understanding of the condition would suggest that this is achievable.
[20] THE DEVELOPMENT OF KEY PERFORMANCE INDICATORS USING THE DELPHI TECHNIQUE FOR A REGIONAL LYMPHEDEMA SERVICE IN IRELAND.

Meadhbh McSweeney 1 2
1 TLC The Lymph Clinic, Cork, Ireland
2 UCD Faculty of Health Sciences, University College Dublin, Ireland

Introduction: A classic Delphi Technique was used to develop Key Performance Indicators (KPIs), relevant to the HSE Mid-Western Lymphoedema Service at University Hospital Limerick. This specialist Lymphoedema Service provides care to patients from the symptomatic breast cancer services and other services.

Aim: To develop relevant KPIs as an essential tool for an LE service and as a means of quantitatively measuring quality for service improvement and future service delivery. The KPIs are centered around access to the service, efficiency, patient education and evidence of effectiveness of service delivery.

Method: A classic two round Delphi Technique was used to achieve consensus among lymphoedema specialists and service referees working nationally and internationally. This included feedback from an Expert Panel of national and international clinical leads. The KPIs consultation process used a Balanced Scorecard™ as prescribed by Kaplan and Norton. An 80% consensus of ‘important’ or ‘very important’ was used as the acceptable cut off and deciding factor for study iterations. Every effort was made to ensure the KPIs are easy to understand, objective, reliable, quantifiable and relevant to patient outcomes.

Results: The Delphi Panel response rate was 93.33%. Following Expert Panel feedback, more than 80% (96.3%-100%) of Delphi Panellists agreed on a Suite of 7 proposed KPIs allowing the KPIs to be accepted.

Conclusions: This is the first Irish study to identify KPIs for lymphoedema services. The Suite of 7 KPIs will play an important part for setting standards and will prove invaluable for the quality of care in Lymphoedema Services.

[21] THE EFFECT OF EARLY INTERVENTION ON EARLY STAGE OF BREAST CANCER-RELATED LYMHPHEDMA

Qian Lu1, Mei Fu2, Fenglian Li3, Quan Ping Zhao4, Ying Cui5
1 Peking University, School of Nursing, Beijing, China
2 New York University, Nyu Rory Meyers College of Nursing, New York, United States
3 Peking University People’s Hospital, Department of Breast Surgery, Beijing, China

Introduction: Breast cancer-related lymphedema (BCRL) is the most common and distressing complication among breast cancer survivors, which remains a challenge globally and continues to be a lifelong, irreversible, and incurable complication with negative physical, psychological, and emotional effects for patients. Early intervention is significantly important.

Aim: To pilot test the effect of the The-Optimal-Lymph-Flow (TOLF) program, an educational and behavioral intervention focusing self-management to promote lymph flow on early stage of BCRL among Chinese women treated for breast cancer.

Method: Wescreened 430 patients treated for breast cancer at a larger metropolitan tertiary hospital northern China from April 2017 to June 2018. Early stage of BCRL was defined as limb volume difference > 1cm using circumference measurements. Among 430 patients screened, 249 patients were identified with early stage BCRL and 66 agreed to participate in the intervention. TOLF program was delivered by a nurse during a face-to-face session, patients were followed up at 1, 3, 6 and 12 months after intervention. Intervention outcomes included lymphedema related behaviors, symptoms measured, and limb volume. Generalized estimating equations were used to estimate the effects of the intervention on outcomes variables.

Results: There was statistically significant difference in the scores of lymphedema related behaviors among the 5 test points (23.35±2.959, 28.14±2.320, 28.71±1.904, 28.77±1.787, 28.62±1.794) (P<0.001) and the b value of each follow-up point was 4.788(P<0.001), 5.364(P<0.001), 5.424(P<0.001) and 5.183(P<0.001), respectively. There was statistically significant difference in the number of lymphedema symptoms among the 5 test points (9.64±4.067, 9.24±4.039, 8.76±3.977, 8.48±4.096, 8.60±4.323) (P<0.001) and the b value of each follow-up point was -0.394 (P<0.001), -0.879 (P<0.001), -1.152 (P<0.001) and -1.511 (P<0.001), respectively. There was statistically significant difference in the scores of lymphedema symptom distress among the 5 test points (18.97±13.876, 16.52±12.250, 15.20±11.638, 13.98±11.157, 14.31±12.246) (P<0.001) and the b value of each follow-up point was -2.455 (P<0.001), -3.773 (P<0.001), -4.985 (P<0.001) and -4.165 (P<0.001), respectively. There was statistically significant difference in the volume difference among the 5 test points [295.24±325.189, 252.98±271.881, 223.31±228.029, 223.31±228.029, 260.63±257.476 (ml)] (P<0.001) and the b value of each follow-up point was -42.257 (P<0.001), -71.931 (P<0.001), -77.281 (P<0.001) and -58.592 (P<0.001).

Conclusions: The-Optimal-Lymph-Flow program was effective to manage early stage BCRL to achieve beneficial effects on increasing behaviors to promote lymph flow, and reducing the occurrence of risk behaviors, alleviating lymphedema symptoms and symptom distress as well as optimizing limb volume changes.
**[22] INTERVAL REGIMEN AFFORDS INCREASED PATIENT CONCORDANCE AND COMPLIANCE FOR OPTIMAL OEDEMA MANAGEMENT SYSTEM**

Karen Bock¹, Jacqueline Suzie Ehmann²

¹ Truman Medical Center Hospital Hill, Kansas City, United States
² Atrium Health Stanly, Edema Management Program, Albemarle, United States

**Introduction:** The diversity of presentations and patient co-morbidities make the “one-size-fit all” a less than optimal treatment approach when it comes to the long-term management of lymphedema. More recent work has demonstrated an “interval” regimen may be a more practical approach. Providing the patient with options for compression devices and/or ability to adjust the compression level to address clinical presentation is hypothesized to optimize the success of oedema management. The options allow the patient to create an “interval” self-care compression regimen that can change hourly, daily or weekly depending on clinical presentation. As randomized controlled trials are not a viable when comparing treatment options in the management of lymphedema, research in the form of case series and observational study have been shown to be valuable evidence to determine treatment efficacy.¹ ² (Piller 2018, Frieden 2017)

**Aim:** The aim of this study is to report the authors’ observational studies, case reports and patient feedback using validated tools to demonstrate how providing compression options can be used to create an optimal “interval” regimen to optimize not only edema management, but also concordance and compliance to a compression regimen.

**Method:** 22 patients referred to two separate oedema management were evaluated and treated with modified complete decongestive therapy. As part of a long-term oedema management regimen the patients were issued multiple compression products (Velcro adjustable wrap, flat knit garments, night-time garments) and instructed with use /care. Outcome data including limb volume, tissue fibrosis (utilizing a tonometer), range of motion, functional activity status assessed via the Timed Get Up and Go (TUG)¹ or four-meter walk test, and quality of life (QOL) assessed utilizing the Lymphedema QOL¹ questionnaire. Outcome data was recorded at regular intervals including upon initial evaluation, at the time of fitting and following a period of self-management.

**Results:** Over 50% of patients had additional volume loss while performing their own “interval” regimen, using multiple compression options. Two patients had slight increase in volume. QOL scores and functional activity levels were maintained or improved in all patients. Preliminary data indicates over 10% reduction in fibrotic tissue in 2 out of 4 patients treated with modified complete decongestive therapy. As part of a long-term oedema management, many patients receive inadequate treatment, are unaware that treatment is available or do not know where to seek help (Best Practice ILF 2006). Treatment should comprise a holistic and multidisciplinary approach that encompasses all aspects such as assessment by a trained lymphedema specialist, exercises tailored to the patient needs, mild, compression therapy and skin care.

**Conclusions:** Optimal management of lymphedema requires focus on not only volume containment but also on tissue texture and patients’ lifestyle. These results indicate that with multiple treatment options patients have enhanced compliance and concordance using an “interval” regimen. One size does not fit all.

---

**[23] THE ONLY WAY FOR TREATING LYMHEDEMA IS MULTI DISCPLINARY APPROACH**

Tim Decock¹

¹ Dr Vodderschool B/N, Willebroek, Belgium

**Introduction:** The main cause of lymphedema is widely assumed to be treatment for cancer. Indeed, prevalences of 12-60% have been reported in breast cancer patients and of 28-47% in patients treated for gynaecological cancer. However, it appears that about a quarter to a half of affected patients suffer from other forms of lymphedema, eg primary lymphedema and lymphoedema associated with poor venous function, trauma, limb dependency or cardiac disease (BP ILF 2006). Although lymphedema is not a life-threatening disorder, it is a chronic condition that can create considerable disability with recurrent infections in the limb, functional impairment and pain. In addition, research has demonstrated significant psychosocial morbidity, and poorer quality of life in breast cancer survivors who develop lymphedema (McNeely 2004). It may be greatly ameliorated by appropriate management, many patients receive inadequate treatment, are unaware that treatment is available or do not know where to seek help (Best Practice ILF 2006). Treatment should comprise a holistic and multidisciplinary approach that encompasses all aspects such as assessment by a trained lymphedema specialist, exercises tailored to the patient needs, mild, compression therapy and skin care.

**Aim:** In Belgium proper reimbursement for lymphedema patients is lacking to provide all aspects necessary for the appropriate treatment in an efficient way. As teachers of Vodderschool B/N we implemented and trained our students in a care pathway to provide efficient care in current economic constraints. As Head Physio of two private lymphedema-clinics and teacher lymphology I see the best results while working together.

**Method:** Our Care Pathway for community patient consists of:

**Phase 0:** Diagnosing by the physician (lymphoscintigraphy, fluoroscopy, ...)

**Phase 1:** by Physical therapist
1. Measurements of current situation and frequent measurement
2. Manual lymphdrainage
3. Bandaging with a 2 Layer Cohesive Compression System
4. Exercises to stimulate the venous and lymphatic flow return

**Phase 2:** by a trained bandagist provider:
1. Measurement of flat knitted stocking
2. Physical therapist during the time of fabrication of the stocking provides weekly MLD and compression sessions to maintain volume reduction

**Phase 3:** After wearing the stocking for a few weeks, check-up by the physician.

**Results:** Results from various cases show that a Lymphoedema Care Pathway for the community setting can have good patient outcomes despite the lack of proper reimbursement for lymphedema patients.

**Conclusions:** Treating lymphedema have the best outcomes when we work together as specialists in our own discipline!
[24] EFFECTIVENESS OF A COMBINED APPROACH OF TEAM WORK IN A COMPLEX CASE OF LOCALIZED MULTIPLE ELEPHANTIASIS

Marina Cestari1, Francesco Boccardo2, Eleonora Conti3, Monica Bordoni2, Lucia Famoso1

1 O.U. Territorial Rehabilitation NHS Umbria, Terni, Italy
2 Department of Surgery - Unit of Lymphatic Surgery – Irccs S. Martino University Hospital - Ist, Department of Surgery - San Martino Hospital, Genoa, Genoa, Italy
3 Study Centre Planetalefedeoma, Terni, Italy

Introduction: In daily practice, complex patients affected with lymphoedema, with associated co-morbidities, are frequently examined and they require expanded team work in order to obtain an optimal result and a consequent better quality of life.

Aim: Authors’ purpose was to obtain an optimal therapeutic result of complex case within extended team work

Method: The evaluated clinical case is a 35-year-old obese man (150 kg), who had already undergone bariatric surgery, suffering from massive inguino-scrotal elephantiasis, with dermato-lymphatic-adenitic sequelae, respiratory failure, hepatic steatosis, depressive syndrome and severe functional limitation.

The surgeon, after the clinical evaluation and the required diagnostic tests (CT abdomen-MRI of the lower abdomen and crustal / genital-lymphoscintigraphy of the lower limbs), in anticipation of an intervention to remove the bulky mass at the root of the left thigh, sent the patient to the attention of a rehabilitative lymphological team for the volumetric reduction of the same.

After a clinical lymphological evaluation, the rehabilitation team carried out the first physiotherapy cycle (special maneuvers for fibrosis, skin care, multi-layer bandage) on the voluminous elephantiasis mass located at the root of the left thigh, performed in 5 sessions, twice per day.

After the short physiotherapy course, the surgeon has removed the residual mass.

After post-intervention healing resolution, the patient underwent a new physiotherapy cycle (special maneuvers for fibrosis, skin care, multi-layer bandage) for the contralateral and scrotal mass reduction, at the end of which (5 sessions twice per day) surgical removal of residual masses followed.

Results: At the end of the first cycle of physiotherapy of the left elephantiasis mass, a circumference reduction was obtained at the widest point of 76 cm, while at the end of the second cycle the circumference of the right mass decreased by 45 cm and the scrotal mass by 55 cm.

The patient completed his physiotherapeutic and surgical therapeutic course within 6 months and the result obtained was stabilized with a tailored flat texture tights.

The patient he started to walk, to drive, to wash himself, to lose weight and improve his psychological state.

Conclusions: In daily practice, complex patients are often referred to the rehabilitation lymphological team, which requires expanded team work in order to obtain an optimal result with a consequent improvement in the quality of life.

[25] NORMATIVE DATA OF BREAST TISSUE DIELECTRIC CONSTANT (TDC) USING THE LYMPHSCANNER

Jane Wigg1, Katinka Rutjens2

1 Lymphoedema Training Academy, Education, Staffordshire, United Kingdom
2 Varodem Bv, Academy, Horn, Netherlands

Introduction: Tissue Dielectric Constant(TDC) is a method to measure tissue water. It is being increasingly used to confirm the presence of lymphoedema not only to the limbs but also of the trunk and head and neck (Mayrovitz and Weingrad, 2018). As a new diagnostic tool, there is minimum data as to the normal values of TDC for normal breast tissue. Having this normative data will allow for us to understand the abnormal values for breast oedema. Normal Tissue water for limbs has been cited as 25-45% (Laitinen, 2015) with breast oedema ratio being used as 1:4, higher than limb TDC at 1.2 (Johannsson, 2014).

Aim: The aim of this study was to ascertain the normative data for breast tissue to allow better diagnosis in the pathological breast. This may lead to differing treatments and improved outcomes through early intervention.

Method: Data was collected from 200 breasts, classified in the normal population. Consent was gained and data collection included age, BMI. Height, weight, breast/bra size, Medication, temperature and menstrual status. The process consisted of removal of the bra for 5 minutes to regulate body temperature whilst questions were asked. The TDC measurement were taken in each of the four quadrant of the breast, with the participant in the sitting position. Where possible, all measurement were taken in the morning.

Results: Data collection at present is ongoing but 50% complete. At this point we cannot discuss predict the final outcomes or the variables.

Conclusions: As new diagnostic tools are introduced to main practice it is important that we understand the norms of different body parts and variables when assessing. This will allow for the better assessment of patients, recognition of variables in using this tool and the implementation of differing treatment programmes as appropriate.
**[26] RELIABILITY OF THE MOISTUREMETER D COMPACT DEVICE AND THE PITTING TEST TO DETERMINE LOCAL TISSUE WATER IN SUBJECTS WITH BREAST CANCER-RELATED LYMPHEDEMA**

Nele Devoogdt 1, Tessa De Vrieze 1, Nick Gebruers 2, Sarah Thomis 3

1 Ku Leuven – University of Leuven, Department of Rehabilitation Sciences, Leuven, Belgium
2 Universiteit Antwerpen, Rehabilitation Sciences, Antwerp, Belgium
3 Uz Leuven, Vascular Surgery, Leuven, Belgium

**Introduction:** Local tissue water (LTW) in patients with breast cancer-related lymphedema (BCRL) can be assessed by measurement of the tissue dielectric constant using the MoisturemeterD compact (MMDC) device, or by performing the pitting test. Although these assessment methods are commonly used in clinical practice, literature shows a lack of research on their clinimetric properties.

**Aim:** The aim of this study was to investigate reliability of both methods, in assessing the upper limb in BCRL.

**Method:** Thirty women with BCRL were enrolled. LTW was evaluated at 9 reference points on the upper limb and trunk, using both methods. To determine intra- and inter-rater reliability of the MMDC device (using absolute PWC% values and inter-arm PWC% ratios based on single and multiple measures), intraclass correlation coefficients (ICCs), standard errors of the measurement (SEMs) and systematic changes between the means were calculated. To determine intra- and inter rater agreement of the pitting test, Cohen’s Kappa coefficients were calculated as well as percentages of agreement.

**Results:** MMDC measurements yielded moderate to very strong intra- (ICC 0.606-0.947) and inter-rater (ICC 0.606-0.941) reliability, depending on the measurement location on the edematous limb. The pitting test showed a very strong intra-rater agreement at mostly all defined points, but a weak inter-rater agreement, especially at the medial elbow and the breast.

**Conclusions:** This study supports the MMDC device and pitting test as being useful tools in the clinical evaluation of BCRL over time. However, further research into the concurrent validity of both tools is warranted.

---

**F Abstract Session Outcome measures**

---

**[27] WHAT IS THE BEST METHOD TO DETERMINE EXCESSIVE ARM VOLUME IN PATIENTS WITH BREAST CANCER-RELATED LYPHEDEMA IN CLINICAL PRACTICE? RELIABILITY, TIME-EFFICIENCY AND CLINICAL FEASIBILITY OF FIVE DIFFERENT METHODS**

Tessa De Vrieze 1, Nick Gebruers 2, Wiebren A.A. Tjalma 3, Ines Nevelsteen 4, Sarah Thomis 5, Jean-Paul Belgrado 6, Liesbeth Vandermeeren 7, Nele Devoogdt 8

1 Katholieke Universiteit Leuven, Universiteit Antwerpen, Ku Leuven – University of Leuven, Dept of Rehabilitations Sciences, Leuven, Antwerpen, Belgium
2 Universiteit Antwerpen, Rehabilitation Sciences, Antwerp, Belgium
3 Universiteit Antwerpen, Rehabilitation Sciences, Antwerp, Belgium
4 Uantwerpen, Antwerp, Belgium
5 Ku Leuven, Leuven, Belgium
6 Uz Leuven, Vascular Surgery, Leuven, Belgium
7 Université Libre de Bruxelles, Clinique de Lymphologie, Bruxelles, Belgium
8 Ku Leuven – University of Leuven, Department of Rehabilitation Sciences, Leuven, Belgium

**Introduction:** As a result of enhanced early detection techniques and improved loco-regional as well as systemic treatment protocols, the amount of cancer survivors nowadays is expanding. (Parry et al., 2011). However, more than 16% of the women treated for breast cancer develops lymphoedema of the arm (DiSipio et al., 2013), with surgical and/or radiation therapy being the most common cause. (Poage et al., 2008) Although health care practitioners can apply various conservative treatment modalities to reduce the amount of breast cancer-related lymphoedema (BCRL), the evaluation of the treatment effect is not possible without an accurate, valid and reliable method to determine arm size. In clinical practice, it is crucial that this measurement tool is easy-to-use and rapid as well. (Megens et al., 2001)

**Aim:** To investigate the reliability, time-efficiency and clinical feasibility of five commonly used methods for assessing excessive arm volume in patients with BCRL.

**Methods:** Excessive arm volume was determined in 30 participants with unilateral BCRL by five different methods: traditional volumetry with overflow, volumetry without overflow, inverse volumetry, opto-electronic volumetry and calculated volume based on circumference measurements. To investigate intra- and inter-rater reliability, measurements were performed twice by the same assessor and once by a different assessor. Intraclass correlation coefficients (ICCs), standard errors of the measurement (SEMs) and systematic changes between the means were calculated. To determine time-efficiency, the mean set-up time, execution time and total time were examined for each method. Furthermore, eleven limitations regarding clinical feasibility were listed and scored for each method. Finally, an overall ranking score was determined between the methods.

**Results:** Mean age was 65 (±8) years, mean body mass index was 28 (±4) kg/m². Intra- and inter-rater reliability ranged between strong and very strong. Calculated arm volume based on circumferences showed the highest intra- and inter rater ICCs of .987 and .984, respectively. Opto-electronic volumetry was the fastest method, representing a mean total time of 1 minute and 43 seconds for performing a bilateral measurement. The least limitations were reported on the calculated volume based on circumferences method.

**Conclusions:** Calculated volume based on arm circumferences is the best measurement method for evaluating excessive arm volume over time in terms of reliability, low error rate, low cost, few limitations, and time spent.
Method: Lymphedema (BCRL). We also explored whether there was a relationship between any disability (BMD) of affected and unaffected forearms in patients with breast cancer-related lymphedema and osteoporosis.

Aim: We aimed to investigate the association between lymphedema and bone mass density (BMD) of affected and unaffected forearms in patients with breast cancer-related lymphedema (BCRL). We also explored whether there was a relationship between any disability and BMD on the affected side.

Method: We evaluated 111 patients (53.75±9.07) with unilateral lymphedema (Group 1) and 61 patients (50.9±12.44) without lymphedema (Group 2) after breast cancer surgery. BMD was performed by dual-energy x-ray absorptiometry (DXA) in lumbar spine, femoral neck, and distal forearm on both sides. Functional situation was assessed by the Disabilities of the Arm, Shoulder and Hand (Quick-DASH) questionnaire.

Results: The total Z score (p=0.018), T score (p=0.005), and BMD value (p=0.014) were lower in the affected forearm than the unaffected forearm in Group 1. There was no difference between the affected or unaffected sides in the total Z-score (p=0.394), T-score (p=0.518), and BMD value (p=0.629) in Group 2. The DXA measurements in terms of the total forearm Z, T scores, and BMD value on the affected side were statistically significantly different between the groups. There was no difference between groups in the femur neck and lumbar total Z and BMD scores. There was also a positive correlation between the Quick-DASH scores and lymphedema stage (r=0.469, p=0.001), and the duration without treatment of lymphedema (r=0.298, p=0.02) in Group 1.

Conclusions: We recommend early diagnosis and treatment of lymphedema for the protection of upper extremity disability and localized osteoporosis in patients with BCRL.
Conclusions: Incidence of LE was higher with longer duration of NAC and patient obesity. This identifies groups where enhanced LE surveillance may be beneficial. Further work exploring this is warranted.

Support: National Cancer Institute Award Number UG1CA189823 (Alliance NCORP Grant), U10CA180821, U10CA180882, U10CA180790, U10CA180858, U10CA180868, and U10CA180888.

A MULTI-CENTER SURVEY TO ASSESS THE OUTCOMES OF FLUOROSCOPY GUIDED MANUAL LYMPHATIC DRAINAGE (FG-MLD) USING BELGRADO ‘FILL AND FLUSH’ TECHNIQUE

Jane Wigg, Garry Cooper, Mary Woods
1 Lymphoedema Training Academy, Education, Staffordshire, United Kingdom
2 Wolverhampton University, Education, Wolverhampton, United Kingdom
3 Royal Marsden Hospital, Lymphoedema, London, United Kingdom

Introduction: Manual lymphatic drainage (MLD) is recognised as a key component for treatment of Lymphoedema and its management. Unfortunately this treatment is being removed from lymphoedema management protocols throughout the world due to a lack of robust evidence on its effectiveness. Indocyanine green within lymphofluoroscopy imaging has provided a tool to evaluate differing methods of MLD. This led to the development of the fluoroscopy guided manual lymphatic drainage technique (FG-MLD/Belgrado ‘Fill and flush’). To date over 800 therapists have been trained in the technique across the world through Lymphoedema Training Academy (LTA). To address deficit in the evidence available for MLD, a survey has been carried out to evaluate the effect, but also the ease of application of the FG-MLD technique.

Aim: To evaluate the efficacy and ease of application of the FG-MLD technique in treating patient’s with lymphoedema. To identify any challenges in the implementation of the technique and any modifications required alongside the effect upon outcomes for the user and patient.

Method: A cross-sectional (survey) approach was devised, with a purposive sample population, which consisted of trained therapists/healthcare professionals in the FG-MLD technique via the LTA. Invitations were sent to individuals and resulted in a 25% acceptance rate to participate. The data collection period took place between 4th of December 2018 and 14th of February 2019. Data collated via the survey involved 1) Limb volume change pre and post treatment and after completion of Combined Decongestive Therapy (CDT); 2) Tissue response, 3) Ease of FG-MLD technique, 4) Ability to individualize treatment, 5) Maintenance of patient outcomes between treatment sessions 6) Treatment times and therapist and patient experience.

Results: At the time of submission 40 individual evaluations have been received with further data collection continuing until the closing date. Initial analysis of the 40 evaluations indicate that the Fill and Flush™ technique is easy to apply, safe, and has a fast response rate with good patient outcomes on treatment

Conclusions: Lymphofluoroscopy has allowed for the identification of hand movement and new drainage pathways that help with Lymphoedema management. This survey will assist with the maintainance of MLD as a treatment modality by demonstrating the affect of MLD and how it can easily be fitted into everyday patient care.
A PRELIMINARY ANALYSIS OF PATIENTS SCREENED FOR EARLY BREAST CANCER-RELATED LYMPHEDEMA USING VOLUMETRIC ARM MEASUREMENTS AND BIOIMPEDANCE SPECTROSCOPY: A COMPLEMENTARY ROLE

Tessa C. Gillespie1, Sacha A. Roberts1, Kayla M. Daniell1, Cheryl Brunelle1, Melissa Skolny1, Cynthia Miller1, Alphonse G. Taghian1

1 Massachusetts General Hospital, Radiation Oncology, Boston MA, United States
2 Massachusetts General Hospital, Physical and Occupational Therapy, Boston MA, United States
3 Massachusetts General Hospital, Department of Surgery, Boston, United States

Introduction: Patients treated for breast cancer (BC) with axillary surgery or regional lymph node radiation (RLNR) are at lifelong risk of breast cancer-related lymphedema (BCRL). Recommendations advise screening using objective measurements incorporating presurgical baselines. However, various measurement modalities with different diagnostic thresholds exist.

Aim: To investigate the relationship between relative volume change (RVC) measured with perometry and LDex values measured using bioimpedance spectroscopy (BIS) when screening for BCRL.

Method: 125 women treated for BC from 2011 to 2018 with unilateral surgery were enrolled and screened for BCRL using perometry and BIS preoperatively and throughout follow-up. Patients had baseline measurements and at least one follow-up. Linear regression models assessed the correlation between RVCs and LDex scores, and descriptive statistics summarized features of the data.

Results: 436 measurements were collected with a median of 3.5 measurements per patient over a median follow-up of 11.1 months. Baseline LDex measurements ranged from -18.2 to 21.5, with a median follow-up score of 1.30. Multiple thresholds for abnormal LDex were compared to current RVC thresholds for diagnosis, including the recent recommendation of 6.5 LDex increase from baseline. Changes in LDex of 6.5, 7, and 10 from baseline were not associated with an RVC of 5-10% (OR: 0.66, p=0.396; OR: 0.69, p=0.453; OR: 0.38, p=0.194 respectively). A change in LDex of 6.5 units was not associated with a future RVC of 5-10% or ≥10% (OR: 2.46, p=0.289). On univariate analysis, increases in LDex within the possibility of limb shape as a new method of measuring for lymphoedema.

Aim: To test the reliability and accuracy of results obtained from 3D camera imaging, including shape.

Method: A purposeful population of 20 new patients with unilateral upper limb lymphoedema. Exclusion criteria included reduced shoulder movement (below shoulder height), inability to meet review commitments and comorbidities exacerbating lymphoedema. Ethical approval was granted June 2016, and R&D approval gained August 2016.

Physical examinations were performed at initial assessment, and at two, four and six-month reviews. These included two 4cm circumferential measurements, limb volume measurement by perometer and imaging with a 3D camera.

Results: Twenty participants were recruited, with three failing to complete the study. Collaboration with Swansea University in deciphering the camera data identified good correlation in volume differences between all three tests (within 95% confidence interval). Data gained through regression methodology to detect change in limb shape demonstrated good sensitivity. New oedema maps provide a colourful and meaningful format for identifying areas of most swelling in a lymphoedematous limb.

Conclusions: Results show a good correlation in volume differences. There is good sensitivity to change in limb volume between all three methods of measurement. Limb shape, as a new method of lymphoedema measurement, is proving reliable and effective.
[33] REVISION OF THE CASLEY-SMITH MLD ROUTINE BASED ON ICG SCANNING

Cheryl Pike1, Melanie Thomas2, Rhian Noble-Jones3

1 Lymphoedema Network Wales, Swansea, United Kingdom
2 Lymphoedema Network Wales, Cimla, West Glamorgan, United Kingdom
3 University of Glasgow, Macmillan Lymphoedema Association, Glasgow, United Kingdom

Introduction: Advancements in scanning for lymphoedema, incorporating Indocyanine Green (ICG) lymphography, has improved the understanding of lymphatic function and lymphoedema distribution. ICG scanning has supported new lymphoedema classification systems as well as treatment for lymphoedema, including Lymphovenous Anastomosis (LVA) surgery and Fluoroscopy Guided Manual Lymph Drainage (FG-MLD).

The use of ICG scanning in real time has prompted constructive discussion within the Macmillan Lymphoedema Association (MLA) in the UK, and inspired the group to review their evolving Casley-Smith MLD techniques.

Aim: Investigate and appropriately revise the Casley-Smith MLD routines based on evidence demonstrated by ICG lymphography.

Method: Three MLD teachers (healthy subjects) and three volunteers with lymphoedema were injected with ICG dye. The lymphatics were scanned using the Fluoptics Fluorescence Imaging (Fluobeam, France) unit. Techniques used during the MLD routine were reviewed and various movements and exercises were tested to determine how these may or may not influence lymph flow.

Results: Effleurage of the neck did not show benefit, however two-way stretches of the neck demonstrated increased rate of flow in the lower leg. Axilla and groin clearance displayed better movement of fluid through activity as opposed to two-way stretches. In general movement and exercise demonstrated better lymph flow compared to massage techniques. Deep massage techniques were also more beneficial in areas of congestion opposed to effleurage, however a combination of techniques had best outcome in terms of movement of fluid.

Conclusions: The Casley-Smith MLD routine has been altered to include exercises pre-and post-MLD. All lymph node clearance is now done through movement where possible. The block and unblock techniques are now obsolete. Fibrosis techniques are encouraged in more challenging areas of swelling, but drained by effleurage as per Casley-Smith MLD routine. The exercises are translated into SLD routines for patients to continue self-management improving lymphatic flow. The use of technology has proven to facilitate advances in lymphoedema MLD.

[34] STADIATION OF LIPEDEMA BY THE CLINICAL AND INSTRUMENTAL SUPPORT

Sandro Michelini1, Cardone Marco2, Alessandro Fiorentino3, Giovanni Moneta2, Fantegrossi Maria Rita3, Failla Alessandro2

1 San Giovanni Battista Hospital, Rome, Italy
2 San Giovanni Battista Hospital, Rehabilitative Day Hospital, Rome, Italy
3 San Giovanni Battista Hospital, Consulting Room, Rome, Italy

Introduction: There are various types of localization in the limbs of patient affected by Lipedema: buttocks, thighs and legs, with prevalence in thighs; buttocks, thighs and legs, with heads in legs; buttocks, thighs, legs and arms; buttocks, thighs, legs, arms and forearms with prevalence in thighs and arms; buttocks, thighs, legs, arms and forearms with prevalence in legs and forearms. The cuffing sign is always present at ankles and wrists. The interest of the feet and the hands is only late and testifies a secondary involvement of loco-regional lymphatic transport.

Aim: The clinical staging of Lipedema, currently used in clinical practice (Meyer-Vollrath and Coll, 2004 which divides clinical frameworks in the three stages) appears outdated for a better clinical and instrumental framework of the pathology, that we can perform to the present day.

Method: From the clinical and instrumental analysis of 225 cases of familial lipedema, the authors propose the following clinical and instrumental staging, based on the objective examination and the execution of lymphoscintigraphy, high resolution ultrasound and tonometry:

Results: Stage 1: Sub-clinical forms (consanguines of patients with a positive name) or mild oedema affecting classical sites without cutaneous deformation, with a negative lymphoscintigraphy examination for alterations of lymphatic transport, ultrasound it shows localized and homogeneous increase of the suprafascial thickness and tonometry within the limits of the norm; feet and hands are free from oedema.

Stage 2: Edema affecting the classic storage sites with circumscribed deformation of the cutaneous profile; feet and hands are free from oedema; Initial subversion of the adiposis lobules at ultrasonography; mild dermal back flow at lymphoscintigraphy; tonometry with decreased or increased values (A, B)

Stage 3: Edema affecting the classical sites with serious deformation of the cutaneous profile circumscribed to some areas; feet and hands are free from oedema. Moderate dermal back flow at lymphoscintigraphy; Partial subversion of the adiposis lobules at ultrasonography; tonometry with decreased or increased values (A, B)

Stage 4: Edema affecting classical sites with total subversion of the cutaneous profile throughout the limb; Feet and hands with oedema, that can be conducted. Marked and diffuse dermal back flow with the presence of one or more lymph node stops along the limbs; total subversion of the adipose lobules at ultrasound examination; tonometry with decreased or increased values (A, B).

Conclusions: The AA will continue with clinical observations to broaden the case for the benefit of diagnostic, therapeutic (physical, medical and surgical) and prognostic addresses.
[35] WOMEN WITH LIPEDEMA HAVE LEAKY CAPILLARY DERMAL SKIN VESSELS COMPARED TO CONTROLS

Marisol Allen¹, Karen Herbst¹, Anastasia Miramontes¹
¹ 1501 N Campbell Ave, Medicine, Tucson, United States

Introduction: Lymphedema causes fluid accumulation in tissues, creating spaces around blood vessels in skin (Lymphology 42;2009:105). Lipedema is a painful disorder of excess fat on the lower body of women that resists loss and increases the risk of lymphedema. Lipedema, lymphedema and BMI worsen by stage. Capillaries in lipoedema skin can have perivascular spaces and accumulate immune cells and altered endothelium, a leaky vessel phenotype.

Aim: Since fluid shifts from the trunk to the lower body on standing, the aim of this study was to determine if a leaky phenotype was present in the thigh of women compared to abdomen and if vessels would be leakier in lipoedema compared to controls.

Method: 5 mm skin punch biopsies were collected from the thigh or abdomen. All vessels in the reticular and papillary dermal skin samples were scored for leaky or non-leaky phenotype by microscopy at 40x magnification by two different observers then averaged. Data was analyzed by ANOVA, linear regression, unpaired and paired t-tests (Graphpad Prism 7).

Results: Women with lipoedema: n=44; age= 46 +/- 1.5; BMI=33.78 +/- 1.37. Control women: n=24; age= 38 +/- 2.5 ; BMI=26.4 +/- 1.18. Women with lipoedema had a higher percentage of leaky vessels in the thigh (43.8 +/- 19.3) compared to the abdomen (18.9 +/- 15.6; P=0.0001), as did control women for thigh (25.1 +/- 14.5) compared to abdomen (13.1 +/- 12.6; P=0.009). Women with lipoedema had more leaky vessels in the thigh (P<0.0001) but not the abdomen compared to controls. In 15 age (P=0.8) and BMI (P=0.6) matched women, lipoedema stages 1 and 2, and 15 controls, percent of leaky vessels in the thigh was significantly higher in lipoedema (P=0.004). Interestingly, there were significantly more leaky vessels in the thigh of women with Stage 1 (n=14; P<0.001) and Stage 2 (n=20; P=0.003) but not Stage 3 lipoedema (n=10) versus controls. The greater the BMI, the fewer leaky vessels in women with lipoedema (r²=0.12; P=0.02), driven by fewer leaky vessels in women with Stage 3 lipoedema.

Conclusions: Fluid shifts on standing influence micro-vessels in the skin towards a leakier phenotype in the thighs compared to the abdomen of women, and this occurs significantly more often in lipoedema thigh skin. These data suggest a microangiopathy is likely in lipoedema. The non-leaky microvessels in women with Stage 3 lipoedema and higher risk for lymphedema, suggest the lymphatic vessels may play a greater role in this stage.

[36] CHRONIC PAIN IN LIPOEDEMA: ARE THERE INDICATORS FOR NOCICEPTIVE, NEUROPATHIC OR CENTRAL SENSITIZATION PAIN?

Wouter Hoelen¹
¹ De Berekuyl, Hierden, Netherlands

Introduction: To this date it is not uncommon for lipoedema patients to be misdiagnosed and thus mistreated due to lack of diagnostic tools and clinical knowledge. The progressive, chronic nature of this condition can provoke other conditions ranging from venous decongestion, lipo-lymphoedema and eventually immobility. Therefore early recognition can make a difference and possibly prevent the progression of this condition.

One of the key features for the diagnosis of lipoedema is the variation in pain levels (mild – extreme) and its manifestation.

Aim: In most cases predominant pain existing for longer than 3 months is present, thus suggesting the presence of a chronic pain condition. The pathophysiology around and the origin of the perceived pain in lipoedema patients, regardless the stage of disease, is yet unknown. Hence, the question arises if a stratification for pain using an algorithm to determine nociceptive, neuropathic, central sensitization or a mixed pain classification, might lead to better pain intervention strategies and pain coping styles.

Method: Cross sectional study; 45 diagnosed women with lipoedema grade I-III are included in this study.

Results: ongoing research (Jan-May 2019), preliminary results will be presented

Conclusions: ongoing research (Jan-May 2019), preliminary results will be presented
Introduction: Lipedema is a chronic, incurable condition that can have a severe impact on quality of life, physical and psychosocial well-being. As the awareness of health professionals is low, lipedema is commonly misdiagnosed as lymphedema or obesity.

Aim: The aims of this study were to evaluate the frequency and characteristics of lipedema patients and determine their awareness about this condition in a lymphedema unit.

Method: All patients who referred to lymphedema unit were screened and the frequency of lipedema was determined according to the diagnostic criteria (1). The demographic and clinical characteristics of lipedema patients were recorded.

Results: A total of 378 patients had referred to lymphedema unit, between September 2017-December 2018. 92 (24%) them had lipedema component. All but one patient were women with a mean age of 56.22 years. Of the 92 patients 39 (42.4%) had pure lipedema, 43 had lipolymphedema (46.4%) and 10 had phlebolipedema (10.9%). The mean BMI was 36.8 kg/m² and most of the patients were obese. 3 (5.7%) patients had stage 1, 11 (20.7%) had stage 2 and 39 (73.6%) had stage 3 lipedema (2). The most common involvement was determined as type 3 (60.4%) followed by type 2 (20.7%), type 4 (13.2%) and type 1 (5.7%) according to classification criteria (3). Most of the patients had involvement of more than one type. A positive family history was present in 37.8% of the patients. The most common comorbid conditions were hypertension (41.3%), diabetes mellitus (17.4%). Only 19 (20.7%) of the patients had knowledge about lipedema and 17 (18.5%) patients were diagnosed as lipedema before they referred to our unit.

Conclusions: The frequency of lipedema is greater than expected in our lymphedema unit. Half of them had lipolymphedema as secondary complication and due to late diagnosis. The BMI was higher in majority of the patients. The awareness about lipedema is low among patients and families. We suggest educational activities for both patients and health professionals about lipedema in order to facilitate early diagnosis and realistic therapeutic approaches for this suffering population.

References
Introduction: Enlargement of lower extremities often times is associated with obesity. Clinically, gynoid fat distribution is symmetrical. Thus, the healthcare professional commonly mistakes the progression of weight gain as the sole cause of enlargement of the lower extremities. Lifestyle induced obesity is different from excess gynoid fat of lipedema. Excessive weight can have a negative impact on the return of lymphatic fluid from the legs. Lipolymphedema may develop. This adversely affects patients in terms of physical suffering and pain, impaired function, and diminished quality of life. Furthermore, persistent relapses have a significant influence on individual employment status and work-related productivity. In addition to the significant burden on patients and their families, lipolymphedema represents a sizable burden to society due to high healthcare and non-healthcare related costs. Decongestive lymphatic therapy may ameliorate these consequences.

Aim: To illustrate how decongestive lymphatic therapy can have positive treatment outcomes, as well as improvement in quality of life and functional mobility

Method:

- Literature review
  The purpose of this literature review is to provide an overview of research studies published from 2005 to 2018 in the English language with keywords (including but not limited to): lipedema, lymphedema, obesity-induced lymphedema, obesity, gynoid fat, decongestive lymphatic therapy, from the perspective of both the health consumer and the health professional.

- Case series
  Descriptive study following three patients who have a similar diagnosis, lipolymphedema and who are undergoing decongestive lymphatic therapy.

Results:
1. Amazing as depicted in the photos

Conclusions: Lipolymphedema is commonly misdiagnosed. It is essential to recognize its uniqueness for proper treatment. Review of the literature indicates an increase of literature to guide healthcare professionals in making the correct diagnosis. However, the literature lacking in what the proper treatment is. The goal of treatment is to improve symptoms, prevent secondary complications, while enhancing quality of life. Decongestive lymphatic therapy is essential for life long sustaining management of lipolymphedema.
Abstract Session  Obesity and Lymphedema/Lipedema

[40] BODY MASS INDEX (BMI) TRENDS OVER SEVEN YEARS FOR PERSONS WITH BREAST CANCER-RELATED LYMPHEDEMA (BCRL)

Allison Anbari¹, Chelsea Deroche¹, Jane Armer¹
¹ University of Missouri, Sinclair School of Nursing, Columbia, United States

Introduction: Early detection and prospective surveillance of breast cancer (BC)-related lymphedema (BCRL) are important, as early treatment can reduce complications and functional decline, ideally maintaining pre-diagnosis quality of life (QOL). Higher body mass index (BMI) at BC diagnosis places survivors at higher risk for developing BCRL.

Aim: 1) What are the seven-year BMI trends for BC survivors with BCRL compared to those without BCRL? 2) Are BMI changes for survivors with BCRL associated with changes in QOL?

Method: Seven-year BMI trends for Breast Cancer and Lymphedema Study participants (BCRL: n=144; non-BCRL: n=167) were reviewed. Participants self-reported BCRL using the reliable and validated Lymphedema and Breast Cancer Questionnaire (LBCQ). Participants completed the LBCQ yearly and were included in the BCRL group with an answer of “yes” to the question “Have you been told you have LE?” at any time. BMI was measured at each lab visit.

Participants also completed the 36-Item Short-Form Health Survey (SF-36) annually. Using a repeated-measures general linear mixed-model with a variance-components covariance structure, controlling for age and region, changes in the SF-36 QOL domains were examined in relation to BMI changes over seven years.

Results: Participants later diagnosed with BCRL commenced BC diagnosis and treatment with a higher mean BMI than the participants who were not later diagnosed with BCRL (p=0.02). Over seven years, participants with BCRL who were <55 years old at diagnosis showed a BMI change of 0.4749 kg/m² higher on average than those who were ≥55 years old. Rural/urban residence was not associated with BMI change or development of BCRL.

Participants with BCRL (n=144; 559 observations), there were statistically significant associations of BMI change and three SF-36 domains covariance structure, controlling for age and region, changes in the SF-36 QOL domains were examined in relation to BMI changes over seven years.

Conclusions: BC patients with higher BMIs should be taught about BCRL signs and symptoms early in their BC diagnosis. Although outcomes are modest here, BCRL impacts QOL. Education and early detection in survivors at high risk for BCRL may preserve QOL.

Abstract Session  Surgery/Basic Science and Biology

[41] DEVELOPMENT OF LYMPHATIC WIRE FOR DETECTION OF LYMPH COLLECTORS IN TREATMENT OF PERIPHERAL LYMPHEDEMA

Jiro Maegawa², Shinya Kitayama², Yuuichro Yabuki²
² Yokohama City University, Plastic and Reconstructive Surgery, Yokohama, Japan

Introduction: Lymphatic venous anastomosis is one of common surgical procedures for peripheral lymphedema. Near infrared fluorescent lymphangiography is useful to detect the lymph collectors during surgery, however, in the areas with thick subcutaneous tissue and dermal back flow it is difficult to detect them. To overcome this problem we developed a small diameter wire, “lymphatic wire” that can be inserted into lymph ducts.

Aim: The aim of this report is to show a possibility to apply endovascular treatment to treatment for peripheral lymphedema.

Method: The basic structure of lymphatic wire is the same as the existing guide wire for blood vessels. Its material is Nitinol, which consists of nickel and titanium. The maximum outer diameter is 250 μm (0.099 inches) and tapered toward the tip. In that part of the tip, gold is wound in a coil shape and made moderate mobility. The whole is coated with a hydrophilic polymer. Animal experiments were performed on the hind limbs of 6 swine to evaluate operability and injury associated with the use of lymphatic wires.

Results: Although damage to the inner membrane was recognized slightly, adverse events such as valve dysfunction and penetration were not identified. In few clinical cases we identified subcutaneously existed lymph ducts even at sites difficult to observe with near infrared fluorescent lymphangiography such as femoral region, and then we could anastomosis with the neighboring vein.

Conclusions: It was suggested that the lymphatic wire seemed to be useful as a new lymph vessel identification method. However, an auxiliary device such as an X-ray fluoroscope is necessary for safe use. This will be an introduction of endovascular treatment for peripheral lymphedema.
[42] ALIGNED NANOFIBRILLAR COLLAGEN SCAFFOLDS CAN TREAT INDUCED LYMPHEDEMA IN RATS

Tatiana Zaitseva1, Dimitris Dionysiou2, Cristhian Montenegro, 2, Gloria Sue1, Peter Depta1a, Derrick Wan1, Michael Pauskho1, Dung Nguyen1, Stan Rockson2

1 Fibralign Corp., Union City, United States
2 Stanford University, California, United States
3 Fibralign Corp, California, United States

Introduction: To expand treatment options for lymphedema patients, we have investigated lymphatic regeneration guided by thread-like scaffolds made from aligned collagen fibrils. The scaffold supports interstitial flow and facilitates cell attachment, alignment, and migration. Preliminary clinical data related to the use of BioBridge for lymphedema treatment demonstrate reduction in edema volume.

Aim: Rat hindlimb lymphedema model was employed to test our hypothesis that implantation of nanofibrillar collagen scaffolds (BioBridge) can (1) reduce lymphedema when used in animals with developed lymphedema and (2) prevent lymphedema in animals when employed at the time of lymphedema induction surgery.

Method: The rat lymphedema model involved inguinal and popliteal lymphadenectomy followed by radiotherapy. Subjects in the prevention group received implantation of BioBridge immediately after lymph node resection. Subjects that developed lymphedema one month after lymphadenectomy/radiation either received implantation of BioBridge with autologous adipose-derived stem cells (ADSC; treatment group) or remain untreated (control group). All subjects were observed for 4 months after lymphadenectomy. The hindlimb volume was measured before, and one and four months after lymphadenectomy, using CT-based volumetric analysis, and the change in affected to unaffected limb volume ratio was evaluated. Lymph flow and lymphangiogenesis was also assessed by ICG fluoroscopy.

Results: Subjects in the treatment group showed a reduction in affected limb volume (affected/non-affected limb volume ratio decreased from 113 to 97% (p <0.02)), and animals in the prevention group showed no increase in the affected limb volume (p < 0.01). ICG fluoroscopy demonstrated restoration of lymph flow in the affected regions and formation of new lymphatic vessels going toward the contralateral groin.

Conclusions: These data show that in the rat lymphedema model, (1) implantation of BioBridge at the time of lymph node removal prevents development of lymphedema, and (2) treatment of established lymphedema with the BioBridge and ADSC reduces lymphedema.

[43] ACQUIRED LYMPHATIC PUMP FAILURE AND THERAPEUTIC RESTORATION IN A MOUSE MODEL OF LYMPHEDEMA

M. T. Cribb1,2, M. J. Weiler1,2, T. S. Nelson1,2, J. B. Dixon1,2,3
1 Parker H. Petit Institute for Bioengineering and Bioscience, Atlanta, GA, United States
2 George W. Woodruff School of Mechanical Engineering, Atlanta, GA, United States
3 Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, United States

Introduction: It has been suggested that many forms of secondary lymphedema in humans are driven by a progressive loss of lymphatic pump function after an initial risk-inducing event. However, the link between pump failure and disease progression has remained elusive due to experimental challenges in the clinical setting and a lack of adequate animal models. Moreover, mouse models of lymphedema involve a complete disruption of the lymphatic vessels that drain the effective limb and result in immediate lymphedema, a process that is not reflective of the partial disruption of the lymphatic vasculature, and gradual decline of lymphatic function and resulting disease onset that occurs clinically.

Aims of Study: We therefore sought to develop a mouse model of partial lymphatic disruption that drives future lymphatic pump failure, and then to test this model against an antiinflammatory therapeutic that has shown efficacy in preventing fibrosis in other lymphedema models, to determine if this approach would correct lymphatic pump failure. Methods: Using a novel surgical model of lymphatic injury, we track the adaptation and functional decline of the lymphatic network in response to surgery. Specifically, a partial circumferential incision is made around the base of the mouse tail, disrupting some of the initial lymphatic capillaries and cauterizing one of two collecting lymphangion chains that drain the tail while leaving one chain intact.

Results: Mice presented with histological hallmarks of the typical tail lymphedema model while leaving an intact collecting vessel to drain the tail. In mice with tail swelling greater than 20%, lymphatic function in the intact vessel negatively correlated with swelling (p<0.05), while mice with swelling below this threshold showed minimal loss of function. Moreover, mice with swelling exhibited a significant loss in lymphatic pumping pressure (p<0.01) that persisted even after resolution of swelling. In mice fed a high-fat diet, obesity exacerbated the acquired lymphatic failure following injury, and obese mice exhibited persistent loss of pumping pressure for 70 days after the initial insult (p<0.05). Obese lymphedema mice were treated via topical application of tacrolimus ointment beginning 14-days after induction of lymphedema, and pumping pressure was restored in these mice by day 28 and function remained up to day 70.

Conclusions: We demonstrate that a secondary injury to an intact collecting lymphatic vessel can occur as the intact vessel remodels in response to an initial surgical insult, and presented evidence that pump dysfunction in this model can be restored pharmacologically.
[44] PHENOTYPIC ASPECTS OF PRIMARY LYMPHOEDEMA IN CELSR1 MUTATIONS

Sandro Michelini1, Maltese Paolo Enrico1, Maurizio Ricci1, Maltz Silvia2, alessandro fiorentino2, Serrani Roberta3, Lazzarotti Alessandra2, Bruson Alice2, Paolacci Stefano2, Bertelli Matteo2

1 San Giovanni Battista Hospital, Rome, Italy
2 Magi’s Lab, Laboratory, Rovereto, Italy
3 Rehabilitation, , Italy
4 San Gerardo Hospital, Pediatric Genetics Unit, Monza, Italy
5 Ospedale San Giovanni Battista, Rehabilitation, Rome, Italy
6 Le Torrette Hospital, Rehabilitation, Ancona, Italy

Introduction: CELSR1 is a member of the cadherin superfamily. It is involved in planar cell polarity and is known to play a role in valve formation and function in murine lymphatics. Only one paper, published in 2016, has described an association between a truncating mutation in CELSR1 and hereditary lymphedema in a large family.

Aim: The aim of this study was to evaluate the frequency of CELSR1 mutations in lymphedema patients in order to establish its utility in routine genetic testing. An overall estimate of the frequency of genes involved in lymphedema is also reported.

Method: The genetic analysis of 132 probands was performed using next-generation-sequencing with a panel including the 11 genes known to be linked to inherited lymphedema, as well as CELSR1.

Results: We identified seven new pathogenic or likely pathogenic loss-of-function variations in CELSR1 in seven unrelated probands. In some cases, we extended the test to their relatives. Lymphedema caused by CELSR1 variations was almost fully penetrant in females (six out of seven females (86%) with a CELSR1 mutation manifested lymphedema) but not in males (only one out of four males, i.e. 25%). Overall, genetic testing proved positive in 12% of cases, negative in 71% and inconclusive in 17% of the patients tested.

Conclusions: CELSR1 variations explain about half the lymphedema patients positive to genetic testing. Since the percentage of lymphedema patients caused by CELSR1 loss-of-function variations is not negligible (7 out of 132 patients, 5.3%), we definitely recommend including this gene in routine genetic testing.

[45] PHYSICAL AND SURGICAL TREATMENT IN PRIMARY AND SECONDARY LYMPHOEDEMA: CLINICAL RESULTS

Sandro Michelini1, Alessandro Fiorentino2, Gobbetti Giulio3, Giovanni Moneta2, Failla Alessandro2, Caneri Massimo1, Giribaldi Valeria4

1 San Giovanni Battista Hospital, Rome, Italy
2 Ospedale San Giovanni Battista, Rehabilitation, Rome, Italy
3 Regina Arco Clinic, Lymphatic Rehabilitation, Arco Di Trento, Italy
4 Le Torrette Hospital, Rehabilitation, Ancona, Italy

Introduction: Treatment of primary and secondary lymphedema requires a multidisciplinary and multi-professional approach. The patient’s expectations are often not satisfied, and this leads to the realization of the phenomenon known as ‘medical nomadism’, for which the patient himself is constantly looking for new health teams to solve his problem.

Aim: The aim of this work was to analyze the real effectiveness of the surgical interventions currently performed in lymphedema.

Method: The AA analyzed three-year of clinical outcomes in two groups of patients: Group A (patients treated with surgery, associated to decongestive physical treatment) and Group B (patients underwet only decongestive physical treatment).

239 patients were studied (142 females and 96 males between the ages of 29 and 67); 112 (Group A) underwent surgery (40 microsurgical or reconstructive microsurgery, 7 lymph node transplants, 49 supermicrosurgery, 14 liposuction, 2 multiple fasciotomies) + decongestive physical treatment and, 127 (Group B) only for decongestive physical treatment.

The two groups were homogeneous by age, clinical stage and form (primary or secondary).

Results: The results show an average major decrease in volume and consistency of limbs in 16% of patients in group A compared to group B; more evident results were observed in the mean decrease in lymphangitis episodes (47% higher in group A patients, with prevalence in subjects operated with supermicrosurgery technique, respect to 27% of Group B). In one case, undergoing a fasciotomy surgery, there was an appearance of recurrent postoperative lymphangitis (absent before surgery).

Conclusions: In the light of these results the Authors consider appropriate a more thorough study of the candidate patients to surgery to have a better result, by means of a better clinical and instrumental definition, in association with clinical lymphologists and surgeons.
ARTIFICIAL DRAINAGE OF LYMPHATIC FLUID: TOWARDS THE CLINICAL TESTING OF AN IMPLANTABLE PUMP FOR THE TREATMENT OF CHRONIC EDEMA

Valentina Triacca1, Marco Pisoni1, Mathieu Aberle1, Vicky Boucard1, Claudia Lessert2, Lucia Mazzola3

1 Lymphatica Medtech Sa, Lausanne, Switzerland
2 Centre Hospitalier Universitaire Vaudois, Angiology Service, Lausanne, Switzerland
3 Chuv, Lausanne, Switzerland

Introduction: We previously proposed an innovative approach to restore continuous lymph flow in lymphedema based on the implantation of an artificial lymphatic vessel composed of a peristaltic pump and a drainage catheter. In a rat model of lower limb lymphedema, we showed that excess volume can be reduced by drainage of accumulated fluid with an implanted peristaltic pump (Triacca et al., EJVES, 2018).

Aim: Aims of the present study were to assess the technological feasibility of an implantable pump suited for human use, to test its functionality, via both bench testing and implantation in sheep, and to finalize its design for clinical use.

Method: The pump was designed following state of the art engineering principles, aiming to minimize the size of the implantable component. Materials were chosen according to their biocompatibility and mechanical properties. Devices were produced by CNC machining and pump characterization curve was obtained with bench performance testing. Obtained devices were implanted subcutaneously in the posterior limb of 6 Swifter sheep and connected to an outlet catheter inserted in the peritoneal cavity. Feasibility of the surgical implantation, device functionality (verified via lymphofluoroscopy) and device removal procedure were tested.

The results of the preclinical studies on rat and sheep were used as input for an improved version of the device, LymphoDrain, designed to be used in a pilot clinical study.

Results: We verified the technological feasibility of the implantable pump for the treatment of lymphedema and characterized pump flow rate and pressure head. We produced 12 fully functional prototypes, 6 of which were implanted in sheep. The implant procedure was easy to perform, and no post-surgical complications were observed. Device functionality was confirmed via lymphofluoroscopy, upon subcutaneous injection of indocyanine green on the distal side of the pump, and visualization of the drained dye in the outlet catheter of the device draining to the peritoneal space. The implanted devices were easily removed two weeks after implantation.

Following preclinical testing, further technological improvements were implemented on the device, and the design freeze of a device suitable for clinical testing was reached.

Conclusions: We designed and developed a fully functional prototype of the implantable pump for lymphedema treatment. Results from the implantation study in sheep demonstrated the feasibility of the surgical procedure and safety of the device. We then finalized the design of an improved version of the device, LymphoDrain, suitable for clinical testing.

INTERMITTENT PNEUMATIC COMPRESSION AND THE EFFECT OF DIFFERENT COMPRESSION SEQUENCING FOR TREATING LOWER LIMB LYMPHOEDEMA

Nyree Dunn1, Mark Williams2, Gina Dolan3, Jane Davies4

1 University of South Wales, Cardiff, United Kingdom
2 University of South Wales, Pontypridd, United Kingdom
3 University of South Wales, Treforest, United Kingdom
4 Cardiff University, Cardiff, United Kingdom

Introduction: Decongestive Lymphatic Therapy (DLT) is recognised as the gold standard care of lymphoedema; however it is often regarded as time and labour intensive with low levels of patient adherence, particularly in relation to the compression component of treatment. Intermittent pneumatic compression (IPC) represents an adjunctive or alternative treatment modality; whilst effectiveness of IPC for the treatment of lower limb venous disease and ulceration has been demonstrated in existing research, an evidence base supporting its use in lymphoedema is yet to be established.

Aim: The study aims to: (i) evaluate the efficacy of IPC as a treatment for lower limb lymphoedema, and (ii) assess the effect of different compression sequencing modes in the IPC device (LymphAssist, Huntleigh Healthcare, UK). Mode one has been designed to mimic the manual lymph drainage process while mode two applies sequential compression in an ascending pattern up the limb.

Method: This randomised control study compares standard lymphoedema care plus use of an IPC device in mode one (n=25) versus standard lymphoedema care plus use of an IPC device in mode two (n=25). The inclusion criteria are 1) age 18 or over, 2) confirmed diagnosis of ISL stage II or III lower limb lymphoedema. Exclusion criteria were based on the contraindications to IPC as specified by the Lymphoedema Framework. Eligible patients who consent to take part follow a prescribed treatment regime consisting of a 5 week control period, followed by a 5 week intervention period during which they use their allocated IPC device on a daily basis.

Outcomes to be assessed at 5 and 10 week time-points include: changes in limb volume, occurrence of lymphoedema complications, changes in skin tone measures (elasticity and stiffness), impact on patient rated quality of life scores and concordance with treatment regimes. Ethical approval was granted by REC 6 (REC 18/WA/0114).

Results: Recruitment and data collection are ongoing and will be complete by May 2019

Conclusions: This study addresses an important evidence gap relating to the clinical effectiveness IPC in the treatment of lymphoedema. Full results will be presented.
ARE COMPRESSION THERAPISTS TOO SUPERFICIAL? QUANTIFYING LIMB COMPRESSION THROUGH PRESSURE MEASUREMENTS AT THE SKIN SURFACE.

Luke Parkinson¹, Neil Piller², John Arkwright³

¹ Parkki Pty Ltd/Flinders University, Kensington Park, Australia
² Flinders Medical Centre/Flinders University South Australia, Department of Surgery, Bedford Park, Australia
³ Flinders University, Tonsley, Australia

Introduction: Compression therapy is one of the few medical practices where the therapeutic ‘dose’ is poorly quantified. This is due to a broad misunderstanding of how sub-bandage pressure measurements at the limb surface can be perturbed by the sensor shape, limb curvature, sensor calibration procedure and how these aspects relate to the internal pressure applied to the limb.

Aim: To relate surface pressure measurements made in regions of different curvature to the internal pressures realised throughout the cross-section of model limbs.

Method: Two model limb sections containing embedded polyethylene sleeves and rigid bone analogues were fabricated from soft silicone rubber. Since both limb sections had the same circumference, the average radius was equal (54 mm). One section was cylindrical whereas the other approximated the cross-section of a healthy calf with five distinct regions of different curvature ranging from 27-2000 mm radius. Pressure was applied by a single loop of bandage contacting the entire circumference under known tension and surface pressure was measured at 5 points around the circumference of each limb with a fibre-optic pressure sensor array that measures pressure independently of curvature[1]. Surface pressure was related to internal pressure throughout the cross-section by measuring flow through the polyethylene sleeves.

Results: For a bandage tension of 135 Nm⁻¹ the pressure around the circumference of the cylindrical limb section was invariant (16.3 ± 0.8 mmHg) and in accordance with Laplace’s Law. This reflected the core limb pressure (15.3 ± 4.0 mmHg) determined by flow analysis. However, for the same tension applied to the anatomically-shaped section, surface pressure varied between 1.5 ± 1.4 mmHg at the flattest part of the shin to 34.0 ± 3.9 mmHg at the smallest radius. While surface pressure varied with curvature in close agreement with Laplace’s Law, the pressure at the core of the anatomical limb (18.5 ±4.5 mmHg) closely approximated those at the core of the cylindrical section.

Conclusions: Our results demonstrate that superficial sub-bandage pressure values are inextricably linked to limb curvature at the measurement location. We also show that the pressure applied at the core of the limb may be inferred from surface pressure measurement and propose a simple algorithm to do this by incorporating the measured value with the local and mean curvatures of the limb.


PATTERNS OF LYMPHEDEMA SYMPTOMATOLOGY: PHENOTYPIC AND BIOMARKER CHARACTERIZATION

Mei Fu¹, Gary Yu², Bradley E Aouizerat³, Yvette Conley⁴, Deborah Axelrod⁵, Amber A. Guth⁶, Karen Hiots⁴, Joan Scagliola⁷, Jean-Pierre Gagner⁸, David Zagzag⁸

¹ New York University, New York, United States
² New York University, Department of Oral and Maxillofacial Surgery, New York, United States
³ New York University School of Medicine, Department of Surgery, New York, United States
⁴ University of Pittsburgh, School of Nursing, Pittsburgh, United States
⁵ New York University School of Medicine, Department of Surgery, New York, United States
⁶ New York University, New York, United States
⁷ NYU Langone Medical Center, Pathology and Neurosurgery, Division of Neuropathology, Microvascular and Molecular Neuro-Oncology Laboratory, New York, United States
⁸ Department of Pathology, New York, United States

Introduction: More than 50% of breast cancer survivors without a diagnosis of lymphedema suffer daily from numerous and co-occurring lymphedema symptoms. Lymphedema symptoms are subjectively perceived indicators of abnormal biological or physiological changes that may or may not be observed objectively. Importantly, lymphedema symptoms may indicate an early stage of lymphedema for which timely intervention may prevent lymphedema from progressing into a chronic condition (i.e. arm lymphedema) that no surgical or medical interventions at present can cure. Little is known about the patterns of co-occurring lymphedema symptoms (i.e., the phenotype), the patient characteristics (e.g., demographic, clinical and behavioral factors) associated with and physiological (i.e., limb volume and lymph fluid level) and patient-reported outcomes influenced by lymphedema symptoms and symptom distress.

Aim: To use latent class analysis (LCA) to identify lymphedema symptom patterns and the association of such patterns with phenotypic characteristics and biomarkers.

Method: A prospective, descriptive and repeated-measure design. The sample of 140 participants were recruited from among consecutively-identified pre-operative patients and each participant was followed for 12 months after breast cancer surgery. Phenotype measures included symptoms, limb volume, and lymph fluid level. Biomarker data, demographic and cancer treatment-related data were collected.

Results: LCA identified three distinct lymphedema symptom classes at 8-week and 12-month post-surgery: low, moderate and severe symptom classes and associated phenotypic characteristics. Pre-surgery level of IL1-a, IL-6, IL-8, VEGF were associated with the severe symptom class at 8-week post-surgery. Patients in the severe symptom classes reported at about 14 symptoms and characterized by a higher than average prevalence of almost all 26 symptoms. Women in the severe symptom class had the highest lymph fluid level and limb volume. The moderate symptom classes also had higher lymph fluid level and limb volume change in comparison with the low symptom classes, a finding may serve as initial evidence that patients in the moderate symptom classes are at-risk patients.

Conclusions: The current study is the first to define lymphedema symptom patterns using LCA to empirically identify clusters of individuals reporting similar patterns and trajectories of lymphedema symptoms. The LCA model identified low, moderate and severe symptom classes at both 8 weeks and 12 months post-surgery and there was a significant association between the latent classes at 8 weeks and at 12 months. The association of inflammatory biomarkers at baseline with symptom classes at 8-week post-surgery suggests that such biomarkers may be used to predict risk for lymphedema symptoms.
Introduction: Despite current advances in cancer treatment, many breast cancer survivors still suffer daily pain. Digital therapy uses behavioral and lifestyle strategies to treat or manage health conditions, such as chronic pain or symptoms or optimizing management of chronic illness by utilizing web-and-mobile-based digital technology to deliver therapy and monitor progress. The Optim-Lymph-Flow™ (TOLF) is a patient-centered digital therapy that delivers safe, feasible, and easily-integrated-into-daily-routine therapeutic lymphatic exercises to manage chronic pain through promoting lymph flow and minimizing inflammation.

Aim: The purpose of the study was to evaluate the efficacy of TOLF digital therapy for chronic pain management following breast cancer treatment.

Method: A parallel, 12-week, randomized clinical trial (RCT) with control-experimental, pre- and post-test was used. A total of 120 patients were randomized. Participants in the intervention group received the lymphatic exercise intervention while those in the control group received the shoulder mobility exercise intervention. The intervention outcomes of pain, soreness, aching, and tenderness, and limb volume difference were evaluated. Descriptive, chi-square, t-tests and mixed effects models were used for data analysis.

Results: Participants in both intervention lymphatic exercise and shoulder mobility exercise group had significant improvement of pain at 12-weeks after intervention. Significantly more participants in the lymphatic exercise intervention reported improvement in pain, soreness, aching, and discomfort in the affected and non-affected limb were found in the lymphatic exercise intervention group.

Conclusions: TOLF digital therapy consisting of therapeutic lymphatic exercises and shoulder mobility exercises is effective to manage chronic pain, including soreness, aching and tenderness following breast cancer treatment. Findings of the study provided the evidence for emerging digital therapy using behavioral strategies for pain, offering support for policy on behavioral management for pain.
Abstract Session Risk Reduction

[52] PREVENTION OF LYMPHOEDEMA AFTER AXILLARY CLEARANCE (ANC) BY EXTERNAL COMPRESSION SLEEVES RANDOMISED TRIAL: RESULTS OF PLACE TRIAL

Nigel Bundred1, Philip Foden2, Katie Riches3, Julie Morris4, Abigail Evans5, Chris Todd6, Maria Bramley6, Anthony Sene7, Arnie Purushotham8, Vaughan Keeley9

1. Manchester University NHS Foundation Trust, Manchester, UK., Manchester, United Kingdom
2. University Hospital of South Manchester, Medical Statistics Department, Manchester, United Kingdom
3. Derby Teaching Hospitals Nhsf Trust, University Hospitals of Derby and Burton NHS Foundation Trust, Derby, UK., Derby, United Kingdom
4. Poole Hospital NHS Foundation Trust, Poole, United Kingdom
5. Manchester University NHS Foundation Trust, Manchester, UK., Division of Nursing, Midwifery & Social Work, Manchester, United Kingdom
6. Pennine Acute NHS Trust, Breast Surgery, Pennine, United Kingdom
7. Royal Bournemouth Hospital, Breast Surgery, Bournemouth, United Kingdom
8. King’s College London, London, United Kingdom
9. Derby Teaching Hospitals NHS Foundation Trust, Lymphoedema Department, Derby, United Kingdom

Introduction: Lymphoedema (LE) develops in 30% of women with early arm swelling (RAVI 4-9%) post ANC. Intervention with a compression garment before arm swelling becomes chronic is claimed to prevent lymphoedema but there is no randomised evidence. Arm swelling of 4 – 9% within 9 months of surgery predicts later development of lymphoedema. A small study claimed early intervention with compression arm sleeves prevented the development of chronic lymphoedema.

Aim: To determine if early intervention with external compression sleeves prevents early RAVI swelling (4-9%) progressing to lymphoedema in a randomised trial.

Method: A multicentre randomised open controlled trial testing (1) standard management (written advice, arm elevation, exercises and massage) versus (2) application of whole arm graduated compression garments (pressure 20-25mmHg:Sigvaris) to affected arm, and standard management for 1 year. Women randomised to compression garments received 4 garments (type 2 20-25mmHg) for 12 months. We compared the 1) Time to development of lymphoedema (>10% RAVI) from randomisation, 2) Quality of life (TOI and FACT B+4 ARM sub-scale).Women with breast cancer (n=1100) undergoing ANC consented to pre and postoperative arm measurements with a perometer and those developing a 4-9% increase in arm volume up to 9 months post-surgery were randomised. Statistical power: With 190 women randomised we had a 90% power to identify a conservative 30% difference (from 60% to 30%) in lymphoedema at 18 months after surgery.

Results: Between October 2010 and August 2016, 143 patients were randomised and 38 (27%) patients subsequently developed lymphoedema. LE rate by 24 months (as pre-defined by RAVI ≥10% after randomisation) in patients randomised to ‘no sleeve’ was 30% (21/71) versus 26% in patients randomised to ‘sleeve’ (17/66: p=0.62). Twenty-six patients randomised to the ‘no sleeve’ group had a sleeve applied within 24 months and 13 subsequently developed RAVI≥10%. In patients with BMI>30 LE was 43.5% sleeve arm and 45.5% no sleeve arm and for BMI<30 patients 15.2% in the sleeve versus 21.1% in the no sleeve arm.

Body Mass Index (BMI) pre-surgery predicted lymphoedema at any time point HR 1.08 (CI 1.02-1.14; p=0.011) with BMI >30 HR 3.09 (CI 1.11-8.54 compared to BMI ≤25) patients having the highest lymphoedema rate in both arms of the trial (sleeve: 10/23, 43.5%; no sleeve: 10/22, 45.5%). Compression sleeves after development of Lymphoedema improved QoL scores (FACT-B p=0.007:TOI p=0.042).

Conclusions: Early intervention with Type 2 External Compression garments does not prevent lymphoedema, particularly in women with a BMI>30.
[53] RISK FACTORS FOR CORDING IN PATIENTS TREATED FOR BREAST CANCER AND AT RISK FOR BREAST CANCER-RELATED LYMPHEDEMA

Cheryl Brunelle1, Sacha A. Roberts2, Tessa C. Gillespie2, Kayla M. Danieli2, Emma J Barry2, Cameron Hall1, Corey Jacobson2, Mitchell Lavoie2, Gabriella Taghian2, Alphonse G. Taghian2

1 Massachusetts General Hospital, Physical and Occupational Therapy, Boston MA, United States
2 Massachusetts General Hospital, Radiation Oncology, Boston, United States

Introduction: Cording is a painful and functionally-limiting condition in which visible bands of tissue form in the axilla, arm or trunk following breast cancer (BC) surgery. Its pathophysiology remains somewhat equivocal, and research on its etiology, risk factors and treatment is limited.

Aim: This study aims to identify cording risk factors from demographic and treatment-related data, arm volume changes, symptoms, functional impairments, and quality of life (QOL) issues in a large cohort at risk for BC-related lymphedema (BCRL).

Method: Patients in the Massachusetts General Hospital (MGH) BCRL Screening Program who underwent BC surgery (n=810) filled out a questionnaire regarding cording. Patients reporting that they could see or feel a cord in their axilla, arm, forearm, wrist, or under their breast were assumed to have cording. The survey included questions regarding symptoms (change in arm size/sleeve cuff fit, heaviness, swelling, stiffness, numbness), function (using overhead shelf, pulling on a tight shirt, sleeping on affected side, pulling wet clothes out of the washer, carrying 10 lb. bag over the shoulder, keyboarding), and QOL.

Patient demographics (BMI and age at diagnosis), treatment-related data (ALND/SLNB, mastectomy/lumpectomy, positive lymph nodes/none, and reconstruction/none), arm volume and questionnaire responses were analyzed via univariate and multivariate analyses to establish risk factors for cording in this population.

Results: A total of 1531 surveys were completed by 810 patients, 143 of whom had cording (17.7%). Median time to cording onset was 23.7 months post-baseline measurement. Amongst those with cording, 13 (9.1%) and 31 (21.7%) of patients had a relative volume change (RVC) of ≤10% and >10% respectively, On multivariate analysis, patients who underwent ALND (OR 3.56, p<0.0001), were <55 years of age (OR 0.68, p=0.060, borderline significance) or had RVC>10% were more likely to have cording (OR 2.13, p=0.021).

Amongst those with cording, Reporting difficulty using an overhead shelf were more likely to have cording (OR 1.48, p=0.042). Patients also had cording. Reporting swelling (OR 1.84, p=0.003) or stiffness (OR 1.73, p=0.008) and patients reporting difficulty using an overhead shelf were more likely to have cording (OR 1.48, p=0.042).

Quality of life items were not significantly associated with cording on multivariate analysis. In this cohort, 87 patients were seen by a CLT for BCRL, 17 of whom (19.5%) also had cording.

Conclusions: Cording may occur late after BC surgery, or in conjunction with early or progressive BCRL. Patients who undergo ALND, who are <55 years of age, who report swelling, stiffness or difficulty reaching overhead after BC surgery should be closely monitored for cording and referred for treatment.

[54] BIOIMPEDANCE SPECTROSCOPY AND LIMB VOLUME MEASUREMENT IN THE EARLY DETECTION OF UPPER LIMB LYMPHEDEMA AFTER AXILLARY NODE CLEARANCE FOR BREAST CANCER.

Vaughan Keeley1, Philip Foden2, Chris Todd2, Julie Morris3, Katie Riches4, Nigel Bund4

1 Derby Teaching Hospitals NHS Foundation Trust, Lymphoedema Department, Derby, United Kingdom
2 University Hospital of South Manchester, Medical Statistics Department, Manchester, United Kingdom
3 Manchester University NHS Foundation Trust, Manchester, UK, Division of Nursing, Midwifery & Social Work, Manchester, United Kingdom
4 University of Manchester, Manchester University NHS Foundation Trust, Manchester, UK, Manchester, United Kingdom

Introduction: Lymphoedema of the arm develops after axillary node clearance (ANC) for breast cancer in 20% of women.

Aim: This prospective, multi-centre study compared multi-frequency bioimpedance spectroscopy (BIS) with arm volume measurements by Perometry to determine 1) which test has better diagnostic accuracy 2) the factors which predict the development of lymphedema.

Method: Participants undergoing ANC were recruited at 9 centres (n=1100). Pre and post-operative arm measurements by Perometry and BIS (L-Dex, Impedimed) were carried out. FACT-B+4 and 2 questions from the LBCQ (lymphoedema breast cancer questionnaire) were completed at each time point. Mediation analysis was used to determine the relative arm volume increase (RAVI) of >10% from baseline. A compression sleeve was given to those who developed a RAVI>10% and to those who were found to have lymphoedema clinically but with RAV1 <10%.

Predictors of lymphoedema development were determined using logistic regression.

Results: Mean age was 56 (SD +/-12; range 22 to 90) years. Lymphoedema was diagnosed in 22% of women by RAVI>10%, but detected in 45-6% by L-Dex (> 10 unit change) by 24 months.

A total of 24.5% received a compression sleeve by 24 months. There was moderate correlation between RAVI and L-Dex at 6 months (r=0.62)For L-Dex>10 increase at 6 months the sensitivity was 69% (95% CI: 60-84%), specificity of 82% (95% CI: 80-84%). Early changes by 6 months in RAVI ≥5-<10 predicted a 29% risk of lymphoedema by 24 months, whereas RAVI of <3% by 6 months had a 6% lymphoedema rate by 24 months.

Using multivariable logistic regression, RAVI at 1 month (p<0.001), number of positive lymph nodes at ANC (p<0.001), and prescription of chemotherapy (p=0.008) were independent predictors of lymphoedema (RAVI>10%) after surgery (from 1 up to 36 months). Patients with lymphoedema (RAVI>10%) had lower QoL (TOI, total FACT-B, and ARM sub-scale) scores (p<0.001, p=0.027, p<0.001, respectively), than those without.
Conclusions: In this study, limb volume measurement by Perometer was more accurate at predicting the development of lymphoedema (defined by RAVI>10%), than BIS. RAVI at 1 month, number of positive lymph nodes at ANC and prescription of chemotherapy were independent predictors of lymphoedema.

Reference:
Bundred NJ, Stockton C, Keeley V et al;

[55] POSTOPERATIVE WEIGHT FLUCTUATIONS MAY INCREASE RISK OF BREAST CANCER RELATED-LYMPHEDEMA

Sacha Roberts1, Kayla M. Danieli2, Tessa C. Gillespie1, Cheryl Brunelle1, Emma Barry1, Corey Jacobson2, Cameron Hall1, Mitchell Lavoie3, Gabriella Taghian1, Alphonse G. Taghian1
1 Massachusetts General Hospital, Department of Radiation Oncology, Boston, United States
2 Massachusetts General Hospital, Physical and Occupational Therapy, Boston MA, United States
3 Mlwavoie@mgh.Harvard.Edu, Massachusetts General Hospital, Boston, United States

Introduction: Several risk factors for breast cancer-related lymphedema (BCRL) have been identified and well-studied in recent years. One well known risk factor is an elevated BMI; however, little is known regarding how weight fluctuations throughout and beyond treatment for breast cancer (BC) may impact a patient’s risk of developing BCRL.

Aim: The purpose of this study is to evaluate the effects of weight fluctuation on the incidence and severity of lymphedema in a cohort of women treated for BC.

Method: We analyzed data from a large, prospective cohort of women treated for breast cancer who were screened for lymphedema with a perometer measurement preoperatively and at regular intervals throughout follow-up care. The final cohort consisted of 1596 patients with a total of 7501 measurements. The magnitude of swelling in the extremity at risk for BCRL was calculated using the relative volume change (RVC) formula for unilaterally-affected patients and the weight-adjusted change (WAC) formula for bilaterally-affected patients.

Results: The median follow-up period was 16.4 months and the average number of measurements per patients was 4.8. On univariate analysis, weight fluctuations of ±5%, ±10%, and ±20% of weight at pre-operative baseline were significant predictors of developing BCRL, defined as an RVC or WAC ≥ 10%, for patients with a low baseline BMI (<30 kg/m²) (±5%: OR: 1.66, p-value: <0.001; ±10%: OR: 1.79, p-value: <0.001; ±20%: OR: 2.21 p-value: 0.007) and a high baseline BMI (≥ 30 kg/m²) (±5%: OR: 2.26, p-value: <0.001; ±10%: OR: 1.71, p-value: <0.001). When the entire cohort was analyzed against ALND, RLNR, a high baseline BMI (≥ 30 kg/m²), and adjuvant chemotherapy on multivariate analysis, a weight fluctuation of ±5% was significantly associated with developing BCRL (OR: 1.53, p-value: <0.001). Furthermore, weight loss correlated with BCRL more than weight gain (-5%: OR: 2.49, p-value: <0.001; -10%: OR: 2.86, p-value: <0.001; -20%: OR: 3.35, p-value: <0.001). Notably, all patients who received adjuvant chemotherapy (n=784) experienced their maximum weight fluctuation after the first dose of chemotherapy.

Conclusions: Multivariate analysis of this cohort suggests that a ±5% weight fluctuation from preoperative baseline may influence risk of developing BCRL for patients with both a low and high preoperative BMI. Further, the incidence of BCRL in this cohort was greater among women who lost weight than those who gained weight.
LYMPHEDEMA: RESULTS FROM A PROSPECTIVE SCREENING PROGRAM

Alphonse G. Taghian1, Sacha Roberts1, Kayla M. Daniell1, Tessa C. Gillespie1, George Naoum1, Mohamed Abouegylah1, Laura Salama1, Cheryl Brunelle2
1 Massachusetts General Hospital, Radiation Oncology, Harvard Medical School, Boston MA, United States
2 Massachusetts General Hospital, Physical and Occupational Therapy, Boston MA, United States

Introduction: Several risk factors have been identified as significant predictors for breast cancer-related lymphedema (BCRL), which is commonly defined as a relative volume change (RVC) or weight-adjusted change (WAC) of 10% or greater in the affected upper extremity. Though increased attention to risk factors in conjunction with prospective screening has allowed for earlier detection, it is unclear whether these same risk factors apply to a patient’s risk of developing low-volume lymphedema.

Aim: The purpose of this study is to assess which risk factors may be associated with low-volume lymphedema so that methods of BCRL screening and detection may be optimized.

Method: We analyzed data from 2117 women treated for breast cancer who were prospectively screened with a perometer measurement and symptoms questionnaires pre-operatively and at regular intervals throughout follow-up. Limb volume changes were calculated using the RVC formula for patients at unilateral risk and the WAC formula for patients at bilateral risk. Linear regression models were applied to elucidate risk factors for developing RVC/WAC 5% to <10%.

Results: In this cohort, 22.1% (468/2117) of patients had a maximum RVC/WAC 5% to <10% and 11.1% (235/2117) had a maximum RVC/WAC ≥10%. On multivariate analysis, history of axillary lymph node dissection (ALND) of eight or more lymph nodes presented as a significant risk factor for progressing to have a maximum RVC/WAC 5% to <10% (OR: 1.46, p-value: <0.001). History of axillary lymph node dissection (ALND) of eight or more lymph nodes presented as a significant risk factor for progressing to have a maximum RVC/WAC 5% to <10% at some point throughout follow up care (OR: 2.29, p-value: <0.001). History of axillary lymph node dissection (ALND) of eight or more lymph nodes presented as a significant risk factor for progressing to have a maximum RVC/WAC 5% to <10% (OR: 1.46, p-value: 0.002) as compared to having ALND with fewer than eight lymph nodes removed. Certain patient-reported symptoms of the affected upper extremity were also associated with having an RVC/WAC 5% to <10% at that time point, including perceived change in arm size (OR: 2.26, p-value: <0.001), change in sleeve fit (OR: 1.85, p-value: 0.010), perceived swelling (OR: 1.48, p-value: 0.030), and aching of the arm (OR: 1.42, p-value: 0.038).

Conclusions: Volume changes within the first three months following initial breast surgery may predict progression to BCRL. However, 22.1% patients had a maximum RVC/WAC of 5% to <10% and did not progress to have an RVC/WAC ≥10%. Given the current movement toward early intervention for BCRL, it is imperative to identify patients for whom early intervention is most appropriate.
**[58] CHALLENGES IN THE WORLD OF PEDIATRIC LYMPHEDEMA**

Catherine McCuaig¹, Nicole Wong¹, Sophie Turpin¹, Raymond Lambert¹, Josée Dubois¹, Sandra Ondrejchak², Chantal Lapointe³

¹ Chu Sainte-Justine, Pediatrics, Dermatology Service, Montreal, Canada
² University of Sherbrooke, Medical School, Sherbrooke, Canada
³ Chu Sainte-Justine, University of Montreal, Nuclear Medicine, Montreal, Canada

**Introduction:** It is important for caregivers to recognize pediatric lymphedema, and to investigate and treat it appropriately. It is considered a rare ‘orphan’ affliction with an incidence of 1/6000.

**Aim:** We wish to share our experience with over one hundred referrals to our lymphedema clinic in the past 10 years and propose a plan for initial investigation and treatment.

**Method:** We reviewed the charts of the patients and entered data in an excel format.

**Results:** We had a female predominance of 65.7%, 63.6% were Caucasian, 8% African or Haitian. 20% had congenital onset, and 32% were under the age of 1 year.

We encountered mainly primary more than secondary lymphedema in children. 10% had edema secondary to other causes. Isolated primary lymphedema was seen in 63%. Lower limb involvement was seen in 73%, 19% upper limb, and 3% in genitals. Milroy’s was in 7 and Meige in several others. More complex genetic syndromes such as Turner’s, Tuberous Sclerosis, Phelan McDermid, SOX 18, multisegmental lymphatic dysplasia. Lymphatic malformations accompanied lymphedema in several patients.

**Conclusions:** Lymphedema in children is commonly due to genetic mutations, and in the primary form is a hypoplastic lymphatic malformation. Treatment is multimodal, with decongestive therapy obtained through short stretch bandages, elastic stockings, and psychologic support to foster self management.

---

**[59] THE CLINICAL AND DEMOGRAPHIC CHARACTERISTICS OF PEDIATRIC LYMPHEDEMA PATIENTS: A MULTICENTER STUDY-PRELIMINARY REPORT**

Pınar Borman¹, Ayşegül Balcan², Sibel Eyyiğör³, Esra Güzem Koyuncu⁴, Evrim COSKUN⁵, Meltem Vural⁶, Esra Deniz Papatya Cakir⁷, Sevil Ceyhan Dogan⁸, Deniz Çağdaş Ayvaz⁹, Sevilya Karahan⁴, Ayşegül Yaman³

¹ University of Hacettepe Lymphedema Practice and Research Center, Ankara, Turkey
² University of Hacettepe Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey
³ Ege University, Medical Faculty, Department of Physical Medicine and Rehabilitation, Izmir, Turkey
⁴ Istanbul Physical Medicine and Rehabilitation Training Hospital, Department of Physical Medicine and Rehabilitation, Istanbul, Turkey
⁵ Dr Sadi Konuk Education and Training Hospital, Department of Physical Medicine and Rehabilitation, Istanbul, Turkey
⁶ Cumhuriyet University Medical Faculty, Department of Physical Medicine and Rehabilitation, Sivas, Turkey
⁷ Hacettepe University, Faculty of Medicine, Department of Pediatric Immunology, Ankara, Turkey
⁸ University of Hacettepe, Dept of Biostatistics, Ankara, Turkey

**Introduction:** Lymphedema is the-chronic, progressive swelling of-tissues caused by inade-quate lymphatic function. Due to the low awareness about pediatric lymphedema, the patients may be misdiagnosed or late-diagnosed in developing countries. There is no data about Turkish lymphedema children.

**Aim:** The aim of this study was to evaluate the frequency and characteristics of patients with pediatric lymphedema presented to specific lymphedema units in Turkey, between May 2018-December 2018.

**Method:** An invitation letter was sent to 10 lymphedema centers in different areas, 8 of them replied but 5 of them reached to the enough number (at least 5 patients) and attended to the study. The demographic, clinical and surgical characteristics of the pediatric patients were determined.

**Results:** A total of 88 pediatric lymphedema patients were recruited from 5 lymphedema centers which had a total number of 1359 patients(6.5%). 49 (55.7%) of these children were female and 39 (44.3%) were male. The mean age of the patients was 137±47.5 months and the mean BMI was 20.8± 5.6 kg/m². Of them; 80 patients (90.9%) had primary lymphedema and 9.1% had secondary lymphedema mostly due to childhood syndromes and trauma. 52 children (59%) had grade 2, 30 (34%) had grade 1 and 6 (6.8%) grade 3 lymphedema. The most common site of lymphedema was lower extremity. 13 children (14.7%) had genital-lymphedema and 4 of them had hydrocele surgery. 13 (14.9%) patients had family history and 5 of them was associated with systemic syndromes and 1 had generalized lymphedema with internal organ involvement. Comorbid disease was lacking in 52 (59.1%) children. The median duration of lymphedema was 41 (2-216) months. The lymphedema stage was reversible in 33.7%, spontaneous irreversible in 64% and elephant-tias in 2.3% of the patients. 53 of the children’s caregiver (60%) had not received any information, education and/or therapy for lymphedema.
Abstract Session Pediatric

**Conclusions:** Although the frequency of pediatric lymphedema is not high in lymphedema units, early diagnosis and treatment is very important in this population. The majority of them had primary lymphedema in the lower extremity. The awareness of lymphedema was low among families. The referring time to lymphedema unit was relatively long and in over half of patients had spontaneous irreversible lymphedema at submission. We suggest educational activities for both families of children with lymphedema and health care providers, in order to facilitate early reference to lymphedema units and to perform prompt preventive and therapeutic approaches for this suffering condition.

**LYMPHOEDMA NETWORK WALES CHILDREN AND YOUNG ADULT’S SERVICE AUDIT**

Cheryl Pike¹, Melanie Thomas²

¹ Lymphoedema Network Wales, Swansea, United Kingdom
² Lymphoedema Network Wales, Cimla, West Glamorgan, United Kingdom

**Introduction:** Lymphoedema Network Wales established a lymphoedema service for ‘Children and Young Adults’ in November 2015. The National Paediatric Lymphoedema Specialist for Wales supports local assessment and treatment of people’s lymphoedema, thus negating the need for excessive travel for patients and their families. This specialist also provides clinical supervision and training for lymphoedema staff in Wales.

**Aim:** To determine the ‘Children and Young Adults Lymphoedema Service for Wales’ activity and the value of this service to these patients and the NHS.

**Method:** An audit of the service from inception up until the end of December 2018 was undertaken. Data was evaluated using Descriptive Statistics from SPSS statistics version 25.

**Results:** The database logged 286 patients, 200 were on the current caseload, 79 had been discharged and seven patients were waiting to be assessed. The average number of days a patient had to wait before being seen was 17.1 days (range 0-187 days). The average age was 15.4 years (0-31 years old), with most of the patients referred being aged 20 years or older (n=96), and decreasing in age groups to the lowest number of patients in the 0-4 year old (n=27) group. The age of onset of lymphoedema ranged from 0 to 24 years, with the average age of onset of lymphoedema being 8.5 years old. The type of lymphoedema demonstrated 49% Primary, 2.4% Secondary to Cancer, 39.2% Secondary to Non-Cancer, and 9.4% were not seen.

The BMI taken showed 19.5% as underweight or normal weight, 11.2% Pre-obese and 13.5% were obese. The remaining people either too young (17.5%) wheelchair bound (8.7%), indeterminable (4.2%) or were not taken (21.6%). The number of patients who had cellulitis prior to their first assessment was 34, which has reduced to 10 episodes since treatment commenced, an improvement of 70.6%. The number of hospital admissions prior to first assessment was 41, which reduced to 4 since commencement of treatment, an improvement of 90.2%. Patient-reported outcome measures (PROMs) scores significantly reduced from the first assessment (average score reduced from 22.4 to 7.1) with swelling and pain being reported the most problematic.

**Conclusions:** The introduction of the ‘Children and Young Adults Lymphoedema Service’ in Wales has provided demographics of this cohort of people in Wales. It illustrates the value of this service to the NHS and service users in terms of reduction of cellulitis episodes.
THE USE OF LYMPHOSCINTIGRAPHY IN THE INVESTIGATION OF PEDIATRIC LYMPHEDEMA

Catherine McCuaig, Sophie Turpin, Raymond Lambert

Introduction: Identify children with lymphedema as cause of limb edema

Aim: Describe the lymphoscintigraphic patterns in congenital lymphedema, lymphedema praecox and secondary lymphedema

Method: 54 studies were reviewed in 50 patients: 16 boys aged 7 months to 15 years (5.4 ± 7 years); 3 girls aged 1 month to 19 years (12.6 ± 4.5 years)

In each following technique was performed: Lymphoscintigraphy by Interdigital injection of Filtered Technetium 99m sulfur colloid in the affected and contralateral feet and/or hands and sequential imaging at 1 hour with delay after walking/massaging; at 3h ± 6h;

Results: We identified 9 patients with edema not due to lymphedema: Congenital hemihypoplasia syndrome 3 Post phlebitic syndrome 1, Linear scleroderma 1, Spontaneous resorption 2, Muscular asymmetry 1, Thoracic lymphangiomatosis 1

In those with Congenital lymphedema, 6 boys and 3 girls, Aged 1 month to 15 years old (5.9 ± 5.5 years old) 3 patients with Milroy’s disease and one patient with Turner’s disease. Bilateral disease in 5 patients and Unilateral disease in 4 patients. Praecox Lymphedema was seen in 4 boys and 19 girls aged 4 to 18 years old. Secondary Lymphedema was seen in 1 boy and 7 girls, Aged 11 to 19 years old: 2 post radiotherapy, 2 post trauma, 4 post venous thrombosis. Dermal back flow. Observed in lower extremities only, was seen in 13 studies; 2 congenital lymphedema 7 lymphedema praecox 4 secondary lymphedema. In congenital Lymphedema:

Conclusions: Lymphoscintigraphy is technically feasible in the vast majority of patients. Aplasia: more common in congenital lymphedema, Hypoplasia: more common in lymphedema praecox or secondary lymphedema. We will discuss the place of Lymphoscintigraphy in the investigation of vascular anomalies, and compare to other investigational modalities time permitting.

AMERICAN LYMPHEDEMA FRAMEWORK PROJECT (ALFP) SURVEY OF LYMPHEDEMA THERAPISTS: A 2018 UPDATE

Elizabeth Anderson, Allison Anbari, Nathan Armer, Jane Armer

Introduction: Lymphedema can occur following underdevelopment or interruption of the lymph system anywhere in the body. Most commonly, it is a sequela of cancer treatments and may affect the approximately 15.5 million cancer survivors living in the United States (U.S.). Once developed, this condition requires both professional and self-care to maintain limb function and quality of life. With cancer survivors increasing in number, lymphedema rehabilitation and management is critical. The importance of trained lymphedema therapists in symptom management and rehabilitation has been increasingly recognized in the literature.

Aim: In 2009, lymphedema therapists in the U.S. were surveyed to describe their preparation, their patient population, and how they cared for patients (Armer et al., 2010). In Fall 2018, we sought to determine how demographics, practice settings, and care modalities of current U.S. therapists changed, as well as determine current practice challenges. In addition, we deliberately expanded the reach of the survey to trained lymphedema therapists around the world.

Method: The 2009 American Lymphedema Framework Project Lymphedema Therapist Survey was updated and distributed via Qualtrics to lymphedema therapists in the U.S. and worldwide over an 8-week period. Some 947 completed surveys were received and included in the current analysis. Therapist demographic information, educational background, practice setting, treatment modalities, patient characteristics, referral methods, assessment and measurement methods, and patient educational resources were queried.

Results: Preliminary results showed these participant characteristics: country: U.S. (n=672/922 [73%]); Canada (n=92[10%]); United Kingdom (n=42[5%]); Australia (n=28[3%]); gender: identifying as female (n=633/676[93%]); mean age: 47yrs (range 21-76); discipline (top 3): PT [45%], OT [31%], MT [24%]); mean practice years: 10.7yrs (range 0-41); and practice setting (top 4): hospital out-patient clinic (47%); private practice (38%); hospital in-patient (13%); home care/hospice (9%). Descriptive-comparative analyses were performed to compare 2009 and 2018 findings. Further 2018 comparative analyses will be shared.

Conclusions: Lymphedema therapists are critical members of the health care team providing care to persons with and at risk of lymphedema from all causes. Understanding the characteristics and practices of lymphedema therapists and their patients will help health professionals, educators, policy-makers, and funders better meet the under- and unmet needs of this population.

Abstract Session Community Organization & Education Initiatives


Anna Kennedy1, Kim Avanthay1, Tracy Gardikiotis1, David Keast1, Catherine McCuaig1, Margie McNeely1, Anna Towers2

1 Canadian Lymphedema Framework, Canada

Introduction: The Canadian Lymphedema Framework (CLF) is an academic and patient stakeholder collaboration that is part of an international initiative promoting worldwide lymphedema research, best practices and clinical development. The CLF is modelled on, and has a partnership with, the International Lymphoedema Framework, and links with other national frameworks and regional lymphedema associations in Canada to achieve its goals.

Aim: The Canadian lymphedema community has seen many positive changes in the last ten years. In celebration of its 10th anniversary, this presentation (poster or oral) will demonstrate the contributions that the CLF has made since its inception a decade ago, in advancing lymphedema care in Canada.

Method: Starting with an open space stakeholder meeting (2009), 100 stakeholders from across Canada prioritized the work to be done into three areas of focus; Education/Awareness, Research and Partnerships. To this day, these same pillars guide the CLF Board in setting annual strategies, projects and activities. Some of those are listed below.

Results:

Education and Awareness tools
• Comprehensive website with over 100 pages of content
• GP card (6 Things Physicians Should Know) distributed to every physician in Canada
• Patient education materials: pamphlet and booklet (French and English)
• Media: Toronto Train Station/Metro billboards showcasing chronic swelling
• Media collaboration with actress Kathy Bates profiling her personal lymphedema story
• Pathways magazine (Summer 2019 issue marks its 8th year and 30th issue)
• Consensus document on Training Standards for lymphedema therapists
• 2019 Calendar featuring inspirational patient stories promoting self management
• Health Professionals Toolkit - supporting clinical practise

Research and publications
• Hosted stakeholder meeting - establishing Canadian priorities
• Produced Lymphedema Landscape Study - identifying educational gaps
• Conducted Delphi study - setting the National Research Agenda for Canada
• Published two repositories of Canadian lymphedema related research
• Determined Canadian lymphedema prevalence estimates
• Conducted Reimbursement Survey, - highlighting inequities in access to care
• Promoted research at national conferences showcasing abstract submissions
• Participated in ILF LIMPRINT and Outcome Measures projects

Partnerships
• Collaboration with ILF - sitting on their Board and co-hosting 2011 ILF conference
• Hosting quarterly cross Canada calls - connecting nine regional associations
• Industry collaboration - 3M (Landscape Study), Valco (inspirational calendar) and BSN (educational webinars)

Conclusion: As a charitable organization, the Canadian Lymphedema Framework is still in its infancy. However with hard working volunteers, strong partnerships and industry support, it has become a credible and reputable association - establishing one strong voice for lymphedema in Canada.
[64] SHAPING LYMPHOEDEMA RESEARCH IN THE UK: A BRITISH LYMPHOLOGY SOCIETY SCIENTIFIC COMMITTEE INITIATIVE

Emma Underwood1, Rhian Noble-Jones2, Beverley Devalois3
1 Royal Cornwall Hospital NHS Trust, Truro, United Kingdom
2 University of Glasgow, Macmillan Lymphoedema Association, Glasgow, United Kingdom
3 Research Acupuncturist, Supportive Oncology Research Team Lynda Jackson Macmillan Centre, Mount Vernon Cancer Centre, Northwood, United Kingdom

Introduction: The British Lymphology Society Scientific Committee (BLSSC) recognises that to improve the evidence base for the treatment and management of lymphoedema, further research is needed and this research needs to be embedded into clinical practice. This presentation describes the BLSSC’s innovative approach to shape the research agenda in the UK.

Aim: To encourage research appreciation and activity amongst the BLS membership in order to improve the evidence base for lymphoedema treatment and management.

Method: A range of approaches has been utilised including:

a. A collaborative, national research prioritisation study to identify the top 10 research priorities for lymphoedema management in the UK from the perspective of patient’s, carers and clinicians to identify and drive action towards meaningful research [1].

b. The top 10 research priorities have been adopted as the BLSSC’s research priorities and aligned to its Lymphoedema Research Grant (LRG), with the aim of promoting research into these areas.

c. The BLSSC aim to support novice researchers through seed grants and expert critical appraisal of research grant applications.

d. Promoting British Lymphology Society (BLS) members’ research activities in the BLS newsletter.

e. Providing a platform for experienced researchers at the annual conference and actively encouraging novice members to participate in research by supporting presentations and a specific novice oral and poster presenter award.

f. Using the BLS newsletter as a research education tool for the membership with the aims of embedding research into clinical practice.

g. Facilitating skills development with an honorary position on the BLSSC to develop the novice researchers’ skills through mentorship.

Conclusions: The aims of the BLSSC are to encourage and promote research into lymphoedema treatment and management in the UK. The research prioritisation collaboration has allowed the BLSSC to focus on the research that is important to those living with lymphoedema and together with the BLSSC’s initiatives to nurture novice researchers we hope to improve both the research landscape and ultimately the management of lymphoedema in the UK.

[65] POSSIBLE RISK FACTORS FOR CELLULITIS EXPERIENCE IN LYMPHOEDEMA PATIENTS IN JAPAN: SECONDARY ANALYSIS USING NATIONAL LIMPRINT DATABASE

Gojiro Nakagami1, Misako Dai2, Junko Sugama3, Hiromi Sanada4
1 The University of Tokyo, Department of Wound Care Management, Tokyo, Japan
2 Institute of Medical, Pharmaceutical and Health Sciences Kanazawa University, Faculty of Health Sciences, Institute of Medical, Pharmaceutical and Health Sciences, Kanazawa University, Kanazawa City, Ishikawa Prefecture, Japan
3 Health Sciences, Kanazawa University, Advanced Health Care Science Research Unit, Innovative Integrated Bio-Research Core, Institute for Frontier Science Initiative, Kanazawa University, Kanazawa, Japan
4 The University of Tokyo, Department of Gerontological Nursing/Wound Care Management; Division of Care Innovation, Global Nursing Research Center, Graduate School of Medicine, 1. Department of Gerontological Nursing/Wound Care Management, Tokyo, Japan

Introduction: Many risk factors for cellulitis in lymphoedema patients have been reported, however, there is limited information in Japanese population. Targeting high-risk individuals will provide efficient preventive strategy for cellulitis in lymphoedema patients.

Aim: The purpose of this study was to clarify the details for patient and wound characteristics and the risk factors for presence of cellulitis history in Japan.

Method: This study was a secondary analysis of LIMPRINT (Lymphoedema IMpact and PRevention – INternational) study using national database collected in the adult population in Japan between 2014 and 2015 including six institutions (N=113). Descriptive data were collected for patient and wound characteristics. Logistic regression analysis was conducted to explore the possible risk factors for presence of cellulitis history.

Results: The duration of oedema ranged from <6 months (16.2%) to 10 years or longer (25.2%) with various severity. Prevalence of cellulitis history was 31.9%. Prevalent categories of treatment within complex decongestive therapy included skin care advice (52.2%), compression garment (55.8%), exercise advice (41.6%), multilayer bandage (38.1%), cellulitis advice (49.6%), and massage (61.1%). Access to lymphoedema specialist was possible for 57.1% of the patients. Wounds are present in 50.4% of patients. The most prevalent site for the wound was abdomen (64.9%) and the most prevalent wound type was surgical wound (closed) (91.1%) with wound duration of 5 years or longer (79.3%). Only five patients had an active wound. Longer duration of lymphoedema (OR=3.49), access to lymphoedema specialist (OR=0.32), and presence of wound (OR=3.17) were significantly associated with cellulitis history in this population.

Conclusions: Having the closed surgical wound in the abdomen with longer duration may be a risk factor. It is noteworthy to state that accessing to lymphoedema specialist prevented having cellulitis. Focusing on the lymphoedema patients who have closed surgical wound and have difficulty in accessing the lymphoedema specialist might be a efficient strategy to prevent cellulitis in Japanese population.
[66] OPPORTUNITIES AND CHALLENGES OF PERFORMING ON-SITE HUMAN SUBJECTS RESEARCH AT PATIENT-FRIENDLY MEDICAL CONFERENCES

Polly Armour1, Karen Herbst2
1 University of Arizona, Department of Medicine, Tucson, United States
2 University of Arizona College of Medicine, Treat Program, Tucson, United States

Introduction: Conducting human subject research has many challenges; one of the biggest is finding adequate numbers of volunteers. Potential volunteers may not be aware of research opportunities, or may be unable to commit to multiple visits. Traveling long distances can be challenging, especially for those with limited mobility, such as with advanced lipedema or lymphedema.

Aim: To discuss our experience conducting on-site research at an annual medical conference for people with fat disorders.

Method: The Fat Disorders Resource Society (FDRS) was founded in 2009; its mission includes improving the quality of life for all people affected by fat disorders by supporting research, education, advocacy, and collaboration. Their annual conference draws several hundred attendees, including patients with lipedema and Dercum’s disease, surgeons, clinicians, therapists, vendors, and advocates. At the 2017 and 2018 FDRS conferences (in Salt Lake City and Dallas, respectively) researchers from the University of Arizona and Vanderbilt University conducted research with attendees following appropriate consent and protocols approved by each institution’s IRB. In 2017, data collected included physical exam, questionnaire, temporo-spatial parameters of gait, body leg and trunk width and circumference, muscle strength, tissue dielectric constant, and measures of tissue fibrosis and elasticity. In 2018, data collected included physical exam, questionnaire, segmental bioimpedance, tissue dielectric constant, digit ratio, 3D imaging, pulse volume, glycocalyx measurement, ultrasound and photography. In 2018, an exit survey captured participants’ feedback regarding their experience.

Results: The response from the attendees of each conference was incredible – 85 participated in 2017, and more than 100 in 2018. In the words of one researcher, “We collected more data in one weekend than we could have in a year at our clinic.” Patients were eager to contribute, and some waited several hours for their turn. Feedback indicated most participants were satisfied or extremely satisfied with their research experience.

On-site research opportunities:
• Large number of potential research volunteers in one place
• Time-efficient means to collect a large amount of data

On-site research challenges:
• Recruitment of controls can be difficult
• Regulatory challenges: Coordination among research institutions, conference organizers, and IRBs; maintaining participant privacy in a conference setting; insurance coverage
• Logistical challenges: Research room layout, staffing, participant time and flow
• Managing bias inherent in a convenience sample

Conclusions: Patient conferences are a viable opportunity to perform human subject research. They are not without constraints, but the opportunities outweigh the challenges.
[68] KNOWLEDGE OF THE LYMPHATIC SYSTEM AND OF EFFECTIVE SELF-MLD

Margareta Haag1, Helena Janlov Remnerud2
1 Svenska Odemförbundet, Stockholm, Sweden
2 Lymphcenter Sverige Ab, Lymphcenter Ab, Edsbro, Sweden

Introduction: The Swedish Association of Chronic Oedema (Svenska Ödemförbundet, SOF) has as an objective to educate our members and the health care profession about the lymphatic system and how to learn to control their chronic oedema (live lympho-logically). The knowledge of lymphoedema is scarce in the health care system and in the public. As long as the health care profession lacks knowledge about the lymphatic system and the syndroms of lymphoedema the patients will not be able to learn about their own condition and how to handle it.

Aim: SOF’s aim is to inform the health care profession and the paramedics about the lymphatic system and how to teach students in lymphology and lymphatic management and patients how to learn to live lympho-logically by self-management including self-MLD. We strive to facilitate for members all over Sweden to live with the condition of chronic oedema whether it is lymphoedema, lipoedema, Dercum’s disease or venous oedema.

Method: Margareta Haag and Helena Janlov Remnerud wrote the manuscript for two films; one film about the lymphatic system and one film where the lymph therapist describes very clearly how to do self-MLD together with a patient/member. SOF is always working in collaboration with a lymph therapist to make them understand the patient’s perspective and preferences and to make the patient understand the importance of certain movements and what actually helps to increase the lymph flow.

Results: The films were linked on the youtube-channel of Svenska Ödemförbundet in the beginning of 2018 and announced on our website, on our social media platform, in our Newsletter and in our journal Lymfan. We have used the film at meetings with lymph therapists and health care professionals and at meetings with members. The films have been a success and members are pleased to be able to learn about the lymphatic system and movements to increase the lymphatic flow.

Conclusions: The films have been shown in the Nordic Patient Council of lymphoedema and lipoedema (patient associations in Denmark, Faroese Islands, Norway and Sweden) and are being translated to the Nordic languages. The films could be used by ILF on the website and may be of assistance to paramedical students and to persons with lymphoedema, lipoedema, Dercum’s disease and venous oedema. We would like to show the films at the ILF-Conference in Chicago, 13 – 15 June, 2019.

[69] PROFESSIONAL GUIDE TO COMPRESSION GARMENT SELECTION - TAKING COMPRESSSION GARMENT PRESCRIPTION IN S.T.R.I.D.E. (AN ALGORITHM INCORPORATING BOTH TEXTILE CHARACTERISTIC AND EDEMA PRESENTATION TO OPTIMIZE MEDICAL COMPRESSION GARMENT SELECTION)

Jacqueline Suzie Ehmann1, Robyn Björk2
1 Atrium Health Stanly, Edema Management Program, Albemarle, United States
2 International Lymphedema &wound Training Institute, Palmer, United States

Introduction: The effectiveness of a compression garment (Medical Compression Stocking - MCS or Adjustable Wrap - AW) is dependent on dose (mmHg) as well as the physical and dynamic properties of the textile, including elasticity and stiffness. Transparency with regards to the comprehensive compression profile is needed to make an appropriate MCS/ AW selection. In addition, there are patient specific characteristics (tissue texture, limb size, location of swelling, quality of edema, patient functional level) that have clinical relevance on compression garment selection.

Aim: Selection of the appropriate compression garment necessitates matching compression garment to the patient presentation and abilities. Clinicians need to evaluate the location and quality of the edema and the functional abilities of the patient; in addition, the specific physical properties of the compression textile need to also be examined. S.T.R.I.D.E.™ (Shape, Texture, Refill, Issues, Dosage, Etiology) is an algorithm that combines evidence-based compression recommendation with clinical expertise to assist the clinician with appropriate compression garment selection.

Method: Review of the literature reveals there is a vast difference among compression products even within an individual compression class or style of garment1-4. Utilizing S.T.R.I.D.E.™, the authors will demonstrate steps to appropriate garment selection. Specific patient characteristics will be matched to a compression textile, garment design, compression dosage and physical ability. Case examples will demonstrate interphase pressure measurements (mmHg) and volume measurements (cm3) at the time of prescription and upon follow-up to demonstrate appropriate garment selection.

Results: Utilizing S.T.R.I.D.E.™ individual edema characteristics, tissue type and physical ability of the patients were matched to a specific compression garment choice. In each of the cases presented, the specified dosage was observed, and the volume of the limb was maintained at one- and two-week follow-up. Compression garment selection requires a comprehensive assessment of etiology and presentation of the edema, the abilities of the patient and the dynamic performance of the compression textile.

Conclusions: S.T.R.I.D.E.™ compression garment selection algorithm is a practical, evidence based clinical tool to assist healthcare providers with effective compression garment prescription.
[P1] NUTRITION GUIDELINES FOR THE MANAGEMENT OF LYMPHEDEMA

Jean LaMantia1

1 Markham Lymphatic Centre, Toronto, Canada

Introduction: There are currently no established dietary recommendations for the nutritional management of lymphedema. Neither of the two major English language databases for nutrition professionals, PEN® or Eat Right Pro®, contain guidance in the area of lymphedema. Since liver and intestinal lymphatics generate approximately 80% of the body’s lymph (1), and the liver and intestines have a dominant role in the digestion, absorption and processing of nutrients, this would infer that diet has the potential to impact the development of lymph and the management of lymphedema.

Aim: To determine the best practices for the nutritional management of lymphedema.

Method: A thorough research review was conducted using PubMed. The resulting research was analyzed according to the PEN® Evidence Grading Checklist and main themes were identified and described. Where no research exists, standard practice that has been described from reputable lymphedema organizations were adopted and nutrition strategies were proposed based on an understanding of lymphatic physiology.

Results: The literature review yielded results and identified the following main themes: weight management, low-salt diet, low fat diet, and restricted long-chain fatty acids with replacement by medium chain triglyceride. In the absence of supporting evidence, standard practices cited by lymphedema organizations discourage fluid and protein restrictions. While time-restricted feeding, anti-inflammatory diet and management of bowel regularity lack specific research, these strategies are recommended on the basis of an understanding of lymphatic physiology.

Conclusions: Nutrition therapy does appear to have a place in the treatment of individuals with lymphedema. Based on this review, the best dietary approach for a nutrition strategy in the management of lymphedema consists of: 1) achieving and maintaining an ideal body weight, 2) sodium restriction, 3) sufficient fluid and protein to meet RDI, 4) low fat with possible inclusion of MCT oil, 5) anti-inflammatory diet, 6) nutrition and exercise strategies to promote bowel regularity and 7) the possible use of time-restricted feeding. These nutrition strategies could be offered to individuals with lymphedema to complement but not replace physical therapies. These strategies should be tested in clinical trials to determine the best nutrition plan for the management of lymphedema.


*PEN® is currently updating their pathways to incorporate information from this review into their database.

[P2] LYMPHOEDEMA MANAGEMENT ACTIVITY IN URBAN AREA, TANZANIA

Cecilia Uisso1, wilfred mandara2, upendo mwingira3

1 Nimr-Tanzania, Director of Research and Coordination Program, Dar Es Salaam, Tanzania
2 Nimr, Dr, Dar Es Salaam, Tanzania
3 Nimr, Drcp, Dar Es Salaam, Tanzania

Introduction: Lymphatic filariasis (LF), caused by Wucheria bancrofti, is a leading cause of morbidity in Tanzania. Tanzania have started to implements Lymphoedema Management training in urban area based on WHO guidelines with the aim of achieving GET 2020 goals. One of the WHO component of the global programme is to alleviate suffering through morbidity management and disability prevention (MMDP). It is estimated that 10,000 individuals have lymphoedema in Tanzania. Since May, 2017 Lymphoedema management training was introduced, targeted community health workers and lymphoedema patients to train them on how to reduce the suffering for the affected people with lymphoedema in Dar es Salaam region.

Aim: The objective was to train health workers on clinical aspects of lymphoedema Management and Lymphoedema patients on self-care management.

Method: Health workers to identify the Lymphoedema patients and bring them for training. Training is conducted within the endemic district where most of the patients are coming from so as to reduce the distance for the patients and encourage more people to attend training. Supervision and Monitoring to trained health workers practices in patient’s identification and follow up, and also to Trained patients on how do they practice self-care.

Results: A total of 186 Health workers and Lymphoedema patients were trained in 2018, Lymphoedema patients being 88 and 98 health workers were trained from all districts of Dar es Salaam region

Conclusions: Lymphoedema management training is very crucial to both Health workers and Lymphoedema Patients whereby it helps the patients not to feel that they are neglected. Wash kits are given during the training which help patients to practice self-care.
[P3] CAN TDC (TISSUE DIELECTRIC CONSTANT) MEASUREMENTS BE USED TO DETECT EDEMA / DERMAL FLUID IN LIPOEDEMA PATIENTS

Katinka Rutjens¹, Suze van Beusekom²

¹ Varodem BV, Horn, Netherlands
² Huid- En Oedeemtherapie Heerlen, Skintherapist, Heerlen, Netherlands

Introduction: According to the Dutch Guidelines Lipoedema 1, lipedema doesn’t show any signs of classic interstitial edema in stage 1, 2 and 3. The use of tissue dielectric constant (TDC) allows for the measurement of superficial fluid. The LymphScanner consists of an electronic control unit and an integrated probe to measure the tissue dielectric constant (TDC) of the measurement site.

Aim: To identify tissue fluid in arms, upper and lower legs and hips in lipedema patients. To compare the tissue fluid outcomes.

Method: An assessment tool was developed to establish the type of edema, investigating whether patients are using medication, have venous insufficiency, heart failure, thyroid or kidney problems, had a liposuction etc. We used clinical investigation to determine what stage and type of lipedema the patients are at. We measured specific measuring points with TDC. These measurements were compared to the normal skin fluid of each patient. Research done by Mayrovitz² what ‘normal’ tissue fluid margins are in healthy people. We also used research of TDC in lipedema patients done by Wigg and Lee³.

Results: 120 lipedema patients will be measured and clinically assessed. At this moment the study and its conclusions aren’t finished. We’re not able to give the exact results in this stage of the study yet. The early results demonstrate that TDC is a useful tool to identify edema in lipedema patients.

Conclusions: We foresee outcomes of TDC measurements in lipedema patients in arm, hip, lower- and upper leg between 38% and 45% and in lipedema patients with a fluid component in the skin more than 45%.

1. Multidisciplinaire evidence-based richtlijn, versie 01-05-2014
2. Mayrovitz et al (2012) bookchapter In: Lymphedema: Presentation, Diagnosis, and Treatment Arin K. Greene, MD, MMSc, HÅkan Brorson, MD, PhD, and Sumner A. Slavin, MD. Section 3 Diagnosis of Lymphedema

Authors: KMH. Rutjens (Varodem BV; manager innovation and education / LTA:NL; F&F MLD therapist; Horn Netherlands) SCC. van Beusekom (Huidtherapie Heerlen; skintherapist Heerlen, Netherlands) B. Schmitz (fysiotherapie Birgit Schmitz; Edema and fysiotherapist Herten Netherlands) G. Vujevich (Skintherapist in The Hague university Netherlands)

--

[P4] SCALING UP TREATMENT OF CHRONIC LYMPHEDEMA SECONDARY TO WUCHERERIA BANCROFTI INFECTION IN TANZANIA.

Omega Edwards¹

¹ Sanitas Hospital Limited, Medicine, Dar Es Salaam, Tanzania

Introduction: It is estimated that over 300,000 people in Tanzania are suffering from chronic lymphedema secondary to being infected with Wuchereria bancrofti¹. Sanitas Hospital located in Dar es Salaam, Tanzania coordinates a multidisciplinary program aimed at up-scaling treatment for those suffering with this debilitating disease.

Aim: To outline the current state of lymphatic filariasis management in Tanzania. To describe the components of our lymphedema management program. To share our experience of training other healthcare facilities in utilizing the best practice methods we have identified. To highlight the key challenges to the up-scaling of treatment. Finally, to discuss possible solutions and the way forward.

Method: The lymphedema program was evaluated through the use of chart review, patient/ key stakeholder interviews and from post-training written surveys.

Results: Since February 19, 2017, seventeen patients with chronic lymphoedema have been cared for. Twenty four healthcare providers from three separate healthcare facilities have been trained. The lack of compression bandages and compression garments were identified as the major challenge to up-scaling treatment.

Conclusions: Tanzania, through the efforts of the national Mass Drug Administration Program (MDA), has made great strides in reducing the transmission rate of Wuchereria bancrofti. However, more effort is needed for those who already suffer with the chronic manifestations of lymphatic filariasis. Multidisciplinary lymphedema programs are in great need. More trained healthcare providers are needed urgently. A solution is needed to solve the problem of securing a steady supply of compression bandages as well as compression garments. The latter is the key to the way forward.

Works Cited:

**Introduction**: Breast cancer is a medical problem but also – since it is women who suffer from it most frequently – an aesthetical and psychological one. Contemporary breast cancer treatment is less and less maiming, but it nonetheless lasts for long periods and has numerous side-effects. Whenever possible, the breast should be reconstructed using autologous tissue, and the procedure should be conducted as soon as possible. The procedure should ensure the best possible not only aesthetical but also functional result because that due to the breast amputation and limited mobility of the upper limb, body statics become disrupted. Due to the possible occurrence of functional limitations the implementation of a functional assessment of patients after a delayed procedure using LDF as a part of comprehensive and interdisciplinary treatment seems necessary.

**Aim**: A functional assessment of post-mastectomy patients who underwent a delayed latissimus dorsi breast reconstruction and of healthy women, through an analysis of selected muscle function parameters.

**Method**: The tests concerned 20 participants. 10 of whom patients who surgery due to breast cancer and an autologous delayed latissimus dorsi breast reconstruction procedure, and 10 of whom consisted of healthy and professionally active women who did not undergo any surgery and were not diagnosed with cancer (control). The tests were conducted once, within a year of the reconstruction procedure.

The research consisted of two tests: an assessment with a DASH questionnaire and a physical examination (of shoulder area static assessment, shoulder complex mobility assessment, latissimus dorsi flexibility assessment, and shoulder complex motor control assessment).

**Results**: LDBR procedure may have influence on limiting shoulder complex active mobility as well as on shoulder complex motor and postural control decrease. Quality of life after delayed LDBR procedure, can be conducted by patients on a significantly lower level. Properly conducted functional assessment and implementing correct physiotherapy should lead to elimination or minimalization of the upper limb and shoulder complex disability after the procedure.

**Conclusions**: Research results point to the necessity of conducting functional assessment of post-mastectomy patients qualified for LDBR procedure on a larger number of patients in order to create a physiotherapeutic algorithm taking into account a comprehensive attitude towards the treatment and exchange experience. Providing patients with comprehensive information on the possibility of the occurrence of functional limitations after the procedure and the necessity of intense post-operative physiotherapy implementation before the procedure seems necessary.
[P7] THE INFLUENCE OF BREAST CANCER-RELATED LYMPHEDEMA ON SURVIVORS’ RETURN-TO-WORK

Yuanlu Sun1, Jane Armer2, Rachael Hillyer3

1 University of Missouri-St. Louis, College of Nursing, Columbia, United States
2 University of Missouri Sinclair School of Nursing, Sinclair School of Nursing, Columbia Mo, United States
3 University of Missouri-Columbia, School of Nursing, Columbia, United States

Introduction: Breast cancer-related Lymphedema (BCRL) is one of the major treatment complications for survivors who have undergone axillary lymph node dissection and radiation. As the majority of women who develop breast cancer are at the age of employment, occupational functioning and employment are issues of concern. This study is novel in exploring the ways that lymphedema affects their work.

Aim: The primary specific aim of this study was to examine the ways that BCRL influences the individual’s work experience. The secondary aim of this study was to investigate the influences of contextual factors (personal and environmental) on survivors with BCRL, as they return to work.

Method: The International Classification of Functioning, Disability, and Health (ICF) was employed as an organizing framework for our inquiry. A multiple-case study methodology drawn from Yin’s (2014) definition was employed. Breast cancer survivors who finished primary treatment (surgery, radiation) more than 12 months prior to study, and were diagnosed with lymphedema and employed at the time of diagnosis were recruited. Thirteen female breast cancer survivors who developed BCRL participated by completing a survey and a sixty-minute semi-structured interview. Constant-comparative data analysis was employed in both within-case and across-case analysis.

Results: Four main themes emerged: 1) BCRL affects physical and emotional functioning associated with work; 2) Ongoing treatment (e.g., bandages) for BCRL creates challenges for work; 3) Environmental factors affect the return-to-work experience with BCRL; and 4) Personal factors play a key role in adjusting to return-to-work. Sub-themes emerged under each main theme (Table 1).

Conclusions: Both BCRL and its treatment have direct and indirect effects on work, with environmental and personal factors also shaping the work-return experience. This study suggests that breast cancer survivors with lymphedema who wish to return to work face potential barriers, and that gaps remain in the availability of supports that might facilitate workforce re-entry and maximize retention.

<table>
<thead>
<tr>
<th>Environmental Factors</th>
<th>Personal Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of BCRL knowledge</td>
<td>Motivated to work</td>
</tr>
<tr>
<td>Unmet need for support</td>
<td>Comfort in seeking help</td>
</tr>
<tr>
<td>Various social supports</td>
<td>Positive attitudes towards challenges</td>
</tr>
<tr>
<td>Positive healthcare providers</td>
<td>Coping strategies were developed along the way to work-return</td>
</tr>
<tr>
<td>Workplace support</td>
<td>Time management of BCRL therapy &amp; work</td>
</tr>
<tr>
<td>Flexible work schedule &amp; sick leave, healthcare insurance</td>
<td>Development of adaptations to address functional change</td>
</tr>
<tr>
<td></td>
<td>Adjust work activities (or change job)</td>
</tr>
</tbody>
</table>

Table 1. PUZZLE of BCRL & WORK
[P8] HEALTHY LEGS CLASS-A STEP FORWARD IN THE MANAGEMENT OF CHRONIC LEG OEDEMA

Lynne Whiteside

1 Lymphoedema Clinic, Portadown, United Kingdom

Introduction: The lymphoedema service identified increased referrals into their service for patients with chronic leg oedema as a result of obesity, immobility and poor venous systems. The management plan for these patients needed to be evaluated to improve patient outcomes and make best use of resources. On assessment they presented with many co-morbidities, chronicity and mental health issues; many faced social isolation, rarely leaving the house. Concordance, compliance and motivation can be challenging in managing those with a long term condition.

Aim: The aim was to find an improved treatment pathway for sustained long term improvement and maintenance. Simply delivering decongestive lymphatic therapy (DLT) does not empower the patient. Although improvements were gained they were not maintained. It was clear that more education, support and encouragement to take on their self management was vital.

Method: A programme was devised over 4 successive weeks. This included education on the causes and exacerbating factors for leg swelling. Participants were taught about the four cornerstones of care and time was taken to explain how each aspect helped. At each session they were also given exercises to complete and a tailored home exercise programme. On initial assessment and at the end of the programme the participants were weighed. They were also given an activity record to encourage them to keep active. The groups were small with 4-8 participants depending on the ability of the group. They were mixed in age, gender and ability; however at times a high or low functioning group was held to tailor further to the needs.

Results: Not only did the class receive very positive feedback but the participants demonstrated increased knowledge of their condition and increased confidence in managing it. For some the results and impact have been very significant. One participant had attended his treatment room nurse 3 x week for over 1 year with ‘leaky’ legs; since attending the 4 weeks he has been ‘dry’ and in garments with no attendances. For others it’s been able to wear proper shoes so they can go out.

Conclusions: In 2018 the lymphoedema service has managed 19% of referrals through this pathway. Those who complete the programme are offered DLT/garments/bandaging as appropriate. The uptake is lower compared with previous as there is a better understanding of the importance of self management and they are motivated to make the change themselves. They understand we cannot ‘fix’ them but empower them.

[P9] REDUCED TISSUE FIBROSIS WITH ADDITION OF TEXTURED COMPRESSION GARMENTS TO EDEMA MANAGEMENT PROGRAM

Karen Bock, Suzie Ehmann, Jeanette Muldoon

1 Truman Medical Center Hospital Hill, Kansas City, United States
2 Atrium Health Stanly, Edema Management Program, Albemarle, United States
3 Clinical Commercial Researcher, Maidenhead, Berkshire, United Kingdom

Introduction: Chronic edema is associated with significant trophic changes including not only increased volume but also trophic changes.1-3 (Partsch & Mortimer 2015, Muldoon & Hildegard 2013, Partsch & Moffat 2012) Compression has been shown to have a positive impact on trophic changes including reduced tissue fibrosis.1-4 It has been observed that textured compression, utilizing chipped foam or channelled foam, has a significant improvement on tissue fibrosis.5

Aim: Aim of this study was to objectively measure the change in tissue fibrosis following the use of a textured compression product.

Method: Observational study tracking outcomes of 4 patients (n) utilizing a textured compression garment at night. Objective measurements included: volume of the limb, tissue density, and subjective feedback from patient. Measurements were taken at three different intervals over a two month period. Tissue density was measured using a tissue tonometer.6-8

Results: In all subjects, both volume and tissue fibrosis were reduced. Two out of four subjects were recorded with at least a 5% reduction in volume and two out of four subjects recorded a %5 tissue density improvement. Patients reported increased movement and reduced heaviness of limb.

Conclusions: The use of textured compression garments as part of a night time regiment reduced tissue fibrosis for patients with chronic edema. Additional study is warranted to assess impact on overall compliance and concordance with a compression regiment.
**[P10] THE USE OF NIGHT TIME GARMENTS FOR CHRONIC EDEMA MANAGEMENT IMPACTS PATIENTS’ QUALITY OF LIFE AND EDEMA MANAGEMENT**

Karen Bock¹, Suzie Ehmann², Jeanette Muldoon³

¹ Truman Medical Center Hospital Hill, Kansas City, United States
² Atrium Health Stanly, Edema Management Program, Albemarle, United States
³ Clinical Commercial Researcher, Maidenhead, Berkshire, United Kingdom

**Introduction:** Successful management of chronic edema requires a commitment to compression bandaging, garments and/or use of alternative bandage wraps (Whitaker 2017, ILF 2012) Some patients require continuous compression day and night.¹,³

**Aim:** The aim of this investigation was to assess the impact on volume control and patients’ quality of life (QOL) with the addition of a nighttime garment to their compression regiment.

**Method:** This observational study details four patients (n=4) medical history, subjective reports and objective measurements of limb volume and self-reported QOL before, during and after the addition of a nighttime garment to their compression regiment. Circumferential measurements were taken to track limb volume and The Lymphedema Quality of Life (LYM-QOL)⁴ questionnaire was used to capture patient’s self-reported improvement in quality of life. The assessment period was over 6 weeks. Measurements were taken at three different intervals.

**Results:** It was observed that all subjects had an improvement in their self-reported quality of life (via LYM-QOL). Limb volume was stable in two out of four patients. Two out of four demonstrated further volume loss with the addition of nighttime product.

**Conclusions:** The addition of a nighttime compression device demonstrated positive change in self-reported QOL as well as better overall edema management. Patients who previously had struggled with long term edema management demonstrated improved edema control. Additional investigation is warranted to study impact of inclusion of a night time garment as part of the standard of care for those patients living with chronic edema.

---

**[P11] TECHNOLOGIES FOR PERSONALIZED NUTRITION**

Chuck Ehrlich¹

¹ Lymph Notes, San Francisco, United States

**Introduction:** Lymphedema and lipedema are associated with gut dysbiosis, an unhealthy change in gut microbes characterized by increases in pro-inflammatory and pathogenic gram-negative bacteria, reductions in anti-inflammatory bacteria, and decreased short-chain fatty acid production. Gut dysbiosis also drives obesity, type 2 diabetes, and other conditions via multiple mechanisms including elevated blood glucose levels. The goal of nutritional therapy is to reduce or eliminate gut dysbiosis by improving eating patterns (food choices, quantities, and timing) and activity. These change the mixture of gut microbes, and improve associated conditions, including blood glucose levels.

Monitoring gut dysbiosis using stool samples is impractical but blood glucose levels are easily measured and can be a reasonable proxy. Current and 90-day average glucose levels (indicated by hemoglobin A1C levels) can be measured by lab tests or consumer devices. Continuous glucose monitors that record levels every 5 minutes are available.

Nutrition research using big data (800 participants and 46,898 meals) shows that post-meal glucose levels vary considerably between individuals. Each person is consistent in how their glucose levels respond to each food item. When different people eat the same meal there can be large differences in both the direction and size of post-meal glucose changes. For example, a food that increases glucose levels greatly for one person may decrease glucose levels slightly for another person. [Zeevi, D. Cell 2015]

Personalized nutrition systems can provide meal plans that are more effective in managing glucose levels than generalized guidelines or meal plans based on calories, carbohydrate counting, or glycemic index.

**Aim:** Provide an overview of personalized nutrition research and technology options suitable or people with lymphedema/lipedema.

**Method:** Review the literature on personalized nutrition and extract relevant insights for people with lymphedema/lipedema.

**Results:** Blood glucose measurements can provide useful insights into gut dysbiosis and other aspects of metabolic health. Personalized nutrition apps can provide useful insights but have limited applicability to lymphedema and lipedema at this time. Technology is available for individual monitoring and experimentation.

**Conclusions:** Tools for personalizing nutritional recommendations are available and can be effective, subject to certain limitations. We need more research into how to utilize these tools, and how to share and expand individual insights with the entire lymphedema/lipedema community.

Glucose levels are a useful proxy for gut dysbiosis. However, glucose is only a single nutrient and meal planning must include all nutrients, vitamins, and minerals required for overall health.
[P12] DOUBLE FOCAL COMPRESSION BANDAGING. EIGHTEEN YEARS OF FOLLOW UP. AN EFFECTIVE AND EFFICIENT THERAPY FOR HEALING VASCULAR ULCERS IN LOWER LIMBS.

Carlos Sánchez Fernández de la Vega

1 Sergas, Lugo, Spain

Introduction: Vascular leg ulcers have a high socioeconomic cost in world health systems. This is a clinical experience in the healing of vascular ulcers in lower limbs (18 years follow up) in more than 100 patients. We have to improve tissue perfusion in the wound bed, applying external pressure using a compression technique: “Double focal compression bandaging”.

Aim: To use the effect of local pressure on the wound bed for healing vascular ulcers.

Method: The first bandage is used for the focal compression of the wound bed and another bandage covers the first, to achieve a gradual external compression from the toes to the knee., each turn of the band covers the preceding tour by 50-70%. The area of the ulcer receives the pressure of 3 layers (that of the pressure over the wound bed, and the double effect of the external gradual compression). It is necessary: A/ To make a differential diagnosis. B/ To establish a clinical diagnosis. C/ Measurement of the Ankle Brachial Index to exclude severe arterial disease.


Results: A representative showing of clinical cases, healed by means of this technique.
1.- Early treatment is essential for healing venous leg ulcers. 2.- It is only necessary mechanical debridement. Simply the focal compression will be enough to provoke its autolytic debridement. 3.- We have observed contamination of wound bed, but not infection. Only antibiotics oral are used, if there are signs of infection, such as fever and cellulitis. Local debridement. 4.- Compression is strongly contraindicated in the event of severe peripheral arterial disease, but in expert hands and according to signs and symptoms, making a daily follow up, it is possible and convenient applying compression therapy. 5.- We have to be patients, the ulcer may take months, even years, to fully heal. 6.- New ulcers may appear even in other part of the same leg being treated. 7.- No recurrences have been observed on the treated area. 8.- Several patients with cardiac failure (excluded grade IV) were treated by compression therapy.

Conclusions: 1° It is effective and efficient technique, because we achieve to heal the ulcers with optimal resources. 2° Cooperation of people who live with the patient is necessary.

[P13] RELATIONSHIP BETWEEN CONTENTS OF BREAST CANCER TREATMENTS AND LYMPHATIC VENOUS ANASTOMOSIS IN THE PATIENTS WITH BREAST CANCER RELATED LYMPHEDEMA

Midori Tsukagoshi1, Jiro Maegawa2, Taro Mikami3

1 Yokohama City University, Yokohama, Japan
2 Yokohama City University, Plastic and Reconstructive Surgery, Yokohama, Japan
3 Yokohama City University Hospital, Plastic and Reconstructive Surgery, Yokohama, Japan

Introduction: Lymphatic venous anastomosis (LVA) has been widely adopted for one of surgical treatments in breast cancer related lymphedema (BCRL). However, it is still unknown on relationship between contents of breast cancer treatments and LVA. In this paper we report how irradiation and chemotherapy for breast cancer effected on results after LVA in BCRL patients.

Aim: The aim of this study is to reveal risk factors in postoperative compression after lymphatic venous anastomosis.

Method: Forty-five patients with BCRL between in 2011 and 2017 in our hospital were included in this study. They were classified into stage II late in ISL classification and had LVA with the average of 4.5 anastomoses. Near infrared florescence lymphography was performed about 6 months after LVA to evaluate lymph-flow changes. We investigated volume changes of the affected limbs at the same timing. If there was no sign of deterioration, we recommended discontinuity to put compression garments. Out of 45 patients 25 underwent postoperative radiation and 22 underwent chemotherapy with taxane (TX). Volume of the affected limb were evaluated before and 1 year after LVA.

Results: Out of 45 patients 32 (71%) discontinued to put garments with the average reduction of 25 ml in volume, and 13 (29%) continued with the average reduction of 35 ml in volume. In the 25 patients with radiation 14 (56%) discontinued to use compressive garments and 11 (44%) continued. In the 35 patients with chemotherapy 12 (34%) discontinued to use compressive garments and 23 (66%) continued. In the 22 patients with TX 12 (55%) discontinued and 10 (45%) continued.

Conclusions: It is important for the patients to become free from compression, which can increase QOL of the patients. In this study more than 70% of the patients with LVA could discontinue to put compression garments. However, in the patients with postoperative radiation and/or TX about 55% of them discontinued after LVA. Postoperative radiation and TX seemed to be risk factors to reduce contents of compression therapy after LVA, so we think it is important to support them to keep compression therapy for long time.
**Introduction:** You follow me since I was born. First, discreetly as a friend, enjoying everything through school time. In the process, you suddenly changed. I was making excuses because we were both teenagers. We were together studying, loving; making holidays. I didn’t complain that you bloated. But you did. I couldn’t imagine that you would become an enemy for me. They called me beautiful. They called you fatty. You were jealous. You always told me: “Don’t wear a mini skirt neither high heels”. Finally, I created my own style, and I kept on living like a normal teenager.

**Aim:** At the same time, I was doing gymnastics, dancing, having lymphatic massage, wearing compression garments. You were never satisfied. I fought to overthrow you. I couldn’t imagine that you would become an enemy for me. They called me beautiful. They called you fatty. You were jealous. You didn’t complain that you bloated. But you did. I couldn’t imagine that you would become an enemy for me. They called me beautiful. They called you fatty. You were jealous. You always told me: “Don’t wear a mini skirt neither high heels”. Finally, I created my own style, and I kept on living like a normal teenager.

**Method:** My first battle! I won, you lost. In Germany I left much of your flow. And I photographed new countries. I was traveling with your flow. My joy didn’t last much. You were back. Powerful and stubborn. “No, Mom! I’ll go again.” Too many expenses! You were back with more flow; like you wanted to stop the flow of my dreams. Two flows at a simultaneous battle that seemed to last forever. My flow was trapped in yours. You were no longer jealous. Just mean. Now I had an enemy to face. And I was about to give up. But I also had my mom. “Life is a struggle”. I should win! “Well Marielena, back to the start.”

**Results:** This time I was lucky enough to find a clinic and a doctor in Greece. A new friend. We were together during this journey, you made me feel unique and I became stronger; capable of defeating you, of understanding you. 35 years together. I’ve learned that lymphedema lives inside and is nurtured by you. It lives because of you. Accept and love it. Enjoy the little ones, dance to the big ones.

**Conclusions:** I’m happy now. I wear whatever I want and I work. Furthermore, I share the joy of winning with my people. We were together during this journey, you made me feel unique and I became stronger; capable of defeating you, of understanding you. 35 years together. I’ve learned that lymphedema lives inside and is nurtured by you. It lives because of you. Accept and love it. Enjoy the little ones, dance to the big ones.
[P16] UNCOMPROMISED COMPRESSION

W. Jungkunz1, Janet Massey2

1 Praxis Dr Jungkunz, Zwolle, Germany
2 Concuria GmbH, Karben, Germany

Introduction: Compression is an absolutely essential treatment of lymphoedema but in order to be effective, it has to be used. Compliance over many years is therefore absolutely imperative as compression is vital for therapy. Competence and consistency are required from the treatment team, as well as a convinced patient.

Aim: The internet provides an almost instant access to subjective reviews of physician strengths as well as, on too many occasions, weaknesses. Also health-insurers may no longer pay unless an evidence-base for consistency, both with regard to the methods of diagnosis and the effect of treatment, can be provided.

Method: After many years experience in a German Lymphoedema Clinic, Dr Jungkunz was able to use the evidence-base of his various random controlled studies to endorse procedures in his dermatological and lymphological practice in Friedberg, Germany. These will be described.

Results: The evidence for the effectiveness of the diagnostic use of the ultrasound at 18MHz and tailor-made prepared bevelled urethane foam inserts sewn into hosiery have been confirmed (Refs. 1, 2).

Conclusions: As yet there is no proven intervention for the reliable long-term control of lymphoedema apart from prescribed compression with garments that have been manufactured under strict quality-controlled conditions. The patient must be motivated and taught by experienced and sympathetic surgical fitters. There should be no compromises for this treatment method.

Ref.:

[P17] APPROPRIATION OF EVIDENCE FOR GUIDELINES

Janet Massey1, W. Jungkunz2

1 Concuria GmbH, Karben, Germany
2 Praxis Dr Jungkunz, Zwolle, Germany

Introduction: The process of Guideline production has been described by Sietse Wieringa (Ref. 1), emphasizing that: “It is important for guideline developers to feel they are part of a community of practice that encourages epistemic (the scientific study of knowledge) skill development, rather than a hierarchical community where superior guideline methods are defined by a small group of experts.”

Aim: German Guidelines on the diagnosis and therapy of primary lymphoedema were published in 2017 (Ref. 2), and have subsequently been translated into English. A further German guideline (Ref. 3) concerns the diagnosis and therapy of Dermatoses in relationship to lymphostasis. It is important that these are integrated into European and International Guidelines.

Method: In view of the many years developing his own dermatological and lymphological practice by diagnosing, treating and following many thousands of lymphoedema and lipoedema patients, as well as Dermatoses in relationship to lymphostasis, Dr Jungkunz has contributed to both sets of German guidelines by providing evidence from randomized controlled trials. The importance of the development of the German Network for the treatment of Lymphoedema in central Germany will also be described.

Results: Duplex Ultrasound at 18MHz has proved to be an effective and harm-free tool for the diagnosis and follow up of compression therapy in primary and secondary lymphoedema, lipoedema as well as venous incompetence and wound healing.

Conclusions: Lymphoedema is still a relatively unknown condition in Germany. Without Consensus Guidelines there are difficulties in obtaining funding for treatment from Health Insurers. Evidence-based studies along with increasing understanding of patients are still needed.

Ref.:
2. Diagnostik und Therapie der Lymphödeme - AWMF: (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften e.V.) https://www.awmf.org/leitlinien/detail/ll/058-001.html
3. S1-Leitlinie 0123-084 Dermatosen bei dermaler Lymphostase AWMF 07/2017
[P18] COMPRESSION THERAPY - PRACTICAL PROBLEMS AND INNOVATIVE SOLUTIONS

Arun Gogia 1, Shashi Gogia 1
1 All India Institute of Medical Sciences, Sanwari Bai Surgical Centre, New Delhi, India
2 Society for Administration of Telemedicine and Healthcare Informatics, Surgery, New Delhi, India

Introduction: Despite many advances, in diagnostics, types of bandages, compression garments MLD, pumps etc., lymphedema care is still in its infancy with most patients either being neglected. Many do not have adequate insurance cover to participate in a well-defined long-term care program.

We bring forth an over thirty years' experience of compression therapy in managing various kinds of lymphatic and venous problems, including due to filariasis, cancer related, as well as other types of lymphedema and venous ulcers. We have consistent results which the processes have been evolved over time and required correcting various issues through teamwork and mutual discussions.

Aim: Case reports and outcomes from two regular clinics - one private, one at a public hospital along with some experience at various camps for lymphoedema care held at a variety of locations including a village in an endemic area.

Method: Patients were evaluated clinically by subjective improvements including Some innovations from our side included – use of group therapy, motivational support from treated patients, individualized compression regime according to comfort, intelligence as well as affordability. During this period 3 formal clinical trials were also held. Penicillin, either oral or injectable helped in reducing incidence of Adeno Dermato-Lymphangitis attacks.

Results: There have been over 2500 patients seen at the above locations. Overall outcomes are reduction in ADL attacks, increased self-confidence and return to work, with volume reduction between 50-70%. Ulcer healing rate was over 90%. Recurrences were related to discontinuation of self-care mostly due to torn or worn out bandages and stockings and sometimes due to stoppage of long-term penicillin. After treatment, even near suicidal patient showed remarkable self-confidence, could marry and help in counselling other patients.

Conclusions: Lymphedema is treatable. Training in selfcare is an important component. The processes have to be individualized with a great role of counselling not only by the clinician but also through creation of self-help groups between patients.

[P19] ADOPTING A NEW E-COMMUNICATION APPROACH

Jane Rankin 1
1 The Lymphoedema Network Northern Ireland (LNNI), Physiotherapy Dept, Level 1, Cancer Centre, Belfast Hsc Trust, Belfast, United Kingdom

Introduction: The Lymphoedema Network Northern Ireland (LNNI) was formed in 2008 with a role to change the emerging picture of lymphoedema care over the next 10 years, whilst ensuring the best use of scarce specialist expertise and standardising quality services.

Many tools were developed and performance audited to ensure success: posters, booklets, website and briefing cards. In recognition of cultural communication changes, a new e-health project was developed.

Aim: 1. Development of an App to replace the current limb volume calculator to increase regional accessibility and measure consistency, and reduce cost. It is not a medical device (as it is not used to diagnose a condition i.e. purely measures a symptom). Body Mass Index (BMI) calculation is included in function choice of platform

To transfer LNNI patient information onto an e-platform to increase access and choice of platform

Method:

1. A project team involving LNNI, the Ulster University and the Public Health Agency was formed; LNNI worked with a mathematician to develop a spreadsheet to calculate limb volume. This was piloted across all 5 trusts to compare the outcome with that of legacy calculators/software and found to produce similar results (with millilitre differences due to the number of decimal places used in the formula). A mathematical model was developed and tested for BMI. A University post-graduate student worked with the team to develop the actual App, ensuring that the clinical team was involved in screen design and design outcome.

2. A service user, who is a professional IT consultant, worked in a philanthropic role with LNNI to transfer some of its published patient information leaflets into an e-medium suitable for phones and tablets. This was piloted with both healthcare staff and by other service users. Service users had been involved in the design of the original paperwork.

Results/conclusion: This project has ensured that LNNI has continued to progress its activities to meet the changing cultural demands of both healthcare workers and also service users.
[P20] LYMPHOEDEMA NETWORK NORTHERN IRELAND: 10 YEAR REVIEW AND 5 YEAR FORWARD PLAN

Jane Rankin\textsuperscript{1}

\textsuperscript{1} The Lymphoedema Network Northern Ireland (LNNI), Physiotherapy Dept, Level 1, Cancer Centre, Belfast Hsc Trust, Belfast, United Kingdom

Introduction:

The Lymphoedema Network Northern Ireland (LNNI) was formed in 2008 to change the emerging picture of lymphoedema care whilst ensuring the best use of scarce specialist expertise and standardizing quality services.

A 10 year review was produced alongside the 2018 demographic report and referenced the baseline data. The original strategies to enhance services: education and communication were underpinned by the 2008 CREST recommendations. The key objectives included:

- Develop lymphoedema services as a managed clinical network - coordination, leadership and governance
- Awareness education for other healthcare professionals
- Develop lymphoedema e-data base

The initial outcome delivered:

- Services modernised into a coordinated, influential and effective network
- 2 year waiting times reduced to meet regional AHP access targets: 13 weeks for routine, 1 for urgent
- Access inequity addressed with centralized referral points to improve pathway, resulting in annual increased referral rates
- Inequity of cancer-related lymphoedema versus non-cancer lymphoedema access resolved
  - 2008: 95% services cancer-related lymphoedema (CRL)
  - 2018: 40% CRL and 52.2% non-CRL (remainder 5.8% primary lymphoedema and 2.1% lipoedema)
- Specialist staffing pool levels increased
- Lack of generalist/referrer knowledge addressed
- Audit of practice:
  - 95% service users offered optimal, tailored treatment
  - 5% treatments modified due to lack of resources
- 2011 development of e-minimum data set
- 2011 audit of CREST recommendations: 43 out 46 achieved (3 linked to external agencies)
- Patient voice integral at all levels (Board/trust) via direct engagement in work plan including service user satisfaction

Aim: To inform a new regional work plan for 2019-2024

Method: The LNNI Board convened a facilitated workshop to review achievements and focus the 2019-2024 work plans taking into account new challenges.

Results: The 2019-2024 focus will be:

1. A health needs assessment to reflect the changing referral/caseload challenges
2. Clarification of how, and who, manages simple chronic oedema
3. Management of red legs
4. Evolving risk reduction education
5. New pathways for differing caseloads
6. Lipoedema
7. Review of palliative care roles
8. Evolving children’s services
9. Domiciliary expectations
10. Liposuction
11. Evolving minimum data set

The Board agreed 5 roles for the lead to continue to influence on:

1. Obesity
2. Mental health and dietetic access
3. All-Ireland working
4. National and international partnerships
5. Non-medical prescribing roles

Conclusion: This facilitated process allowed the LNNI Board, including service users, to debate the challenges and agree the work plan for 2019-2024.
POSTER ABSTRACTS

[P21] HOW MANY LYMPHEDEMA PATIENTS HAVE PROBLEMS WITH FOOT AND TOE?

Angelique wiene van Ooijen

Bispeberg Hospital Region Hs, Department of Dermatology and Copenhagen Wound Healing Centre, Copenhagen, Denmark

Introduction: One of the signs of lymphedema in lower limb, is swelling of leg and foot. In our clinic we do different assessment to diagnose lymphedema in lower limb, etc. if there are positive or negative Stemmers sign. When we make this examination, we often note other foot and toe problems.

There can be different kind of complication such as swelling toes, fungal infection, corns, hyperkeratosis, ingrown toenails, very dry skin and pain in toes. These problems can cause infection.

Aim: How many patients with lower limb lymphoedema have problems with their foot and toes?

Method: I will make a pilot study in two months from d.2/1-2019 to 2/3-2019, on all patients in our lymphoedema clinic.

I data collection form are interviews and assessment.

Results: I will present the results of this pilot study on a poster presentation.

With this pilot test, I hope to increase awareness of how many of our patients, with lymphedema, have problems with their toe and foot.

[P22] GRADED NEGATIVE PRESSURE: DOES IT HAVE A PLACE IN THE CDT TREATMENT MODEL?

Paula Donahue

Vanderbilt University Medical Center, Physical Medicine and Rehabilitation, Nashville, United States

Introduction: Complete decongestive therapy (CDT) is a conservative therapy commonly employed to manage lymphedema. CDT includes compression, skin hygiene, exercises and manual lymphatic drainage (MLD), a manual technique to mobilize lymphatic congestion1, 2. A recent study illustrated that the lymphatics are capable of withstanding higher surface pressures than previously believed3, which supports refined applications of MLD: When lymphatic congestion advances to higher stages with thickened fibrotic tissue, this hardened tissue will not mobilize well using traditional MLD of light pressure, and rather respond to greater pressures to assist the movement of the interstitial fluid through these hardened soft tissues to lymphatic collaterals3, 4. Now, a device is available using graded negative pressure application which may augment the impact MLD techniques have on congested superficial tissues. Graded negative pressure application allows for an additional outward pull of the tissue with option for combined lateral and rotational tissue stretches that when used in conjunction with MLD may enhance clearance of interstitial lymphatic congestion by facilitating a more comprehensive 3D mobilization of tissue5. However structured trials showing objective efficacy of CDT with and without graded negative pressure have not been performed.

Aim: To obtain preliminary data investigating if mobilization of protein-enriched hardened tissue using graded negative pressure therapy in conjunction with CDT will improve patient-valued functional outcomes compared to standard CDT.

Method: Six patients with advanced secondary arm or leg lymphedema received sequential CDT with and without graded negative pressure therapy. The therapy was provided by the same trained lymphedema physical therapist to minimize differences in manual techniques when a patient underwent CDT alone and later CDT with graded negative pressure. Patient Specific Functional Scale (PSFS) was evaluated at the beginning and end of both treatment courses.

Results: Patients improved with both conservative therapies however PSFS scores increased 3.2±1.4 points in CDT with graded negative pressure vs. 2.5±1.7 when the same patient received CDT alone. This greater improvement in quality outcomes measurement supports the individual patient reports of tissue feeling softer, lymphedema easier to manage, and limb feeling lighter with less pain following CDT with graded negative pressure vs CDT alone.

Conclusions: In this pilot study, the inclusion of graded negative therapy with CDT provided further improvements in patient valued outcomes than CDT alone. Further investigation is warranted to evaluate quantitative and qualitative treatment impact on these two conservative therapies.
Introduction: Oropharyngeal cancer is a type of head and neck cancer. Sometimes more than one cancer can occur in the oropharynx and in other parts of the oral cavity, nose, throat, larynx (vocal cords), trachea, or esophagus at the same time. Most oropharyngeal cancers are squamous cell carcinomas. Squamous cells are the thin, flat cells that line the inside of the oropharynx. Current treatment options include surgery, gland removal, lymph node removal, chemotherapy and radiation therapy which can cause head and neck lymphedema.

Aim: To demonstrate role of physical therapy, kinesiotape and successful rehabilitation of patients with lymphedema after oropharyngeal carcinoma.

Method: Three patients with oropharyngeal carcinoma were chosen for this study. Patient 1 is a 55y/o male with oropharyngeal cancer, 23 lymph node removal, parotid gland removal, tongue biopsy, and 39 radiation treatments and 7 rounds of chemotherapy. Patient 1 has received speech therapy for trouble swallowing after surgery. Patient 2 is a 75y/o male who developed cancer at the base of tongue and received radiation therapy. Patient 3 is a 62y/o male who developed throat cancer followed by radiation and chemotherapy. All patients were referred to the lymphedema clinic with chief complaint of lymphedema. All 3 patients were able to self-manage the neck lymphedema with alleviation of the “frog’s throat” symptoms in 2-3 weeks.

Results: All 3 patients were able to self-manage the neck lymphedema with alleviation of the “frog’s throat” symptoms in 2-3 weeks.

Conclusions: Kinesiotape serves as an essential modality in management of lymphedema after oropharyngeal carcinoma. A thorough knowledge of anatomy of superficial lymphatic system anatomy is needed for successful taping application.
[P25] ROLE OF COMPLETE DECONGESTIVE THERAPY (CDT) IN CHRONIC VENOUS LEG ULCER (VLU) HEALING.

Virtu Arora1
1 Stanford Valleycare, Psm, Stockton, United States

Introduction: VLU’s are a common chronic recurring condition and a major cause of morbidity and disability affecting approximately 1% of the US adult population, or about 3 million Americans. 95% of VLU’s are in the lower leg gaiter area, around the malleoli. Management of VLUs include graded compression, 20-40mmHg, that increases the limb hydrostatic pressure and reduces the superficial venous pressure. Treating venous leg ulcers can be time-consuming and costly affecting patients’ quality of life. In a recent study, a total of 50 patients healed their VLUs without recurrence in a mean time of 122 days (range, 6-379 days) at a cost of $10,563 (range, $430-$50,967). Inpatient admission for wound-related issues like cellulitis with intravenous antibiotics, increased total cost. A Cochrane review found that adherence to multidisciplinary guidelines was associated with 6.5-fold increases in the VLU healing among US and British patients. This case study demonstrates that the specialized care provided by complete decongestive therapy (CDT) can help reduce time and cost of healing for VLU.

Aim: To establish role of Physical Therapy and Complete Decongestive Therapy in lymphedema management and chronic venous leg ulcer healing.

Method: Two patients with the diagnosis of chronic, non-healing, large venous ulcers were chosen for this study. Patient 1 is 62y/o obese white male who stopped taking his diuretics and the legs started with odorous drainage. Patient 2 is a 56y/o morbidly obese white male with chronic bilateral leg edema with a history of cellulitis and hospitalization. Pt is now diagnosed with chronic non healing venous ulcer on right calf. Both the patients received CDT 3 times a week for 3 weeks and were fitted into compression garments at discharge.

Results: Complete healing of wounds was achieved in both patients in a short period of time (21days).

Conclusions: Early outpatient treatment of VLU utilizing CDT will reduce total time and cost of healing by preventing complications while improving outcomes. Further research is needed.

[P26] NATIONAL LYMPHODEMA FRAMEWORK IRELAND - CHILDRENS LYMPHODEMA CAMP

Norah Kyne1
1 Ireland

Introduction: In 2018, the NLFI developed and hosted a lymphoedema camp specifically for children and their families and carers. Adjusting to life with lymphoedema can be a challenge for the child, their parents and their siblings. It is important that the family has knowledge/understanding and the child with lymphoedema is an active participant in their own well-being. The workshop aimed to engage and inform all participants.

Aim:
• Education for the child and immediate carers
• Treatment and instruction for ongoing management of the condition.
• Exercise and activities to complement fundamental treatment schedules

Method: The NLFI developed the criteria for children attending the camp, application form, terms and conditions, programme for the day, feedback forms, certificates of attendance, venue and dates. Each member completed the Childrens First Training prior to the camp.

Results: The following feedback from children and parents capturing the essence and success of the day: “...it was fantastic to speak with all the therapists, guest speakers and to liaise with the companies...I would love to see this as an annual event”

“...Joseph said he had a fantastic time, great to meet others with lymphoedema .. we would only be delighted if we could help out in any other way to help raise awareness ......”

“Thank you so much I have to complement you on the awareness day. I found it so informative and learned so Much. Conor had a great day and everyone made him feel so special. Cant put in to words how grateful myself and Husband are. We took away so much from that day. And best of All Conor was on a cloud. It would be something I would defiantly recommend. “

“As a parent it was fantastic to speak with all the therapists, the Guest speakers and to liaise with the companies. I would definitely love to see this become an annual event....”.

Conclusions: This is a successful model to inform children, families and carers about lymphoedema. NLFI plan to host a similar programme in 2019.
Introduction: The prevalence rate of Chronic Lower Limb Oedema (CLLO) in people with MS (pwMS) has been reported to fall between 45% and 62%. Chronic oedema is treated by a range of interventions that can be grouped together under the term ‘complex decongestive therapy’ (CDT) and exercise is one element of this. However, the effectiveness of exercises in the CDT have not been investigated separately and it was always accompanied with compression bandages or garment. Therefore, it is not certain if exercises are effective if it is used in isolation.

Aim: The aim of this study is to assess the effectiveness of progressive resistance exercise (PRE) in the management of changing CLLO in people with MS who are resident in Saudi Arabia and to determine the impact of CLLO on quality of life.

Method: Two-hundred and fifty-five pwMS with an EDSS between 3 to 6.5 were screened for the presence of CLLO using a pitting oedema test. Participants were recruited through out-patient neurology and rehabilitation services at two hospitals in Saudi Arabia. Twenty-two patients were found to have CLLO and fifteen people agreed to participate in the study. Participants followed a 12-week lower limb PRE programme in which exercises were carried out biweekly. Lower limb circumference was measured prior to and following the intervention period using a 4 cm interval circumference which divided the limbs into segments. At the same time points, Quality of Life (QOL) and degree of pain experienced were measured using the Quality of Life Measure for Limb Lymphoedema (LYMQOL) tool and Short form of the McGill Pain Questionnaire (SF-MPQ).

Results: Fourteen participants completed the intervention with a mean age of 44±7.11 years, EDSS 5.6±0.96, BMI 29.08±7.91 and disease onset 12.92±3.7 years. The results show no statistically significant change occurred in limb volume overall. However, a reduction in the volume of some leg segments occurred in the intervention period using a 4 cm interval circumference which divided the limbs into segments. At the same time points, Quality of Life (QOL) and degree of pain experienced were measured using the Quality of Life Measure for Limb Lymphoedema (LYMQOL) tool and Short form of the McGill Pain Questionnaire (SF-MPQ).

Conclusions: The twelve-week programme suggests that PRE may have an impact on CLLO in some lower limb segments and quality of life. Further studies are required to determine the limitations, optimal dose and duration of PRE.

Linda-Anne Kahn1

1 Lymphatic Therapy Services, Lymphedema, San Diego, United States

Introduction: Lipedema is a chronic debilitating disease affecting the subcutaneous adipose tissue of the extremities, occurring mostly in females during or after puberty or menopause. Lipedema is a poorly understood condition and health professionals most often dismiss the patient and tell them to lose weight. They are “blamed” for being overweight, told they eat too much or are “cheating” on their prescribed diets. There is a lack of sympathy and understanding. This can cause anxiety, frustration and a feeling of helplessness. This condition is a genetic abnormality and the obesity is not the patient’s fault.

The clinical presentation and symptoms of lipedema can commonly result in a misdiagnosis of lymphedema, obesity, Dercum’s disease, or chronic venous insufficiency, resulting in incorrect treatment.

Aim: In this informational workshop led by an experienced lymphedema therapist, we will explore the clinical presentation of Lipedema and differential diagnosis of lipedema, obesity, lymphedema and Dercums disease as well as stages and types of lipedema, complications and side effects of lipedema

Method: Participants will learn about conservative therapy for the treatment of lipedema and goals of therapy, including Dr Vodder’s Manual Lymph Drainage, self massage, dietary options, breathing and exercises. Lipedema affects a patient’s emotional state and quality of life. We will discuss psycho-social challenges to the lipedema patient and tools to address these challenges; compression and challenges with compression for the patient as well as surgical options

Results: Participants will:

1. Achieve a deep understanding about lipedema including symptoms, classification and stages of lipedema;
2. Gain knowledge of differential diagnosis of Lipedema, lymphedema, obesity and Dercums disease.
3. Understand the complications and side effects of lipedema;
4. Identify how to diagnose lipedema;
5. Learn about the treatment of lipedema both physically and emotionally;
6. Develop and understanding of the psycho-social challenges to the lipedema patient and tools to address these challenges;
7. Learn about supplements that have been shown to reduce weight and volume and help to reduce inflammation
8. Learn how foods play an important role in the treatment of lipedema.

Conclusions: The prognosis of lipedema is not fully understood and patients are often misdiagnosed.

The treatment for the Lipedema patient is complex as it is essential to treat the patient physically, emotionally and also provide nutritional guidance to avoid additional weight gain.

162 163


Emad Abdalla1, Mohammed Shafi2, Sumaiya Sobani3

1 National Center for Cancer Care and Research - Hamad Medical Corporation, Doha, Qatar
2 National Center for Cancer Care and Research - Hamad Medical Corporation, Physiotherapy & Lymphedema Department, Doha, Qatar
3 National Center For Cancer Care & Research-Hamad Medical Corporation, Physiotherapy & Lymphedema Department, Doha, Qatar

Introduction: Lipedema is an uncommon disfiguring disorder frequently misdiagnosed as diet-induced obesity and/or Lymphedema, almost exclusively affecting women, but a few cases have been reported in men. Given the lack of knowledge and little evidence about this disorder world widely. In Qatar, it is mostly unrecognized due to decreased awareness among most of healthcare providers along with the Cultural taboo delaying patients from reaching them. This leads to late referrals leaving patients in psychosocial distress including anxiety, depression, isolation and eating disorders. Having a dedicated Lymphedema clinic only recently opened, healthcare providers are not still fully aware of the availability of this service in Qatar which makes patients feel rejected especially when they are branded as being simply “Obese”.

Aim: To identify Lipedema cases & its incidence in the state of Qatar from 2016 to 2018.

Method: As the only dedicated Lymphedema clinic in Qatar, we have been conducting awareness programs, lectures & workshops for healthcare providers in National & international conferences. In 2016 we joined the Vascular Multidisciplinary Team, which led to receiving patients with different lymphatic & vascular disorders by which we were able to identify Lipedema cases by clinical examination & assessment. Dedicated therapists were assigned for data collection of these cases. From 2016-2018 given the increased number of patients & based on the data collected, we were able to assess the variables ( Age, Gender, Body mass index and other factors) affecting the incidence of this disorder in the patient population in the state of Qatar.

Results: From 2016 to 2018, 38 patients (N=38) were identified as Lipedema cases, with mean age of (50.13) ranging between (32-74), Majority of patients were Qatari (81.5%), with Male to female ratio of (1:37), mean BMI was (45.24) ranging between (25.64-73.46), nearly (10) patients presented with family history, (20) had history of previous surgeries with pain and cellulitis history presented in (21) & (10) of those patients respectively.

Conclusions: Lipedema is a rare entity of fatty deposition; the lack of research and understanding about this disorder has contributed to its common misdiagnosis. Early diagnosis & recognition of the clinical features will allow for more effective & efficient management. Further studies are required to identify the real prevalence of Lipedema given the diverse population in state of Qatar.
**[P31] A FACULTY SURVEY ON THE STATUS OF LYMPHOLOGY EDUCATION IN ENTRY-LEVEL DOCTORATE PHYSICAL THERAPY PROGRAMS**

David Doubblestein1, Amy Yorke2

1 University of Michigan - Flint, Physical Therapy, Flint, United States
2 University of Michigan - Flint, Physical Therapy, Flint, United States

**Introduction:** Lymphedematous conditions are encountered in physical therapy practice settings. Entry-level doctorate physical therapy (ELDPT) students require education in lymphology. Lymphology education in ELDPT programs has not been examined for 20 years; therefore, creating an opportunity to explore if knowledge gaps exist in basic science, examination, and interventions.

**Aim:** 1) describe the coverage of lymphology content within ELDPT programs; 2) identify whether lymphology content is perceived as entry-level material; 3) determine the relationship between perceived grade (PG) of the lymphology curriculum and hours devoted to lymphology content.

**Method:** A cross-sectional research design was implemented, using an online survey, delivered to program directors of 221 ELDPT programs in the US, who were requested to disseminate the survey to departmental faculty.

**Results:** Forty-three surveys were analyzed, representing thirty-five universities. Types of edema taught – mechanical insufficiency (86.8%, n = 33), dynamic insufficiency (73.7%, n = 28), combined insufficiency (68.4%, n = 26), and lympho-lipedema (57.9%, n = 22). Lymphedema interventions were taught in integrative therapy (47.4%, n = 18), and cardiopulmonary (31.6%, n = 12) courses, and rarely in neuromuscular (2.6%, n = 1), and musculoskeletal (7.9%, n = 3). Variability existed across curriculums in range of hours devoted to didactic (0.4-14.1 hours) and laboratory (0.0-10.0 hours) instruction.

Respondents somewhat to strongly agreed that lymphatic system anatomy and physiology (84.4%, n = 38), pathophysiology (90.7%, n = 39), and examination (81.4%, n = 35) were ELDPT material. 58.1% (n = 25) of the respondents somewhat to strongly agreed that manual lymphatic techniques were entry-level, while 23.2% (n = 10) somewhat to strongly disagreed. 58.1% (n = 25) of the respondents somewhat to strongly agreed that education on multi-layer compression bandaging was entry-level, while 20.9% (n = 8) somewhat to strongly disagreed.

The PG of content adequacy of lymphology curriculum programs averaged a “C” (M = 3.47, SD = 0.70, N = 43). Spearman rank correlations indicated a positive relationship between number of lecture hours and PG for anatomy and physiology [rs (33) = 0.36, p = 0.04], pathophysiology [rs (34) = 0.47, p = 0.005], examination [rs (29) = 0.42, p = 0.02], compression devices [rs (31) = 0.50, p = 0.004], and manual lymph drainage [rs (31) = 0.36, p = 0.044].

**Conclusions:** Consistent lymphology content and format is lacking for examination skills, and interventions within the ELDPT programs. This study supports developing unified content standards of professional entry-level lymphology curriculums.
[P33] STREPTOCOCCAL SEX SYNDROME- AN UNUSUAL COMPLICATION OF LYMPHOEDEMA

Bernadette Hannon\(^1\), Mary Paula Colgan\(^2\), Caitriona Canning\(^3\)

\(^1\) St. James’s Hospital, Vascular, Dublin, Ireland
\(^2\) St James’s Hospital, Vascular, Dublin, Ireland
\(^3\) St. James Hospital, Vascular, Dublin, Ireland

Patient Presentation: A 44 year old female presented with a history of 6 episodes of acute left groin cellulitis over a 2 year period requiring hospital admission and intravenous antibiotics. All episodes of cellulitis occurred after the patient had sexual intercourse. The patient became systemically unwell on each occasion developing erythema and warmth in her pubic area and left upper thigh/groin.

The patient was diagnosed with cervical cancer in 2011 and with recurrence in 2012. She was treated with a radical hysterectomy followed by radiotherapy and chemotherapy. The patient developed left upper thigh lymphoedema almost immediately and manages this condition with regular manual lymphatic drainage and compression garments.

The patient is both physically and emotionally affected by her lymphoedema and recurrent cellulitis and presented to clinic for advice. She has avoided sexual intercourse for the past 5 months and this is now putting a strain on her relationship with her partner.

Physical Examination: On examination there was modest left leg swelling – left thigh measures 56cm compared to right thigh 54cm. Pedal pulses were palpable and Stemmers sign was negative. Her skin was dry and the left thigh was soft to palpate but there was induration in the groin and pubic area.

Summary: 44 year old lady with groin and pubic lymphoedema secondary to cervical cancer who presents with a 2 year history of recurrent groin cellulitis following sexual intercourse.

Discussion: Two similar cases were reported in 1987 and the entity was named Streptococcal Sex Syndrome (SSS)\(^1\). It was postulated that the vagina is the site of inoculation following microtrauma from intercourse. Management includes moderate sexual stimulation, use of a water-soluble lubricant jelly and prophylactic antibiotics. Only one other case has been reported in 2018\(^2\).

This is an often forgotten and rare complication of pelvic cancers which has a significant impact both physically and emotionally on patients. Simple measures can result in complete control.

Ref.:  

[Poster abstracts]
**[P36] CASE REPORT TO DEMONSTRATE THE NEED FOR SELECTION CRITERIA FOR OPTIMAL ADJUSTABLE VELCRO WRAP PRESCRIPTION**

Karen Bock\(^1\), Suzie Ehmann\(^2\)

1 Truman Medical Center Hospital Hill, Kansas City, United States
2 Atrium Health Stanly, Edema Management Program, Albemarle, United States

**Introduction:** Compression, in the form of either a compression bandage or a compression stocking, has been touted as the gold standard for treatment of swelling and venous leg ulcers (VLU). (ILF 2012, O’Donnell et al 2014, Stout et al 2012, Partsch et al 2008) Adjustable Velcro wraps have been marketed as compression alternative (Williams A 2016). Although there is a growing body of evidence to support use of these products, there has not been a critical evaluation of the functionality of the devices to best matching product to patient presentation and ability to utilize the device effectively. Unlike compression garments, which are classified by compression category (class I/II or flat knit /circular), there is not an algorithm to direct health care providers to best match a specific adjustable Velcro wrap to an individual patient presentation.

**Aim:** This case series sought to demonstrate that although each product demonstrated ability to produce the marketed level of compression, realistic utilization of the product varies based on patient limb characteristics and functional level.

**Method:** Three different adjustable Velcro wraps were reviewed. Each product was applied per the manufacturer’s instructions. Resting pressures for each device were measured using a validated tool on a normal volunteer. Five patients who had previously been wrapped were issued the products and instructed with application/use. Evaluation of performance of each device were documented by the patient and the clinical staff to include ease of application, volume containment, and any undesirable characteristics.

**Results:** Marketed compression profile was demonstrated in each device. However, there were significant differences in the patients’ ability to effectively apply the product and for the product to adequately maintain compression for the limb.

**Conclusions:** This small case series demonstrates that although each product performed as marketed in vitro, performance in clinical setting varied greatly dependent on patient presentation and functional skill level.

---

**[P37] FEASIBILITY OF MOBIDERM® USE A SELF-BANDAGE BY SECONDARY LOWER LYMPHEDEMA PATIENTS; A CASE STUDY.**

Mihoe Katayama\(^1\), Tomoko Minamiyama\(^2\), Mitsuko Kima\(^3\), Katsushi Ueyama\(^2\), Misako Dai\(^2\), Junko Sugama\(^4\)

1 Kanazawa Cardiovascular Hospital, Nursing, Kanazawa Ishikawa, Japan
2 Kanazawa Cardiovascular Hospital, Cardiovascular Surgery, Kanazawa Ishikawa, Japan
3 Institute of Medical, Pharmaceutical and Health Sciences Kanazawa University, Faculty of Health Sciences, Institute of Medical, Pharmaceutical and Health Sciences, Kanazawa University, Kanazawa City, Ishikawa Prefecture, Japan
4 Health Sciences, Kanazawa University, Advanced Health Care Science Research Unit, Innovative Integrated Bio-Research Core, Institute for Frontier Science Initiative, Kanazawa University, Kanazawa, Japan

**Introduction:** Improvement in skin and edema conditions of lymphedema patients to prevent cellulitis is important. MOBIDERM® is a system used for the mobilization of edematous or indurated subcutaneous tissues.

**Aim:** This case study aimed to clarify the feasibility of MOBIDERM® use as a self-bandage by lower lymphedema patients at their homes.

**Method:** We used MOBIDERM® instead of standard bandages as self-care for 2 months. A certified lymphedema therapist nurse educated each patient about the use of MOBIDERM® before each patient used it at home. Once a month, a nurse verified this situation. Outcome was the change in the thigh, lower leg, and ankle circumferences by measurement. Skin and edema conditions were evaluated using an original questionnaire and visual analog scale (VAS), respectively. Ethical approval was obtained from the Kanazawa Cardiovascular Hospital and Kanazawa University.

**Results:** We recruited two patients with late Stage II secondary lymphedema. Self-care was performed using MOBIDERM® at the patient’s home. Case 1 was an 83-year-old with an affected right limb. The circumference reduced by 1.0 cm (from 53.0 to 52.0 cm) in the thigh and other sites were stable. Case 2 was a 77-year-old with an affected left limb. The circumference reduced by 0.7 cm (from 52.4 to 51.7 cm) in the thigh and increased by 2.1 cm each in the lower leg and ankle (from 42.1 to 44.2 cm and 23.8 to 25.8 cm respectively). Both patients had no skin trouble, and edema condition did not worsen. Heaviness, tightening, and hardness improved (Case 1; 8.5→7.4 cm, 8.5→7.4 cm, 8.5→0.4 cm respectively; Case 2; 4.9→2.2 cm, 8.1→2.2 cm, 4.9→1.0 cm respectively); strangely, this was increased in Case 2 (0.1→1.0 cm).

**Conclusions:** We clarified the feasibility of MOBIDERM® use for self-care by secondary lower lymphedema patients who could continue using daily self-bandage. Edema heaviness, tightening, and hardness improved following MOBIDERM® use. The reported success might be due to the massaging function of the small cushions in this reduction in the circumference with this bandage as self-care should be consider.
**[P38] A NEW COMPRESSION GARMENT FOR PATIENTS WITH PRIMARY LYMPHOEDEMA?**

**Justine Whitaker**, MAIRI OLIVIER, Simon Sumner, LAUREN HAWORTH, Ambreen Chohan

1 University Of Central Lancashire, School Of Health Sciences, Preston, United Kingdom

**Introduction:** Lymphoedema is associated with dysfunctional lymphatics, tissue fibrosis and inflammatory changes in the skin and local tissue. Oxygen is an essential substrate required to supply the amount of energy required for tissue renewal. Providing patients with safe compression which also enhances their tissue health is paramount when supporting their self-management regimens. A range of compression devices should be available to meet individual needs as they progress through the day without compromising their lymphoedema and tissue health as their activities change in a 24-hour management plan. Ensuring compression supports tissue health is crucial to the management of lymphoedema.

**Aim:** This case study aims to explore the use of a new compression garment in two sitting positions in an adult with primary lymphoedema.

**Method:** An eighteen-year-old female (BMI: 25.2kg/m²) with Milroy’s Disease, was recruited. All data conformed to the Declaration of Helsinki and ethical principles. She attended two separate one-hour sessions to evaluate StO₂ in chair-sitting and long-sitting positions. Following removal of her usual Class 2 (20-30mmHg) flat-knit compression hosiery, StO₂ was recorded for 20-minutes Pre, during and post a 20-minute application of the TributeWrap™ (Lohmann-Rauscher, DE) to the right leg.

**Results:** In the long-sitting position, StO₂ levels started high at baseline (94.5%) remaining relatively maintained both during and post a short 20-minute intervention (94.1%). In the short sitting position, StO₂ levels were significantly lower at baseline (52%), showing a 77% increase during the intervention (92%) followed by a small 9% decrease post-intervention (83.7%). The patient described comfort levels highly positively in both positions, with further comparisons made to reduction in swelling seen after bandaging also comparing the effects to hosiery, with more movement possible post-intervention. Compliance was described as extremely likely due to the comfort and ease of application.

**Conclusions:** This compression garment significantly increased StO₂ levels in the chair sitting position whilst maintaining the effects of the patients’ compression stockings, in the long sitting position. Baseline oxygenation levels (52%) were similar to levels seen in an earlier healthy leg study (56%), indicating that the patients’ normal prescription hosiery maintains StO₂ similar to non-lymphoedematous limbs. When increasing tissue oxygenation through short intervention sessions, this washable compression garment has the potential to improve tissue health in individuals with Primary Lymphoedema. This not only encourages self-management, but also offers a potential night time compression solution where the need arises in a 24-hour management plan.

---

**[P39] CAN A NEW COMPRESSION GARMENT IMPROVE TISSUE HEALTH?**

Ambreen Chohan, LAUREN HAWORTH, MAIRI OLIVIER, Simon Sumner, Daniel Birdsall, Justine Whitaker

1 University Of Central Lancashire, School Of Health Sciences, Preston, United Kingdom
2 University of Central Lancashire, School of Health Sciences, Preston, United Kingdom

**Introduction:** Compression systems such as bandaging, compression stockings and self-adjustable wrap systems aim to correct venous insufficiency by counteracting the force of gravity, increasing cutaneous pressure. Compression therapy has been shown to increase the efficacy and effectiveness of both the lymphatic and venous system in moving fluid. Compression garments have been shown to reduce venous stasis and increase blood, lymphatic flow and skin tissue oxygenation (StO₂), promoting healthy tissue. Though compression garments are primarily associated with lymphoedema, there is also an increasing use in sports performance, to aid faster recovery and reduce fatigue.

**Aim:** This quantitative study aims to explore the efficacy of a new compression garment in three sitting positions in healthy adults by monitoring skin tissue oxygen levels.

**Method:** Twenty-eight participants (aged 24.6 years±8.4 years; 13 Males, 15 Females) were screened and recruited using (PAR-Q, CA). All data conformed to the Declaration of Helsinki and ethical principles. Participants attended three separate one-hour sessions to evaluate StO₂ in supine-lying, chair-sitting and long-sitting positions. StO₂ was recorded for 20-minutes Pre, during and post a 20-minute application of the TributeWrap™ (Lohmann-Rauscher, DE). A repeated-measures analysis of variance (ANOVA) was followed by post-hoc pairwise comparisons.

**Results:** A significant difference was seen between the three seating positions (p=0.000; figure 1). Chair-sitting had the lowest StO₂ pre-intervention and no significant difference was seen between long-sitting and supine-lying (p=1.000). When chair-sitting, the garment increased StO₂ significantly during the intervention (32.25%, p=0.000) and decreased StO₂ significantly following the intervention (5.6%; p=0.000) yielding an overall 24.8% increase from baseline to post intervention. In contrast long-sitting and supine-lying only increased post-intervention (11%/16.8% respectively, p=0.000); compared to baseline.

**Figure 1**

**Conclusions:** This compression garment significantly increased StO₂ levels in all seating positions. Increasing StO₂ through short intervention sessions with this portable device has the potential to improve tissue health in individuals with reduced mobility, oedema or venous insufficiency. Further use of the product is also possible in post-game recovery in sport. This reusable compression device has the potential to encourage self-management of tissue health in multiple settings, therefore warrants further research with specific groups.
**Introduction:** In elderly care facilities, elderly individuals spend most of the daytime in a sitting position as a deterrence against becoming bedridden. However, opportunities to move the lower limbs are decreased by continuous sitting, and the feet may become easily swollen. Our previous prospective study showed that severity of oedema in Japanese elderly individuals increased over time and progressed to non-pitting oedema in the lower extremities.

**Aim:** To investigate the severity of oedema in the feet and daytime activities among elderly Japanese individuals in a nursing home.

**Method:** In this observational cross-sectional study, participants were nursing home residents ≥65 years old in August and September 2018. Elderly individuals whose family members did not consent to participation were excluded. Collected data included age, sex, diagnosis of diseases, Mini-Nutritional Assessment (MNA), immobility, and oedema in the feet. Severity of oedema was assessed at 4 sites per foot: the pretibial edge, medial malleolus, lateral malleolus, and dorsum of the foot. The severity of oedema was evaluated using the modified Fukazawa method (grade 0-4), with grade ≥2 define as “with oedema”. The sum of the severity scores each 4 sites at right and left foot was used as the oedema score. The researchers observed participants’ movement (frequency of standing up, walking, and sitting) during the daytime for 2 days (total 19 hours). This study was approved by the Medical Ethics Committee at Fukui Prefectural University and the participating nursing home.

**Results:** Participants were 9 women (median age, 91 years; IQR, 80-97 years). All participants showed “with oedema” at assessment point. The median oedema score was 9 (IQR, 6-15). The median time spent sitting was 12.5 hours (IQR, 12.1-14.5) per over the full 19 hours. The participants spent 65.8% (IQR, 64.0-78.1) of daytime hours in a sitting position.

**Conclusions:** The participants were found to spend most of the day in a sitting position. This is a big problem in Japan due to its high elderly population. It is necessary to increase the opportunities for elderly people to move their lower limbs.
**[P42] IMPLEMENTATION OF PATIENTS CARE ACTIVITIES PARALLEL WITH MASS DRUGS ADMINISTRATION (MDA) IN TANZANIA ENDEMIC AREAS**

_Wilfred Lazarus Mandara^1, Upendo John Mwingira^2, Abdallah Athuman Ngenya^2, Hayley Mableson^1, Charles Donald Mackenzie^3_

^1 National Institute for Medical Research (Nimr), Diseases Prevention & Control Programmes -Ntdcp, Dar Es Salaam, Tanzania  
^2 National Institute for Medical Research (Nimr), Diseases Prevention and Control Programmes/Neglected Tropical Diseases Control Programme (Ntdcp) - Mohcdeg, Dar Es Salaam, Tanzania  
^3 Liverpool School of Tropical Medicine (Lstm), Centre for Neglected Tropical Diseases, Pembroke Place, Liverpool, L3 5qa, England, United Kingdom  
^4 Task Force for Global Health (Tfgh), 330 Wence Ponce de Leon Ave, Decatur, Georgia, United States

**Introduction:** Tanzania began its Elimination Programme for Lymphatic filariasis disease in a year 2000 with the formation of Tanzania National Lymphatic Filariasis Elimination Programme (NLFEP), Mafia District in Pwani region being the first to implement Mass Drugs Administration (MDA) with Albendazole and Ivermectin. Post MDA feedback indicated reduction or stopping of acute dermatolymphangioadenitis (ADLA), reduction of leg circumference to some individuals and improvement of skin for affected part with lymphoedema. In 2001, under the TNLFEP, a lymphatic Filariasis (LF) clinical reference center was established with an aim to provide treatment and instruction on self-care to the many previously unattended lymphoedema (LE) and hydrocele patients.

**Aim:** Aim of the study is to document and monitor LF clinical cases and determine the impact of patient care in parallel with MDA.

**Method:** During clinical visits, the attendee is clerked, physical examination is done and a diagnosis is made. Counselling is provided in parallel with health education skin care management, wounds care and lymphoedema hygiene training. During the visit provision of anti-filarial medicines and at times lymphoedema management kits are freely given to enhance lymphoedema management practice while at home. Hydrocele patients are counselled for surgical intervention.

**Results:** Over 1200 patient visits have now been reported at the clinic having improvements. These improvements ranged from skin quality, reduction on limb size, increased ability to perform daily activities, minimization of stigmatization and hence a dramatic improvement in the quality of life of patients.

**Conclusions:** Findings strongly suggest that the implementation of patient care activities parallel with MDA programmes for LF are extremely beneficial and should be encouraged.

---

**[P43] SIGNIFICANT IMPROVEMENT IN QUALITY OF LIFE AFTER TREATMENT OF LOWER EXTREMIT Y LYPHEDEMA WITH NEGATIVE PRESSURE APPLICATION**

_Adrien MacKenzie^1, Paula Donahue^2_

^1 Osher Center for Integrative Medicine at Vanderbilt, Physical Medicine and Rehabilitation, Nashville, United States  
^2 Vanderbilt University Medical Center, Physical Medicine and Rehabilitation, Nashville, United States

**Introduction:** A 55 y.o. woman presents with a 17-year history of Stage III secondary lymphedema in her right lower extremity after cervical adenocarcinoma requiring pelvic and inguinal lymph node dissection. Despite reported aggressive self-management efforts involving daily pneumatic compression use, wearing day and night compression garments and receiving professional manual lymphatic drainage (MLD) twice a month from a certified lymphedema therapist (CLT), she experiences daily pain and states that episodes of intensive outpatient complete decongestive therapy (CDT) result in minimal response to pain and quality of life changes. With a new treatment option available, the patient underwent a course of CDT in conjunction with the use of a manual negative pressure device, PhysioTouch®.

**Aim:** To assess if CDT combined with PhysioTouch® has a patient-valued impact on her expressed pain and quality of life.

**Method:** The patient was treated weekly for 10 visits with MLD in combination with PhysioTouch® for 60 minutes duration. She continued her usual daily self-management though temporarily stopped her daily use of compression pump and regular professional MLD sessions. Pain ratings were made using the Visual Analogue Scale (VAS) and volumetric measurements were obtained using perometry. Additionally, clinical assessment of skin and superficial tissue mobility was acquired through palpation and quality of life data was attained using the Patient Specific Functional Scale (PSFS) and Lower Extremity Functional Scale (LEFS).

**Results:** VAS improved from 4/10 to 1/10. Tissue palpation revealed a change of improved tissue movement and reduced thickness post treatment. Leg volume revealed essentially no change (initial: involved=12438ml, contralateral=7556ml, % difference=69.1%; post: involved=12446ml, contralateral=7305ml, % difference=70.4%). PSFS improved from 2 to 6 where the minimal detectable change (MDC) is 2 points, and LEFS improved from 53 to 67 (MDC=10).

**Conclusions:** Results suggest incorporating negative pressure in a patient’s plan of care should be considered.
[P44] SECONDARY LEG LYPHEDEMA DEVELOPMENT AND DELAYED WOUND HEALING AFTER CORONARY ARTERY BYPASS GRAPH SURGERY VEIN HARVESTING IN AN AT RISK LIMB: CDT MANAGEMENT WITH WOUND HEALING IN 2 WEEKS

Ann DiMenna1

1 Markham Lymphatic Centre, Markham, Canada

Introduction: At the present time, there are a limited number of studies on patients at risk for lymphedema who also undergo coronary artery bypass grafting (CABG) with femoral vein harvesting. A patient who had ovarian cancer 3 years earlier (in 2012) had no reported swelling and underwent CABG treatment in 2015. Post surgery, the patient presented with swelling, repeated cellulitis infections, and delayed wound healing in the leg where the femoral vein was harvested.

Aim: To demonstrate that complex bandaging for lymphedema can reduce the length of time for complex wounds to heal following CABG surgery in a patient with past ovarian cancer.

Method: A standard case history obtained from the patient revealed no outstanding risks or complications. During multiple phases of treatment, pictures were taken of the affected leg and leg wounds. In addition, a standard treatment plan of Combined Decongestive Therapy (CDT) was implemented, including: skin care, wound care, manual lymph drainage, exercise and bandaging. CDT treatments were completed three times a week for 3 months.

Results: Within one month, the three open wounds closed completely. The lymphedema was stabilized and the client has returned to prior level of function and activities of daily living (ADL) with compression stockings.

Conclusions: Patients planning to undergo CABG surgery should be aware of the risks and potential onset of lymphedema related swelling, especially for those patients at risk from prior cancer treatments. As well, these types of surgeries are also associated with cellulitis as well as delayed wound healing. A key treatment strategy to address lymphedema in these patients is Combined Decongestive Therapy, which can aid in wound healing and lymphedema volume reduction.

[Poster abstracts]

[45] SCLEROSIS OF PAPILLOMATOSIS

Sandrine Mestre Godin1, sou howaldt monira2, Murielle Benhamou2, Emilie Valdelleire2, Virginie Soulier Sotto2, Pourquier Hélène3, Flerence Delseny3, fabienne mourgues4, Isabelle Quéré5

1 Service de Médecine Interne et Maladies Vasculaires Hôpital St Eloi, Montpellier Cedex 5, France
2 Chu Montpellier, Vascular Medicine, Montpellier, France
3 Chu Montpellier, Montpellier, France
4 Montpellier, Medecine Vascular, .., France
5 University of Montpellier, Chu Montpellier, Montpellier, France

Introduction: Papillomatosis have major consequences on the quality of life of our patients, particularly because of episodes of lymphorrhea and the associated risk of infection, but also aesthetic and psychological especially as they are located in the genital sphere.

Aim: The management of these patients is complex and requires a multidisciplinary management associating physiotherapist, nurse, doctor, gynecologist, urologist and plastic surgeon. Lymphedema should be maintained by a compression adapted to the localization of edema during the day, an inelastic compression associated with fragmented mobilizing foam at night, global lymphatic drainage should be performed regularly and the patient should be trained to self-management especially for the genitains lymphedema. The assessment of the severity of papillomatous is done on the presence or absence of lymphorrhea, the number of infectious episodes presented by the patient, the comparison of images before / after treatment, by accounting for the number of lesions and trying to assess their size, as well as assessing the discomfort felt by the patient (scale from 1 to 10). The papillomatosis on the affected limbs or toes respond well to the medical treatment well conducted with the realization of regular bandages, drainage and optimal compression. It may be necessary to perform a limited complementary resection in case of significant discomfort (for example, for the footwear), but it must be performed by a trained surgeon working in a reference lymphedema’s center.

Method: Genital lymphedema involvement is characterized by the presence of pedicle papillomatosis, which may be like a bunch of grapes, a caveite, often associated with more or less abundant lymphorrhea. Surgical resection can be performed which must be limited but recurrences are frequent. These lesions can be sclerotic in consultation by injection of Aetoxisclerol 0.5% foam after application of lidocaine cream for 1h. It could be injected from 2 to 10cc maximum per session. This treatment was performed, one time or several times, on 8 patients followed at Montpellier University Hospital.

Results: The first results have led to a decrease (1), a temporary (1) or permanent cessation (2) of discharge, a decrease in number of infectious episodes (2) and a decrease in size and number of papillomatosis lesions for some (n=6).

Conclusions: This series of patients is short but shows the interest of being able to offer complementary therapeutic possibilities in the complex management of our patients. A study on a larger population with a longer follow-up, especially for recurrences, will be necessary to complete our first observations.
**[P46] REDUCTION KIT VERSUS SHORT STRETCH BANDAGING OUTCOMES IN THE REDUCTION PHASE OF COMPLETE DECONGESTIVE THERAPY: CASE REPORT**

Jamie Carlson1

1 James Cancer Center at The Ohio State University Medical Center, Oncology Rehabilitation, Columbus, United States

**Introduction:** Complete Decongestive Therapy (CDT) has been recognized as a successful treatment intervention for symptoms consistent with lymphedema.1 The current treatment standard of reducing lymphedema is with application of short stretch compression bandages.2 These bandages are often reported by patients as bulky, hot, cumbersome, and difficult to don/doff. There is a more recent product, known as a Circaid Reduction Kit, which can be used as an alternative to compression bandaging. Unfortunately, the Circaid Reduction Kit is an expensive out of pocket cost and further research needs to be completed to determine its effectiveness.

**Aim:** This case study compares the Circaid Reduction Kit to the compression bandaging on a single patient with stage 1 bilateral lower extremity lymphedema and includes both objective effectiveness and the patient’s subjective satisfaction with both applications.

**Method:** A 57 year old female with stage 1 phlebolymphedema was provided with short stretch bandages for her right leg and foot and a Circaid Reduction Kit and PAC band for the left leg and foot. Girth measurements were taken by the same physical therapist at the onset of every visit over a five week time frame. Pictures were documented of both legs at the onset of each appointment. Outcomes included patient satisfaction outcome provided by Medi as well as Lymphedema Quality of Life Questionnaire.

**Results:** According to this case study, when comparing the use of Circaid Reduction Kit and short stretch compression bandaging on the calf and foot, volume reduction percentage is similar. Patient rated much greater satisfaction using the Reduction Kit over the bandaging and her skin seemed to tolerate the Reduction Kit better.

**Conclusions:** From a clinician standpoint, it is much easier to educate and teach application of the Reduction Kit over the short stretch compression bandaging and is also easier to don and doff. This study suggests that the Reduction Kit is not only as effective as short stretch bandaging at reducing volume, but the Reduction Kit also demonstrates greater patient satisfaction based on fit, ease of use, application time and ease of initial application.


2 NLN Medical Advisory Committee (February 2011). The Diagnosis and Treatment of Lymphedema [PDF file] retrieved from https://www.lymphnet.org/pdfDocs/nlntreatment.pdf

**[P47] LIMITED USABILITY OF LYMPHOSCINTIGRAPHY IN FOLLOW-UP OF PRIMARY LYMPHEDEMA**

Rita Hansdorfer-Korzon1, Aleksandra Korzon2, Michał Korzon3, Jacek Teodorczyk4

1 Medical University of Gdańsk Nip 584-09-55-985, Department of Physiotherapy, Gdańsk, Poland
2 Medical University of Gdańsk, Department of Obstetrics, Gdańsk, Poland
3 Medical University of Gdańsk, Department of Gastroenterology, Gdańsk, Poland
4 Medical University of Gdańsk Nip 584-09-55-985, Department of Nuclear Medicine and Radiology, Gdańsk, Poland

**Introduction:** The diagnosis of primary lymphoedema and the initiation of appropriate treatment is usually significantly delayed. In spite of continuous progress in diagnostic and therapeutic methods, we do not observe any improvement in frequency of taking primary lymphoedema into account in diagnostics. To identify the cause of edema, various imaging methods can be used. The lymphoscintigraphy is a non-invasive method, easily repeatable, inexpensive, having no negative effect on the vessel endothelium. Considering all the advantages of LS, the few contraindications to it, and perfect suitability of this method for imaging of edemas, it is surprising that it is not taken into account in routine diagnostics to recognition of primary lymphoedema.

**Aim:** We emphasize the role of LS as a gold standard in diagnosing primary lymphoedema and its limited usefulness for supplementary assessment in monitoring treatment outcomes.

**Method:** Clinical case. Patient 49 years old after a long journey, she noticed swelling in the area of the right ankle. The size of the edema was initially different, but later it gradually increased. It was only 8 years since the beginning of the disease, after another visit to the surgeon, LS was performed. Disturbances in the formation of lymphatic vessels and lymph nodes of the right leg were detected. After diagnosis, she was treated intensively physiotherapeutically with clinical and metric improvement. For objective observation, LS (2013) was repeated, but no differences were detected compared to LS (2006). However, the functional and clinical improvement after physiotherapy was high. The biggest differences between measurements before and after intensive physiotherapy at the groin, thigh, ankle and foot level are significant (p < 0.05).

**Results:** LS allow an objective assessment of lymphatic edema in patients undergoing intensive physiotherapy. In our patient, LS was performed at the beginning and during therapy, but gave almost identical results. Despite the lack of scintigraphic improvement during intensive therapy, the metric measurements of the affected limb were significantly reduced, subjectively felt much better, the limb mobility / functioning was significantly improved, and the swollen tissues were much softer.

**Conclusions:** It seems that it is particularly important to extend the diagnostic methods. The probable reason for the contrast between scintigraphy and clinical improvement is not entirely clear and should be the subject of further research and it seems that the lack of regression of lymphoscintigraphic disease should not be the only indication for detention or modify physical therapy in such advanced cases.
**[P48] ARE COMPRESSION CORSETS BENEFICIAL FOR THE TREATMENT OF BREAST CANCER RELATED LYMPHEDEMA? NEW OPPORTUNITIES IN PHYSIOTHERAPY TREATMENT.**

Rita Hansdorfer-Korzon, Jacek Teodorczyk, Aleksandra Korzon, Maciej Sliwinski, Michal Korzon

1 Medical University of Gdansk, Department of Physiotherapy, Gdansk, Poland
2 Medical University of Gdańsk, Department of Nuclear Medicine and Radiology, Gdansk, Poland
3 Medical University of Gdańsk, Department of Obstetrics, Gdansk, Poland

**Introduction:** There is no fully effective treatment for secondary lymphedema. In patients with breast cancer, lymphedema may present immediately after axillary dissection or years later. It typically occurs in a limb (such as an arm), but it can also occur in the torso, especially in breast cancer patients. It is, therefore, essential to prevent or minimize the condition. The currently used compression therapy has varying efficiency. Thus, researchers are still looking for better solutions, especially for primary prevention.

**Aim:** whether compression corsets therapy with a class I compression garment could prevent truncal lymphedema on the operated side in females who underwent mastectomy and axillary lymph node dissection as the standard of care for breast cancer treatment and whether this therapy is efficient in prevention and treatment of truncal lymphedema in patients who underwent mastectomy and additional radiotherapy, and whether this method could be implemented for pain reduction strategies in this treatment group.

**Method:** The study was carried out in 50 randomly selected breast cancer patients classified by the oncologist as candidates for surgery. The final study was completed in 37 patients who underwent mastectomy and lymphadenectomy. The group was randomly divided into two subgroups: received compression corsets 1 month following the surgery and control—in which the patients underwent no physiotherapeutic treatment. The size of truncal lymphedema was measured using ultrasound in presentation B. Measurements were carried out symmetrically on both sides of the chest wall. The patients were examined four times. The follow-up was for 7 months in total. After the second measurement, a randomly selected subgroup of patients received fitted compression corsets, which they had to wear throughout the study, the control subgroup had no physiotherapy treatment. The results were statistically analyzed. In both subgroups, we analyzed the reduction of pain using a VAS.

**Results:** The results strongly suggest that when properly fitted, class I compression corsets not only are an effective treatment for lymphedema but also could be used for antiedematous prevention in patients who underwent removal of axillary lymph nodes as well as radiotherapy. Results of these studies have also confirmed that the use of compression corsets could reduce pain associated with surgical treatment of breast cancer.

**Conclusions:** Class I compression corsets should constitute an integral element of complete decongestive therapy. There is an urgent need for developing generally accepted rehabilitation protocols for breast cancer patients, including broad, modern, and comprehensive approach to the physiotherapeutic treatment.
Help women
Join the Lipedema Foundation Registry

Every BODY has the power to make a difference

Millions of women around the world live with the physically painful and emotionally distressing effects of lipedema, a fat disorder characterized by increased adipose tissue in the limbs that does not respond to diet or exercise. Because little is known about how and why it develops, lipedema remains a difficult disease to diagnose and treat.

The power to change this lies with you!

Join the Lipedema Foundation Registry (LFR) and help forge a path to better treatments from the comfort of your own home. Established by the Lipedema Foundation, the LFR is an online registry designed to help affected individuals and those who care for them better understand and treat lipedema.

Who can join?
Anyone! People who have or may have lipedema. People who do not have lipedema.

What do I need?
A computer with an internet connection and an email address.

What can I expect?
To answer questions about your medical experiences and lifestyle.

Why should I join?
To help researchers better understand lipedema and figure out:
- why lipedema happens
- who/how many are affected
- what treatments are being used
- how it impacts quality of life

Questions? Email registry@lipedema.org

Join the Lipedema Foundation Registry at lipedema.org/registry
THE COMPLETE PROGRAM FOR THE TREATMENT OF LYMPHOEDEMA

1. LINFOROLL®
   Medical Device for an evidence based drainage

2. CIZETA
   A wide and complete range of therapeutic bandages

3. VARISAN® FLAT
   Flat and circular elastic garments, off the shelf and custom made

MAINTAINING THE DRAINAGE RESULTS

LYMPHATIC DRAINAGE

MANTAINING THE DECONGESTIVE THERAPY

YOU BRING YOUR BEST TO PATIENTS EVERY DAY.
NOW YOU CAN SEND IT HOME WITH THEM, TOO.

Lymph Press is the world's leading innovator in dynamic compression systems

- Superior compliance
- Over 20 peer reviewed studies
- Distributed for over 40 years
- Available in over 35 countries

CIZETA MEDICALI S.p.A. - Via IV Novembre, 46 - 20012 Cuggiono (MI) Italy - Tel. +39 02.97.21.81.1 - Fax +39 02.97.24.07.34
www.cizetamedicali.com - info@cizetamedicali.com

For more information and helpful resources, visit tactilemedical.com

Flexitouch® Plus comfortably automates self-MLD for increased patient compliance, reduced cellulitis episodes and improved quality of life.

FOR MANAGEMENT OF CVI & LYMPHEDEMA

- 20–50mmHg of gradient, short-stretch compression
- Easily worn under standard footwear
- Soft, conforming Breathe-O-Prene® material creates a comfortable fit.

Visit us at booth B20

1.800.322.7744 | sigvaris.com

**WHAT’S NEW IN COMPREFLEX?**

The medi Therapy Concept Lymphology

**WHAT'S NEW IN COMPREFLEX?**

**1. Decongestion**

- Adjustable compression device—effective and easy to self-manage
  - circaid juxtafit

**2. Transition**

- Wide range of mediven and circaid compressive solutions—individual requirements
  - mediven flat knit
  - circaid juxtafit
  - circaid graduate

**3. Phase**

- Wide range of mediven and circaid compressive solutions—individual requirements
  - mediven flat knit
  - circaid juxtafit
  - circaid graduate

**Maintenance**

www.medi.biz/ltc
LymphaTouch® has cut down the treatment time of lymphedema patients with fibrous skin by a week, sometimes even two weeks compared to just using manual therapy.

–Kathryn McGinty, PTA,CLT, USA

“Clinically tested medical device used by more than 1000 therapists around the world”

LymphaTouch® is a game changer in reducing swelling. I can activate the lymphatic system fast and effectively by pulling the tissue. Negative pressure combined with high frequency vibration softens up and breaks down fibrotic tissue, developed by swelling, better than manual treatment.

–Leena Vallin, CNS, CLT, Finland

DISTRIBUTORS WANTED

VISIT US AT STAND C 04!

LYMPHATOUCH.COM
contact@lymphatouch.com