Abstracts
Short Talks

001 - Organ Specific Induction of Lymphatic Growth with Nanoparticle-Encapsulated Nucleoside-Modified VEGFC mRNA (VEGFC mRNA-LNP) Complexes In Vivo

Szoke Daniel, Semmelweis University; Styevkone Dinnyes, Andrea (Semmelweis University, Budapest, Hungary); Pardi, Norbert (University of Pennsylvania, Philadelphia, PA, USA); Ajtay, Kitti (Semmelweis University, Budapest, Hungary); Weissman, Drew (University of Pennsylvania, Philadelphia, PA, USA); Jakus, Zoltan (Semmelweis University, Budapest, Hungary)

- The mRNA-LNP system is an effective novel approach to trigger protein expression in vitro and in vivo.
- Organ specific VEGFC mRNA-LNP treatment results in increased lymphatic growth.
- It is a novel gain of function model to identify the organ specific roles of the lymphatic system.

002 - Primary cilia on lymphatic endothelial cells and their roles in flow sensing

Magold Alexandra, University of Chicago; Hirosue, Sachiko (Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland); Odermatt, P (Swiss Federal Institute of Technology Lausanne (EPFL),, Lausanne, Switzerland); Triaca, V (Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland); Pisano, Marco (Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland); Fantner, G (Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland); Swartz, Melody A. (University of Chicago, Chicago, IL, USA)

- Lymphatic endothelial cells are able to ciliate.
- Lymphatic ciliation is short in length and frequency.
- Lymphatic ciliation is flow responsive to shear stress intensity and exposure duration.

003 - Suppression of epsin expression limits VEGFR3 degradation and rescues diabetes triggered impairment of lymphangiogenesis

Chen Hong, Boston Children's Hospital/Harvard Medical School; Srinivasan, Sathish (OMRF, Oklahoma City, OK, USA); Dixon, J. Brandon (Georgia Institute of Technology, Atlanta, GA, USA)

- hyperglycemia induces VEGFR3 degradation and impairs lymphangiogenesis
- epsin upregulation causes enhanced degradation of VEGFR3 in diabetes
- sustained VEGFR3 signaling upon epsin loss is crucial for restoring impaired lymphangiogenesis in diabetes

004 - Organ-specific regulation of lymphatic vessel function by the autonomic nervous system

Bachmann Samia, ETH Zurich; Proulx, Steven; Montoya, Javier; Schneider, Martin; Rudin, Markus; Detmar, Michael (ETH Zurich, Zurich, Switzerland)

- characterization of innervation pattern of lymphatic vessels in different organs
- in vivo imaging of neurotransmitter effects on lymphatic vessel pumping
- identification of target cells of neurotransmitters and their downstream effects
  Visit poster F50 on Friday evening

005 - Emerging roles of the chromatin-remodeling SWI/SNF ATPase BRG1 in omental lymphatic development.

Menendez Matthew, Oklahoma Medical Research Foundation; Drozd, Anna (Oklahoma Medical Research Foundation, Oklahoma City, USA); Podsiadlowska, Joanna; Griffin, Courtney T. (Oklahoma Medical Research Foundation, Oklahoma City, OK, USA)

- Macrophage expression of BRG1 is required to maintain blood-lymphatic separation in the omentum.
- BRG1 suppresses necroptosis in macrophages by inhibiting RIPK3 expression.
- Genetic reduction of Ripk3 rescues blood entry into developing omental lymphatics.
  Visit poster F49 on Friday evening

Posters

Thursday, June 8 – 7:30-9:30pm
Odd numbered posters will be manned from 7:30 to 8:30pm
Even numbered posters will be manned from 8:30 to 9:30pm

Endothelial Cells

T01

Semaphorin 3G Provides a Repulsive Guidance Cue to Lymphatic Endothelial Cells via Neuropilin-2/PlexinD1

Liu Xinyi, Kobe Universtiy; Uemura, Akiyoshi (Graduate School of Medical Sciences, Nagoya City University, Nagoya, Japan); Fukushima, Yoko (Graduate School of Medicine, Osaka University, Oosaka, Japan); Yoshida, Yutaka (Cincinnati Children's Hospital Medical Center, Cincinnati, USA); Hirashima, Masanori (Kobe University, Kobe, Japan)

- lymphatic endothelial cells
- Semaphorin 3G
- mouse

T02

The role of mitochondria in lymphatic endothelial cell differentiation

Gil HyeaJin, Northwestern University; Chandel, Navdeep (Northwestern University, Chicago, IL, USA); Oliver, Guillermo (Northwestern University, Chicago, IL, USA)

- Mitochondria is an essential for ATP generation and metabolites for signaling pathway
- We focus on the role of mitochondria during early lymphatic endothelial cell differentiation
- Complex III is one of mitochondrial respiratory chain. We use lymphatic specific Cre for deleting complex III

T03

VEPTP controls opposing actions of angiopoietin 2 in blood and lymphatic vessels

Souma Tomokazu, Northwestern University; Thomson, Benjamin R.; Heinen, Stefan (Northwestern University, Chicago, IL, USA); Carota, Isabel (Feinberg Cardiovascular Research Institute, Northwestern University, Chicago, IL, USA); Yamaguchi, Shinji (Northwestern University, Chicago, USA); Jin, Jing (Northwestern Universtiy, Chicago, IL, USA); Quaggin, Susan E. (Northwestern University, Chicago, IL, USA)

- A new model for agonistic role of Angiopoietin2 in lymphatic endothelial cells is provided.
- A concise time window for the Tie2 signal requirement in lymphatic development is provided.
- New approach to effectively convert Angiopoietin2 to Angiopoieitn1-like is provided.

T04

Investigating the effect of spatially varying wall shear stress on lymphatic endothelial cell alignment and transcriptional regulation

Michalaki Eleftheria, Stanford University; Surya, Vinay; Fuller, Gerald G.; Dunn, Alexander R. (Stanford University, Stanford, CA, USA)

- Use of a novel 2D in vitro assay that reproduces key aspects of the fluid flow environment near valves.
- HLMVECs reorient perpendicular to the flow direction at the region of maximum wall shear stress.
- HLMVECs exhibit a highly nuclear localization of FOXC2 at the region of maximum wall shear stress.

T05

Sphingosine 1-phosphate receptor 1 is necessary for collective lymphatic endothelial cell migration in response to fluid shear stress

Surya Vinay, Stanford University; Michalaki, Eleftheria; Huang, Eva Y.; Fuller, Gerald G.; Dunn, Alexander R. (Stanford University, Stanford, CA, USA)

- Human lymphatic endothelial cells migrate against the flow direction in response to fluid shear stress
- S1PR1 is required for upstream migration of lymphatic endothelial cells in response to fluid shear stress
- S1P, the ligand to S1PR1 is also required for the collective upstream migration of lymphatic endothelial cells

T06

Adrenomedullin Stabilizes Lymphatic Endothelial Junctions through Modulation of Small GTase Rap1 and RhoA Signaling

Xu Wenjing, UNC-Chapel Hill; Hoopes, Samantha; Wittchen, Erika; Burridge, Keith (UNC-Chapel Hill, Chapel Hill, USA); Caron, Kathleen M. (University of North Carolina, Chapel Hill, Chapel Hill, NC, USA)

- Rap1 is implicated in regulating the formation and permeability of lymphatic endothelial junctions.
- Deletion of Rap1 impairs the effect of adrenomedullin on tightening lymphatic endothelial junctions.
- Adrenomedullin may also exert its function in a parallel pathway by inhibiting RhoA signaling.

T07

Role of heme oxygenase-1 (HO-1) in lymphangiogenesis

Mezyk-Kopec Renata, University of Chicago; Swartz, Melody A. (University of Chicago, Chicago, IL, USA)

- Impact of HO-1 inhibition on LECs migration, proliferation and organization into structures
- Impact of induction of HO-1 expression on LECs proliferation and migration
- Expression of HO-1 in lymphatics in a mouse model of melanoma

T08

The Role of Tie1 in Flow-Mediated Lymphatic Vessel Remodeling and Valvulogenesis

Harmelink Cristina, Vanderbilt University Medical Center; Zhou, Bin (Albert Einstein College of Medicine, Bronx, USA); Qu, Xianghu; Baldwin, H. Scott (Vanderbilt University Medical Center, Nashville, USA)

- Conditional deletion of Tie1 from lymphatic endothelial cells disrupts development of lymphatic vasculature.
- Tie1 is required for proper expression of key mediators of lymphatic valve formation, in vivo and in vitro.
- We hypothesize Tie1 mechanotransduces cues from lymph flow to orchestrate valve development and maintenance.

Lymphangiogenesis

T09

Novel "Hybrid" Vessels in the Renal Vasculature and their Role in Proper Renal development and function

Kenig-Kozlovsky Yael, Northwestern University; Scott, Rizaldy (Northwestern University, Chicago, IL, USA); Onay, Tuncer; Carota, Isabel (Northwestern University, Chicago, USA); Gil, HyeaJin (Northwestern university, Chicago, IL, USA); Thomson, Benjamin R. (Northwestern University, Chicago, IL, USA); Ramirez, Veronica (Northwestern University, Chicago, USA); Quaggin, Susan E. (Northwestern University, Chicago, IL, USA)

- Role of Angiopoietin- Tie2 signaling pathway in the development of renal vasculature
- Investigating ''hybrid '' vessels in the kidney.
- Investigating cystic phenotype as a result of reduction of density of renal vasculature.

T10

Left-asymmetric transcription factor Pitx2 regulates functional intestinal lymphatic development

Mahadevan Aparna, Cornell University; Hu, Shing P. (Cornell University, Ithaca, NY, USA)

- Pitx2 is a key left determining transcription factor crucial for intestinal looping morphogenesis.
- Pitx2 coordinates formation of novel asymmetric lymphatic population in the intestinal mesentery.
- Pitx2 mutants display aberrant transport of fatty acids and have defects in valve and lacteal morphogenesis.

T11

The endothelial specific phosphatase VE-PTP is required for lymphangiogenesis and vascular maturation

Carota Isabel, Feinberg Cardiovascular Research Institute, Northwestern University; Onay, Tuncer (Feinberg Cardiovascular Research Institute, Northwestern University, Chicago, IL, USA); Scott, Rizaldy; Kenig-Kozlovsky, Yael; Liu, Xiaolei; Thomson, Benjamin R.; Souma, Tomokazu (Northwestern University, Chicago, IL, USA); Quaggin, Susan (Northwestern University, Chicago, USA)

- Investigating the impact of VEPTP deletion on lymphangiogenesis
- Genetic deletion of VEPTP activates Tie2 signaling
- Association of absence of VEPTP and the development of venous malformations

T12

uPARAP/endo180 receptor acts as a gatekeeper of pathological lymphangiogenesis by controlling VEGF-C driven lymphatic endothelial cell migration

Morfoisse Florent, GIGA center-University of Liege; Durré, Tania; Ebroin, Marie; Blacher, Silvia (GIGA-Center University of Liege, Liege, Belgium); Garcia-Caballero, Melissa (Vesalius Research Center KU Leuven, Leuven, Belgium); Behrendt, Niels (Rigshospitalet and University of Copenhagen, Copenhagen, Denmark); Paupert, Jenny (CNRS 5273 INSERM U1031 Université de Toulouse 3, UPS, Toulouse, France); Noel, Agnes (University of Liege, Liege, Belgium)

- Regulations of lymphatic sprouting and proper organization
- VEGF-C-driven endothelial chemotactism and directional migration
- Deciphering uPARAP-mediated signalling pathways in lymphatic cells

T13

ERK5 is a novel regulator of lymphatic development

Kim Ah-Ra, Gwangju institute of science and technology; KIM, Jun-Dae (Weill Cornell Medical College, Texas, USA); Jin, Suk-Won (Yale University, New Haven, CT, USA)

- ERK5 is essential for lymphatic development.
- PDE5-PKG Modulates Lymphatic Development via ERK5.
- ERK5 Serves as the Main Target of Sildenafil in Lymphatic Endothelial Cells.

T14

Glycolytic metabolism and VEGFR3 signaling are required for lymphangiogenesis

Chan Joanne, Hampton University; Dasgupta, Amrita (Hampton University, Hampton, VA, USA)

- Glycolytic metabolism plays an important role during lymphangiogenesis
- zebrafish lymedema model provides whole animal model for chemical library screening
- combined activation of MEK-ERK and glycolysis may be beneficial for lymphedema patients

T15

Characterization of Lymphatic Vessel Development in the Central Nervous System

Izen Rebecca, National Institutes of Health; Yamazaki, Tomoko (National Institute of Health, Bethesda, MD, USA); Mukouyama, Yoh-suke (National Institutes of Health, Bethesda, MD, USA)

- Dural lymphatic vessels develop after birth.
- Dural lymphatic vessels extend along dural blood vessels towards the Superior Saggital Sinus.
- Prox1+ dural lymphatic endothelial cells appear to emerge along the side of the skull.

T16

Genetic prevention of PDGFB-dependent mural cell recruitment does not alter lymph vessel identity

Wang Yixin, Karolinska Institutet; Jin, Yi (Karolinska Institutet, Stockholm, Sweden); Andaloussi-Mäe, Maarja; Betsholtz, Christer; Makinen, Taija (Uppsala University, Uppsala, Sweden); Jakobsson, Lars (Karolinska Institutet, Stockholm, Sweden)

- PDGFB is expressed by lymphatic endothelial cells (LECs) of collecting vessels but not capillaries
- LEC-specific deletion of Pdgfb impaired collecting vessel morphology and contraction
- Overexpression of PDGFB in all LECs did not induce recruitment of SMCs to capillaries.

T17

Live imaging of the lymphatic vascular network using transgenic zebrafish

Jung Hyun Min, NICHD/NIH; Castranova, Daniel; Swift, Matthew R.; Pham, Van N.; Venero Galanternik, Marina (NICHD/NIH, Bethesda, USA); Isogai, Sumio (Iwate Medical University, Morioka, Japan); Butler, Matthew G.; Mulligan, Timothy S.; Weinstein, Brant M. (NICHD/NIH, Bethesda, USA)

- Live imaging of lymphangiogenesis using a new transgenic zebrafish reporter line.
- Live imaging of fluid drainage in zebrafish lymphatics.
- Live imaging of immune cell trafficking in zebrafish lymphatics.

T18

Th2 dependent lymphatic endothelial cell expansion supports plasma cell survival through eosinophil recruitment to mesenteric lymph node

Dubey Lalit Kumar, ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE (EPFL); Harris, Nicola L. (École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland)

- intranodal lymphangiogenesis
- inflammation-induced lymphangiogenesis
- mechanisms underlying intranodal lymphangiogenesis in response to type 2 inflammation

T19

Rasip1 is a novel regulator of lymphatic vasculature formation

Liu Xiaolei, Northwestern University; Ma, Wanshu (Northwestern University, Chicago, IL, USA); Gil, HyeaJin (Northwestern university, Chicago, IL, USA); Cleaver, Ondine B. (UT Southwestern Medical Center, Dallas, TX, USA); Oliver, Guillermo (Northwestern University, Chicago, IL, USA)

- Rasip1 is required for lymphatic vessel development
- Rasip1 is required for lymphatic valve formation
- Rasip1 regulates RhoGTPase activity

T20

In Vivo Gain of Function Approaches to Study Lymphatic Endothelial Cell Fate Differentiation and Lymphangiogensis

Ma Wanshu, Northwestern University; Oliver, Guillermo (Northwestern University, Chicago, IL, USA)

- The lymphatic endothelial fate is plastic and reprogrammable.
- Prox1 and Pdpn are key genes for lymphatic fate.
- Mouse models are generated to test if Prox1 and pdpn promote lymphatic fate and growth in vivo.

T21

Novel loss of function variants in the Angiopoietin-TEK signaling pathway are causative for human pediatric congenital glaucoma

Thomson Benjamin, Northwestern University; Souma, Tomokazu; Onay, Tuncer (Northwestern University Feinberg School of Medicine, Chicago, USA); Thompson, Stuart W. (University of Wisconsin-Madison, Madison, USA); Siggs, Owen M. (Flinders University, Adelaide, Australia); Feng, Liang; Liu, Xiaorong (Northwestern University, Evanston, USA); Craig, Jamie E. (Flinders University, Adelaide, Australia); Kizhatil, Krishnakumar; John, Simon W. (The Jackson Lab, Bar Harbor, USA); Jin, Jing (Northwestern University Feinberg School of Medicine, Chicago, USA); Young, Terri L. (University of Wisconsin-Madison, Madison, USA); Quaggin, Susan E. (Northwestern University Feinberg School of Medicine, Chicago, USA)

- Angiopoietin signaling is essential for Schlemm's canal development.
- Angiopoietin 2 can compensate for the loss of ANGPT1 in Schlemm's canal.
- Novel loss of function mutations in ANGPT1 can cause human glaucoma.

T22

Local induction of lymphangiogenesis with engineered fibrin-binding VEGF-C promotes wound healing by increasing immune cell trafficking and matrix remodeling

Guc Esra, The University of Edinburgh; Briquez, Priscilla; Fankhauser, Manuel; Foretay, Didier; Hubbell, Jeffrey (University of Chicago, Chicago, USA); Swartz, Melody A.; Kilarski, Witold (University of Chicago, Chicago, IL, USA)

- Matrix-bound, control-released VEGF-C acts locally increasing hypertrophia of initial lymphatics
- Hypertrophic lymphatics have increased functionality, no effect on collectors or blood vessels
- Increased local lymphangiogenesis stimulate wound healing in normal and diabetic wounds

T23

ELK3 is a functional regulator of Prox1 in lymphatic endothelial cells

Yoshimatsu Yasuhiro, Tokyo Medical and Dental University; Itoh, Taichi (The University of Tokyo, Tokyo, Japan); Inagawa, Akihiko (Tokyo Medical and Dental University, Tokyo, Japan); Miyazono, Kohei (The University of Tokyo, Tokyo, Japan); Watabe, Tetsuro (Tokyo Medical and Dental University, Tokyo, Japan)

- Molecular mechanisms by which ELK3 transcription factor regulates lymphanigogenesis
- ELK3 is capable of binding to Prox1. ELK3 enhances inflammatory lymphangiogenesis.
- ELK3 positively regulates expression of platelet-derived growth factor receptor ß in cooperation with Prox1.

T24

Mechanisms of lymphatic vessel assembly and guidance

Astin Jonathan, University of Auckland

- Facial lymphatic development requires three different populations of lymphangioblasts
- Vessel migration occurs through the sequential contribution of lymphangioblasts to the growing tip
- Cartilage and sensory neurons are templates for lymphatic vessel guidance

T25

Lymphangiogenesis reduces resistance against lymph formation and enhances the formation of the DC mobilizing chemokine CCL21

Karlsen Tine, University of Bergen; Nikpey, Elham; Reikvam, Tore; Wagner, Marek; Tofteberg, Anne; Tenstad, Olav; Wiig, Helge (University of Bergen, Bergen, Norway)

- lymphangiogenesis
- lymph flow
- extracellular volume regulation

T26

Multifaceted roles of lymphatics in allergic airway inflammation

Maisel Katharina, University of Chicago; Potin, Lambert; Hrusch, Cara L.; Camacho, Daniel F.; Sperling, Anne I.; Swartz, Melody A. (University of Chicago, Chicago, USA)

- Changes in molecule and antigen drainage during inflammation with lymphangiogenesis in the lung
- Role of VEGFR3 signaling during allergic airway inflammation
- Interaction between lymphatics and T cell during allergic stimuli

T27

Local, sustained delivery of VEGF-C alters adaptive immune response to co-delivered antigens

Yu Shann, University of Chicago; Fankhauser, Manuel; Aigner, Petra (École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland); Broggi, Maria (University of Chicago, Chicago, USA); Swartz, Melody A. (University of Chicago, Chicago, IL, USA)

- Intradermal delivery of VEGF-C promotes accumulation of CD4 T cells of effector memory phenotype
- Co-delivery of antigen with VEGF-C educates antigen-reactive CD4 T cells towards non-Th1 responses
- OVA vaccination w/ VEGF-C co-delivery impairs Listeria-OVA clearance & rejection of OVA-expressing transplants

T28

A novel mechanism of lymphangiogenesis in the postpartum mammary gland

Lyons Traci, University of Colorado Anschutz Medical Campus; Elder, Alan; Black, Sarah (University of Colorado Anschutz Medical Campus, Aurora, USA); Zwick, Rachel; Grisotti, Gabriella; Horsley, Valerie (Yale University, New Haven, USA)

- Novel mechanisms of lymphangiogenesis during mammary tissue remodeling
- A novel role for macrophages in lymphangiogenesis
- Postpartum mammary macrophages are sufficient to drive increased lymphatic vessel density

T29

TMEM100 is a key factor for specification of lymphatic endothelial progenitors by regulating NOTCH signaling

Kim Yong Hwan, University of Florida; Moon, Eun-Hye; Vu, Phuong-Nhung; Lee, Young Jae (Gachon University, Incheon, Korea, Republic of); Oh, S. Paul (University of Florida, Gainesville, USA)

- TMEM100
- Development of lymphatic vasculature
- Lymphatic endothelial cell differentiation

T30

Mechanisms and Regulations of VEGF-C activation

Jha Sawan, University of Helsinki; Rauniyar, Khushbu (University of Helsinki, Helsinki, Finland); Kärpänen, Terhi (University of Oslo, Oslo, Norway); Leppänen, Veli-Matti (University of Helsinki, Helsinki, Finland); Brouillard, Pascal; Vikkula, Miikka (de Duve Institute, Université catholique de Louvain, Brussels, Belgium); Alitalo, Kari (Biomedicum Helsinki/Univ Helsinki, Helsinki, Finland); Jeltsch, Michael (University of Helsinki, Helsinki, Finland)

- C-terminal domain VEGF-C is required for efficient VEGF-C activation.
- The N-terminus of CCBE1 affects VEGF-C rediscribution
- KLK3 (PSA) specifically and efficiently activates VEGF-C

T31

Characterization of the pre-metastatic niche in lymph node, in experimental and clinical settings

Noel Agnes, University of Liege

- lymph node metastases
- lymphangiogenesis
- pre-metastatic niche

T32

Molecular Mechanism of Flow-Induced Lymphatic Expansion

Hong Young, University of Southern California; Choi, Dongwon (University of Southern California, Los Angeles, CA, USA); Park, Eunkyung; Jung, Eunson; Seong, Young Jin; Hong, Mingu (University of Southern California, Los Angeles, USA); Hong, Yeo Jin (USC, Los Angeles, USA)

- Larminar flow
- Lymphatic sprouting
- Notch

T33

Gata2 is an extracellular matrix-responsive key regulator of early lymphatic development

Frye Maike, Uppsala University, Sweden; Makinen, Taija (Uppsala University, Uppsala, Sweden)

- early lypmphangiogenesis
- Gata2 as critical ECM-responsive transcription factor in lypmphangiogenesis

T34

Inhibition of macrophage VEGFR-3 signaling in adipose tissue via AAV-mediated gene delivery reduces weight gain and hepatic steatosis in obesity

Karaman Sinem, Wihuri Research Institute and University of Helsinki; Nurmi, Harri J. (Wihuri Research Institute, Helsinki, Finland); Kazimi, Arian (Swiss Federal Institute of Technology (ETH) Zurich, Zurich, Switzerland); Schwager, Simon (ETH Zürich, Zurich, Switzerland); Haertel, Eric (Swiss Federal Institute of Technology (ETH) Zurich, Zurich, Switzerland); Proulx, Steven (ETH Zurich, Zurich, Switzerland); Werner, Sabine; Wolfrum, Christian (Swiss Federal Institute of Technology (ETH) Zurich, Zurich, Switzerland); Alitalo, Kari (Biomedicum Helsinki/Univ Helsinki, Helsinki, Finland); Detmar, Michael (ETH Zurich, Zurich, Switzerland)

- VEGFR-3 is upregulated in M1 macrophages and VEGF-C levels are elevated in adipose tissue in obesity
- Macrophage-specific VEGFR-3 deletion reduces weight gain and hepatic steatosis under high-fat diet
- AAV-mediated VEGFR-3 blockade improves adipose M2/M1 ratio and reduces hepatic steatosis in obesity

T35

What is the relation between clinical examination and classification of dermal backflow patterns during lymphofluoroscopy in patients with breast cancer related lymphedema?

Thomis Sarah, UZ Leuven

- ICG fluoroscopy was performed and recorded using a standar body diagram. An individual drawing is made.
- Clinical assessment is performed by using different techniques.
- A correlation is calculated using a one-way analysis of variance and Spearman rank correlation coeffic

Lymphatic Physiology and Function

T36

The role of polyunsaturated fatty acid - derived epoxides and diols in angiogenesis and lymphangiogenesis

Ciliberti Giorgia, Goethe University Frankfurt; Dziumbla, Sarah; Kesavan, Rushendhiran (Goethe University Frankfurt, Frankfurt, Germany); Popp, Rüdiger (Institute for Vascular Signalling, Frankfurt am Main, Germany); Fleming, Ingrid (Goethe University Frankfurt, Frankfurt, Germany); Dehne, Nathalie (Goethe University Frankfurt, Frankfurt, USA); Weigert, Andreas; Brüne, Bernhard (Goethe University Frankfurt, Frankfurt, Germany)

- Effect of omega-3 and omega-6 PUFA derived epoxides and diols on angiogenesis and lypmhangiogenesis
- Impact of the Cytochrome derivatives on blood and lymphatic cells formation in vivo and in vitro
- Possible role of epoxides and diols of vasculogenesis

T37

MMP14 suppresses LEC proliferation downstream of ERK activation in lymphatic valve maturation and homeostasis

Muley Ajit, Columbia University Medical Center; Kitajewski, Chris; Rittano, Gloria (Columbia University Medical Center, New York, USA); Saade, Mia M. (Columbia University, New York, USA); Shawber, Carrie (Columbia University Medical School, New York, NY, USA)

- Lymphatic valve development
- Matrix metalloproteases
- ERK signaling

T38

A Multiscale Biomechanical Model of Lymphatic Pumping

Edgar Lowell, Imperial College London; Morris, Christopher; Moore, James E. (Imperial College London, London, United Kingdom)

- Multiscale Lymphatic Pumping
- Computational Homogenization
- Lymphedema Mechanisms and Treatment

T39

Computational model of immune cell trafficking during inflammatory lymph node expansion

Johnson Sarah, Imperial College London; Moore, James E.; Taylor Edgar, Lowell (Imperial College London, London, United Kingdom)

- To better understand the coordination between lymph node cell trafficking, expansion and fluid flow
- Agent based modelling describes T cell trafficking and retention in an expanding lymph node
- Inhibiting lymph node expansion can reduce T cell transit time and dampen the proliferative response

T40

Comparison of Lymphatic Function Techniques

Bouta Echoe, Massachusetts General Hospital

- It is unclear why there is variation in reported endpoints from techniques to measure lymphatic function.
- We have found that mouse position, invasiveness, and dye volume all affect endpoints from separate modalities.
- After certain volumes of dye injection, there is no difference in contraction but is a difference in flow.

T41

HDL: a novel modulator of lymphatic transport?

Angeli Veronique, National University of Singapore

- interaction between HDL and lymphatic vessels
- describe a novel property of HDL
- HDL can regulate VEGF-C gene expression

T42

Size and Pressures in the Thoracic Duct of animals in Right Heart Failure

Zviman Menekhem, The Children's Hospital of Philadelphia; Dori, Yoav (The Childrens Hospital of Philadelphia, Philadelphia, PA, USA)

- Measurement of size and pressure in the Thoracic duct in closed chest.
- Changes to lymphatics during right heart failure.
- Waveform of lymphatic pressure.

T43

Extra-lymphatic vessel fluid and antigen delivery via the peri-nodal adipose tissue to the lymph node

Liao Shan, University of Calgary; Lin, Yujia (University of Calgary, Calgary, Canada)

- Fluid and cell communication between the Peri-nodal adipose tissue and lymph node.
- Extra-lymphatic vessel antigen delivery via peri-nodal adipose tissue to lymph node.
- Circulation antigen enters peri-nodal adipose tissue and lymph node.

T44

Stretch-Induced Modulation of Lymphatic Pumping

von der Weid Pierre-Yves, University of Calgary; Cho, Eun-Ball; Kratofil, Rachel M. (University of Calgary, Calgary, AB, Canada); Nasser, Jacob (University of calgary, Calgary, AB, Canada); Rehal, Sonia (University of Calgary, Calgary, Canada); Lee, Stewart S.; Roizes, Simon (University of Calgary, Calgary, AB, Canada)

- Lymphatic pumping is activated by lymph pressure
- TRPM, TRPC and TMEM16A/Ano1 channels are expressed in mesenteric lymphatic vessels.
- TRPM4 and TMEM16A/Ano1 are involved in stretch-induced contraction

T45

Connexin-45 plays a critical role in the conduction and coordination of spontaneous contractions in collecting lymphatic vessels

Castorena-Gonzalez Jorge, University of Missouri; Zawieja, Scott D. (University of Missouri, Columbia, Columbia, MO, USA); Li, Min (University of Missouri, Columbia, MO, USA); Srinivasan, Sathish (OMRF, Oklahoma City, OK, USA); Simon, Alexander (The University of Arizona, Tucson, USA); Hennig, Grant (University of Nevada-Reno, Reno, USA); de Wit, Cor (University of Lubeck, Luebeck, Germany); De La Torre, Roger; Martinez-Lemus, Luis A. (University of Missouri, Columbia, USA); Davis, Michael J. (University of Missouri-Columbia, Columbia, MO, USA)

- Cx45 is critical for the conduction and coordination of lymphatic spontaneous contractions.
- Expression of the calcium indicator GCaMP6f enabled analysis of intracellular conducted Ca2+ events.
- Endothelial connexins and calcium events are dispensable for lymphatic spontaneous contractions.

T46

Calcitonin receptor-like receptor is required for regulating intestinal lipid homeostasis

Davis Reema, University of North Carolina at Chapel Hill; Ding, Shengli (University of North Carolina at Chapel Hill, Chapel Hill, USA); Blakeney, Elizabeth S. (University of North Carolina at Chapel Hill, Chapel Hill, NC, USA); Caron, Kathleen M. (University of North Carolina, Chapel Hill, Chapel Hill, NC, USA)

- Intestinal lacteals and their ability to absorb fat
- Role of Calcrl in the lymphatic endothelium
- Role of Calcrl in the enteroendocrine system

T47

Effects of pressure applied to either end of isolated rat mesenteric collecting lymphatic segments on the propagation of contractions, with and without nitric oxide inhibition

Bertram Christopher, University of Sydney; Davis, Michael J. (University of Missouri-Columbia, Columbia, MO, USA)

- Contractions were mostly synchronized/entrained along the length of segments.
- There was a trend for pacemaking to be controlled from the end with the highest transmural pressure.
- There was little apparent influence from NO, but other (unidentified) factors play a significant role.

T48

VEGFR2 signalling regulating the lymphatic barrier

Venkatraman Lakshmi, Uppsala University

- Crosstalk between VEGFR2 and actin cytoskeleton signalling in regulating Lymphatic junctions.
- In vivo studies of VEGFR2 induced modulation of lymphatic junctions during tumor metastasis.
- Computational model of VEGFR2 induced changes in lymphatic junctional integrity.

T49

Meningeal lymphatics mediate immune cells/antigen circulation and impact neuroinflammation

Louveau Antoine, University of Virginia; Herz, Jasmin (University of Virginia, Charlottesville, VA, USA); Alme, Maria; Herod, Grace; Setliff, Joshua; Viar, Kenneth (University of Virginia, Charlottesville, USA); Da Mesquita, Sandro (University of Virginia, Charlottesville, VA, USA); Smirnov, Igor (University of Virginia, Charlottesville, USA); Oliver, Guillermo (Northwestern University, Chicago, IL, USA); Kipnis, Jonathan (University of Virginia, Charlottesville, USA)

- Functional role of the meningeal lymphatic
- Anatomy of the meningeal lymphatic
- Immune cell circulation

T50

Contractility of human leg lymphatics-pulse, lymph flow and pressure

Olszewski Waldemar, Central Clinical Hospital

- Autonomous rhythmic contraction of human lymphatics
- Amplitude and ejection fraction of contracting lymphatics depend on local tissue fluid volume
- Contracting lymphatics of human limbs conduct lymph against gravity

Friday, June 9 – 7:30-9:30pm

Odd numbered posters will be manned from 7:30 to 8:30pm
Even numbered posters will be manned from 8:30 to 9:30pm

Lymphatics and Disease

F01

Utilization of a lymphatic defect patient cohort to identify causes of generalized lymphatic anomaly leading to targeted therapeutics development

Li Dong, Children's Hospital of Philadelphia

- Identifying novel genetic causes in undiagnosed lymphatic disorders
- Assessing gene function both in vitro and in vivo
- Evaluating potential therapy for lymphatic disorders

F02

The role of lymphatic vessels in distant organ metastasis

Ma Qiaoli, ETH Zurich; Dieterich, Lothar; Ikenberg, Kristian; Bachmann, Samia; Proulx, Steven (ETH Zurich, Zurich, Switzerland); Mangana, Johanna; Amann, Valerie; Levesque, Mitchell; Dummer, Reinhard (University Hospital Zurich, Zurich, Switzerland); Detmar, Michael (ETH Zurich, Zurich, Switzerland)

- lymphatic vessel area coverage increased in metastasis bearing organs
- lymphatic vessels facility the secondary metastasis from established metastases in distant organs
- peri-metastases lymphatic vessel density and lymphatic invasion correlated with poorer prognosis

F03

Therapeutic Potential of Inflammation-Site-Specific Activation of Lymphatic Vessels

Schwager Simon, ETH Zürich; Renner, Silvana; Hemmerle, Teresa (ETH Zurich, Zurich, Switzerland); Karaman, Sinem (Biomedicum Helsinki, Helsinki, Finland); Proulx, Steven; Halin, Cornelia; Neri, Dario; Detmar, Michael (ETH Zurich, Zurich, Switzerland)

- Chronic inflammation
- Targeted delivery of lymphangiogenic factor
- Activation of lymphatic vessels

F04

Effect of Bestatin Treatment on Lymphatic System Function in Single Vessel Ligation Lymphedema Model in Mice

Cribb Matthew, Georgia Institute of Technology; Tian, Amy (Stanford School of Medicine, Palo Alto, CA, USA); Nicolls, Mark (Stanford University, palo alto, CA, USA); Rockson, Stanley G. (Stanford University School of Medicine, Stanford, CA, USA); Dixon, J. Brandon (Georgia Institute of Technology, Atlanta, GA, USA)

- Bestatin has been shown to reduce swelling in a double vessel ligation lymphedema model in mice.
- Novel single vessel ligation model allows for functional characterization of the intact vessel.
- Results show that function is improved in bestatin-treated mice.

F05

Tumor Angiogenesis and Lymphangiogenesis Effects on Size-Regulated Profiles of Tumor-derived Molecular Dissemination to Draining Lymph Node-resident Immune Cells

Thomas Susan, Georgia Institute of Technology; Rohner, Nathan (Georgia Institute of Technology, Atlanta, USA)

- VEGF-C and VEGF effects on restoring tumor crosstalk with sentinel lymph nodes
- VEGF-C and VEGF effects on the biodistribution of tumor-derived factors to disseminated tissues
- Size-regulated profiles of molecular dissemination to cell subpopulations within sentinel lymph nodes

F06

Therapeutic stimulation of cardiac lymphangiogenesis –protein vs. gene therapy approaches post-MI

Brakenhielm Ebba, Inserm; Houssari, Mahmoud (Inserm, Rouen, France); Boukhalfa, Ines (Inserm U1096, Rouen, France); Dumesnil, Anais; Henri, Orianne; Henry, Jean-Paul (Inserm, Rouen, France); Kivelä, Riikka (University of Helsinki and Wihuri Research Institute, Helsinki, Finland); Alitalo, Kari (Biomedicum Helsinki/Univ Helsinki, Helsinki, Finland); Richard, Vincent (Inserm, Rouen, France); Mulder, Paul (Rouen University, Rouen, France)

- therapeutic lymphangiogenesis
- heart failure
- cardiac edema and inflammation

F07

Methicillin-resistant Staphylococcus aureus pathogenicity causes sustained lymphatic dysfunction

Jones Dennis, Massachusetts General Hospital; Padera, Timothy P. (Massachusetts General Hospital, Boston, MA, USA)

- We focus on lymphatic vessel function (contractility and lymph flow) after MRSA infection.
- MRSA infection leads to chronic impairment of lymphatic vessel function.
- MRSA virulence and lymphatic vessel dysfunction

F08

CD36 deletion causes disruption of intestinal lymphatic integrity and fatty liver in mice

Cifarelli Vincenza, Washington University School of Medicine; Appak-Baskoy, Sila (Heidelberg University, Heidelberg, Germany); Ivanov, Stoyan (Washington University school of Medicine, St.Louis, USA); Randolph, Gwendalyn J. (Washington University, St. Louis, MO, USA); Augustin, Hellmut G. (Heidelberg University and German Cancer Research Center, Heidelberg, Germany); Abumrad, Nada A. (washington University in St.Louis, St.Louis, USA)

- Fatty acid receptor CD36 controls chylomicron formation and lipid absorption in the intestine.
- CD36 controls proliferation, migration and formation of dermal lymphatic endothelial cells in vitro
- CD36KO have hypertrophied mesenteric lymph nodes, altered lacteals structures, chylous ascites and fatty liver

F09

Peri-tumoral edema is a primary contributor of tumor inflammatory and immunosuppressive microenvironment

Kataru Raghu, Memorial Sloan Kettering Cancer Center; Mehrara, Babak J. (Memorial Sloan Kettering Cancer Center, New York, NY, USA)

- Tumor lymphatic vessels
- Dysfunctional peri-tumor lymphatics and edema
- Peri-tumor edematous tissue- Inflammatory/Immunosuppressive

F10

Inhibition of Th2 differentiation mitigates the pathologic findings of lymphedema

Ly Catherine, Memorial Sloan Kettering Cancer Center; Gárcia Nores, Gabriela D.; Kataru, Raghu P.; Mehrara, Babak J. (Memorial Sloan Kettering Cancer Center, New York, NY, USA)

- T-betKO (Th2-restricted mice) develop lymphedema after lymphatic injury similar to WT mice
- CD4KO and STAT6KO (Th1-restricted mice) do not develop lymphedema after lymphatic injury
- Th2 cells are critical for lymphedema pathology and a topical Th2 inhibitor is highly effective in mice

F11

Obesity-induced iNOS Mediates Lymphatic Dysfunction via Oxidative Stress and Promotes Insulin Resistance

Rehal Sonia, Memorial Sloan Kettering Cancer Center; Ly, Catherine L. (Memorial Sloan Kettering Cancer Center, New York, NY, USA)

- The link between Obesity and Lymphatic Dysfunction
- iNOS is a mediator of lymphatic dysfunction during obesity
- Lack of iNOS rescues lymphatic function in obese mice

F12

ApoA-I improves lymphatic function through a platelet-dependent mechanism in an atherosclerotic mouse model

Milasan Andreea, Montreal Heart Institute

- Atherosclerosis
- Apolipoprotein A-I
- Platelets

F13

Transcriptional regulation of postnatal lymphatic vascular development by Foxc1 and Foxc2

Norden Pieter, Northwestern University; Liu, Ting; Shackour, Tarek (Northwestern University, Chicago, IL, USA); Kume, Tsutomu (Northwestern University School of Medicine, Chicago, IL, USA)

- The mechanisms of lymphatic valve formation, maturation and maintenance are not well understood.
- Foxc1 and Foxc2 have a key role in lymphangiogenesis and lymphatic valve maintenance and maturation.
- Identifying mechanisms regulated by Foxc1 and Foxc2 will help to treat lymphedema patients.

F14

Lymph flow of pediatric lymphangioma, and its flow oriented surgery

Kato Motoi, Saitama Children's Medical Center

- lymph flow on lymphangioma with indocyanine green lymphangiography are classified
- micro cystic type lymphangioma is treatable with lymphatic venous anastomosis which mostly apply on lymphedema
- clinical questions and solutions about pediatric lymph diseases were shown in this presentation

F15

Modulation of the pre-metastatic lymph node niche by melanoma cells through secreted exosomes

Garcia-Silva Susana, Spanish National Cancer Research Center (CNIO); Benito-Martin, Alberto; Nogues-Vera, Laura (Weill Cornell Medical College, New York, NY, USA); Amor-Lopez, Ana; Merino, Cristina (Spanish National Cancer Research Centre (CNIO), Madrid, Spain); Matei, Irina (Weill Cornell Medical College, New York, NY, USA); Gardenier, Jason C.; Kataru, Raghu; Brady, Mary S.; Mehrara, Babak J. (Memorial Sloan Kettering Cancer Center, New York, NY, USA); Lyden, David (Weill Cornell Medical College, New York, NY, USA); Peinado, Hector (Spanish National Cancer Research Centre (CNIO), Madrid, Spain)

- Pre-metastatic niche formation in the lymph node
- Melanoma secreted exosomes target several lymph node cell types
- lymphangiogenesis is promoted by melanoma-secreted exosomes

F16

Leukotriene B4 Antagonism Ameliorates Experimental Lymphedema

Tian Amy, Stanford University; Jiang, Xinguo (Stanford University, Palo Alto, CA, USA); Tu, Allen (Stanford University, Palo alto, CA, USA); Rockson, Stanley G. (Stanford University School of Medicine, Stanford, CA, USA); Nicolls, Mark (Stanford University, palo alto, CA, USA)

- potential treatment for lymphedema
- inflammation, lymphangiogenesis
- leukotriene B4, Notch signaling

F17

Lymphatic Flow Disorders in Patients with Congenital Heart Disease

Dori Yoav, The Children's Hospital of Philadelphia

- Lymphatic flow disorders in patients with CHD
- MR lymphangiography
- Liver lymphangiography

F18

Induced lymphangiogenesis enhances antigen-specific immunity in anti-cancer vaccination

Sasso Maria Stella, The University of Chicago; Hauert, Sylvie (The University of Chicago, Chicago, IL, USA); Swartz, Melody A. (University of Chicago, Chicago, IL, USA)

- Inducing local lymphangiogenesis is a potential approach to increase vaccine efficacy
- lymphatic activation and expansion modulates local T cell recruitment and antigen transport
- Irradiated VEGFC-overexpressing tumor cells can be used as lymphangiogenic cancer vaccine

F19

Disrupted KLF2-Mediated PPARγ Signaling in Lymphatic Endothelial Cells from an Ovine Model of Congenital Heart Disease with Increased Pulmonary Blood Flow

Datar Sanjeev, UCSF; Morris, Catherine; Gong, Wenhui; He, Youping; Boehme, Jason; Kameny, Rebecca J.; Maltepe, Emin (UCSF, San Francisco, CA, USA); Raff, Gary W. (UC Davis, Sacramento, CA, USA); Fineman, Jeffrey R. (UCSF, San Francisco, CA, USA)

- Pulmonary lymph flow is increased in a model of CHD with increased pulmonary blood flow.
- LECs exposed to this increased lymph flow in vivo have a KLF2-mediated disruption of PPAR? signaling.
- This is associated with increased ROS, decreased bioavailable NO, and impaired lymphatic function.

F20

Extracellular RNA profiles of rat mesenteric lymph

Hong Jiwon, University of Auckland; Tsai, Peter; Blenkiron, Cherie; Premkumar, Rakesh; Nachkebia, Shorena; Hickey, Anthony; Windsor, John; Phillips, Anthony (University of Auckland, Auckland, New Zealand)

- RNA profiling of rat mesenteric lymph
- RNA profiling of extracellular vesicles in rat mesenteric lymph
- RNA profiling of triglyceride-rich lipoproteins in rat mesenteric lymph

F21

The effects of flavonoid-based treatment on lymphatic vessel inflammation, barrier dysfunction and muscle contractile impairment associated with lymphedema

Bowman Catharine, University of Calgary; Roizes, Simon; von der Weid, Pierre-Yves (University of Calgary, Calgary, AB, Canada)

- Inflammation, increased lymphatic vessel permeability and contraction are features of lymphedema
- The flavonoid apigenin positively restores lymphatic changes caused by inflammation

F22

Rapamycin induces partial regression of newly formed abnormal lymphatics

Baluk Peter, University of California San Francisco; Flores, Julio; Yao, Li-Chin (UCSF, San Francisco, USA); Choi, Dongwon; Hong, Young K. (University of Southern California, Los Angeles, CA, USA); McDonald, Donald (University of California, San Francisco, San Francisco, CA, USA)

- Unlike blood vessels, newly formed lymphatics are resistant to spontaneous regression
- Lymphatic malformations show features of abnormally growing lymphatic vessels
- Of several therapeutic treatments tested, only rapamycin induced regression of new formed abnormal lymphatics

F23

Dysregulation of lymphangiogenesis results in liver fibrosis and promotes disease progression

Truax Tracy, CU Medical/GI-Hep division; Finlon, Jeffrey; Winter, Andrew (University of Colorado Anschutz Medical Campus, Aurora, CO, USA); Pytowski, Bronislaw (Eli Lilly and Company, New York, NY, USA); Rosen, Hugo; Tamburini, Beth A. (University of Colorado Anschutz Medical Campus, Aurora, CO, USA)

- Lymphatic function in the liver
- Loss of VEGFR3 signaling and fibrosis
- Loss of VEGFR3 signaling and neutrophil accumulation

F24

The Role of Polycystin 1 GPS cleavage in vascular development

Watnick Terry, University of Maryland School of Medicine; Outeda, Patricia (University of Maryland, Baltimore, MD, USA); McAvoy, Kathleen; Qian, Feng (University of Maryland School of Medicine, Baltimore, MD, USA)

- Polycystin-1 is required for lymphatic development
- Polycystin-1 undergoes cleavage and this is required for ciliary localization
- Mice with a knock in mutation that abolishes cleavage do not have a vascular phenotype but have kidney cysts

F25

RASA1 regulates the development and function of lymphatic vessel valves

King Philip, University of Michigan; Lapinski, Philip E.; Lubeck, Beth; Chen, Di (University of Michigan, Ann Arbor, MI, USA); Doosti, Abbas (University of Michigan, Ann Arbor, USA); Zawieja, Scott D. (University of Missouri, Columbia, Columbia, MO, USA); Davis, Michael J. (University of Missouri-Columbia, Columbia, MO, USA)

- RASA1 maintains LEC number in LV valve leaflets and is essential for valve function
- RASA1 is required for the survival of Prox1 hi LEC in LV valve leaflets during development
- Impaired LV valve development and maintenance accounts for LV leakage defects in CM-AVM

F26

VEGF-D and Lymphatics in Rare Lung Disease Lymphangioleiomyomatosis (LAM): Progress and Current Challenges

Krymskaya Vera, University of Pennsylvania

- Role of VEGF-D and lymphatics in rare lung fatal disease LAM, which affects predominantly women
- VEGF-D expressing TSC2-null lung lesions induce lymphangiogenesis in VEGF-D KO mice
- Therapeutic targeting of VEGFR signaling prevents lymphangiogenesis and tumor growth in mouse model of LAM

F27

A mathematical study of stenotic and regurgitant lymphatic valves

Contarino Christian, University of Trento; Toro, Eleuterio (University of Trento, Mesiano, Italy)

- We quantified the lymphodynamical effect of stenotic and regurgitant lymphatic valves.
- High contraction frequencies decrease the averaged ejected lymph flow for severe stenoses.
- Regurgitant valves lead to zero net flow during lymphatic cycles.

F28

Meningeal lymphatic function in models of Alzheimer's disease

Da Mesquita Sandro, University of Virginia

- Meningeal lymphatics drain molecules from the CNS fluids.
- Ablation of meningeal lymphatics affects the clearance of Aß.
- Impairing meningeal lymphatic drainage aggravates Aß pathology.

F29

Structural and functional features of spinal cord meningeal lymphatic vessels

Herz Jasmin, University of Virginia; *Dong, Michael (University of Virginia, Charlottesville, VA, USA); Smirnov, Igor; Louveau, Antoine; Kipnis, Jonathan (University of Virginia, Charlottesville, USA)*

- lymphatics in the spinal cord meninges
- injury
- CSF drainage

F31

Generation of Photoactivatable ApoA-I to Study HDL Transport in vivo Reveals Impaired HDL Recirculation in a Murine Model of Psoriasis

Huang Li-Hao''Paul'', Washington University School of Medicine; Zinselmeyer, Bernd H. (Washington University School of Medicine, St Louis, USA); Elvington, Andrew F. (Washington Univeristy School of Medicine, St Louis, USA); Saunders, Brain T.; Chang, Chih-Hao (Washington University School of Medicine, St louis, USA); Kim, Brian S. (Washington Univeristy School of Medicine, St louis, USA); Wiig, Helge (University of Bergen, Bergen, Norway); Thomas, Michael T.; Sorci-Thomas, Mary G. (Medical College of Wisconsin, Milwaukee, USA); Randolph, Gwendalyn J. (Washington University, St. Louis, MO, USA)

- A novel tool using photoactivatable apoA-I/HDL was made to monitor tissue HDL transports through lymphatics
- HDL becomes trapped in collagen-rich skin that arises in a model of psoriasis
- HDL entrapment in psoriasis model skin is reversed by depletion of CD4+ T cells

F32

Comparison of modified and traditional circumferential to water displacement volume measurement of the upper extremity

Rosenberg Catherine, Rutgers University; Chang, Eric I. (Fox Chase Cancer Center, Philadelphia, PA, USA); Flores, Ann Marie (Northwester University, Chicago, IL, USA); Lun, Desmond S. (Rutgers University - Camden, Camden, NJ, USA)

- The purpose is to develop a prototype formula equivalent to WD by using a modified truncated cone (MTC) method
- Prospective, cross-sectional design to compare two computational measurement methods to WD
- Truncated Cone underestimates volume found with WD by 7.82%

F34

Can intermittent pneumatic compression substitute lymphatics in tissue fluid/lymph flow in lymphedema

Zaleska Marzanna, Medical Research Center; Olszewski, Waldemar L. (Central Clinical Hospital, Warsaw, Poland)

- In lymphedema lymphatic collectors are obstructed and there is no lymph flow
- In lymphedema capillary filtrate/tissue fluid bypass obstructed lymphatics via spontaneous tissue channels
- Intermittent pneumatic compression can provide force for tissue fluid flow

Novel Functional Roles of the Lymphatic Vasculature

F35

Lymphatics transport of microorganisms from tissues to organized lymphoid tissue

Olszewski Waldemar, Central Clinical Hospital; Zaleska, Marzanna T. (Medical Research Center, Warsaw, Poland)

- Normal lymphatics contain microorganisms
- In lymphatic obstruction microbes accumulate in tissue fluid/lymph and evoke host reaction
- Most microbes belong to Staphylococci coagulase-negative sensitive to most antibiotics

F36

Postnatal remodeling of meningeal lymphatics is required for the drainage of macromolecules from the Central Nervous System

Balint Laszlo, Semmelweis University; Deak, Balint Andras; Ocskay, Zsombor; Jakus, Zoltan (Semmelweis University, Budapest, Hungary)

- Structural remodeling of the meningeal lymphatic vessels occurs during the postnatal period.

- Structural remodeling of meningeal lymphatics is required for the lymphatic drainage from the CNS.
- Increasing lymph flow might be an important driver of structural remodeling of meningeal lymphatics.

F37

Lymphatic endothelial cells cross-prime memory-like CD8+ T cells under steady-state conditions

Vokali Efthymia, Swiss Federal Institute of Technology (EPFL); Hosseinchi, Peyman (University of Chicago, Chicago, IL, USA); Hirosue, Sachiko; Yu, Shann; Rincon-Restrepo, Marcela (Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland); do Valle Duraes, Fernanda (Université de Genève, Geneva, Switzerland); Scherer, Stefanie (Technical University of Munich, Freising, Germany); Corthésy-Henrioud, Patricia (Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland); Mondino, Anna (San Raffaele Scientific Institute, Milan, Italy); Zehn, Dietmar (Technical University of Munich, Freising, USA); Hugues, Stéphanie (Université de Genève, Geneva, Switzerland); Swartz, Melody (University of Chicago, Chicago, USA)

- LECs can cross-present exogenous antigens, inducing dysfunctionally-activated CD8+ T cells.
- Some LEC-educated CD8+ T cells differentiate into a central memory-like phenotype.
- These cells display functional features of memory T cells.

F38

The study of flow dynamics in lymphatic system

Takeda Kazu, Tohoku University

- Fluid dynamics in the lymphatic and blood vascular systems of mice were clarified.
- Lymph nodes could be a source of systemic metastasis in MXH10/Mo/lpr mice.
- This can be used to study the progression of lymphatic metastasis to hematogenous metastasis

F39

Lymphatic endothelial cells actively regulate extracellular vesicle trafficking from tumors

Maillat Lea, University of Chicago; Broggi, Maria; Potin, Lambert; Kilarski, Witold (University of Chicago, Chicago, USA); Swartz, Melody A. (University of Chicago, Chicago, IL, USA)

- Lymphatic transport
- Exosomes
- Cancer metastasis

F40

Antigen exchange between lymphatic endothelial cells and antigen presenting cells

Tamburini Beth, University of Colorado Anschutz Medical Campus; Kedl, Ross (University of Colorado Anschutz Medical Campus, Aurora, CO, USA); Finlon, Jeffrey (University of Colorado Anshutz Medical Campus, Aurora, CO, USA); Lucas, Erin D. (University of Colorado Anschutz Medical Campus, Aurora, CO, USA); Lindsay, Robin; Friedman, Rachel (National Jewish Health, Denver, CO, USA)

- Antigen archiving in the lymph node
- Antigen exchange from LECs to DCs
- Lymph node contraction

F41

Sodium Accumulation in the myocardium of hypertensive rats

Rossitto Giacomo, University of Glasgow; Lacchini, Silvia; Harvey, Adam; Petrie, Mark; Touyz, Rhian (University of Glasgow, Glasgow, United Kingdom); Delles, Christian (University of Glasgow, Glasgow, USA)

- Na+ accumulates in peripheral tissues bound to glycosaminoglycans and regulated by lymphatic vessels
- A similar accumulation in the heart of aged hypertensive animals and is at least in part independent of water
- The increase of myocardial glycosaminoglycans with aging and hypertension could provide a binding site

F42

Impaired Lymphatic Flow Leads to Increased Pulmonary Inflammation in Mice

Outtz Reed Hasina, University of Pennsylvania; Sweet, Daniel; Kahn, Mark L. (University of Pennsylvania, Philadelphia, PA, USA)

- Normal pulmonary lymphatic structure and function
- The role of lymphatic function in lung homeostasis
- The role of lymphatic function in the development of pulmonary pathology

F43

Developmental studies of the meningeal lymphatic vessels

Antila Salli, Wihuri Research Institute and University of Helsinki; Karaman, Sinem (Wihuri Research Institute and University of Helsinki, Helsinki, Finland); Nurmi, Harri J. (Wihuri Research Institute, Helsinki, Finland); Airavaara, Mikko; Voutilainen, Merja (University of Helsinki, Helsinki, Finland); Mathivet, Thomas (PARRC - INSERM UMR970, PARIS, France); Park, June Hee (Yale School of Medicine, New Haven, CT, USA); Eichmann, Anne; Thomas, Jean-Leon (Yale University School of Medicine, New Haven, CT, USA); Saarma, Mart (University of Helsinki, Helsinki, Finland); Alitalo, Kari (Biomedicum Helsinki/Univ Helsinki, Helsinki, Finland)

- An extensive lymphatic network was only recently discovered in dura mater surrounding the brain
- Little is known about the development and maintenance of these newly discovered vessels
- Meningeal lymphatic vessels develop postnatally and response markedly to an excess of VEGF-C

F44

Outflow of cerebrospinal fluid is lymphatic-specific and reduced in aged mice

Proulx Steven, ETH Zurich; Ma, Qiaoli; Detmar, Michael (ETH Zurich, Zurich, Switzerland)

- Outflow of cerebrospinal fluid
- Lymphatic system in neurological conditions
- Novel imaging techniques

Tissue Engineering

F45

Tissue-engineered model of the lymph node paracortex to study stromal immunomodulatory functions in vitro

Buchanan Cara, Ecole Polytechnique Fédérale de Lausanne; Zhou, Ruolan (University of Chicago, Chicago, IL, USA); Pisano, Marco; Vokali, Efthymia (Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland); Swartz, Melody A. (University of Chicago, Chicago, IL, USA)

- In vitro model of lymph node stroma with perfusable 3D matrix allowing relevant cell movements and interaction
- LNSCs regulate T cell responses by altering the LN microenvironment
- Tumor-derived immunosuppressive cytokines prime the LN microenvironment to dampen cytotoxic T cell function

F46

A Microscale Biomimetic Platform to Generate 3D In Vitro Lymphatic Vessels for Cancer Research

Beebe David, University of Wisconsin-Madison; Lugo-Cintron, Karina (University of Wisconsin-Madison, Madison, WI, USA); Gong, Max (University of Wisconsi-Madison, Madison, WI, USA)

- Development of a biomimetic lymphatic vessels in vitro model.
- Characterization of lymphatic cells from lymph nodes and dermal lymphatic cells in the 3D model.
- Potential of the model to advance our understanding of tumor spread through the lymphatics.

F47

3D In Vitro Microfluidic Model to Reconstitute Sprouting Lymphangiogenesis

Kim Sudong, Boston University; Chung, Minhwan; Lee, Somin; Jeon, Noo Li (Seoul National University, Seoul, Korea, Republic of)

- Pro-lymphangiogenic factors and interstitial flow synergize to mediate sprouting of lymphatic vessels.
- Interstitial flow significanly augmented outgrowth of lymphatic sprouts against the direction of flow.
- Lymphatic vessels expressed molecular signatures and cellular phenotypes of in vivo sprouting lymphatics.

F48

A Microfluidic Lymph Node Model to Investigate Lymphatic Recirculation

Lee Somin, Seoul National University; Jeon, Noo Li (Seoul National University, Seoul, USA)

- 3D in vitro model of lymph node using human cells which will overcome limits of previous animal in vivo models
- Using microfluidic platform which enables easy but minute control of biochemical and biomechanical cues
- Quantitative analysis on morphological phenotype of HEV and efficiency of lymphocyte trafficking inside chip

Short Talks

F49

Emerging roles of the chromatin-remodeling SWI/SNF ATPase BRG1 in omental lymphatic development.

Menendez Matthew, Oklahoma Medical Research Foundation; Drozd, Anna (Oklahoma Medical Research Foundation, Oklahoma City, USA); Podsiadlowska, Joanna; Griffin, Courtney T. (Oklahoma Medical Research Foundation, Oklahoma City, OK, USA)

- Macrophage expression of BRG1 is required to maintain blood-lymphatic separation in the omentum.
- BRG1 suppresses necroptosis in macrophages by inhibiting RIPK3 expression.
- Genetic reduction of Ripk3 rescues blood entry into developing omental lymphatics.

F50

Organ-specific regulation of lymphatic vessel function by the autonomic nervous system

Bachmann Samia, ETH Zurich; Proulx, Steven; Montoya, Javier; Schneider, Martin; Rudin, Markus; Detmar, Michael (ETH Zurich, Zurich, Switzerland)

- characterization of innervation pattern of lymphatic vessels in different organs
- in vivo imaging of neurotransmitter effects on lymphatic vessel pumping
- identification of target cells of neurotransmitters and their downstream effects