

OFFICIAL ORGAN  
OF THE



EUROPEAN GROUP OF LYMPHOLOGY  
LATIN-MEDITERRANEAN CHAPTER OF ISL  
SOCIETÀ ITALIANA DI LINFANGIOLOGIA  
CZECH SOCIETY OF LYMPHOLOGY  
ROMANIAN SOCIETY OF LYMPHOLOGY  
GREEK SOCIETY OF LYMPHOLOGY

# THE EUROPEAN JOURNAL OF lymphology

and related problems

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## SUMMARY

# 45<sup>th</sup> European Congress of Lymphology and 1<sup>st</sup> CGAFI Meeting May 3<sup>rd</sup>-4<sup>th</sup>, 2019

**Congress Venue:**  
**Brussels Marriott Hotel Grand Place**  
**Rue A. Orts, 3-7, 1000 Brussels**

SCIENTIFIC PROGRAM	p. 4
Scientific Sessions (Abstracts):	
– Lymphatic system : anatomy, physiology and patho-physiology	p. 11
– Secondary Lymphatic Complications: Diagnosis and Prevention. (Part 1)	p. 15
– Lymphatic system imagings in Lymphedemas	p. 18
– Secondary Lymphatic Complications: Diagnosis and Prevention. (part 2)	p. 20
– Surgery for prevention and/or treatment of Lymphatic Complications. (Part 1)	p. 23
– The Physical Treatments of Lymphedemas (Part 1)	p. 25
– Surgery for prevention and/or treatment of Lymphatic Complications. (Part 2)	p. 27
– The Physical Treatments of Lymphedemas (Part 2)	p. 30
– Lymphatic system and sport	p. 32
– Lymphedema Evaluation	p. 34
– Genetics and/in Lymphedemas	p. 36
– Fatty tissues and lymphatic system	p. 37
– Lymphatic System infection and/or inflammation	p. 39
– Poster Session I	p. 41
– Poster Session II	p. 47

## THE EUROPEAN JOURNAL OF LYMPHOLOGY AND RELATED PROBLEMS (EJLRP)

The EJLRP - official organ of the European Group of Lymphology (ESL), Czech Society of Lymphology, Romanian Society of Lymphology, Greek Society of Lymphology, the Latin-Mediterranean Chapter of Lymphology (LMCL), the Società Italiana di Linfangiologia (SIL) covers all fields of Lymphology and aims to present a multidisciplinary approach to diseases of the lymphatic system, with information on the analysis, control and treatments of such diseases.

### Topics

The topics include:

- anatomy and anatomopathology
- physiology and physiopathology
- pharmacology
- diagnostic methods (conventional radiology, nuclear medicine, ultrasonography, computed tomography, biopsy, nuclear magnetic resonance)
- therapy (surgery, medicine, radiotherapy, physical)
- oncology (primary lymphatic system diseases, lymphonodal metastatic process)
- immunology
- post-therapeutic complications
- upper and lower limb edemas

### Manuscripts publications

Submitted manuscripts will be published in the form of Editorial, Review article, Original article, Teaching article, Special article, Work in progress, Case Report, Short Communications, Letter to the Editor (in English), Abstract (in English)

They will be subdivided in Clinical and Basic Sciences.

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**45<sup>th</sup> European Congress  
of Lymphology**

**May 3<sup>rd</sup>-4<sup>th</sup>, 2019  
Brussels, Belgium**

*Congress Venue:*  
**Brussels Marriott Hotel Grand Place  
Rue A. Orts, 3-7, 1000 Brussels**

# E.S.L.

European Society of Lymphology

# 45<sup>th</sup> European Congress of Lymphology and 1<sup>st</sup> GCAF Meeting

May 3<sup>rd</sup>-4<sup>th</sup>, 2017 – Brussels, Belgium

*Congress Venue:*

**Brussels Marriott Hotel Grand Place  
Rue A. Orts, 3-7, 1000 Brussels**

*Congress President*

Prof. Dr. med. Pierre Bourgeois



**European Society of Lymphology**

**SAVE THE DATE**  
The 3<sup>rd</sup> and the 4<sup>th</sup> May  
Brussels, Belgium  
The 45<sup>th</sup> European Society  
of Lymphology Meeting  
and  
The 1<sup>st</sup> GCAFI Meeting

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Presidential Welcome

Dear Colleagues,

The members of the Organizing and Scientific Committees of the Belgian Society of Lymphology (BeSL) and of the Group R&D Clinical Applications of Fluorescence Imagings (GCAFI) are pleased to invite you to the 45th congress of the European Society of Lymphology (ESL) and to the 1st GCAFI Meeting taking place in Brussels on 3rd and 4th May 2019.

In the framework of 8 oral sessions, diagnostics, screenings, evaluation methods and conservative as well as surgical treatments of lymphedemas and of other lymphatic complications will be presented and discussed. Issues related to genetics, sport, infections/inflammations and the fatty tissues, anatomy, physiology and pathophysiology of the Lymphatic System will be raised during other sessions.

Due to its growing interest for the surgeons and for the lymphologists, clinical applications (some well-established –such as for the identification of the Sentinel Lymph Nodes, for the evaluation of the vascularization of tissues to be grafted and/or anastomosed- and some in development –such as the identification-delineation of tumoral remnants, of lymph-node invasion,...) of Near Infra-Red Fluorescence Imaging will also be presented and discussed in the framework of 4 sessions on 3rd May.

Specific sessions for the French and Dutch speaking physical therapists and general practitioners are also organized on 4th May from 10h00 to 16h00!

We are looking forward to seeing you at the congress.

In the name of the Organizing and Scientific Committees

Prof. Pierre BOURGEOIS, MD, PhD, MCU-PH,

ESL Congress President

BeSL President

## ORGANIZERS



### These meetings are endorsed by the following societies

La Fondation contre le Cancer – De Stichting Tegen Kanker

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The Spanish Group of Lymphology (Grupo Espanol de Linfologia, GEL)

The Swedish Lymphology Association (SLA)

**Friday, May 3<sup>rd</sup>, 2019**

**GCAFI**

07:15-08:15	<b>REGISTRATION</b>
08:00-08:15	<b>WELCOME</b>
08:15-10:00	<b>SESSION I: OPTO-ACOUSTIC AND NEAR-INFRA-RED- FLUORESCENCE IMAGINGS (ICG) IN BREA- ST CANCERS AND IN MELANOMAS</b> Preclinical ICG applications in optoacoustics Dr Sardella (Germany) Lymphatic Mapping and SLN biopsy: multi-spec- tral optoacoustic tomography based tri-modal ima- ging can replace technetium Pr Klode (Germany) Near-Infra-Red-Fluorescence Imagings for Breast cancers and their nodal metastases? Pr Bourgeois (Belgium)
10:00-10:30	<b>COFFEE BREAK</b>
10:30-12:30	<b>SESSION II: NEAR-INFRA-RED-FLUORESCENCE IMA- GINGS IN GYNECOLOGIC AND UROLOGIC CANCERS</b> ICG-targeted template lymph node dissection in prostate cancer : the evolution Pr Janetschek (Austria) Clinical application of fluorescence imaging in ro- botic urologic surgery Dr De Naeyer (Belgium) NIRFI of SLN in cervical and endometrial cancers (tittle TBC) Pr Mathevet (Switzerland)
12:30-14:00	<b>LUNCH</b>
14:00-16:00	<b>SESSION III: NEAR-INFRA-RED-FLUORESCENCE IMA- GINGS IN HEAD AND NECK CANCERS AND PARATHYROID</b> NIRFI in combination with radio-guided surgery for SLN in head and neck cancers Pr F Van Leeuwen (The Netherlands) ICG and autofluorescence for parathyroid detection and imaging Dr JV Fortuny (Switzerland) ICG Near-Infra-Red-Fluorescence Imagings for Head and Neck cancers and their nodal metastases? Dr Dignonnet (Belgium)
16:00-16:30	<b>COFFEE BREAK</b>
16:30-18:30	<b>SESSION IV: NEAR-INFRA-RED-FLUORESCENCE IMA- GINGS IN INTRA-ABDOMINAL CANCERS</b> Decreasing leak rate in colorectal anastomosis using near infra red technology Pr Ris (Switzerland) NIRFI imaging of endometriosis after IV injection of ICG (tittle TBC) Pr Fastrez (Belgium)

**Clinical applications of ICG-Fluorescence imagings  
in digestive surgical oncology**

Pr Liberale (Belgium)

18:30-19:00

**ROUND TABLE:**

**Plastic Surgery and Lymphatic Microsurge-  
ries in the Per and Post-Operative Manage-  
ment of Patients At Risk Of and/or With  
Limbedema**

20:00-23:00

**GALA DINNER**

**Friday, May 3<sup>rd</sup>, 2019**

**ESL (1)**

07:15-08:15

**REGISTRATION**

08:00-08:15

**WELCOME**

ESL President Welcome Speech:

Pr Boccardo (Italy)

Congress President Welcome Speech:

Pr Bourgeois (Belgium)

In Memoriam «Michael Foeldi»:

Pr Leduc (Belgium)

08:15-10:00

**LYMPHATIC SYSTEM : ANATOMY, PHYSIO-  
LOGY AND PATHO-PHYSIOLOGY.**

Chair: Pr Papendieck (Argentina), Pr Olszewski (Po-  
land), Pr Pissas (France)

08:15-08:25

**Reassessment of anti-podoplastin antibody (DE-40)  
immunohistochemistry for lymphatic vessels: study  
of the immunohistochemical reactivities to histologi-  
cal components other than lymphatic endothelium.**  
Okada E (Japan)

08:25-08:35

**The importance of the posterior gastric trunk in the  
lymphatic drainage of the lymphatic splenic  
territory of the stomach**

Pissas A, Gras O, Scarratto M, Canovas F (France)

08:35-08:43

**Comparison in the axillary distribution of the  
Lymph nodes draining respectively the breast and  
the arm; preliminary results based on SPECT-CT  
lymphoscintigraphic investigations**

Westerby T, Roman MM, Bourgeois P (Belgium)

08:43-08:53

**Spect-CT assessment of unexpected lymphatic  
drainages in patients with secondary lower limb  
lymphedema**

Barbieux R, Roman MM, Leduc O, Leduc A,  
Bourgeois P (Belgium)

08:53-09:01

**Lymphoscintigraphic observations in a series of 7  
patients with non secondary edema at the level of  
the face.**

Giacalone G, Zeltzer A, Bourgeois P (Belgium)

09:01-09:11

**Venous Hypertension and Lymphedema of Lower  
Limbs: the key role of lymph nodes veins**

Amore M, Papendieck CM, Salvia S (Argentina)

09:11-09:21

**Human lower limb lymphatic pulse insufficiency**  
Olszewski WL, Zaleska MT (Poland)



- 09:21-09:31 **Aligned Nanofibrillar Collagen Scaffolds Can Prevent and Treat Lymphedema in Rats.**  
Nguyen D, Dionysiou D, Zaitseva T, Montenegro C, Sue G, Deptula P, Wan D, Rochlin D, Paukshto M, Rockson S (USA).
- 09:31-10:00 **DISCUSSIONS**
- 10:00-10:30 **COFFEE BREAK**
- 10:30-12:30 **LYMPHATIC SYSTEM IMAGINGS IN LYMPHEDEMAS.**  
Chair: Pr Bourgeois (Belgium), Pr Ningfei Liu (China), Prof Yamamoto (Japan), Pr Wald (Czech Republic)
- 10:30-10:40 **The 4 phase SPECT-CT lymphoscintigraphic investigation in the classification of lymphatic disorders**  
Bourgeois P (Belgium)
- 10:40-11:00 **MRI lymph angiography in classification of lymphatic disorders**  
Ningfei Liu (China)
- 11:00-11:20 **ICG NIRFI lymphography in the classification (evaluation and management) of lymphedematous patients**  
Yamamoto T (Japan)
- 11:20-11:30 **Ultra high-frequency ultrasound: a new tool for visualization of lymphatic vessels?**  
Giacalone G, Yamamoto T, Belva F, Hayashi A
- 11:30-11:40 **The lymphoscintigraphic study of the deep lymphatic circulation for the differential diagnosis of lower limbs edema**  
Povolato M, Onorato A, Busetto A (Italy)
- 11:40-11:50 **Non-standard lymphoscintigraphy in primary lymphoedema of lower limb: is it meaningful?**  
Wald M, Svobodova J (Czech Rep)
- 11:50-12:00 **MRL and clinical evaluation of free lymph node transfer in management of lymphoedema of extremities**  
Atta AT (Egypt)
- 12:00-12:10 **“MR lymphography in the planning of lymphedema surgery: the Brussels protocol.”**  
Zeltzer A, Brussaard C, Adriaenssens N, Hamdi M (Belgium)
- 12:10-12:30 **DISCUSSIONS**
- 12:30-14:00 **LUNCH**
- 14:00-16:00 **SURGERY FOR PREVENTION AND/OR TREATMENT OF LYMPHATIC COMPLICATIONS. (PART 1).**  
Chair: Pr Hamdi (Belgium), Pr Olszewski (Poland), Pr Yamamoto (Japan)
- 14:00-14:20 **Management of female genital Lymphoedema by a new technique**  
Manokaram G (India)
- 14:20-14:35 **System of Complete and Effective Staging-guided Treatment for Peripheral Lymphedema: The Genoa Protocol**  
Campisi CC (Italy)
- 11:00-11:20 **ICG NIRFI lymphography in the classification (evaluation and management) of lymphedematous patients**  
Yamamoto T (Japan)
- 14:35-14:50 **Decreasing donor site morbidity after groin vascularized lymph node transfer with lessons learned over a 12-year experience and review of the literature.**  
Hamdi M, Ramaut L, De Baerdemaeker R, Zeltzer A (Belgium)
- 11:30-11:40 **The lymphoscintigraphic study of the deep lymphatic circulation for the differential diagnosis of lower limbs edema**  
Povolato M, Onorato A, Busetto A (Italy)
- 14:50-15:05 **L.Y.M.P.H.A. technique for the prevention of early and late complications in melanoma treatment**  
Dessalvi S, Mascherini M, Cavelli M, De Cian F, Boccardo F (Italy)
- 15:05-15:17 **How to treat intractable lymphorrhea?**  
Giacalone G, Yamamoto T, Belva F, Wets R, Gysen M, Hayashi N, Yamamoto N, Hayashi A (Belgium – Japan)
- 15:17-15:29 **Microsurgical treatment for recurrent lymphocele: does it work?**  
Giacalone G, Yamamoto T, Belva F, Wets R, Gysen M, Hayashi N, Yamamoto N, Hayashi A (Belgium – Japan)
- 15:29-16:00 **DISCUSSIONS**
- 16:00-16:30 **COFFEE BREAK**
- 14:00-16:00 **SURGERY FOR PREVENTION AND/OR TREATMENT OF LYMPHATIC COMPLICATIONS. (PART 2).**  
Chair: Dr Boccardo (Italy), Pr Campisi (Italy), Pr Zeltzer (Belgium)
- 16:30-16:50 **Interdisciplinary Approach to the Prevention and Treatment of Secondary Lymphatic Complications.**  
Boccardo F. (Italy)
- 16:50-17:02 **Microsurgical planning for lymphedema guided by two-compartment lymphoscintigraphy**  
Campisi CC, Villa G, Ryan M, Boccardo F, Campisi C (Italy)
- 17:02-17:14 **Single site multiple lymphatic venous anastomosis (SS-MLVA) for the staging guided peripheral lymphedema treatment and long-term clinical outcomes**  
Campisi CC (Italy)
- 17:14-17:26 **Management of giant lymphoedema by a combined modality**  
Manokaram G (India)
- 17:26-17:38 **Sequential selective Fibro-Lipo-Lymph aspiration for Lymph Vessel Sparing Procedure (FLVA-LSVP) for the effective treatment of Advanced stages of peripheral lymphedema**  
Campisi CC (Italy)

- 17:38-17:50 **Advanced stage obstructive lymphedema of lower limbs can be successfully controlled by silicone tube implants replacing obliterated lymphatic collectors**  
Olszewski WL, Zaleska MT, (Poland) Hydrabadi R, Banker M, Kurkular P (India)
- 17:50-18:02 **Lymphovenous shunts in pediatrics**  
Papendieck C, Amore M (Argentina)
- 18:02-18:30 **DISCUSSIONS**
- 18:30-19:00 **ROUND TABLE:  
Plastic Surgery and Lymphatic Microsurgeries in the Pre and Post-Operative Management of Patients At Risk Of and/or With Limbedema**
- 20:00-23:00 **GALA DINNER**
- Friday, May 3<sup>rd</sup>, 2019**
- ESL (2)**
- 07:15-08:15 **REGISTRATION**
- 08:00-08:15 **WELCOME**  
ESL President Welcome Speech:  
Pr Boccardo (Italy)  
Congress President Welcome Speech:  
Pr Bourgeois (Belgium)  
In Memoriam «Michael Foeldi»:  
Pr Leduc (Belgium)
- 08:15-10:00 **SECONDARY LYMPHATIC COMPLICATIONS:  
DIAGNOSIS AND PREVENTION. (PART 1)**  
Chair: Pr Amore (Argentina), Pr Eliska (Czech Rep), Pr Leduc (Belgium)
- 08:15-08:25 **Secondary Malignant lymphedema:  
different scenarios**  
Forner-Cordero I, Martinez-Amoros P, Herrero-Manley L, Munoz-Langa J (Spain)
- 08:25-08:35 **Lymphatic cord following axillary node dissection**  
Johansson K (Sweden), Chong H, Mortimer P (UK)
- 08:35-08:45 **Influence of breast cancer surgery on the development of axillary web syndrom.**  
Beranuy Rodriguez M (Spain)
- 08:45-08:55 **Early detection of secondary lymphedema after cancer treatments**  
Belgrado J.P., Vandermeeren L., Vankerckhove S., Valsamis J.B., Carly B., Hertens D., Beier B., Etbaz S., Liebens F. (Belgium)
- 08:55-09:05 **Lymphatic system and silicone implants of the breast**  
Eliska O, Benes J (Czech Rep)
- 09:05-09:15 **Sirolimus induced lymphedema**  
Amore M (Argentina)
- 09:15-09:25 **Associated factors of axillary web syndrome in patients affected by breast cancer: a retrospective study**  
Vázquez Gallego S (Spain)
- 09:25-10:00 **DISCUSSIONS**
- 10:00-10:30 **COFFEE BREAK**
- 10:30-12:30 **SECONDARY LYMPHATIC COMPLICATIONS:  
DIAGNOSIS AND PREVENTION. (PART 2)**  
Chair: Pr Adriaenssens (Belgium), Pr Johansson (Sweden), Pr Michelini (Italy)
- 10:30-10:42 **Lymphedema Prophylaxis recommendations after breast cancer surgery: a systematic literature review**  
Rogan S, Taeymans J, Sidler S, Sturzenegger T, Luginbuehl H (Switzerland)
- 10:42-11:00 **Implementation of early lymphedema diagnosis for prevention**  
Johansson K (Sweden)
- 11:00-11:12 **Early prevention of 2ary lymphedema and its complications after breast cancer treatment: integrated approach and advisability.**  
Rovnaya A (Russia)
- 11:12-11:24 **Calf circumscribed lymphedema proceeds to whole body lymphedema if not early diagnosed and treated-early diagnosis**  
Olszewski WL, Zaleska MT (Poland)
- 11:24-11:36 **Perioperative conservative treatment for lymphedema patients with microsurgery (LVA and LNT)**  
Adriaenssens N, Zeltzer A, Hamdi M (Belgium)
- 11:36-11:48 **Lymphedema after breast cancer treatment: primary prevention protocol study after a 5-year follow-up**  
Cestari M, Amati S, Appetecchi F, Curti L, De Marchi M, De Rebotti C, Tomassi C (Italy)
- 11:48-12:30 **DISCUSSIONS**
- 12:30-14:00 **LUNCH**
- 14:00-16:00 **THE PHYSICAL TREATMENTS OF LYMPHEDEMAS (PART 1)**  
Chair: Pr Adriaenssens (Belgium), Dr Cestari (Italy), Pr Forner-Cordero (Spain), Pr Leduc (Belgium)
- 14:00-14:20 **Normobaric oxygen and lymphedemas**  
Balestra C (Belgium)
- 14:20-14:40 **MLD by the facts**  
Barbieux R, Leduc A (Belgium)
- 14:40-14:50 **Lymphoscintigraphic evaluation of the effects of manual lymphatic drainage at the root of the limb for patients with (upper or lower) limb lymphedema.**  
Barbieux R, Roman MM, Doyenard S, Rivière F, Curnier A, Van De Putte L, Rodriguez Y Penafuerte D, Windels A, Saragoni F, Leduc O, Leduc A, Provyn S, Bourgeois P. (Belgium)
- 14:50-15:10 **Self adjustable compression wraps: recent data**  
Flour M (Belgium)
- 15:10-15:20 **Evaluation of different short-stretch compression systems treating patients with bilateral leg lymphoedema stage II**  
Rucigaj M, Vrecek M, Suhodolcan AB (Slovenia)
- 15:20-15:30 **The effectiveness of edema fluid mobilisation and formation of flow "channels" by the tissue Mobiderm-like compressing blocks**  
Zaleska MT, Olszewski WL (Poland)

15:30-16:00	<b>DISCUSSIONS</b>	09:02-09:14	<b>Reliability test of measurements of lower limb volume and local tissue water in healthy subjects</b> Jönsson C, Bjurberg M, Brogardh C, Johansson K (Sweden)
16:00-16:30	<b>COFFEE BREAK</b>	09:14-09:26	<b>Psychological research study on the effect of global treatment in patients with lymphedema</b> Lebois M, Leone A (Italy)
16:30-18:00	<b>THE PHYSICAL TREATMENTS OF LYMPHEDEMAS (PART 2)</b> Chair: Pr Foeldi (Germany), Pr Johansson (Sweden), Pr Michelini (Italy),	09:02-09:14	<b>Reliability test of measurements of lower limb volume and local tissue water in healthy subjects</b> Jönsson C, Bjurberg M, Brogardh C, Johansson K (Sweden)
16:30-16:50	<b>Pneumatic decongestion : out of the facts of fake-data</b> Theys S (Belgium)	09:36-10:00	<b>DISCUSSIONS</b>
16:50-17:02	<b>Effectiveness of intermittent pneumatic compression in leg edema can be shown on ICG images</b> Zaleska MT, Olszewski WL, Hydrabadi R (Poland and India)	10:00-10:30	<b>COFFEE BREAK</b>
17:02-17:14	<b>Early diagnosis and treatment of mild arm lymphedema: preliminary results.</b> Johansson K, Karlsson K (Sweden)	10:30-12:30	<b>SESSION FOR FRENCH-SPEAKING PHYSIOTHERAPISTS AND GENERAL PRACTITIONERS</b>
17:14-17:26	<b>Adapting conservative treatment to lymphedema surgery: what can the patient expect?</b> Zeltzer A, Adriaenssens N, Jacobs K, Hamdi M (Belgium)	12:30-14:00	<b>LUNCH AND VISIT THE "BELGIAN CORNER"</b>
17:26-17:38	<b>Synergic treatment and clinical results</b> Michelini S (Italy)	14:00-16:00	<b>SESSION FOR FRENCH-SPEAKING PHYSIOTHERAPISTS AND GENERAL PRACTITIONERS</b>
17:38-17:50	<b>Lymphedema and venous ulcers</b> Harfouche J, Van den Bulck R, Matabisi I, Ceulemans S (Belgium)	16:00-16:30	<b>COFFEE BREAK</b>
17:50-18:02	<b>Lymphatic ulcers: traditional bandage and new aspect of advance wound care: photobiomodulation</b> Maccio A (Italy)	16:30-18:00	<b>ESL GENERAL ASSEMBLY</b>
18:02-18:30	<b>DISCUSSIONS</b>	<b>Saturday, May 4<sup>th</sup>, 2019</b>	
18:30-19:00	<b>ROUND TABLE: Plastic Surgery and Lymphatic Microsurgeries in the Pre and Post-Operative Management of Patients At Risk Of and/or With Limbedema</b>	<b>ESL (2)</b>	
20:00-23:00	<b>GALA DINNER</b>	07:15-08:30	<b>REGISTRATION</b>
<b>Saturday, May 4<sup>th</sup>, 2019</b>		08:00-10:00	<b>GENETICS AND/IN LYMPHEDEMAS</b> Chair: Pr Michelini (Italy), Pr Vikkula M (Belgium)
<b>ESL (1)</b>		08:30-08:50	<b>Genetics in Primary lymphedemas</b> Vikkula M (Belgium)
07:15-08:30	<b>REGISTRATION</b>	08:50-09:10	<b>Post-therapeutic limb lymphedema: Primary and/or Secondary?</b> Roman MM (Belgium)
08:00-10:00	<b>LYMPHEDEMA EVALUATION</b> Chair: Dr Harfouche (Belgium), Pr Johansson (Sweden), Pr Leduc (Belgium)	09:10-09:25	<b>CCBE1 mutation study in primary lymphedema</b> Michelini S (Italy)
08:30-08:50	<b>Means and steps for a better response in the lymphedema therapy</b> Harfouche J (Belgium)	09:25-09:40	<b>Lymphoscintigraphic evolution of primary lower limb lymphedema</b> Bourgeois P, Roman MM (Belgium)
08:50-09:02	<b>Diagnosing early mild arm lymphoedema using tissue dielectric constant (TDC) and water displacement method (WDM).</b> Karlsson K, Nilsson-Wikmar L, Brogardh C, Johansson K (Sweden)	09:40-10:00	<b>DISCUSSIONS</b>
		10:00-10:30	<b>COFFEE BREAK</b>
		10:30-12:30	<b>SESSION FOR DUTCH-SPEAKING PHYSIOTHERAPISTS AND GENERAL PRACTITIONERS</b>
		12:30-14:00	<b>LUNCH AND VISIT THE "BELGIAN CORNER"</b>
		14:00-16:00	<b>SESSION FOR DUTCH-SPEAKING PHYSIOTHERAPISTS AND GENERAL PRACTITIONERS</b>
		16:00-16:30	<b>COFFEE BREAK</b>
		16:30-18:00	<b>ESL GENERAL ASSEMBLY</b>

**Saturday, May 4<sup>th</sup>, 2019**  
**ESL (3)**

- 07:15-08:30 **REGISTRATION**
- 08:00-10:00 **LYMPHATIC SYSTEM AND SPORT**  
 Chair: Pr Hamadé (France), Dr Engels (Belgium)
- 08:00-08:10 **Sport and lymphedema: a reality or a contradiction?**  
 Hamadé A (France)
- 08:10-08:25 **Lymphatic system and sport : why exercise for lymphedema declined and then came back in favor.**  
 Johansson K (Sweden)
- 08:25-08:45 **Cyclist's vulvar edemas**  
 Engels S, Baeyens Y (Belgium)
- 08:45-08:55 **Damages of the lymphatic system in other sports?**  
 Bourgeois P (Belgium)
- 08:55-09:07 **Insufficient lymphatic transport of excess capillary filtrate from subcutaneous tissue may be cause of delayed onset muscular soreness (DOMS) in marathon runners**  
 Zaleska MT, Olszewski WL, Ziemba AW, Mikulski T (Poland)
- 09:07-09:19 **The benefit of graduate degressive compression garment in running in athletics affected by lymphedema of lower limbs**  
 Hamadé A, Bensalah N, Woehl B, Jambert L, Michel P, Obringer G, Lehn-Hogg M, Buschenrieder N (France)
- 09:19-09:29 **Evaluation of physical activity, exercise capacity, physical performance, balance and fear of movement in lower extremity lymphedema patients**  
 Pehlivan B, Erdoganoglu Y, Tüzün S (Turkey)
- 09:29-09:39 **Upper limb functional capacity and peripheral muscle strength in patients with lymphedema after breast cancer**  
 Selin Of N, Tuzun S (Turkey)
- 09:39-10:00 **DISCUSSION**
- 10:30-12:30 **FATTY TISSUES AND LYMPHATIC SYSTEM**  
 Chair: Dr Horra (Spain), Pr Michelini (Italy), Pr Probyn (Belgium)
- 10:30-10:50 **Lymphatic obstruction and fat deposition**  
 Andrade M. (Brasil)
- 10:50-11:10 **Fatty tissues as cause and consequence of the interstitial lymphatic drainage deficiency.**  
 Horra A (Spain)
- 11:10-11:25 **New stadiation of lipedema**  
 Michelini S, Fiorentino A., Moneta G., Cardone M., Fantegrossi M.R., Romaldini F (Italy)
- 11:25-11:37 **Quantitative evaluation of leg soft tissue volume increase in lymphedema (fluid and increased cell and matrix mass) measurement before and after compression**  
 Olszewski w, Zaleska MT (Poland)

- 11:37-11:50 **Prevalence of joint hypermobility in lipedema**  
 Vazquez-Diez J, Forner-Cordero I, Munoz-Langa J (Spain)
- 11:50-12:30 **DISCUSSION**
- 12:30-14:00 **LUNCH AND VISIT THE "BELGIAN CORNER"**
- 14:00-16:00 **LYMPHATIC SYSTEM INFECTION AND/OR INFLAMMATION**  
 Chair: Pr Flour (Belgium), Pr Manokaram (India)
- 14:00-14:20 **Skin infection/inflammation in lymphoedema**  
 Flour M (Belgium)
- 14:20-14:40 **The complications of lymphoedema and their management**  
 Manokaram G (India)
- 14:40-14:52 **Treatment by external application for lymphedema (part 2)**  
 Okhuma M (Japan)
- 14:52-15:04 **Early diagnosis of lower limb inflammation foci prior to overt clinical lymphedema using ICG soft tissue visualization**  
 Zaleska MT, Olszewski WL (Poland)
- 15:04-15:16 **Dermatolymphangioadenitis (DLA, cellulitis) in obstructive lymphedema type of bacteria and effects of slowly-absorbed penicillin 2019 state of knowledge**  
 Zaleska MT, Olszewski WL (Poland)
- 15:16-15:28 **Advanced lymphedema of lower limbs: ICG NIRFI and isotopic lymphographies detect sites of predilection for inflammation: hints for prevention therapy**  
 Olszewski WL, Zaleska MT, Hydrabadi R, Banker M, Kurkular P (Poland and India)
- 14:52-15:04 **Early diagnosis of lower limb inflammation foci prior to overt clinical lymphedema using ICG soft tissue visualization**  
 Zaleska MT, Olszewski WL (Poland)
- 15:28-16:00 **DISCUSSION**
- 16:00-16:30 **COFFEE BREAK**
- 16:30-18:00 **ESL GENERAL ASSEMBLY**

**Friday, May 3<sup>rd</sup>, 2019**

**Poster Session**

18:30-19:00

**POSTER SESSION 1**

Chair: Dr Belgrado (Belgium)

1. **Changes in the status of our primary lymphoedema patients: focus on compliance, adherence, and persistence**  
Nemes-Toldi J, Boros E (Hungary)
2. **The psycho-socio-economic impact of severe primary lower limb lymphedema. A case report**  
Takacs E, Nemes-Toldi J, Boros E (Hungary)
3. **Reimbursed inpatient treatment for lymphedema: an Italian experience**  
Dorigo E, Ausbergher S, Onorato A (Italy)
4. **Infiltration of Botulinum Toxin A in patients with post-mastectomy syndrome: impact on quality of life**  
Maitin Noguera V, Crespo Cobo MP, Gil Hernandez MS (Spain)
5. **Possible new methods for measuring the effectiveness of lymphedema rehabilitation**  
Boros E, Miklody-Trasy E, Nemes-Toldi J, Takacs E (Hungary)
6. **Lower Limb Lymphedema In A Patient With Rheumatoid Arthritis**  
Kostanoglu A, Kaya M, Tepe H (Turkey)
7. **The effect of trunk stabilization exercises on postural stability at lipoedema patients**  
Demircan G, Kostanoglu A (Turkey)
8. **The effects of repeated intensive phase treatment upper and lower limb lymphedema**  
Kaya M, Kostanoglu A (Turkey)
9. **Complex decongestive therapy: transition from intensive phase to maintenance phase**  
Maccio A (Italy)
10. **The patient with primary left lower extremity lymphedema : a case study.**  
Yudur C (Turkey)

18:30-19:00

**POSTER SESSION 2**

Chair: Pr Leduc (Belgium), Mrs Dubois (Belgium)

11. **Effects of Neuromuscular Tape on signs and symptoms of Axillary Web Syndrome: a pilot study**  
Ausbergher S, Dorigo E, Onorato A (Italy)
12. **Lymphoscintigraphy in Ehlers Danloss syndrom with Lower Limb Lymphedema in one adult patient**  
Moutschen M, Bourgeois P (Belgium)
13. **Upper limb Klippel-trenaunay syndrome associated with breast cancer related lymphedema**  
Vazquez-Diez J, Forner-Cordero I, Bermejo-Marin A, Rel-Monzo P (Spain)
14. **Retro-peritoneal cystic lymphangioma treated by Sildenafil: case report**  
Holemans C, Honore P, Defraigne JO (Belgium)
15. **Lympho-venous anastomosis for gluteal lymphedema**  
Yamamoto T, Belva F, Hayashi N, Yamamoto N, Hayashi A (Japan)

16.

**Microsurgical treatment for breast lymphedema**

Giacalone G (Belgium), Yamamoto T (Japan)

17.

**Complete reduction of breast cancer related arm lymphedema in 105 patients following liposuction: a five-year follow-up.**

Hoffner T, Brörson H (Sweden)

18.

**Axillary Web Syndrome: post-surgery incidence in 18 month follow-up**

Gil Hernandez MS, Crespo Cobo MP, Cid Bassaletti C, Martinez Serrno S (Spain)

19.

**The rehabilitative treatment of lymphatic microsurgery**

Onorato A, Busetto A, Dorrucchi V (Italy)



*Acknowledgement*



Fondation  
contre le Cancer



Friday, May 3<sup>rd</sup>, 2019

## LYMPHATIC SYSTEM : ANATOMY, PHYSIOLOGY AND PATHO-PHYSIOLOGY.

Chair : Pr Papendieck (Argentina), Pr Olszewski (Poland), Pr Pissas (France)

### REASSESSMENT OF ANTI-PODOPLANIN ANTIBODY (D2 40) IMMUNOHISTOCHEMISTRY FOR LYMPHATIC VESSELS- STUDY OF THE IMMUNOHISTOCHEMICAL REACTIVITIES TO HISTOLOGICAL COMPONENTS OTHER THAN LYMPHATIC ENDOTHELIUM.

E OKADA, *Japan*

**Background:** D2-40 immunohistochemistry is a very useful method for detection of lymphatic invasion by cancer cells, and it has been widely practiced in routine histopathological examinations. It is true that it exactly detects lymphatic endothelial cells immunohistochemically on paraffin embedded sections. But we have realized that D2-40 immunoreactivity is observed also in various histological components other than lymphatic endothelial cells.

**Aim of the work:** In order to use D2-40 immunohistochemistry under clearer basis, we analyzed immunoreactivities of D2-40 antibody to histological components other than lymphatic endothelial cells.

**Material & Methods:** We used formalin fixed and paraffin embedded histological sections of human breast, skin, stomach, and colorectal tissues. They underwent, D2-40, anti-von Willebrand, anti-CD68, anti-CD34, and anti-S-100 protein immunohistochemistry, and observed under a microscope.

**Results:** D2-40 immunoreactivity observed in other than lymphatic endothelium is, in the cytoplasm of myoepithelial cells of the mammary ductuli in the breast tissue. It reacted to the cytoplasm of the covering lining cells of the sebaceous gland acini and more weakly to the basal cells of the epidermis of the skin. In the stomach and colorectal tissues, it reacts to the cytoplasm of ganglion cells of the Auerbach's plexus and somewhat more weakly to those of Meissner's plexus. It also reacts to the cytoplasmic granular corpuscles of the macrophages in various intensities. Despite detailed observation, it never showed immunoreactivity to the blood vascular endothelium.

**Conclusion:** Although D2-40 antibody reacts positively to various histological components other than lymphatic endothelium, it never reacts to blood vascular endothelium. Other histological components those react to the antibody are possible to be identified under a microscope by their morphology.

### THE IMPORTANCE OF THE GASTRIC POSTERIOR TRUNK IN THE DRAINAGE OF THE LYMPHATIC SPLENIC TERRITORY OF THE STOMACH

A.PISSAS, O.GRAS,M.SCARRATTO,F.CANOVAS

*Faculty of medicine of Montpellier and department of general surgery Bagnols sur Cèze FRANCE*

The classical authors ,Rouviere, Cunéo etc...thought that the lymphatic vessels from the splenic area of the stomach had a precise road to reach the two components of the splenic chain (above the artery and in front of the vein )

They flow first through the gastrosplenic ligament and after the pancreaticosplenic ligament to reach the splenic chain.We think that this road is not the principal because it represents a very difficult way for lymph .Our study is based upon 180 injections of the lymphatic system on corpses ( adults, essentially children , still-borns) using Papamiltides' solution ( colored cedar oil); on the living we tried lipiodol lymphography on 15 patients ; intraoperative injections of vital staining dye on 20 cases and essentially the study of the repartition of metastatic nodes in gastric cancer ( 130 cases)

Our results are significant (97%) ; we can certify that the principal way is represented by the lymphatic vessels satellite of the short vessels (vasa brevia)and often of the posterior gastric artery which is the first and the biggest short vessel; this artery exists in 50 % of cases .

## COMPARISON IN THE AXILLARY DISTRIBUTION OF THE LYMPH NODES DRAINING RESPECTIVELY THE BREAST AND THE ARM; PRELIMINARY RESULTS BASED ON SPECT-CT LYMPHOSCINTIGRAPHIC INVESTIGATIONS

WESTERBY T<sup>°</sup>, BOURGEOIS P<sup>\*/\*\*</sup> AND ROMAN MM<sup>°/\*</sup>

<sup>°</sup> Service of Surgery, <sup>\*\*</sup>Service of Nuclear medicine and <sup>\*</sup> Multidisciplinary Clinic of Lymphology  
Institut Jules Bordet, Université Libre de Bruxelles, Brussels, Belgium

**Introduction:** After Complete Axillary (Ax) Lymph Node (LN) Dissection (CALND) –and less frequently after the selective lymphadenectomy of the Sentinel Lymph Node (SLN) for Breast Cancer (BC), the risk to develop one lymphedema of the upper arm (ULLE) is related (among other factors) to the removal of the Ax LN receiving the lymph from the arm.

Aim of the study : to compare the normal anatomical distribution of the Ax LN draining respectively the breast (the SLN of the BC) and the arm (called by the French the « sentibras »).

**Material and Methods:** This is one retrospective monocentric study with approval of the institutional Ethic Committee. The surgeons reviewed the pre-operative lymphoscintigraphic SPECT-CT of 23 women who had undergone one lymphoscintigraphic imaging of their SLN after injection of radiocolloids around the BC and of 27 women with unilateral ULLE for whose the images of their normal arm (obtained after injection of the tracer in the 1st interdigital space of the hand) were analyzed. Based on the anatomical structures seen on CT, they classify-localize the LN as in the level I and/or II and/or III according to Berg.

**Results:** The SLN were seen at Level I in 17 cases (73.9%), II in 12 (52.2%) and III in 1 (4.3%) and the « Sentibras » at the corresponding levels in 8 (29.6%), 17 (63%) and 10 (37%). When the analysis was limited to patients with a single LN seen, the SLN were at the level I in 9/13 (69.2%) and II in 4/13 (30.8%) while the « Sentibras » were at level I in 2/15 (13.3%), II in 8/15 (63%) and III in 5/15 (33.3%).

**Conclusion:** As it could be expected, our study show one different (but with some overlapping and logical from the anatomic point of view) distribution in the axilla of the LN draining the BC and the arm explaining why the patients who undergo CALND are more at risk to develop one ULLE than the ones who undergo SLN procedure and/or one limited resection of the LN at the level I.

## SPECT/CT ASSESSMENT OF UNEXPECTED LYMPHATIC DRAINAGES IN PATIENTS WITH SECONDARY LOWER LIMB LYMPHEDEMA (LLE)

ARTHUR WINDELS<sup>2</sup>, ROMAIN BARBIEUX<sup>1</sup>, OLIVIER LEDUC<sup>2</sup>, ALBERT LEDUC<sup>2,3</sup>, PIERRE BOURGEOIS<sup>1</sup>.

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<sup>2</sup> Lympho-phlebology Unit, Department of Occupational and Environmental Physiology, Haute Ecole Pol-Henry Spaak, Brussels, Belgium

<sup>3</sup> Service de Kinésithérapie et réadaptation, Université Libre de Bruxelles – Vrije Universiteit Brussel.

**Introduction:** Secondary lymphedema is a chronic, heavy and disabling pathology often consecutive to oncological surgery and/or radiotherapy. Conservative treatment consists in physical therapy with Manual Lymphatic Drainage (MLD), Multi-Layered Bandages (MLB) combined with physical activity, Pressotherapy (PT) and skin care. Lymphedema management requires a good knowledge of lymphatic anatomy and collateralization pathways bypassing the affected area. Development of new technologies in the clinical imagery domain allows also to improve the comprehension of the physiopathology of lymphedemas and their management. The aim of this retrospective study was to evaluate the contributions and interests of SPECT/CT imaging, a new imaging technique that allows 3D visualization, when applied to secondary LLE.

**Material and Methods:** 53 patients with 2ary LLE were included in this study. They underwent a standard bipedal planar 3 phases lympho-scinti-graphic imaging and a SPECT/CT imaging at the level of one or more of these areas: Leg (Gr1), Thigh (Gr2), Pelvis (Gr3), Abdomen (Gr4), Thorax (Gr5). Classical planar imaging (PI) were compared to SPECT/CT imaging and contributions of the later (in addition to the results of the formers) were analyzed in terms of demonstration of unsuspected lymphatic drainages and/or better precision of these structures. Correlation between the CT honey-comb pattern (HCP) and the Dermal-backflows (DBF) was also evaluated. Chi-square test is used to determine the association between the different observations.

**Results:** The HCP is seen in 37% (10/27) of the Gr1 and in 22% (10/46) of the Gr2 and was not associated with DBF. A significant association was found between Leg DBF and popliteal lymph nodes (LN), between Thigh DBF and deep thigh LN and between deep calf LN and popliteal LN. SPECT/CT imaging showed and/or précised the localization of LN (signing the presence of lymphatic collateralization pathways) in the following areas: inter-gluteal (12%: all were not seen on PI), anterior abdominal wall (8%: all were missed on PI), supra-iliac (11%: in half of the cases, these LN were unsuspected on PI) and thoraco-vertebral (11%: seen on PI, the SPECT/CT allowed their more precise localization).

**Conclusion:** In patients with 2ary LLE, SPECT/CT allowed in the present series to show in one patient out of four lymphatic drainage pathways unsuspected on the classical planar imaging. Our study highlights and precise the importance and anatomical variability of these collateralization pathways which influence the physical treatments. Patients with lymphedema for which the classical physical treatments do not seem to decrease the swelling should undergo a SPECT/CT in addition to a planar lymphoscintigraphic investigations, especially when the interpretation of the planar imaging is difficult.

## LYMPHOSCINTIGRAPHIC OBSERVATIONS IN 7 PATIENTS WITH EDEMA AT THE LEVEL OF THE FACE.

GIACALONE G, ZELTZER A, BOURGEOIS P (BELGIUM)

Edema at the level of the face are not frequent. We report here the results of our lymphoscintigraphic in 7 patients (4 men and 3 women) who presented one edema at the level of the face. In one case, the edema might be related to a previous trauma and in another, it was observed in the framework of one Yellow-Nails syndrom. In a third case, we could demonstrate that it was associated to the presence of one abnormal ductus thoracicus, suggesting that this facial edema was the symptom of a more generalized malformation of the lymphatic system. In the seven cases, we could demonstrate abnormalities of the lymphatic vascular drainages explaining the presence of the edema and its localisation. In such patients with edema at the level of the face, their lymphoscintigraphic investigation can thus establish their lymphatic origin and the observations may be of help for the physiscal therapist, showing the remaining functional and/or hypofunctional lymphatic vessels draining the edematous area(s) et to be stimulated by manual lymphatic drainage.

## VENOUS HYPERTENSION AND LYMPHEDEMA OF LOWER LIMBS: THE KEY ROLE OF LYMPH NODES VEINS

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**Background:** During the past years, several authors described morphological changes at the inguinal lymph nodes after great saphenous vein surgery and these can be consider one of the causes of the recurrence varicose, which may be related to the intranodal venous hypertension.

**Aim:** to evaluate the interruption of the venous drainage of the inguinal lymph nodes after great saphenous vein surgery, the dilated of the subcapsular venous sinus, the secondary intranodal venous hypertension and the possible cause to induced a lymphedema.

**Material & Methods:** We evaluated 5 (N=5) patients with secondary lymphedema of lower limbs who refered that began the clinical signs of edema after 2 to 6 month after venous surgery. We perform Duplex ultrasound in all cases. Lymphocintigraphy (N=5), ICG lymphography (N=2) and oil lymphography (N=1). in (N=2) we combine with ascending phlebography.

**Results:** With Duplex Ultrasound we observed a hypertrophy of one or two nodes with a dilated subcapsular venous sinus at the groin, the venous reflux and their relation with varicoses veins. by Lymphocintigraphy, ICG lymphography and oil lymphography we observed an hipoplasia of lymph nodes and dermal backflow.

**Conclusion:** We have enough data about the trauma of the lymph vessels after vein surgery and how can develop a secondary lymphedema. It is our intention to focus on the inguinal lymph nodes, their pathophysiology changes after interruption the venous drainage and how the venous hypertension of the lymph nodes can develop a disfunction and induced a lymphedema.

## HUMAN LOWER LIMB LYMPHATIC PULSE INSUFFICIENCY

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Lymphatic insufficiency in human limbs can now be observed on the near infrared lymphography. It differs from "lazy" contractions to total stop and passive lymphatic filling by external massage. Early observations of functional insufficiency may indicate edema will develop and treatment should be initiated. Edema of tissues is excess of tissue fluid with proteins and cells and its insufficient flow away by lymphatics. Lymphatics are not visible with the naked eye. Once visualized on ICG lymphography, they are seen contracting autonomically depending on filling up of lymphangions (Olszewski AmJ Physiol 1980). Their contraction (pulse) capacity as frequency, pressure amplitude and stroke volume can be measured. It may be deteriorated by inflammation, trauma and lymph hypertension due to proximal collector obstruction. Endothelial and muscle cells undergo destruction. Tissue fluid/lymph drainage is first slowed down and then stopped.

**Aim.** To evaluate foot and lower calf collector contractions and lymph flow capacity in initial stages of lymphedema.

**Methods.** Twenty patients with lower limb lymphedema stage I underwent ICG lymphography procedure in a horizontal position with 3 minutes foot flexion (first recording) followed by one hour walk (second recording). The pulsating lymphatics and their fluorescence level were video recorded at standard ankle area. The obtained curve pulse waves and area of fluorescence changes in time were analyzed and compared with those of the contralateral normal limb ((ICcalc, Pulsion Medical Systems, Munich).

**Results.** Low pulse frequency (below 6/min) and amplitude was observed in one or two lymphatics with other dilated non-contracting collectors as well as distal spread of ICG, compared with healthy limb (fluorescence 30% vs 15%). A variety of individual images was observed but common to all was slowing down of dye flow.

**Conclusions.** Early diagnosis of decreased collector contracting capacity and their dilatation point to the necessity of early therapeutic intervention.

## **ALIGNED NANOFIBRILLAR COLLAGEN SCAFFOLDS CAN PREVENT AND TREAT LYMPHEDEMA IN RATS.**

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To address the current deficit of sustainable lymphedema treatment, we investigated lymphatic regeneration guided by thread-like aligned nanofibrillar collagen scaffolds (BioBridge), which facilitate cell attachment, alignment, and migration. In this study, we tested our hypothesis that implantation of 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.

The rat lymphedema model involved inguinal and popliteal lymphadenectomy followed by irradiation. Subjects in the prevention group received implantation of BioBridge immediately after lymph node resection. Subjects that developed lymphedema one month after lymphadenectomy/irradiation 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 change in affected to unaffected limb volume ratio was evaluated using CT-based volumetric analysis. Lymph flow and lymphangiogenesis was also assessed by ICG. Conducted immunohistochemistry demonstrated increased lymphatic density in the vicinity of the BioBridge.

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 lymph flow and formation of lymphatics towards the contralateral groin.

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.

Preliminary clinical data related to the use of BioBridge together with LVA/VLNT for lymphedema treatment demonstrate an enhancement of lymphatic regeneration and edema reduction compared to LVA/VLNT alone. A large randomized study is necessary to prospectively evaluate the impact of this promising adjunct treatment.



## SECONDARY LYMPHATIC COMPLICATIONS : DIAGNOSIS AND PREVENTION. (PART 1)

Chair : Pr Amore (Argentina), Pr Eliska (Czech Rep), Pr Leduc (Belgium)

### SECONDARY MALIGNANT LYMPHEDEMA: DIFFERENT SCENARIOS

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To diagnose Secondary Malignant lymphedema (SML) is a challenge in daily clinical practice.

Patients can sometimes show clear signs of malignancy, but other times diagnosis is not so obvious. Pain, hardness of the tissues, joint stiffness, proximal involvement, collateral circulation or an acute onset are the findings that should make us suspect.

We present different scenarios of malignant lymphedema depending on the etiopathogenesis, illustrated by different cases.

One of the mechanisms is Lymphatic obstruction. It can be provoked by Tumoral infiltration of the Deep nodes and regional nodes or the Cutaneous and subcutaneous vessels: lymphangitis carcinomatosa; or by an Extrinsic compression of lymphatic vessels and nodes by the primary or metastatic masses.

Another cause is the Obstruction of the Venous flow, by a Tumoral Venous thromboembolism, or an Extrinsic compression of the veins by tumor or adenopathic conglomerates.

But most of the cases have a mixed etiopathogenesis.

The alarm signs and symptoms of a lymphedema are: Acute onset of the symptoms, Intense and invalidating pain with a neuropathic component, Collateral circulation that makes us suspect of venous obstruction, Hardness and infiltrated skin, lymphangitis carcinomatosa, Joint stiffness that reduces mobility and cannot be explained because of the edema.

When these characteristics are noticed in a lymphedema, we should ALWAYS discard the possibility of a tumor recurrence or the first sign of an unknown cancer.

It is essential to send the patient to the Oncologist urgently in order to confirm the diagnosis, by the mean of anatomical imaging test as Computed tomography.

Once SML is confirmed, it is possible to begin Decongestive Lymphatic Therapy (DLT) during the oncological treatments only after the Oncologist's approval. Nevertheless, we should postpone DLT until the patient has finished the oncological treatment when his disease is a curable locoregional disease that can be sorted out with a radical treatment. DLT has shown to be safe in SML and to reduce the volume of the limb, to relieve pain and to improve the quality of life. We should always adapt DLT to the patient's conditions and to the target. Whereas MLD has been a contraindication in SML, it is not shown to increase the spread of the tumor. No studies report the security of Intermittent pneumatic compression. Bandages are safe and effective in SML, and new autoadjustable devices can be of help in treating these patients minimizing the hospital visits.

### LYMPHATIC CORD FOLLOWING AXILLARY NODE DISSECTION

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<sup>3</sup> *MD FRCP, Professor of Dermatological Medicine, St George's University of London, UK*

**Background:** The axillary cord (AC) phenomenon occurs in the axilla and on the frontal side of the upper arm and sometimes along the forearm to the thumb. The cord is painful, in particular by movement, and can therefore be very disturbing to the patient. Though the phenomenon has been examined and discussed for decades, no evidence for the origin has been found until now.

**Aim of this study:** to perform a histopathologic analysis of cords taken 1996-98 in the Surgical Clinic, Skane University Hospital, Lund.

**Material and Method:** In seven patients with AC, biopsies of the cord were taken 4-5 weeks after axillary node surgery due to breast cancer, and analyzed for endothelial cells of lymphatic vessels using the D2-40 method.

**Results:** In one biopsy, there is a dilated vessel with a thickened wall which is confirmed by D2-40 immunostaining to represent a lymphatic vessel. The lumen is occluded by organised thrombus within which new vessels are being formed indicating recanalisation. In two other biopsies, similar lymphatic vessels with thickened walls are also present although the lumen of the vessels are not visualised in the planes of section. The other four biopsies do not show specific features.

**Conclusion:** Although only one case this is the first pathological evidence of thrombosis within a confirmed lymphatic vessel from a case of cording. We propose that AC represents lymphatic vessel thrombosis. Recanalisation of the thrombus eventually restores lymphatic flow consistent with the transient nature of the condition.

## INFLUENCE OF BREAST CANCER SURGERY ON THE DEVELOPMENT OF AXILLARY WEB SYNDROME

BERANUY RODRIGUEZ M (SPAIN)

**Background:** Axillary web syndrome (AWS) is a complication after breast cancer surgery. It refers to ropelike structure developed mainly under axilla but can be extended by the upper limb, affecting medial aspect of the arm and the antecubital fossa. According to literature, this affection has a variable incidence. It appears between the first and eighth week after performing an axillary dissection, either lymphadenectomy (LA) or sentinel lymph node biopsy (SLNB). It's a self-limited disorder, and in most cases is resolved within the first three months after surgery.

**Aim of the work:** The objective of this study is to identify risk factors for developing an axillary cord in relation to surgical act and postsurgical complications.

**Material and methods:** We performed a retrospective study of 213 patients visited at Bellvitge Hospital Rehabilitation Department between 2013-2017, after being submitted to breast cancer surgical treatment. The first visit was made one month after surgery to detect early complications. Following visits were made every 6 months, until completing a 3 year follow-up. Patients with less than 3 visits were excluded. Statistical analysis performed with SPSS 20 and taking as significance level  $p < 0.05$ .

**Results:** The 16,4% of all patients developed AWS. In 51,4% of the cases, only the axilla was affected. The axilla-elbow segment was the second most frequent location. The most common form of presentation was as a limitation of shoulder balance. After 3 months of surgery, 54,3% of the cords appeared and most of them were resolved in the first 3 months after the diagnosis was made. Appearance of axillary cord was more frequent in quadrantectomies and mastectomies, being only significant in case of quadrantectomies. As for axillary approach, the incidence of AWS was higher in patients undergoing a LA compared to patients undergoing SLNB. The presence of postsurgical complications increased the risk of developing cords but the only complication in which the differences had been statistically significant was the seroma. There were no statistically significant differences in surgical time or quadrant where the tumor was located.

## EARLY DETECTION OF SECONDARY LYMPHEDEMA AFTER CANCER TREATMENTS

SBELGRADO J.P., VANDERMEEREN L., VANKERCKHOVE S., VALSAMIS J.B., CARLY B., HERTENS D., BEIER B., ETBAZ S., CARLY B., LIEBENS F. BELGIUM

**Introduction:** All patients undergoing an axillary dissection, from SNL procedure up to large dissection, are at risk to develop a secondary lymphedema. Currently, breast cancer related lymphedema (BCRL) is diagnosed after its clinical onset.

Sensitive detecting tools are needed to identify accurately pre-clinical signs of BCRL. Near infrared fluorescence lymphatic imaging (NIRFLI) could be an answer to this need. NIRFLI exams on lymphedematous and healthy subjects highlight that the superficial lymphatic pictures reveal typical architectural differences. This prospective monocentric study, started 5 years ago, aims to confirm the possibility to detect BCRL at a subclinical stage.

**Method:** The study was approved by the local ethical committee and received the approval for ICG intradermal injection from the Belgian Federal Agency of Drugs. After having read and signed the informed consent, breast cancer patients were recruited before breast cancer surgery. Patients from SNL up to large dissection procedure were included. Patients were submitted to the evaluation protocol before surgery and then, 10 days, 3 months, 6 months, 1 year and 2 years after surgery. The protocol includes: standardized pictures - far infrared imaging - high accurate segmental volumetry of both upper limbs, based on Archimedes principle - mapping and recording by NIRFLI of the limb of the operated side (or to be operated). The evolution of volumetry and lymphatic architecture are stated and compared along the time. If minor changes of NIRFLI occur during follow-up, such as dermal rerouting patterns, appointment will be set tighter, the patient is asked to come to measure the segmental limb volume each month.

**Results:** On 28/02/2019, 82 patients were enrolled consecutively. 10 patients showed changes in NIRFLI and developed lymphedema afterwards. 13 patients presented only minor changes in NIRFLI and up until now have not developed lymphedema. The 59 other patients had no changes in NIRFLI and no volume increase.

**Conclusion:** Primary results indicate that NIRFLI seems to be a promising sensitive tool to detect the imminent risk of development of secondary lymphedema. Continuous follow-up, enlargement of the study in a multicentric way in order to increase the number of patients will strengthen these results for a better identification and prevention of secondary lymphedema after breast cancer treatment.

## LYMPHATIC SYSTEM AND SILICON IMPLANTS OF THE BREAST

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Breast implants manufacturers guarantee the strength and quality of implants. However, any use of a breast implant from any indication carries the risk of complications (5-10% of cases). It also involves the formation of a capsule around the implant, its possible contracture including rupture. of the implant. After rupture during time some silicon blebs persist and are located in connective tissue of the breast. Others are absorbed by lymph nodes. It is a question of how the nodes will react after a certain period of time after a few years. In this presentation, it is shown which nodes are affected. The next question is the development of cancer?

## SIROLIMUS INDUCED LYMPHEDEMA

AMORE. M

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**Background:** For some years now, the use of sirolimus has been increase to treat venous and lymphatics malformations, nevertheless this type of drugs is used as an immunosuppressant for solid-organ transplant recipients

**Aim of the study:** to evaluate the lymphedema induced by sirolimus.

**Material & Methods:** We evaluate 8 patients (N=8) who received sirolimus after kidney transplant (N=7) and liver transplant (N=1) for more than 10 years and recently they developed lymphedema after a minimal trauma, (N=6) unilateral lower limb and (N=2) combine unilateral lower and upper limb. We perform in (N=4) of this patients lymphocintigraphy of lower limbs, (N=1) Lymphocintigraphy of lower and upper limbs, (N=2) ICG Lymphography and (N=1) MR Lymphography.

**Results:** In all cases we observe hypoplasia and aplasia of lymph nodes with dermal backflow.

**Conclusions:** We need more evidence to know if that patients have a primary condition to develop lymphedema or the target of the rapamycin is focused on the involution of the lymphatic tissue. Maybe the dose and duration of the treatment have an impact factor

## ASSOCIATED FACTORS OF AXILLARY WEB SYNDROME IN PATIENTS AFFECTED BY BREAST CANCER: A RETROSPECTIVE STUDY

VÁZQUEZ GALLEGOS (SPAIN)

*President of LymphoLab*

*Scientific Director of Compression Therapy study Group (CTG)*

**Background:** Breast cancer is the most frequent cancer among women in the world. The increase in early cancer detection and a better knowledge of the disease has made longer the survival rates for women with this neoplasia. Surgical treatment is an essential part of therapy, which includes chemotherapy, radiotherapy and hormonal therapy. As a consequence of these treatments, a multitude of morbidities that affect the quality of life of patients can occur. The objective of this study is evaluate the frequency and risk factors that favour the appearance of axillary web syndrome (AWS), and the association with treatments performed in patients with breast cancer.

**Methods:** Retrospective study of 213 patients visited at Bellvitge Hospital Rehabilitation Department between 2013-2017, after breast cancer surgery. They were enrolled, interviewed and submitted to a specific physical exam to investigate the axillary cords. First visit made one month after surgery and, subsequently, successive visits every 6 months, until completing 3 years follow-up. Patients with less than 3 visits were excluded.

**Results:** The incidence of AWS was 16.4% in the women. According to literature, higher risk of triggering the syndrome has been associated with younger age (average age of 49.5 years old), this was statistical significance. A lower body mass index (BMI) is also associated, without statistical significance. Furthermore, there is an increased risk in patients receiving neoadjuvant chemotherapy and adjuvant radiotherapy (average dose 40-50Gy) being this significant.

**Conclusions:** The AWS is a frequent complication in the early postoperative period after breast cancer surgery. It is important to know the risk factors associated with AWS and increase surveillance. Screening, prevention and appropriate referral is necessary for the early post-operative management of AWS

## LYMPHATIC SYSTEM IMAGINGS IN LYMPHEDEMAS

Chair: Pr Bourgeois (Belgium), Pr Ningfei Liu (China), Prof Yamamoto (Japan), Pr Wald (Czech Republic)

### ULTRA HIGH-FREQUENCY ULTRASOUND: A NEW TOOL FOR VISUALIZATION OF LYMPHATIC VESSELS

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**Background** Lymphovenous anastomosis (LVA) is a worldwide applied surgical technique for the treatment of peripheral lymphedema. Preoperative visualization of lymphatic vessels is currently performed by means of indocyanine green lymphography. However, in cases of severe lymphedema, identification of individual lymphatics is problematic given the pattern of dermal backflow. While high-frequency ultrasound (HFU) has been reported useful in the detection of suitable lymphatic vessels for LVA, its application in routine has been hampered due to its limited power to detect small lymphatic vessels. The introduction of ultra high-frequency ultrasound (UHFU) as a new imaging tool has created opportunities to visualize tiny anatomical structures.

**Aim** To explore the performance of ultra high-frequency ultrasound versus high frequency ultrasound in terms of identifying lymphatic vessels; more specifically the number and diameter of the lymphatic vessels.

**Material and methods** Between October 2017 and December 2017, 30 patients with secondary lymphedema were included in the study. Lymphatic vessels were identified by HFU and UHFU at 3 locations of the unaffected limb. Confirmation of the exact location was performed after injection of indocyanine green. The characteristics, including number and diameter of the identified lymphatics were noted.

**Results** In total, 178 lymphatic vessels could be identified following ultrasound examinations: 109 lymphatic vessels could be detected by both techniques, 60 by UHFU only and 9 by HFU only. The mean diameter of the lymphatic vessels was 0.38 mm for vessels detected by UHFU and 0.44 mm for vessels detected by HFU. Also, UHFU showed unprecedented clear images of valves within the lymphatic vessels, even in the smallest ones (smaller than 0.3 mm).

**Conclusion** Following UHFU examination, more and smaller lymphatic vessels could be identified when compared to standard examination with HFU. Given the high resolution images of the lymphatic vessels, the use of HFUS can add to the identification of suitable lymphatic vessels for LVA.

### THE LYMPHOSCINTIGRAPHIC STUDY OF THE DEEP LYMPHATIC CIRCULATION FOR THE DIFFERENTIAL DIAGNOSIS OF LOWER LIMBS EDEMA

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**Background:** Lymphoscintigraphy is the main investigation for visualization of lymphatics, assessment of their function, diagnosis of lymphedema. Till now there is no internationally agreed standard for it. Even if there are two peripheral lymphatic circulations (superficial and deep), with connections and the potentiality of compensations in case of lymphatic damage, only the superficial lymphoscintigraphy is commonly performed. This could lead to a wrong diagnosis of the origin of an oedema, especially in case of the lack of evident causes of lymphatic damage (as in case of lymphadenectomy).

**Aim of the work:** Demonstration of the importance of lymphoscintigraphic study of both superficial and deep peripheral circulation for adequate differential diagnosis of lymphedema.

**Material & Methods:** A retrospective study was carried out on lymphoscintigraphic exams performed between 2013 and 2018, at Nuclear Medicine Unit of University Hospital of Udine (Italy), for diagnostic confirmation of an established or suspected lymphedema of lower limbs. The lymphoscintigraphic assessment of the superficial circulation was followed, after few days, by the exam of the deep system. In both studies, the images were taken immediately and after 60 and 120 minutes. They were evaluated semi-quantitatively using a modified Transport Index score, with analysis of tracer kinetics, distribution pattern, and visualization of lymph nodes and lymphatic vessels. The resulting data were subjected to descriptive statistical analysis

**Results:** Lymphoscintigraphy of superficial and deep lymphatic systems of the lower limbs has been performed on 142 patients. Of these, 106 are females (75%) and 36 are males (25%), with average age of 52. Eighty-seven patients have been diagnosed with lymphedema, in congenital form for 46 (53%) and secondary for 41 (47%); 14 patients have been diagnosed with lipoedema, and 41 are affected by oedemas which originate from different causes (e.g. chronic venous insufficiency). The two lower limbs have been analysed singularly: out of 284 limbs, 89 presented both superficial and deep pathological lymphatic system (31,3%), 31 only with superficial pathological system (11%), 72 only with deep pathological lymphatic system (25,3%) and 92 with no plainly pathological system (32,3%).

**Conclusions:** Lymphoscintigraphy is an important tool for diagnosis of lymphedema. Nevertheless, it is still lacking of a standardization. Moreover, due to many reasons, in most cases only an investigation of the superficial lymphatic circulation is performed. This can lead to misdiagnosis, especially in case of mild oedema. Our study demonstrates that in a relevant number of patients only the deep lymphatic circulation is damaged. This result is interesting not only for a diagnostic reason, but possibly also for the choice of the best surgical approach to lymphedema.

## NON-STANDARD LYMPHOSCINTIGRAPHY IN PRIMARY LYMPHOEDEMA OF LOWER LIMB. IS IT MEANINGFUL?

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**Introduction:** There is a possibility to find a discrepancy between clinical finding and a result of lymphoscintigraphy in the case of primary lymphatic insufficiency of lower extremities.

Standard lymphoscintigraphy with application of radiocolloid into the first interdigital space of the foot can show severe lymphatic insufficiency of the entire limb from both morphological and functional point of view including abnormalities of lymph nodes. On the other hand, clinical examination can show severe or moderate findings of lymphoedema only distally from ankle including fingers, but the rest of the limb is free of any clinical signs of lymphatic insufficiency including oedema.

Clinicians may face the problem how adequately to treat patients with this discrepancy and not to overtreat them.

**Methods:** In case of the above mentioned discrepancy we carried out standard lymphoscintigraphy in 12 patients with application of radiocolloid into the first interdigital space of the foot and after some days we injected the radiocolloid at the inner side of the limb above the ankle.

**Results:** In 9 patients non-standard lymphoscintigraphy showed physiological or nearly physiological function of lower extremity superficial lymphatic system, whereas standard lymphoscintigraphy showed severe insufficiency. In 3 patients non-standard lymphoscintigraphy showed severe insufficiency of the lower extremity lymphatic system similar to the result of standard lymphoscintigraphy.

**Conclusion:** Results of additionally carried out non-standard lymphoscintigraphy, where the radiocolloid was injected at the inner side of the lower limb above the ankle, enabled to carry out the comprehensive decongestive therapy only to the affected part of the lower extremity (fingers, foot and ankle) with very good long lasting clinical results.

## MRL AND CLINICAL EVALUATION OF FREE LYMPH NODE TRANSFER IN MANAGEMENT OF LYMPHOEDEMA OF EXTREMITIES

A.T.ATTA

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Lymphoedema is a chronic progressive disease that is primarily managed by complex decongestive therapy (CDT). Free lymph node has been the most recent development in the management of lymphoedema. The aim of the present work is clinical and magnetic resonance lymphangiography evaluation of the results of lymph node transfer in management of lymphoedema of extremities. During the period between October 2014 and April 2017, a total of 14 patients with 15 limbs were included. Thoracodorsal lymph nodes group was used in 2 cases and inserted in groin region. The submandibular lymph node was the donor in 13 cases and inserted at mid leg (1 case) and at distal sites (ankle or wrist) in 12 cases.

The results showed that the mean value of percentage of girth reduction was 71.6% ( $P < 0.001$ ). The frequency cellulitis attacks markedly decreased (statistically significant). Also the need for pressure garments or stockings decreased by the end of the first year to 80% and reached 93.3% by end of second year. Magnetic resonant lymphangiography showed marked decrease in dilated tortuous lymphatics and improvement in dermal back flow (100% of patients), visualization of new lymphatics around site of anastomosis with filling of surrounding deep veins denoting a good lymphovenous shunt (100% of patients), visualization of newly transferred lymph node in 26.6% of patients.

## “MR LYMPHOGRAPHY IN THE PLANNING OF LYMPHEDEMA SURGERY: THE BRUSSELS PROTOCOL.”

ZELTZER A, BRUSSAARD C, ADRIAENSSENS N, HAMDI M (BELGIUM)



Friday, May 3<sup>rd</sup>, 2019

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## SECONDARY LYMPHATIC COMPLICATIONS : DIAGNOSIS AND PREVENTION. (PART 2)

Chair : Pr Adriaenssens (Belgium), Pr Johansson (Sweden), Pr Michelini (Italy)

### LYMPHEDEMA PROPHYLAXIS RECOMMENDATIONS AFTER BREAST CANCER SURGERY - A SYSTEMATIC LITERATURE REVIEW

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**Background:** The prevalence of lymphedema after breast cancer surgery varies between 6%-80%. Affected women receive advice to reduce the risk of developing secondary lymphedema. Basically, it is recommended to avoid activities which could lead to an increase in lymphatic load or could impair the already reduced transport capacity of the lymph vessels. Among such recommendations is avoidance of tissue damage with following inflammatory response. Up to date the question whether tissue damage can trigger secondary lymphedema is controversially discussed.

**Aim:** We conducted a systematic literature review of studies in the field of lymphology, which investigated the influence of tissue damage (such as "hospital skin puncture" (injection), blood draws, cuff compression, burns, trauma, insect bites) of the affected arm and trunk quadrant on the development of secondary lymphedema in women after breast cancer surgery and/ or radiation.

**Methods:** CINAHL (EBSCOhost), Cochrane Central Register of Controlled Trials, Embase, Physiotherapy Evidence Database (PEDro) and PubMed databases were searched between April 2017 to May 2018. All retrieved studies were screened for title and abstract by two independent reviewers reaching consensus through discussion in case of disagreement. The same researchers independently assessed the full-text articles for eligibility based on a priori set inclusion and exclusion criteria. The methodological quality was appraised using the CASP checklists while the study characteristics were screened and extracted by the two reviewers independently. The study protocol was registered at PROSPERO (CRD42017043224).

**Results:** A total of 483 articles were identified. After screening of the titles and removing the duplicates, 99 articles remained. Following the reading of the abstracts, 31 articles entered the full text review. From those, 27 articles were excluded. Finally, four studies involving 1,526 women met the inclusion criteria. These studies showed a low to medium methodological quality. This systematic review showed but very poor evidence that the investigated risk factors were associated with an increased risk for lymphedema development. Only the risk factor "hospital skin puncture" (injection) represented a significant risk of developing secondary lymphedema in women after breast cancer surgery.

**Conclusions:** Due to the low number of included studies, the lack of their methodological quality and their high risk of bias, it is difficult to draw recommendations for affected women. Only "hospital skin puncture" (injection) may be related to an increased development of secondary lymphedema in women after breast cancer surgery. The current systematic literature review corroborates the clinical implication that health-care professionals should perform skin punctures on the contralateral upper extremity of women after breast cancer surgery. This present work also revealed a lack in literature on this topic. Therefore, further high-quality epidemiological studies should be performed.

## EARLY PREVENTION OF SECONDARY LYMPHEDEMA AND ITS COMPLICATIONS AFTER BREAST CANCER TREATMENT – INTEGRATED APPROACH AND ADVISABILITY

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**Background:** one of the most serious problems of secondary lymphedema – early diagnosis and early start of treatment, so most of the patients get to specialists on the 2d and the 3d stage of lymphedema and the cost and length of treatment are rising and results of treatment are not the same good if to start treatment at 1st stage of the disease. Another problem – lack of information for patients about methods how not to increase the lymphatic load on the damaged lymphatics and about self-care procedures.

**Aim:** to decrease number of secondary lymphedema onsets, to improve early diagnostics of lymphedema, to start the treatment on the 1st stage of lymphedema, to prevent complications.

**Methods:** On the mammology department the “schools for patients” were organized – 2 hours lecture every 1-2 months for those, who started breast cancer treatment that month. For three years we made 21 lectures for 194 patients, 142 of them are still under observation. During the lectures the following information is provided to patients: basic knowledge about anatomy and physiology of lymphatics and the way how it is damaged due to the cancer treatment, mechanisms of developing lymphedema and its treatment, factors increasing and decreasing the lymphatic load, prophylactic methods – using of compression garments, physical exercises, dietary recommendations, erysipelas prevention, skin care, self-measurement control for early diagnostics. Then - evaluation of patients after lectures every 6 months or if patient measured the increasing circumference of limb.

**Results:** 94 patients still have not developed lymphedema. 43 patients were diagnosed 1st stage of lymphedema, 5 – second stage . 17 patients are controlling light edema with standard compression garments of round knit with keeping the difference in arms circumferences (arm circumferences on healthy side and arm circumferences on the side of surgery) not more than 1 cm. 28 patients received CDT with maintenance of results with custom-made flat knit garments keeping the difference in arms circumferences 0 - 1,5 cm, 3 patients are using Velcro systems with the same results. No one from 142 patients has difference in arm circumference more than 1,5 cm at present moment. Only two patients had erysipelas (both with history of hospital infection during surgical treatment).

**Conclusion:** providing information to patient and education about self care just after cancer treatment have following positive effects: psychological confidence of patient (keeping situation “under control”), decreasing of lymphatic load and provoke factors (possibly – frequency of lymphedema onsets, but demands following clinical study, that will be done on the department), early diagnostics of lymphedema (predominantly on 1st stage) and early start of treatment with achieving and maintenance of good results without decreasing quality of life. Providing information in the way of lectures (“schools for patients”) is more effective if to compare to personal consultations from timing point of view.

## CALF CIRCUMSCRIBED LYMPHEDEMA PROCEEDS TO WHOLE LIMB LYMPHEDEMA IF NOT EARLY DIAGNOSED AND TREATED-EARLY DIAGNOSIS

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Lymphedema of lower extremities is considered to comprise the entire limb. This is most common in cases with recurrent attacks of cellulitis (dermatolymphangioadenitis, DLA) gradually destroying main lymphatic collectors. However, at present the early diagnosis and appropriate antibiotic treatment of foot or calf infection may limit spread of microbes and the region of inflammation. This is why we see more isolated lymphedema regions limited to foot or part of calf only. On the ICG imaging confluent areas of dye at site of inflammation with still preserved flow in the dilated collectors can be seen. Early imaging of inflammatory areas by ICG lymphography may help in initiation of a fast therapy.

**Aim.** To perform ICG lymphography in patients complaining of limited regions of edema and inflammation of any part of the lower limb so far not diagnosed as lymphedema.

**Material and methods.** Fifty patients showing up in OPD with circumscribed inflammatory regions of foot, calf or thigh without edema of the limb underwent ICG lymphography, tonometry and dielectric constant testing.

**Results.** Foot edema. Confluent spread of ICG in the dorsum and plantar area. Outline of collecting lymphatics in the calf and thigh. Enlarged inguinal nodes. Calf edema. Outline of dilated foot lymphatics. A confluent ICG spot embracing lower part of calf. Slight outline of thigh lymphatic. Enlarged inguinal nodes. Thigh edema. Dilated collecting lymphatics of the whole limb, large ICG spots in the thigh with enlarged inguinal nodes. Tissue stiffness at inflamed site  $>1.5\text{kg/sq.cm}$  and skin water concentration  $>45\%$ .

**Conclusions.** Early ICG lymphography depicts areas of lymphatic involvement by the inflammatory process. Immediately employed therapy may prevent spread of damage to collecting trunks and nodes.

## **LYMPHOEDEMA AFTER BREAST CANCER TREATMENT: PRIMARY PREVENTION PROTOCOL STUDY CONCLUDED AFTER A FIVE-YEAR FOLLOW-UP**

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**Background:** In the authors' laboratory of lymphology the decision was taken to focus the attention on patients who had undergone breast cancer surgery, in sub-clinical stage, which included patients at risk of developing lymph stasis in the homolateral arm.

**Aims of the work:** Five years ago the authors planned a preventive protocol in order to avoid lymphoedema onset in patients who had undergone breast cancer surgery and after a five-year follow-up they have drawn the conclusions.

**Material and Methods:** 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 of compared arms, shoulder functionality evaluation through abbreviate Costant-Murley shoulder score and 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 was aimed at resolving eventual complications-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 undergone individual treatments and consisted in two phases: a. the Informative Group consisted of simple information about lymphoedema and on preventive measures. Furthermore, it included informal conversation with patients and active listening to patients' problems, b. the Physical Activity Group consisted of respiratory training, stretching exercises, gymnastic exercises, relaxation techniques, improving awareness through movement based upon Feldenkrais Method.

The follow-up required was: for the following 2 years every 6 months for patients included in individual lymphology section and every year for other patients, after the 2<sup>nd</sup> year one check-up a year for all patients.

**Results:** In the first 2 years, lymphoedema onset in 4 patients during the 1<sup>st</sup> year was noted (came out of follow-up after oedema onset) and 7 patients of 139 remaining during the 2<sup>nd</sup> year (came out of follow-up after oedema onset). At the end of the 2<sup>nd</sup> year, 34 patients without oedema, decided not to continue the follow-up; we asked them to get in touch with us immediately after oedema onset, but none of them called us 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.

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

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## SURGERY FOR PREVENTION AND/OR TREATMENT OF LYMPHATIC COMPLICATIONS. (PART 1)

Chair: Pr Hamdi (Belgium), Pr Olszewski (Poland), Pr Yamamoto (Japan)

### DECREASING DONOR SITE MORBIDITY AFTER GROIN VASCULARIZED LYMPH NODE TRANSFER WITH LESSONS LEARNED OVER A 12-YEAR EXPERIENCE AND REVIEW OF THE LITERATURE.

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**Introduction:** Donor site morbidity related to VLNT remains a cause of worry among surgeons. As such, our study explores donor site morbidity after VLNT with or without concomitant deep inferior epigastric artery perforator (DIEP) flap breast reconstruction. Furthermore, we evaluate our novel surgical approach whether it reduces the morbidity rate.

**Materials and methods:** A retrospective chart review of donor site complications in VLNT before and after the implementation of a new surgical technique in 2013 was performed from 2006 to 2018. The patients' medical histories and demographic data were analyzed for risk factors. A literature review was implemented to evaluate the reported donor site complication incidence and to compare our surgical strategies with those in other papers. We evaluated complications with and without concomitant autologous breast reconstruction (DIEP flap). Our proposed surgical strategy corresponds with several known methods like avoiding lower limb sentinel lymph nodes, the use of drains and reversed lymphatic mapping, but adds a unique feature of deepithelializing the upper abdominal flap in order to obliterate dead space.

**Results:** Eighty-nine patients were included in our case series. Sixty five cases (73%) were combined with DIEP flap breast reconstruction. Seroma rate diminished from up to 60% in the first 39 cases to 18% in the last five years (50 cases) ( $p < 0,001$ ) since the implementation of the described surgical method. Smoking and concomitant DIEP flap were identified as risk factors for developing donor site complications. Lymphedema of the afferent lower limb is described in the literature but did not occur in our series.

**Conclusions:** Seroma is the most common donor site morbidity after groin VLNT flap harvest, especially when combined with DIEP flap breast reconstruction. This paper contains the largest reported series of combined VLNT + DIEP flaps and describes surgical strategies on how to decrease seroma formation and avoid iatrogenic lymphedema of the lower

### LY.M.P.H.A. TECHNIQUE FOR THE PREVENTION OF EARLY AND LATE COMPLICATIONS IN MELANOMA TREATMENT

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**Background:** Groin (GD) and axillary (AD) dissection for melanoma are burdened by a high incidence of lymphatic complications, both early (lymphorrhoea, lymphocele, lymphangitis, wound dehiscence) and late (lymphedema). These complications seriously compromise patients' quality of life and can modify the therapeutic project, delaying adjuvant therapy, too. Ly.M.P.H.A. Technique proved to be effective in reducing the incidence of breast cancer related lymphedema. It consists in performing, at the end of the lymph node dissection, a multiple lymphatic-venous anastomosis between arm lymphatics coming from the upper limb, afferent to the axillary lymph node and previously identified by the BPV dye, and a collateral branch of the axillary vein.

**Aim of the work:** The purpose of our study is to verify the effectiveness of Ly.M.P.H.A. technique also in reducing lymphatic complications following lymph node dissection for trunk melanoma.

**Material & Methods:** The study includes 18 patients who underwent lymph node dissection, 8 AD (I, II and III level) and 4 GD. Exclusion criteria were patients with melanoma of the extremities and patients with metastatic disease (4 AD patients, 2 GD, for a total of 6 patients). In patients who are candidates to GD, lymphatic vessels of the lower limb and a collateral branch of the great saphenous vein were used for the anastomosis.

**Results:** We assessed the incidence of lymphatic complications (lymphorrhoea, lymphocele, lymphangitis, lymphoedema) and wound complications (wound infection and wound dehiscence). Average amounts of lymphatic leakage from drains, average time of persistence of the drains, operative times were also evaluated. The follow-up period was 2 months-2 years.

The results showed a significant reduction in short and long term lymphorrhoea, in average time of persistence of the drains and in incidence of secondary lymphoedema, compared to a moderate increasing of operative times.

**Conclusions:** Ly.M.P.H.A. technique proved to be effective in reducing early- and late-onset of lymphatic complications in patients undergoing lymph node dissection for trunk melanoma.

This leads to a reduction in hospitalization, socio-health costs and an improvement in the quality of life of patients.

## HOW TO TREAT INTRACTABLE LYMPHORRHEA?

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**Background** Lymphorrhea is a well-known complication after inguinal lymph node excision and severely impacts the quality of life of the patient. Indeed, patients with lymphorrhea often face long hospital stays because of recurrent infections or end up with a percutaneous drainage system. Ligation of the injured lymphatic vessels usually results in the formation of a lymphocele or will induce lymphedema. Therefore, it is plausible that lympho-venous anastomosis is indicated in patients with persistent lymphorrhea as it bypasses the area of destruction and restores the lymph flow.

**Aim** To describe the clinical outcome after lympho-venous anastomosis in patients with persistent lymphorrhea.

**Material and Methods** Between January 2013 and January 2019, 10 patients (5 men, 5 women) were referred for surgical treatment of the unstopable lymphorrhea after lymph node excision (n=9) and after excision of a lipoma (n=1). In most cases the lymph was leaking from the groin (n=8), while one patient had lymphorrhea from the scrotum and one from the axilla. At the time of referral, three patients had a lymphatic fistula and five patients had a drainage system with a daily output between 200 and 1000 ml. The diagnosis of lymphorrhea was confirmed in all patients by means of lymphoscintigraphy which visualized lymphatic pathways leaking radioactive tracer outside the body. Fluorescent lymphatic mapping (PDE Neo II, Hamamatsu Photonics, Japan) was used to visualize the lymphatic flow and in the three patients with lymphocutaneous fistulae fluorescent discharge could be observed on the wound dressing. When the dominant leaking lymphatic vessels were identified, these were anastomosed to a recipient vein using a fully equipped microscope. All microsurgical interventions were performed under loco-regional anesthesia.

**Results** Ten patients were successfully treated by two or three lympho-venous anastomoses. There were no peri- or postoperative complications. In all patients, a leaking lymphatic vessel could be anastomosed to a recipient vein thanks to intraoperative-guided ICG lymphography. In the majority of the patients, additional lympho-venous anastomoses were performed in the vicinity of the region of the leakage. The lymphorrhea was completely cured in 9/10 patients and no recurrence was noted during a follow-up period of 14 to 40 months. In one patient, the daily discharge decreased from 1000 ml to 300 ml after 2 lympho-venous anastomoses but the third planned microsurgical intervention had to be postponed due to chemotherapy followed by 3 episodes of sepsis.

**Conclusions** Lympho-venous anastomosis is a minimal invasive procedure that offers a curative solution for persistent lymphorrhea by redirecting the lymphatic flow towards the venous system and hence bypassing the area of lymphatic injury. When more than one major lymph vessel is leaking, several LVA are required.

## MICROSURGICAL TREATMENT FOR RECURRENT LYMPHOCELE: DOES IT WORK?

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**Background:** Lymphoceles are common complications after lymph node dissection for oncological conditions, but may occur after any injury to the lymphatic system. Although conservative treatment by means of repetitive needle aspirations and compressive bandaging is the first treatment, the recurrence rate is high, even when combined with injection of sclerosing agents. Also, when sclerotherapy is applied, there is a risk of imposing lymphedema after obliteration of the normal lymphatic vessels. Microsurgical treatment and more specifically lympho-venous anastomosis might be curative in patients with lymphoceles refractory to conservative treatment as it restores the lymph flow.

**Aim:** To describe the clinical outcome after lympho-venous anastomosis in patients with recurrent lymphoceles.

**Material and Methods:** Between January 2013 and January 2019, 6 patients (3 men, 3 women) were referred for surgical treatment of the lymphocele after unsuccessful prior treatments with sclerotherapy. Lymphoceles occurred after lymph node excision (n=4) and after vein graft for coronary bypass (n=1) and after trauma (n=1). In most cases the lymphocele was localized at the upper leg (n=3). Other locations were: the groin (n=2) and the lower leg (n=1).

The clinical diagnosis of lymphocele was confirmed by means of lymphoscintigraphy showing in all patients, an accumulation of tracer in a cavity and in some patients the afferent lymphatics ending in the lymphocele.

Fluorescent lymphatic mapping (PDE, Hamamatsu Photonics, Japan) was used to visualize the lymphatic flow towards the lymphocele. When the dominant leaking lymphatic vessels were identified, these were anastomosed to a recipient vein using a fully equipped microscope. No excision or curettage of the lymphocele was performed. All microsurgical interventions were performed under loco-regional anesthesia.

**Results:** Six patients were successfully treated by one or more lympho-venous anastomoses (range 1-4). There were no postoperative complications. In all patients, a leaking lymphatic vessel could be anastomosed to a recipient vein after exploration of the lymphocele by means of intraoperative ICG lymphography. In 2 patients, additional lympho-venous anastomoses were performed in the vicinity of the lymphocele. The lymphoceles resolved in all six patients, and no recurrence was recorded during a follow-up period of 3 to 44 months.

**Conclusions:** Lympho-venous anastomosis offers a curative solution for lymphoceles unresponsive to conservative treatment.

Moreover, LVA is a minimal invasive procedure and has the advantage to prevent the worsening of lymphedema since it redirects the lymphatic flow towards the venous system.



## THE PHYSICAL TREATMENTS OF LYMPHEDEMAS (PART 1)

Chair : Pr Adriaenssens (Belgium), Dr Cestari (Italy), Pr Forner-Cordero (Spain), Pr Leduc (Belgium)

### LYMPHOSCINTIGRAPHIC EVALUATION OF THE EFFECTS OF MANUAL LYMPHATIC DRAINAGE AT THE ROOT OF THE LIMB FOR PATIENTS WITH (UPPER OR LOWER) LIMB LYMPHEDEMA

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**Introduction:** Manual lymphatic drainage (MLD) aims to stimulate lymphatics and to decrease the edema. Although it is an important part of the complex decongestive therapy for lymphedema management, its efficiency is in doubt. The purpose of this study is to lymphoscintigraphically assess the effect of skin mobilization, non-specific massage and MLD on the root of the lower limb for patients with lower limb lymphedema.

**Material and Methods:** 80 lymphoscintigraphical exams of the lower limb root of patients with primary and secondary lower limb lymphedema were analyzed. Lymphoscintigraphical exam consisted in imaging performed after the intradermal injections of <sup>99m</sup>Tc labeled nanosized colloids of Human Serum Albumin at the root of the limb, 1) directly after the injection (phase 1), 2) after pinching and stretching of the injection site (phase 2), 3) after a non-specific massage applied on the injection site (phase 3) and 4) after manual lymphatic drainage of the injection site (phase 4). The openings of lymphatic pathways was evaluated after each sub phase.

**Results:** No lymphatic drainage after the injection and no improvement after the 3 interventions following the injection were observed in 5% of the cases (n=4). On the other hand, all lymphatic pathways were observed after phase 1 and 2 AND were not modified by phase 3 (nonspecific massage) and/or phase 4 (MLD) in 8.8% of the cases (n=7). For its part, nonspecific massage improved the situation in 57 cases (71.5% of the whole series) when compared to the situation observed at the end of phase 2. However, MLD improved the visualization of the lymphatic pathways in 48 cases (60%) when compared to phase 3 and was necessary to lead to the visualization of the lymphatic drainage at the level of the root of the edematous limb in 6 cases (7.5%).

**Conclusions:** Physical therapy leads to a greater number of lymphatic collaterals openings in a region where no other technique of complex decongestive therapy technique can be applied.

**Introduction:** Manual lymphatic drainage (MLD) aims to stimulate lymphatics and to decrease the edema. Although it is an important part of the complex decongestive therapy for lymphedema management, its efficiency is in doubt. The purpose of this study is to lymphoscintigraphically assess the effect of skin mobilization, non-specific massage and MLD on the root of the upper limb for patients with upper limb lymphedema.

**Material and Methods:** 91 lymphoscintigraphical exams of the upper limb root of patients with secondary upper limb lymphedema were analyzed. Lymphoscintigraphical exam consisted in imaging performed after the intradermal injections of <sup>99m</sup>Tc labeled nanosized colloids of Human Serum Albumin at the root of the limb, 1) directly after the injection (phase 1), 2) after pinching and stretching of the injection site (phase 2), 3) after a non-specific massage applied on the injection site (phase 3) and 4) after manual lymphatic drainage of the injection site (phase 4). The openings of lymphatic pathways was evaluated after each sub phase.

**Results:** No lymphatic drainage after the injection and no improvement after the 3 interventions following the injection were observed in 11% of the cases (n=10). On the other hand, all lymphatic pathways were observed after phase 1 and 2 AND were not modified by phase 3 (nonspecific massage) and/or phase 4 (MLD) in 8.8% of the cases (n=8). For its part, nonspecific massage improved the situation in 9 cases (9.9% of the whole series) when compared to the situation observed at the end of phase 2. However, MLD improved the visualization of the lymphatic pathways in 64 cases (70.3%) when compared to phase 3 and was necessary to lead to the visualization of the lymphatic drainage at the level of the root of the edematous limb in 15 cases (16.4%).

**Conclusions:** Physical therapy leads to a greater number of lymphatic collaterals openings in a region where no other technique of complex decongestive therapy technique can be applied.

## EVALUATION OF DIFFERENT SHORT-STRETCH COMPRESSION SYSTEMS TREATING PATIENTS WITH BILATERAL LEG LYMPHOEDEMA STAGE II

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**Background:** Lymphedema is defined as accumulation of fluid and fibroadipose tissues due to disruption of lymphatic flow. The mainstay of treatment is conservative, typical multimodal therapy, which is aimed at improving patient comfort and reducing limb volume. External compression with short stretch bandages is used as a first line therapy to reduce the lymphedema. Aim of the work: In this study we wanted to compare two different short-stretch systems, from both the patients and staff point of view.

**Materials and methods:** 20 patients with bilateral secondary lymphoedema stage II were included in the study. Both legs were treated with short stretch bandages, on one leg two-layer adherent short-stretch system PUTTER PRO 2\* was applied and on the other leg adherent short-stretch system ACRYLASTIC\* was applied for 7 days. At the next check-up a questionnaire with 10 questions was filled out by the patients (regarding comfort, mobility, compliance, ability to wear usual footwear) and the staff (regarding ease and speed of application, slippage during wearing).

**Results:** Both systems were easy and very fast to apply. There were no differences in slippage, the skin condition was good under both systems, both systems were very comfortable and patients did not have any problems with mobility and wearing their usual footwear. Compliance was slightly better with adherent short-stretch system.

**Conclusions:** Both two-layer adherent short-stretch system and adherent short-stretch system are very suitable for the therapeutic phase of compression therapy in patients with secondary lymphoedema of the leg stage II.

## THE EFFECTIVENESS OF EDEMA FLUID MOBILIZATION AND FORMATION OF FLOW “CHANNELS” BY THE TISSUE MOBIDERM-LIKE COMPRESSING BLOCKS

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**Background.** Lymphedema of tissues is characterized by obstructed lymphatic collecting trunks, distension of dense subcutaneous lymphatic network and excess fluid in the intercellular space. How to apply external force to overcome the high tissue hydraulic conductance and generate flow? Sequential compression of the whole limb surface from foot or hand to inguinal or axillary region forms a circular fluid wave. This fluid wave requires a large force to be moved along loose tissue spaces and dilated subdermal lymphatic network. A new concept is that fluid flow can be facilitated by changing the tissue hydraulic structure, compressing by 2-3 sq.cm large sponge blocks (“force one”) and moving fluid from there to the adjacent tissue. There the accumulating fluid will form artificial tissue “channels”. Compressing “channels” (“force two”) will move fluid more easily proximally, as a large radius channels need less force for flow than the capillary structure under the compressing sponge block.

**Aim.** To check hydraulic effects of block-designed short stretch compression bandage (Mobiderm) on tissue fluid mobilization, movement and formation of flow channels. Material and methods. Twenty patients with leg lymphedema, stage II were studied. Leg was wrapped around by Mobiderm and short stretch bandage for 8 h under skin-bandage interface pressure of 40mmHg. Upon release of compression areas depressed by blocks and expanded around them were seen. Skin durometry, water concentration test and deep tissue tonometry were done. For control the same short-stretch bandage without Mobiderm was used after 3 days break. ICG was injected into toe-web and dye spread was followed in tissues..

**Results.** Prior to Mobiderm bandaging (mean values). Mid-calf circumference 36 cm, skin durometry 0.14N, water 45%, tonometry 1.2 kg/sq.cm. After bandaging. Depressed areas. 0.08N, 34%, 0.8 kg/sq.cm, and adjacent expanded areas 0.16N, 65%, 1.6 kg/sq.cm, respectively. On ICG picture depressed areas fluorescence 22%, expanded areas 45%. In controls without Mobiderm circumference 41 cm, durometry 0.12N, water 42%, tonometry 1.1kg/sq.cm.

**Conclusions.** Decrease of circumference was higher under Mobiderm than in controls. We found that under Mobiderm edema fluid moved from block depressed regions to adjacent tissue and from there through a network of the newly formed fluid filled “channels” flew proximally under bandage compression.

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## SURGERY FOR PREVENTION AND/OR TREATMENT OF LYMPHATIC COMPLICATIONS. (PART 2)

Chair : Dr Boccardo (Italy), Pr Campisi (Italy), Pr Zeltzer (Belgium)

### INTERDISCIPLINARY APPROACH TO THE PREVENTION AND TREATMENT OF SECONDARY LYMPHATIC COMPLICATIONS.

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**Background and aim of the work:** The Author report the experience concerning the prevention and treatment of secondary lymphatic complications performed by an interdisciplinary approach in a public hospital, which represents a regional and national reference center for lymphatic surgery and microsurgery.

The interdisciplinary approach includes the participation of physiotherapists, lymphatic surgeons, nuclear physicians, radiologists, surgical oncologists, breast surgeons, gynecologists, etc. Their experience involves primary, secondary and tertiary prevention of lymphatic complications.

**Materials and Methods:** Primary prevention aims to prevent these complications before they occur following axillary or groin lymph nodal dissection. This is done by means of preventing surgical procedures, mainly represented by LYMPHA technique.

Secondary prevention aims to reduce the impact of lymphatic disorders when they have already occurred to halt or slow their progress, and planning an early surgical treatment. Tertiary prevention aims to avoid complications, above all infections, and long-lasting and irreversible effects. This would help patients to manage long-term and often complex chronic dysfunctions and permanent impairments in order to improve as much as possible their ability to function, their quality of life and their life expectancy.

**Results and conclusions:** Finally, the Author will report the flowcharts that are proposed for each kind of prevention and early treatment in different clinical cases.

### MICROSURGICAL PLANNING FOR LYMPHEDEMA GUIDED BY TWO-COMPARTMENT LYMPHOSCINTIGRAPHY

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**Objective:** Microsurgery for lymphedema is becoming firmly established as an effective long-term treatment for peripheral lymphedema. It is important now to clarify which type of microsurgery is the most appropriate for which patient. The authors examined the lymphatic flows in affected limbs by lymphoscintigraphy in order to develop a surgical treatment algorithm based on grade of lymphatic impairment.

**Method and Materials:** 258 patients with lymphedema underwent segmental lymphoscintigraphy with <sup>99m</sup>Tc-labeled antimony sulfur colloid or <sup>99m</sup>Tc-nanocolloid human serum albumin. The transport index (TI) was calculated to categorize the flow of the superficial and deep vessels as normal (<10) or pathological (greater or equal to 10). Patients with normal scans were excluded from the study. The scores from the remaining 248 (48 unilateral arm, 86 unilateral leg, 114 bilateral leg) were tested with a 3-way ANOVA to examine the relationship between affected limb, deep or superficial pathways, and primary or secondary lymphedema. The relationship between clinical presentation and TI was also investigated.

**Results:** For unilateral arms and bilateral leg lymphedema there was no difference between primary and secondary lymphedema for TI scores (F (1, 46) = 2,49, p=ns, F (1, 112) = 0,38, p=ns, respectively). In general, the deep lymphatic pathways were more adversely affected with worse TI for the lower limbs and the superficial pathways for arm lymphedema. Patients with unilateral clinical presentation can have bilateral TI abnormalities. The vast majority of patients (88-98%) had either the deep vessels alone or both the superficial and deep vessels with pathological TI.

**Conclusions:** A two-compartment lymphoscintigraphy is able to accurately detect lymphatic flow abnormalities in patients with limb swelling. Given that the vast majority of patients had deep lymphatic vessels abnormalities, inclusion of these vessels in the lymphoscintigraphic diagnostic protocol is recommended. The authors propose a new treatment algorithm for lymphatic microsurgery based on the pattern of pathological lymphoscintigraphy TI.

## "SINGLE-SITE MULTIPLE LYMPHATIC VENOUS ANASTOMOSIS (SS-MLVA) FOR THE STAGING-GUIDED PERIPHERAL LYMPHEDEMA TREATMENT AND CONSISTENT LONG-TERM CLINICAL OUTCOMES "

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**Aim** A wide clinical experience has led to a remarkable knowledge about microsurgery applied to lymphatic disorders. Strategies of treatment are proposed to treat lymphatic diseases, utilizing a “single-site” procedure. The rationale behind the single-site approach is twofold: lower infection risk and larger caliber vessels for anastomoses. Particular focus is given by the author to new technology and new surgical strategies within this field.

**Methods** Clinical outcomes for over 5300 patients with peripheral lymphedema treated in Genoa, Italy with a follow-up of at least 5 years, to 20 years is reported. Microsurgical methods included derivative lymphatic-venous anastomoses and lymphatic reconstruction by interpositioned vein-grafted shunts, in a single surgical site. Specific pre-operative diagnostic investigations consisted of duplex scan, lymphoscintigraphy, and the Photo Dynamic Eye (PDE) method with indocyanine green fluorescence. Recently the new Fluodeam test, which allows measurements under normal light conditions, has been adapted. Outcome measures included volume reduction, stability of results with time, reduction of dermato-lymphangio-adenitis (DLA) attacks, necessity of wearing elastic supports, and use of conservative measure post-operatively.

**Results** Compared to pre-operative conditions, patients obtained significant reductions in ELV of over 87%, with an average follow-up of 12 years or more. Over 86% of patients with earlier stages of disease (stages IB or IIA) progressively stopped using conservative therapies and 47% of patients with later stages (stages IIB and III) decreased the frequency of physical therapies. DLA attacks considerably reduced by over 93%.

**Conclusions** MLVA or MLVLA techniques when performed at a single surgical site produce excellent outcomes in the treatment of both primary and secondary lymphedemas, giving the possibility of a complete restoration of lymphatic flow in early stages of disease when tissue changes are minimal.

## SEQUENTIAL SELECTIVE FIBRO-LIPO-LYMPH-ASPIRATION BY LYMPH VESSEL SPARING PROCEDURE (FLLA-LVSP) FOR THE EFFECTIVE TREATMENT OF ADVANCED STAGES OF PERIPHERAL LYMPHEDEMA

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**Background:** Peripheral lymphedema remains a poorly recognized disease that causes significant morbidity and chronic lymphedema is associated with fibrotic tissue changes and adipose formation (‘non-pitting’ edema) that is irreversible when untreated. Lymphatic Microsurgery provides a functional repair to overcome the obstacle in lymphatic flow. In these cases, lymphatic microsurgery helps to resolve the lymphstasis that contributes markedly to swelling. Notwithstanding the success of the microsurgery, there often remains significant adipose tissue in the affected limb in advanced lymphedema, which contributes to residual lymphstasis and increased risk of infection. The authors discuss a recently developed Fibro-Lipo-Lymph-Aspiration technique to improve this chronic swelling, using a Lymph Vessel Sparing Procedure (FLLA-LVSP).

**Methods:** In cases of advanced lymphedema, we use a recently developed Fibro-Lipo-Lymph-Aspiration technique with a Lymph Vessel Sparing Procedure (FLLA-LVSP) where microlymphography techniques highlights the lymphatic pathways and the excess adipose tissue is carefully aspirated. The lymphatics are anastomosed with telescopic technique to multiple tributary vein, for example, the axillary vein or the saphenous vein, depending on the affected limb.

**Results:** For 450 advanced cases involving the upper limb, there was an average pre-surgery excess volume of 23.16%, which reduced to 2.84% after the FLLA-LVSP (Z-score = -6.73, p<0.001). Similarly, for the lower limb, there was an average pre-surgery excess limb volume of 24.04% and a reduction to 2.89% post-operatively (Z-score = -3.42, p<0.01).

**Conclusion:** MLVA techniques when performed at a single-site produce excellent outcomes in the treatment of lymphedema, giving the possibility of complete restoration of lymphatic flow in the early stages of when tissue changes are minimal. In cases of advanced lymphedema, the FLLA-LVSP is efficient with immediate cosmetic results. More importantly, the removal of excess tissue is completed without further damage to lymphatic vessels.

## ADVANCED STAGE OBSTRUCTIVE LYMPHEDEMA OF LOWER LIMBS CAN BE SUCCESSFULLY CONTROLLED BY SILICONE TUBE IMPLANTS REPLACING OBLITERATED LYMPHATIC COLLECTORS-2019

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**Objectives:** We propose to drain edema fluid accumulations in advanced stages of lymphedema with obliterated collecting trunks by creating artificial pathways to non-obstructed regions by implantation of "silicone lymphatics".

**Aim.** To present the 3 to over 7 years follow up results of therapy of lymphedema by subcutaneous implantation of silicone tubings in lower and upper limbs.

**Methods.** In 181 patients with obstructive limb lymphedema after pelvic or axillary lymphadenectomy and irradiation in uterine or breast cancer or following soft tissue inflammation silicone tubes were implanted subcutaneously. Compression and prophylactic penicillin were applied in the same fashion before and after implantation.

**Results** a) immediate decrease of limb circumference within days after implantation b) in lower limbs in a 4 years follow up a decrease in mid-calf circumference by a mean -9% (P<.05) with range of -3% to -30 % corresponding to 90-900ml volume and in mid-thigh a mean -2.0% (P<.05) with range of 10% to + 3% equal to 0-900ml. In upper limb in three-year follow up decrease in mid-forearm was -8.5% (P<.01) with a range of -3.0% to -25.0 % and in mid-arm a mean -10% (P<.05) with a range of -7% to - 25%, corresponding to 180-700ml volume, c) decrease in tissue stiffness (tonometry), d) "dryness" of tissues with no more fluid squeezed out on plethysmography, e) all tubes remained patent, d) no major inflammatory reactions to implanted tubing in 95% of lower limbs and no such episodes in upper limbs. In some lower limb lymphedema a several days lasting inflammation was seen. Under normal conditions single bacterial cells are transported from skin surface via lymphatics to the regional lymph nodes. This should not be considered as infection but as a physiological process of elimination of microbes by lymphatic system.

**Conclusions.** Technical simplicity, fast decrease of edema and lack of tissue reaction make the method worth applying in advanced stages of lymphedema.

## "LYMPHOLOGY IS NOT ONLY LYMPHEDEMA" LYMPHOVENUS SHUNTS IN PEDIATRICS

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The last 50 years in the History of the Lymphology makes possible with creativity and passion, of pioneers, (M. Degni, A. Cordeiro, F.A. Assal, W. Olszewski, C. Grandval, R. Baumeister, C. Campisi, F. Boccardo, I. Koshima, C. Becker and other prominent leaders, the design of different micro surgical techniques for the treatment of the secondary lymphedema in adults recreating new pathways for the flow of lymph, on lymphatic channels and lymphnodes. No one has achieved all, but all has achieved something, important on the road of the vascular and flow reconstruction, towards of the this surgical chapter. The lymphangion and the lymphnodes, are organs, with clearly defined rules and functions. The lymphatic and the venous endothelium meet at different levels, in the body, specially at the nodes, and the confluence with the truncal venous system. Lymph may concentrate up to 10% of its initial volumen, at the level of the nodes. Exclusively. Due to the venous system of the nodes. Venous hypertension at this level, difficults this action, overloading the lymphflow or the lymph volumen in the lymphatic system. And not at last, outside at the interstitial level. This is surely the most frequent reason of secondary lymphedema in pediatrics, Eg in overgrowth syndromes with vascular malformations, venous impairment after vascular acceses or as a consequence of surgical complications. Endothelial dysfunction of the intial lymphatics and or displasias of the lymhatic channels, extra and or intranodal, LAD I-LAD II, as primary pathology, are surely the most frequent reasons of primary lymphedema. Secondary lymphedema needs rehabilitation. Primary, habilitation. That is the difference. In pediatrics, the anastomosis of several lymphatics in one time and one step, with the venoys system, appears as the most real and posible. The best option, high Venturi effect, high lymphatic and low venous pressure. Simultaneously anti aggregation. A considerable part of succes lies to the technical detail, at the level of the lympho venous anastomosis. Our preference is to work with lymph nodes, on its lateral side, and terminal veins, without backflow. A variable of Olszewskis technique. On secondary lymphedema, with venous hypertension, we proposed the Olszewsky technique over a translocated vein, like the Palma technique, in two simultaneos steps; we work with external and internal yugular veins; the superficial temporal vein connected with the external yugular vein, the external mamarial cen, the circumflex iliac vein, the mayor azigos vein and of course, the internal saphenous vein. More tan this, we use the veins, to derivate lymph volumen from cysts, like lymphangiomas, lymphoceles and collections, including lymph chyle. This is particullary usefull in the systemic lymphatic malformations. Synthetic valves are not usefull in this age, because its section. Some malformations, make some impossible. Eg the lymphnode hipoplasia, some hiperplasias and of course, agenesis, extremely rare, needs the lymphnodes transfer proposed by C. Becker.



## THE PHYSICAL TREATMENTS OF LYMPHEDEMAS (PART 2)

Chair : Pr Foeldi (Germany), Pr Johansson (Sweden), Pr Michelini (Italy)

### EFFECTIVENESS OF INTERMITTENT PNEUMATIC COMPRESSION IN LEG EDEMA CAN BE SHOWN ON INDOCYANINE GREEN FLUORESCENCE (ICG) IMAGES

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**Background.** Picture of edema fluid flow during compression would allow the therapist to use force adjusted to the tissue volume and stiffness as well as identify sites of abundant accumulation of fluid.

**Aim.** To visualize tissue edema fluid flow during manual drainage, intermittent pneumatic compression and bandaging.

**Material and methods.** Twenty patients with post-surgical (after hysterectomy and radiotherapy in uterine cancer and mastectomy in breast cancer) lymphedema of lower and upper limbs, ten patients with postthrombotic leg edema and 5 cases with venous ulcers were investigated. Study was carried out in 3 groups: group I, manual lymphatic drainage (thumb or hand), group II, intermittent pneumatic compression ( 8 chamber sleeve, each chamber inflated to 50, 80, 100 and 120 mmHg for 50 sec) and group III, bandaging generating interface pressure of 40-50 mmHg. ICG lymphangiography was done during each type of compression at a known force (pressure).

**Results.** a) ICG lymphography provided possibility of real time observation of edema fluid movement, b) enabled defining threshold pressures necessary to move edema fluid at the compression device-skin interface to reach at least 40 mmHg in tissue fluid, level necessary for initiation of flow, c) showed inefficacy of compression in generating flow in advanced stage cases despite of applying high force, d) depicted accumulation of fluid in the inflamed regions for additional compression.

**Conclusions.** The ICG lymphography provides data useful for adjustment of compression procedures to external pressures effective in edema fluid movement.

### EARLY DIAGNOSIS AND TREATMENT OF MILD ARM LYMPHEDEMA. PRELEMINARY RESULTS.

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**Introduction:** Highest risk for development of arm lymphedema (AL) occur among breast cancer patients treated with both axillary surgery and radiotherapy. Follow-up visits of these patients 1 month after surgery and again 3-4 months after radiotherapy, for early diagnosis and compression treatment, has proven effective to maintain AL at a minimum in a 10-year follow-up and 80% of the patients never exceeded lymphedema relative volume(LRV) 10% (Johansson & Branje, 2010). A hypothesis was generated that mild AL could be treated only with self-care and no compression.

**Methods:** Mild AL was defined as (LRV)5-8% using water displacement method (WDM) and/or TDC ratio>1.45 for upper arm and >1.3 for forearm using MoisterMeterD. Seventy-five patients have been included, randomized to either no compression treatment (NCS, n=38) or daily treatment with standard compression sleeve ccl 1 (CS, n=37). Follow-up are made after 1, 2, 3, 6, 9 and 12 months.

**Results:** 45% were diagnosed by TDC only, 26% by WDM only and, 29% by both WDM and TDC. The mean LRV for diagnosis by WDM was 6.3±0,8% and the mean TDC ratio for diagnosis of upper arm was 1.67±0.2 and forearm 1.51±0.2. Sixty-three patients have so far past 12 months follow-up. In the NCS group (n=32) there has been an increase of ≥2%LRV in 19(59%) of the patients, who therefore have to wear CS, and 41% never had to wear CS within one year postop. In the CS group (n=31) the compression were taken off at 6 months and thereafter 6(19%) patient had increase of LRV and had to wear CS.

**Conclusion:** Preliminary results indicate that mild and early diagnosed AL can be effectively resolved by compression garment worn for 6 months. However, compression is only needed for about 40% when LRV is ≤8% at diagnosis.

## SYNERGIC TREATMENT AND CLINICAL RESULTS

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Primary and secondary lymphedema requires a multidisciplinary and multi-professional approach. The patient's expectations are often not satisfactorily fulfilled, 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.

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

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 underwent 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 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).

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.

## LYMPHATIC ULCERS: TRADITIONAL BANDAGE AND NEW ASPECT OF ADVANCE WOUND CARE- PHOTOBIO-MODULATION

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**Background:** Lymphatic ulcer is a complication that can occur in advanced stages of lymphedema. As well as prescribing systemic antibiotics, the treatment includes the use of appropriate elastic bandages (in our experience zinc oxide or new Manuka honey) to reduce edema, improve peripheral lymphatic flow and, in the case of Manuka, control bacterial overload. local. Furthermore, in recent times, resorting to photobiomodulation (PBM) is becoming an increasingly used clinical tool to induce the healing of wounds that are more resistant to traditional treatments

**Aim of the work:** Our center is specialized in treatment of lymphatic complications such as lymphangitis, ulcers and lymphorrhea. From our experience, proper bandaging is essential for the management of the ulcer. In addition, we wanted to test the new PBM method, one of the new frontiers of wound care.

**Material & Methods:** In this presentation, we will show you our specific experience about the use of a particular type of bandaging combined with the PBM.

**Results:** In conclusion, our presentation underlines how positive results can be obtained through the use of appropriate bandages (for execution and use of the right materials) also supported by the use of PBM

## LYMPHATIC SYSTEM AND SPORT

Chair : Pr Hamadé (France), Dr Engels (Belgium)

### INSUFFICIENT LYMPHATIC TRANSPORT OF EXCESS CAPILLARY FILTRATE FROM SUBCUTANEOUS TISSUE MAY BE CAUSE OF DELAYED ONSET MUSCULAR SORENESS (DOMS) IN MARATHON RUNNERS

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**Background:** Delayed onset muscle soreness (DOMS) in runners is classified as a leg muscle strain injury and presents with tenderness or stiffness to palpation and movement limitation. Most attention is directed at muscles but not at the mass of other limb soft tissues, albeit they undergo stress as edema, bruises, nail destruction and pains contributing to symptoms.

**Aim:** The knowledge of the epifascial non-muscle tissue response to running remains rudimentary. Foot and calf skin, subcutaneous tissue, blood and lymphatic vessels, skeleton structures respond to trauma by excess blood perfusion, plasma leakage to tissues, tissue fluid accumulation. This may contribute to the symptoms and designing prevention.

**Material & methods.** The study was done on lower limbs of the long-distance runners with DOMS complaints. Sixteen runners, 11 males and 5 females, age 22-28, practicing long-distance running over the last 5 years, BMI 23±4. Inclusion criteria: 3 to 5 marathons per year and daily 3-5 km slow runs. Last long distance run 3 to 7 days before the investigation. Controls were 6 subjects initiating running, of the same age group and BMI. Testing was done before and after standard ergometer 300W 30 min cycling. The measurement methods were lower limb venous plethysmography and skin capillary point Doppler, tonometry of skin and deep tissues, lymphoscintigraphy and indocyanine green fluorescent lymphography.

**Results:** a) strain gauge plethysmography of the calf revealed a 2-3-times higher venous capacity in runners than in controls, b) significant increase upon cycling in venous capacity of runners but not controls, c) no increase in the calf tissues venous capillary permeability, d) higher big toe venous volume in runners compared with controls, e) slight increase in big toe venous volume upon cycling, e) confirmation of increased toe venous capacity by point Doppler recordings with a 2-3-times higher blood capillary flow velocity compared to controls, f) tonometry (stiffness) of calf tissues increased by 10-15%, e) on lymphoscintigraphy retention of tracer in the feet, dilated superficial and deep lymphatics and enlarged popliteal and inguinal lymph nodes, and on ICG lymphograms confluent pictures of the accumulated fluid in foot and calf subcutaneous tissue with fluorescence level 40-50% compared to 20% in controls.

**Conclusion:** Not only muscles but also skin and subcutaneous tissues compartment undergoes major fluid exchange changes during running and may be co-responsible for DOMS symptoms.

### THE BENEFIT OF GRADUATE DEGRESSIVE COMPRESSION GARMENTS IN RUNNING IN ATHLETICS AFFECTED BY LYMPHEDEMA OF LOWER LIMBS

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**Objective.** The practice of some sports improves the quality of life in patients affected by lymphedema of lower limbs (LLL). The principal objective of this study is to determine the place of graduate degressive compression garments (GDCG) in running in amateur athletics affected by LLL. The secondary objective is to evaluate the microcirculation of the feet in these athletics after exercise by para-clinical exams.

**Methods.** A monocentric observational study in 5 amateur athletics men aged from 28 to 50 years, affected by LLL (4 of left limb, the fifth of both leg) who practice running. All men are treated daily by GDCG. Duplex ultrasound, TcPO<sub>2</sub>, ankle-brachial-index (ABI), toe brachial-index (TBI) are normal. All men ran on treadmill in 3 exercises : 1 exercise without garment , he ran during the 2 and 3 exercise with GDCG on the leg affected by lymphedema ( the 2 exercise with 20 mmHg, the 3 with 32 mmHg ). We appreciated the effect of GDCG during exercise by questionnaire (pain, heaviness and mobility of leg affected by lymphedema). The calf circumference (CC), TcPO<sub>2</sub>, ABI and TBI are measured after each exercise.

**Results.** In terms of results, we have confirmed our objective of improving performance with GDCG during the exercise. All men reported reduction of pain and heaviness and performance of mobility with GDCG. CC is increased without garments and remains stable after the 2 and the 3 exercise. No significant change of TcPO<sub>2</sub>, ABI and TBI after exercise.

**Conclusion.** GDCG can improve the performance during exercise in amateur athletics affected by LLL. However a multicentric study with graduate degressive compression garments versus graduate progressive compression garments would be necessary.

## EVALUATION OF PHYSICAL ACTIVITY, EXERCISE CAPACITY, PHYSICAL PERFORMANCE, BALANCE AND FEAR OF MOVEMENT IN LOWER EXTREMITY LYMPHEDEMA PATIENTS

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**Background:** Lymphedema is a chronic and progressive condition caused by the accumulation of protein rich in interstitial tissue intervals due to congenital development or damage of the lymphatic system. In the lower extremity lymphedema, weight and pain sensation, movement limitation, muscle weakness and decreased mobility are observed with edema. When living and walking becomes difficult, the activities of daily living affected cause problems such as anxiety and depression and decrease the quality of life. In studies, it has been shown that increased severity of edema in patients with upper extremity lymphedema adversely affects daily activities of patients. However, in the literature, there is no study showing the relationship between the fear of movement, physical activity, exercise capacity, physical performance and balance parameters in patients with lower extremity lymphedema.

**Aim of the work:** This study was to evaluate physical activity level, exercise capacity, physical performance, balance and fear of movement in patients with lower extremity lymphedema.

**Material & Methods:** Thirty one patients with unilateral lower extremity lymphedema aged between 19-56 and thirty one volunteers aged between 20-63 who did not have a story of lymphedema were included. The severity of edema of the patients by environmental measurement, physical activity with the international physical activity questionnaire (UFAA-short form), exercise capacity by the six-minute walk test (6MWT), physical performance by the Timed Up and Go test (TUG), static balance by the one-leg standing balance test, dynamic balance Y-balance test (YBT), fear of movement by the Tampa Scale for Kinesiophobia (TSK) was assessed.

**Results:** The duration of the diagnosis of lymphedema was  $9.42 \pm 9.23$  years and of the patients and 5 had mild, 4 had moderate, and 22 had severe lymphedema. There was a significant difference in physical activity levels, exercise capacity, physical performance, static balance and dynamic balance in the anterior direction and fear of movement of the patients compared to healthy controls ( $p < 0.05$ ). No significant difference was found in the affected and unaffected side static and dynamic balance of the patients with lower extremity lymphedema ( $p > 0.05$ ). There was a strong correlation between fear of movement with exercise capacity, physical performance and static balance in patients with lower extremity lymphedema ( $p < 0.05$ ).

**Conclusions:** In this study, physical activity levels, physical performances and walking distance were lower in patients with lower extremity lymphedema and the fear of movement was high. Functional parameter results that may affect the daily life activities of the patients are thought to be due to the high fear of movement shown in these patients and severe lymphedema of the decrease in static balance. The patients with lower extremity lymphedema should be assessed extensively and proper physiotherapy and rehabilitation approaches should be added to treatment procedures of such patients, due to these results.

## UPPER LIMB FUNCTIONAL CAPACITY AND PERIPHERAL MUSCLE STRENGTH IN PATIENTS WITH LYMPHEDEMA AFTER BREAST CANCER

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**Background:** Breast cancer is the most commonly diagnosed type of cancer in women all over the world. A main complication in breast cancer survivors is secondary lymphedema of the upper limbs. The functional capacities and peripheral muscle strength of people with lymphedema may be adversely affected.

**Aim of the work:** The aim of this study was to compare the upper extremity functional capacity and peripheral muscle strength in patients with breast cancer related lymphedema and non-lymphedema.

**Material & Methods:** A total of 30 subjects were included in the study, 15 of them were women with lymphedema (stage II) after breast cancer (age:  $52.6 \pm 7.7$  years, duration of disease:  $5.1 \pm 1.6$  years) and 15 patients with non-lymphedema after breast cancer (age:  $49.8 \pm 6.3$  years). Physical and demographic characteristics of individuals were recorded. The duration of diagnosis and medical treatments were recorded in patients with breast cancer. The functional capacity of the upper limbs of the individuals was assessed by a six-minute pegboard and ring test and peripheral muscle strength (biceps brachii) was evaluated using hand-held and Jamar dynamometers

**Results:** The mean values of age, height, weight and body mass index of lymphedema and non-lymphedema patients were similar ( $p > 0.05$ ). The six-minute pegboard and ring test ( $p = 0.009$ ), and biceps brachii muscle strength ( $p = 0.000$ ) were significantly lower in lymphedema patients than in non-lymphedema cases ( $p < 0.05$ ).

**Conclusions:** According to our findings, it was determined that the functional capacity and peripheral muscle strength values of lymphedema individuals were affected. As a result of our study, it is thought that functional capacities and muscle strengths of lymphedema should be evaluated at appropriate intervals and it would be beneficial to take early training programs for patients who need exercise training.

## LYMPHEDEMA EVALUATION

Chair : Dr Harfouche (Belgium), Pr Johansson (Sweden), Pr Leduc (Belgium)

### DIAGNOSING EARLY MILD ARM LYMPHOEDEMA USING TISSUE DIELECTRIC CONSTANT (TDC) AND WATER DISPLACEMENT METHOD (WDM).

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**Background:** Early diagnosis and treatment of lymphoedema is important to prevent its progress. Lymphoedema is often diagnosed through measuring lymphoedema relative volume (LRV) with the water displacement method (WDM). In the early phase, fluid accumulation may not be clinically apparent with volume measurements. Tissue dielectric constant (TDC), measuring local tissue water, might be a better method for early diagnosis than WDM but has neither been compared with WDM nor been used to diagnose mild arm lymphoedema. Our aims were to: examine patients diagnosed with mild breast cancer-related arm lymphoedema by TDC and WDM, compare related factors between patients diagnosed by these methods, and examine whether there is an association between TDC and WDM measurements.

**Methods:** Seventy-two women treated for breast cancer were diagnosed with mild arm lymphoedema using palpation, TDC, and WDM. Background data were obtained from medical records and two study-specific questionnaires.

**Results:** Thirty-two (45%) women were diagnosed by TDC, 19 (26%) by WDM, and 21 (29%) by both TDC and WDM. The women diagnosed by TDC, were diagnosed earlier after surgery ( $p=0.003$ ) and had a lower LRV (1,3%) than those diagnosed by WDM (6,3%) or both TDC and WDM (6,2%;  $P < 0.001$ ). TDC and WDM were negatively associated: LRV ( $r = -0,535$ ,  $P < 0,001$ ).

**Conclusions:** TDC can be used to improve the accuracy of a diagnosis of early mild breast cancer-related arm lymphoedema.

#### Acknowledgements

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### RELIABILITY TEST OF MEASUREMENTS OF LOWER LIMB VOLUME AND LOCAL TISSUE WATER IN HEALTHY SUBJECTS

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**Background:** The assessment of lower limb volume by circumferential measurements every 4th cm along the limb is common in lymphedema management. In recent years, also measurements of local tissue water by Tissue Dielectric Constant (TDC) of the skin using a MoistureMeterD have been applied more frequently. There are very few studies assessing the reliability of these methods.

**Aim of the work:** To evaluate the test-retest reliability of lower limb volume and local tissue water by TDC values in healthy women and men, and to define limits that indicate real changes over time.

**Material & methods:** In total, 33 women and 28 men completed the measurements. Inclusion criteria was 18 years or older, with a stratified variety in age, and with no previous lower limb swelling. Both legs were measured by the same rater (CJ), at two occasions, 2 weeks apart, preferable in the morning. Circumferential measurements every 4th cm along the limb were used to calculate the volume, and measurements of local tissue water were taken at 14 predefined points, using TDC.

**Statistical methods:** To evaluate the reliability agreements between measurements (ICC2,1), systematic changes in the mean, the standard of measurement (SEM and SEM%) and the smallest real difference (SRD and SRD%) were used. The SEM% gives the measurement variability in relative values and represents the limit for the smallest change that indicates a real change for a group of subjects. The SRD% represents the limit for the smallest change that indicates a real change for a single subject.

**Results:** For the volume, the reliability was excellent (ICC2,1 0.99) and the mean difference was low for both women and men. A systematic difference was seen only in the left limb in men. The SEM% was 1.3% and the SRD% was 3.6%. For the TDC measurements, the ICC2,1 ranged from 0.63 to 0.93 in women and from 0.21 to 0.89 in men. The mean difference was low. Some small systematic differences in the mean were found in a few points. The SEM% ranged from 3.9% to 10.2% in women and from 3.9% to 14.5% in men. The SRD% ranged from 10.8% to 28.2% in women and from 10.9% to 40.1% in men.

**Conclusions:** Lower limb volume and TDC measurements can be reliably measured in healthy subjects. Small changes in volume will indicate real clinical changes for a group of subjects as well as for single subjects. Relatively small changes in TDC values in all points in women and in all but 3 points in men, will indicate real clinical changes for a group of subjects as well as for single subjects.



## "PSYCHOLOGICAL RESEARCH STUDY ON THE EFFECT OF GLOBAL TREATMENT IN PATIENTS WITH LYMPHEDEMA"

M. LEBOIS, A. LEONE

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**Introduction:** Lymphoedema is a condition that, although known as a rare disease, is currently present involving more and more cases of patients, subtiles to the oncological pathology, the sentinel lymph node technique tries to preserve from the radical intervention on the lymph nodes, but nevertheless the cases of secondary lymphedema are expected to increase, an effective approach focuses on the necessity of complex and non-monotherapy therapies. Our idea is that it is not enough to think about the loneliness of complex decongestive physiotherapy, but rather a holistic approach that cares for the person as a whole, considering the particular impairment of the social, psychological aspect that the pathology involves. We therefore conducted research, control and research. This is a study conducted by a group of experts on psychological problems.

**Patients and methods:** Affected by primary and secondary lymphedema, contacted in random mode, throughout the Italian national territory, the only common element is the lymphedema pathology. The first contact took place via email and we have integrate with telephone interviews from the responsible physician (angiology) present in the project. From the literature we have identified correlates such as anxiety, particularly present in lymphedema patients, and then built hypothesis, at the beginning of the event we have administered the test for anxiety. The setting for the research was the "Lymphedema Village" a reserved hotel location for seven days. Identifying human resources for research (physicians, physiotherapists) involves adopting the standard of physiotherapy and language. These treatment include: physiotherapy sessions, nutritionist and technician for elastic guardians, water aerobics, yoga, pilates, health coach sessions, round tables with the doctor, guided tours in the mountain area, evening entertainment activities, involvement of the host territory with a popular day on the pathology with the participation of patients and citizens.

Statistic analysis: Random sampling methodology, group of 23 patients, with primary and secondary, male / female.

Data collection technique with questionnaire S.T.A.I -Y (Y scale, scale of state) intra-group administration before / after treatment, quantitative analysis.

**Conclusions:** The quantitative analysis data confirm a significant reduction in the state of anxiety, after the treatment, understood as an experience of the week Lymphedema Village, where the hypothesis is that the patient with lymphedema need a complete approach, where the results of physiotherapy are integrated with the psychological support work, which bring the patient back to the best quality of life and compliance with the management of the pathology

## GENETICS AND/IN LYPHHEDEMAS

Chair : Pr Michelini (Italy), Pr Vikkula M (Belgium)

### CCBE1 MUTATION STUDY IN PRIMARY LYMPHOEDEMA

MICHELINI S (ITALY)

Gene 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 lymphatics of murine. It has been described in Literature an association between a mutation in CELSR1 and hereditary lymphedema in a large family.

Considering the costs of genetics studies the aim of this paper is 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.

Genetic analysis of 132 probands was performed using next-generation-sequencing (NGS) with a panel including 11 genes known to be linked to inherited lymphedema, as well as CELSR1.

The AA. identified seven new pathogenic or likely pathogenic loss-of-function variations in CELSR1 in seven unrelated probands. In some cases, the test was extended 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.

In conclusion 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%), the AA definitely recommend including this gene in routine genetic testing.

### LYMPHOSCINTIGRAPHIC EVOLUTION OF PRIMARY LOMWER LIMB PRAECOX AND TARDA LYPHHEDEMAS : REVIEW OF 53 CASES

BOURGEOIS P (BELGIUM).

**Background:** Little is known about the natural evolution of the lymphatic system in cases of primary diseases.

**Aim of the study:** To report our analysis of such natural evolution of these diseases based on the results of our lymphoscintigraphic investigations.

**Material and methods:** Retrospective review (CE2048) among of our data base of patients and selection of 53 cases with the diagnosis of primary lower limb lymphatic edema(s) (LLE) who had undergone at least 2 detailed lymphoscintigraphic exam (performed following our standardized 3 phases protocol of investigation). Were excluded from the analysis the patients with congenital (present of birth) and/or syndromic LLE and/or (in order to exclude factors that could have interfered with the natural evolution of the disease) who had history of trauma, lymphatic surgery and/or venous problem before the first exam and/or between the first and last exam.

Diagnosis of primary LLE was based on the clinical data (age of first symptoms, familial history,...) and on the result of the lymphoscintigraphic exam. Based on the age at the onset of the clinical symptoms, 26 patients could be classified as praecox (F-Up : median = 46 months, range 8.5-167.8 mo.) and 27 as tarda (F-Up : median = 54.2 months, range 6.3-145.7 mo.).

**Results:** Among the 10 praecox cases with only functional abnormalities, 3 (« 30% ») showed only functional deterioration while among the other 16 cases with morphologic abnormalities (distal « lymphangioplasia » in 12 and vascular lymphatic reflux from the inguinal LN 4), 9 (75%) showed the disappearance of LN (7 among the distal « lymphangiodysplasia ») and 2 (only) one functional deterioration (the last 5 remained stable)

Among the 15 tarda cases with only functional abnormalities, 7 (« 56% ») showed only functional deterioration and 2 the appearance of morphologic abnormalities while among the other 12 cases with morphologic abnormalities (distal « lymphangioplasia » in 8 and vascular lymphatic reflux from the inguinal LN in 4), 1 (« 8% ») showed the disappearance of LN and 6 (« 50% ») (only) one functional deterioration (the last 5 remained stable)

**Conclusions:** In this (relatively limited) series, our results suggest (and/or confirm) that primary LLE tarda and praecox show different evolutions in their lymph(-oscintigr-)aphic disease with a worse « prognosis » for the formers than for the latters and with the patients with only functional abnormalities a better « prognosis » than those who are diagnosed with morphological abnormalities.

## FATTY TISSUES AND LYMPHATIC SYSTEM

Chair : Dr Horra (Spain), Pr Michelini (Italy), Pr Provyv (Belgium)

### NEW STADIATION OF LIPEDEMA

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Lipedema can appear with various types of localization in the limbs of patient affected: 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. Clinical staging of Lipoedema, 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 can perform to the present day.

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

**Stage 1:** Sub-clinical forms (relatives of patients with a positive phenotype of Lipedema) or mild oedema affecting classical sites without cutaneous deformation, with a negative lymphoscintigraphy examination for alterations of lymphatic transport, Ultrasounds show localized and homogeneous increase of the suprafascial thickness and normal tonometry; 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 decreased. 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 ultrasounds examination; tonometry with decreased or increased values (A, B).

The AA will continue with clinical observations to select the case for the benefit of diagnostic, therapeutic (physical, medical and surgical) and prognostic addresses.

### QUANTITATIVE EVALUATION OF LEG SOFT TISSUE VOLUME INCREASE IN LYMPHEDEMA- FLUID AND INCREASED CELL AND MATRIX MASS – MEASUREMENT BEFORE AND AFTER COMPRESSION

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**Background.** Chronic limb edema is caused by retention of the capillary filtrate, connective tissue growth and matrix deposition. The increase of tissue mass is usually not being taken into consideration. Patients with limb edema are aware only of fluid problems, the tissue changes problem is not raised by the treating personnel. At present, diagnostic methods are available to recognize and quantitate both fluid and tissue components of the edematous limb. This is especially important for evaluation of the compression results, as the edema fluid volume becomes reduced, whereas excess tissue (cells and matrix) remains increased.

**Aim.** To prove the efficacy of modern tissue edema fluid detection methods and hints for effective fluid evacuation as well as measurement of the volume of increased retained tissue mass.

**Methods.** The methods were applied in 100 legs with lymphedema: A. for tissue fluid; dielectric constants- subepidermal water, bioimpedance-electric conductivity depending on extracellular water contact, durometry - skin stiffness, deep tonometry- subcutaneous tissue stiffness, fluid mobilization force meter, visualization by indocyanine green fluorescence, lymphoscintigraphy, and B. for solid tissue: tissue spaces X-ray graphy, ultrasonography (US) and MRI. All these methods provide data on edema fluid volume necessary for evaluation of the compression procedures and density of solid elements.

**Results.** Edema parameters for fluid were: subepidermal water > 40%, bioimpedance Ldex >10, skin stiffness > 0.8 Newtons, deep tonometry > 1kg/sq.cm, fluid mobilization > 50mmHg, ICG fluorescence level- 40-60%, lymphoscintigraphy- subdermal accumulation, and for solid tissue US-thickness (skin 5%, subcutaneous tissue 20% and MRI honey-comb image density (5-25%). Pre- and post- compression numerical data and images will be presented.

**Conclusions:** Compression therapy to decrease edema should be applied and evaluated basing on edema fluid physical parameters. Simple volume measurements are not anymore tenable. The tissue overgrowth volume should also be quantitated.

## PREVALENCE OF JOINT HYPERMOBILITY IN LIPEDEMA

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**Background:** Lipedema is characterized by a symmetric edema and fat tissue accumulation affecting mainly women, pain and frequent bruising in lower limbs. Unlike obesity, lipedema has no response to hypocaloric diets and generates a clear volume disproportion between the trunk and lower limbs.

Recent studies point at a possible association between lipedema and joint hypermobility, but literature on this topic is still scarce.

Hypermobility is diagnosed through the Beighton scale for hypermobility. A score greater than 3 in the Beighton scale is indicative of generalized joint hypermobility (GJH). Hypermobility is estimated to have a prevalence of at least 3% of the general population and some studies estimate it to be up to 20%.

**Aim of the Work:** We analyzed the prevalence of hypermobility in lipedema patients.

**Material and Methods:** We performed a prospective descriptive study of female patients meeting lipedema criteria who attended the Lymphedema Unit. Data were analyzed using SPSS and mean, median and 95% confidence intervals were obtained. The correlation between the Beighton Score and the rest of variables was obtained through ANOVA and Chi-square tests. P-values lower than 0.05 were considered statistically significant.

**Results:** From a sample of 223 eligible patients, 60 were included in the study. The median age was 44.8yrs (95% CI: 42.4-49.0). Mean right LL volume was 12,137mL (95% CI: 11,383.6-12,891.2), left LL volume 12,013.8mL (95% CI: 11,260.9-12,766.7), and BMI 28.9 (95% CI: 27.2-30.6). Lipedema type frequencies were as follows: type I: 2% (1 patient), type II: 8% (5 patients), type III: 72% (43 patients), type IV: 17% (10 patients), and type V: 2% (1 patient). Lipedema stage distribution was the following: stage 1: 38% (23 patients), stage 2: 38% (23 patients), stage 3: 22% (13 patients), and stage 4: 2% (1 patient). Mean Beighton Score was 3.7 (95% CI: 3.1-4.3). Forty-three percent of our patients showed a Beighton Score > 3. We discovered that being hypermobile as assessed by the Beighton Score had a negative linear correlation with age ( $p=0.001$ ) and BMI ( $p=0.003$ ). No correlation was found between hypermobility and LL volume ( $p=0.531$ ), lipedema type ( $p=0.777$ ) nor lipedema stage ( $p=0.149$ ).

**Conclusion:** Lipedema is an underdiagnosed condition that may have other clinical manifestations besides those widely known (lower limb predominance, easy bruising, pain, etc.). Joint hypermobility seems to be more prevalent among these patients as compared to the general population. The presence of hypermobility showed a statistically significant correlation with age. This could be due to the fact that joint mobility decreases normally with age, so GJH in lipedema could be found to be even more prevalent than stated in this study when asked for signs of GJH in the past. In our study, lipedema type and stage were not related with a Beighton Score > 3. The high prevalence of hypermobility among lipedema patients supports the etiopathogenic theory that links this entity with collagen abnormalities.

## LYMPHATIC SYSTEM INFECTION AND/OR INFLAMMATION

Chair : Pr Flour (Belgium), Pr Manokaram (India)

### TREATMENT BY EXTERNAL APPLICATION FOR LYMPHEDEMA---PART 2

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**Background:** In ESL congress, Prague, 2018 the authors have shown how to treat the diseases seen in lymphedema by external application. This supplies drug rich into the skin but with the less adverse effects to the whole body.

**Material and Method:** Ten complications of lymphedema are treated by external applications.

**Results:** V. Tinea of the skin and of the nail is treated by external applications. VI. Fibrosis is treated by heparinoid cream. VI'. Itchy skin is well managed by application of heparinoid cream containing 5% camphor. VII. Skin ulcer is treated by bFGF spray. VIII. Contact dermatitis is well managed by steroid ointment. IX. So is by the steroid for intertrigo. X. Skin hyperpigmentation of scar is prevented by covering the lesion by skin-colored micropored plaster without giving colorization of skin.

**Discussion:** The external applications are effective in the above ten diseases. If the complications of lymphedema are well treated, prognosis of the lymphedema will be better. **Conclusion:** Tinea, fibrosis, itchy skin, ulcer, contact dermatitis, intertrigo and skin hyperpigmentation (10 complicating diseases) are well managed by the external applications.

### EARLY DIAGNOSIS OF LOWER LIMB INFLAMMATION FOCI PRIOR TO OVERT CLINICAL LYMPHEDEMA USING INDOCYANINE GREEN (ICG) SOFT TISSUE VISUALIZATION

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**Background.** Foot and calf skin infections, blunt trauma and fractures are the most common risk factors for long-lasting soft tissue inflammation leading to fibrosis, edema fluid leakage and ulcers, sporadically sepsis. The first hidden symptom of tissue changes is persistent palpation pain and hot spots of calf tissue. These are the early signs of inflammation requiring visualization of the subdermal events.

**Aim.** To perform ICG visualization of lower limb tissues, lymphatics and lymph node in patients complaining of foot or calf pains, hot spots and sporadic edema and observe changes by external compression.

**Materials and methods.** One hundred randomly selected patients suffering from evening heavy leg and painful calf tissues were included. Excluded were patients with acute inflammatory symptoms, venous thrombosis, profuse varices, obesity, cardiac insufficiency edema. The ICG visualization of spreading dye in tissues, lymphatics and nodes was done after injection of 0.4ml 5% ICG into toe webs of both feet and one hour walk. Pneumatic compression was applied for 30 min at 120mmHg. Pre- and post-compression pictures were taken and fluorescence level measured. **Results.** In 90% of obtained images pathological changes were detected. They were: confluent spread of dye in foot dorsum, dilated foot and calf lymphatics, spotty foci in lower calf, dilated thigh lymphatics, confluent spread in thigh and groin, outline of small inguinal nodes or their lack. Most common were changes were detected in lower calf. They were classified as a. dense, b. foggy, c. reticular, d. spotty and e. net web. The areas of images were consistently larger than the painful and hot ones. Compression brought about decrease in fluorescence by 10-20%.

**Conclusions.** The ICG tissue images detect clinically non-diagnosed inflammation foci in the lower limb soft tissues at sites predisposed for lymphedema formation, fibrosis and lymph leakage. A hint for early therapy.



## DERMATO-LYMPHANGIO-ADENITIS (DLA, CELLULITIS) IN OBSTRUCTIVE LYMPHEDEMA –TYPE OF BACTERIA AND EFFECTS OF SLOWLY-ABSORBED PENICILLIN - 2019 STATE OF KNOWLEDGE

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**Objectives.** Dermato-lymphangio-adenitis (DLA) occurs in about 50% of cases with obstructive lymphedema of lower and upper limbs. Each recurrence is followed by progression of edema and irreversible increase in limb size. Question arises which strains of bacteria are present in inflamed lymphedematous tissues responsible for DLA.

**Aim.** To identify bacteria in lymphedematous tissues and their responsiveness to antibiotics. **Methods.** Study was carried out on 80 patients with obstructive lymphedema of lower limbs reporting more than 3 DLA attacks. Inflamed area skin and subcutaneous tissue fragments were harvested from calves under strict aseptic conditions in the operating room. Scalpels, forceps and gauze were cultured. Bacterial air fall-down was routinely measured. Specimens were placed on Hemoline plates and put into warm box for 3-5 weeks. Bacterial strains from colonies were identified. In some cases skin and subcutis fragments were evaluated in scanning electron microscopy. Patients were given long-term penicillin for over 46 months.

**Results.** On-plate culture revealed confluent colony formation around and on tissue fragments in over 40% specimens. Strains were *Staph. epidermidis* and other coagulase-negatives. *Staph. aureus* methicillin-sensitive was other most common. All were sensitive to standard antibiotics. No *Streptococci* were identified. On electron micrographs single extracellular cocci and bacilli were seen. There were few macrophages close to bacteria. Serum penicillin concentration was maintained above 20 pg/ml. No DLA recurrency in 90% of patients over a mean 39 months penicillin administration. In the remaining 10% decrease of attacks/person by 55%.

**Conclusions.** We presume that permanent presence of slowly absorbed penicillin keeps the tissue dwelling bacteria in a non-proliferating state. We consider year-long administration of long-term penicillin an obligatory condition in all cases of obstructive lymphedema after experienced DLA episode.

## ADVANCED LYMPHEDEMA OF LOWER LIMBS– NEAR INFRA RED INDOCYANINE GREEN AND ISOTOPIC LYMPHOGRAPHIES DETECT SITES OF PREDILECTION FOR INFLAMMATION- HINTS FOR PREVENTION THERAPY

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Inflammatory foci in lower leg in lymphedema are a frequent complication of lymphedema. Skin abrasion, soft tissue trauma, fat excess and subsequently colonization of deep tissues by foot and perineal microbiom are the predisposing factors. Autoimmune reaction to own damaged tissue antigens develops. Inguinal and retroperitoneal lymph nodes become enlarged. How to foresee the development of calf inflammation? Subclinical “cryptic” sites of inflammation in skin and subcutaneous tissue should be detected before inflammatory changes develop. In inflamed tissue capillaries become “leaky” and plasma proteins accumulate. These sites can be identified on lymphographies.

**Aim.** To perform indocyanine (ICG) and isotopic (Nanocol) lower limb lymphographies in patients with advanced leg edema.

**Material and methods.** One hundred randomly selected patients suffering from leg edema stage II and III (mid leg circumference > 5cm, painful erythematous calf skin, no ulcer) were studied. ICG and lymphographies of lower limbs were carried out. Sites of extra-lymphatic tracer accumulation were identified and radiation level measured. Preventive measures as i.m. long term penicillin, topical nanosilver cream on mid-calf skin and bandaging 40mmHg were applied for 6 months.

**Results.** In over 90% of cases ICG and Nanocol showed areas of accumulation above the ankle joint, dilated peripheral lymphatics and enlarged inguinal and in 30% popliteal lymph nodes. The ICG fluorescence level in the accumulation foci was on the average 30-40%, Nanocol radioactivity 1.2 ratio (affected vs normal calf). On clinical evaluation in the 6-months follow up erythema area decreased and skin color turned into brownish.

**Conclusions.** ICG and isotopic lymphographies visualize sites of calf tissue inflammation where deep tissue inflammation may develop.

## POSTER SESSION I

### CHANGES IN THE STATUS OF OUR PRIMARY LYMPHOEDEMA PATIENTS: FOCUS ON COMPLIANCE, ADHERENCE, AND PERSISTENCE

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**Background:** Lymphoedema is a non-curable disease, and maintaining the best possible state requires the patient's end-of-life treatment and the continuation of an appropriate lifestyle. It is particularly important for young primary lymphoedema patients to have an understanding of the various components of Complete Decongestive Therapy (manual lymph drainage, skin care, compression, movement therapy) and to be responsible for maintaining their own condition.

**Aim of the work:** The symptoms of primary lymphoedema patients treated in our department started all under 35 years (lymphoedema praecox). All of them receive regular Foeldi type Complete Decongestive Therapy. Since, despite the same treatment method, the effectiveness of their condition and treatments was very variable, our goal was to explore the underlying causes.

**Material & Method:** Retrospective examination of 12 primary lymphoedema patients in the past 5 years (history, body weight, limb circumference, limb volume, skin condition, 6 min. walking test etc.), and comparing the results of intensive care and self-treatment periods, looking for correlations between compliance, adherence and persistence.

**Results:** Among the primary lymphoedema patients examine (6 men and 6 women), BMI was above 40 in men and 25-40 in women. Male patients have not or hardly used compression devices, care and intensive oedema therapy have been rarely used, self-care is not performed, so the process progresses faster, intensive treatment is often done when complications (leak of lymph, tissue fibrosis, wounds) appear. The lifestyle of male patients did not change significantly during the examined period and is mostly not supported by their social environment. Skin condition is much better for female patients. All of the examined men were smoked at none of the women. The majority of men are offset by women active workers. The majority of women are active in self-treatment and movement therapy, in which their health consciousness and vanity play a role, so they have a higher level of compliance, adherence and persistence.

**Conclusion:** Although the number of patients is low, it can be established the condition of primary lymphoedema males is generally worse than that of women, so they deserve special attention, which requires closer cooperation between physician, dietitian, physiotherapist, lymphoterapist and psychologist. Suggested new methods (internal motivational interviews, recruitment of fate communities, sport program, develop applications, education of patient, use modern communication channels) and closer patient tracking may have a positive effect

### THE PSYCHO-SOCIO-ECONOMIC IMPACT OF SEVERE PRIMARY LOWER LIMB LYMPHEDEMA. A CASE REPORT

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Although there are conservative and surgical methods to reduce and maintain severe lymphedema, it still remains a distressing and chronic condition that can cause serious effects on a person's psychological, sociological and economical life with a deep impact on quality-of-life.

Our patient, a 32 years old male, was born with a bigger scrotum, but the left unilateral lower limb lymphedema only appeared and was diagnosed at age 9. He had several operations at childhood concerning the genital oedemas, but the first time he had specific investigations and received complex lymphedema therapy was at age 23. By that time stage III lymphedema with lymphorrhagia and regular superinfections was developed. It caused him such a psychological trauma that he had no relationship for years, he tended to be only with his family and he couldn't find a proper job. He refused the conservative treatment, he wanted to get rid of his "gigantic leg" quickly, and so he sought a plastic surgeon to make a tissue-reducing operation. We had started working with him 6 years ago, just around that time. Despite it was not clearly advised by medical professionals, finally he managed to get operated twice in one year at age 29. He got a complex rehabilitation program and complex lymphedema therapy at our Institute afterward. Unfortunately his "slim" leg hadn't been for long. His compliance had become bad, he used less compression therapy, had gained weight. In six month his leg had become considerably bigger than before. At this time he lived with his parents, worked with them and got more and more depressed and ashamed of his leg. Only two years ago did he return to our ward and could we finally convince him that regular complex conservative treatment, a proper diet, psychological and social helping he can achieve his expectations and maintain his lymphedema. Since then he's been coming to our ward three times a year, he's become more positive, but he couldn't manage to lose weight and stop smoking. Nowadays he has a fiancée, a stable job and he has been living in a relationship for the past year, and finally he has a better quality of life. Anyhow, he still have doubts and questions. He sometimes wants to have another plastic surgery, moreover, every so often he's thinking about an amputation. We believe that with a complex, multi-specialized team approach we can help these patients more than with heroic but short term surgery. Thus we give them a guidance to adapt, slowly change their lifestyle, lose weight, take good care of themselves, in order to finally be able to see that they can feel better and there can be a good life quality even with a disability.

## REIMBURSED INPATIENT TREATMENT FOR LYMPHEDEMA: AN ITALIAN EXPERIENCE

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**Background:** While in some European countries the inpatient treatment of lymphedema is reimbursed by public health, in Italy this is not possible due to the adoption of the DRG system, which does not provide for this eventuality. To date, only lymphedema complications (primarily erysipelas) allow a hospitalization.

However, at the "Ospizio Marino" in Grado it has been possible to open a department for the inpatient treatment of lymphedema. "Ospizio Marino" is a rehabilitative private clinic, with 75 beds. It carries out activities that can be reimbursed by the Regional Health System, on the basis of an agreement with the government of Friuli Venezia Giulia Region, effective only for civil disabled people, with chronic conditions. Therefore, the treatment of lymphedema is in this case reimbursed, even if at significantly lower rates than those for a hospital rehabilitation of other pathologies.

**Aim:** The aim of the study is the analysis of various parameters related to patients with lymphedema treated at "Ospizio Marino", to the type and severity of their pathology, and to the results obtained with the therapies.

**Materials and methods:** A retrospective research was performed on the activity carried out by the Lymphedema Department, from August 2017 (start date of the devoted activity) to December 2018, at "Ospizio Marino" in Grado. At the beginning and at the end of the therapies, patients underwent evaluation of anthropometric data, measurement of the lower limbs, semi-quantitative evaluation of the tissue consistency, photographic and sometimes video recording and ultrasound evaluation at predetermined points. The commonly used therapy consists in CDT (Complex Decongestive Therapy), performed by a physiotherapist certified for lymphedema treatment.

**Results:** 76 patients with lymphatic conditions have been treated at Ospizio Marino from 01/08/2017 to 31/12/2018. Of these, 61 are females (80,26%) and 15 are males (19,73%) and 64 is the average age. 64 patients come from the same region of Ospizio Marino, while 12 come from other Italian regions. Patients with lymphedema diagnosis are 60, of which 12 are primary lymphedemas and 48 are secondary lymphedemas; lipedema patients are 5, and 11 are affected by oedemas which originate from multiple causes. In 29 patients, upper limbs are affected (38,16%) and in 47 patients lower limbs are affected (61,84%). Treatment periods may vary from 5 to 28, with an average of 15 days. Data about treatment outcome are also presented.

**Discussion:** The activity performed at the "Ospizio Marino" in Grado is one of the very few examples of inpatient treatment of lymphedema in Italy. Its first phase, to be considered still experimental on the organizational level, has given comforting results. This will involve an increase in dedicated personnel and an expansion of the offer, which will also be aimed at patients from neighboring countries (Austria, Slovenia, Germany).

A limit, difficult to overcome and related to the organization of "Ospizio Marino", is the impossibility of treating unstable patients: for them hospital beds must be identified, surpassing the DRG reimbursement model, currently used in Italy.

## **INFILTRATION OF BOTULINUM TOXIN A IN PATIENTS WITH POSTMASTECTOMY SYNDROME. IMPACT ON QUALITY OF LIFE.**

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### **Objective:**

To assess the effects of botulinum type A (BTX A) infiltration to improve pain and functional impairment and consequently the impact on the quality of life in patients undergoing mastectomy.

### **Introduction:**

The treatment of breast cancer usually have long-lasting or permanent effects on the body. Patients with mastectomy and lymphadenectomy tends to present long-term sequelae such as lymphedema, cosmetic deformities, and chronic pain syndromes. This pain syndrome could be attributed to persistent spasms of the muscles of the chest wall (pectoralis major and teres major) after surgery. In recent years, many studies have been reported the use of BTX A to treat patients with Postmastectomy Pain Syndrome (PMPS) and painful contractures of PM/TM muscles after mastectomy or breast reconstruction. BTX A produces a chemical motoneuron denervation, and also it could have an analgesic effect mediated by inhibition of substance P and other pain neuromodulators.

### **Materials and methods:**

We present 16 cases of female patients with PMPS and PM/TM contracture:

- Average age: 55 years
- Working status: 43.75% were active workers
- Affected arm: 43.75% of patients were affected on the dominant side.
- Average Body Mass Index - BMI: 27.75 kg/m<sup>2</sup>; 43.75% patients had overweight, and 31.25% had obesity type I
- Surgery: 81.25% patients went under radical mastectomy and 18.75% conservative procedures
- Complementary treatments: 93.75% received radiotherapy, 87.5% patients received chemotherapy and 68.75% received hormonal therapy

### **Physical Exam:**

- Range of shoulder mobility, measured with goniometer: average flexion 148.5<sup>o</sup>; average abduction 144.2<sup>o</sup>
- Pain measured with Visual Analog Scale: severe pain (VAS 10-8): 31.25% patients; moderate pain (VAS 3-7): 68.75% patients. 70% patients were taking pain medication
- Lymphedema: 25% patients had lymphedema, one of them was transitory
- Shoulder Pain and Disability Index (SPADI) average: pain score 71.75% and disability score 67.15%

### **Procedure:**

We made an ecoguide infiltration with BTXA in the PM muscle in 100% patients, and also in TM muscle of 87.5% patients. None presented complications during or after the procedure. Patients were re-evaluated one, three and six months after the treatment.

### **Results:**

- 25% patients received four infiltrations, 25% received three infiltrations, 25% received two infiltrations. Just 12.5% patients received five infiltrations, and only 6.25% received one infiltration
- Average of shoulder flexion increased 24<sup>o</sup> and shoulder abduction increased 23<sup>o</sup>
- VAS decreased between 2 and 8 points in 81.25% patients. 25% patients had no pain, 50% remained with mild pain and just 6.25% had severe pain
- In one patient the VAS did not change, but the range of mobility increased 20<sup>o</sup>
- In one patient neither the VAS and range of mobility changed, probably due to incorrect selection of the case
- SPADI pain score improved to 54% and disability score improved to 50.3%

### **Conclusions:**

BTX-A infiltration in patients with PMPS due to contracture of PM/TM muscles, relieves pain and increases the mobility range improving shoulder and upper limb functionality, and consequently, improves the quality of life in patients.

## POSSIBLE NEW METHODS FOR MEASURING THE EFFECTIVENESS OF LYMPHOEDEMA REHABILITATION

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**Introduction:** The measurement of the outcome of lymphoedema rehabilitation is important evidence of the efficiency of the treatment, and can be an important motivating parameter both for the patient and for the therapist. Most often the limb volume measurement is used. The aim of our study was to find new available methods, and examine their correlation to the limb volume and to identify the best method that reflects to the clinical condition.

**Materials and Methods:** The prospective study was carried out in a 40 bed rehabilitation department over two year (2016, 2017). 179 in- and outpatients (85 % women and 15% men) were treated with decongestive lymphatic therapy. The impact of the therapy was tested before and after treatment via different methods. Beyond the limb volume the following scales and parameters were defined: body weight, body mass index (BMI), Functional Independence Measure (FIM), Barthel index, visual analogue scale (VAS), 6 min walking test (6MWT) and a special lymphoedema test.

**Results:** The mean body weight was 99,26 kg, BMI was 37.9. Average limb volume decrease was 1100,5 ml (11%). The body weight decrease was 1,8 kg, BMI decrease was 1%. The body weight in the 10 % of our patient didn't changed, moreover in case of a 3rd of our patients the body weight increased. Barthel index and FIM didn't change at all, and the special lymphoedema test remained almost unchanged. The main change was observed in the VAS (from 7,3 to 4.2) and in the 6MWT, where the distance grew by 26,8 %.

**Conclusions:** Our results show that despite the widespread opinion neither the body weight decrease, nor the usually used scales - such as the FIM and Barthel indexes - are informative. The special lymphoedema test is not specific enough either. However, these methods which are not in use to evaluate lymphoedema, according to the literature such as the VAS and the 6MWT, have a high correlation with the limb volume. We found that these methods can provide useful added information to the evaluation of the decongestive lymphatic therapy's effectiveness.

## LOWER LIMB LYMPHEDEMA IN A PATIENT WITH RHEUMATOID ARTHRITIS

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**Background:** Secondary lymphedema may be associated with chronic inflammatory rheumatic diseases. The coexistence of inflammatory rheumatologic diseases and treatment of lymphedema is an underestimated issue.

**Aim of the work:** The aim of this study is to investigate the efficacy of combined decongestive physiotherapy (CDP) for treatment of lower limb lymphedema in a patient with rheumatoid arthritis.

**Case Presentation:** 57 years old female patient was diagnosed with seropositive rheumatoid arthritis more than 30 years ago. She was formerly treated with nonsteroidal antiinflammatory drugs and methotrexate. Comorbid diseases can be listed as; primary hypertension (10 years), chronic kidney insufficiency (4 years), left ventricular hypertrophy, mitral and tricuspid valve insufficiency. In 2008, she operated left knee and right hip arthroplasty surgery. In 2017, she underwent right knee arthroplasty and developed a patellar tendon rupture with a fall of 40 days after the operation. For more than 10 years, she presented progressive pitting edema both lower limbs. In 2015, stage 2 lymphedema diagnosis was determined by lymphoscintigraphy.

**Material & Methods:** Lymphedema volume was evaluated by circumference measurement from the first metatarsophalangeal joint to the proximal with each 4 cm intervals. The obtained values were recorded in centimeters and converted to the limb volume. Pain was assessed with Visual Analog Scale. CDP lasts four weeks and consists of primarily skin care, manual lymphatic drainage (two days in a week), multi-layered compression bandage and exercises.

**Results:** Initial of the treatment volume of the limbs were 7269 ml (right) and 6716 ml (left) and at the end of four weeks volume of the limbs decreased 4262 ml (right) 4166 ml (left) respectively. There was 4 cm decrease in visual analog scale.

**Conclusion:** The lymphedema of the extremities is a rare extraarticular complication of rheumatoid arthritis. CDP was effective in decreasing limb volume and pain.



## THE EFFECT OF TRUNK STABILIZATION EXERCISES ON POSTURAL STABILITY AT LIPOEDEMA PATIENTS

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**Background:** Lipoedema is a chronic, progressive adipose tissue disorder that is mostly seen as a symmetrical growth of the hips and legs, affecting women.

**Aim of the work:** The aim of our study is to investigate the effect of trunk stabilization exercises in addition to active range of motion exercises on body composition, pain, edema, trunk endurance, functional capacity and postural stability.

**Material & Methods:** The study is included 32 female patients with a mean age of  $53,06 \pm 7,92$  years who were diagnosed as upper and lower leg lipoedema. The subjects were divided into two groups as experimental (n = 17) and control (n = 15) groups. The physiotherapy program of the control group consisted of active range of motion exercises and the physiotherapy program of the experimental group consisted of trunk stabilization exercises in addition to the active range of motion exercises. After the demographic data of all cases were recorded, the extremity volume (circumference measurement), body composition analysis, trunk endurance, pain (Visual Analog Scale), postural stability (Biodex Balance System<sup>®</sup>) was evaluated. After the six-week treatment program, all evaluations were repeated. SPSS (SPSS 21.0) program was used for statistical analysis of the data. For all analyzes, the level of significance was accepted as  $p < 0.05$ .

**Results:** As a result of our study, a statistically significant improvement was found in pain, extremity circumference measurement and 6 minutes walking test values in both groups. In addition, body composition, trunk endurance and postural stability were found significantly different in the experimental group. Considering the intergroup evaluation; postural stability, body composition, trunk endurance, extremity circumference measurement, were found statistically superior to the experimental group. There was no significant difference between the two groups in pain scores.

**Conclusions:** This study concluded that active range of motion exercise program was sufficient to reduce pain in lower and upper leg lipoedema patients. It was concluded that trunk stabilization exercises in addition to active range of motion exercises program are more effective method to improve the body composition, trunk endurance and postural stability in reducing the volume of the limb and increasing the functional capacity.

## THE EFFECTS OF REPEATED INTENSIVE PHASE TREATMENT UPPER AND LOWER LIMB LYMPHEDEMA

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**Background:** Lymphedema is a lifelong, chronic but treatable condition. Deficiencies in self-care management after intensive phase treatment may lead to recurrent increase of lymphedema volume. In generally maintenance phase failure may be related to recurrent infections, skin care, self injury and compression garment problems.

**Aim of the work:** The aim of this study is to investigate the effects of repeated intensive phase treatment upper and lower limb lymphedema.

**Material & Methods:** Fifteen lower limb and eleven upper limb lymphedema patients ( $47.2 \pm 11.08$  years) who were previously treated intensive phase of combined decongestive physiotherapy (CDP) were evaluated retrospectively. In the evaluation of cases, intensive phase treatment was started again in patients with at least above 30% volume difference by comparing the volume of the affected limb to that of the healthy limb. The 4-week intensive phase consisted major skin care, manual lymphatic drainage, multilayer compression bandages, and exercises. Limb volume measurements were repeated at the beginning and at end of the treatment (4th week) in all patients. The therapeutic response of CDP was quantified as the change in percentage of excess limb volume.

**Results:** Average duration and initial volume of lymphedema were  $70.45 \pm 16.45$  months and  $784,92 \pm 468,24$  ml respectively. % excess limb volume was significantly ( $P < 0.05$ ) decreased after CDP, corresponding to 43% total lymphedema-volume reduction. The cases reported the most recurrent infections (40.45%) and use of compression garment problems (21.05 %) as the reason for the increase in lymphedema volume.

**Conclusions:** Lifetime self-management is required because no method provides a permanent treatment. This study suggests that significant improvements were made in the upper and lower limb lymphedema after repeated intensive phase treatment of CDP which is necessarily correlated with limb volume reduction.

## COMPLEX DECONGESTIVE THERAPY: TRANSITION FROM INTENSIVE PHASE TO MAINTENANCE PHASE

ALBERTO MACCIÒ, MD ISL- ESL MEMBER PRESIDENT OF LYMPHOLAB

**Background:** The complex decongestive therapy (CDT) is considered the gold standard for the management of lymphedema. CDT includes two phases: intensive phase which aims is to reduce the volume of lymphedema and maintenance phase to preserve the result. In the intensive phase, is used a complex decongestive therapy, mainly multicomponent high stiffness bandage and manual lymphatic drainage (MLD) associated or not with IPC (intermittent pneumatic compression). In the maintenance phase, we used elastic compression (stockings). The timing of this important transition is often linked to the individual experience of the doctor who can not rely on objective evaluation element. Thus, he risks to place the elastic stocking too early, with a relative reduction in patient compliance or even partial therapeutic failure.

**Aim of the work:** The objective of our study is to define the transition between the attack phase (bandage) and the maintenance phase (sock) giving indications on the right prescription and logistic timing based on clinical parameters, lymphoscintigraphic evaluation of edema and analysis of the reduction of the volumetric range of the lower limbs.

**Material & Methods:** Patients with lymphedema in the lower limbs are evaluated retrospectively. Using 3D Body Scanner, the lower limbs are measured over time by relating the change in the volume of the limb with the therapy phase in which the patient is located.

**Results:** A decrease in volume progressively less important until the achievement of a plateau that will indicate the "stabilization" of the limb, or the moment beyond which further bandages would not significantly modify the volume of the limb. This moment will mark the transition from the "attack phase" to the "maintenance phase".

**Conclusions:** The possibility to estimate in advance the passage between the attack phase and the maintenance phase thanks to the aid of clinical parameters, the lymphoscintigraphic evaluation of edema and the analysis of the reduction of the volumetric range would result in an optimization of resources, a reduction in costs and greater accuracy and prescriptive appropriateness of the elastic stocking with consequent increase in patient compliance with therapy

## THE PATIENT WITH PRIMARY LEFT LOWER EXTREMITY LYMPHEDEMA; A CASE STUDY

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**PURPOSE:** The aim of this study was to investigate the complex decongestive therapy (CDT) in patient with stage 3 primary lymphedema in the left lower extremity.

**METHODS:** A 57-year-old female patient (body mass index-BMI 60.9 kg/m<sup>2</sup>). with left lower extremity swelling and difficulty in walking was included in this study. The patient with congenital lymphedema in the left lower extremity was frequently experiencing cellulite attack and as a result of these attacks, the leg is more swollen. However when she applied to the clinic there was no sign of any infection.

There were big skin folds on medial thighs area. Also had fibrotic tissues on this area.

The patient who had a lot of cellulitis attack before was taken to the CDT program for 16 weeks, 7 days a week. After the treatment, left lower extremity edema was reduced. BMI was also reduced 38.7 kg/m<sup>2</sup>. As a home program, compression garment for daytime and compression bandage at night was recommended. After 5 months, the patient who applied to our clinic for compression garment control, CDP was performed again for 8 weeks, 6 days a week. After treatment, left lower extremity volumes decreased significantly. Fibrotic tissues and skin folds of extremity were improved positively.

**CONCLUSION:** Regularly repeated CDT in patients with **severe** lymphedema is important for softening of fibrotic tissue, improvement of skin folds, and reduction of extremity volume.

## POSTER SESSION II

### EFFECTS OF NEUROMUSCULAR TAPE ON SIGNS AND SYMPTOMS OF AXILLARY WEB SYNDROME: A PILOT STUDY

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**Background:** The surgical therapy of breast cancer can be responsible of complications in the post-operative period, even though of minor entity in case of conservative surgery if compared to demolitive surgery. One of these is Axillary Web Syndrome (AWS): this term refers to a rope-like structure that develops mainly under the axilla but can extend to the medial aspect of the ipsilateral arm down to the antecubital fossa. AWS can show a strong negative impact on the patients' quality of life and a possible reason for delay in the return to normal activities. The currently advised rehabilitative treatments for AWS consist of active and passive mobilization exercises and stretching of the affected anatomical areas, deep massage, lymphatic drainage and mobilization of scar tissue. These protocols are supported by limited scientific evidence, therefore the treatment possibilities for this disease are yet to be fully explored.

**Aims of the study:** Evaluating the efficacy of a Neuromuscular Tape (NMT) treatment protocol in the reduction of signs and symptoms of AWS. The objective is to explore the possibility of reducing the main disorders caused by this disease, of improving the quality of life in the AWS onset period, and to evaluate its impact on the spontaneous disappearance time frame of AWS.

**Materials and methods:** Six surgical patients who underwent a lymphadenectomy surgery (radical or sentinel lymph node biopsy) at the University Hospital of Udine (Italy) have been enlisted. The recruitment took place within 30 days from the surgery. The study was developed in 4 stages: initial assessment (T0); treatment with Neuromuscular Tape protocol; final assessment (T1); follow-up assessment, after thirty days (T2). The recorded data from the three assessments have been compared: they were related to shoulder motion, pain intensity at NRS, evolution of the cording structures, functionality of the affected upper limb.

**Results:** The number of needed treatments varied from 4 to 6. At T1 all patients obtained an improvement of active movement at the gleno-humeral joint (20-70°), a reduction of pain (1-5 points on NRS scale), an amelioration in functional activities. A satisfying quality of life and a good functionality of the limb affected by the disease were reported since T1.

High treatment tolerability and absence of side effects have been observed.

**Conclusions:** AWS can be a frustrating complication of surgical intervention for breast cancer. None of the therapies till now proposed are strongly recommended by literature. Our treatment protocol, using NMT, showed good results in relation to symptoms and signs of AWS, reducing its entity and duration. Important limit of the study is the small size of sample; therefore, additional studies are necessary to increase the cohort size and to obtain results that can be generalized and, eventually, validate the tested treatment protocol.

### CASE REPORT OF THE LYMPHOSCINTIGRAPHIC INVESTIGATION IN ONE ADULT PATIENT WITH EHLERS-DANLOS'S DISEASE TYPE 4 WITHOUT LYMPHEDEMA BUT WITH LYMPHADENITIS

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Lymphatic abnormalities are well documented in Ehlers-Danlos's disease observed in the new-borns and/or in young patients. We report here the case of one adult patient with well documented Ehlers-Danlos's disease (with vascular dissection of the coeliac trunk, superior mesenteric artery and right renal artery) type 4 (mutation c.2536 G>A of COL3A1) who had presented many recurring and clinically dramatic episodes of inguinal lymphadenitis with important temperature, marked hyperleucocytosis and acute pain. These episodes were spontaneously resolvable within 24 hours (without antibiotics) and the resection of one inguinal Lymph Node showed only a reactional pattern at the anatomico-pathological examination. Our lymphoscintigraphic SPECT CT exam showed merely one lymphatic Ductus Thoracicus completely abnormal which might explain (LN congestion and inflammatory reaction?) the aseptic « lymphadenitis ». Our review of the literature allowed us to find a single case of such abnormality demonstrated in a newborn by x-ray lymphangiography. Such case report shows that adult patients with Ehlers-Danlos's disease and with benign manifestations at the level of the lymphatic system may also present lymphatico-vascular abnormalities-malformations.

## UPPER LIMB KLIPPEL-TRENAUNAY SYNDROME ASSOCIATED WITH BREAST-CANCER-RELATED LYMPHEDEMA

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**Introduction:** Klippel-Trenaunay Syndrome (KTS) is characterized by the following triad: a port-wine stain, abnormal overgrowth of soft tissues and bones, and vascular malformations (VM). It has been linked to a mutation found in the gene PIK3CA leading to overactivation of mTOR, responsible for cell proliferation and angiogenesis. A paradominant inheritance pattern has been proposed, although most cases represent de novo mutations. Lower limb involvement is most common, while upper limb (UL) affection is only found in 5% of all cases.

**Purpose:** We present the case of a 67-year-old woman with upper-limb KTS and superimposed breast cancer-related lymphedema (BCRL).

**Method:** We described the clinical case and searched for relevant information about KTS in Web of Science.

**Results:** Our patient was first diagnosed of KTS in 2000 owing to the finding of a cardiac murmur in relation to the VM she presented. Right UL overgrowth became more evident during puberty. She first attended our Lymphedema Unit in 2003 because of KTS and later in 2013 because of a superimposed BCRL. The patient presented a grade III right UL lymphedema from shoulder to wrist with readily-visible collateral circulation in the arm. The hand remained unaffected during several years, so compression therapy on this site was offered as optional until 2015. Our patient rejected it during this time, after which we prescribed a compression garment in order to protect the hand skin, prevent distal right UP edema and prevent right UL ulceration due to the presence of vascular malformations. Difference of perimeters in 2013 were 1cm in the hand and wrist, 7cm in the elbow, 13.5cm and 11cm in the distal and proximal arm respectively. Stemmer's sign was evident. Following lymphadenectomy, right UL volume increased, which worsened disability and quality of life. Decongestive lymphatic therapy (DLT) was prescribed once hypercoagulability was discarded in order to reduce lymphedema- dependent limb volume and recover lost mobility, after which custom-made flat-knitted garments were prescribed. These not only warrant a stable limb volume, but also prevent skin deterioration and lymphangitis.

**Conclusion:** KTS is a rare syndrome involving vascular malformations and limb overgrowth. UL involvement, as found in our patient, is uncommon. A multidisciplinary approach involving Vascular Surgery, Orthopedics, Physiotherapy and Rehabilitation has proven to enhance patient treatment outcomes. Adequate compression therapy and limb care monitored by the PRM specialist is of paramount importance to achieve clinical stability.

## RETROPERITONEAL CYSTIC LYMPHANGIOMA TREATED BY SILDENAFIL: CASE REPORT

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We report the case of a 62-years old man presenting a retroperitoneal, inter aortico-caval CL treated by Sildenafil. The cystic lymphangioma (CL) is a congenital benign malformation secondary to an abnormal development of lymphatic system during embryogenesis resulting in isolation of a lymphatic bud. The CL is therefore mostly observed in children during the first 2-years of life. The preferential localisations are cervico-facial area, axillary spaces and thoraco-abdominal area. US and CT can be used for the diagnosis. It also can be completed by MRI. The final diagnosis is based on anatomopathology.

Surgical removal seems to be the best treatment, particularly from a volume level and when there are clinical manifestations. Surgery offers a definitive treatment if the resection is complete. However, a resection with security marge is not always possible limited by the proximity of vital structures.

Alternative therapies are proposed, like on sclerotic injection, prescription of immunosuppressive treatment or sildénafil.

In this case, the CL was discovered by angio-CT during a post pulmonary emboly follow-up.

The CT-scan showed an inter aortico-caval cystic mass probably resulting in altered venous flow into the veina cava.

The proposed treatment was a 2x20mg daily dose of Sildénafil.

A post 3 months control CT-scan showed a significant regression of the CL with a reduction of the diameter from 100x64mm to 41x28mm.

## LYMPHO-VEIN ANASTOMOSIS FOR GLUTEAL LYMPHEDEMA

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Lymphedema of the gluteal region is a rare condition and may arise after orthopedic and cosmetic surgery. It causes functional problems and is difficult to treat conservatively due to the anatomical characteristics of the affected region. We report the first case of gluteal lymphedema successfully treated with super-microsurgical lympho-venous anastomosis (LVA). A 65-year-old woman presented with lymphedema of the right gluteal region after total hip replacement. She suffered from pronounced swelling, sensation of tension when wearing clothes and sitting was uncomfortable. Conservative treatment by means of manual lymph drainage performed for several months was ineffective. Lymphoscintigraphy showed dermal backflow at the level of the right gluteal region. Indocyanine Green lymphography was performed for pre-operative vessel marking and showed two patent lymphatics suitable for LVA. The microsurgical intervention was performed under loco-regional anesthesia: lympho-venous anastomoses were performed at two regions: the gluteal region and the level of the greater trochanter. The patency of the 2 anastomoses was confirmed intra-operatively by use of near-infrared technique. Postoperatively, the swelling at the right hip region decreased and the sensation of tension disappeared. Normal clothing was again possible. The patient was also able again to sit without discomfort. One year post-operative, the patient had no distress and was satisfied with the result.

Although LVA is an established treatment option for lymphedema, its efficacy in the treatment of gluteal lymphedema should be replicated by others. Thanks to its minimal invasive nature, LVA is particularly indicated for lymphedema at 'unusual' regions which is difficult to treat conservatively because of its localization

## MICROSURGICAL TREATMENT FOR BREAST LYMPHEDEMA

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Not only arm lymphedema but also breast lymphedema has been reported as a complication following breast cancer treatment. However, its management is poorly characterized. Conservative treatment is a mainstay of the treatment, but the application of compressive garments is difficult given the anatomy. Therefore, surgical approach might be a solution, particularly in cases of progressive breast lymphedema refractory to conservative treatment.

We report the first case of breast cancer-related breast lymphedema successfully treated with microsurgical lymphaticovenous anastomosis (LVA).

A 55 year-old woman presented with severe swelling of the left breast after breast conserving surgery with axillary lymph node dissection and adjuvant radiotherapy. After the cancer treatments, the patient suffered from pronounced swelling, sensation of tension and pain of the left breast with frequent episodes of breast cellulitis. Conservative treatment by means of manual lymph drainage and compressive garments had been performed for years, but was not effective. Eight years after cancer treatment, the patient was referred for surgical treatment. The clinical diagnosis of breast lymphedema was confirmed by lymphoscintigraphy. Indocyanine green (ICG) lymphography (PDE, Hamamatsu, Japan) was performed for preoperative lymphatic vessel marking. In total, 3 lymphovenous anastomoses were performed: 2 at the midline of the thorax and 1 at the left latero-thoracic region. Although all 3 lymphatic vessels were sclerotic, the patency of the anastomoses was confirmed intra-operatively by ICG lymphography. After microsurgical treatment, the left breast decreased in size and the sensation of tension disappeared. One year postoperatively, the patient had no distress nor cellulitis episodes and was satisfied with the result of normal breast condition.

Although further clinical studies are required to confirm efficacy, LVA seems a valid treatment option for breast lymphedema particularly since conservative treatment is difficult given the anatomical location.



## COMPLETE REDUCTION OF BREAST CANCER RELATED ARM LYMPHEDEMA IN 105 PATIENTS FOLLOWING LIPOSUCTION – A FIVE-YEAR FOLLOW-UP

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**Objective:** Patients with chronic non-pitting lymphedema do not respond to conservative treatment probably because diminished lymph flow and inflammation result in the formation of excess subcutaneous adipose tissue. Previous surgical treatments seldom achieved acceptable cosmetic and functional results. Microsurgical reconstructions cannot provide complete reduction because they do not eliminate the newly formed, subcutaneous adipose tissue collections. Liposuction is therefore a logical treatment to reduce the excess of adipose tissue.

**Methods:** 105 women with non-pitting edema, a mean age of 64 (range, 41-89) years and a mean duration of arm swelling of 10 (range, 1-38) years underwent liposuction. Mean age at breast cancer operation, mean interval between breast cancer operation and lymphedema start, and duration of lymphedema were 51 years (range, 34-86), 3 years (range, 0-32), and 10 years (range, 1-38) respectively. Aspirate and arm volumes were recorded.

**Results:** Aspirate mean volume was 1831 ml (range, 650-3780) with an adipose tissue concentration of 94 % (range, 58-100). Preoperative mean excess volume was 1573 ml (range, 570-3520). Postoperative mean reduction was 101 % (range, 68-189) at 3 months and 118% (range, 25-191) at 5-years' follow-up, i.e. the lymphedematous arm was somewhat smaller than the healthy arm. The preoperative mean ratio between the volumes of the edematous and healthy arms was 1.5 (range 1.2-2.1) and 0,9 (range, 0-8-1.4) after 5 years.

**Conclusion:** Our long-term results demonstrate that liposuction is an effective method for treatment of chronic, non-pitting arm lymphedema in patients who have failed conservative treatment. It is the only known method that reduces the excess volume of fat completely at all stages of arm lymphedema. The removal of hypertrophied adipose tissue is a prerequisite to complete reduction. The newly reduced volume is maintained through constant use of compression garments postoperatively.

## AXILLARY WEB SYNDROME: POSTSURGERY INCIDENCE IN 18 MONTH FOLLOW UP

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**Introduction:** Breast cancer is the most frequently diagnosed cancer among women worldwide. Surgery is the treatment of choice, and many times includes sentinel lymph node biopsy (SLNB) or axillary lymph node dissection (ALND). It allows us to predict prognosis, reduce recurrence and propose a treatment program. However, this actuation involves complications such as lymphedema, decreased range motion, postmastectomy pain syndrome or axillary web syndrome (AWS). The axillary web syndrome is described by the appearance of a visible, palpable fibrous cord under the skin of the axilla and in the middle arm toward the elbow region, appearing between one and eight weeks after surgery, but it may appear later. The patients may present axillary pain radiating to the ipsilateral arm, restriction in range of motion, numbness and/or tightness. The incidence in the literature is 20% after SLNB and between 38 to 72% after ALND. It's a self-limiting process, usually resolves spontaneously within three months.

**Material and methods:** This study evaluated women who developed AWS following breast cancer surgery in a prevention lymphedema unit. Epidemiological data were recorded in 173 patients attended from January 2017 to January 2018: age, dominant side, body mass index, breast surgery, lymph nodes removed, cancer treatments, range motion, AWS presents, therapy in patients with AWS. All the patients were examined after one month of the surgery. Doctors of the unit explained to the patients the pathology, exercises and stretches. If they had pain NSAIDs were prescribed and if the range of motion (ROM) was restricted specific kinesitherapy with a physiotherapist.

They were followed up 18 months.

**Results:** In total 173 patients were included, 52 patients (30.05 %) developed axillary web syndrome, with a mean age of 49 years old, a mean Body Mass Index (BMI) 25, most of the patients 69% (36p) underwent mastectomy and the mean of axillary dissection was 10 nodes. The majority of the cords appeared immediately surgery 84.61% (44p), 53.84% presented only one cord, 46.15% more of one. Flexion and abduction of the shoulder showed a reduced ROM in 53% (28 patients), 42% need pharmacology treatment for pain and 26,92% physiotherapy treatment. In the 38% of the cases disappeared in one month, 25% from one to three months and 36% were more persistent. Four patients had the recurrence of cords. 42% (22p) presented local edema that disappeared, 36,53% (19p) presented lymphedema and in 1 case vanished in 6 months.

**Conclusions:** Surgery for breast cancer can cause several complications, one of them is the AWS.

Most of the patients had spontaneous resolution within a few weeks like are described in the bibliography, but some patients could persist for several months. It's important to recognise this pathology because it could cause alert to the patient and could delay radiotherapy treatment if the ROM limitation is severe. In our study, the AWS isn't related to low BMI or lymphedema.

## THE REHABILITATIVE TREATMENT OF LYMPHATIC MICROSURGERY

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Rehabilitation is an important integration of surgical interventions in various disciplines, particularly in the orthopedic and traumatological field. The different techniques aim at recovering as completely as possible the functionality of the operated structures and of the organism as a whole, reducing healing times and preventing complications related to the surgical procedures themselves.

Regarding lymphatic surgery there are three questions to be answered:

- is rehabilitation treatment necessary?
- which rehabilitation must be performed and with which modalities (type / duration / rhythm / intensity)?
- how can we evaluate the effectiveness of rehabilitation treatment?

The data reported in the literature are few, heterogeneous and sometimes in contrast.

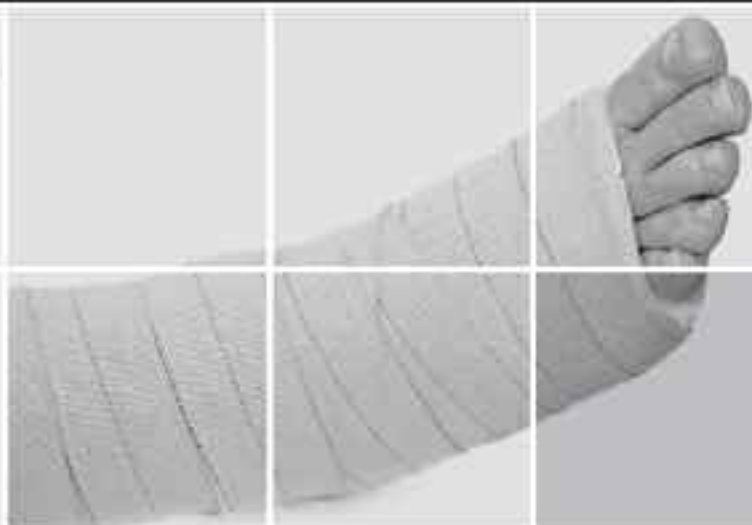
The usefulness of rehabilitation treatment is supported by the need to achieve the two objectives of the postoperative phase: the maintenance of a good drainage through the anastomosis and the prevention of its occlusion. A recent review identified 22 relevant articles, because pertaining to perioperative procedures, out of 1222 referring to lymphatic surgery. Eighteen refer to lymphatic-venular anastomosis, one to multiple lymphatic-venous anastomoses, three to different or unspecified procedures. In 11 cases, the rehabilitation treatment included the elevation of the limb, in 11 the lymphatic drainage and / or the pressure therapy, in 11 the bandage of the segment (with non-homogeneous times and duration of application), in 14 the use of elastocompressive garments. The combination of the aforementioned treatments varied according to the authors, with recourse to none in one case, and to all the treatments in another. Only in the case of multiple lymphatic venous anastomosis a true perioperative treatment protocol was conceived. It is called Complete Lymphedema Functional Therapy (CLyFT) and it provides an early postoperative phase (1-2 weeks) with incremental pressure pressotherapy and a long-term treatment with mechanical lymphatic drainage and exercise. The evaluation of the results can be performed through monitoring (direct or indirect) of the volume, with lymphoscintigraphy and with questionnaires on quality of life. Green indocyanine lymphography is an important modality for post-surgical monitoring, especially for predominantly solid lymphedema, as it is accurate, objective, reproducible and robustly correlated with clinical findings.

The existing data shows the need for guidelines on perioperative treatments and the evaluation of the effects of microsurgery and rehabilitation. Collaboration between microsurgeons and rehabilitators is desirable to reach the drafting of appropriate rehabilitation protocols.

# A COMPLETE PROGRAM FOR THE TREATMENT OF LYMPHOEDEMA

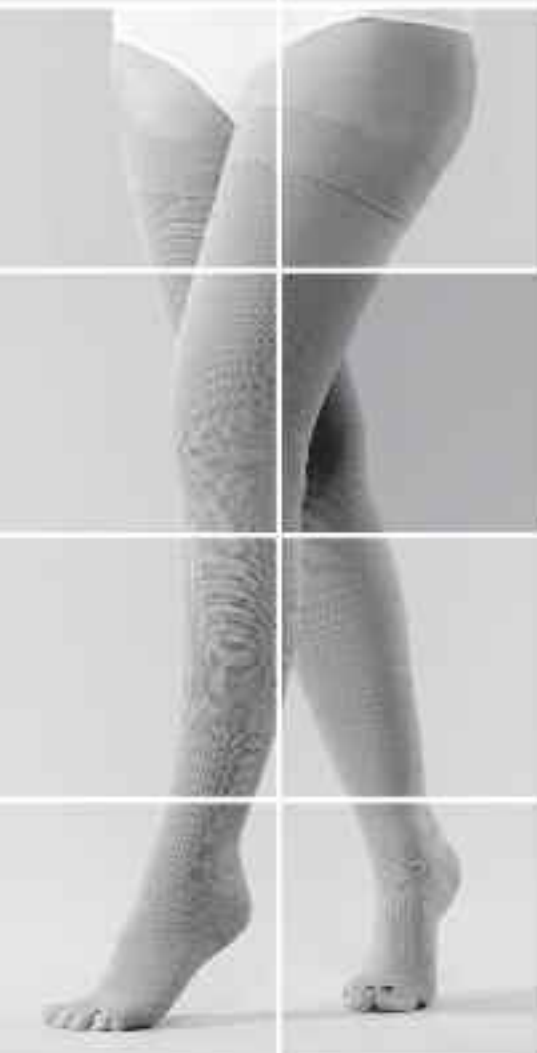
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