

The 9th International Bio-Fluid Mechanics and Vascular Mechano-Biology Symposium

University of Arizona, Tucson, Arizona • February 13-16, 2020

Celebrating the 70th Birthday of Professors Roger Kamm and David Elad



<https://9thbiofluids.com/>

Location: University of Arizona, Tucson, Arizona

Chairmen: Shmuel Einav, Mory Gharib, Marvin J. Slepian

Organizing Committee: S. Einav, M. Slepian, D. Bluestein, R. Ethier, A. Gefen, M. Gharib, G. Marom, M. Mofrad, A. Ratnovsky, J. Sznitman, D. Weiss

Scope: Maintain the tradition of excellence and the spirit of the International Bio-fluid Mechanics and Vascular Mechano-Biology Symposia that have evolved to be a unique opportunity for reviewing recent major milestones and achievements in all areas of biofluid mechanics, experimental and computational, from molecule and cell to organ levels and corresponding mechanobiological processes, therapeutics, and cardiovascular devices.

Objectives: To gather scientists, clinicians, and practitioners from around the world to explore and assess the latest frontiers of Bio-Fluid Mechanics and Vascular Mechano-Biology, and to set important directions for further research and development, and education. The symposium will provide an opportunity for investigators to interact with peers, young and seniors, for development of new collaborations, as well as enhancement of existing ones.

Keynote Speakers: George Karniadakis, Brown University, USA
Marvin Slepian, University of Arizona, USA
Danny Bluestein, Stony Brook University, USA

The 9th International Bio-Fluid Mechanics and Vascular Mechano-Biology Symposium,
February 13-16, 2020 • Tucson, Arizona • Health Sciences Innovation Building

PROGRAM OUTLINE

Thursday, February 13, 2020		
7:00-17:00	Registration- Main Lobby	
9:30 -11:10	Post-Doc Session I: Moderators: K. Amman, Y. Roka-Moiia	
9:30-9:40	Whole Blood <i>In Vitro</i> Assessment of Stent Hemocompatibility	Kaitlyn Ammann University of Arizona
9:40:9:50	Patient Specific Drug Thrombosis	Selene/Yun Xu Pirola Imperial College London, UK
9:50-10:00	Fluid Dynamics of a Biologically-Engineered Bileaflet Vein Valve in Pulsatile and Steady Inflow Conditions	Omid Amili University of Minnesota
10:00-10:10	Heterogeneous Erythrocyte Dynamics Correlate with Vascular Remodeling in Developing Retinal Networks	Lowell Edgar University of Edinburgh, UK
10:10-10:20	Patient-Specific Reduced Order Models of Cerebrovascular Flow Based on 4D Flow MRI	Kimberly Stevens Purdue university
10:20-10:30	The MICELI: An Impedance Aggregometer for Point-of-Care Testing of Platelet Hemostatic Function in Whole Blood	Yana Roka-Moiia University of Arizona
10:30-10:40	The Fluid Mechanics of Kidney Stone Removal	Jessica Williams University of Oxford, UK
10:40-10:50	In Vitro Investigation of The Effect of Pulsatility and LVAD Speed on Intraventricular Hemodynamics	Fanette Chassagne University of Washington
10:50-11:00	Vessel Compression Biases Red Blood Cell Partitioning at a Downstream Bifurcation	Romain Enjalbert University of Edinburgh, UK
11:00-11:10	Shear Stress Errors Induced by MCS Hemocompatibility Testing Loop Elements: A Call for Caution	Mengtang Li Vanderbilt University
11:10-12:15	Lunch Break	
12:15-12:45	Official Conference Opening Welcome – 3rd Floor Welcome – M. Slepian, S. Einav, M. Gharib Deans Welcome – David Hahn – College of Engineering Bio 5 Welcome – Jennifer Barton	
12:45 -14:30	Computational Hemodynamics, Chairs: Gil Marom, Shawn Shadden	
12:45-13:00	Impact of Leaflet Laceration on the Risk of Leaflet Thrombosis Post Valve-In-Valve Implantation	Gil Marom Tel Aviv University, Israel
13:00-13:15	Analyzing the Role of Morphology on the Aneurysmal Flow Complexity via Dynamic Mode Decomposition	Trung Le North Dakota State University
13:15-13:30	Image-Based Modelling of Blood Flow in Prenatal Hearts	Choon Hwai Yap National University of Singapore
13:30-13:45	Topological Analysis of Transport Processes in Cardiovascular and Respiratory Flows	Amirhossein Arzani Northern Arizona University
13:45-14:00	Computational Models of Fluid-Structure Interaction in Healthy and Diseased Aortic Valves	Rajat Mittal Johns Hopkins University
14:00-14:15	Physics-Based Reduced Order Modeling of Blood Flow	Shawn Shadden UC Berkeley, California
14:15-14:30	Automated Imaging-To-Flow for Patient-Specific Fluid-Structure Interactions	Sarah Vigmostad University of Iowa
14:30-15:00	Coffee Break	
15:00-15:30	Keynote Speaker: Marvin J. Slepian The “New Thrombosis” of Cardiovascular Therapeutics Devices in 2020: Flow, Shear, Drugs and Signatures – Processes in Balance	
15:30-17:00	Thrombosis- Formation and Growth, Chairs: Keefe Manning, David Ku	
15:30-15:45	Predicting Thrombus Growth and Thromboembolism	Keefe Manning The Pennsylvania State University
15:45-16:00	Modeling Blood Clotting at The Extreme	Aaron Fogelson University of Utah
16:00-16:15	Cleavage of Von Willebrand Factor in Turbulent Flow	David Bark Colorado State University
16:15-16:30	Multiscale Analysis of vWF Conformation, Cross-Association and Interaction with Platelets	Cyrus Aidun Georgia Institute of Technology
16:30-16:45	Alteration of vWf Structure by Charged Nanoparticles Leads to Inhibition of High Shear Arterial Thrombosis	David N Ku Georgia Institute of Technology

16:45-17:00	Reactive Ion Plasma Treatment of Poly(Vinyl-Alcohol) (PVA) to Study the Mechanisms of Endothelial Cell Attachment, Migration, Proliferation, and Thrombogenicity	Patrick Journey San Jose State University
17:00-19:00	POSTER SESSION (1st Floor HSIB) and Get Together/Social	
Friday, February 14, 2020		
7:00-8:00	Conference Breakfast	
8:00-10:00	Cardiovascular Flows, Hemodynamics and Biological Consequences, Chairs: Idit Avrahami, Anat Ratnovski	
8:00-8:15	Coronary Perfusion Due to Aortic Stenosis and TAVI	Idit Avrahami Ariel University, Israel
8:15-8:30	Identification of Umbilical Cords Abnormalities Utilizing Flow Simulator for Doppler Ultrasound	Sara Naftali Afeka Academic College of Engineering, Israel
8:30-8:45	Transient Subject-Specific Drug Delivery in Stented Arteries: Physics-Based Simulation of Controlled Release and Retention	Farhad Rikhtegar Nezami MIT
8:45-9:00	Establishment of a Processing Framework to Comprehensively Evaluate the In Vivo Vascular Fluid Mechanical Environment with 4D Flow Cardiac MRI	Lucas Timmins University of Utah
9:00-9:15	Comparison Between High-Frame Rate Vector Flow Imaging and Computational Flow Dynamics in the Carotid	Andrea Remuzzi University of Bergamo, Italy
9:15-9:30	A Structured-Tree Model for the Coronary Arterial and Venous Circulation	Nicholas Hill University of Glasgow, UK
9:30-9:45	Enhanced Microcirculatory Blood Flow in Response to Photobiomodulation: The Role of Skin Temperature and the Bilateral Effect	Zehava Blechman Afeka Academic College of Engineering, Israel
9:45-10:00	Investigations Into the Biomechanics of the Cervical Cerclage	Megan Leftwich The George Washington University
10:00-10:30	Coffee Break	
10:30-11:00	Keynote Speaker: Danny Bluestein, Stony Brook University Multiscale Modeling and Machine Learning for Studying the Initiation of Platelet Mediated Thrombosis, and a Biomechanics Perspective of Calcific Aortic Valve Disease and Transcatheter Aortic Valve Replacement (TAVR)	
11:00-12:30	The Glycocalyx in Vascular Health and Disease, Chairs: John Tarbell, Hans Vink	
11:00-11:15	Arterial Stiffness Inhibits Endothelial Cell Glycocalyx Core Protein Glypican 1 and Promotes Endothelial Dysfunction and Disease	John Tarbell The City College Of New York
11:15-11:30	Solid-Fluid Interactions in the Endothelial Glycocalyx: Implications for Cell Adhesion and Permeability	Herbert Lipowsky Penn State University
11:30-11:45	Glycocalyx-Mediated Vascular Endothelial Cell Signaling, Permeability, & Remodeling in Disturbed Flow	Eno Ebong Northeastern University
11:45-12:00	Organization and Ultra-Structural Components of Brain Microvascular Endothelial Surface Glycocalyx Revealed by Stochastic Optical Reconstruction Microscopy (STORM)	Bingmei Fu The City College Of New York
12:00-12:15	Temporal Variability of Flow-Dependent Glycocalyx Properties	Hans Vink, Maastricht University, The Netherlands
12:15-12:30	Glypican-1 and Lung Mechanotransduction During Acute Heart Failure	Randal Dull University Of Arizona
12:30-13:45	Lunch, Guest speaker: Tod R Lauer PhD NSF OIR Lab (NOAO), Astronomy and Big Science – Pluto, Black Holes and Beyond	
13:45-16:00	Respiratory Fluids and Mechanics, Chairs: Josué Sznitman, Daniel Isabey	
13:45-14:00	Transport Mechanisms in the Human Bronchial Tree: In Vitro Experiments Using Magnetic Resonance Velocimetry	Filippo Coletti University of Minnesota
14:00-14:15	Using Mechanosensitive MicroRNAs to Regulate Lung Injury and Inflammation During Mechanical Ventilation	Samir Ghadiali The Ohio State University
14:15-14:30	Multiscale Model of the Lung with Fluid-Structure and Surfactant Physico-Chemical Interactions	Donald Gaver Tulane University
14:30-14:45	Challenges of Predicting Inhaled Deposited Dose In Asthma Subjects	Jessica Oakes Northeastern University
14:45-15:00	Secretion-Removal from the Respiratory System by a Combination of Oscillatory Flow and Acoustic Waves	David Katoshevski Ben-Gurion University, Israel
15:00-15:15	Are Alveolar Epithelial Cells Mechanosensitive to Changes in Alveolar Surface Tension?	Daniel Isabey INSERM U955, France
15:15-15:30	A Mechanical Evaluation of the Ciliary Beating Efficiency	Bruno Louis INSERM U955, France

15:30-15:45	Structural and Hemodynamic Properties in Murine Pulmonary Arterial Networks Under Hypoxia-Induced Pulmonary Hypertension	Mette Olufsen NC State University
15:45-16:00	Targeted Delivery of Inhalation Aerosols Using Magnetic Particles	Josué Sznitman, Technion, Israel
16:00-16:30	Coffee Break	
16:30-18:00	Session Honoring Roger Kamm and David Elad	
16:30-16:45	Recovery of Human Cardiomyocytes Following Extended Ischemia	C. Forbes Dewey, Jr. MIT
16:45-17:00	A New Theory Challenges the Current Body of Knowledge	Eitan Kimmel Technion, Israel
17:00-17:15	Dancing Volvox	Tim Pedley University of Cambridge, UK
17:15-17:30	Looking Under the Hood of Cellular Mechanotransduction	Mohammad R. K. Mofrad UC Berkeley
17:30-17:45	Perspective	Roger Kamm, MIT
17:45-18:00	Perspective	David Elad, Tel Aviv University, Israel
19:00-22:00	Valentine Dinner – Held at the UA Student Union: Celebrating Kamm and Elad Birthdays	
Saturday, February 15, 2020		
7:00-8:00	Conference Breakfast	
8:00-9:45	Biological Flows (Lymphatic, Ocular, Neurologic), Chairs: Ross Ethier, Geert Schmid-Schönbein	
8:00-8:15	Identification of Genetic Loci Influencing Scleral Stiffness by Ocular Fluid Infusion	Ross Ethier Georgia Tech/Emory
8:15-8:30	Is There a Flow Signal Involved in Localizing Lymphatic Valves to Junctions, and if so What?	Chris Bertram University of Sydney, Australia
8:30-8:45	Roles of Interstitial Fluid Mimicking Tiny Flow in Extracellular Matrix for Reconstituting Microscale 3D Tissue and Disease Models	Seok Chung Korea University, Korea
8:45-9:00	Autodigestion in Physiological Shock and Multiorgan Failure	Geert Schmid-Schönbein University of California San Diego
9:00-9:15	Fluid Dynamics In Neonatal Double Lumen Cannulae: A Particle Image Velocimetry Study	Kerem Pekkan Koc University, Turkey
9:15-9:30	CFD Model to Study Structural Basis of Glomerular Filtration	Bogdan Ene-Iordache University of Bergamo, Italy
9:30-9:45	Computational Modeling of Bacterial Dynamics and Biofilm Formation	Kartik Jain University of Twente, The Netherlands
9:45-10:15	Coffee Break	
10:15-10:45	Keynote Speakers: George Karniadakis, Brown University Machine Learning and Biofluids	
10:45-12:45	Microfluidics, Chairs: CT Lim, Abraham Lee	
10:45-11:00	Microfluidic Detection of Human Diseases from Peripheral Blood	Chwee Teck Lim National University of Singapore
11:00-11:15	A High-Throughput Cell Concentrator Using a 3D Printed Right-Hand Triangular Spiral Microchannel	Majid Ebrahimi Warkiani University of Technology, Sydney, Australia
11:15-11:30	Biomedical Applications of Microfluidics: Platelets Function Assay and Isolation of Circulating Biomarkers	Sehyun Shin Korea University, Korea
11:30-11:45	Paper Microfluidics for Point-Of-Care Testing	Feng Xu Xi'an Jiaotong University, China
11:45-12:00	Engineering Vascularized Microphysiological Systems	Abraham Lee UC Irvine
12:00-12:15	Mammalian versus Non-Mammalian Blood Flow in Microchannels	Dorian, Liepmann, UC Berkeley, California
12:15-12:30	Microfluidic Devices for Blood Cell Biomechanics Analysis and Separation	Joseph Samitier Institute for Bioengineering of Catalonia (IBEC), Spain
12:30-12:45	Biomimetic Microvascular Platforms Reveal a Role for the Notch Family Receptors in Vascular Mechanotransduction	William Polacheck University of North Carolina Chapel Hill

14:00-15:30	Thrombosis and Drug Delivery, Chairs: Natanel Korin, Alberto Redaelli	
14:00-14:15	Understanding Collective Function of Platelets During Blood Clotting	Alexander Alexeev, Georgia Institute of Technology
14:15-14:30	In Search of... Origins of Thrombosis with Continuous Flow VADs.	James Antaki Cornell University
14:30-14:45	Return Cannula Flow Physics	Lisa Prah Wittberg, KTH Royal Institute of Technology, Sweden
14:45-15:00	On the Reliability of Turbulence Models in Lagrangian Analysis Assessment of Platelet Activation	Alberto Redaelli, Poltenico di Milano, Italy
15:00-15:15	Permeability Measurements in Microfluidic Bilayer Devices	Yitshak Zohar University of Arizona
15:15-15:30	The Behavior of Platelet Mimetic Drug Carriers under Flow	Netanel Korin, Technion, Israel
15:30-16:50	Physicians, Engineers and Industry panel on Aneurysm, Dissection, and Aortic Disease Progression, Chairs: Pinhas Bar-Yoseph, Asaf Rabin	
15:30-15:45	Aortic Diseases in the General Population and Specifically in Women	Rana. O Afifi McGovern Medical School at UTHHealth, Houston, TX.
15:45-16:00	Aortic Imaging - Screening and Diagnosis, Surveillance, Intra-Operative and Follow-Up	TBD
16:00-16:15	Aortic Aneurysm & Dissection - Current Open Surgical Treatment and Unmet Needs	Naveed Saqib McGovern Medical School at UTHHealth, Houston, TX
16:15-16:30	Aortic Aneurysm & Dissection - Current Endovascular and Hybrid Treatment and Unmet Needs	Asaf Rabin, Baruch Padeh M.C., Poriya & Technion, Israel
16:30-16:50	General Discussion	
16:50-17:10	Coffee Break	
17:10-18:10	Post-Doc Session II, Chairs: Dar Weiss, Ran An	
17:10-17:20	Fluid Forces Regulate Direct Current Electric Field Induced Increase in Endothelial Permeability	Prashanth Mohana Sundaram The Ohio State University
17:20-17:30	Full-Field Characterization of Material and Structural Properties in Arteries for Better Understanding of Vascular Pathologies	Dar Weiss Yale University
17:30-17:40	Patient-Specific Evaluation of Neo-Sinus Flow After Transcatheter Aortic Valve Replacement: A Computational Fluid Dynamics Study	Shelly Singh-Gryzbon Georgia Institute of Technology
17:40-17:50	Red Blood Cell Derived Extracellular Vesicles Result in Activation of Microvascular Endothelial Cells and Adhesion of Red Blood Cells in Sickle Cell Disease	Ran An Case Western Reserve University
17:50-18:00	Multiscale Particle Transport in Tubular Blood Flow: From Nanomolecule Dispersion to Platelet Margination	Zixiang Liu Georgia Institute of Technology
18:00-18:10	Individual-Specific Modeling of Hemodynamics in the Posterior Pole of the Eye	Yi Hua University of Pittsburgh
19:30-22:00	Buffet Dinner + Wine & Beer – on the Mall/Optical Sciences; Planetarium Expo and Star Show Guest Speaker: Abhijit Saha NSF OIR Lab (NOAO) "Telescopes of the Future"	
Sunday, February 16, 2020		
7:00-8:00	Conference Breakfast	
8:00-10:00	Vascular Biomechanics, Tissue Engineered Vessel and Transport Phenomena, Chairs: James Moore, Zehava Blechman	
8:00-8:15	Hydrodynamic Influences on Drug Release and Absorption in the Intestines	James Brasseur University of Colorado Boulder
8:15-8:30	Mechanisms of Tracer Transport in Cerebral Perivascular Spaces	Keith M. Sharp University of Louisville
8:30-8:45	Unpacking the Mechanical Correlates of Brillouin Microscopy in Living Cells	Overby, Darryl Imperial College London, UK
8:45-9:00	Biotransport Mechanisms in Adaptive Immunity	James Moore Imperial College London, UK
9:00-9:15	Modelling Three-Phase Myocardium Perfusion Using an Immersed Boundary/Finite Element Method	Xiaoyu Luo University of Glasgow, UK
9:15-9:30	An Engineered Human Blood Vessel Microphysiological System for Disease Modeling	George Truskey Duke University
9:30-9:45	Initial Metastatic Pattern of Three-Dimensional Bladder Multicellular Tumor Spheroid at Heterogeneous Matrix Interface	Ting-Yuan Tu National Cheng Kung University, Korea

9:45-10:00	Realizing Authentically Complex Microvascular Networks for Studying Cell and Nano Medicine Transport	Paolo Decuzzi, Italian Institute of Technology, Italy
10:00-10:30	Coffee Break	
10:30-12:30	Patient-Specific Modelling and Aneurysm, Chairs: Irene Vignon-Clementel, David Ku, Alejandro Roldan-Alzate	
10:30-10:45	Airway Motion Significantly Increases the Work of Breathing Calculated by CFD in Pediatric Subjects with Obstructive Sleep Apnea and Tracheomalacia	Alister Bates Cincinnati Children's Hospital
10:45-11:00	Non-Invasive Patient-Specific Cardiovascular Fluid Dynamics Using 4D Flow MRI	Alejandro Roldan-Alzate University of Wisconsin-Madison
11:00-11:15	Enhancing 4d Flow MRI in Cerebral Aneurysms with Computational and Experimental Modeling	Vitaliy Rayz Purdue university
11:15-11:30	Intrinsic Frequency as a Novel Index for Cardiovascular Diagnostics	Niema Pahlevan University of Southern California
11:30-11:45	Longitudinal Data, Numerical Analysis and Machine Learning to Predict Growth of Aortic Aneurysms	Irene Vignon-Clementel, Inria Paris & Sorbonne Université LJLL, France
11:45-12:00	Discussion	All
12:00-13:30	Lunch and General Discussion/Wrap-up, Moderators:, Mory Gharib, Shmuel Einav, Marvin Slepian	
13:30	Adjournment	



**International Bio-Fluid
Mechanics & Vascular
Mechano-Biology Symposium**

9th Biofluids Location

**University of Arizona
Health Sciences Innovation Building (HSIB)
1670 E. Drachman Street
University of Arizona
February 13-16, 2020**

**Within walking distance from Aloft
Cat Tran (Yellow Route, USB Stop right outside of University
Marriott cattran.arizona.edu) and Sunlink Access from University
Marriott**



International Bio-Fluid Mechanics & Vascular Mechano-Biology Symposium

Special Evening Events

Thursday, February 13th, 2020

**Cocktail Reception & Poster Session
Health Sciences Innovation Building Forum (1st) Floor
5:00pm-7:00pm**

Friday, February 14th, 2020

**Valentine Dinner and Birthday Celebration of Roger Kamm and David Elad
Student Union Memorial Center
1303 E. University Blvd
7pm-7:30 Cocktail Hour w/ Wilbur the Wildcat
7:30p Dinner
8:15pm Program & Birthday Celebration
8:30pm Mariachis**

Saturday, February 15th, 2020

**Planetarium Dinner
Flandrau Science Center & Planetarium
1601 E. University Blvd
7:30pm Cocktails & Dinner
8:30pm Talk by Dr. Saha followed by Planetarium Show**

Planetarium Show “Phantom of the Universe:”

Phantom of the Universe showcases the exciting exploration of dark matter, from the Big Bang to its anticipated discovery at the Large Hadron Collider.