

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

## XXXVI Congress of European Society of Lymphology

Athens (Greece) - May 14-15-16, 2010

Classical Athens Imperial Hotel, Karaiskaki Square GR104 37

***Clinical Sciences***

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## 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

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of European Society  
of Lymphology

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Prof. V. Smymiotis - Dr. E. Dimakakos

**Athens (Greece)**

**May 14-15-16, 2010**

[edimakakos@yahoo.gr](mailto:edimakakos@yahoo.gr)

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European Society of Lymphology

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Groupement Européen de  
Lymphologie

# XXXVI CONGRESS

Athens (Greece) - May 14-15-16, 2010

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# Programme

## H. 09.30 ESL EXECUTIVE MEETING

Friday 14 May 2010

Round Table

12,00 Anatomy of the lymphatic system

Chairmen P. SKANDALAKIS, M. RIQUET, M. AMORE, A. PISSAS

**Anatomy of the lymphatic's**

P. Scandalakis

**Thoracic duct lymph tributaries from renal origin**

M. Riquet, J. Assouad, C. Pricopi, G. Hidden, V. Delmas

**Lymphatics of the breast before and after surgery**

O. Eliška, D. Pavlišta, M. Wald

**Lymphatic drainage of the skin of ventral and dorsal region of thorax and abdomen.**

**Anatomical and Pathophysiological bases**

M. Amore

**Speaking of anatomical research of lymphatic system on corpses, in the country of papamiliades is a great honour**

A. Pissas, R. Rubay, E. Prieur, E. Boulay, T. Coste, F. Canovas, M. Prudhomme

Friday 14 May 2010

Round Table

12,45 Physiology and pathophysiology of the lymphatic system

Chairmen O. ELISKA, J.P. BELGRADO, E. AGAPITOS, A. KATSAMOURIS

**Anatomy and physiology of the manual lymphodrainage**

O. Eliška, M. Elišková

**The role of lymphatic system in tissue homeostasis - Regulation of tissue fluid volume response to microbial, tumor and tissue self antigens. Whither we go?**

W. Olszewski

**Physiology and Pathophysiology of the lymphatic system**

S. Michelini, G. Moneta, A. Failla, M. Cardone, F. Fiorentino, F. Cappellino

**Modification of skin's sensitivity of the forearm and the hand from patients affected by lymphedema**

J.P. Belgrado, C. Robert, A. Plusquellec, P. Bracale, P. Bourgeois, N. Röh, R. Rosiello, J.J. Moraine

Friday 14 May 2010

Oral Presentation

13,30 A. Session of oncology, surgical oncology, lymphangiogenesis and phlebolymphe-  
dema (New York)

Chairmen N. ARKADOPOULOS, G. ORPHANOS, A. PAPAGEORGIOU

OP1

**The effect of paclitaxel treatment on the occurrence of lymphedema of the arm in unilateral breast cancer patients with axillary lymph node dissection: a prospective study**

N. Adriaenssens, P. Lievens, C. Fontaine, H. Van Parijs, M. Vanhoey, G. Verfaillie, J. Lamote, J. De Grève

OP2

**The role of compression in maintaining the volume in breast-cancer related lymphedema**

I. Forner-Cordero

OP3

**Long-term variations in breast tissue water content following breast-saving surgery and conventionally fractionated radiotherapy**

T. Lahtinen, J. Nuutinen, E. Kumpulainen, R. Kesikikuru

OP4

**ICF functioning core sets in lymphedema secondary to breast cancer**

S. Michelini, M. Cardone, A. Failla, G. Moneta, F. Cappellino, A. Fiorentino, F. Romaldini

OP5

**Breast cancer lymphedema and pain, due to brachial plexus injury**

E. Richter, A. Gersman, M. Andrade

OP6

**The relationship of lymphatic system and the sentinel lymph node in the surgical treatment of cutaneous melanomas**

G. Champsas, E. Kostopoulos, M. Frangoulis, P. Konofaos, C. Chrisostomidis, O. Papadopoulos

OP7

**Modulation of lymphangiogenesis: a novel effect of aspirin and non steroidal anti-inflammatory agents?**

E. Yiannakopoulou

OP8

**Where does tissue fluid accumulate in obstructive lymphedema?**

W.L. Olszewski, M. Zaleska, M. Cakala, G. Ambujam, P. Jain

OP9

**Formation of new tissue fluid channels in lymphedematous subcutaneous tissue during pneumatic compression therapy**

W.L. Olszewski, M. Zaleska, M. Cakala, G. Ambujam, P. Jain

OP10

**Phlebedema urgency treatment of the face: 12 cases**

A. Hamadé, E.M. Cordeanu, A.M. Hamadé, M. Pierre, G. Obringer, M. Lehn-hogg, J.C. Stoessel, H. Metzger

Friday 14 May 2010

14,00 B. Session of anatomy epidemiology, physiology and pathophysiology (Boston)

Chairmen J.P. BRUN, D. LAPPAS, S. GEORGOPOULOS

OP11

**Epidemiology of lymphedema in Czech Republic: demands for health care (up-date and perspective)**

Benda K.

OP12

**Legal and financial aspects of lymphology in selected countries of EU**

A. Loskotova, J. Loskotova

OP13

**Anatomical project of the variations of cisterna chyli**

D.A. Lappas, E. Kuriopoulou, N. Nikiteas, P. Skandalakis  
Associate students: A. Zouridis, M. Sideris, I. Vasilikos

OP14	<b>Anatomical project of the variations of minor thoracic duct</b> D.A. Lappas, N. Stavropoulos, N. Nikiteas, E. Florou, P. Skandalakis <i>Associate students:</i> A. Zouridis, M. Sideris, I. Vasilikos
OP15	<b>Anatomical project of the variations of major thoracic duct</b> D.A. Lappas, I. Gisakis, N. Nikiteas, A. Smyrnis, P. Skandalakis <i>Associate students:</i> A. Zouridis, M. Sideris, I. Vasilikos
OP16	<b>Neck dissection classification and staging</b> P. Theodosis, M. Sismani, V. Agelou, S. Papaspirou
OP17	<b>Radical Neck Dissection (RND): Indication and Techniques our experience</b> P. Theodosis, M. Sismani, V. Agelou, S. Papaspirou
OP18	<b>Human keratinocytes are stimulated by own tissue fluid/lymph and proliferate</b> A. Domaszewska, M. Moscicka, M. Zaleska, W.L. Olszewski
OP19	<b>Study of lymph composition in post-surgical lymphocele and its modifications by the treatment</b> S. Michelini, M. Cardone, A. Failla, G. Moneta, R. Todisco, M. Todini, F.M. Albergati
14.30	<b>LUNCH - POSTERS (PP1 - PP2)</b> <i>Chairmen of Posters:</i> C.C. Campisi, P. Theodosis

	<b>Round Table</b>
15,30	<b>Genetics and lymphangiogenesis</b>
<i>Chairmen</i>	W.L. OLSZEWSKI, M. WITTE
	<b>Immunohistopathology of human leg lymphoedematous tissues - Is there lymphangiogenesis?</b> W.L. Olszewski, M. Zaleska, M. Cakala, D. Zolich
	<b>Lymphovascular genomics and lymphangiogenesis: background, terminology, and update</b> M.H. Witte, M. Bernas, K. Jones

	<b>Round Table</b>
16,00	<b>Classification and staging of lymphedema</b>
<i>Chairmen</i>	S. MICHELINI, V. KEELY, S. VASDEKIS, T. KOTSIS
	<b>Prevalence and classification of chronic oedema</b> V. Keely
	<b>Classification and staging of lymphedema</b> S. Michelini, A. Failla, M. Cardone, G. Moneta, L. Michelotti, C. Salustri
	<b>Diagnosis of Lymphedema</b> E. Foeldi
	<b>Differentiation of diagnosis of lymphedema</b> S. Kakkos

17.00 **COFFEE BREAK**

	<b>Round Table</b>
17,30	<b>Imaging of lymphatic diseases</b>
<i>Chairmen</i>	L. VLACHOS, N. LIASIS, P. BOURGEOIS, A. GOULIAMOS
	<b>The value of ultrasound examination in Lymphedema</b> P.K. Martin, E. Foeldi
	<b>The classical lymphangiography today</b> L. Vlachos
	<b>MRI Lymphography: The state of the art</b> E. Dimakakos, A. Koureas, G. Limouris
	<b>Lymphoscintigraphies in the management of lymphoedemas and their health costs reimbursement in Belgium</b> P. Bourgeois, J.P. Belgrado, C. Aerens

	<b>Round Table</b>
18,30	<b>Lymphatic disorders in pediatrics</b>
<i>Chairmen</i>	C.M. PAPENDIECK, C. BELLINI, R. SMERLA
	<b>Lymphology in pediatrics</b> C.M. Papendieck, L. Barbosa, P. Pozo, D. Braun, V. Dell'Oro, K. Bajaroff
	<b>Lymphology in pediatrics: diagnostic aspects and therapeutic implications</b> C. Bellini, F. Boccardo, C. Campisi, E. Bonioli
	<b>Long term therapeutic results of primary lymphedema in children</b> E. Foeldi

	<b>Welcome Ceremony</b>
19,15	<b>Welcome Greetings</b>
	Prof. V. SMYRNIOTIS <i>President of 36<sup>th</sup> Congress of the European Society of Lymphology and President of Greek Society of Lymphology</i>
	Prof. A. LEDUC <i>Honor President of European Society of Lymphology</i>
	Prof. A. PISSAS <i>Ex President of International Society of Lymphology</i>
	Prof. P. BALAS <i>Honor President of Greek Society of Lymphology</i>
	Prof. P. DIMAKAKOS <i>Honor President of Greek Society of Lymphology</i>
	Prof. C. CAMPISI <i>President of Latin-Mediterranean Chapter of International Society of Lymphology</i>
	Prof. R. BAUMEISTER <i>President of International Society of Lymphology</i>

	<b>Opening Greetings</b>
	Fr N. XATZINIKOLAOU <i>Honor President of Greek Society of Lymphology</i>
	Dr. N. KAKLAMANIS <i>Mayer of Athens City</i>
	Prof. S. MICHELINI <i>President of European Society of Lymphology</i>
	Dr. E. DIMAKAKOS <i>President of 36<sup>th</sup> European Congress of the European Society of Lymphology and General Secretary of Greek Society of Lymphology</i>



Friday 14 May 2010

Ceremonial Lecture

Chairmen S. MICHELINI, V. SMYRNIOTIS

**Medicine: Art or Science**

K.N. Syrigos

*Byzantine Chorus "TROPIS" directed by Konstantinos Angelidis. Traditional Dances*

*Welcome Cocktail dinner*

Saturday 15 May 2010

**Oral Presentation**

08,00 C. Session of pathophysiology, psychology lipedema, imaging, prevention and organization of treatment of lymphedema (New York)

Chairmen K. KATSENI, G. LIMOURIS, E. OKADA, N.F. LIU

OP20 **Physiological parameters for effective compression therapy of swollen lower limbs- skin tonometry, tissue fluid pressure and flow**

W.L. Olszewski, M. Zaleska, M. Cakala

OP21 **Lymphatic drainage patterns of the head and neck: anatomical studies and clinical implications**

W.R. Pan, C.M. le Roux, C. Briggs

OP22 **Childhood lipedema with Ehlers-Danlos syndrome**

E. Iker, S.A. Selahi, E.C. Glass

OP23 **Psycholymphology in 2010**

M. Bendová, K. Benda

OP24 **Psychology of success**

L. Gurina

OP25 **Evaluation of axillary lymph node metastases using mr lymphangiography with uspio, in patients with breast cancer**

E. Panourgias, A. Koureas, A. Dalakidis, V. Koutoulidis, A. Mouloupoulos, A. Gouliamos

OP26 **Interest of lymphoscintigraphic investigations in the management of post-therapeutic upper limb edemas: updated data**

P. Bourgeois, P. Bracale, O. Leduc, A. Leduc, J.P. Belgrado

OP27 **Use of Sentinella (Portable Gamma Camera) in localisation of Sentinel Lymph Nodes in breast Cancer - First U.K. experience**

V. Stafyla, C. Wickham, D. Ghosh, A.O' Brien, J. Page, D. MacCool, T. Davidson, M. Keshtgar

OP28 **MR-Lymphangiography for visualization of dermal backflow in patients with lymphedema of the lower extremity**

M. Notohamiprodjo, M. Weiss, K.A. Hermann, R.G. Baumeister

OP29 **Comparison of radionuclide lymphoscintigraphy and dynamic magnetic resonance lymphangiography for investigating extremity lymphoedema**

N.F. Liu

OP30 **Organization of endoecological rehabilitation unit in a health institution**

V. Milov, A. Glushonkova

OP31 **Endoecological role of education in human ecology**

O. Rodionova, Y. Levin, E. Artamonov, M. Butenin, V. Glebov

OP32 **Effectiveness of limphotrope therapy and endoecologic rehabilitation in patients with endocrine system pathology**

I. Kurnikova, S. Zykina, G. Klimentjeva, I. Gadzieva

OP33 **The possibility of lymphotropic therapy in treatment of acute tonsillitis in children**

T.Y. Tsvetkova, L.V. Sofronova, E.V. Troitskaya

OP34 **Methods of clinical lymphology at the endoecological center in a hotel setting**

Syzdykova Kulzira

Saturday 15 May 2010

**Oral Presentation**

D. Session of treatment of lymphedema and its complications (Boston)

Chairmen Y. LEVIN, O. KASTANA, A. MUNNOCH, A. GERSMAN

OP35 **Treatment of Lymphedema. 15 years experience in Complex Decongestive Therapy. The Foeldi Method in Argentina**

A. Gersman

OP36 **Conservative Treatment of genital lymphedema**

A. Gersman

OP37 **Treatment of a chronic scrotal oedema: case report**

F. Pastouret, M. Ezquer, O. Leduc, A. Leduc

OP38 **Myofascial-manual lymphatic drainage (m-mld) in complex therapy of functional pathology in traumatology**

A. Loskotova, J. Loskotova

OP39 **Management of high exudation of the ulcers in patients with lymphedema (first results)**

E. Dimakakos, J. Kalemikerakis, M. Makarona, H. Moraitou, A. Mavrommati, L. Pardali, M. Galiatsos, K. Syrigos

OP40 **Lymphoedema after breast cancer treatment primary prevention: compared studies**

M. Cestari

OP41 **Physical treatment of lymphedema: what is the precise mission of each partner?**

A. Pissas, R. Rubay, E. Prieur, E. Boulay, T. Coste, M. Adriaens

OP42 **Experience on the outpatient management programme of lymphoedema patients at the university general hospital of Larissa**

A. Giannoukas, M.C. Papadopoulou, R. Stankova Salta

OP43 **Insulin growth factor in lymphedema and its change after physiotherapy by magnetic fields, vibration and hyperthermia**

H. Hasegawa, M. Ohkuma



OP44	<b>A new level of clinical lymphology</b> Y. Levin
OP45	<b>Human skin tissue fluid/lymph cytokines and growth factors - Their role in skin wound healing and infections</b> M. Zaleska, M. Cakala, W.L. Olszewski
OP46	<b>Interest of deep infrared thermography in the follow-up of the treatment of secondary upper limb lymphedema</b> J.P. Belgrado, J. Alignier, P. Bracale, C. Migliore, G. Palazzoto, P. Bourgeois, N. Röh, J.J. Moraine
OP47	<b>Giving to water the property of stimulation of lymphatic drainage and enhancement of lymph outflux from organs and tissues</b> M. Pikalov
OP48	<b>Manual lymphatic drainage in secondary upper lymphedema: what are the conditions for a real efficiency?</b> J.P. Brun

### Round Table

09,30	<b>Infections and cutaneous complications of lymphatic disease</b>
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Chairmen G. PETRIKOS, M. OHKUMA, E. ZOURIDAKI

**Infections of the Lymphatic diseases: the state of the art**

S. Tsiodras

**How to manage lymphedema related acute dermatitis**

M. Ohkuma

**Fungal Infection and Lymphedema**

A. Skiada

**Cutaneous lesions and Lymphedema**

E. Tsele

10.30 COFFEE BREAK GREEK SOCIETY MEETING

### Round Table

11,00	<b>Surgical oncology and lymphatic system</b>
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Chairmen D. VOROS, I. KARAITIANOS, F. BOCCARDO

**The role of the sentinel lymph node in Surgical Oncology**

I. Spiliotis

**Study on lymphatic invasion by cancer cells in patients with gastric adenocarcinoma**

E. Okada

**Management of lymphatic leak in oncologic surgery**

I. Kaklamanos

**Optimal lymphadenectomy in colorectal cancer**

K. Stamou

**Prevention and treatment of complications due to lymphadenectomy**

F. Boccardo, C.C. Campisi, A Barberis, S. Accogli, C. Campisi, C. Campisi

**Educational program for sentinel lymph node Biopsy in Greece**

N. Arkadopoulos

### Round Table

12,30	<b>Oncological and radiotherapeutical approach of lymphedema</b>
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Chairmen K. GENNATAS, J. KOUVARIS, M. WALD, C. BECKER

**Occurrence of lymphedema of the upper extremity after breast carcinoma therapy**

M. Wald, J. Adámek, R. Zemanová

**Cancer and the lymphatic system: A lymphologic perspective and update**

M.H. Witte, K. Jones, S. Daley, S. Leong

**Combined decongestive therapy of breast cancer related lymphedema**

E. Foeldi

**Lymphedema as a consequence of cancer treatment**

S. Xynogalos

**Post Radiotherapy Lymphedema**

E. Balafouta

**Treatment of plexitis after radiotherapy**

C. Becker, P. Fanzio

### Round Table

13,30	<b>Conservative treatment of lymphedema</b>
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Chairmen E. FOELDI, E. DIMAKAKOS, A. LEDUC, G. MANOKARAN

**Drugs which may affect chronic oedema**

V. Keeley

**Lymphedema: only MLD or CDT**

E. Foeldi

**Results of combined decongestive therapy in Greece**

E. Dimakakos, J. Kalemikerakis, G. Antonatos, K. Krousianotaki, E. Tsatsis, I. Sofou, Ei Lymperopoulou, K. Syrigos

**Intermittent pneumatic compression in the evidence based eye**

J.P. Belgrado, P. Bourgeois, O. Leduc, P. Cullus, P. Bracale, G. Natoli, N. Röh, J.J. Moraine

**The most proper garment in every patient**

S. Michelini, G. Moneta, A Failla, M. Cardone, F. Cappellino, V. Zinicola

**European consensus of oedema treatment: experimental approach**

O. Leduc, A. Leduc

**Management of lymphoedema - A multi modality approach**

G. Manokaran, Kiran Prasath

15.00 LUNCH ISL EXECUTIVE MEETING

### Round Table

16,00	<b>When the conservative treatment fails - Surgical treatment of lymphedema</b>
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Chairmen C. CAMPISI, D. KISKINIS, R. BAUMEISTER, H. BRONSON, O. PAPAPOPOULOS

**Free nodes transplantations surgery in secondary upper limb lymphedema: magement and protocol**

G.P. Brun, C. Becker

**Microsurgical treatment of lymphedema**

C. Campisi, C. Bellini, S. Accogli, C.C. Campisi, A. Barberis, Cat. Campisi, F. Boccardo

**The facts about liposuction as a treatment for lymphoedema**

H. Bronson

**Update of bringing lymphatic gaps by lymphatic autografts**

R.G.H. Baumeister, J. Wallmichrath, M. Weiss, A. Frick

**Surgical options in the management of lymphoedema**

M. Wald, D. Tomášek, L. Jarolím, J. Adámek

17.00 **COFFEE BREAK  
LATIN-MEDITERRANEAN MEETING**

**Round Table**

17,30 **Prevention of lymphedema**

*Chairmen* O. LEDUC, G. THIBAUT, G. FRAGOULIDIS, G. THEODOROPOULOS

**Nursing management of Lymphedema**

M. Galiatsos

**Lymphatic microsurgery for primary prevention of secondary lymphedema after breast cancer surgery:  
A model of translational lymphology**

C.C. Campisi, F. Boccardo, C. Campisi

**The active prevention in the treatment of lymphedema: An unsuccessful concept?**

A. Pissas, E. Prieur, R. Rubay, T. Coste, E Boulay

**Lymphedema patient management along the life**

S. Michelini, A. Failla, G. Moneta, M. Cardone, F. Cappellino, A. Santoro

**Round Table**

18,30 **Phlebolymphelemas**

*Chairmen* R. MATTASSI, D. PAPANIMITRIOU, G. BRACALE, A. GIANNOUKAS

**The venous and lymphatic System Close development, topographical and functional relationship**

W.L. Olszewski

**Lymphatic injuries in phlebolymphelemas: Role of lymphatic-venous anastomoses**

F. Boccardo, C. Campisi, A Barberis, S. Accogli, Cat. Campisi, C. Campisi

**Venous malformations and lymphatic dysplasias**

R. Mattassi, M. Vaghi, R. Dentici, E. De Mauro

**Primary lymphedema in the context of venous hypertension in pediatrics**

C.M. Papendieck, L. Barbosa, P. Pozo, D. Braun, V. Dell'Oro

20.30 **GALA DINNER**

**Saturday 15 May 2010**

11,00 **Workshops**

*Chairmen & Instructors*

E. DIMAKAKOS, P. POULMANTIS, Z. VARDAKI

*Trainers*

K. KROUSANIOTAKI, E. TSATSIS, I. SOFOU, E.I. LYMPEROPOULOU

11.00 **What is Lymphedema? E. Dimakakos**

11.15 **Practice in Manual Lymph Drainage (MLD) of upper extremities**

12.30 **Practice in Manual Lymph Drainage (MLD) in lower extremities**

13.30 **Exercises of lower extremities**

14.00 **Exercises of upper extremities**

16.00 **Compression therapy of lower extremities**

*Chairmen*

M. KELESI

17.30 **Management of ulcers in Lymphedema J. Kalemikerakis**

18.00 **Compression therapy of upper extremities**

18.30 **When and How? The use of elastic garments of lower extremities**

19.00 **When and How? The use of elastic garments of upper extremities**

**Sunday 16 May 2010**

09,30 **GENERAL ASSEMBLY OF ESL AND THE END OF THE 36<sup>TH</sup> CONGRESS OF EUROPEAN SOCIETY OF LYMPHOLOGY**

11,00 **Excursion at the museum of Acropolis and Acropolis Monument**

Friday 14 May 2010 - H. 12,00 - Round Table

## Anatomy of the lymphatic system

### ANATOMY OF THE LYMPHATIC'S

P. SKANDALAKIS

*Prof. of Anatomy of University of Athens, Greece*

The lymphatic system is perhaps the most complicated system of Homo sapiens. An introduction to the topography anatomy, relations, variations of the principle vessels of the lymphatic system and anomalies of the lymphatics is presented in order to understand the functions of the lymphatic system.

### THORACIC DUCT LYMPH TRIBUTARIES FROM RENAL ORIGIN

RIQUET M., ASSOUAD J., PRICOPI C., HIDDEN G., DELMAS V.

*Service de Chirurgie Thoracique, Hôpital Européen Georges Pompidou, Paris - France  
Institut d'Anatomie - Biomédicale des Saints-Pères, Paris - France*

The thoracic duct (TD) originates from one intestinal and two lumbar trunks. The latter are deemed to carry lymph from the kidneys, but anatomical studies generally describe lymph nodes but are not indicative on the lymph vessels (LV) termination. Our purpose was to investigate the TD lymph tributaries from renal origin.

The study was performed on 16 refrigerated adult cadavers. Both kidneys were injected with a blue modified Gerota mass, resulting in 26 successful preparations. Injected LV were dissected until their termination.

From the right kidneys (n=13), anterior LV reaching interaortocaval and more distant nodes, aorta bifurcation (n=1) and left latero-aortic (n=1), were observed eight times, not adding much to our common knowledge. On the other hand, posterior LV were demonstrated in all subjects: they always connected to the TD, either after crossing nodes (n=8) or directly (n=5). From the left kidneys (n=13), anterior LV reaching left latero-aortic, but also celiac (n=4) and iliac (n=1) nodes, were observed in most cases, and in the same manner, posterior LV connecting to the TD (3 of them directly), were also demonstrated in all subjects.

Renal lymph drainage reaches periaortic and distant nodes, which is classically described, but also constantly and massively the TD, which suggests it may play an important role in TD formation and origin.

### LYMPHATICS OF THE BREAST BEFORE AND AFTER SURGERY

ELIŠKA O.<sup>1</sup>, PAVLIŠTA D.<sup>2</sup>, WALD M.<sup>3</sup>

<sup>1</sup> Charles University, 1<sup>st</sup> Medical Faculty, Department of Anatomy

<sup>2</sup> Charles University, 1<sup>st</sup> Medical Faculty, Department of Oncogynecology, Clinic of Obstetric and Gynecology Prague, Czech Republic

<sup>3</sup> Charles University, 2<sup>nd</sup> Medical Faculty, 2<sup>nd</sup> Surgery Clinic, Prague, Czech Republic

**Lymphatics of the breast- normal individuals.** Our results show that under physiologic conditions the natural dominant drainage for the outflow of lymph from the superficial areas of the breast are the axillary nodes. Although each quadrant of the breast is dominantly drained by one or two of its own collectors, it is also interconnected via the subareolar plexus and lymphatics running outside plexus with the other quadrants of the breast. This fact is important for increase of risk development locoregional recurrences (Pavlišta, Eliška 2005). Parasternal lymphatics –normal individuals. The goal of this part is to describe the natural border between lymphatic drainage of the breast and parasternal lymphatic drainage. The study was performed on 18 female cadavers aged 52 - 73 years. After local warming of the anterior part of the thorax to temperature 37 degrees Celsius gradually and slowly patent blue or mixture of Patent blue with India ink was injected cutaneously and subcutaneously on the both sides of the sternum in the level of the second to fifth intercostal space. **Results.** If the solution was injected in the distance 4 cm from sternum on the left and right side, the dye spreads predominantly to the subcutaneous tissue of the ipsilateral breast. If the solution was injected in the distance 1 cm from sternum (parasternal line) the dye spreads predominantly into the deep ipsilateral parasternal lymphatics and contralateral parasternal. **Lymphatics after surgery for breast cancer.** After surgery lymph flow in breast region is changed. After total mastectomy and clearing of axilla lymphatics run along the scar and they are linked up to ipsilateral and contralateral axillary nodes, scapular and abdominal lymphatics as well together with possible development of lymphedema. Partial mastectomy is discussed.

## LYMPHATIC DRAINAGE OF THE SKIN OF VENTRAL AND DORSAL REGION OF THORAX AND ABDOMEN - ANATOMICAL AND PATHOPHYSIOLOGICAL BASES

AMORE M.

*Normal Anatomy Department, Buenos Aires University, Buenos Aires, Argentina*

**Introduction.** The aim of this study is to describe the normal lymphatic drainage of the skin of the ventral and dorsal region of thorax and abdomen, highlighting the ipsilateral and contralateral lymphatic drainage, the connections between lymph territories, the lymphatics watersheds and a alternative drainage pathways, to be used in lymphedema treatment, oncological skin diseases and others diseases.

**Objectives.** Study the ipsilateral and contralateral lymphatic drainage of the ventral and dorsal region of the thorax and abdomen. Study the lymph node chains. Evaluate the usefulness of lymphoscintigraphy for the identification the lymphatic drainage and the sentinel node. Correlate these finding, with the descriptive lymphatics anatomy.

**Materials and Method.** This study, has been done in 50 humans fetus, over the punctions in several skin sections of the thorax and abdomen. The injection was done with the modified Gerota's mass. Dissection is carried out after fixation of the specimen in 40% formaldehyde for 6 days, and then immersed in an 100 volume hydrogen peroxide solution for 24 hours (Prof. Caplan's bleaching technique). After this technique we proceeded to perform the diafanization, with Spalteholz technique modified by the author. Research was carried out at the Lymphatic Research Laboratory of the III Chair of Anatomy at the University of Buenos Aires.

**Result.** The anatomy of the lymphatic drainage of this region, evidence a superficial and deep lymph flow with a ipsilateral and contralateral drainage and lymph nodes chains. we want to emphasizes the contralateral direct drainage, which do not represent the descriptions of some classic authors, showing that the lymphatics system has not imaginary watersheds. its correlation with lymphoscintigraphy may be useful for lymphedema treatment and neoplastic diseases of this region.

## SPEAKING OF ANATOMICAL RESEARCH OF LYMPHATIC SYSTEM ON CORPSES, IN THE COUNTRY OF PAPAMILTIADES IS A GREAT HONOUR

A. PISSAS, R. RUBAY, E. PRIEUR, E. BOULAY, T. COSTE, F. CANOVAS, M. PRUDHOMME

*Unit of Treatment of Lymphedema and Department of Visceral Surgery, General Hospital Louis Pasteur, 30200 Bagnols sur Cèze, France*

*Laboratory of Anatomy, Faculty of Medicine of Montpellier, 34000, France*

*Laboratory of Anatomy, Faculty of Medicine of Nîmes, 30000, France*

The authors bring their experience of the injection of the lymphatic system on corpses those past 35 years. 3 000 corpses have been injected. They explain their main topic = stomach, pancreas, thyroid, esophagus, upper and lower limbs.

In each case the result of their study was very surprising in contradiction with the classical concept and unexpected. They essentially insist upon the practical technic of cadaveric injection. They used Papamiltiades solution (that is coloured cedar oil) and a personal one, coloured China wood oil.

Precisions are given concerning this very important part of the anatomical study. They convey their sadness in face of disaffection of the anatomical world, now concerning the injection and the study of lymphatics or corpses. They recall the memory of the prestigious anatomists the Greek M. PAPAMILTIADES and the Argentin I. CAPLAN.

*Friday 14 May 2010 - H. 12,45 - Round Table*

## Physiology and pathophysiology of the lymphatic system

### ANATOMY AND PHYSIOLOGY OF THE MANUAL LYMPHODRAINAGE

ELIŠKA O., ELIŠKOVÁ M.

*Charles University, First Faculty of Medicine, Prague, Department of Anatomy, Czech Rep.*

A number of techniques for decongestive treatment of lymphedema are recommended, but clinically most effective is manual lymphodrainage. It is performed by specific manual techniques which differ from the technique of the classic massage. The goal of the manual lymphodrainage is to influence the lymph flow from the lymphedematous tissue. From these reasons is necessary to know the physiological background of this process. This contribution is summary of our experimental results which were published during 15 years.

**Results and conclusion.** The repeated manual lymphodrainage performed with high pressure 100mmHg alters the wall of the superficial lymphatic vessels mainly the endothelial lining. The alteration is absent in deeply located vessels. The pressure of 30-40mmHg does not harm the structure of lymphatics. The measured pressures in lymphatics under the quiet conditions in most cases were in the range of 0-5 mm Hg. In lymphatics with the diameter of 300-400 micrometers the lymph flow in rest position was very low - 2-10 microliters. The every manual lymphodrainage stroke is followed for period some seconds negative pressure in lymphatics - what proves suction effect of manual lymphodrainage. In lymphedema is higher concentration of lymph proteins in lymphatics and interstitial tissue as well. By manual lymphodrainage decreases in lymphatics the total amount of proteins but for short time only. After 10-15 minutes the level of the proteins returns back to the starting values. During the manual lymphodrainage increases lymph flow in lymphatics distally and proximally to the scar. From these reasons is necessary to repeat the manual lymphodrainage with bandage again and again. The lymphodrainage is more effective than the other methods for example lasers, vibrator massagers, nerve-muscle stimulators.

## THE ROLE OF LYMPHATIC SYSTEM IN TISSUE HOMEOSTASIS- REGULATION OF TISSUE FLUID VOLUME, - REGULATION OF TISSUE FLUID VOLUME, RESPONSE TO MICROBIAL, TUMOR AND TISSUE SELF-ANTIGENS. WHITHER WE GO?

OLSZEWSKI W.L.<sup>1,2</sup>

<sup>1</sup> Department of Surgical Research & Transplantation, Medical Research Center, Polish Academy of Sciences, Warsaw, Poland

<sup>2</sup> Department of Transplantation Surgery, Central Clinical Hospital, Ministry of Internal Affairs, Warsaw, Poland

The lymphatic system of tissues (LS) secures the chemical environment of tissue cells regulating water volume and stabilizing tissue fluid (TF) proteins at physiological concentration. The “lymphatic space” comprising interstitial, perivascular and lymph vessels spaces serves as a reservoir accumulating surplus of TF in conditions of lymph flow obstruction or excessive production. This mechanism secures normal plasma capillary filtration (according to Starling’s equation), extravasation of recirculating immune cells and maintenance of normal supply of nutrients and removal of waste products from cells. Compliance of the “lymphatic space” is the basic property protecting tissue homeostasis. The lymphatic system of tissues (LS) recognizes microbial antigens through PAMP (pathogen associated molecular pattern) on migrating immune (dendritic cells, tissue macrophages) and endothelial cells. Cell toll-like receptors and humoral factors as coagulation and complement components, locally produced cytokines and chemokines and defensins mediate the in-tissue anti-microbial processes. The lymphatic system of tissues (LS) participates in tumor antigen recognition, active transport of tumor cells to lymph nodes, elimination or help for tumor cells to proliferate, creating tolerance to tumors. Does it react to necrotic tumor cells and tumor produced proteins? The lymphatic system of tissues (LS) eliminates own senescent and disintegrated cells and cellular debris from traumatized tissues. Recognition of self-antigens takes place in the lymph node preventing development of autoimmune reaction. Do lymph nodes dispatch tissue-specific lymphocytes to the damaged sites to regulate healing and reconstruction. Are memory tolerance cells to own antigens being raised in lymph nodes?

## PHYSIOLOGY AND PHYSIOPATHOLOGY OF LYMPHATIC SYSTEM

MICHELINI S., MONETA G., FAILLA A., CARDONE M., FIORENTINO F., CAPPELLINO F.

*San Giovanni Battista Hospital – Rome – Italy*

The lymphatic flow depends on two factors: 1) Increases of interstitial pressure secondary to muscular contraction and external compression; 2) Propulsive forces through the sequential contraction and relaxation of lymphangions separated by valves that prevent retrograde flow. Lymphangions respond to increased lymph flow like the heart responds to increased venous return, in that they increase their contractility. Lymphatics modulate their own contractility through more stimulus. Some Hormones and drugs can influence the lymphangions contractility. The lymph transport capacity of thoracic and right lymph ducts is influenced on the changes of intra abdominal and, above all, intra thoracic pressure that occur with respiration, as well as changes in central venous pressures through the cardiac cycle. The lymph system does not have a heart to propel lymph (tissue fluids that have entered the lymphatic system) through the system. Throughout the lymph system, can be found a series of lymph nodes, whose function it is to filter the lymph, trapping and destroying bacteria and other foreign particles. The lymphatic system has three primary functions: to return excess interstitial fluid, the absorption of fats and fat-soluble vitamins from the digestive system and the defense against invading microorganisms and disease.

The oedema appears when the lymph flow transport capacity becomes not sufficient respect to the fluid production. The common origin of venous and lymphatic vessels at microvasculotissutal level, permits to both systems to interact. In case of deficit of any system, the other one can support its function, as far as possible. When the deficit goes too far, the anathomo-functional failure increases and oedema appears. Very important is also the differential diagnosis among the cardiac, hepatic, renal oedema and the oedema induced by drugs.

## MODIFICATION OF SKIN’S SENSITIVITY OF THE FOREARM AND THE HAND FROM PATIENTS AFFECTED BY LYMPHEDEMA

J.P. BELGRADO<sup>1</sup>, C. ROBERT<sup>2</sup>, A. PLUSQUELLEC<sup>1</sup>, P. BRACALE<sup>1</sup>, P. BOURGEOIS<sup>3</sup>, N. RÖH<sup>4</sup>, R. ROSIELLO<sup>4</sup>, J.J. MORAINÉ<sup>1</sup>

<sup>1</sup> *Faculté des Sciences de la Motricité*

<sup>2</sup> *CHUB - Erasme*

<sup>3</sup> *Hôpital J. Bordet, Université libre de Bruxelles*

<sup>4</sup> *European-Medical-Center - Bruxelles*

**Purpose.** Patients affected by a lymphedema seem to have a higher risk in harming, for example burning themselves, than healthy people. The prevention of injuries takes an important place in the treatment of lymphedema because any wound increases the risk of lymphangitis or other infections. It has not been clearly established whether patients have systematically an altered skin’s sensitivity on the side of the affected limb compared to the healthy side. It is well known that sensitive fibres can be damaged by surgery, radiotherapy and chemotherapy. It is unclear whether the derm’s dilatation due to the edema and dermal backflow could also lead to an alteration of the skin’s sensitivity (due to the compression of the receptors or their own vascular network). We have found only a few publications dealing with that subject. These previous studies mention troubles of skin’s sensitivity at the internal part of the arm and the axilla. According to them, surgery would be the primary cause. However, they never explore the sensitivity of the forearm and the hand. Firstly, the study aims at determining whether there is a difference of skin’s sensitivity, at the level of the forearm and the hand, between the healthy limb and the oedematous one. Secondly the study will verify whether the reduced sensitivity areas are correlated with the dermal back flow areas determined by lymphoscintigraphy.

**Method.** 12 patients suffering from an unilateral lymphedema examined by lymphoscintigraphy were randomized. The skin’s

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⇒ sensitivity was measured on the healthy and oedematous side. Then the oedematous areas were compared to the corresponding ones on the opposite side. The thermal, tactile and vibratory sensitivity's measurements were realized by the three following validated methods: Thermode, Monofilament of Semmes-Weinstein and calibrated vibrator.

**Results.** In our study all patients have shown in the Semmes-Weinstein monofilament test a statistically significant reduction of skin's sensitivity on the oedematous limb (on both, forearm and hand).

The reduced sensitivity areas were correlated with those of the dermal back flow (assessed by lymphoscintigraphy).

**Conclusions.** In order to inform objectively the patient about the risk and to define the areas of reduced sensitivity, assessments of skin's sensitivity should be systematically added to the evaluation of lymphedema. It might be interesting to extend our study on different groups of patients and different stages of lymphedema. Eventually, we could analyze if there is a possible correlation between the results of the decongestive treatment and the possible recovering of skin's sensitivity.

Friday 14 May 2010 - H. 13,30 - Oral Presentation

## A. Session of oncology, surgical oncology, lymphangiogenesis and phlebolympheoedema (New York)

### OP1

#### THE EFFECT OF PACLITAXEL TREATMENT ON THE OCCURENCE OF LYMPHEDEMA OF THE ARM IN UNILATERAL BREAST CANCER PATIENTS WITH AXILLARY LYMPH NODE DISSECTION: A PROSPECTIVE STUDY

ADRIAENSSENS N.<sup>1</sup>, LIEVENS P.<sup>1</sup>, FONTAINE C.<sup>2</sup>, VAN PARIJS H.<sup>3</sup>, VANHOEY M.<sup>4</sup>, VERFAILLIE G.<sup>4</sup>, LAMOTE J.<sup>4</sup>, DE GRÈVE J.<sup>2</sup>

<sup>1</sup> VU Brussels, Department of Physical Therapy, Jette, Belgium;

<sup>2</sup> UZ Brussels, Department of Medical Oncology, Jette, Belgium;

<sup>3</sup> UZ Brussels, Department of Radiotherapy, Jette, Belgium;

<sup>4</sup> UZ Brussels, Department of Surgery Oncology Jette, Belgium

**Background.** Secondary lymphoedema of the ipsilateral arm (LE<sub>arm</sub>) is the most important chronic complication after dissection of the axillary lymph nodes (AD). Incidence rates for LE<sub>arm</sub> range from 5% to 56% within two years after surgery. (Lacomba *et al.*, 2010) Compared to other formulated risk factors, the influence of chemotherapy on the development of LE<sub>arm</sub> has not yet been studied.

**Objective.** To define the possible causal relationship between paclitaxel treatment and the occurrence of LE<sub>arm</sub> in breast cancer (BC) patients (pts) after unilateral breast surgery with AD. **Design.** A prospective observational population based study. **Setting.** University hospital in Jette, Brussels, Belgium. **Participants.** 52 early, unilateral, lymph node positive female BC pts, treated with breast surgery and AD. **Intervention.** The intervention group was treated with post operative adjuvant concomitant irradiation and anthracyclines, 4\*FEC(500/75/600mg/m<sup>2</sup>), followed by paclitaxel, 12\*weekly (80mg/m<sup>2</sup>). The control group received the adjuvant concomitant irradiation and anthracyclines, 4\*FEC(500/75/600mg/m<sup>2</sup>), only. **Main outcome measure.** Incidence of clinically significant LE<sub>arm</sub> (> 1,5 cm increase in arm circumference measured at two adjacent points compared with the non-affected arm). Measurements were conducted via tape measure during a follow up of two years post diagnosis. **Results.** 40% of the 52 pts developed an LE<sub>arm</sub>, of which 80% was developed early during the adjuvant therapy with paclitaxel (intervention group). An incidence of 13% LE<sub>arm</sub> was found retrospectively in the control arm. **Conclusion.** This study suggests the potential causal relationship between the previous concomitant chemo-irradiation and LE<sub>arm</sub>, through capillary leakage. This is the first prospective analysis of the incidence of LE<sub>arm</sub> in early BC pts treated with concomitant postoperative irradiation and anthracyclines followed by taxanes. The same research group is now further investigating whether and how the onset of LE<sub>arm</sub> during this treatment can be monitored, prevented and treated.

### OP2

#### THE ROLE OF COMPRESSION IN MAINTAINING THE VOLUME IN BREAST-CANCER RELATED LYMPHEDEMA

DR. ISABEL FORNER-CORDERO<sup>2</sup>

Lymphedema Unit. Hospital Universitario La Fe. Valencia (SPAIN)

While many authors have written about treatment of breast-cancer related lymphedema (BCRL) in the phase I, few studies are performed to determine the effects of different therapies in the maintenance phase.

To start with our work we had many questions that we wanted to answer: • the first one was to collect the most frequent complaints of the patients; • to design a score system of suitability; • to perform a descriptive analysis of the fitting, trying to quantify the frequency of the problems in our unit; • To see what was happening at long term, in the volume of the limb, and if the suitability was related to the maintenance of the volume; • And to see What was the compliance of the patients in our unit.

#### 1. SCORE SYSTEM TO ASSESS GARMENT'S SUITABILITY

Following the recommendations of the literature about compression, analysing the most frequent complaints of the patients about their garments and collecting the several fitting problems in our unit, we decided to describe all them. The objective was to design a score system to assess the suitability of compression garments for BCRL. It was designed by consensus of the team (doctor, lympho-therapist and orthopaedic technician), taking into account the common complaints of the patients and the main errors seen in the garments'



fitting. The items checked in the armsleeve are listed in the Table 1. Each item was assigned 1 point when the adaptation was correct and 0 when incorrect. The addition of points for every item gave us the final score, range 0 to 10. In the glove the addition of points gave us the final score range 0 to 5.

## 2. DESCRIPTIVE ANALYSIS OF THE SUITABILITY IN OUR UNIT

We performed a descriptive prospective analysis of the fitting of the garments in one 130 patients with BCRL in the maintenance phase.

One hundred twenty eight patients were wearing armsleeves and only one hundred had gloves. The mean of the score of the armsleeves was 8.9 (for a maximum of 10 points) and the mean of the gloves' score was 4.5 (maximum 5 points).

With the armsleeves, the most frequent problems of fitting were: redness at the elbow inside (43.8%), followed by too high pressure in the wrist (13.3%), and hand swelling (13.3%).

The most frequent problem with the glove was cyanosis at the fingers (37%) and incorrect finger length (7%).

In our sample the score obtained was good, but some problems were observed.

## 3. EFFICACY OF THE GARMENTS

We conducted a prospective study to assess the efficacy of garments in maintaining the volume of the arm in BCRL patients and to look for any relation between the suitability and maintenance of the volume. The change of Volume was calculated as a percentage from the baseline volume at 1st, 6th and 12th months after the adaptation of the garment. The deterioration of the garment was recorded.

The volume calculated with the Kuhnke formula: decreases at 1st month: a mean of -1.6% (95%CI:-2.6 to -0.3); returns to baseline after 6 months: 0.0% (95%CI:-1.0-2.0) and increases a little after 12 months: 1.5% (95%CI:-0.4-3.5).

We found an association between the increase of volume after 6 months and the lymphedema stage. The volume increased more in severe stages of lymphedema (p=0.005). No relation was found between the increase of volume at 1st month and the time of use of the garment. High score of the garment in our score system was related to a lower increase of volume after 6 and 12 months and this relationship was statistically significant. Each point in the score means a reduction in 2% of the volume.

In BCRL, the use of accurate and suitable garment seems to be effective for maintaining the volume of the arm, after 6 and 12 months since the prescription. This means that the armsleeve plays an important role in maintaining the arm volume at long-term, even later than recommended, and even when it seems to be deteriorated.

## 4. COMPLIANCE

The patients were using the armsleeve a mean of 11.4 hours per day, and the glove 7 hours per day.

No relation was found between the time of compliance and the independence of the patient to put it on. We analysed the relationship between the problems detected with the suitability assessment system and the compliance. Only hand swelling was associated with a significant decrease in the compliance. When the patients did not have hand swelling they wore the garment 11.9 hours per day, while for the patients with hand swelling the time of use was 8.4 hours per day.

The patient's satisfaction with the garment was good or excellent in about 80% of the patients. When patients were more satisfied with the garment, they used it longer during the day.

The patients wear their armsleeves the main part of the day but they often put off their gloves. The main factors influencing the use of the garment are the undesirable effect of hand swelling and the patient's satisfaction with the garment.

In this field, there's a need of further research.

Items	0 points	1 point
Knitting technique	<input type="checkbox"/> Circular knit	<input type="checkbox"/> Flat knit
Correct amplexness	<input type="checkbox"/> no	<input type="checkbox"/> yes
Cutting in the axilla region	<input type="checkbox"/> yes	<input type="checkbox"/> no
Cutting in other region	<input type="checkbox"/> yes	<input type="checkbox"/> no
Fixation system	<input type="checkbox"/> uncomfortable	<input type="checkbox"/> comfortable
Elbow shape	<input type="checkbox"/> no	<input type="checkbox"/> yes
Presence of folding	<input type="checkbox"/> yes	<input type="checkbox"/> no
Correct pressure at wrist	<input type="checkbox"/> no	<input type="checkbox"/> yes
Redness at elbow inside	<input type="checkbox"/> yes	<input type="checkbox"/> no
Hand swelling	<input type="checkbox"/> yes	<input type="checkbox"/> no
Total = addition of the items' punctuation (Maximum 10)		

Items	0 points	1 point
Knitting technique	<input type="checkbox"/> Circular knit	<input type="checkbox"/> Flat knit
Correct amplexness	<input type="checkbox"/> no	<input type="checkbox"/> yes
Cutting in the wrist	<input type="checkbox"/> yes	<input type="checkbox"/> no
Correct length of the fingers	<input type="checkbox"/> no	<input type="checkbox"/> yes
Fingers' cyanosis	<input type="checkbox"/> yes	<input type="checkbox"/> no
Total = addition of the items' punctuation (Maximum 5)		

Forner-Cordero I., Albiach-Gascó L., Maldonado-Garrido D., Muñoz-Langa J.: *A new method to assess garment's suitability in post-mastectomy lymphedema*. Eur. J. of Lymphol. and Relat. Probl., 2008; 18(53): 11-5.

Forner-Cordero I., Muñoz-Langa J., Albiach-Gascó L., Maldonado-Garrido D.: *Efficacy of garments in the long-term management of post-mastectomy lymphedema: preliminary results from prospective cohort study*. Eur. J. of Lymphol. and Relat. Probl., 2007; 17(52): 7-11.



## OP3

### **LONG-TERM VARIATIONS IN BREAST TISSUE WATER CONTENT FOLLOWING BREAST-SAVING SURGERY AND CONVENTIONALLY FRACTIONATED RADIOTHERAPY**

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Tissue dielectric constant (TDC) measurements at 300 MHz are useful to evaluate local tissue water (LTW) in arm lymphedema. Although measurements have demonstrated marked differences between lymphedematous and non-lymphedematous arms, there are no data on long-term variations in breast LTW following breast-saving surgery and conventionally fractionated radiotherapy (RT). MoistureMeterD (Delfin Technologies Ltd, Kuopio, Finland) allowing quick tissue-water specific measurements of LTW at any site of the body was applied. The MoistureMeterD generates a high-frequency electromagnetic (EM) field and sends the EM wave via a coaxial line and probe into breast. The EM field in the breast tissue will oscillate the tissue water molecules. From the properties of the reflected wave the breast TDC was calculated and followed for two years in 21 breast cancer patients having breast-saving surgery and conventionally fractionated RT. Breast skin and subcutaneous tissue water content were increased during RT followed by the decline post-RT. During acute delayed radiation reaction at 3-6 months post-RT a transient edema was noticed. After latent period of 6-24 months the tissue water starts to increase again due to the development of breast fibrosis. This can be related to the increase of collagen-bound water. We conclude that the tissue water specific instrument MoistureMeterD is a feasible instrument for the local assessment of breast edema. In further studies the breast edema will be correlated with changes in arm lymphedema.

## OP4

### **ICF FUNCTIONING CORE SETS IN LYMPHEDEMA SECONDARY TO BREAST CANCER**

MICHELINI S., CARDONE M., FAILLA A., MONETA G., CAPPELLINO F., FIORENTINO A., ROMALDINI F.

*San Giovanni Battista Hospital - Rome - Italy*

Aim of the work was to find a checklist of items to be used in the "d" domain of ICF, analyzing the specific level of functioning, in order to obtain a faster use and to facilitate the gathering of statistical data.

Second, profit was the finding of a correlation between the degree of oedema and the health of patients, in order to provide a useful tool for objectifying the degree of disability that follows a certain stage.

Since no systematic work has been established in individualizing limitations in functioning and health in 125 secondary lymphedema-related patient, we tried to define a typical spectrum of problems in functioning in patients with lymphedema secondary to breast cancer, with 14 specific items. The study of functioning in such patients could help us to comprehend better the health status.

The results show that with increasing oedema there is an exponential decline in health status of the patient, otherwise difficult to objectify through the disability scales commonly used in clinical practice, with the advantage of being able to use a universal language with a multi-professional access.

Further studies could consider subset of patients, for example breast-conserving treatment, mastectomy, radiation therapy, patient age, etc., in order to demonstrate differences in health condition and functioning in between these categories helping us in planning health interventions and resources, through a multidisciplinary assessment that can help communication and information process among patients, relatives, and healthcare professionals in the understanding functioning problems.

Ricci M., Sandroni L.: *Linfopatie: dati epidemiologici in età geriatrica. Il ruolo della riabilitazione.* La Linfologia italiana 1/2009, 22-24. World Health Organization: *International Classification of Functioning, Disability and Health.* Geneve, WHO 2001.

## OP5

### **BREAST CANCER LYMPHEDEMA AND PAIN, DUE TO BRACHIAL PLEXUS INJURY**

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Every day we see patients with different grades of upper limb lymphedema with movement limitations though without pain.

Normally pain appears with a tendinitis, shoulder limitation, acute infections, Sudeck syndrome, radiogenic plexitis or external compression of the plexus braquialis by tumoral advance, until frozen shoulder.

The three authors of this paper have analyzed 1775 lymphedema patients since 1990, out of them 1239 were patients with secondary arm lymphedema. Thirteen of them suffering of brachial plexopathy (1.05%)

Out of the 328 lymphedemas treated since 1990 by Dra. Richter, 227 cases (72%) were secondary to axillary dissection and/or radiation therapy, 598 lymphedema patients treated by Dr Gersman, 423 cases (70%) were secondary to the same procedure, 730 lymphedema patients treated by Dr Andrade, 510 cases (69%) were secondary to surgical and radiation therapy for breast cancer. Neurological symptoms, due to radiation therapy or tumor progression in the supraclavicular fossa, were found in 0, 5 to 1 % of the population checked up in this paper.

The authors concluded that, because it does not exist yet an effective treatment for the neurological damage, all the efforts must be targeted to avoid injury to the Brachial

Plexus or prompt diagnosis of recurrence of the tumor, in order to bring a better quality of life to the patient.

## OP6

### THE RELATIONSHIP OF LYMPHATIC SYSTEM AND THE SENTINEL LYMPH NODE IN THE SURGICAL TREATMENT OF CUTANEOUS MELANOMAS

CHAMPSAS G.R., KOSTOPOULOS E., FRANGOULIS M., KONOFAOS P., CHRISOSTOMIDIS C., PAPADOPOULOS O.

**Introduction:** Cutaneous melanoma can metastasize in lymph nodes, depending on its depth. Sappey, in 1870, described the lymphatic drainage of the skin. It is very important to know the condition of the lymph node in a melanoma patient. Micrometastases cannot be excluded. Solution was given by Morton, who first introduced the technique of the sentinel lymph node (SLN). Using a blue dye identified the first lymph node drainage area from the primary melanoma site. Krag's team, in 1993, introducing radioactive substance (Tc-99) recognized the SLN intraoperatively by a hand-held gamma ray detector. SLN biopsy procedure is indicated in melanoma patients with a Breslow >1,00 mm, and depth Clark IV. However, this indication has extended to some patients with a Breslow less than 1,00 mm if histology showed aggravating factors such as ulceration, regression, increased mitosis, filtration of vessels or lymphatic vessels.

**Materials and methods:** From October 2000 to December 2008 SLN biopsy was performed in 248 patients (128 men and 120 women).

**Results:** Concerning the location, SLN was identified most in the axilla (130/248 patients or 52%), followed by the inguinal area (77/248 patients or 31%) and head & neck area (41/248 cases or 16.5%). 29 patients had a double location of SLN. NM represented the most frequent histological type (164/248 or 66.13%) followed by SSM (61/248 or 24.6%), ALM (13/248 or 5.20%) and UNKNOWN (10/248 or 4%). In 26% of the cases SLN was found positive for micrometastasis and the patients underwent radical lymph node dissection. Combining the two techniques, the percentage of successful and accurate retrieval of SLN can reach the 97%. Prognosis of the disease is based on the status of lymph node groups draining the primary melanoma site. Subsequently, the outcome of the SLN biopsy (Positively or not) included in the new staging system by AJCC (American Joint Committee on Cancer). Complications following SLN removal included local infections, numbness, persistent burning sensation and pseudocyst formation.

**Conclusion:** Incidence of malignant melanoma is continuously increasing. SLN biopsy is important because represents actually the most accurate way to detect melanoma spreading avoiding any unnecessary surgery. Prevention, early diagnosis and appropriate surgical treatment of the primary lesion are necessary to control the disease.

## OP7

### MODULATION OF LYMPHANGIOGENESIS: A NOVEL EFFECT OF ASPIRIN AND NON STEROIDAL ANTI-INFLAMMATORY AGENTS?

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**Background:** Lymphangiogenesis is desirable in wound healing and in lymphedema. On the other hand, recent studies have implicated that lymphangiogenesis plays a role in tumor metastasis. Epidemiological studies have shown that regular uptake of non steroidal anti-inflammatory agents (NSAIDs) reduces the risk of development of some cancers. Although the effect of aspirin and of the other NSAIDs in angiogenesis is well documented, limited data exist for their effect in lymphangiogenesis. This systematic review aimed to synthesize data on modulation of lymphangiogenesis by aspirin and NSAIDs.

**Methods:** Pubmed, Scopus, Google Scholar, Science Citation Index were searched with the search terms "aspirin", "salicylates", "sodium salicylate", "salicylic acid", "NSAIDs", "cyclo-oxygenase", "lymphangiogenesis" up to and including February 2010. Only full publications were considered. Trials providing evidence on the mechanisms of modulation of lymphangiogenesis by NSAIDs were also included.

**Results:** A few experimental trials were identified. Most of them investigated the effect of NSAIDs on lymphangiogenesis in the context of lymph node metastasis, with the exception of one trial that investigated the effect of these agents on lymphangiogenesis associated with wound healing and another trial that focused on lymphangiogenesis in peritoneum subjected to dialysis. NSAIDs investigated included aspirin, celecoxib, rofecoxib, SC-560 etodolac, nimesulide. All the studies indicated that aspirin and the other NSAIDs inhibit lymphangiogenesis through cyclo-oxygenase II (COX II) inhibition. The proposed mechanism was COX II mediated regulation of vascular endothelial growth factor C (VEGF-C) expression at least in part through prostaglandin E EP1/EP4 receptors. COX II independent mechanisms of inhibition of lymphangiogenesis by salicylates and the other NSAIDs were not investigated.

**Conclusion:** Although further research validation is needed, published experimental data imply that aspirin and other NSAIDs inhibit lymphangiogenesis in the presence or absence of cancer cells. This proposed effect of NSAIDs might have therapeutic implications including chemoprevention, adjuvant chemotherapy, postoperative analgesia and treatment of lymphedema.

## OP8

### MODULATION OF LYMPHANGIOGENESIS: A NOVEL EFFECT OF ASPIRIN AND NON STEROIDAL ANTI-INFLAMMATORY AGENTS?

OLSZEWSKI W.L.<sup>1,2</sup>, ZALESKA M.<sup>1</sup>, CAKALA M.<sup>1</sup>, AMBUJAM G.<sup>3</sup>, JAIN P.<sup>4</sup>

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**Introduction.** The knowledge where does excess of tissue fluid accumulate in obstructive lymphedema is indispensable for rational physical therapy. Neither lymphoscintigraphic, ultrasonographic and MR images provide composite pictures of dilated lymphatics and expanded tissue space in dermis, subcutis and muscles. **Methods and results.** We visualized the "tissue fluid and lymph" space in skin and subcutaneous tissue of foot, calf and thigh in various stages of lymphedema in specimens obtained during lymphatic microsurgical procedures or tissue debulking, using special staining techniques. The volume of accumulated fluid was calculated from the densitometric data of stained tissue sections. We found that lymph was present only in the subepidermal lymphatics, whereas the collecting trunks were obliterated. Mobile tissue fluid accumulated in the spontaneously formed spaces in the subcutaneous tissue, around small veins and in, above and under the muscular fascia. Deformation of subcutaneous tissue by free fluid led to formation of interconnecting channels. The volume of subcutaneous free fluid ranged around 50% of total tissue and there were no differences in various stages of lymphedema. This could be explained by the presence of thick layers of subcutaneous fat tissue even in the most advanced stage of lymphedema with rigid skin. **Conclusions.** In lymphedema caused by obliteration of collecting trunks lymph is present only in subepidermal lymphatics, whereas the bulk of stagnant tissue fluid accumulates in subcutis and above and below muscular fascia. This knowledge should be useful for designing pneumatic devices for limb massage as well as for rational manual lymphatic drainage.

## OP9

### FORMATION OF NEW TISSUE FLUID CHANNELS IN LYMPHEDEMATOUS SUBCUTANEOUS TISSUE DURING PNEUMATIC COMPRESSION THERAPY

OLSZEWSKI W.L.<sup>1,2</sup>, ZALESKA M.<sup>1</sup>, CAKALA M.<sup>1</sup>, AMBUJAM G.<sup>3</sup>, JAIN P.<sup>4</sup>

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**Introduction.** In advanced lymphedema of lower limbs of postinflammatory, posttraumatic or postsurgical etiology the collecting lymphatics are obstructed. Lymph flow is practically nil. Tissue fluid accumulates in soft tissues spaces. Pressures generated during muscular contractions and massaging move fluid through artificial tissue channels. We tried to enhance formation of these channels by high pressure long-term pneumatic massaging. **Aim.** To observe formation of tissue channels during high pressure pneumatic therapy using lymphoscintigraphic and biopsy histochemical methods. **Material.** Four patients with lymphedema stage III/IV of lower limbs were investigated. An 8-chamber sequential pneumatic device was used for compression therapy. The parameters of compression were: inflation pressure 120-100mHg sequentially from chamber 1 to 8, inflation time of each chamber 55'', daily for 1 h for a period of 12 months. Lymphoscintigraphy was performed before, after 6 and 12 months. Skin and subcutaneous tissue biopsies were taken before and after treatment. **Results.** Lymphoscintigraphic imaging. After one year of massaging multiple wide channels filled with tracer could be seen on the internal aspect of thigh along large blood vessels running to the groin. There were no channels around the hip, in the hypogastrium and buttocks. Immunohistochemistry of biopsies revealed presence in subcutis and around veins of open spaces not lined by cells, negative on staining with LYVE1. **Conclusions.** Long term high pressure pneumatic compression brings about formation of multiple fluid channels running to the groin but not lateral parts of the limb. These channels are not lined with endothelial cells.

## OP10

### PHLEBEDEMA URGENCY TREATMENT OF THE FACE : 12 CASES

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**Aim.** Compression or thrombosis of vena cava superior (VCS) provoke important edema of the face. Superior vena cava syndrome (SVCS) requires an urgent management. **Methods.** We report the case of 12 patients, 7 women and 5 men, aged from 32 to 71 years who presented SVCS with dyspnea and important facial edema. 8 patients presented compression of VCS by mediastinal tumor and in 4 patients CT showed thrombosis of this vein. The first group (compression of VCS) had been treated by percutaneous stenting of VCS and the second group (thrombosis of VCS): 3 patients by thrombolysis and 1 by heparin and corticosteroids. No major complication was reported in short and long-term follow up in the 2 groups. There was no recurrence of the symptoms and the median survival after the stenting was 13 months. **Conclusion.** Vascular stenting for malignant SVCS allows a rapid improvement of the symptoms (dyspnea and edema). Some cases require thrombolysis.

## B. Session of anatomy epidemiology, physiology and pathophysiology (Boston)

### OP11

#### EPIDEMIOLOGY OF LYMPHEDEMA IN CZECH REPUBLIC: DEMANDS FOR HEALTH CARE (UP-DATE AND PERSPECTIVE)

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Demands for specialized health care depend on epidemiology of the disease in question. Concerning lymphedema, statistical data in CZ are not available (lack in obligatory reporting). Therefore, approximation of relevant data from comparable Middle European countries is needed (A, D, I).

**Approximated data.** Incidency of chronic lymphedema: approx. 800 cases/mill. inhabitants = 8.500 pts. Roughly 800 pts. need medical procedures 1x weekly; 300 of them as in-patients (radical CDT phase) and 600 pts as out-patients (maintenance phase). Total demands (personal and institutional): 60 qualified lymphotherapists on full-time job under M.D.-lymphologist's guidance, No. of lymphocentres depends on capacity and accessibility on regional level.

**Up-date.** Insufficient (only 16 lymphocentres, 14 beds and 32 lymphotherapists on full-time basis provide specialized treatment).

**Perspective.** To put lymphedema management in CZ on the level of EU and ISL standards the Czech Lymphologic Society started "Project of guaranteed lymphocentres". Workplaces granting up-date standards in complex lymphedema patients' management are supported and enrolled on CLS websides. Essential conditions are evidence of appropriate qualification of staff members and rational treatment régime according to the standards regularly checked-up by experts.

### OP12

#### LEGAL AND FINANCIAL ASPECTS OF LYMPHOLOGY IN SELECTED COUNTRIES OF EU

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**Introduction.** Our quality of life is significantly influenced by the volume and the quality of providing health care. This fact is evident in the states of EU where the basic harmonisation of legislation was achieved. Nowadays not only the legislators but also medical specialists try to keep this way on the field of medical law because that shall have a direct impact on the patient's health.

Concerning to lymphology this branch becomes more and more wide and the scope of therapeutic possibilities provided to a patient is more generous. All this should be based on a valid and adequate legal and economical structure that although still varies from state to state is generally "patient-friendly". Anyway even here we meet some loopholes in the law.

This work describes legal basis of lymphology and its financial consequences in public and private expenses in the states of EU as Germany, Belgium, France, Italy, Greece and Czech republic.

**Aim of the study.** To show the national legal basis of selected countries with description and comparison of public and private costs.

**Conclusion.** Answers on the following questions: What is the real structure of provided lympho-therapeutical health care in selected countries? What is the form of regularization of lympho-therapy in various states of EU? What is the way of approximation of this regularization? What is the kind and the level of costs expended on lympho-therapy and prevention? Does using of this therapeutic method have any financial - beneficial effect on patient and indirectly on state budget or not?

### OP13

#### ANATOMICAL PROJECT OF THE VARIATIONS OF CISTERNA CHYLI

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**Aim.** The cisterna chyli is a very important part of the lymphatic system. The aim of this study is to mention the variations of the cisterna chyli.

**Materials and methods.** The Laboratory of Anatomy of U.O.A. carried out this project at the Medical Jurisprudence of Athens during the last 5 years, on 112 cadavers (63 men, 49 women) with healthy lymphatic system. After the necrotomy we were searching for the cisterna chyli at its normal position (1<sup>st</sup> lumbar vertebra retroperitoneally). We were studying its formation, morphology and size. We were detecting and recognising cisterna chyli, detecting the beginning of the major thoracic duct, injecting serum for better detection, dissecting major thoracic duct and studying variations of its route, relationships and outfall. We were also detecting the beginning of the minor thoracic duct, injecting serum for better detection, dissecting minor thoracic duct and studying variations of its route, relationships and outfall.

**Results.** Cisterna chyli was obvious at 53%. At 18% its diameter was the same as major thoracic duct. In many cases major thoracic duct (starting from T12<sup>th</sup> level) had plexus form with or without cisterna chyli. Multiple channels at T11<sup>th</sup> level were found at 14 cases.





At two cases two lumbar trunks were broadened forming major thoracic duct. Cisterna chyli was located at T12<sup>th</sup> level at 38 cases, and at 1<sup>st</sup> and 2<sup>nd</sup> lumbar level at 74 cases. At 102 cases cisterna chyli was less than 5cm long, at 5 cases between 5 and 7cm and at 5 cases more than 5cm long. Cisterna chyli was polymorphic. At most cases it was like “Λ”, “pearl necklace” or “comma”

**Conclusion.** Cisterna chyli is an important part of the lymphatic system with only a few variations. Intensive study of the variations shows a variety that has to do with the body structure of the individual (height, sex, etc.). Good knowing of the formation and the route of the cisterna chyli is necessary, as it helps the better estimation of lymphangiographies and the understanding of everyday clinical problems. Knowing of the variations is also useful at lymphatic vessels abnormalities as chylothorax and hereditary abnormalities of thoracic lymphatic vessels.

## OP14

### ANATOMICAL PROJECT OF THE VARIATIONS OF MINOR THORACIC DUCT

D.A. LAPPAS<sup>1</sup>, N. STAVROPOULOS<sup>2</sup>, N. NIKITEAS<sup>3</sup>, E. FLOROU<sup>4</sup>, P. SKANDALAKIS<sup>1</sup>

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**Aim.** The minor thoracic duct is very important lymphatic vessel. The aim of this study is to mention the variations of the minor thoracic duct.

**Materials and methods.** The Laboratory of Anatomy of U.O.A. carried out this project at the Medical Jurisprudence of Athens during the last 5 years, on 112 cadavers (63 men, 49 women) with healthy lymphatic system. After the necrotomy we were searching for the cisterna chyli at its normal position (1st lumbar vertebra retroperitoneally). We were studying its formation, morphology and size. We were detecting and recognising cisterna chyli, detecting the beginning of the major thoracic duct, injecting serum for better detection, dissecting major thoracic duct and studying variations of its route, relationships and outfall. We were also detecting the beginning of the minor thoracic duct, injecting serum for better detection, dissecting minor thoracic duct and studying variations of its route, relationships and outfall.

**Results.** Minor (right) thoracic duct (1.25cm long on average) comes down along the internal border of scalenus anterior and empties into the junction of the right subclavian vein and right jugular vein. Two valves prevent lymph reciprocation. Three lymph trunks form Minor (right) thoracic duct: a) Right lymphatic jugular trunk, b) Right lymphatic subclavian trunk, c) Right lymphatic bronchomediastinal trunk. Sometimes these trunks empty separately and they don't form minor thoracic duct.

**Conclusion.** Minor (right) thoracic duct is an important part of the lymphatic system with only a few variations. Intensive study of the variations shows a variety that has to do with the body structure of the individual (height, sex, etc.). Good knowing of the formation and the route of the minor thoracic duct is necessary, as it helps the better estimation of lymphangiographies and the understanding of everyday clinical problems. Knowing of the variations is also useful at lymphatic vessels abnormalities as chylothorax and hereditary abnormalities of thoracic lymphatic vessels.

## OP15

### ANATOMICAL PROJECT OF THE VARIATIONS OF MAJOR THORACIC DUCT

D.A. LAPPAS<sup>1</sup>, I. GISAKIS<sup>2</sup>, N. NIKITEAS<sup>3</sup>, A. SMYRNIS<sup>4</sup>, P. SKANDALAKIS<sup>1</sup>

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**Aim.** The thoracic duct is the primary lymphatic vessel. The aim of this study is to mention the variations of the major thoracic duct.

**Materials and methods.** The Laboratory of Anatomy of U.O.A. carried out this project at the Medical Jurisprudence of Athens during the last 5 years, on 112 cadavers (63 men, 49 women) with healthy lymphatic system. After the necrotomy we were searching for the cisterna chyli at its normal position (1st lumbar vertebra retroperitoneally). We were studying its formation, morphology and size. We were detecting and recognising cisterna chyli, detecting the beginning of the major thoracic duct, injecting serum for better detection, dissecting major thoracic duct and studying variations of its route, relationships and outfall. We were also detecting the beginning of the minor thoracic duct, injecting serum for better detection, dissecting minor thoracic duct and studying variations of its route, relationships and outfall.

**Results.** In many cases major thoracic duct (starting from T12<sup>th</sup> level) had plexus form with or without cisterna chyli. Multiple channels at T11<sup>th</sup> level were found at 14 cases. At two cases two lumbar trunks were broadened forming major thoracic duct. Major thoracic duct enters thorax via aortic hiatus and moves along the thoracic segments of the spinal column, up to the 7<sup>th</sup> cervical vertebra, where it empties into the junction of the left subclavian vein and left jugular vein. It is 30-40cm long, 2mm wide, and although it moves at first lightly right along spinal column, at the T5 vertebral level it passes behind the oesophagus and goes ahead along it. The major thoracic duct: a) At 76% empties into the junction of the left subclavian vein and left jugular vein, b) At 13% the left subclavian trunk empties into the left subclavian vein at other distance, c) At 11% the bronchomediastinal trunk empties into the left jugular vein at other distance. When cisterna chyli is bicameral or tricameral, 2 or 3 major thoracic ducts vegetate, which unite forming one duct.

**Conclusion.** Major thoracic duct is an important part of the lymphatic system with only a few variations. Intensive study of the variations shows a variety that has to do with the body structure of the individual (height, sex, etc.). Good knowing of the formation and the route of the major thoracic duct is necessary, as it helps the better estimation of lymphangiographies and the understanding of everyday clinical problems. Knowing of the variations is also useful at lymphatic vessels abnormalities as chylothorax and hereditary abnormalities of thoracic lymphatic vessels.

## OP16

### NECK DISSECTION CLASSIFICATION AND STAGING

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The neck dissection is a surgical procedure for control of neck lymph node metastasis from squamous cell carcinoma (SCC) of the head and neck. The aim of the procedure is to remove lymph nodes from one side of the neck into which cancer cells may have migrated. Metastasis of squamous cell carcinoma into the lymph nodes of the neck reduce survival and is the most important factor in the spread of the disease. The metastases may originate from SCC of the upper aerodigestive tract, including the oral cavity, tongue, nasopharynx, oropharynx, hypopharynx, and larynx, as well as the thyroid, parotid and posterior scalp.

To describe the lymph nodes of the neck for neck dissection, the neck is divided into 6 areas called Levels. The levels are identified by Roman numeral, increasing towards the chest. A further Level VII to denote lymph node groups in the superior mediastinum is no longer used. Instead, lymph nodes in other non-neck regions are referred to by the name of their specific nodal groups.

The staging of head and neck cancer includes a classification for nodal disease. It is important to note the critical difference in size of nodes with break points at 3 and 6 cm. The staging system for head and neck malignancies considers all malignancies with palpable cervical adenopathy as Stage 3 or Stage 4, reflecting the grim prognostic implications of palpable nodal disease. The most important prognostic indicator in patients with squamous carcinoma of the head and neck remains the status of the cervical lymph nodes.

#### Classification of Neck Dissections

1. Radical Neck Dissection (RND) - removal of all ipsilateral cervical lymph node groups from levels I through V, together with SAN, SCM and IJV.
2. Modified Radical Neck Dissection (MRND) - removal of all lymph node groups routinely removed in a RND, but with preservation of one or more nonlymphatic structures (SAN, SCM and IJV).
3. Selective Neck Dissection (SND) (together with the use of parentheses to denote the levels or sublevels removed) - cervical lymphadenectomy with preservation of one or more lymph node groups that are routinely removed in a RND. Thus for oral cavity cancers, SND (I-III) is commonly performed. For oropharyngeal, hypopharyngeal and laryngeal cancers, SND (II-IV) is the procedure of choice.
4. Extended Neck Dissection - This refers to removal of one or more additional lymph node groups or nonlymphatic structures, or both, not encompassed by the RND.

## OP17

### RADICAL NECK DISSECTION: (RND) INDICATION AND TECHNIQUESOUR EXPERIENCE

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Radical neck dissection was the original surgical procedure described for treatment of metastatic neck cancer. Crile described the operation in 1906, and until recently, radical neck dissection was considered the standard procedure for management of both occult and clinically positive neck disease. In the last 2 decades, a shift toward the use of more conservative surgical procedures has occurred. This shift is predicated upon the following 2 important insights that developed over a period of time: 1) the removal of lymphatic tissue is not hindered by preserving adjacent nonlymphatic structures ; and 2) the specific nodal groups at risk for metastatic disease is predictable on the basis of the size, location, and other features of the primary tumor.

The lymphatic drainage of the mucosal surfaces and other tissues of the head and neck is directed to the lymph nodes located within the fibroadipose tissue that lies between the investing (superficial) layer of the deep fascia superficially and the visceral and prevertebral layers underneath. In this space, these lymph nodes tend to be aggregated around certain neural and vascular structures such as the internal jugular vein, spinal accessory nerve, and transverse cervical artery.

To describe the lymph nodes of the neck for neck dissection, the neck is divided into 6 areas called Levels. The levels are identified by Roman numeral, increasing towards the chest. A further Level VII to denote lymph node groups in the superior mediastinum is no longer used. Instead, lymph nodes in other non-neck regions are referred to by the name of their specific nodal groups.

Originally described by Crile in 1906, this procedure is an en bloc clearance of all fibrofatty tissue from one side of the neck, including the lymph nodes from levels I-V and lymph nodes that surround the tail of the parotid gland, the spinal accessory nerve, the internal jugular vein, and the sternocleidomastoid muscle. Radical neck dissection does not include the removal of the postauricular, suboccipital, perifacial, buccinator, retropharyngeal, or central compartment nodes. Previously used for neck disease of any stage, from microscopic to bulky nodal disease, this procedure is now limited to patients with advanced neck disease, recurrent disease after chemoradiation, or gross extracapsular spread to the spinal accessory nerve, sternomastoid muscle, and the internal jugular vein.

This operation involves the removal of the same lymph node groups as those involved in the radical neck dissection (levels I-V) but requires preservation of 1 or more of the following 3 nonlymphatic structures: the spinal accessory nerve, the internal jugular vein, and the sternomastoid muscle. The structure or structures preserved should be specifically indicated in the name of the procedure (eg, modified radical neck dissection with preservation of accessory nerve and internal jugular vein).

## OP18

### HUMAN KERATINOCYTES ARE STIMULATED BY OWN TISSUE FLUID/LYMPH AND PROLIFERATE

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**Introduction.** Keratinocytes (KC) are needed for covering large denuded skin areas. They can be cultured in artificial media, however, the yield is always low and viability is low. However, in vivo they can proliferate actively as it is observed in lymphedematous skin characterized by hyperkeratosis. In this condition tissue fluid and lymph (TF/L) contain high levels of growth factors and cytokines. The question arises what effect do lymph cytokines have on proliferation of KC and whether they can be used for obtaining large numbers of cells. **Aim.** To study the effect of human TF/L obtained from patients with obstructive lymphedema on expression of proliferation markers of lower limb keratinocytes. **Methods.** KC were cultured in various concentrations of TF/L. Lymph contained IL1, IL6, TNFalpha, KGF, EGF, VEGF, TIMP1,2 at higher levels than serum. To block the effect of cytokines on KC proliferation antibodies against IL1, IL6, TNFalpha, KGF, FGF and TGF, and their receptors on KC were used. After 7 days phenotypes were defined using moAbs against p63 (stem cells), CD29 (transient daughter cells), markers of proliferation: Ki67 and PCNA and differentiation: keratins 1,6,10,16 and 17. **Results.** Seven day culture in lymph showed increased percentage of p63 and CD29 positive cells. Moreover, there was increased number of dividing cells in lymph. The total yield after 7 days was 2- 3x higher than initial number of KC. Blocking of all but TGF cytokines decreased KC proliferation by 30%. Similar results were obtained after blocking of receptors. **Conclusion.** KC cultured in skin tissue fluid/lymph reveal high proliferation tendency mediated by a combination of locally produced cytokines.

## OP19

### STUDY OF LYMPH COMPOSITION IN POST-SURGICAL LYMPHOCEL AND ITS MODIFICATIONS BY THE TREATMENT

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The post-operative lymphocel can be considered a source of informations about the lymph composition. The lymphocele is lasting (from 2 weeks to more of 1 year) and is supplied by the lymph collectors coming from the natural corresponding anatomical area. The lymph carried by the collectors is the same produced by the tissues and collected by the initial lymphatic vessels at microvasculotissutal level.

The authors studied the following components of the serum and of the lymphocele (of subjects with and without associated lymphedema):

- Protein electrophoresis;
- Electrolytes;
- Leukocytes
- Platelets
- Interleukin 6
- TNF  $\alpha$

They observed: A medium concentration so composed: Albumine (with lymphedema 3,5 gr/lit. Without 3,8), Alpha1 globuline (with lymphedema 3,0% without 3,2%), Alpha2 globuline (with lymphedema 5,2% without 7,2%), Gamma globuline (with lymphedema 7,3% without 7,7), Na (with lymphedema 142 without 146), K (with lymphedema 4,1 without 4,0), Cl (with lymphedema 108 without 103), leucocytes (with lymphedema 139/microlit. without 101/microlit.), platelets (with and without lymphedema absent), Interleukin 6 (I6) (with 78pg/ml and without 46 pg/ml), TNF  $\alpha$  (with 31 pg/ml and without 22 pg/ml). A medium Protein concentration in the serum were 7.2 gr/lit in patients with lymphoedema, 6,9 in patient without lymphedema.

After three weeks of combined physical treatment (Group A - AG) and CPT+Lyndiaral (Group B - BG) the most important modifications were the medium decrease of the albumin concentration of 23% in AG and 28% in BG, and the medium decrease of the alfa2 globulines of 36% in AG and 44% in BG. In 6 cases (3 AG and 3 BG) it was observed a medium decrease of the I6 of 35% in AG and 54% in BG; a medium decrease of the TNF  $\alpha$  of 41% in AG and 51% in BG. The leucocytes were all lymphocytes.

This preliminary study demonstrates that the lymph composition is characterized by low concentration of protein respect to the serum and its difference in function of the production area. The composition can change in function of the pharmacological and/or physical treatment.



PP1

**THE INFLUENCE OF SUBSTANCES OF DIFFERENT CHEMICAL AND BIOLOGICAL NATURE IN SMALL AND MINUTE DOSES ON TISSUE LYMPHATIC DRAINAGE**

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The given work was fulfilled in the framework of the special purpose federal programme "Scientific and scientific-pedagogical cadres of innovation Russia" on "Creation of the system of interstitial transport regulation of metabolites of cellular and extracellular origin" N 02.740.11.0095. In his physiological experiments on white, inbred, healthy female mice with body mass of 25-30 gr., under narcosis the time of the marker's injected into mesentery tissue passage into lymphatic vessel was determined. A preparation was given per os, once a day, on an empty stomach for three days. Chemical elements (sulphur solution and metallic mercury), substances of biological origin (melliferous bee, adrenalin), substances of vegetative origin (*Atropa belladonna*, *Rhus diversiloba*, *Rhus radicans*) were used. Narcotized animals not given the preparation served as control.

**Results.** In control the time of the marker's removal was  $41,7 \pm 1,1$  min. Sulphur and adrenalin solutions in given dilutions accelerate lymphatic drainage: Sulphur 200 by 30%. Sulphur 1000 by 26%, Adrenalin C8 by 30% ( $p < 0,001$ ). The same substances in other dilutions and all the rest slowed down LD ( $p < 0,001$ ): *Rhus toxicodendron* C30 by 6%, *Belladonna* 3X by 6%. *Mercurius solubilis* C200 by 8%. Sulphur C6 by 12%. Adrenalin C30 by 19%, *Sepia* 3X by 20%. *Sepia* C6 by 22%, *Mercurius solubilis* C30 by 25%, *Apis* C6 by 27%. *Rhus toxicodendron* 3X by 27%, *Belladonna* C30 by 5%, *Apis* 3X by 12%, *Belladonna* C6 by 55%, *Mercurius solubilis* C6 by 77%, *Apis* C30 by 82%, *Sepia* C30 by 152%.

**Conclusions.**

1. All the preparations studied of metallic, biological and vegetative origin in small and minute doses influence LD.
2. The character of this influence and its degree depend on the preparation dose.
3. The effect revealed should be considered when using various preparations in medical practice. Besides it opens the perspective of expanding LD regulation possibilities.

PP2

**NEW METHODS IN HEALTHCARE**

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The developments in clinical lymphology, namely new methods introduced in Russia by Dr. Y.M. Levin, that formed the basis of "Endoecological Medicine" (EM), make it necessary to review not only the existing medical technologies but also those of healthcare and wellness.

It has been proved that the technologies of Endoecological Medicine (EM), providing sanitization of cellular environment and endoecological rehabilitation on the cellular level, assist in boosting the immune system.

With the further growing popularity of modern spa and wellness technologies, medicine is playing a very important role in their development. Until recently spa and wellness industry has not employed the existing methods of endoecological rehabilitation and treatment (ERT).

Our foundation has started collaboration with the Chair of clinical lymphology and endoecology (at the post-graduate medical education faculty of the Russian Friendship University), headed by Professor Y.M. Levin, Doctor of Medicine. We aim at elaborating a conception of introducing non-traumatic methods of ERT in spa and wellness programs.

The analysis of existing data makes it possible to achieve the following goals:

1. Improve sufficiently the standards of healthcare for clients of spa and wellness institutions
2. Expand and diversify clientele of spa and wellness institutions by involving those clients who cannot be qualified as completely healthy.

Realization of the above mentioned tasks will raise the medical standards of spa and wellness industry, starting a new, "endoecological" stage of its development.

This new direction requires elaborating technologies of progressive diagnostics, as well as introducing a function of "endoecologist" in the structure of spa or wellness center. For this purpose we plan to launch a new program of education for physicians.

World spa and wellness industry, enriched by the new method of endoecological rehabilitation, could make a serious contribution in global health protection.

### PP3

#### **ORGANIZATION AND APPLICATION OF GENERAL CLINICAL LYMPHOLOGY METHODS FOR PATIENTS WITH MULTIMORBIDITY IN SANATORIUM CONDITIONS**

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The system of endoecological rehabilitation at the cellular and organism level according to Levin (ERL) is a complex of procedures performed in strict succession. The key procedure is lymphatic drainage stimulation (LDS) of organs and tissues. It is preceded by preparatory procedures and followed by additional procedures. Naturally, ERL is combined with basic therapy for patients with multimorbidity. We have created the organizational model combining clear implementation of task set. 80 patients over 60 were observed. Out of them, 48 people (major group) received ERL and 32 people – reference group – received standard sanatorium treatment. The treatment duration in both groups comprised 10 days. The major preparation for LDS was terrilitin, the major LDS method was terrilitin electrophoresis (in the text below indicators in percent are represented in the form of ratio: major group/reference group). All patients had osteochondrosis: distributed – 63/67, limited – 37/33, 31/21 patients had osteoarthritis, 50/48 patients had coronary heart disease, 66/43 patients had arterial hypertension, 38/19 patients had discirculatory encephalopathy, 25/21 patients had diseases of veins of lower extremities, 13/17 patients had diabetes mellitus II. **Each** patient received a health card in which they daily assessed dynamics of their health with points from one to three. Card analysis revealed the following (in percent to the number of patients in the group – major group/reference group). Complaints about weakness – 63/84, sleep disorders – 52/88; depression – 38/59; irritation – 31/75, heartache – 35/72, headache – 42/75, pains in joints – 58/100, spinal pains – 58/84, pains in muscles – 27/47; pains in the right hypochondrium – 27/63, stomachaches – 23/47, dyspnea – 25/41, high heart beat – 46/72, head noises – 19/69, vertigo – 23/56, spots in eyes – 13/44, dyspepsia – 31/78, intestinal habit disorder – 54/63, dysuria – 31/41, backache – 33/81.

After receiving treatment, the number of patients from the major group with full disappearance or significant decrease of pathological symptoms was on an average by 22 percent over that of the reference group.

**Conclusion.** Application of the ERL with lymphatic system stimulation significantly improves the efficiency of sanatorium treatment of elderly patients with multimorbidity. Strict succession of the performed procedures is very important.

### PP4

#### **"LEVINASAN" AS A MEANS OF LYMPHATIC DRAINAGE STIMULATION IN COMPLEX THERAPY OF NONSPECIFIC FOR LYMPHATIC SYSTEM DISEASES AND IN THE ORGANISM SANITATION**

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It is well known that lymphatic drainage (LD) of organs and tissues secures the removal of substances released by cells and toxic metabolites penetrating tissues. But the theory and practice of this process regulation in nonspecific for lymphatic system (LS) diseases were developed comparatively not long ago (Levin Y.M.). In experimental research on mice carried out at the Clinical lymphology and endoecology chair in the Russian Peoples' Friendship University the ability of phytopreparation "Levinasan" to stimulate LD was studied. The animals (10) for 10 days were receiving phytopreparation "Levinasan" tincture as a drink. To evaluate tissue LD state narcotized animals were injected with the solution of lymphotropic dye – Evans blue-into mesentery. The time of complete removal of the marker from mesentery tissue to a regional lymphatic vessel was recorded. It was found out that in animals receiving Levinasan tincture LD was accelerated on an average by 30% ( $p < 0,01$ ). In other experiments it was proved that LD activation contributes to the cells supply of nutrients and to the removal from tissues of accumulating in them metabolites, disturbing tissue and cellular metabolism. The effect revealed allowed Levinasan to occupy one of the key positions in the system of endoecological rehabilitation at the cellular – organismic level (abbreviated to ERL). Positive effect of Levinasan application in ERL system was obtained:

1. in adults and children suffering from the organism contamination of ecological origin,
2. in elderly people suffering from polymorbidity,
3. in elderly people suffering from cardiovascular pathology,
4. in elderly people suffering from osteoarticular pathology,
5. in certain forms of hepatic pathology and other diseases.

There is a wide geography of Levinasans application in Russia: in sanatoria, resorts, hospital and polyclinic settings of different regions and towns. There is also some interest shown abroad.

## PP5

### LYMPHATIC SYSTEM FUNCTIONS REGULATION IN MEDICAL TREATMENT AND SANATORY INSTITUTIONS OF RUSSIA

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Regulation of lymphatic system (LS) functions – drainage, transport, barrier, detoxifying, immune, rheological, etc., and lymphotropic therapy (Yu.M. Levin) is included into basic components of endoecological rehabilitation of the organism at the cell and organism level (abbreviated name – ERL). ERL technology is being used in medical treatment and sanatory institutions of Russia and many other countries wider and wider. Lymphological methods in the ERL system opened the opportunity to activate interstitial humoral transport unavailable to medicine before and by this means to optimize metabolic process at cellular and extracellular level. We first speak of delivery of nutritious substances to cells and removal of worked out metabolites, which allows to receive unique treatment and sanitation effect. At the same time, introduction of the ERL system in medical treatment and sanatory institutions is associated with overcoming of certain difficulties. There are mainly three of them:

1. Psychological difficulties.
2. Educational difficulties.
3. Organizational difficulties.

1. Psychological difficulties are associated with inertness of a doctor's thinking. A doctor is not prepared to understand opened possibilities of LS functions regulation must overcome the natural psychological barrier.
2. Educational difficulties. A doctor is not familiar with the LS functions regulation methods and has to master unusual methods of working with new pathology targets.
3. Organizational difficulties. ERL system must be included into the treatment and sanitation service as a technology supplementary to other methods of treatment and recreation. At the same time, its application demands strict consistency of performing the procedures included into it.

Clinical lymphology and endoecology chair of the Russian Peoples' Friendship University and Endoecomed LLC have accumulated longstanding experience in overcoming of the said difficulties. Organization of ERL and LS functions regulation in dozens of hospitals and sanatoria of Russia demonstrated that the efforts made were really effective. A medical care institution receives a higher level of medical care to patients with various diseases, a more distinct effect of health improvement.

## PP6

### EFFECTIVENESS OF ENDOECOLOGICAL REHABILITATION AND BIOLOGICALLY ACTIVE ADDITIVE "LEVINASAN-1" DURING SANATORIUM AND RESORT TREATMENT OF ELDERLY PATIENTS WITH ISCHEMIC HEART DISEASE

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**Purpose:** evaluate the effectiveness of endoecological rehabilitation according to Levin (ERL) to reduce the number of risk factors of development of cardio-vascular complications during sanatorium and resort treatment of elderly patients with ischemic heart disease (IHD).

**Methods:** 78 IHD, angina pectoris I FC-II FC elderly patients underwent generally accepted sanatorium and resort treatment for 21 days: iodine-bromine baths, circular shower, neck area massage and magnetic laser therapy.

30 patients out of them (the main group) got in addition a course of endoecological rehabilitation: bilberry leaf tincture (limphostimulator), BAA "Levinasan-1" (hepatoprotector and limphostimulator), enterosgel (enterosorbent), amber acid (antioxidant), monitor cleaning of intestine. BAA Levinasan-1 comprises black currants leaf and lady's milk seeds. Therapy efficiency was evaluated by the changes in concentration of some indices of carbohydrate and fat metabolism in the blood serum after the treatment: glucose (GC), total cholesterol (TCh), triglycerides (TG), lipoproteins of low (LPLD) and high density (LPHD).

**Results:** In elderly patients with initially increased content of lipids in blood serum (TCh>6.24, TG>1.82, LPLD>3.36 mmol/l) and glucose (>5.5 mmol/l) sanatorium and resort treatment did not exert any influence upon their level. Patients who got additionally ERL and BAA Levinasan-1 showed reduction in the GC, TCh and LPLD (p<0.01) and normalization of TG (p<0.05) indices.

**Conclusions:** Introduction of ERL and BAA Levinasan-1, which provide for the increased excretion of excess metabolites from interstice through the lymph channel and optimization of their further detoxication into SRT of IHD, angina pectoris I FC-II FC elderly patients provides for the decrease in the number of risk factors to develop cardio-vascular complications, which is evidenced by the reduction of the initially increased indices of carbohydrate (GC) and lipid (TCh, TG, LPLD) metabolism.

## PP7

### **CARCINOMA ERYSIPELATOIDES**

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Carcinoma erysipelatoides, which is frequently called inflammatory carcinoma, is an uncommon form of skin metastasis. It originates most commonly from breast carcinoma. Since it clinically can evoke an inflammatory or infectious process (for example erysipelas), it is frequently misdiagnosed. We present two cases of metastatic skin lesions, originate from breast carcinoma.

## PP8

### **FACTS OF PARIETAL CONECTIVE STRUCTURES AND LIMPHATIC VESSELS AT FEMURAL ARTERIAL TRIPOD LEVEL**

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Two cm from commune femoral artery (CFA) fork, the parietal histological structure of the superficial femoral artery (SFA) is significantly different from deep femoral artery (DFA) architecture, as of the three arteries that represent the femoral arterial tripod (FAT): in the CFA wall and in SFA wall fibrillary elastic elements are predominant; in PFA smooth muscle structures are in majority. The essentially different situation of arteriosclerotic alterations on the femoral artery tripod is: seldom, highly seldom, in the walls of profound femoral artery, especially two centimeters after emergence and certain in case of common femoral and superficial femoral arteries. In experimental conditions, arterosclerosis develops laborious in dog subjects and easy in rabbits, on similar arterial segment (femoral tripod). We study parietal vasa lymphatic vasorum disposing in the three arterial segments of femoral tripod in three „animals – dog, rabbit, men” and have identify significant statistic aspects unproportional with frequency and importance arterosclerotic disturbances in nine (3x3) groups of studied samples (optical microscopy, hystoimmunology, electro microscopy).

In the under-endothelial connective layer (thicker in elastic type arteries – for CFA and SFA than in muscular type artery – DFA) and in the adventice – similar in connective structures (thicker in muscular type arteries) three categories of cellular elements were followed (in special): fibroblasts, macrophages and lymphatic vascular capillaries structures (markers and hialuronic acid).

Those three elements (arterial parietal components) can be and are direct participants (directly) in atherogenetic processes without inflammatory implications, frequent in CFA and SFA and rare/very rare in DFA and essential at rabbit (more ample) at man medium and rare in pigs (paradox?).

Segments of FAT were fixed, colored and examined as arterial parietal sections for man, for the pig and for the rabbit (in man – 3 cm from the arterial fork for each segment: CFA, SFA and DFA, in pig and dog – at 2cm, in rabbit at 1 cm).

## PP9

### **INTERRELATIONSHIP BETWEEN FAT CELLS AND LYMPHATIC ENDOTHELIAL CELLS IN AN ADJUVANT-INDUCED BENIGN LYMPHANGIOMA MODEL**

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Recent studies have paid more attention to the functional interrelationship between fat cells and lymphatic endothelial cells. We employed an adjuvant-induced benign lymphangioma model to investigate the interrelationship between them in the mouse. The lymphangioma was induced by two intraperitoneal injections of Freund's incomplete adjuvant (FIA) into young adult female C57BL/6 mice at an interval of 2~3 weeks according to Mancardi et al. (1999). After 2 weeks, we found peritoneal mesothelial cells became tall in height and lost their polarity, and gradually formed thick stratified cell masses all over the peritoneal membranes. At 1~2 months of induction, they showed typical honeycomb-like lymphangiomas consisted of various sizes of fat storing cells. At 3 months or longer periods, the fat storing tumor cells fused with each other and gradually formed tubular structures like lymphatic vessels. The typical lymphatic vessel-like structures expressed some of lymphatic markers, such as LYVE-1, Podoplanin and LA102 (Ezaki et al., 2006). The results may suggest a sequential changes from mesothelial cells to lymphatic endothelial cells via fat-storing lymphangioma cells after FIA stimulations. This phenomena may be interpreted as one of biological defense mechanisms to drain the extrinsic adjuvant oil out of the peritoneal cavity. The biological significance of FIA-induced lymphangiomas and the diversity of mesothelial cells are discussed with respect to the interrelationship between fat cells and lymphatic endothelial cells.

## PP10

### BLOOD SUPPLY TO THE LYMPHATIC VESSELS IN THE LEG: AN INCIDENTAL FINDING

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**Background:** There is no report and record of the blood supply to the lymphatic vessels. **Methods:** One lower limb of an unembalmed human cadaver was studied. 6% hydrogen peroxide was applied to find the lymphatic vessels using a surgical microscope. The vessels were injected with a radio-opaque mixture and dissected. During the dissection several sites of Para-lymphatics Arteriole Nutrient (PAN) vessels were found in close proximity to collecting lymphatic vessels in the medial aspect of the leg.

**Results:** The calibre of the lymphatic vessels is about 1mm. The calibre of PAN vessels is less than 0.1mm. The blood vessels were seen running along the lymphatic vessels. Some of them crossing the lymphatics and supplying the fatty tissue nearby and some running parallel on the lymph vessel walls. Histology sections show different sized PAN vessels containing blood cells situated close to the lymphatic wall and within the lymphatic vessel wall.

**Conclusion:** PAN vessels have been found and described. It will upgrade our anatomical knowledge also be of benefit for medical and/or scientific research.

## PP11

### RADICAL NECK DISSECTION: (RND) CLASSIFICATION, INDICATION AND TECHNIQUES

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Cancers in the head and neck region commonly metastasize to cervical lymph nodes. The term "neck dissection" refers to a surgical procedure in which the fibrofatty contents of the neck are removed for the treatment of cervical lymphatic metastases. Neck dissection is most commonly used in the management of cancers of the upper aerodigestive tract. It is also used for malignancies of the skin of the head and neck area, the thyroid, and the salivary glands.

Radical neck dissection was the original surgical procedure described for treatment of metastatic neck cancer. Crile described the operation in 1906, and until recently, radical neck dissection was considered the standard procedure for management of both occult and clinically positive neck disease. In the last 2 decades, a shift toward the use of more conservative surgical procedures has occurred. This shift is predicated upon the following 2 important insights that developed over a period of time: 1) the removal of lymphatic tissue is not hindered by preserving adjacent nonlymphatic structures; and 2) the specific nodal groups at risk for metastatic disease is predictable on the basis of the size, location, and other features of the primary tumor.

The radical neck dissection is defined as removing all of the lymphatic tissue in regions I-V including removal of the spinal accessory nerve, (SAN), sternocleidomastoid muscle (SCM), and internal jugular vein (IJV). It does not include removal of the suboccipital nodes, periparotid nodes except for infraparotid nodes located in the posterior aspect of the submandibular triangle, buccal nodes, retropharyngeal nodes, or paratracheal nodes.

Modified radical neck dissection (MRND) is defined as excision of all lymph nodes routinely removed by radical neck dissection with preservation of one or more nonlymphatic structures, i.e., SAN, IJV, SCM. Medina subclassifies the MRND into types I-III; where type I MRND preserves the SAN, type II MRND preserves the SAN and IJV, and type III MRND preserves the SAN, IJV, and SCM. The type III MRND is also referred to as the "functional neck dissection" as popularized by Bocca, however in his classic description the submandibular gland is not excised.

## PP12

### **SURGICAL ANATOMY NECK DISSECTION CLASSIFICATION AND STAGING**

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Cancers in the head and neck region commonly metastasize to cervical lymph nodes. The term "neck dissection" refers to a surgical procedure in which the fibrofatty contents of the neck are removed for the treatment of cervical lymphatic metastases. Neck dissection is most commonly used in the management of cancers of the upper aerodigestive tract. It is also used for malignancies of the skin of the head and neck area, the thyroid, and the salivary glands.

To describe the lymph nodes of the neck for neck dissection, the neck is divided into 6 areas called Levels. The levels are identified by Roman numeral, increasing towards the chest. A further Level VII to denote lymph node groups in the superior mediastinum is no longer used. Instead, lymph nodes in other non-neck regions are referred to by the name of their specific nodal groups.

The staging of head and neck cancer includes a classification for nodal disease. It is important to note the critical difference in size of nodes with break points at 3 and 6 cm. The staging system for head and neck malignancies considers all malignancies with palpable cervical adenopathy as Stage 3 or Stage 4, reflecting the grim prognostic implications of palpable nodal disease. The most important prognostic indicator in patients with squamous carcinoma of the head and neck remains the status of the cervical lymph nodes.

The current classification of neck dissections developed by the Committee for Head and Neck Surgery and Oncology of the American Academy of Otolaryngology-Head and Neck Surgery is based on the following governing principles:

- Radical neck dissection is the standard basic procedure for cervical lymphadenectomy, and all other procedures represent one or more modifications to this procedure (see the eMedicine article Radical Neck Dissection).
- When modification of the radical neck dissection involves preservation of one or more nonlymphatic structures, the procedure is termed a modified radical neck dissection (see the eMedicine article Modified Radical Neck Dissection).
- When the modification involves one or more lymph node groups that are routinely removed in the radical neck dissection, the procedure is termed a selective neck dissection.
- When the modification involves removal of additional lymph node groups or nonlymphatic structures relative to the radical neck dissection, the procedure is termed an extended radical neck dissection.

## PP13

### **THE EFFECT OF COMPRESSION THERAPY ON SECONDARY ARM LYMPHEDEMA**

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Secondary arm lymphedema is a chronic and distressing condition which affects approximately 30% of women who undergo breast cancer treatment.

Combined Physical Therapy (CPT) also known as Complete or Complex Decongestive Therapy (CDT) is backed by longstanding experience and generally involves two-stage treatment program as the standard therapy for lymphedema. Despite of well known effectiveness, it is time consuming and needs therapists specifically trained, educated, and experienced in this method. It is unclear and there is little good quality evidence whether the lymphedema reduction is mainly due to the MLD or the other components of CPT - CB and exercises.

In our clinic approximately 1600 patients with lymphoedema (mainly women after radical mastectomy) have been treated this method for 15 years. For the last 2 years some of them have been treated without MLD due to their urgent needs and longer waiting time for the procedures. The results were surprisingly beneficial.

50 postmastectomy women were assigned according to the time since mastectomy, oedema duration and body mass index into CB+EX group (25 women) receiving only compression bandaging plus exercises, or MLD+CB+EX group (25 women), who were treated with manual lymph drainage plus compression bandaging and exercises.

In both groups a significant reduction in affected limb volume (mean 364,6 ml in CB+EX group vs. 336,6 ml in MLD+CB+EX group,  $p < 0,001$ ) and percent lymphedema reduction (mean 42,2 % in CB+EX group vs. 33,2 % in MLD+CB+EX group,  $p < 0,001$ ) were found. During the treatment the largest volume changes were seen after the start of therapy.

In many countries, including Poland proper treatment is not necessarily administered and physical therapy for the treatment of lymphedema is not covered by health insurance.

Shortening the treatment phase of physical therapy without compromising therapeutic effects is extremely important not only for individual patients but also medical economics. Choosing compression bandaging (CB) together with exercises (EX) connected with MLD of the trunk can remarkably diminish the therapy costs and may be considered as a standard procedure in the first stage of program in lymphedema treatment.

## PP14

### COMPLICATIONS OF SENTINEL LYMPH NODE BIOPSY IN BREAST CANCER – A SINGLE INSTITUTION EXPERIENCE

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3. Medical School, University of Athens, Athens Greece.

**Background:** Axillary lymph node status remains one of the most powerful and precise prognostic factors in breast cancer. SLNB has been introduced into clinical practice, as a both safe and accurate staging procedure for early breast cancer. Many studies have reliably shown that SLNB, versus standard Axillary Lymph Node Dissection (ALND), is associated with lower morbidity rates and similar nodal staging value. Nevertheless, the absolute complication rates after SLNB vary widely among the different studies.

**Materials and Methods:** From February 2006 till November 2008, 147 consecutive patients with invasive breast cancer and both clinically and sonographically negative axillary lymph nodes underwent SLNB in our Department. In all cases a combined identification method was applied, which included preoperative lymphoscintigraphy and intraoperative radioguided surgery, along with blue dye injection. In 5 patients (3.4%) SLN could not be identified and a standard ALND was carried out. After frozen section or definitive histology, a total of 25 patients (17%) were found positive for SLN metastases and also proceeded to ALND. For the remaining patients a chart review analysis was conducted, focusing on morbidity matters.

**Results:** A group of 117 patients, aged 29 to 81 years (median age: 59 years), underwent SLNB alone as the axillary staging procedure. At the time of this analysis the median follow-up for those patients was 17 months (6 – 39 months). The average number of SLNs removed was 2.1 (range: 1-5). 2 patients (1.7%) presented a skin erythema at the site of blue dye injection, which resolved spontaneously in both cases. 1 case (0.85%) of wound infection was noted, which was treated successfully with oral antibiotics in an outpatient basis. There were 3 cases of axillary seroma (2.5%), none of which necessitated drain placement. 3 patients (2.5%) complained for axillary pain after postoperative day 2, but none at the 30-days reevaluation. Neurologic disorders (numbness, paresthesias) were reported by 7 patients (5.9%). Lymphedema (determined by the patient's arm circumference measurements) occurred in 6 patients (5.1%) and was categorized as mild in all cases. It should be noted that the median age of that latter "lymphedema-group" was 69.6 years (range: 51 – 81 years) and that the wound infection case was also included.

**Conclusions:** Our results, concerning the morbidity of SLNB, stand within the ranges as defined by previously published data. This ongoing analysis has already pointed us out a possible explanation for the wide variations of post-SLNB complication rates: the complete lack of unanimous methods in collecting and interpreting data.

## PP15

### AN EXTRAVASCULAR CELL MIGRATION PATHWAY TO LYMPHOGENIC ROUTE AS REVEALED BY SPECIFIC MARKERS FOR LYMPHATIC VESSELS IN THE MOUSE SPLEEN

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There have been very few reports detailing the lymphatic vessels (LVs) in the spleen. In this study, we used an immunohistochemical 3D-imaging technique to characterize lymphatic vessels in the normal mouse spleen and successfully demonstrated their spacial relationship to the blood vascular system for the first time. We used various specific markers for LVs such as LYVE-1 and podoplanin, and found their different staining patterns depending on their location in the spleen. The LYVE-1<sup>+</sup> LVs ran reverse to the arterial blood flow along the central arteries in the white pulp and trabecular arteries and exited the splenic hilum. In contrast, podoplanin was expressed in not only LVs but also stromal cells of the white pulp. These podoplanin<sup>+</sup> stromal cells formed fine meshworks surrounding the LVs and central arteries. Intravenous transplantation of GFP<sup>+</sup> splenic cells into normal recipient mice revealed that the donor cells appeared in the meshworks within 1 h and accumulated in the splenic LVs at 6 h after injection. The GFP<sup>+</sup> cells further emigrated to a draining celiac lymph node through the efferent LVs from the splenic hilum. These results suggest that these meshworks may act as an extravascular lymphatic pathway together with ordinary LVs and play a primary role in cell traffic and the blood circulatory system in the mouse spleen. The functional significance of these lymphatic pathways and their development in the mouse spleen are also discussed. This work is supported by a grant by G-COE of MERCER in TWU.



## Genetics and lymphangiogenesis

### IMMUNOHISTOPATHOLOGY OF HUMAN LEG LYMPHEDEMATOUS TISSUES - IS THERE LYMPHANGIOGENESIS?

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Recent progress in immunohistopathology and development of new biological markers of lymphatic endothelium allow us to assess the morphological and functional status of human limb lymphatics. We studied normal skin and collecting lymphatics of lower legs in healthy non-lymphedema subjects and in obstructive lymphedema patients. The main question is whether there is lymphangiogenesis in lymphedematous tissues.

**Objective.** To investigate lymphatic endothelium in skin superficial and deep system and collecting trunks in lower legs. Material and methods. Skin fragments and superficial lymphatics were harvested from 10 patients with obstructive lymphedema stage IV of lower limbs undergoing debulking surgery and 6 healthy (ischemic) legs amputated because of irreversible arterial changes.

Immunohistochemical staining of specimens was performed using monoclonal antibodies against LYVE1, prox1, podoplanin, chemokines CCL19 and CCL21, receptor CCR7, VEGF C and VEGF C R.

**Results.** (1) Control limbs: LYVE1 was detected in small skin lymphatics. In lymphatic trunks staining was very weak. Neither prox1 nor podoplanin were identifiable in skin and collectors. Slight staining for CCL19 and CCL21 was seen both in skin and collecting lymph vessels. No presence of receptor CCR7 was detected. VEGF C and its receptor flt4 were present in skin lymphatics but not in collecting vessels. Western blot of VEGF C and LYVE of collectors did not detect their proteins. (2) Lymphedematous skin and collectors: Neither LYVE nor podoplanin and prox1 could be identified in lymphatic structures. Also there was no chemokine CCL19 and 21 or CCL9. No VEGFC and its receptor were identified in skin and large lymphatics.

**Conclusions.** Normal lymphatics stain very weakly for LYVE1 and contain little of CCL19 and 21 as well as VEGF compared with embryonic vessels. No pictures of lymphangiogenesis were seen. Differentiated lymphatics probably contain less receptors, chemokines and growth factors. In long-lasting lymphedema lymphatic endothelium undergoes major degenerative changes.

### LYMPHVASCULAR GENOMICS AND LYMPHANGIOGENESIS: BACKGROUND, TERMINOLOGY, AND UPDATE

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This mini-review will provide a context for the historical background, basic science, and clinical evaluation of genetic/lymphangiogenesis/angiodyplasia disorders that lymphologists see in the clinic. Suggestions for a terminology adjustment (the lymph-heme and lymphedema/lymphangiodyplasia distinctions paramount) were first alluded to more than 20 years ago and discussed at International Congresses of Lymphology since then. At this time, precise terminology is even more pressingly needed as the angiogenesis field and its prominence expand rapidly, and a multitude of angiogenesis-related mouse genes and a few human genes are being discovered and clinical targets identified. This update will also offer guidance for the management of these disorders and point to unanswered questions that need to be pursued collaboratively in the translational "round-trip" from "bench to bedside to community".



## DIAGNOSIS OF LYMPHEDEMA

FOELDI E:

*Foeldiclinic, Hinterzarten - Germany*

## DIFFERENTIAL DIAGNOSIS OF LYMPHEDEMA

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Lymphedema, especially during its initial stage when it can be pitting, can masquerade many other causes of edema. Differential diagnosis of lymphedema should therefore include a variety of systemic or local diseases. The former usually present bilaterally and include heart, renal or liver failure, hypoproteinemia, myxedema or can be the side-effect of a variety of medications, such as some hormones, nifedipine, hydralazine and anti-inflammatory drugs. Local or regional causes that should be considered include mostly the far more common venous disorders, such as primary varicose veins, post-thrombotic syndrome, arteriovenous fistula, vascular malformations, trauma and compression of intra-abdominal veins from tumors or retroperitoneal fibrosis. Other local causes include infection, lipedema, hematoma, tumors, snake or insect bite, hemihypertrophy, dependency and post-revascularization. Detailed history and meticulous physical examination can usually direct the physician toward the correct diagnosis. Lymphedema itself is painless and can be suspected in case of limb or abdominal surgery, radiation, trauma, malignancy or infection, travel or residence in areas where filariasis is endemic or in patients with family history of lymphedema. On physical examination advanced lymphedema appears as non-pitting and affects the foot ("buffalo hump") and toes ("squared toes"). Stemmer's sign (defined as the inability to raise a fold of the skin of the second toe) is the hallmark of lymphedema. History/symptoms and signs of the conditions included in the long list of differential diagnosis of lymphedema should be carefully sought; the examiner should have in mind that occasionally lymphedema can coexist with other causes of leg swelling. Phlebolymphe-  
dema is the most common combination with the venous component being primary varicose veins, post-thrombotic syndrome or venous ligation, frequently in combination with injury of the lymphatics. In case of diagnostic uncertainty or suspicion of multiple causes of edema, venous duplex, lymphoscintigraphy, MRI or MR lymphangiography should.

*Friday 14 May 2010 - H. 17,30 - Round Table*

## Imaging of lymphatic diseases

### THE VALUE OF HIGH RESOLUTION ULTRASOUND – EXAMINATION IN LYMPHEDEMA

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**Background.** The continual improvement of ultrasonic devices enables us to make increasingly smaller structures visible. High-end ultrasonic devices with 17 MHz probes, super sensitive colour doppler, Harmonic-Imaging and Sono-CT improve the application of real time ultrasound in soft-part and subcutaneous areas in the field of lymphology as well.

**Patients and procedure.** The potential of ultrasound diagnostics for lymphedema, complicating diseases and therapeutic interventions will be demonstrated using an example of patients at the Földi-Clinic. We employed a PHILPPS IU 22 ultrasonic device with 17 MHz linear array probe, colour doppler; Harmonic-Imaging and Sono-CT.

**Results.** The measurement of skin thickness depends on the anatomical region and shows individual varieties. The fluctuation range in the thigh is between 1.3 to 1.6 mm (healthy test persons). In lymphedema patients the skin thickness was measured at over 2 mm (or at least significantly different to the other healthy side). Macrocytic and microcytic lymphangiomas could be detected. Benign and malignant diseases were diagnosed and necessary therapeutic steps were taken. The thoracic duct and expanded lymph vessels were illustrated in some cases.

**Conclusions.** High resolution ultrasound has improved the diagnostic options in lymphology. The examination method has few side effects and can be used repeatedly in all age groups.

**Disclosure.** The authors declare that they have no financial interests in the companies mentioned.

### THE CLASSICAL LYMPHANGIOGRAPHY TODAY

L. VLACHOS

## MAGNETIC RESONANCE IMAGING LYMPHOGRAPHY: THE STATE OF THE ART

E.P. DIMAKAKOS, A. KOUREAS

Many patients worldwide suffer from lymphatic diseases and in particular lymphedema. It is very important for the physician to know the anatomic status of the lymphatic system for determination of prognosis and to select the appropriate treatment. Multiple tools are available to help physicians with the diagnosis of lymphatic diseases including the imaging tests as MRI. Although MRI origins began in the late 1940's, only the 20 last years it began to play an important role in the imaging of the lymphatic system and particular for the diagnosis of the lymphatic diseases. MRI provides comprehensive information of both peripheral and central lymphatic system. Continued improvements in technology have decreased image artifacts and increased spatial resolution. MRI has provided extensive anatomical and functional information of the lymphatic system but the problem to visualize all the lymphatic system remains dissolve. For the time being it is easy to depict the lymphatic vessels but do not the lymph nodes and vice versa. Some investigators are occupied with differentiation diagnosis of lymph nodes: benign or non benign lymph nodes in very early stages of metastases of cancer. Some other investigators are occupied with only the diagnosis of lymphedema. There are different ways to approach and to depict the lymphatic system such as intravenously and interstitially or intracutaneously. The use of USPIO contrast agents, its derivatives and newer agents incorporating gadolinium have improved the visualization of vessels and nodes in animal models and of lymphatic disorders in man. So in our days MRI has increasing potential to be the lymphatic imaging modality OR TOOL of the future.

## LYMPHOSCINTIGRAPHIES IN THE MANAGEMENT OF LYMPHEDEMAS AND THEIR HEALTH COSTS REIMBURSEMENT IN BELGIUM

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Limbedemas of lymphatic origin, either primary, or secondary, represent a chronic disease sometimes heavy to bear by patients who suffer from. These lymphedemas imply specific care by physical therapists trained to the use of different therapeutic approaches. Until a few years, only the treatments of secondary lymphedemas after radiotherapy and/or complete nodal dissection for cancer were reimbursed by the national health insurance system in Belgium. The introduction of the primary congenital lymphedemas as a disease also reimbursed raised several problems and led to a redefinition of these situations and of their cares. The definition and classification of the lymphedemas in view of the reimbursement of their treatments by the national health insurance system are now officially based (not only on the sole clinical history but) mainly on their clinical severity and/or also on the result of their lymphoscintigraphic investigation (according to a methodological protocol and to diagnostic criteria adopted at the national level). The reimbursements of the treatments by the physical therapists were also adapted and improved. The lymphoscintigraphic investigations of the limbedemas became so essential in the management of the lymphedematous situations and in the reimbursement of their physical treatments in Belgium.

*Friday 14 May 2010 - H. 18,30 - Round Table*

## Lymphatic disorders in pediatrics

### LYMPHOLOGY IN PEDIATRICS

PAPENDIECK C.M., BARBOSA L., POZO P., BRAUN D., DELL'ORO V., BAJAROFF K.

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The main topics of lymphology appear in all its aspects clearly with identity in pediatrics. Primary pathology is there, in general, the only pathology, or as a part in combined vascular syndromes, or on bi or tri dermic syndromes. The recognition of these pathologies depend on the medical specialization- pediatric angiology does not exist – the social level, geographical aspects, and available resources for diagnosis and treatment. The great questions are the malformations – dysplasias – lymph angio adeno (nodal) dysplasias, and functional disturbances of the endothelium of the initial lymphatics at the interstitial level – no cannicular – tus summarizing the three possible lecausal levels of primary lymphedema.. Another relevant subject is the secondary lymphedema, in order of frequency – first the different types of parasites, first of all the different kinds of filarias, esquistozomiasis, among others; the podoconiosis, the amniotic bridles, the hair tourniquet syndrome, pharmacological causes, hormones, trauma, in all its shapes. The clinical signs of the reflux of all types of lymph, including chyle, accumulations, internal and external fistulas, lymphangiectasias, lymphangiomatosis, on the capillary level, and cystic congenital or acquired malformations, such as lymphangiomas – cystic hygromas – and post surgical or traumatic lymphoceles-dominant themes in pediatric surgery. Lymphangiomas with systemic lymph, and with chyle, such as in the bone disappearing syndrome and the mesenteric and retro peritoneal chylus cysts Primary lymphedema is a hidden and sophisticated “phantom” – not consensuated – congenital or not, known or unknown at birth. Among others, three genetic mutations, ( the Nonne Milroy disease, the distichiasis lymphedema syndrome and the telangiectasia- lymphedema syndrome,) and 22 identified syndromes compromising other tissues, and organs, taking in consideration 18 kinds of lymph-vascular and nodal dysplasias. Possibly the most frequent pathology in this context, statistically replacing the space of the secondary lymphedema of the adult, as a sign and as a syndrome, in combined vascular or bi and tri dermic (BAS- big angiodyspasic S) syndromes (more than 80) (Grades 0 to IV ) and more than 40 syndromes with lymphangiectasias. such as on the respiratory tract or the small intestinal level- Primary Lymphedema requires in pediatrics the differential diagnosis with all the kinds of edemas. Lymphology in pediatrics, requests identity.

## LYMPHOLOGY IN PEDIATRICS: DIAGNOSTIC ASPECTS AND THERAPEUTIC IMPLICATIONS

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The term "lymphatic dysplasia syndrome" includes primary (idiopathic) lymphedema syndromes, congenital chylothorax, idiopathic effusions (often chylous). The lymphatic dysplasia syndrome encompasses effusions of the pericardium, pleura, peritoneum, and lymphedema, without an identifiable cause, such as cancer or injury, and in absence of lymphangiomas, lymphangiectasis, and lymphangiomatosis. Searching for the terms "congenital lymphedema" and "lymphangiectasia", 27 and 12 entries, respectively, were found using Online edition of Mendelian Inheritance in Man (OMIM). Searching for the terms "ascites chylous" 7 entries were found using Online edition of Mendelian Inheritance in Man (OMIM). Searching for the terms "peripheral lymphedema", "intestinal lymphangiectasia", "generalized lymphedema", and "pulmonic lymphangiectasia" 41, 5, 85, and 17 entries, respectively, were found using London Dysmorphology Data Base. In addition, 67 entries could be found in a database for chromosome anomalies (the Human Cytogenetic Data Base). The majority of patients who are affected by lymphatic dysplasia syndromes have hypoplastic or aplastic peripheral lymphatics. One-third have obstructed proximal lymphatics. A few have hyperplastic peripheral lymphatics. Finally, some have incompetent lymphatic valves that develop into megalymphatics. Lymphedema is divided into two major groups, primary and secondary. Primary lymphedema is caused by a primary abnormality or disease of the lymph conducting elements of the lymph vessels or lymph nodes. According to the age of onset, primary lymphedema is defined as congenital (appearing at birth), precox (onset at puberty, age range 9-25 years), and tarda (after age 35). Secondary lymphedema is edema caused by disease in the nodes or vessels that began elsewhere (neoplastic or filarial) or began in the cellular-nonconducting elements of the nodes (lymphocytic proliferative disorders). Secondary lymphedema may also occur following surgical removal of lymph nodes or vessels; such as in mastectomy for breast cancer. Congenital lymphedema may be caused by a) congenital aplasia or hypoplasia of peripheral lymphatic, b) congenital abnormalities of the abdominal or thoracic lymphatic trunks, and c) congenital valvular incompetence, usually associated with megalymphatics. In the newborn, chylothorax, chylopericardium, and chylous ascites, as well as generalized lymphatic dysplasia may occur as separated or associated entities. More generally, all causes that may generate non-immune fetal hydrops, may also be the cause of lymphedema of the newborn or cavity effusions evidenced at birth. Diagnosis and management of a newborn affected by primary lymphedema is a challenge. Early diagnosis during the neonatal age is very important to prevent the rapid evolution of lymphedema. The diagnosis of lymphedema is mainly clinical and relies primarily on family history and physical exam. Initially, the edema is soft and pitting, but over the course of months and years, the swelling becomes hard and "non-pitting" and the skin thickens. Early diagnosis during the neonatal age is very important to prevent the rapid evolution of lymphedema. We report some examples of congenital lymphatic dysplasias in newborns, with a particular regard to congenital chylothorax that very often occurs at birth as a severe complication. Finally, we discuss the diagnostic flow-chart that more generally encompasses all conditions presenting as non-immune hydrops fetalis.

## LONG TERM THERAPEUTIC RESULTS OF PRIMARY LYMPHEDEMA IN CHILDREN

FOELDI E.

Foeldiclinic, Hinterzarten - Germany

Saturday 15 May 2010 - H. 08,00 - Oral Presentation

## C. Session of pathophysiology psychology lipedema, imaging, prevention and organization of treatment of lymphedema (New York)

### OP20

#### PHYSIOLOGICAL PARAMETERS FOR EFFECTIVE COMPRESSION THERAPY OF SWOLLEN LOWER LIMBS-SKIN TONOMTERY, TISSUE FLUID PRESSURE AND FLOW

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**Introduction.** Removal of excess of tissue fluid (TF) from injured tissue is indispensable for healing, irrespective whether it is an open or closed wound. **Aim.** Mechanical compression is at present the most effective method enabling tissue fluid to overcome tissue resistance and flow to non-swollen regions. **Methods.** We studied hydraulics of tissue fluid in swollen lower limb (lymphedema, venous ulcers, posttraumatic hematoma) using sequential pump with no deflation of distal segments. Skin tonometry, TF pressure and flow were measured in calf and thigh. **Results.** TF pressure generated by massage depends on skin rigidity. In advanced cases of lymphedema with fibrotic skin, pressures in the sleeve had to be raised to as high as 150mmHg to obtain the transmural pressure of 40 mmHg. This was the minimum pressures necessary for TF flow. Newly proposed tonometry helped to choose proper sleeve inflation pressures. Tonometer piston was pressed against swollen tissue to a depth of 10mm and applied force read off on the scale. Simultaneously, TF pressure was measured under tonometer. Force plotted against pressure gave hints how high massage pressure is required to move TF. Tonometer force of 1000g/sq.cm generated average TF pressures of 30mmHg, of 2000g/sq.cm 50mmHg, above 2000g/sq.cm 70mmHg. Massage pressures had to be set accordingly. Strain gauge applied around calf showed increase in circumferences depending on applied sleeve pressures. TF flow calculated from girth increase ranged from 1 to 20 ml per inflation cycle. **Conclusions.** Pneumatic compression to be effective should be based on prior skin tonometry and TF pressure/flow measurements.

## OP21

### LYMPHATIC DRAINAGE PATTERNS OF THE HEAD AND NECK: ANATOMICAL STUDIES AND CLINICAL IMPLICATIONS

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**Background.** There is an increasing clinical need for accurate evaluation of the lymphatic anatomy of the head and neck.

**Methods.** Fourteen halves of the superficial tissues of the head and neck and six specimens of the anterior superficial neck tissue from thirteen unembalmed human cadavers were studied. 6% hydrogen peroxide was used to detect the lymphatic vessels using a surgical microscope. These vessels were then injected with a radio-opaque lead oxide mixture. Each specimen was dissected, photographed and radiographed to demonstrate lymphatic vessels in the tissue. The final results were then transferred to the computer for analysis.

**Results.** Lymph collecting vessels were found in three regions of the superficial tissue of the head and neck – in the scalp, the face and the cervical region. They were dense in the scalp and lateral neck area, but sparse in the facial, anterior and posterior neck. Most vessels in the lateral neck were inter-nodal lymphatics. Two layers of lymphatic vessels were found in the anterior superficial neck tissue coursing in different directions.

**Conclusion.** An actual and accurate lymphatic map of the head and neck Lymphatic drainage patterns is presented to upgrade our anatomical knowledge. This map will be of benefit for the clinical management of trauma and malignancies in this region.

## OP22

### CHILDHOOD LIPEDEMA WITH EHLERS-DANLOS SYNDROME

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Lipedema is a disorder of abnormal and excessive subcutaneous adipose tissue deposition in the body. Lipedema has a genetic component, occurs mostly in women, symmetrically involves the lower body (hips and lower extremities), spares the feet and is poorly responsive to treatment with diet and exercise. We report an unusual case of lipedema in a 10 year old female who was also diagnosed with Ehlers Danlos Syndrome.

## OP23

### PSYCHOLYMPHOLOGY IN 2010

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There exist various psychologic factors and motivations influencing the pts. for accepting or refusing long-term therapy of lymphedema. These factors should be identified, positively influenced and directed by therapists. Authors present a short history of psycholymphology and its impact on complex lymphedema patients' management.

According to practical experiences based on the care of 453 lymphedema pts. from varying cause (10/2005 – 12/2009, follow-up nearly 4 years, 76 pts. underwent targeted psychologic interview) the authors characterize basic terms, spheres and up-date ways of psychosomatic approach to the pts. They are: (a) **communication** (pts. should gain the feeling of confidence and trust in their physicians, therapists' training in communication skill is needed), (b) **cooperation on the level of "adherence"** (active voluntary involment of the pts. in complex long-term treatment), (c) **"self treatment"** (generally accepted to be an unavoidable part of long-term complex decongestive therapy) and (d) **quality of life (QL) improvement** (depends first of all on treatment outcomes). Appropriate data are presented.

In conclusion the authors emphasise the impact of psycholymphology on complex lymphedema pts' management, necessity of psychosomatic approach to the disease and integrated somato-psychotherapy.

## OP24

### PSYCHOLOGY OF SUCCESS

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Pollution of the environment which has become the cause of the unprecedented pollution of the internal organism proved environment to be the corner-stone for the citizens of Bratsk 22 years ago. Timber Industrial Complex and Aluminum Plant are ones of the largest enterprises in the world and the most considerable pollutants of the town. We shall not discuss their "merits". This task is rather difficult. In 1987 the group of enthusiasts of different professions and outlooks was organized spontaneously. They were united by the common goal.

In 1992 Bratsk ecologists Gurina and Sandomirsky met professor Levin for the first time.

The group of 9 doctors took the training course on "Lymphology and endoecological medicine". Then on the 1<sup>st</sup> of September in 1993 they started their work in kindergartens and schools.

Results of 6 year period of work

32 schools: the 1<sup>st</sup> course of ERL - 18700 children; 2 and more courses of ERL - 13200

Results of treatment: good - 15200; satisfactory - 3500

No effect: 0,1%

24 kindergartens: the 1st course of ERL - 3800 children; 2 and more courses of ERL - 2600

Results of treatment: good - 3600; satisfactory - 200

No effect: 0,5%

1. Acute attack of gastric - intestinal diseases: reduction - 75%

2. Accute attack of chronic diseases: reduction - 50%

3. Nerve-psychological diseases: reduction - 25%

4. Cold diseases: reduction - 25%

5. The number of the backward students: reduction -52%

6. Adresses for the medical treatment - 50%

Organisation of the endoecological centre for the patients' reception with the full treatment course of ERL-G: electrophoresis with "Terrilitin" and "Imozimaza"; inhalations; course of ERL ("Katrel", additions); lymphatic therapy. Application of "DENAS" therapy (DENAS-glasses).

Today the centre works in five directions: pediatrics, therapeutics, cardiology and recover medicine.

## OP25

### EVALUATION OF AXILLARY LYMPH NODE METASTASES USING MR LYMPHANGIOGRAPHY WITH USPIO, IN PATIENTS WITH BREAST CANCER

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**Purpose.** To evaluate the utility of MR lymphangiography with superparamagnetic iron oxide (Resovist, Schering AG, Charlottenburg, Berlin, Germany) enhancement in the evaluation of axillary lymph nodes in patients with breast cancer.

**Materials and Methods.** Eighteen women with newly diagnosed breast carcinoma underwent MR imaging within 24-36 hours after the intravenous administration of SPIO, preoperatively. Imaging was performed with a 1.5-Tesla magnet by using conventional T1-weighted and T2-weighted spin echo sequences, a T2\*-weighted gradient echo sequence and Gd enhanced T1 weighted 3D GRE with fat saturation, using a slice thickness of 2.5 mm. MR imaging of the axilla was performed in the supine position using a cardiac surface coil. The axillary lymph nodes were assessed with regard to size, number, anatomic level of malignant lymph nodes, morphologic features and assessed as normal or diseased, according to nodal enhancement pattern after SPIO administration. The signal intensity ratio before and after SPIO administration of malignant versus nonmalignant lymph nodes were evaluated. Level I and II nodes of the axilla were assessed. Surgery was performed within 5 days after MR imaging. The MR findings were compared to the histologic findings.

**Results.** SPIO-enhanced MR imaging results were true negative in 9, true positive in 7, false positive in 0 and false negative in 2 of the 18 patients. No side effects were noted.

**Conclusions.** MR imaging with the use of SPIO appears valuable for assessment of axillary lymph node metastases in patients with breast carcinoma. These results suggest that this method of imaging may contribute to better preoperative lymph node staging.

## OP26

### INTEREST OF LYMPHOSCINTIGRAPHIC INVESTIGATIONS IN THE MANAGEMENT OF POST-THERAPEUTIC UPPER LIMB EDEMAS: UPDATED DATA

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**Background and question.** In the management of the secondary ULE, the most important information is: can the lymph flow out of the limb?

**Material and methods.** The lymphoscintigraphic investigations of 113 women (age ranging from 36 to 80 years) who were referred for evaluation of one ULE were thus reviewed and analyzed. Subcutaneous injections of <sup>99m</sup>Tc-labeled nanosized HSA colloids were performed in the first interdigital space of all patients and the upper limbs imaged following a well standardized protocol. Additional injections were performed thereafter at the level of the shoulder (IS) and/or of the chest wall (IW) following the results of these first injections.

**Results.** In 72 patients (63.7%), lymph nodes (LN) in the axillary (Ax) and/or supra-retro-clavicular (SRC) areas were observed (IS in 30 of these patients showed the same and/or additional LN in 25).

In 41 patients, no LN in these anatomical areas was observed. IS injection thereafter failed to demonstrate (despite massages) any LN and/or clear lymphatic drainage (LD) in 10 (25%). In other 31 patients, however, LD were observed with these IS injections towards homolateral Ax and/or SRC LN in 22, towards heterolateral Ax LN in 3 and, among the previous 17, towards additional posterior LN in 3.

In 19 mastectomized patients, IW injections also showed LD towards heterolateral Ax LN in 12 and parasternal LN in 3.

**Conclusion.** The lymphoscintigraphic investigations of the secondary ULE with our additional injections (IS and IW) show that the lymph can flow out of the edematous limb in 91.1% of the cases (although these lymphatic pathways need IS injection in 27.4% to be demonstrated). These informations are of the utmost importance for the physical management of these patients.

## OP27

### USE OF SENTINELLA (PORTABLE GAMMA CAMERA) IN LOCALISATION OF SENTINEL LYMPH NODES IN BREAST CANCER-FIRST U.K. EXPERIENCE

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Sentinel Node Biopsy is a standard practice for staging of the axilla in breast cancer. Combining radioactive isotope injection along with patent blue dye has been found to be the most specific and sensitive of all methods. Sentinella® is a new portable imaging camera used intraoperatively to produce real time visual localisation of Sentinel nodes. Sentinella® was tested in a controlled laboratory environment at our centre and we report the first use of this novel technique in Breast cancer patients from UK.

**Methods.** Sensitivity and spatial resolution of Sentinella® mobile gamma camera was compared with a CGC (conventional single headed gamma camera) normally used for sentinel node imaging. Spatial resolution was measured by calculating the full width half maximum (FWHM) of a line profile measured perpendicular to the image of a capillary tube filled with high activity concentration technetium-99m pertechnetate.

In the second experiment a special simulator mimicking the axilla was planted with seeds containing radiocolloid Tc, mimicking lymph nodes. Seeds were placed at varying depths in the axilla. For each combination of depths and radioactivity images with Sentinella® and cGC were obtained. Sentinella was also used in 10 patients who underwent Sentinel Node Biopsies

**Results.** Sentinella® resolution is comparable with the CGC for objects close to the camera i.e. ~ 5 cm, but reduces rapidly as you move away from the camera. For distances up to about 7 cm the Sentinella® with the blue collimator is more sensitive than the CGC. 68 Sentinella® images and 34 CGC images obtained from the simulated axilla. Sentinella detects high radioactivity (500 kBq) faster than CGC (1 vs 2.5min). In cases of low radioactivity (10kBq) Sentinella® was equally accurate and faster than cGC, when placed close to the skin. Identification of different number of beads with varying radioactivity was similar in Sentinella and CGC. Sentinella images used in ten patients undergoing Sentinel node biopsy corresponded accurately to the scintigram images.

**Conclusion.** Sentinella is accurate and fast in detecting radioactivity in the axilla. The anatomical shape of its collimator allows the operator to place it adjacent to the axilla, thus increasing its sensitivity in cases of low radioactivity. Its major advantage is that due to its small size it can be used by the surgeon in the operating theatre. Our independent tests and initial patient data confirms the excellent sensitivity and specificity of the machine in localisation of radioactive nodes. We expect that this new imaging technique will increase our pick up of sentinel lymph nodes intraoperatively that are missed due to inadequate visualisation and provide an alternative to static scintigram imaging.



## OP28

### MR-LYMPHANGIOGRAPHY FOR VISUALIZATION OF DERMAL BACKFLOW IN PATIENTS WITH LYMPHEDEMA OF THE LOWER EXTREMITY

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**Purpose.** Dermal backflow is associated with obstruction of the lymph collecting vessels. The aim of this study was to evaluate MR-lymphangiography for visualization of dermal backflow in patients with lymphedema of the lower extremity. **Material and Methods.** 25 consecutive patients with lymphedema of the lower extremity underwent MR-lymphangiography on a 3.0T-scanner (Magnetom VERIO, Siemens Sector Healthcare) with a highly resolved isotropic T1-weighted Fast low angle shot (FLASH3D)-sequence after intracutaneous injection of Gd-DTPA. Four levels were examined: lower leg, knee, upper leg and pelvis. One radiologist and one nuclear-physician evaluated depiction of lymph-collectors, diffusivity of drainage and number of visualized levels in consensus. All examinations were correlated with corresponding lymphoscintigraphy-examinations performed with colloid-bound <sup>99</sup>Tcm. Correlation of the two methods was assessed with weighted-kappa-coefficients. **Results.** All examinations were diagnostic and MR-lymphangiography and lymphoscintigraphy showed excellent correlation ( $r=0.84$ ). Normal and instant lymphatic drainage in unaffected extremities was observed in both modalities shortly after contrast application. Depiction of delayed drainage was concordant in both modalities. In 12 patients dermal backflow in terms of complete or partial diffuse lymphatic drainage was detected. Five of these patients showed localized dermal backflow with directed lymphatic drainage of the levels below. Compared to lymphoscintigraphy the leakage of the contrast media was more clearly depicted in MR-lymphangiography. The three-dimensional reconstruction capabilities proved beneficial for more exact anatomical localization of the lymph vessel obstruction. **Conclusion.** MR-lymphangiography and lymphoscintigraphy show excellent correlation. MR-lymphangiography allows for a more accurate anatomical localization of dermal backflow in patients with lymphedema of the lower extremity and may be a valuable tool for planning of microsurgical therapy.

## OP29

### COMPARISON OF RADIONUCLIDE LYMPHOSCINTIGRAPHY AND DYNAMIC MAGNETIC RESONANCE LYMPHANGIOGRAPHY FOR INVESTIGATING EXTREMITY LYMPHOEDEMA

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**Background.** Lymphoscintigraphy is widely used to image the lymphatic system. The aim of this study was to compare lymphoscintigraphy and dynamic magnetic resonance lymphangiography (MRL) in the investigation of extremity lymphoedema. **Methods.** Sixteen patients with primary extremity lymphoedema and two with Klippel-Trenaunay syndrome with lymphoedema were examined by lymphoscintigraphy using the tracer <sup>99</sup>Tc-labelled dextran, and by MRL using gadobenate dimeglumine as contrast agent. Morphological abnormalities and functional state of the lymphatic systems of affected limbs were compared between the two imaging. **Results.** Lymphatic vessels were imaged in 14 of 18 limbs with lymphoedema using MRL, compared with one of 18 using lymphoscintigraphy. MRL detected the inguinal nodes in 16 of 17 patients, whereas lymphoscintigraphy revealed inguinal nodes in only nine. MRL revealed more precise information about structural and functional abnormalities of lymph vessels and nodes than lymphoscintigraphy by real-time measurement of lymph flow in vessels and nodes. **Conclusion.** Dynamic MRL was more sensitive and accurate than lymphoscintigraphy in the detection of anatomical and functional abnormalities in the lymphatic system in patients with extremity lymphoedema.

## OP30

### ORGANIZATION OF ENDOECOLOGICAL REHABILITATION UNIT IN A HEALTH INSTITUTION

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It is well-known, that the key element in endoecological rehabilitation at a cellular-organismic level according to Levin (ERL) is medical methods, which influence Lymphatic System. That is why we consider that the organization of ERL in sanatoria, spa-wellness centers, hospitals, other health institutions affects operation of all units of such institutions. We have gained much experience in the organization of ERL center with consideration of specific character of medical and health activity in mega polis (Moscow). It includes: training of medical staff, organization of cooperation between ERL unit and other units of institution, specific character of personnel management, technical issues in preparation of rooms with consideration of sanitary and hygienic standards, provision with required diagnostic and medical equipment, its rational placement, adjustment of rooms for patients coming for ERL program, provision with required medicines, composition of ERL programs, creation of clear sequence of necessary procedures realization, adjustment of nutrition unit operation, advertising and promotion of ERL programs, control for the quality of patient treatment and other tasks. Location of ERL center near mega polis allows to reduce costs, which are connected with expensive diagnostic procedures. Specific character of ERL dictates the necessity for solution of new economic tasks. Clear highly efficient organization of the whole process is required along with formation of its logistics for the purposes of expenses optimization without worsening of health improvement quality in ERL programs. In order to solve these problems we need the following: a) specialized computerized system for the procedure prescriptions automation, which allows optimizing its fulfilment in the real time and b) reduction of expenses without worsening of health-improving activity. Solution of the last task required participation of heads of all units of institution: deputy general director on general issues, head doctor, chief economist (economic analysis, registration and forecasting), commercial director (marketing, sales department, advertising), chief manager of reception service, technical director (utility systems and communication networks), head of nutrition service. The cost structure of the ERL center in sanatoria near mega polis. Cost item: Salary 21%; Materials 4%; Salary taxes 6%; Taxes and rents 2%; ERL 8%; Leisure 1%; Other therapeutic procedures 3%; Amortization 1%; Food 10%; Profitability 15%; Utilities costs 5%; Overhead (advertising, promoting, etc) 17%; Maintenance and repair 7%.

### OP31

#### ENDOECOLOGICAL ROLE OF EDUCATION IN HUMAN ECOLOGY

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There is no denying the impact of the human environment on the state of his health currently. The researchers conclude that the ecological pressure on the person already exceeds the ability of the latter to adapt and respond adequately to the changing environmental conditions. A necessary condition for the survival of humanity is environmental education and extensive knowledge of environmental specialists from many sectors of the economy, medicine and ecology. The subject of ecology is entered in the training schedule almost all secondary and higher educational institutions of the Russia, but from the universities with environmental departments come many professionals who understand the problems of nature and the environment, but they know nothing about the mechanisms of changes in the human body, under the pressure of environmental factors. Human ecology is rarely taught as a separate discipline, but about Endoecology also mentioned that often. Endoecology - the science of the internal environment of the human body, as the environmental space for the cells, which is closely linked with the external human environment and responsive to changes of external environment and internal state. Developed by Y.M. Levin extracellular transport management system, ensuring the delivery of cells to nutrients and removing waste metabolites under physiological conditions and in pathology enhanced the ability of medical, rehabilitation and health technologies. These results formed the basis of disciplines for undergraduate students of biological and environmental sciences, "Fundamentals of Endoecology" and Masters "Endoecology and endoecological rehabilitation". All this developed and successfully used in secondary vocational education program of additional professional education of health workers "School of Clinical Lymphology and Endoecology".

### OP32

#### EFFECTIVENESS OF LIMPOTROPE THERAPY AND ENDOECOLOGIC REABILITATION IN PATIENTS WITH ENDOCRINE SYSTEM PATHOLOGY

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We represent the results of three investigations connected by the way of problem solving of the same authors group. In these investigations the complex therapy in patients with endocrine system pathology included methods of endoecologic rehabilitation by Yu.M. Levin (ERL) or lymphotrope therapy methods (LT). As the diagnostic criteria we used as well as traditional patented author methods of evaluation of rehabilitation organism possibilities, methods of immunology controle, psychology status and cognitive function evaluation. The first study presents the results of following 37 patients with diabetes mellitus type 2 (DM 2) in sanatorium. We revealed the improving of metabolic data and increasing of rehabilitation possibilities by ERL influence. The decreasing of insulin resistance by ERL was proved. In the second investigation we studied the influence of lymphotrope infusions of drugs improving the brain circulation and metabolism in 16 patients with severe DM and diabetic encephalopathy stage 2-3. The LT effectiveness was confirmed by statistically significant decreasing of latentness ( $p=0,001$ ) and deviation per cent ( $P=0,0008$ ) by P300. The decreasing of personal and situation anxiety levels correlated with increasing of social function ( $r=0,48$ ) and psychology health ( $r=0,34$ ). The third study presents the experience of ERL in 9 patients with autoimmune thyroiditis in natural or medicamental compensation with high level of antibodies to thyroperoxidase. They were compared with the group of 11 patients that received the course of plasmapheresis. The results revealed that the therapeutic effectiveness of ERL is the same as plasmapheresis, and its economical effectiveness is 5-6 times more.

### OP33

#### THE POSSIBILITY OF LYMPHOTROPIC THERAPY IN TREATMENT OF ACUTE TONSILLITIS IN CHILDREN

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Pediatricians in primary care deal with treatment of acute tonsillitis very often. Acute tonsillitis together with virus infections of upper respiratory tract and infections of middle ear is one of most often infection diseases in daily practice of pediatricians. **Purpose.** The aim was to find out, how the lymphotropic therapy was implemented in the treatment of acute tonsillitis in pediatric patients. **Methods.** We have treated 19 children (7-15 years old) with acute tonsillitis. The symptoms of acute tonsillitis included sore throat, hoarseness of voice, coated tongue, headache, inflammation and redness of tonsils with grey or yellow spots, difficulty in swallowing and moderate or high fever, swollen or tender lymph nodes. The size of submandibular and cervical lymph nodes were 2.0-4.0 cm x 1.0-2.0 cm. These patients have received combined therapy including lymphotropic regional therapy with antibiotics for mastoid process. 5 patients have recieved ampicillin, 5 – claforan and 9 – rocefin. The lymphotropic dose of antibiotics was 1/3 – 1/5 of average daily dose. The course - 3-5 days, once a day. The antibiotic diluted in 3.0-5.0 ml of physiologic solution with 0.5 ml 0.5% solution of Novocain. The speed of injection was about 0.2 – 0.4 ml/min. **Results.** A significant decrease in symptoms of acute tonsillitis was observed as early as 1-3 days after treatment startup. The size of submandibular and cervical lymph nodes became less than 1.5-2.0 cm x 0.5-1.0 cm. The use of lymphotropic injection of antibiotics in the treatment of acute tonsillitis leads to the earlier disappearance of the symptoms of intoxication in 91% of the patients. **Conclusions.** It was concluded that acute tonsillitis can be treated with a lymphotropic therapy. Lymphotropic injections provide targeted and long-lasting effect of the antibiotics. After injection into the mastoid process the drug slowly enters the inflammation area, where it is maximally accumulated, which allows to reduce the number of injections and the total dose of the antibiotic.

## OP34

### METHODS OF CLINICAL LYMPHOLOGY AT THE ENDOECOLOGICAL CENTER IN A HOTEL SETTING

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"Samal" Hotel is located in the resort zone "Borovoye" near the lake Shuchie. The Center of the endoecological rehabilitation at cellular and organismic level by Levin (abbreviated to - ERL), which operates in the hotel, uses technically simple methods of lymphatic drainage stimulation (LDS) and other health-improving procedures. The Phytopreparations like Levinasan, Katrele, electrophoresis of terrilytinum, hirudotherapy – general and at the Yuryin spots – are used for the stimulation of lymphatic drainage. During a year from 480 up to 560 patients undergo the ERL. Among them: - about 60 % with the cardiovascular diseases, - about 30% - with the gastrointestinal diseases, about 7% - with the upper respiratory tract diseases. The rest are with the otolaryngology or ENT, gynecological, bone and joint abnormalities, chronic radiculitis and others. The age of the patients is between 18 and 75; about 40% are men, and about 60% are women. The medical treatment course lasts 10 days. Accumulated data allow to make the following generalizations:

1. The effectiveness of noninvasive, technically simple inexpensive methods of clinical lymphology opens the opportunity of health support to the low-income category of the population.
2. Organization of the ERL Centers at the hotel setting – is the perspective way of the general population health improvement.

*Saturday 15 May 2010 - Oral Presentation*

## D. Session of treatment of lymphedema and its complications (Boston)

### OP35

#### TREATMENT OF LYMPHEDEMA. 15 YEARS EXPERIENCE IN COMPLEX DECONGESTIVE THERAPY. THE FOLDI METHOD IN ARGENTINA

GERSMAN A.

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The author presents his 15 years experience in CDT for lymphedema patients, performing by his self all the treatments. Also remarks the truth that must be emphasize in the treatment of lymphedema, and the myths that must be eliminate. Also point out that MLD is not an aesthetic treatment, and the role of massage therapists, beauticians, and nurses, that must avoid to put hands on people who suffers different illnesses.

### OP36

#### CONSERVATIVE TREATMENT OF GENITAL LYMPHEDEMA

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The present paper is not intended to show statistical results, but the author would like to remark the possible treatment for a specific group of patient that suffer of genital lymphedema. This traumatic problem in the man, could be a manifestation of the illness that causes a sever psychophysic dysfunction when it is evident. The author remarks the anatomy of the most frequent areas involved in the illnesses that produces genital lymphedema, several clinical cases, and the technique of CDT protocol.

### OP37

#### TREATMENT OF A CHRONIC SCROTAL OEDEMA: CASE REPORT

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We present the physical treatment of an important chronic scrotal oedema by a 55 years old patient. The oedema exists since a full year and was developed after testicle's infection. The patient has difficulties to walk and to urinate. **Treatment method.** The daily treatment is started with MLD and specific multilayers bandages in order to facilitate the resorption of the oedema by the inguinal and axillary lymph nodes. Specific multilayers bandages maintain a permanent compression and sustain the weight of the scrotum.

**Results.** After the first treatment period, the volume of the oedema was sufficiently reduced: the patient has recuperated a normal moving schema and normal urinating facilities. In a second step, the goal of the treatment consists in the maintenance of the results. After 8 months of treatment, with, at the end, a once a week treatment, the patient is recovering a good quality of life.

**Conclusion.** The total reduction of the scrotal oedema is not obtained. The finality of the physical treatment is to give the patient the possibility for recovering a good quality of life.

## OP38

### MYOFASCIAL – MANUAL LYMPHATIC DRAINAGE (M-MLD) IN COMPLEX THERAPY OF FUNCTIONAL PATHOLOGY IN TRAUMATOLOGY

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**Introduction.** Injuries in traumatology in terms of function of skin, soft tissues, vascular, nervous and lymphatic system (LS) represent very painful physical and mental traumas. Functional changes in the area of trauma develop on the level of immunology, nervous, hormones and other systems. It results in functional pathology of lymphatic system (LS) in the area of soft tissues. Based on the clinical picture the manual therapy is important – using techniques of manual lymphatic drainage (MLD) and soft techniques of myoskeletal medicine (MsM). This therapeutical intervention shall influence not only the process but also the result of the therapy. The effect is not only medical but also psycho-social and economical.

**Aim of the study.** To prove the necessity of application of *myofascial-manual lymphatic drainage (M-MLD) within the complex therapy immediately after* basic surgical treatment to influence the functional pathology.

**Methods.** 1) *MLD – manual lymphatic drainage*; 2) *MsM – myoskeletal medicine - techniques*; 3) *M-MLD – myofascial-manual lymphatic drainage* - especially in case of local edema and secondary functional lymphoedema. Myofascial techniques influence tender and trigger points of muscles.

**Results (from our experience: 1996-2010).** In the period of 15 years we treated and observed (from app. 2.160 patients: 360 burnt patients and 1.800 suffered from contusions of soft tissues, fractures and polytraumas).

In case of functional disorders in traumatology is preferable to use techniques of MLD and MsM. Excellent knowledge of anatomical-physiological patterns of LS and also good knowledge of MsM techniques (esp. palpation, barrier effect and effect of unblocking of tender and trigger points (TrPs)) is necessary and allow us to profit of the synergism of techniques by new method: M-MLD.

**Conclusions for practice.** *Organism has an enormous ability of reparation.* Well timed and regular use of M-MLD leads to better healing results (on the local and system reaction). *It influences oncotic pressure and improves the transportation of deponating and circulating immunocomplexes and stimulates erytrophage activity of macrophages in tissue.* Application of these methods shorten duration of the treatment up to app. 25-30%, subsequently it helps to cut down medical expenses. In most cases prevent developing of scars and contribute to general recovery according to gravity of trauma.

## OP39

### MANAGEMENT OF HIGH EXUDATION OF THE ULCERS IN PATIENTS WITH LYMPHEDEMA (First Results)

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**Introduction.** Exudation of ulcers and consequently the leaking and the wet of the lower extremities is a very common and big problem in patients with lymphedema which change dramatically the quality of their life and delay the healing of the ulcers.

**Aim.** The aim of this work is to study the safe and the effectiveness of the dressing wound foam in the management of the exudation and the wet of the bandage in patients with lymphedema

**Method - Material.** We studied 26 patients with ulcers who were randomized into two groups. Group A included 14 patients (9 women and 5 men- mean age 61.2 ±3,7 years) who were treated with Silver dressing Contreet foam for four weeks. Group B included 12 patients (9 women and 3 men- mean age 59.8± 4,2 years) who were treated with Biatain foam for four weeks. The inclusion criteria were patient with lymphedema, ulcers without signs of inflammation, ulcers > 10 cm diameter and superficial <0.5 cm. and ulcers with only venous and lymphatic diseases. We defined exudation as very high when the bandage was wet, moderate exudation as the leaking was out of the limit of the wound dressing foam and mild exudation as the leaking is in bigger area of the wound dressing foam. In group A were 6 patients with high exudation 5 patients with moderate exudation and 3 with mild exudation. In group B were 7 patients with high exudation 3 patients with moderate exudation and 2 with mild exudation. We got initial ulcer cultures the wounds were cleansed using sterile water and 10% povidone iodine solution and we changed the wound dressings twice a week. In order to compare better the groups we used a score for the grade of exudation. For high exudation we put 3 points for the moderate exudation 2 points and for mild exudation 1 point So initially we had a score of grade exudation for the group A= 2,21 and for group B = 2,42

**Results.** We recorded from group A 3 patients with high exudation, 6 patients with moderate exudation and 5 patients with mild exudation. In group B, 7 patients with high exudation, 2 patients with moderate exudation and 3 patients with mild exudation. We had a finally score of grade exudation for the group A = 1,86 (reduction = -16,13%) and for group B = 2,33 (reduction = -3,45%). In group A we got very excellent control of the exudation of ulcers. No side effects were presented in both of wound dressing foam. There was no significant difference between groups regarding bacterial load.

**Conclusion.** The wound dressing foam with silver after four weeks of treatment has better management of the exudation of the ulcers in comparison with the simple wound dressing foam (p=0,001 simple t-test) due to the wide antibacterial spectrum of the wound dressing foam-Contreet and its big absorbent capacity.

## OP40

### LYMPHOEDEMA AFTER BREAST CANCER TREATMENT PRIMARY PREVENTION: COMPARED STUDIES

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In our lymphology laboratory we compared the results of our previous study with a new one beginning with an accrual of 27 females in sub-clinical stage from 2008 to 2009.

Patient evaluation has led to a clinical report including the results of lymphoscintigraphy, which allows us to identify patients at risk of oedema onset: those who presented slower radiotracer flow, which might not otherwise be identified.

In 67% of exams carried out, lymphoscintigraphy has highlighted a slower radiotracer flow: in these cases patients have been included in the rehabilitative treatment, modified compared to the precedent study, consisting in the stimulation of alternative and Mascagni pathways, breathing exercises, cervical region and scapular-thoracic exercises, and the treatment of eventual related problems. Self-drainage has not been included in this study.

It is also essential that patients are informed about lymph-oedema and must cooperate towards the primary prevention, so, as in the precedent study, we have included them in the informative groups, composed of an angiologist, a physiotherapist, a psychologist and patients affected by lymph-oedema: the end-point is the information on lymph-oedema and primary prevention, the acceptance of hygienic-behavioural rules, and the active listening to the women's problems.

In this study, as in the previous one, we have not observed lymphoedema onset in patients with normal lymphoscintigraphy until now, while two patients with homolateral slower radiotracer flow have experienced lymph-oedema onset, secondary to accidental event which is, however, avoidable in previously informed patients.

These compared studies underline the necessity to attain the complete compliance of the patients, who have to interpret the preventive measurements, highlighted in the case of slower radiotracer flow, as only a fundamental, behavioural strategy in primary prevention.

## OP41

### PHYSICAL TREATMENT OF LYMPHEDEMA: WHAT IS THE PRECISE MISSION OF EACH PARTNER?

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In our country there is a very damaging situation concerning lymphedema. This situation although not dramatic concerns one important topic.

The most damaging concurrence concerns the treatment because it concerns patients – sick people frequently disappointed with a peculiar psychological profile. Very often economical problems decide (and it is a pity !) which treatment will be used, and this can have very detrimental effects on the patients. The truth belongs to nobody.

Progress can be made only during discussions with serenity, in scientific societies such as GEL (Groupement Européen de Lymphologie) or ISL (International Society of Lymphology).

Our experience concerns 2.000 patients treated in the Unit of Treatment of Lymphedema of the General Hospital Louis Pasteur of Bagnols sur Cèze.

This concerns primary or secondary lymphedema of the upper or lower limbs in men or women.

The authors describe their experience and the evolution of their ideas concerning the strategy of the physical therapy these past 25 years. They show that the treatment is based, according to their experience, upon three components :

1. the unit of treatment of lymphedema (a hospital structure);
2. the physician and physiotherapist who treat the patient after hospitalisation, and;

the patient himself because he has to understand his pathology, his situation in the evolution of it. By the details he gives to the practitioners he can teach the team of the unit treatment. Prevention of acute lymphangitis is done. To be efficient, this therapy has to use the three components together without overlapping. The unit of treatment is reserved only for very large lymphedema. It associates lymphatic manual drainage according to Leduc, pneumatic drainage (pressotherapy), sloping, multilayer bandages, physical exercise, medical treatment, choice of contention, other therapies in the experiment: vibrating table, electrostimulation, soft laser. Each patient is treated 8-10 h/day. The hospitalisation lasts between 1 and 3 weeks according to the importance and the age of the lymphedema. The result, for big lymphedema, is always very good. This hospitalisation occurs only one time each 3 or 4 years. This profit must be maintained by the physician and be physiotherapist. This scheme, which permits patients to collaborate more in their own therapy, allows progress in their treatment of lymphedema.

For in 2010 the main question in the physical treatment of lymphedema is: what is the precise mission of each partner in order to avoid the detrimental competition often seen in Europe?

## OP42

### EXPERIENCE ON THE OUTPATIENT MANAGEMENT PROGRAMME OF LYMPHOEDEMA PATIENTS AT THE UNIVERSITY GENERAL HOSPITAL OF LARISSA

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The multifactorial outpatient management programme of lymphoedema patients at the University Hospital of Larissa is based on the Lymphoedema Management Protocol of the Nij Smellinghe Hospital (Drahten Netherlands) and on the Lymphoedema Management Guidelines from the Lymphoedema Framework (2007).

The multifactorial group consists of Vascular Surgeons, Dermatologists, Physiotherapists, Dietician, Psychologist, Social Worker and Administrative Servant.

The duration of the programme is 3 weeks minimum and consists of patient evaluation (photos, limb measurement, evaluation questionnaires on the physical statue, the quality of life and the psychological statue of the patients), daily Complete Decongestive Therapy (CDT), with bandaging, manual lymph drainage, exercise and stockings at the end of the programme, psychological support, weight control and patient education on self-management.

Till today, though the number of patients that have followed the programme is not high, the preliminary data show that the majority of the patients had primary lower limb lymphoedema that had not yet been treated and that the patients apart from the diagnosis had now further knowledge about the lymphoedema nature, cause and management.

All the patients were satisfied with the programme outcome, but they were worried about the economical burden of the bandaging material and stockings and about the daily transfer to the hospital.

All the patients had substantial limb circumference reduction (up to 11cm in some cases), that was sustained at the follow-up after 6 months.

The majority of the patients reported physical and psychological statue improvement.

The best outcome was observed in patients with recent lymphoedema and in patients who followed the instructions about regular exercise at home.

That is why, in order to succeed early diagnosis, education and treatment, one of the future goals of the outpatient programme is public information and population screening in Thessaly.

## OP43

### INSULIN GROWTH FACTOR IN LYMPHEDEMA AND ITS CHANGE AFTER PHYSIOTHERAPY BY MAGNETIC FIELDS, VIBRATION AND HYPERTHERMIA

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**Background and Purpose.** An effective conservative treatment of lymphedema is aimed to passive (twisting tourniquet, pneumatic compression) or active transport (stimulating vanilloid receptors by physiotherapy by magnetic fields, vibration and hyperthermia, or manual massage) of fluid to the proximal direction. If lymphangiogenic cytokines are elevated and stimulate lymphangiogenic proliferation and anastomosis with the existing functioning lymphatics, the effects become more intensified. The authors have already reported favorable changes of VEGFR-3 and PDGF-BB\* as well as increase of calcitonin-gene related peptide and substance P after the physiotherapy. This time IGF, one the lymphangiogenic cytokines have been investigated.

**Material and Method.** Five cases of lymphedema patients are evaluated for serum IGF before and after the physiotherapy by magnetic fields, vibration and hyperthermia. Five normal volunteers are also examined in the same way for the control.

**Result.** All data are within normal limit.

**Discussion.** This time the authors have not obtained positive data. However this physiotherapy increases substance P and CGRP stimulating thermal, mechanical and pharmacological vanilloid receptors. On the contrary, manual massage stimulates only a mechanical receptor.

\***Acknowledgement.** The authors have already reported the result of PDGF to the contrary in the 21st international congress of lymphology, Shanghai, 2007. However after a detailed evaluation of all data we have come to the conclusion to the contrary.

## OP44

### A NEW LEVEL OF CLINICAL LYMPHOLOGY

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Historically formed medicine having concentrated on blood section of humoral transport missed the development of theory and methods to effect other functionally inseparable links of the organism fluid circulation: blood → tissue → lymph → blood. This serious omission cost human health dear.

Its correction required a long-term work of a large body of experimentors and clinicians (Levin Y.M. and coauthors, 1969-1996) - a patent of Russia N2132737, inventions N256947, N452343, N825079 and oth. "Clinical" lymphology mastered the methods which made it "all-clinical" science (general clinical, interclinical...) and became methodical basis for developing "Endoecological medicine". The main postulates of the created conception are as follows:

- §1. ANY PATHOLOGY REGARDLESS OF ITS CAUSE AND COURSE GRAVITY DISTURBS TISSUE HUMORAL TRANSPORT (THT), LYMPHATIC DRAINAGE (LD) AND LYMPHATIC SYSTEM FUNCTIONS (LS).
- §2. THE EMERGING DISTURBANCIES IN MANY RESPECTS DETERMINE THE COURSE AND OUTCOME OF THE DISEASE.
- §3. THE DISTURBANCIES ABOVE have been INDICATED AS THE TARGETS OF THERAPEUTIC MEASURES.
- §4. THE DEVELOPED THEORY AND METHODS OF REGULATING THT, LD AND LS DIVERSE FUNCTIONS (TRANSPORT, BARRIER, METABOLIC, IMMUNE, RHEOLOGIC AND OTH), ALLOW TO ELIMINATE OR REDUCE PATHOGENIC EFFECT OF DENOTED DISTURBANCIES.
- §5. THE METHODS DEVELOPED ARE NONTRAUMATIC, SIMPLE AND ECONOMICAL. A LONG-TERM EXPERIENCE OF THEIR APPLICATION (HOSPITALS, SANATORIA, INDUSTRIES, CHILDREN'S, EDUCATIONAL AND OTHER INSTITUTIONS ...) SHOWED THEIR EFFECTIVENESS:

IN CURATIVE MEDICINE;

IN SANATORY MEDICINE;

IN PROPHYLACTIC MEDICINE.

- §6. All said above, and first of all, the effectiveness of the methods of THT and LS function regulation, allowed us to state that implementation of these methods should become the law of the present day medicine. The existing disregard of discovered possibilities is associated with lack of understanding.

To put an end to such incomprehension is an actual task of up-to-date medicine, with clinical lymphologists playing a significant part in this process.

## OP45

### HUMAN SKIN TISSUE FLUID/LYMPH CYTOKINES AND GROWTH FACTORS - THEIR ROLE IN SKIN WOUND HEALING AND INFECTIONS

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**Objective.** Tissue fluid/lymph (TF) contains cytokines, chemokines, growth factors originating from blood, parenchymatous and infiltrating cells. These proteins regulate immune processes but also influence cellular events in lymph nodes draining inflammatory tissues. Aim. To measure concentration of pro- and anti-inflammatory cytokines and chemokines in human lower limb skin tissue fluid/lymph in normal subjects, patients with rheumatoid arthritis, obstructive lymphedema without and with bacterial dermatitis.

**Methods.** TF was collected from lymphatics in lower leg and cytokines measured with ELISA.

**Results.** 1) pro- and anti-inflammatory (IL1 $\beta$ , TNF $\alpha$ , IL1R $\alpha$ , MIP1 $\alpha$ , MCP1, IL6, IL12, TGF $\beta$ ), 2) regulating epidermal and dermal cellular (KGF, MMP9, TIMP 1 and 2, PDGF BB) and 3) lymphatic structure (VEGF, VEGF C, CCL21 and 27) were measured in patients: A) without any dermal conditions (N), B) with rheumatoid arthritis (RA), C) lymphedema without dermatitis (LD), D) lymphedema complicated by dermatitis (L). 1) Level of proinflammatory cytokines was highest in RA. In all patients groups it was higher than in N. IL10 and 12 levels were low. 2) KGF, MMP9 and TIMPS concentration was significantly higher than in N in all groups, 3) VEGFs and CCL21 and 27 were much elevated in lymphedema but not so much in RA.

**Conclusions.** Concentration of cytokines in tissue fluid/lymph varies depending on the type of processes in skin. Most of cyto- and chemokines are produced locally and their level exceeds that of serum. Measuring humoral factors in TF gives insight into tissue events that is not possible with measuring serum concentrations.

## OP46

### INTEREST OF DEEP INFRARED THERMOGRAPHY IN THE FOLLOW-UP OF THE TREATMENT OF SECONDARY UPPER LIMB LYMPHEDEMA

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**Background.** The skin's temperature of a healthy person is regulated at 32.5°C +/- 1 in any circumstance. Actually, thermal cameras are able to obtain surface thermograms of high precision and excellent resolution. Because of their easy operation and quick manipulation, these cameras can be used in the daily routine.

We evidenced in a recent communication that sometimes there is a very significant difference between the skin's temperature of the healthy and the edematous limb of patients with lymphedema. This difference can be in particular observed in those areas where the derm is oversaturated by the lymphatic backflow. These areas of backflow demand a specific attention in the global treatment of lymphedema.

Lymphoscintigraphy represents the golden standard examen for the diagnosis of the dermal backflow, but it needs an injection of radiocolloids. This is not conceivable in a regular follow-up of a treatment.

The skin's temperature of areas with lymphatic reflux on the edematous side is systematically lower than on the controlateral side. We have suggested to use thermography in the evaluation of treatment's efficiency on lymphedema accompanied by dermal backflow.

**Purpose.** To verify by thermography if the physical treatment – multilayer bandaging and manual lymphatic drainage – could modify the skin's temperature of the swollen arm.

**Method.** 9 patients with secondary lymphedema after breast cancer having had no physical treatment at least for three months before starting the study were recruited. A thermogram of both of their arms was realised under standard conditions before the start of the physical treatment. The physical treatment was designed as follows : 5 sessions of 30 min. manual lymphatic drainage completed by multilayered bandages constantly worn between the sessions . The thermogram has been realised before the first and after the last session.

**Results.** Initially all patients showed a significant difference of temperature between the two upper limbs. The edematous forearm was "colder". After the fifth session, the volume of the edematous forearm had decreased and its skin's temperature was equal to the healthy side.

**Discussion.** Thermography could be considered as an objective mean to pilote the treatment of lymphedema because it localizes areas of dermal suffering (areas of dermal backflow are colder) due to the high intradermal pressure.

Because of its high resolution, thermography shows the practioner which dermal areas are most touched by the edema and where he will have to concentrate on.

Thermography in the field of lymphology needs to be more largely explored, but should already be seriously considered as a mean of evaluation in the treatment of lymphedema in order to improve the evidence based practice.

## OP47

### GIVING TO WATER THE PROPERTY OF STIMULATION OF LYMPHATIC DRAINAGE AND ENHANCEMENT OF LYMPH OUTFLOW FROM ORGANS AND TISSUES

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New "Law of therapeutic medicine" formulated by Prof. Y.M. Levin (Russia) says: "Any pathology implies pathology of lymphatic system and environment of cells which in many ways conditions the run of the disease and its outcome. Removal of emerging abnormalities is essential for treatment and rehabilitation".

To implement this law, noninvasive methods of management of lymphatic drainage of tissues (LD) and interstitial humoral transport (IGT) were developed. This methods help to clean the organism of toxic substances on cellular level and on the level of surrounding tissues. The effect for rehabilitation and treatment of many diseases is unique. A new medical branch was started - CLINIC (practical) LYMPHOLOGY. They found medicines, medical herbs, developed physiotherapeutic procedures which can stimulate IGT and LD. Those include also our invention – a remedy for stimulation of lymphatic drainage (Russian patent for invention No. 2 336 880 dd. 27.10.2008), It is specific drinking water which underwent baromembrane processing and has oxidation-reduction potential from +200 to +343 mV, general mineralization from 25 to 130 mg/l and pH index from 6.9 to 8.3; the method of preparation of the remedy includes carrying the water to drinking condition and following baromembrane processing, i.e. filtering the water through permselective membranes with hole diameter 0.0001 – 0.005 µm. When tested on animals, the remedy increased LD by 20-30%. We developed the method of stimulating lymphatic drainage by consumption of the said remedy 30-40 minutes prior to and 2-2.5 hour after eating. Daily dose meets the physiological requirements. The first dose is taken on an empty stomach.

Characteristics of the said water comply with all the effective world standards for drinking water irrespectively of the approach of a particular country to quality of drinking water provided to its population.

We have applied for receipt of international patent effective in the territory of Europe, USA, Canada, South Korea, CIS countries, and Ukraine.



## OP48

### MANUAL LYMPHATIC DRAINAGE IN SECONDARY UPPER LIMB LYMPHEDEMA: WHAT ARE THE CONDITIONS FOR A REAL EFFICIENCY?

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**Method.** The author analyzes through the manual lymphatic drainage method proposed by Leduc (MLD) the conditions for an optimal efficiency.

The basic manoeuvres (calling and resorption) have an effect on the structure of the lymphatic system.

Anatomical, physiological, clinical and paraclinical arguments are exposed for the demonstration.

The important points for an efficiency are:

- Földi and Kubik anatomical descriptions,
- A. Leduc and O. Leduc experimental and clinical descriptions,
- the aim of the 2 manoeuvres,
- the notion of safe and affected territories,
- the direction of the manoeuvres,
- the pressure of the manoeuvres,
- lymphoscintigraphic images are used.

Personal experience of the author is exposed.

*Saturday 15 May 2010 - H. 09,30 - Round Table*

## Infections and cutaneous complications of lymphatic diseases

### INFECTIONS OF THE LYMPHATIC DISEASES: THE STATE OF THE ART

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Lymphedema is often complicated by infections especially ones involving the skin and the soft tissue structures. On the other hand chronic skin and soft tissue infections may result in lymphedema. Infections characteristically associated with lymphedema include the following: cellulitis, erysipelas, lymphangitis, lymphadenitis, cutaneous abscesses, and necrotizing fasciitis. In treating infection in patients with lymphedema, the physician should attempt to understand the staging of lymphedema and in addition identify the pathogen involved. Then an appropriate antibiotic therapy should be initiated. Issues relating to long term prophylaxis against infections in patients with lymphedema have not been clearly elucidated yet. The role of newer lymphedema therapies in reducing the risk for infection needs to be further addressed.

### HOW TO MANAGE LYMPHEDEMA-RELATED ACUTE DERMATITIS

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Lymphedema-related acute dermatitis is one of the most serious complications of lymphedema, because edema gets worse after it and if the attacks are repeated, elephantiasis may be developed.

The complication is thought to be mostly a kind of opportunistic infection due to non-pathogenic skin surface resident bacteria with a severe inflammation which subsides spontaneously in most cases.

When the patient suffers from mycotic infection, mechanical microtrauma or intertrigo, its incidence becomes more often.

**Treatment.** Oral NSAIDS with external application of steroid ointment is the treatment of choice. Systemic antibiotics may be given in rare exceptional cases with severe and longer symptoms. Actually the author has given it to merely 4 out of 392 attacked cases (1%). Such cases are all primary lymphedema although its reason is not known.

**Management and prophylaxis.** 1. Treat tinea by external application of anti-fungal drug with a perfect prophylaxis (mentioned during the lecture). Confirm the diagnosis by microscopic examination specially for nail mycosis. 2. Treat and inhibit microtrauma and intertrigo. If any, treat by external application of steroid ointment containing antibiotics or antimicrobial lotion. Always protect the edematous skin mechanically. 3. After the physiotherapy by pulse magnetic fields, vibration and hyperthermia (Ohkuma), its incidence becomes minimum. 4. Apply antimicrobial lotion to the whole edematous skin daily after bath taking. 5. Let the patients always carry a dose of NSAIDS tablet (subscription for a week which is kept in refrigerator) wherever the patients go (including shopping or park-walking). When the attack starts, take it as soon as possible and come back home to be in bed rest.

The sooner the patients take the less the damage becomes. Continue to take the tablets until high fever comes down. In most of the cases the patients do not need to visit the doctor. If the NSAID is given, extent of fever, necessary days, severity of following edema and subjective symptoms become minimum.

## FUNGAL INFECTIONS AND LYMPHEDEMA

ANNA SKIADA, MD

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The connection between fungal infections and lymphedema is a two-way street. Lymphedema is a risk factor for some fungal infections and, vice versa, there are some other fungal infections which result in lymphedema. Patients with lymphedema, due to surgical excision of axillary nodes or obesity, are prone to fungal infections of the skin, mainly candidiasis. The most common site of this infection are the interdigital areas of the feet. Lymphedema produces a closed space between the toes, with increased humidity. In addition, friction of the macerated surfaces leads to skin breaks. These lesions may become portals of entry for various fungi and bacteria, leading to more severe infections, such as cellulitis. Fungal infections leading to lymphedema are encountered mainly in tropical and sub-tropical areas. Chromoblastomycosis is a chronic localized infection of the skin and subcutaneous tissue that follows the traumatic implantation of the etiologic agent. The lesions are verrucoid, ulcerated, and crusted, and may be flat or raised. Satellite lesions may develop following autoinoculation and by lymphatic spread to adjacent areas. The mycosis usually remains localized with extensive keloid formation. Many different fungi cause this disease. The disease takes its common name from the fact that most of the etiologic agents are dark-walled. Elephantiasis and lymphatic stasis can occur as a result of secondary infections. Another fungal infection which may produce lymphedema is sporotrichosis. It is also a chronic infection of the skin and subcutaneous tissue and the etiologic agent is *Sporothrix schenckii*. It may disseminate to muscle, bone, central nervous system, lungs or urogenital system. Zygomycosis is another fungal infection which may be linked to lymphedema. Zygomycosis includes infections due to fungi of the order Mucorales and infections due to Entomophthorales. The latter are responsible for chronic infections in immunocompetent patients in the tropics and are often connected to lymphedema. In conclusion, lymphedema, especially if it is advanced, is a risk factor for skin and subcutaneous infections, mainly by *Candida* spp. These lesions may be portals of entry for bacteria, leading to systemic infections which may even be life-threatening. Fungal infections leading to lymphedema are mainly found in tropical countries.

## CUTANEOUS LESIONS AND LYMPHEDEMA

EFROSINI TSELE

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Lymphoedema is defined as the swelling of soft tissue due to accumulation of protein riched fluid in the interstitial space caused by reduced drainage of lymph by lymphatic vessels. The main purposes of lymphatics are a) to remove the excess of fluid from the interstitial tissue, the proteins and other particles acting as colloids and b) to secure the immunological response of the drained area by circulating the immunocompetent cells and by carrying the noxious agents to the lymph nodes. Impairment of the first function results in swelling of the drained area, hyperkeratosis, papillomatosis and thickening of the skin, lymphangectasies, lymphangiomas and lymphorrhea. Impaired lymph circulation results in infections of the dermis and subcutis, infections of the intrdigital spaces of lower or upper limbs, autoimmune and malignant diseases of the lymphoedematous area.

*Saturday 15 May 2010 - H. 11,00 - Round Table*

## Surgical oncology and lymphatic system

### THE SENTINEL LYMPH NODE IN SURGICAL ONCOLOGY

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Lymphatic mapping and sentinel lymph node biopsy (SLNB) represent an exciting development of surgical oncology and is accepted as a standard of care for nodal staging in breast cancer. The presentation SLNB has been performed with the aim of defining the rationale, the methods of detection, the accuracy and the current indications to SLNB in different solid neoplasms. In melanoma patients SN biopsy represents a standard procedure for staging purpose, although its therapeutic value is still under examination. In breast cancer patients is an accurate method in early stage disease and it can be useful for the selection of patients with axillary metastasis who should undergo standard axillary dissection. In gynecologic malignancies appreciable results are available in patients with vulvar and cervical cancer only. Patients with squamous cell vulvar cancer may benefit with SLNB, because a complete bilateral inguino-femoral lymph node dissection may be avoided whenever SN is free of metastasis. As regards to cervical cancer the radioguide technique seems promising in order to avoid in SLNB negative cases the pelvic lymphadenectomy. In urologic cancer the experience deals mainly with penile and prostate cancer. In both conditions very preliminary results suggest thus SLNB may enhance the pathologic staging of these neoplasms. In head and neck cancers and especially in clinically node negative squamous cells cancer the reliable of SN-guided neck-lymph node dissection seems promising. In thyroid cancer the SLNB is feasible but the role of this procedure is unclear due to the questionable biological meaning of nodal metastasis especially in well differentiated carcinomas. In lung cancer and especially in non-small cell cancer the SLNB is useful in the prognosis of isolated N2 metastasis can be better elucidated. In patients with gastrointestinal malignancies the intra-operative mapping is more complicated than other sites and skips metastasis being rather frequent. In gastric cancer recent data shows excellent results. In colorectal cancer the SLNB may reveal disease that might otherwise go undetected by conventional methods and those patients can be benefit by adjuvant chemotherapy.

## STUDY ON LYMPHATIC INVASION BY CANCER CELLS IN PATIENTS WITH COLORECTAL CANCERS

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We studied the relationship between morphological patterns of lymphatic invasion observed by D2-40 (monoclonal antibody, Dako M3619) immunohistochemistry and status of regional lymph node metastasis in cases of colorectal adenocarcinoma. The patterns of lymphatic invasion were classified according to morphology into four types; invading type, floating type, casting type, and casting with space type. Although the cases having all types of lymphatic invasion showed tendency to have higher numbers of positive metastatic lymph nodes compared to those without invasion, statistical difference was demonstrated among the cases having floating type and invading type of lymphatic invasion.

The state of regional lymph node metastasis is the most important prognostic factor for the patients with colorectal cancers. However, recurrence after curative surgery may take place in a few patients without any lymph node metastasis. Evaluation of the states of lymph node metastasis considerably depends on the personal skill and concentration in preparing lymph nodes from surgically removed materials. We looked for a complementary indicator to reinforce the information of regional lymph node metastasis. We focused on the morphological patterns of lymphatic invasion by cancer cells. So long as the cutting method to make histological preparations from surgically removed materials is standardized, personal difference in grading and typing of lymphatic invasion is much smaller compared to that in evaluation of prepared lymph nodes. Regarding such cases with negative lymph node study, in which invading type and/or floating type of lymphatic invasion is detected, we consider that lymph nodes with cancer metastasis might have over-looked in preparation. Chemotherapy should be indicated for the patients having lymphatic invasion of the risky types, even they reveal no lymph node metastasis. The term "lymphatic dysplasia syndrome" includes primary (idiopathic) lymphedema syndromes, congenital chylothorax, idiopathic effusions (often chylous). The lymphatic dysplasia syndrome encompasses effusions of the pericardium, pleura, peritoneum, and lymphedema, without an identifiable cause, such as cancer or injury, and in absence of lymphangiomas, lymphangiectasis, and lymphangiomatosis. Searching for the terms "congenital lymphedema" and "lymphangiectasia", 27 and 12 entries, respectively, were found using Online edition of Mendelian Inheritance in Man (OMIM). Searching for the terms "ascites chylous" 7 entries were found using Online edition of Mendelian Inheritance in Man (OMIM). Searching for the terms "peripheral lymphedema", "intestinal lymphangiectasia", "generalized lymphedema", and "pulmonic lymphangiectasia" 41, 5, 85, and 17 entries, respectively, were found using London Dysmorphology Data Base. In addition, 67 entries could be found in a database for chromosome anomalies (the Human Cytogenetic Data Base). The majority of patients who are affected by lymphatic dysplasia syndromes have hypoplastic or aplastic peripheral lymphatics. One-third have obstructed proximal lymphatics. A few have hyperplastic peripheral lymphatics. Finally, some have incompetent lymphatic valves that develop into megalymphatics. Lymphedema is divided into two major groups, primary and secondary. Primary lymphedema is caused by a primary abnormality or disease of the lymph conducting elements of the lymph vessels or lymph nodes. According to the age of onset, primary lymphedema is defined as congenital (appearing at birth), precox (onset at puberty, age range 9-25 years), and tarda (after age 35). Secondary lymphedema is edema caused by disease in the nodes or vessels that began elsewhere (neoplastic or filarial) or began in the cellular-nonconducting elements of the nodes (lymphocytic proliferative disorders). Secondary lymphedema may also occur following surgical removal of lymph nodes or vessels; such as in mastectomy for breast cancer. Congenital lymphedema may be caused by a) congenital aplasia or hypoplasia of peripheral lymphatic, b) congenital abnormalities of the abdominal or thoracic lymphatic trunks, and c) congenital valvular incompetence, usually associated with megalymphatics. In the newborn, chylothorax, chylopericardium, and chylous ascites, as well as generalized lymphatic dysplasia may occur as separated or associated entities. More generally, all causes that may generate non-immune fetal hydrops, may also be the cause of lymphedema of the newborn or cavity effusions evidenced at birth. Diagnosis and management of a newborn affected by primary lymphedema is a challenge. Early diagnosis during the neonatal age is very important to prevent the rapid evolution of lymphedema. The diagnosis of lymphedema is mainly clinical and relies primarily on family history and physical exam. Initially, the edema is soft and pitting, but over the course of months and years, the swelling becomes hard and "non-pitting" and the skin thickens. Early diagnosis during the neonatal age is very important to prevent the rapid evolution of lymphedema. We report some examples of congenital lymphatic dysplasias in newborns, with a particular regard to congenital chylothorax that very often occurs at birth as a severe complication. Finally, we discuss the diagnostic flow-chart that more generally encompasses all conditions presenting as non-immune hydrops fetalis.

## MANAGEMENT OF LYMPHATIC LEAK AFTER ONCOLOGIC SURGERY

I.G. KAKLAMANOS

Lymphatic leak of different extend appears after virtually all types of surgery, addressing regional lymphatic basins, during resection of solid tumors. The leak often manifests itself clinically as a large sub dermal collection or a wound infection with subsequent flap necrosis. When this type of major morbidity appears, there is always a delay in adjuvant treatment jeopardizing a favorable oncologic outcome.

Types of operations that complicate more often with major lymphatic leak are radical lymph node dissections in the area of the groin, axilla and the neck as part of surgical treatment of melanoma, breast cancer and cancer of the head and neck.

Prevention of major lymphatic leak has been attempted by meticulous ligation of all major lymphatic channels, the use of biologic glue or the use of ultrasonic dissectors instead of standard electrocautery. Although some of these techniques might be useful, there is no data from large prospective studies that they can limit complications related to lymphatic leak. The use of closed-suction drains might prevent infectious complications by removing the excess lymph and thus, avoiding collections.

The major means of preventing lymphatic leak during oncologic surgery is avoiding radical lymph-node dissections when this is possible. Evaluation of regional lymphatic basins by means of sentinel lymph node biopsy offers a reliable alternative especially for patients with melanoma or breast cancer.

## OPTIMAL LYMPHADENECTOMY IN COLORECTAL CANCER

KONSTANTINOS STAMOU, MD, PhD

Colorectal cancer surgery is essentially vascular surgery and more specifically surgery of the lymphatics. Ernst Miles initially set the goal for lymph node clearance in 1908 and to this day it is the second most important prognostic factor for survival after the stage of the disease. The optimal level of clearance is still under dispute but what is universally accepted is that the greater the number of lymph nodes harvested, the more accurate the staging and better the selection of candidates for adjuvant therapy. To the present, the means of collecting more lymph nodes is by extending the anatomic level of clearance to a higher tie of the primary feeding vessel or to lateral vessels. Extensive lymphadenectomy in colorectal cancer may result to complications that seriously impair the postoperative quality of life. Thus, optimal lymphadenectomy is the minimally adequate clearance that results in accurate staging and possibly improvement of survival. For this to be introduced in clinical practice, more precise preoperative staging is needed.

## PREVENTION AND TREATMENT OF COMPLICATIONS DUE TO LYMPHADENECTOMY

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**Introduction.** The problem of prevention of lymphatic injuries is extremely important if we think about the frequency of both early complications such as lymphorrhea, lymphocele, wound dehiscence and infections and late complications such as lymphangites and lymphedema. Nowadays, it is possible to identify risk patients and prevent these lesions or treat them at an early stage.

**Material and Methods.** Authors report their experience about patients who underwent procedures to prevent and/or treat lymphatic injuries after trauma or surgery. The main causes of secondary lymphatic injuries are represented by surgical operations, irradiations, infections, traumas, metastatic lymphnodal involvement. The high risk surgical operations include: radical mastectomy, Wertheim-Meigs operation, oncologic operation in urology, abdominal surgery, lymphadenectomies in "critical sites" (groin and axilla). Other operations are represented by exeresis of lipomas in critical sites, saphenectomy, inguino-crural hernioplasty. After an accurate diagnostic approach (mainly lymphoscintigraphy), prevention is based on different technical procedures among which microsurgical procedures.

**Results.** It was identified a protocol of prevention of secondary limb lymphedema that included , from the diagnostic point of view, lymphoscintigraphy and, as concerns therapy, it recognized also a role to early and preventive microsurgery.

## EDUCATIONAL PROGRAM FOR SENTINEL LYMPH NODE BIOPSY IN GREECE

N. ARKADOPOULOS

*Saturday 15 May 2010 - H. 12,30 -Round Table*

# Oncological and radiotherapeutical approach of lymphedema

## OCCURRENCE OF LYMPHOEDEMA OF THE UPPER EXTREMITY AFTER BREAST CANCER THERAPY

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**Introduction.** According to literature reports, up to 40% of the patients treated for breast cancer are affected by secondary lymphoedema of the upper extremity as a result of axillary dissection and/or radiotherapy. The prerequisite of a successful lymphoedema therapy is early diagnosis of its initial stages. The aim of this study is to analyse the data obtained on patients treated in the Department of Surgery of the 2nd Faculty of Medicine in the period from January 1998 to January 2002.

**Materials and methods.** A total of 178 patients (176 women and 2 men) were operated on for breast cancer. Of them, 119 (100%) were followed-up, 54 died and five failed to provide the data required. The investigation was focused on malfunction of the lymphatic drainage system of the ipsilateral upper extremity. If diagnostic uncertainty occurred, lymphoscintigraphy was carried out (in 67 patients, i.e. 59,3 %). If lymphoedema was diagnosed , an adequate treatment was administered. The final evaluation was carried out as of March 1st 2009, i.e. 7 - 11 years after the operation.

**Results.** Symptoms of insufficiency of the lymphatic system of the upper extremity were found in 56 patients (47%). Clinical findings were as follows:

Acute lymphoedema after surgery was diagnosed and treated in eight patients. In five patients, the clinical findings returned to normal. In two patients, lymphoedema was stabilised to stage 0, in one patient to stage 1.

⇒

⇒ **Stage 0 (latent)** was diagnosed and treated in 14 patients. In 12 patients, the clinical signs and subjective findings resolved with therapy. One patient showed no improvement and, in one, stage 0 lymphoedema deteriorated to stage 2 including recurrent erysipelas and suspected thrombosis of the axillary vein.

**Stage 1 (reversible)** was diagnosed in 24 patients. In 11 patients, the clinical findings returned to normal. In six patients, the diagnosis improved to stage 0. In six patients no change was noted, and one patient deteriorated to stage 2.

**Stage 2 (irreversible)** was diagnosed in 10 patients. In three patients, the clinical findings returned to normal with therapy. In seven patients no change was noted.

**Stage 3 (elephantiasis)** was not diagnosed at all.

**Conclusion.** The results show that lymphoedema can be reversed to a normal condition in up to 55.3% of the patients, improved in 16%, and can become stable for a long time in 25.0%, if an appropriate diagnostic and therapeutic algorithm is used early. Only in two patients (3.6%) deterioration was recorded. The basic treatment consisted of Complex Decongestive Therapy (CDT) and pharmacotherapy with proteolytic enzymes administered orally. Pharmacotherapy alone was used in 46.4 %, CDT alone in 7.1%, and a combination of CDT and pharmacotherapy in 39.3 % of the patients. Four patients (7,1 %) were without therapy.

## CANCER AND THE LYMPHATIC SYSTEM: A LYMPHOLOGIC PERSPECTIVE AND UPDATE

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The lymphatic system is the stage on which cancer develops, progresses, and spreads. The extent of lymphatic involvement is also the basis for evaluation, prognosis, treatment, post-treatment complications, prevention, containment, and opportunities for cure of most solid organ cancers. For centuries the central role of the lymphatic system in cancer has been recognized and sometimes even overemphasized (i.e., before Virchow, cancers were thought to actually arise from the “lymph” gel bathing cells rather than from the cells themselves), and the goal of therapy has been local and regional control through primary tumor resection and regional lymph node dissection and/or radiation. When the emphasis shifted in the 1970's to hematogenous spread and viewing cancer as a systemic disease, the focus turned to systemic chemotherapy with a consequent lull in research on lymphogenous spread. This trend has recently been reversed by the growing acceptance of the sentinel lymph node concept and applications, technical refinements in radiation therapy, and concomitant advances in basic and clinical lymphology. The result has been renewed interest in lymphogenous spread of cancer from the primary site, regional control, lymphatic and lymph node imaging, and tumor lymphatics and lymphangiogenesis. Nonetheless, interactions of the lymphatic system and its components (lymphatic vessels, lymph, lymph nodes and lymphocytes) with the developing cancer and its spread are more complex and multifaceted than currently being considered. Accordingly, any comprehensive basic and clinical research agenda should encompass these many poorly understood interacting processes and take a “second look” at forgotten questions and observations in lymphology.

## COMBINED DECONGESTIVE THERAPY OF BREAST CANCER RELATED LYMPHEDEMA

E. FOELDI

*Foeldiclinic, Hinterzarten - Germany*

## LYMPHEDEMA AS A CONSEQUENCE OF CANCER TREATMENT

S. XYNOGALOS

The most common cause of secondary lymphedema is surgery and radiation therapy for the treatment of cancer. The most commonly reported context is following breast cancer treatment, but lymphedema can result from the treatment of cervical, endometrial, vulvar, head and neck, and prostate cancers, as well as sarcomas and melanoma. The exact incidence rate of cancer treatment-related lymphedema is difficult to assess accurately due to a lack of standardized definitions and measurement techniques for the disorder. Breast lymphedema occurs most commonly in patients who have undergone both axillary radiation therapy and surgery; when both surgery and radiation therapy are performed, the frequency ranges from 6% to 48%. If a lumpectomy is performed alone, the frequency is approximately 6%. With a sentinel lymph node biopsy (SLNB) and radiation therapy, the frequency of breast lymphedema rises to 23%. If the patient undergoes an axillary lymph node dissection (ALND) with radiation therapy, the lymph node status may affect the development of lymphedema (35% in lymph node-negative patients and 48% in lymph node-positive patients). Factors that are reported to significantly increase the risk of breast lymphedema include an increased body mass index (BMI), tumor location in the upper outer quadrant, extent of lymph node dissection or wound infection after SLNB and age above 60 years. In the treatment of cervical cancer, the incidence of lower extremity lymphedema is reported to be approximately 21% to 49% after surgery and radiation therapy. In a retrospective review of 517 patients, 11% of endometrial cancer patients undergoing surgery and postoperative radiation therapy were reported to develop lower extremity lymphedema. In the treatment of vulvar cancer patients undergoing bilateral inguinal irradiation had a 6% frequency, versus 12% in patients undergoing unilateral or bilateral inguinofemoral lymph node dissection. In prostate cancer patients undergoing a limited or diagnostic dissection followed by pelvic irradiation had a 25% to 30% incidence of lower extremity lymphedema, versus a 66% incidence in patients undergoing pelvic irradiation after a complete or therapeutic dissection.

⇒ In the treatment of melanoma, the incidence of lymphedema when SLNB was used was reported to be 1.7%. A study of upper extremity lymphedema resulting from ALND for melanoma found a 10% risk after a complete level I to III ALND, rising to 53% after additional axillary radiation therapy. Finally, lymphedema occurred in 30% of melanoma patients after inguinal lymph node dissection. Conventional oncologic interventions, such as radiation therapy and surgery, despite the improved outcome, can leave patients with untoward complications, such as lymphedema. Lymphedema is a chronic and incurable condition that must be discussed with each at-risk patient. Early identification and management of lymphedema can help patients maintain their quality of life by minimizing cosmetic, functional, psychoemotional, and potentially life-threatening complications.

### POST RADIOTHERAPY LYMPHEDEMA

ERSI BALAFOUTA

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Lymphedema is a common impairment diagnosed following the treatment for cancer. Breast cancer related lymphedema incidence rates are documented between 33% and 48% following axillary lymph node dissection and radiation therapy and 5% to 14% after sentinel lymph node biopsy and radiotherapy. Cancer patients who have had neck surgery, lymph node removal, plastic surgery reconstruction, tumors obstructing lymph flow, and/or radiation treatment are at risk for developing lymphedema. European literature suggests that 30% to 56% of all head and neck patients develop lymphedema regardless of type of treatment, a larger percentage than those with lymphedema associated with breast cancer. Both radiation and lymph node dissection can individually cause lower extremity, but the combination of the two substantially increases the risk. The complications can be minimized if sufficient attention is given to the placement of the surgical scar and the radiotherapeutic technique.

### TREATMENT OF PLEXITIS AFTER RADIOTHERAPY

BECKER C., FANZIO P.

Lymphoedema occurs after radiotherapy, combined with adenectomy. Pain and palsy can be associated. We have to make the difference between pain appeared after the surgery, in the inf part of the arm and in the thoracic region, due to nevroma; and the pain due to burning lesions by the radiotherapy. The surgery consist in neurolysis and apposing of a fatty flap around the plexus for the plexitis and/or neurolysis and treatment of the nevroma of the thoracic nerves and little cutaneous branches. The results of the different situations are analyzed in terms of pain nerve regeneration (sensible of motor).

*Saturday 15 May 2010 - H. 13,30 . Round Table*

## Conservative treatment of lymphedema

### DRUGS WHICH MAY AFFECT CHRONIC OEDEMA

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**Introduction.** It is recognised that drugs may cause oedema or exacerbate existing chronic oedema, usually by increasing capillary filtration rate. However, details of the importance of different drugs in this respect and the frequency of oedema as a significant side effect are not easy to obtain. The search of drug databases described here has been reported in Keeley, 2008.

**Method.** The drug databases Electronic Medicines Compendium and Micromedex were searched for "oedema" as an undesirable effect (2007).

**Results.** In the Electronic Medicines Compendium there were 930 records of "oedema as an undesirable side effect" and in Micromedex, 333.

Some interpretation is required as the term "oedema" may include pulmonary oedema and allergic oedema. The frequency of oedema as a side effect was not always available for each drug, particularly those "older drugs" e.g. corticosteroids. Those with frequency of greater than 10% included: calcium channel antagonists, some of the sex hormones, pregabalin, risperidone, zoledronic acid, docetaxel and sirolimus.

**Conclusion.** Oedema is a common side effect of many drugs. The potential contribution of this to the overall picture of a patient with chronic oedema should be considered as part of routine assessment. If this is felt to be a significant effect, consideration should be given to withdrawal of the drug or a reduction in dose.

Reference: Keeley V.L. *Drugs that may exacerbate and those used to treat lymphoedema.* Journal of Lymphoedema 2008; 3(1): 57-65.

## RESULTS OF COMBINED DECONGESTIVE THERAPY IN GREECE

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**Introduction.** Lymphedema is an abnormal accumulation of protein rich protein fluid in the interstitium which causes chronic inflammation and reactive fibrosis of the affected tissues. Lymphedema is separated in primary and in secondary lymphedema. The treatment of lymphedema is mainly conservative as CDT, IPC.

**Aim** of this work was to study the reduction of volume of the extremity after CDT treatment twice a day for four weeks. CDT includes skin care, mld, bandage, exercises and education of the patient.

**Method.** In our clinic we treated 56 patients with either primary or secondary lymphedema for four weeks

**Results.** From 56 patients with lymphedema 22 patients had primary lymphedema and 34 secondary lymphedema. 42 were females and 14 males. 32 patients had upper extremity and 24 lower extremity lymphedema. From 56 patients with lymphedema 15 patients had primary lymphedema and 42 secondary lymphedema. 34 were females and 25 males. 29 patients had upper extremity and 27 lower extremity lymphedema. In all patients we had a mean reduction of volume of 65,09% in upper extremity lymphedemas and a mean reduction of volume of 69,96% of the lower extremity. In patients with lymphedema <12 months the reduction was about 72,5% whereas in patients with lymphedema >12 months the reduction was about 55,5%.

**Conclusion.** The treatment of Lymphedema with CDT was successfully in all patients with almost the same results in both extremities. Prevention of the onset of lymphedema is of extreme importance. However, a return to as normal a lifestyle as possible by the patient is also essential. The earlier treatment begins after the onset of lymphedema, the better the prognosis for the patient. Moreover the target of the treatment must be a reduction of the volume between 50%-70% of the initial oedema.

## INTERMITTENT PNEUMATIC COMPRESSION IN THE EVIDENCE BASED EYE

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**Abstract.** Intermittent pneumatic compression (IPC) has been regularly suggested in the field of physical treatment of primary and secondary lymphedema.

Actually, the main devices are pneumatic systems controlled by software. The software is included in a microchip that controls the pump, the valves and the sequences in charge to inflate and deflate de sleeves composed by variable material and different number of chambers.

There are mainly three attitudes among professionals regarding IPC: Those who refuse categorically the use of these devices, those who integrate it into a multi-therapeutic approach (MLD, multilayered bandaging, exercises...) and those who make of it their main therapeutic spearhead.

The International Consensus document published and regularly updated by the International Society of Lymphology considers IPC as adjuvant therapy, usually applied to maintain the edema's reduction after a complete decongestive therapy. But they never furnish any guide line in their document about the way of using it in an effective and non damageable manner. There's no real specification sheet available for the industry relating to physical parameters of the IPC and its possible effects on the physiological parameters of a patient. Furthermore, no consensus has been reached among the users concerning the compression systems. No study describes the physiological interest of the IPC compared to other compression systems mentioned in the ISL consensus, such as multilayer bandages. The added value of one system compared to another one is totally unclear and too often employed to serve personal interest instead of benefitting the real interest of evidence based medicine.

For example: people sustain that IPC acts just as manual lymphatic drainage executed by a machine. Anybody knows that the physical parameters of IPC and MLD are not a bit similar, what makes a comparison erroneous.

Regarding to the protocol of IPC: we found disaccords concerning pressure's values applied on the swollen limb, the number of inflating chambers, the sequences, the frequencies of the sessions, the duration of each session...

We need more knowledge about physiological mechanisms of the IPC. Its extended effects, indication and contra-indication remain to be more widely identified. Only few studies exist.

For example, we found only 4 studies about the hemodynamic cardiac effects of IPC.

Considering the discordance of information and the existence of so many different points of view, we formed the habit of proposing regularly an overview of the current state of knowledge concerning the use of IPC in the treatment of primary and secondary lymphedema.

But to obtain a first consensus, any person concerned by the evolution of the physical treatment of lymphedema (I appeal especially to the members of the ESL and ISL) should think hard in order to reach an agreement that is not only concerning the entirety but also specific approaches driving at evidence based medicine.

We are convinced that the European Congresses of Lymphology will be the right place to get to the point around these topics.

### **LYMPHEDEMA: ONLY MLD OR CDT**

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### **THE MOST PROPER GARMENT IN EVERY PATIENT**

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The reduction of lymphedema after a physical combined decongestive treatment (CPDT) is the result of a work performed on the holistic vision of the problem (stage, muscles, articulations, skin), psychological and social conditions (age, job, family). All these aspects and the obtained results lead us toward the choice of the most proper garment for each patient in order to be sure that, first of all, the garment will be worn always and in any case with the highest possible compliance.

In the last 2 years we have treated 283 patients for a lymphedema of the limbs. Among them 182 were female and 101 male and the age range was between 2 and 88 years old. All the patients were approached basing on a previous or not experience of PCDT, in order to administer, in the most correct way, the treatments (above all bandages) to avoid from the beginning, bad responses as regard the compliance.

All the patients, at the end of cycle, worn the garment considered as the most proper to be constantly used, but 34 of them (21 female, 13 male) at the control declared to wear ever or rarely the garment for different matters (social, climate, psychological aspects, concomitant occurred pathologies). In 107 cases was necessary a "made by measure" also, sometimes, with additional. For all the other patients a prescription of a standard garment was enough to guarantee the results gave by the CPDT.

It's necessary to know who and why will wear the garment for the prescription. Only in this way It's possible to obtain best patient compliance.

ISL: *The diagnosis and treatment of peripheral lymphedema. Consensus document of International Society of Lymphology.* Lymphology, 2002; 28: 113-117.

### **EUROPEAN CONSENSUS OF OEDEMA TREATMENT: EXPERIMENTAL APPROACH**

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The physical treatment of a slight oedema is limited to manual lymphatic drainage (MLD) applied 3 to 5 times a week for 2 to 3 weeks followed by reducing the frequency of the sessions until the end of the treatment.

The physical treatment of moderate or severe oedema is proposed according to several stages.

During the first stage, the treatment consists in MLD, intermittent pneumatic compression (IPC) and multilayer bandages (MLB).

During the second stage, MLD, IPC and compression garments are proposed.

The physical treatment is started daily for 3-4 weeks and the frequency is progressively reduced to eventually once a week.

The different treatment technics are illustrated on the basis of fundamental and clinical investigation.

### **MANAGEMENT OF LYMPHOEDEMA - A MULTI MODALITY APPROACH**

G. MANOKARAN, KIRAN PRASATH

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Lymphoedema is as old as human-being. Various treatment options are tried, and practiced for centuries. As like in any other medical field we lymphologist also has come a long way and lymphology also has gone through tremendous advancement in the last two decades in terms of diagnosis, investigation and management

I would like to present our 30 years of experience in terms of management. NO SINGLE KEY FITS IN TO ALL THE LOCKS. like that every individual patient needs a customized management depending upon the etiology, duration, and the clinical staging of the lymphoedema.

Lymphoscintigraphy is a single investigation which has revolutionized the understanding of lymphatic disorders, the etiology, staging and the management outcome. We have used various combinations of treatment like CDT, Pneumatic compression and followed by surgery, and maintained the outcome of the treatment by preventing the secondary infection with regular chemotherapy and by using pressure garments. This multi modality approach to the treatment of lymphoedema will be discussed in detail by an oral power point presentation.



## When the conservative treatment fails - Surgical treatment of lymphedema

### FREE NODES TRANSPLANTATIONS SURGERY IN SECONDARY UPPER LIMB LYMPHEDEMA: MANAGEMENT AND PROTOCOL

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**Material and Method.** The authors have organised a multidisciplinary consultation to take care of patients presenting a secondary lymphedema of the upper limbs (ULL). After a complete patient assessment if a decision of surgery is taken, the following protocol is observed:

- A decongestive therapy during 15 to 21 days before surgery was attempted including manual lymphatic drainage (MLD), multi layer bandaging (MLB), specific exercises under bandages (SE) and compression by sleeve (SSC).
- Then surgical treatment using free nodes transplantation was made. Hospital care is generally 3 days.
- Sessions of MLD are started during 10 days "upstream" the nodes graft, largely applied on safe territories of the body.
- Then for the 10 next days MLD on the site of the nodes graft is included.
- Then MLD, MLB, SE were setting again.
- MLB and sleeve compressions (SSC) are continued.
- The follow-up of the post operative period was assessed by the multidisciplinary consultation at 15 days – 1 month – 3 months – 6 months and more.
- A score of satisfaction has been established by the patient himself, the surgeon and the physiotherapist.

**Results.** The author analyses the first results for 50 patients with ULL after a mean follow-up of 4 years.

The improvement of the volume is about 45% - the controlled LYSC shows the transplanted free nodes in about 50% – infection episodes are less frequent - morbidity of surgery (15%) like lymphoceles of the given or receiving sites are treated by puncture and compression.

Related resistant fibrosis a liposuction is done followed by a new session of decongestive treatment.

### MICROSURGICAL TREATMENT OF LYMPHEDEMA

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**Introduction.** More than 1800 patients with peripheral lymphedema have been treated with microsurgical techniques. These techniques were used for both rehabilitative therapy and prevention of lymphedema.

**Materials and Methods.** Derivative lymphatic micro-vascular procedures recognize today its most exemplary application in multiple lymphatic-venous anastomoses (LVA), and particularly in the end-to-end telescopic technique, that allows to avoid any contact between lymphatics and the blood stream. For those cases where a venous disease (valvular insufficiency, venous hypertension, etc.), is associated to more or less latent or manifest lymphostatic pathology of such severity to contraindicate a lymphatic-venous shunt, reconstructive lymphatic microsurgery techniques have been developed (autologous venous grafts or lymphatic-venous-lymphatic-anastomoses - LVLA). Objective assessment was undertaken by water volumetry and lymphoscintigraphy.

**Results.** Subjective improvement was noted in 87% of patients. Objectively, volume changes showed a significant improvement in 83%, with an average reduction of 67% of the excess volume. Of those patients followed-up, 85% have been able to discontinue the use of conservative measures, with an average follow-up of more than 10 years and average reduction in excess volume of 69%. There was a 87% reduction in the incidence of cellulitis after microsurgery.

**Conclusions.** Microsurgical lymphatic-venous anastomoses have a place in the rehabilitative treatment and prevention of peripheral lymphedema and should be the therapy of choice in patients who are not sufficiently responsive to nonsurgical treatment. Improved results can be expected with operations performed earlier at the very first stages of lymphedema.

### THE FACTS ABOUT LIPOSUCTION AS A TREATMENT FOR LYMPHOEDEMA

HÅKAN BRORSON, MD, PhD

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There is some controversy regarding liposuction for late-stage lymphoedemas. While it is clear that conservative therapies such as complex decongestive therapy and controlled compression therapy should be tried in the first instance, options for the treatment of late-stage lymphoedema that is not responding to this treatment is not so clear.



The common understanding among clinicians is that the swelling of a lymphoedematous extremity is due purely to the accumulation of lymph fluid, which can be removed by use of noninvasive conservative regimens. These therapies work well when the excess swelling consists of accumulated lymph, but do not work when the excess volume is dominated by adipose tissue. The same goes for microsurgical procedures using lymphovenous shunts and lymph vessel transplantation.

Today, large chronic non-pitting arm and leg lymphoedema can be effectively removed by use of liposuction, without any further reduction in lymph transport. Long-term results, up to 15 years, have not shown any recurrence of the arm swelling (Figure 1 and 2). There need be no tension between those who favour conservative treatment and proponents of liposuction. Accumulated lymph should be removed using the well-documented conservative regimens until minimal or no pitting is seen. If there is still a significant excess volume, this can be removed by the use of liposuction.

This lecture outlines the benefits of using liposuction and presents the evidence to support its use.

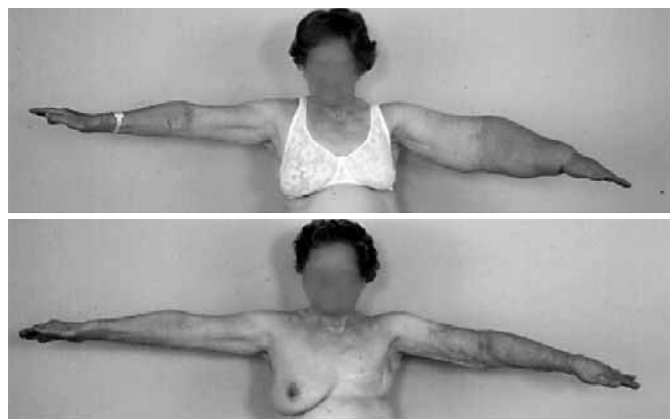


Fig. 1 - Secondary lymphoedema before (3 100 ml) and after liposuction.



Fig. 2 - Primary lymphoedema before (14 300 ml) and after liposuction.

#### UPDATE OF BRIDGING LYMPHATIC GAPS BY LYMPHATIC GRAFTS

R.G.H. BAUMEISTER, J. WALLMICHATH, M. WEISS, A. FRICK

Interruption of lymphatic pathways may lead to lymphedemas. This is often the case after surgical intervention in the axillary, inguinal and pelvic region. With the use of advanced microsurgery these gaps can be bridged using the patients own lymphatic vessels harvested from the thigh. Through Januar 2010 343 patients have been operated. The patients are followed by volume measurement, lymphoscintigraphy, indirect lymphography and MRI-Lymphography. A significant reduction in volume was seen in arm edemas also after a follow-up period of more than 10 years. Also patent grafts were seen more than 10 years after surgery in upper and lower extremities. When the lymphatic transport is improved by the grafting heavy tissue alterations may be additionally removed by lipolymphosuction with the option to avoid further compression treatment.

#### SURGICAL OPTIONS IN THE MANAGEMENT OF LYMPHOEDEMA

M. WALD<sup>1</sup>, D. TOMÁŠEK<sup>2</sup>, L.JAROLÍM<sup>3</sup>, J.ADÁMEK<sup>1</sup>

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Faculty of Medicine, Charles University, Prague, Czech Republic

The interest of surgeons in the lymphoedema issue dating back to the 19th century has continued till today. In every given period, surgical treatment was based on the knowledge of the lymphatics and its anatomy, physiology and pathophysiology, as well as the diagnostic and technical limitations of medicine. The ability to reduce to minimum both intra-operative and early/late post-operative complications has also played an important role.

Clinical conditions requiring surgical intervention are those in which, despite intensive Complex Decongestive Therapy (CDT), disorders of lymphatic drainage continue progressing, and lead to chronic changes in soft tissues that result in their increased volume due to lipohypertrophy and subsequent fibrosis.

*In this lecture the authors present the results of surgical procedures performed in their department of surgery. Since 2004 they have carried out 80 operations for chronic lymphoedema with lipohypertrophy and these included liposuction of the upper and lower limbs in 42 and 14 patients, respectively; lipectomy of the abdominal wall in seven patients; debulking surgery in six lower extremities and in two upper extremity; resection and reconstruction for penoscrotal lymphoedema in eight and vulvoplasty for female genital lymphoedema in two patients.*

The authors describe indications, contraindications, complications and long-term results.

Acknowledgement: This research has in part been supported by the Internal Grant Agency of the Ministry of Health, Czech Republic, project no. NS9906-4/2008

## Prevention of lymphedema

### NURSING MANAGEMENT OF LEMFOIDIMA

M. GALIATSOS

Lymphedema is an illness and not a symptom and is consequent to the treatments of cancer. In this presentation basic directives are given on the prevention of lymphedema in patients with cancer. These directives concern the care of skin, the diet, the exercise and generally speaking in the patients' way of life. In addition special directives are presented on how women with breast cancer will protect themselves from lymphedema. Analytic directives are provided on the treatment of arms and legs to the patients with high risk of appearance of lymphedema.

The proper briefing, education and good collaboration with the patients with lymphedema have as result the better prevention and the more effective treatment of these patients. This is also the objective of this presentation.

### LYMPHATIC MICROSURGERY FOR PRIMARY PREVENTION OF SECONDARY LYMPHEDEMA AFTER BREAST CANCER: A MODEL OF TRANSLATIONAL LYMPHOLOGY

C.C. CAMPISI, F. BOCCARDO, C. CAMPISI

Department of Surgery - Operative Unit of Lymphatic Surgery - Section of Lymphology and Microsurgery - University Hospital "San Martino" - Genoa - Italy

**Introduction.** The incidence of arm lymphedema following sentinel lymph node biopsy varies from 0 to 13%, on the contrary lymphedema following axillary lymph node dissection varies from 7 to 77%. Arm lymphedema is mainly correlated to arm lymphatic obstruction due to AD. It is possible to identify arm lymphatics and nodes, but it is practically impossible to preserve them during AD.

**Methods.** Among forty-nine consecutive women from March 2008 to September 2009 addressed to complete AD, 46 were randomly divided in two groups, the other 3 were not analyzed because they refused to perform lymphoscintigraphy (LS) pre-operatively. Twenty-three underwent LYMPHA (Lymphatic Microsurgical Preventive Healing Approach) technique for the prevention of arm lymphedema (LYMPHA group - LG). The other 23 patients had no preventive surgical approach (control group - CG). LYMPHA procedure consisted in performing lymphatic-venous anastomoses (LVA) at the same time of AD. All patients underwent pre-operative LS. Follow-up was performed at 1, 3, 6, 12 and 18 months by volumetry and LS.

**Results.** Lymphedema appeared in 1 patient in the LG after 6 months from the operation (4,34 %). In the CG lymphedema occurred in 7 patients (30,43 %). Lymphedema was diagnosed when a difference in excess volume was of at least 100 ml. Pre-operatively, duplex scan allowed to exclude a venous pathology in all patients and LS allowed to identify and select patients at risk for lymphedema.

**Conclusion(s).** LYMPHA represents a valid technique for primary prevention of secondary arm lymphedema with no risk of leaving undetected malignant disease in the axilla during AD.

### THE ACTIVE PREVENTION IN THE TREATMENT OF LYMPHEDEMA: AN UNSUCCESSFUL CONCEPT?

A. PISSAS, E. PRIEUR, R. RUBAY, T. COSTE, E. BOULAY

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Laboratory of Anatomy, Faculty of Medicine of Montpellier, 34000, France

The authors explain their interrogations concerning the difficulty to convince the colleagues essentially oncologist surgeons and radiotherapists concerning the active prevention of lymphedema.

In fact they explain the results of their study those past 20 years.

1) Concerning the lower limbs:

It is mandatory to have the certitude of malignancy before the decision of clearing out of groin lymphocenter. For after femoral lymphadenectomy it always appears a secondary lymphedema

2) Concerning the upper limb:

The axillary lymphadenectomy occurs secondary lymphedema only in two circumstances

- Lymphorrhea, lymphocela, lymphatic fistula in immediate postoperative course,
- Injury of derivative ways, vicariant ways (deltopectoral Mascagni Sappey's way, scapular posterior, tricipital way).

So the sentinel lymph node which is an excellent concept for respect of lymph node capital is not a tool in prevention of the apparition of lymphedema. It is not, at all, a preventive attitude.

All those considerations are based upon an experience of treatment of 2 000 patients in 25 years in our unit of treatment of lymphedema.

The great difficulty is summarized by the inexistence of the lymphological research of GEL and ISL in the congresses of cancerology worldwide.

## LYMPHEDEMA PATIENT MANAGEMENT ALONG THE LIFE

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*San Giovanni Battista Hospital - ACISMOM - Rome - Italy*

Lymphedema is a serious discomfort pathology and as such it will be many strategies to look for improving the quality of life patients. PCDT has been applying for a long time successfully; MLD, skin care, elastocompression and physical exercises are irreplaceable elements of the rehabilitative training in lymphedema treatment. It's also useful to propose some treatments for the proprioceptive mechanism recovery and some specific movements of the principal limb articulations. We have studied 136 patients – 91 females, 45 males – age from 21 to 81 years, who presented primary or secondary limbs. All patients underwent a clinical examination (limbs circumference– body weight – muscular exam), lymphoscintigraphy, CT, laserdoppler exam. All patients started a tailored rehabilitative protocol for 3 months (drugs, M.L.D., pressotherapy, elastocompression, ventilatory and isotonic gymnastic, psychological evaluation, behavioural rules). At the end of treatment all the subjects showed an evidence reduction of limb circumference (between 10% and 30% above all at II and III clinical stage), 8 patients dropped the treatment. It's necessary so to personalize the treatment in function of the patient's needs and of his capacity to interact with the equip.

Saturday 15 May 2010 - H. 18,30 - Round Table

## Phlebolympheдемas

### THE VENOUS AND LYMPHATIC SYSTEMS - CLOSE DEVELOPMENTAL, TOPOGRAPHICAL AND FUNCTIONAL RELATIONSHIP - CLINICAL ASPECTS

OLSZEWSKI W. L.<sup>1,2</sup>

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<sup>2</sup> Department of Transplantation and Gastroenterological Surgery, Central Clinical Hospital, Ministry of Internal Affairs, Warsaw, Poland

There is a close relationship between the lymphatic and venous systems starting at the embryonal stage. Lymphatics either bud off from primordial veins or are formed from cells located in close proximity of developing veins. During adult life they cooperate in the process of tissue fluid transport, removal of excess of extravasating erythrocytes and filtered blood cellular and humoral elements. Although much has been known about physiopathology of the venous system, and in particular in limbs, the knowledge of what is the role of lymphatics and nodes in regulation of tissue fluid volume, elimination of excess of coagulation factors and cellular debris and bacteria in thrombophlebitis and how does damage to lymphatics affect peripheral venous physiology, remains rudimentary. Recent methods of imaging of lymphatics and nodes have thrown a new light on the functional interdependence of both systems. The following points will be discussed:

- (1) Venous and lymphatic space volume in lower limbs and their regulation;
- (2) Humoral and cellular factors in tissue fluid and lymph;
- (3) Fluid and cell traffic at the level of exchange vessels and transport capacity of initial lymphatics;
- (4) The effect of venous insufficiency on lymphatic function and of lymphatic damage on venous function;
- (5) Color Doppler and lymphoscintigraphy simultaneously visualizing both systems;
- (6) Skin bacteria and their effects on veins and lymphatics, incl. pathogenicity of various strains;
- (7) Immunohistological changes in skin, veins and lymphatics in venous insufficiency.

Hints for prophylaxis and therapy in chronic venous insufficiency, thrombophlebitis and chronic dermato-lymphangio-adenitis (DLA). Parallel evaluation of the venous and lymphatic systems in limbs of patients with swollen and inflamed limb tissues becomes indispensable and provides us with most rational data for effective treatment. It allows to decide whether anticoagulants, antiaggregants, antibiotics, diuretics, manual physiotherapy and elastic support or even surgery should be recommended.

### LYMPHATIC INJURIES IN PHLEBOLYMPHEDEMAs: ROLE OF LYMPHATIC-VENOUS ANASTOMOSES

F. BOCCARDO, C. CAMPISI, A. BARBERIS, S. ACCOGLI, CAT. CAMPISI, C. CAMPISI

*Department of Surgery, Unit of Lymphatic Surgery and Microsurgery, San Martino Hospital, University of Genoa, Genoa, Italy*

**Introduction.** In case of phlebolympheдемa, it is necessary to accurately evaluate both diseases, venous and lymphatic dysfunction, in order to establish a correct therapeutical approach. **Methods.** A part from objective tests that can reveal a clinically evident lymphatic deficiency, it is helpful to investigate family and remote pathological anamnesis to identify possible risk factors or specific familiar predisposition. As far as instrumental tests are concerned, it is advisable to perform both a doppler ultrasonographic examination and a limb segmentary lymphoscintigraphy. The most risky area is the inguinal one, where lymphatic collector vessels join main lymph-nodal structures. Obviously, lesions of these structures may start or worsen a lymphatic impairment, but it is also important to underline that scar reactions and relevant fibrosis, that may characterize an even normal post-operation period, may create a further obstacle to normal lymphatic drain. **Results.** Proper attention has to be paid to precise exact indications to surgical treatment and venous surgery technique in mixed clinical situations must avoid potential lymphatic injuries and furthermore treat also lymphatic disorder. Diagnostic and therapeutical prevention procedures for possible lymphatic injuries in limbs with chronic venous disorder must be properly considered, and microsurgical techniques can be applied to treat lymphatic dysfunctions associated with venous insufficiency.

## VENOUS MALFORMATIONS AND LYMPHATIC DYSPLASIAS

R. MATTASSI, M. VAGHI, R. DENTICI, ENZO DE MAURO

Center for Vascular Malformations "Stefan Belov", Garbagnate Milanese (Milano) Italy

**Purpose.** To report about lymphatic dysplasia combined with venous malformations (VM) of the lower limbs. **Material and methods.** In one patient with a marginal vein, a lymphedema appears after surgical removal of the anomalous vein. Not any sign of lymphatic disease was noticed before surgery. We performed lymphoscintigraphy with a special technique to study deep and superficial lymphatics separately in 22 cases of venous malformations of the lower limbs in order to study possible lymphatic dysplasia in VM. **Result.** In the first patient, with a lymphedema after surgery of the marginal vein, lymphoscintigraphy performed after operation demonstrated a lateral superficial lymphatic interrupted probably by surgery. In 3 cases of marginal vein, we observed dysplasia of main lymphatics: 2 cases had a anomalous superficial lymphatic on the lateral edge of the lower limb without deep lymphatic outflow. One case had the same anomalous superficial lymphatic but with normal deep lymphatic outflow. In 1 case with VM without marginal vein, a aplasia of the deep lymphatics of the controlateral limb was noticed. **Conclusion.** By analogy to marginal vein, a "marginal lymphatic" may coexist. As surgery of the marginal vein may damage these anomalous lymphatic, we recommend to perform lymphoscintigraphy with separate study of deep and superficial lymphatic before operation to remove marginal vein.

## PRIMARY LYMPHEDEMA IN THE CONTEXT OF VENOUS HYPERTENSION IN PEDIATRICS

PAPENDIECK C.M., BARBOSA L., POZO P., BRAUN D., DELL'ORO V.

Angiopediatria, Buenos Aires, Argentina

Primary lymphedema may be defined as that which results because a dysplasia and/or dysfunction o an area of the lymph system. 95% of the dysplasias are congenital, trunkular or extra trunkular. But three are the basic levels, that are the cause of primary lymphedema: the endothelium of the initial lymphatics at the interstitial space, the cannalicular network, and the nodal organs as system. The interstitial hypertension is a constant in the three kinds of origin of the primary lymphedema, but the functional interstitial cause, has no cannalicular or nodal hypertension.

This might represent about 20% of the primary lymphedemas. More often, do we identifie primary lymphedema in syndromes with trunkular congenital venous hypertension, such as among others, the deep and/or superficial primary intrinsic venous dysplasia – without AV shunts – and specially primary dysvalvulation or avalvulation of the envolved veins.

Through our diagnostic and eventually therapeutic methodology in the treatment of primary lymphedema, the recognition and knowledge about the lymph angio adeno dysplasias and the coexistence of venous dysplasias is possible.

Simultaneous hypertension in both circuits, is not a constant. There is no real explanation for this. One is the common endothelial origin. Another is the shared interstitial space, the great scenario of the edemas.

There exist the suspicion that trunkular venous hypertension also means primary lymphedema, even in its lowes degree (0). We consider this aspect basic in therapeutical aspects, in particular to solve in a first step the phlebo angio dysplasia.

## Saturday 15 May 2010 - Workshop

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### Chairmen & Instructors

E. DIMAKAKOS, P. POULMANTIS, Z. VARDAKI

### Trainers

K. KROUSANIOTAKI, E. TSATSIS, I. SOFOU, E.I. LYMPEROPOULOU

- 11.00 **What is Lymphedema? E. Dimakakos**
- 11.15 **Practice in Manual Lymph Drainage (MLD) of upper extremities**
- 12.30 **Practice in Manual Lymph Drainage (MLD) in lower extremities**
- 13.30 **Exercises of lower extremities**
- 14.00 **Exercises of upper extremities**
- 16.00 **Compression therapy of lower extremities**

### Chairmen

M. KELESI

- 17.30 **Management of ulcers in Lymphedema - J. Kalemikerakis**
- 18.00 **Compression therapy of upper extremities**
- 18.30 **When and How? The use of elastic garments of lower extremities**
- 19.00 **When and How? The use of elastic garments of upper extremities**

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