

Joint Meeting of the
The European Society for Clinical Hemorheology and Microcirculation
The International Society for Clinical Hemorheology
The International Society of Biorheology
July 4–7, 2021

Live-streaming Scientific Program

July 4, 2021

- 14:30–15:30 **Opening Ceremony**
- 15:40–16:40 **Opening Plenary Lecture**
Chair: **Shinya Goto**
- PL1 Coagulopathy and Anticoagulation in Covid-19 - what can we learn for future challenges?
Danial Dürschmied
Cardiology and Intensive Care Medicine, Heart Center, University of Freiburg, Germany
- 16:50–17:50 **Plenary Lecture for ESCHM**
Chair: **Jean-Frederic Brun**
- PL2 Lessons learnt from comparative hemorheology
Ursula Windberger
Medizinische Universitaet Wien, Center for Biomedical Research
- 18:00–19:00 **Rising Star Award Session - 1**
Chairs: **Maria Fornal, Ursula Windberger**
- RSA1-1 Towards elimination of sublethal blood trauma in mechanical circulatory support
Michael J Simmonds^{1,2}
¹*Menzies Health Institute Queensland,* ²*Griffith University, Australia*
- RSA1-2 Hemorheological changes caused by pituitary adenylate cyclase-activating polypeptide administration during vessel anastomosis regeneration in the rat
Balazs Szabo¹, **Laszlo Adam Fazekas**¹, **Adam Varga**¹, **Barbara Barath**¹,
Vince Szegeczki², **Tamas Juhasz**², **Dora Reglodi**³, **Norbert Nemeth**¹

¹*Department of Operative Techniques and Surgical Research, University of Debrecen, Faculty of Medicine, Debrecen, Hungary,* ²*Department of Anatomy, Histology and Embryology, Faculty of Medicine, University of Debrecen, Debrecen Hungary,* ³*Department of Anatomy, Faculty of Medicine, University of Pecs, Pecs, Hungary*

19:00–20:20 **Free Communication (Video Presentation 1)**

20:20–21:50 **Symposia S1–S3**

S1: Microperfusion of different inner organs examined by contrast enhanced ultrasound technology or PET/CT

Chair: **Dong Yi**

S1-1 Potential application of dynamic contrast enhanced ultrasound in predicting microvascular invasion of hepatocellular carcinoma

Yi Dong¹, Yijie Qiu¹, Daohui Yang¹, Dan Zuo¹, Qi Zhang¹, Wen-Ping Wang¹, Ernst Michael Jung²

¹*Zhongshan Hospital, Fudan University,* ²*Department of Radiology, University Medical Center Regensburg, Germany*

S1-2 [Withdrawn]

S1-3 [Withdrawn]

S2: Clinical hemorheology in critically ill patients

Chairs: **Shohei Moriyama, Michinari Hieda, Masahito Hitosugi**

S2-1 Vascular toxicity in cardio-oncology

Shohei Moriyama, Michinari Hieda

Department of Hematology, Oncology and Cardiovascular Medicine, Kyushu University Hospital

S2-2 Catheter treatment of leg arterial atherosclerosis: Endovascular treatment for peripheral arterial disease

Eiji Karashima

Shimonoseki City Hospital

S2-3 Advances in diagnosis and treatment of pulmonary hypertension

Kohtaro Abe

Department of Cardiovascular Medicine, Kyushu University Hospital

S2-4 Myocardial pathological changes in patients with epilepsy and psychiatric disorders

Marin Takaso, Misa Tojo, Masahito Hitosugi

Department of Legal Medicine, Shiga University of Medical Science

S3: Intracellular signaling in RBC: roles and consequences

Chairs: **Özlem Yalçın, Philippe Connes**

- S3-1 Calcium signaling in red cells induced by mechanical stress and flow
Lars Kaestner
Saarland University
- S3-2 Shear conditioning attenuates the effects of superoxide in red blood cells: Role of generation and signaling of nitrogen species in different cell subpopulations
Marijke Grau¹, Lennart Kuck², Thomas Dietz¹, Michael J Simmonds²
¹*German Sport University Cologne, Institute of Cardiovascular Research and Sports Medicine,* ²*Griffith University Mechanobiology Research Laboratory*
- S3-3 Signaling in erythroid cells: Role in physiology and contribution to pathological manifestations
Wassim El Nemer
EFS
- S3-4 Impact of oxidative stress and decreased NO bioavailability on eryptosis and red blood cell microparticles in SCA: Consequences on endothelial cells and vascular function
Elie Nader^{1,2}, Marc Romana^{3,4}, Nicolas Guillot^{1,2}, Romain Fort⁵, Emeric Stauffer^{1,2,6}, Nathalie Lemonne⁷, Yohann Garnier^{3,4}, Sarah Skinner^{1,2}, Maryse Etienne-Julan⁷, Mélanie Robert^{1,2,8}, Alexandra Gauthier^{1,2,9}, Giovanna Cannas⁵, Sophie Antoine-Jonville³, Benoit Tressières¹⁰, Marie-Dominique Hardy-Dessources^{3,4}, Yves Bertrand⁹, Céline Renoux^{1,2,11}, Philippe Joly^{1,2,11}, Marijke Grau¹², Philippe Connes^{1,2}
¹*Laboratoire Interuniversitaire de Biologie de la Motricité (LIBM) EA7424, Team "Vascular Biology and Red Blood Cell", Université Claude Bernard Lyon, Université de Lyon, Lyon, France,* ²*Laboratoire d'Excellence du Globule Rouge (Labex GR-Ex), PRES Sorbonne, Paris, France,* ³*Université des Antilles, Pointe-à-Pitre, France,* ⁴*Université de Paris, Paris, France,* ⁵*Département de Médecine Interne, Hôpital Edouard Herriot, Hospices Civils de Lyon, Lyon, France,* ⁶*Centre de Médecine du Sommeil et des Maladies Respiratoires, Hospices Civils de Lyon, Hôpital de la Croix Rousse, Lyon, France,* ⁷*Unité Transversale de la Drépanocytose, Hôpital de Pointe-à-Pitre, Hôpital Ricou, Guadeloupe, France,* ⁸*Erytech Pharma, Lyon, France,* ⁹*Institut d'Hématologie et d'Oncologie Pédiatrique, Hospices Civils de Lyon, Lyon, France,* ¹⁰*Centre Investigation Clinique Antilles Guyane, 1424 Inserm, Academic Hospital of Pointe-à-Pitre, Guadeloupe, France,* ¹¹*Laboratoire de Biochimie et de Biologie Moléculaire, UF de Biochimie des Pathologies érythrocytaires, Centre de Biologie et de Pathologie Est, Hospices Civils de Lyon, Lyon, France,* ¹²*Molecular and Cellular Sport Medicine, Deutsche Sporthochschule Köln, Köln, Germany*
- S3-5 Phosphoproteomic changes in red blood cell membrane by Adenylyl cyclase/Protein kinase A signaling pathway and their roles on the mechanical stress responses of red blood cells
Elif Ugurel^{1,2}, Neslihan Cilek^{1,2}, Evrim Goksel^{1,2}, Ozlem Yalcin^{1,2}

¹Koc University School of Medicine Department of Physiology, ²Koc University Research Center for Translational Medicine

July 5, 2021

09:10–10:10 **Keynote Lecture 1**

Chair: **Toru Maruyama**

KL1 Endothelium-dependent hyperpolarization (EDH) and endothelial dysfunction in hypertension: The role of endothelial ion channels

Kenichi Goto

Kyushu University

09:10–10:10 **Keynote Lecture 2**

Chair: **Takeshi Nakatani**

KL2 Clinical management for adverse complications in patients with left ventricular assist devices

Michinari Hieda

Kyushu University

09:10–10:40 **Symposium S4**

S4: Microfluidic and in silico device applications in hemorheology

Chairs: **Sara Hashmi**

S4-1 Microfluidic assays to investigate the role of red blood cell-derived extracellular vesicles in sickle cell disease

Ran An An, Umut Gurkan

Case Western Reserve University

S4-2 Hemorheology and pathophysiology of COVID-19 induced thrombosis predicted by Vein-Chip

Navaneeth Krishna Rajeeva Pandian, Abhishek Jain

Texas A&M University

10:20–11:50 **Symposia S5–S6**

S5: Mechanical circulatory support: From in-development to in vivo

Chairs: **Michael Simmonds, Tamas Alexy**

S5-1 The importance of blood rheology in left ventricular assist device therapy

Mohammed Chowdhury¹, Valmiki Maharaj², Arianne Agdamag², Blair Edmiston³, Bellony Nzemenoh³, Victoria Charpentier⁴, Tamas Alexy²

¹North Central Heart, Sioux Falls, SD, USA, ²Department of Medicine, Division of Cardiology, University of Minnesota, MN, USA, ³Department of Medicine, University of Minnesota, MN, USA, ⁴University of Minnesota Medical School, Minneapolis, MN, USA

S5-2 Hemo-compatibility related adverse events with left ventricular assist device (LVAD) support: Past, present, and future

Valmiki Maharaj¹, Mohammed Chowdhury², Arianne Agdamag¹, Blair Edmiston³, Bellony Nzemenoh³, Victoria Charpentier⁴, Tamas Alexy¹

¹*Department of Medicine, Division of Cardiology, University of Minnesota, MN, USA,* ²*North Central Heart, Sioux Falls, SD, USA,* ³*Department of Medicine, University of Minnesota, MN, USA,* ⁴*University of Minnesota Medical School, Minneapolis, MN, USA*

S5-3 Analysis of the HeartMate 3 pump characteristics under continuous and pulsatile flow operation – An in vitro study

Jo Pauls^{1,2}, Nicole Bartnikowski^{2,3}, E-Peng Seah², Clayton Semenzin², Martin Mapley²

¹*Griffith University - School of Engineering and Built Environment,* ²*Innovative Cardiovascular Engineering and Technology Laboratory, Critical Care Research Group, The Prince Charles Hospital,* ³*Queensland University of Technology - Science and Engineering Faculty*

S5-4 Re-evaluation of blood trauma from a sublethal perspective

Michael J Simmonds^{1,2}

¹*Menzies Health Institute Queensland,* ²*Griffith University, Australia*

S6: Multi-scale diagnosis of biorheology and microcirculation

Chairs: **Yu Nakamichi, Daisuke Furukawa**

S6-1 Micro-tomographic visualization of tissue rheological properties by mechanical stimulation using optical coherence tomography

Daisuke Furukawa¹, Souichi Saeki²

¹*Akita Prefectural University, Faculty of Systems Science and Technology,* ²*Meijo University, Graduate School of Science and Technology*

S6-2 Three-dimensional detection of hemodynamic changes in skin microcirculation by optical coherence tomography-angiography

Yu Nakamichi

Sanyo-Onoda City University

S6-3 Investigation the extensional effects on the viscosity distribution of bile in the cystic duct

Ngoc Minh Nguyen¹, Hiromichi Obara²

¹*Department of Mechanical Engineering, Thuyloi University, 175 Tay Son, Dong Da, Ha Noi, Vietnam,* ²*Department of Mechanical Systems Engineering, Tokyo Metropolitan University, 1-1 Minami Osawa, Hachioji, Tokyo, Japan*

S6-4 Quantitative evaluation of flowing blood with the electrical parameters based on the Hanai mixture equation

Yusuke Nakajima¹, Daisuke Kawashima¹, Ryubu Shoji¹, Katsuhiro Matsuura², Masahiro Takei¹

¹*Division of Mechanical Engineering, Chiba University,* ²*Department of Veterinary Surgery, Tokyo University of Agriculture and Technology*

S6-5 Development of butterfly type artificial atrioventricular valve with anisotropic valvular cusps by using collagenous connective tissue membrane “Biosheet®” similar to *in vivo* tissue architecture

Yota Sekido¹, Yasuhide Nakayama², Tsutomu Tajikawa³

¹*Kansai University, Graduate School of Science and Engineering,* ²*Biotube Co., Ltd,* ³*Kansai University, Faculty of Engineering Science*

12:00–13:00 **President-Invited Plenary Lecture - 1**

Chair: **Toshiro Ohashi**

PL3 On the path of cell biomechanics research

Masaaki Sato

Tohoku University

14:20–15:50 **Symposia S7–S9**

S7: Whole blood behaviour in chips, stents and capillaries

Chairs: **Andreas Passos, Efstathios Kaliviotis**

S7-1 Investigation of hemorheological and hematological properties of blood in stented mice

Despoina Kokkinidou^{1,2}, Konstantinos Kapnisis², Efstathios Kaliviotis¹, Andreas Anayiotos²

¹*Biorheology Laboratory, Dept. of Mechanical Engineering and Material Science ad Engineering, Cyprus University of Technology, Cyprus,* ²*BioLISYS Laboratory, Dept. of Mechanical Engineering and Material Science ad Engineering, Cyprus University of Technology, Cyprus*

S7-2 Estimation of whole blood coagulation using image processing techniques

Marinos Louka¹, Antonios Inglezakis², Constantinos Loizou², Savvas Psarelis³, Elena Nikiphorou⁴, Efstathios Kaliviotis¹

¹*Cyprus University of Technology,* ²*EMBIO Diagnostics Ltd, Nicosia, Cyprus,* ³*Ministry of Health Cyprus, Nicosia, Cyprus,* ⁴*King’s College London, King’s College Hospital, London, UK*

S7-3 Capillary blood flow on a chip: Influence of hemorheological factors. Capillary blood flow on a chip: Influence of hemorheological factors.

Dimitris Pasiias Pasiias, Andreas Passos, Georgios Constantinides, Loukas Koutsokeras, Stavroula Balabani, Efstathios Kaliviotis

Cyprus University of Technology

S7-4 Erythrocyte sedimentation rate measurements in a high aspect ratio microfluidic channel

Andreas Passos¹, Antonis Nikolaidis¹, Charalampos Vryonidis¹, Konstantinos Loizou², Antonis Inglezakis², Efstathios Kaliviotis¹

¹*Dept. of Mechanical Engineering and Material Science and Engineering, Cyprus University of Technology, Cyprus, ²EMBio Diagnostics Ltd, Nicosia, Cyprus*

S7-5 Influence of hemorheological parameters on the local velocity characteristics of blood in a superhydrophilic channel

Efstathios Kaliviotis¹, Dimitris Pasiadis¹, Andreas Passos¹, Loukas Koutsokeras¹, Georgios Constantinides¹, Stavroula Balabani²

¹*Cyprus University of Technology, ²University College London*

S8: Mechanobiology of red blood cells

Chairs: **Michael Simmonds, Jon Detterich**

S8-1 Role of Piezo1 in red blood cell sickling

Elie Nader^{1,2,3}, Aline Hatem⁴, Robin Bertot¹, Philippe Joly^{1,2,3}, Camille Boisson^{1,2,3}, Guillaume Bouyer⁴, Nicolas Guillot^{1,2,3}, Alexandra Gauthier^{1,2,3}, Solène Poutrel^{1,2,3}, Céline Renoux^{1,2,3}, Nicola Conran⁵, Flavia Costa⁵, Yves Bertrand³, Stéphane Égée⁴, Philippe Connes^{1,2,3}

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S8-2 Shear induced red blood cell nitric oxide production is increased in sickle cell disease

Jon A Detterich^{1,2}, Silvie Suriany¹, Honglei Liu¹, Pinar Ulker³, G Esteban Fernandez¹, Matthew Borzage¹, Rosalinda Wenby², Herbert J Meiselman², Henry J Forman⁴, Thomas D Coates¹

¹*Children's Hospital of Los Angeles, ²Keck School of Medicine, University of Southern California, ³Department of Physiology, Akdeniz University, ⁴Department of Gerontology, University of Southern California*

S8-3 Contribution of red blood cells to pulmonary arterial hypertension pathogenesis: NOS activity and vessel responses

Pinar Ulker¹, Ibrahim Basarici², Nur Özen¹, Ece Kilavuz¹, Fatih Kisak¹, Filiz Basrali¹, Nazmi Yaras³, Sadi Koksoy⁴, Mukadder Levent Celik⁵, Leyla Abueid¹, Ahmet Yildirim¹

¹Department of Physiology, Medical Faculty, Akdeniz University, Antalya, Turkey, ²Department of Cardiology, Medical Faculty, Akdeniz University, Antalya, Turkey, ³Department of Biophysics, Medical Faculty, Akdeniz University, Antalya, Turkey, ⁴Department of Medical Microbiology, Medical Faculty, Akdeniz University, Antalya, Turkey, ⁵Department of Internal Medicine, University of Health Sciences Antalya Training and Research Hospital, Antalya, Turkey.

S8-4 Impaired mechanotransduction in diamide-treated erythrocytes

Lennart Kuck¹, Jason N. Peart², Michael J. Simmonds¹

¹Biorheology Research Laboratory, Menzies Health Institute, Griffith University Gold Coast, Queensland, Australia, ²School of Medical Science, Griffith University Gold Coast, Queensland, Australia

S9: Hemorheological Measurement and Analysis: RBCs and Platelets

Chairs: **Sehyun Shin, Dong-Guk Paeng**

S9-1 Deformability measurement of RBCs flowing in capillary channels using a coflowing channels-based pressure sensor

Yang Jun Kang¹, Sami Serhrouchni², Anna Bogdanova², Sung-Sik Lee³

¹Chosun University, ²University of Zürich, ³ETH Zürich

S9-2 Numerical study of local parabolic rouleaux formation analyzed by axial and radial shear rates

Cheong-Ah Lee¹, Dong-Guk Paeng^{1,2}

¹Jeju National University, ²University of Virginia

S9-3 Total volume ratio (TVR): A new parameter to evaluate the risk of aneurysm rupture

Jinmu Jung¹, Ui Yun Lee¹, Hyosung Kwak², Dongwhan Lee¹

¹Division of Mechanical Design Engineering, College of Engineering, Jeonbuk National University, Jeonju, South Korea, ²Department of Radiology, Jeonbuk National University Hospital, Jeonju, South Korea

S9-4 Measurement of platelet adhesion by using correlation mapping

Eunseop Yeom

Pusan National University

S9-5 Thrombus formation through upstream activation and downstream adhesion of platelets in a microfluidic system

Sehyun Shin¹, SeonYoung Kim², ByoungKwon Lee³, ChaeSeung Lim⁴

¹Korea University, ²Rheomeditech. Inc., ³Gangnam Severance Hospital, Yonsei University, ⁴Guro Hospital, Korea University

16:00–17:30 **Symposia S10–S12**

S10: Rheological models and estimation of prognosis in clinical hemorheology

Chairs: **Kalman Toth, Peter Kenyeres**

- S10-1 Hemorheological alterations in patients with chronic cerebrovascular disease
Peter Kenyeres¹, Kinga Totsimon¹, Alexandra Nagy³, Barbara Sandor¹, Katalin Biro¹, Laszlo Szapary², Kalman Toth¹, Zsolt Marton¹
¹*1st Department of Medicine, University of Pecs, Medical School, Pecs, Hungary,*
²*Department of Neurology, University of Pecs, Medical School, Pecs, Hungary,*
³*Department of Behavioral Sciences, University of Pecs, Medical School, Pecs, Hungary*
- S10-2 Novel predictors of future vascular events in post-stroke patients
Diana Schrick¹, Erzsebet Ezer¹, Margit Tokes-Fuzesi², Tihamer Molnar¹
¹*Department of Anaesthesiology and Intensive Therapy, University of Pecs, Medical School, Pecs, Hungary,* ²*Department of Laboratory Medicine, University of Pecs, Medical School, Pecs, Hungary*
- S10-3 Hemorheological investigations in critically ill patients
Zsolt Marton, Zsofia Eszter Szabo, Kinga Totsimon, Kalman Toth, Peter Kenyeres
1st Department of Medicine, University of Pecs, Medical School, Pecs, Hungary
- S10-4 Maternal hemorheological changes in early-onset preeclampsia
Beata Csiszar^{1,2}, Gergely Galos^{1,2}, Peter Kenyeres^{1,2}, Kalman Toth^{1,2}, Barbara Sandor^{1,2}
¹*1st Department of Medicine, University of Pecs, Medical School, Pecs, Hungary,*
²*Szentagotai Research Centre, Pécs, Hungary*
- S10-5 The French paradox - from a rheological point of view
Andras Toth^{1,2}, Barbara Sandor², Judit Papp^{2,3}, Miklos Rabai², Peter Kenyeres², Istvan Juricskay², Kalman Toth²
¹*Department of Medical Imaging, University of Pecs, Medical School, Pecs, Hungary,* ²*1st Department of Medicine, University of Pecs, Medical School, Pecs, Hungary,* ³*Hungarian Defence Forces Medical Centre, Budapest, Hungary*
- S10-6 Hemorheological, hematological and histological examination, and 3D flow simulation of arterio-venous fistulas or loop-shaped venous grafts in the rat
Balazs Szabo¹, Adam Varga¹, Barbara Barath¹, Souleiman Ghanem¹, Orsolya Matolay², Gyorgy Trencseny³, Levente Kiss-Papai⁵, Balazs Gasz⁵, Lajos Daroczi⁴, Norbert Nemeth¹

¹*Department of Operative Techniques and Surgical Research, University of Debrecen, Faculty of Medicine, Debrecen, Hungary,* ²*Department of Pathology, Faculty of medicine, University of Debrecen, Debrecen, Hungary,* ³*Division of Nuclear Medicine, Department of Medical Imaging, Faculty of medicine, University of Debrecen, Debrecen, Hungary,* ⁴*Institute of Physics, Department of Solid State Physics, Faculty of Physics, University of Debrecen, Debrecen, Hungary,* ⁵*Department of Surgical Research and Techniques, Faculty of Medicine, University of Pecs, Hungary*

S11: Known and unknown factors regulating the circulatory system

Chairs: Kvetoslava Burda, Maria Fornal

- S11-1 Association of sulfur concentration in erythrocytes with heart geometry parameters and blood pressure
Maria Fornal¹, Janusz Lekki², Jarosław Krolczyk¹, Barbara Wizner¹, Tomasz Grodzicki¹
¹*Jagiellonian University Medical College, Krakow, Poland,* ²*Institute of Nuclear Physics PAN, Krakow, Poland*
- S11-2 Results of blood research relating to: rheology, morphology and biochemistry of blood in a man living 50 days in extremely low temperatures
Zbigniew Joseph Dabrowski¹, Aneta Teleglow¹, Anna Marchewka¹, Maria Fornal²
¹*Academy of the Physical Education in Cracow, Poland,* ²*Collegium Medicum, Jagiellonian University, Krakow, Poland*
- S11-3 Interactions of β -carotene with red blood cells - its effect on their stability and functioning
Joanna Fiedor¹, Mateusz Przetocki¹, Aleksander Siniarski^{2,3}, Grzegorz Gajos^{2,3}, Nika Spiridis⁴, Kinga Freindl⁴, Kvetoslava Burda¹
¹*AGH University of Science and Technology, Faculty of Physics and Applied Computer Science, Krakow, Poland,* ²*Jagiellonian University Medical College, Krakow, Poland,* ³*The John Paul II Hospital, Krakow, Poland,* ⁴*Polish Academy of Sciences, Krakow, Poland*
- S11-4 Correlations between hemorheological parameters in a group of qualified honorary blood donors compared to those in a group of cardiovascular patients.
Anna Marcinkowska-Gapinska
Department of Biophysics, Karol Marcinkowski University of Medical Sciences in Poznan, Poland
- S11-5 Can nanoparticles be responsible for the development of hypertension?
Kvetoslava Burda¹, Joanna Fiedor¹, Magdalena Peter¹, Mateusz Przetocki¹, Jarosław Kiecana^{2,3}, Aleksander Siniarski^{2,3}, Grzegorz Gajos^{2,3}, Nika Spiridis⁴

¹AGH-University of Science and Technology, Krakow, Poland, ²The John Paul II Hospital, Krakow, Poland, ³Jagiellonian University, Medical College, Krakow, Poland, ⁴Jerzy Haber Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences, Krakow, Poland

S12: Colloidal models in red blood cell behaviour

Chairs: **Alexis Darras, Alexander Pribush**

- S12-1 Intricate journey of micro- and nano-carriers for drug delivery in the blood stream
Dmitry Fedosov
Forschungszentrum Juelich GmbH
- S12-2 Physical mechanism of erythrocytes sedimentation: experiments and gel-model
Alexis Darras¹, Anil Kumar Dasanna², Thomas John¹, Gerhard Gompper², Lars Kaestner¹, Dmitry A. Fedosov², Christian Wagner¹
¹*Experimental Physics, Saarland University, 66123 Saarbruecken, Germany,*
²*Theoretical Physics of Living Matter, Institute of Biological Information Processing and Institute for Advanced Simulation, Forschungszentrum Jülich, 52425 Jülich, Germany*
- S12-3 The erythrocyte sedimentation rate as a diagnostic biomarker for neuroacanthocytosis syndromes
Alexis Darras¹, Kevin Peikert^{2,3}, Antonia Rabe^{1,4}, François Yaya^{1,5}, Greta Simionato^{1,6}, Thomas John¹, Anil Kumar Dasanna⁷, Semen Bavalyy⁷, Jürgen Geisel⁸, Andreas Hermann^{2,3,9,10}, Dmitry A. Fedosov⁷, Adrian Danek¹¹, Christian Wagner^{1,12}, *Lars Kaestner^{1,4}
¹*Experimental Physics, Saarland University, 66123 Saarbruecken, Germany,*
²*Translational Neurodegeneration Section “Albrecht-Kossel”, Department of Neurology, University Medical Center Rostock, University of Rostock, Rostock, Germany,*
³*Neurodegenerative Diseases, Department of Neurology, Technische Universität Dresden, Dresden, Germany,*
⁴*Theoretical Medicine and Biosciences, Saarland University, 66424 Homburg, Germany,*
⁵*Laboratoire Interdisciplinaire de Physique, UMR 5588, 38402 Saint Martin d’Hères, France,*
⁶*Institute for Clinical and Experimental Surgery, Saarland University, 66424 Homburg, Germany,*
⁷*Institute of Biological Information Processing and Institute for Advanced Simulation, Forschungszentrum Jülich, 52425 Jülich, Germany,*
⁸*Central Clinical Laboratory, Saarland University, 66424 Homburg, Germany,*
⁹*DZNE, German Center for Neurodegenerative Diseases, Research Site Rostock/Greifswald, Rostock, Germany,*
¹⁰*Center for Transdisciplinary Neurosciences Rostock (CTNR), University Medical Center Rostock, University of Rostock, Rostock, Germany,*
¹¹*Neurologische Klinik und Poliklinik, Ludwig-Maximilians-Universität, 81366 Munich, Germany,*
¹²*Physics and Materials Science Research Unit, University of Luxembourg, Luxembourg City, Luxembourg*
- S12-4 Investigating the red blood cells (dis)aggregation mechanisms by means of optical tweezers

***Francois Yaya^{1,2}, Olivera Korculanin^{3,4}, Mehrnaz Babaki^{3,4}, Pavlik Lettinga^{3,4}, Christian Wagner¹, Kisung Lee⁵**

¹*Experimental Physics, University of Saarland, Saarbrücken, Germany,* ²*Laboratoire Interdisciplinaire de Physique (LIPhy), CNRS and University of Grenoble, Grenoble, France,* ³*Biomacromolecular Systems and Processes (IBI-4), Forschungszentrum Jülich GmbH, Jülich, Germany,* ⁴*Laboratory for Soft Matter and Biophysics, KU Leuven, Leuven, Belgium,* ⁵*Center for Soft and Living Matter, Institute for Basic Science, Ulsan, South Korea*

17:50–18:50 **President-Invited Plenary Lecture - 2**

Chair: **Alberto Caggiati**

PL4 Pathophysiology and treatment options for venous ulceration: Is there a role for exercise?

Markos Klonizakis

Lifestyle, Exercise and Nutrition Improvement (LENI) Research Group, Department of Nursing and Midwifery, Sheffield Hallam University, United Kingdom

19:00–20:00 **Plenary Lecture for ISCH**

Chair: **Brian Cooke**

PL5 Hemodynamic functionality of transfused red blood cells – A0 potent effector of transfusion outcome

***Saul Yedgar¹, Neta Goldschmidt², Orly Zelig², Axel Pries³, Gregory Barshtein¹**

¹*The Hebrew University Medical School, Jerusalem, Israel,* ²*Hadasah Hospital, Jerusalem, Israel,* ³*Charite-Free University, Berlin, Germany*

20:10–21:40 **Symposia S13–S15**

S13: Preclinical and clinical studies on blood cells and microcirculation

Chair: **Anna Maria Blocki**

S13-1 Nanoparticle-mediated delivery of nucleic acids in primary human endothelial cells

Manfred Gossen^{1,2}, Skadi Lau^{1,2}, Hanieh Moradian^{1,2,3}, Marc Behl¹, Andreas Lendlein^{1,2,3}

¹*Institute of Active Polymers, Helmholtz-Zentrum Hereon, Teltow, Germany,* ²*Berlin-Brandenburg Center for Regenerative Therapies (BCRT), Berlin, Germany,* ³*Institute of Biochemistry and Biology, University of Potsdam, 14476 Potsdam, Germany*

S13-2 Long-term stabilization of three-dimensional perfusable microvascular networks in microfluidic devices

Ho-Ying Wan¹, Jack Chun Hin Chen², Qinru Xiao², Christy Wingtung Wong¹, Yi-Ping Megan Ho², Roger D. Kamm³, Sebastian Beyer², Anna Maria Blocki¹

¹*Institute for Tissue Engineering and Regenerative Medicine, The Chinese University of Hong Kong*, ²*Department of Biomedical Engineering, Faculty of Engineering, The Chinese University of Hong Kong*, ³*Department of Biology and Mechanical Engineering, Massachusetts Institute of Technology*

S13-3 [Withdrawn]

S13-4 Assessment of leukocyte activation in the intestinal microcirculation in a novel model of CNS injury-induced immunodepression

Bashir Bietar, Christian Lehmann

Dalhousie University

S13-5 Experimental Cannabinoid Receptor 2 Modulation for the Treatment of Interstitial Cystitis

Geraint Christopher Berger¹, Juan Zhou¹, Melanie Kelly^{2,1,4}, Christian Lehmann^{1,2,3,5}

¹*Department of Anesthesia, Pain Management and Perioperative Medicine, Dalhousie University*, ²*Department of Pharmacology, Dalhousie University*, ³*Department of Microbiology & Immunology, Dalhousie University*, ⁴*Department of Ophthalmology & Visual Sciences, Dalhousie University*, ⁵*Department of Physiology and Biophysics, Dalhousie University*

S14: Biorheology and COVID-19 Thrombosis

Chairs: **Barbara Zieger, Shinya Goto**

S14-1 [Withdrawn]

S14-2 Retrospective study of COVID-19-associated coagulopathy in hospitalized patients at Tokai University Hospital

Masayuki Oki¹, Hideki Yanagi¹, Masahiro Kamono¹, Saki Manabe¹, Akiko Taoda¹, Ayumi Tsuda¹, Satoshi Abe¹, Takako Kobayashi¹, Koichiro Asano², Yoshihide Nakagawa¹, Yasuhiro Kanatani³, Hideki Ozawa¹, Shinya Goto²

¹*Department of General Medicine, Tokai University School of Medicine*, ²*Department of Internal Medicine*, ³*Department of Pharmacology*

S14-3 COVID-19 and thrombosis: the importance of endothelial function.

Shinichi Goto^{1,2,3}, Shinya Goto³

¹*Brigham and Women's Hospital, Harvard Medical School*, ²*Keio University School of Medicine*, ³*Tokai University School of Medicine*

S15: New useful techniques in disease

Chairs: **Özlem Yalçın, Philippe Connes**

S15-1 A novel integrated biomarker for screening diabetic kidney diseases: critical shear stress of RBCs

Sehyun Shin¹, Junsung Moon², Jimi Choi³, Sin-Gon Kim³, Kyu Jang Won²

¹Korea University, ²Yeungnam University Hospital, ³Korea University Anam Hospital

- S15-2 Clinical microfluidic biomarker assays for red cell health and blood rheology
Umut Gurkan
Case Western Reserve University
- S15-3 Concurrent assessment of deformability and adhesiveness of sickle red blood cells by measuring perfusion of an adhesive artificial microvascular network
Madeleine Lu¹, Celeste Kanne^{2,3}, Riley Reddington¹, Dalia Lezzar¹, Vivien Sheehan^{2,3}, *Sergey Shevkoplyas¹
¹Department of Biomedical Engineering, University of Houston, Houston, TX, USA, ²Aflac Cancer and Blood Disorders Center, Children's Healthcare of Atlanta, Atlanta, GA, USA, ³Department of Pediatrics, Emory University School of Medicine, Atlanta, GA, USA
- S15-4 Usefulness of oxygen gradient ektacytometry in sickle cell disease
Philippe Connes^{1,2}, Camille Boisson^{1,2,3}, Minke Rab^{4,5}, Elie Nader^{1,2}, Céline Renoux^{1,2,3}, Philippe Joly^{1,2,3}, Romain Fort^{1,2,6}, Alexandra Gauthier^{1,2,7}, Yves Bertrand⁷, Richard van Wijk⁴, Vivien Sheehan⁸, Eduard van Beers⁵
¹Laboratoire Interuniversitaire de Biologie de la Motricite (LIBM) EA7424, Team Vascular Biology and Red Blood Cell, Université Claude Bernard Lyon 1, Université de Lyon, France, ²Laboratoire d'Excellence du Globule Rouge (Labex GR-Ex), PRES Sorbonne, Paris, France, ³Laboratoire de Biochimie et de Biologie Moléculaire, Lyon, ⁴Central Diagnostic Laboratory - Research, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands, ⁵Van Creveldkliniek, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands, ⁶Departement de Meedecine Interne, Hopital Edouard Herriot, Hospices Civils de Lyon, ⁷Institut d'Hematologie et d'Oncologie Pédiatrique, Hospices Civils de Lyon, Lyon, ⁸Department of Pediatrics, Division of Hematology/Oncology, Baylor College of Medicine; Houston Texas, USA
- S15-5 A novel microfluidics-based point of care technique for viscoelastic hemostatic assay
***Ozlem Yalcin¹, Ahmet Can Erten², Berfin Irmak Torun³, Fatma Oz³**
¹Koc University, School of Medicine, Koç University, Research Center for Translational Medicine (KUTTAM), Istanbul, Turkey, ²Department of Electronics and Communication Engineering, Istanbul Technical University, Istanbul, Turkey, ³Koç University, Graduate School of Biomedical Sciences and Engineering, Istanbul, Turkey

July 6, 2021

9:10–10:10 **Rising Star Award Session – 2**

Chair: **Edgar O'Rear, Tamas Alexy**

- RSA2-1 Blood flow thrombosis simulation to understand complex phenomenon of thrombosis under blood flow conditions

Shinichi Goto¹, Noriko Tamura³, Masamitsu Nakayama², Shu Takagi⁴, Shinya Goto²

¹Brigham and Women's Hospital, Harvard Medical School, MA, USA, ²Tokai University School of Medicine, Japan, ³Niigata University of Health and Welfare, Japan, ⁴Graduate School of Engineering, The University of Tokyo, Japan

- RSA2-2 Suspension rheology of red blood cells under oscillatory shear flow
Naoki Takeishi¹, Marco E Rosti², Naoto Yokoyama³, Shigeo Wada¹, Luca Brandt⁴
¹Osaka University, ²OIST, ³Tokyo Denki University, ⁴KTH
- 10:20–11:20 **Free Communication (Video Presentation 2)**
- 11:30–12:30 **Plenary Lecture for ISB**
 Chair: **Peter Butler**
- PL6 Lessons from red blood cell mechanics to endothelial cell mechanobiology
Kris N. Dahl
Carnegie Mellon University
- 13:50–14:50 **Keynote Lecture 3**
 Chair: **Toshiaki Dobashi**
- KL3 Coagulation of blood: A possible triggering mechanism of the intrinsic coagulation pathway, and assessment of anticoagulant effect of DOACs using a seesaw-type device
Makoto Kaibara¹, Hiroshi Ujiie²
¹Past affiliation: RIKEN (The Inst. Phys. Chem. Res.), ²Ujiie Neurosurgical & Medical Clinic
- 13:50–14:50 **Keynote Lecture 4**
 Chair: **Nobuo Watanabe**
- KL4 Computational fluid dynamics (CFD) analysis to optimize the design of rotary blood pumps
Masahiro Nishida
National Institute of Advanced Industrial Science and Technology
- 13:50–14:50 Keynote Lecture 5
 Chair: **Toru Maruyama**
- KL5 Dynamics of blood fluidity under various pathologic conditions. The roles of endothelial anticoagulant activities and their pathophysiological conditions
Ikuro Maruyama
Department of Systems Biology in Thromboregulation, Kagoshima University Graduate School of Medical and Dental Sciences
- 15:00–16:30 **Symposia S16-S17 / Free Communication (Live presentation) O1**

S16: Hemorheological and metabolic properties of red blood cellsChairs: **Björn Neu, Olivera Korculanin**

- S16-1 Competition between red blood cell aggregation and breakup: Depletion force due to filamentous viruses vs. shear flow

Olivera Korculanin^{1,2}, Tatiana Kochetkova¹, Pavlik Minne Paul Lettinga^{1,2}¹*Biomacromolecular Systems and Processes (IBI-4), Forschungszentrum Juelich GmbH, Germany,* ²*Laboratory for Soft Matter and Biophysics, KU Leuven, Belgium*

- S16-2 Sphingosine-1-phosphate and Adenosine affect the oxygen dependence of erythrocyte metabolism

Francesco Misiti*Cassino and Lazio Meridionale University*

- S16-3 The role of macromolecular depletion on the adhesion of red blood cells with a reduced sialic acid content

Björn Neu¹, Huimin Teo², Zhengwen Zhang²¹*Rhine-Waal University of Applied Sciences,* ²*Nanyang Technological University*

- S16-4 The Mizar®: a novel, fully-automated aggregometer

Lennart Kuck¹, Francesco A. Frappa², Michael J. Simmonds¹¹*Biorheology Research Laboratory, Menzies Health Institute Queensland, Australia,* ²*Alcor Scientific Inc., Rhode Island, USA***S17: Microrheological responses of blood cells under normal and pathological conditions**Chairs: **Alexei Muravyov, Nadia Antonova**

- S17-1 Development of experimental microfluidic device and methodology for assessing microrheological properties of blood

Nadia Mladenova Antonova¹, Khristo Khristov², Anika Svilenova Alexandrova³, Alexei Vasilievich Muravyov⁴¹*Dept. Biomechanics, Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria,* ²*Institute of Physical Chemistry at the Bulgarian Academy of Sciences, Sofia, Bulgaria,* ³*Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria,* ⁴*Yaroslavl State Pedagogical University Ushinskii, Yaroslavl, Russia*

- S17-2 Comparative study of the microrheological properties of the blood in patients with type 2 diabetes mellitus, using viscosimetry and microfluidic flow analysis

Anika Svilenova Aleksandrova-Watanabe¹, Nadia Mladenova Antonova¹, Alexey Vasilievich Muravyov², Khristo Ivanov Khristov³, Irena Vasileva Velcheva⁴

¹*Dept. of Biomechanics, Institute of Mechanics, Bulgarian Academy of Sciences, Sofia, Bulgaria,* ²*Dept. of Medical and Biological Foundations of Sports, Yaroslavl State Pedagogical University named after K. D. Ushinsky, Yaroslavl, Russia,* ³*Dept. of Interfaces and Colloids, Institute of Physical Chemistry, Bulgarian Academy of Sciences, Sofia, Bulgaria,* ⁴*Clinic of Nervous Diseases, Uni Hospital, Panagyurishte, Bulgaria*

- S17-3 Microrheological responses of red blood cells (RBCs) to gasotransmitters in persons with different levels of oxygen supply to the body
Alexei Vasilievich Muravyov¹, Pavel Valentinovich Mikhailov¹, Irina Alexandrovna Tikhomirova¹, Roman Sergeevich Ostroumov¹, Victor Vasilievich Zinchuk²
¹*State pedagogical university, Yaroslavl,* ²*State Medical University, Grodno, Belarus*
- S17-4 Effect of gasotransmitters (NO and H₂S) on hemorheology and blood clotting
Irina Alexandrovna Tikhomirova¹, Elena Petrovna Petrochenko¹, Yulia Viktorovna Malysheva¹, Alexei Vasiljevich Muravyov¹, Alexander Sergeevich Petrochenko²
¹*Yaroslavl State Pedagogical University,* ²*Yaroslavl State Medical University*
- S17-5 Interaction forces of pair interaction of RBCs and their relation to aggregation parameters under normal and pathological conditions
Alexander V. Priezzhev¹, Andrei E. Lugovtsov¹, Alexey N. Semenov¹, Larissa I. Dyachuk², Petr B. Ermolinskiy¹
¹*Physics Department of Lomonosov Moscow State University,* ²*Medical Research and Education Centre of Lomonosov Moscow State University*
- S17-6 Microrheological responses of RBCs after age (density) separation
Petr Ermolinskiy¹, Andrei Lugovtsov¹, François Yaya^{2,5}, Lars Kaestner^{2,3}, Christian Wagner^{2,4}, Alexander Priezzhev¹
¹*Physics Department, Lomonosov Moscow State University, 119991 Moscow, Russia,* ²*Experimental Physics, Saarland University, 66123 Saarbrücken, Germany,* ³*Theoretical Medicine and Biosciences, Saarland University, 66123 Saarbrücken, Germany,* ⁴*Physics and Materials Science Research Unit, University of Luxembourg, L-1511 Luxembourg, Luxembourg,* ⁵*Laboratoire Interdisciplinaire de Physique, UMR 5588 CNRS and University Grenoble–Alpes, 38058 Grenoble, France*
- 16:40–18:10 **Symposia S19–S20**
S19: Microcirculation disturbances, blood microrheological properties and functional states of leukocytes
 Chairs: **Nadia Mladenova Antonova**
- S19-1 Disturbances in skin temperature oscillations and blood rheological and electrical properties in patients with Diabetes mellitus type 2

Nadia Mladenova Antonova¹, Vasilka Krumova Paskova², Irena Vasileva Velcheva³, Sergey Yurievich Podtaev⁴

¹*Dept. Biomechanics, Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria,* ²*Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria,* ³*Uni Hospital, Panagyurishte, Bulgaria,* ⁴*Institute of Continuous Media Mechanics, RAS, Perm, Russia*

S19-2 Functional states of PMN in pregnant women with hypertension assessed with chemiluminescent method - preliminary data

B. Bechev¹, M. Magrisso², S. Stoeff¹, Sv. Jovtchev¹, S. Miteva¹, S. Alexandrov¹, J. Ivanov¹, M. Pencheva³, D. Koleva⁴, I. Buteva⁴, M. Vretenarska⁵, N. Nikolova⁶ and V. Iliev^{6,7}

¹*Dept Medical Physics and Biophysics and* ³*Dept Biology of Medical University Sofia, Bulgaria,* ²*Omrad Electronics LTD, Beer Sheva, Israel,* ⁴*OGW/MHAT "Nadezhda" Sofia,* ⁵*2nd MHAT Sofia, Nephrology Ward,* ⁶*MC Vitclinic,* ⁷*Military Medical Academy of Sofia*

S19-3 Participation of polymorphonuclear leukocytes in initiation and evolvement of pathologies induced by SARS-Cov-2 virus

B. Bechev¹, S. Stoeff¹ and K. Kavaldzhieva²

¹*Dept Medical Physics and Biophysics,* ²*Dept Biology of Medical University Sofia, Bulgaria*

S20: Nanomechanical and nanorheological assessments of various diseases
Chairs: **Malgorzata Lekka, Joanna Zemla**

S20-1 Search for efficient diagnosis and therapy of resistant BRAF mutated melanoma using biophysical methods

Tomasz Kobiela¹, Anna Sobiepanek¹, Swamy Kasarla¹, Weronika Prorok¹, Tomasz Gambin²

¹*Warsaw University of Technology, Faculty of Chemistry,* ²*Warsaw University of Technology, Faculty of Electronics and Information Technology*

S20-2 Rheological properties of biological materials

Joanna Zemla¹, Claude Verdier², Malgorzata Lekka¹

¹*Institute of Nuclear Physics Polish Academy of Sciences, PL-31342 Krakow, Poland,* ²*Laboratoire Interdisciplinaire de Physique, Université Grenoble Alpes, CNRS, Grenoble, F-38000, France*

S20-3 Nanomechanical assessment of cancer cells and solid tumors as a mechanical biomarker

Andreas Stylianou^{1,2}

¹*European University Cyprus,* ²*University of Cyprus*

16:40–18:30 **Free Communication (ePoster)**

19:20–20:00 **ESCHM-ISCH-ISB Combined Business Online Meeting**

20:10–22:00 **Symposium S21****S21: Shear stress and red cell rheology**Chairs: **Edgar O’Rear, Ozlem Yalcin**

- S21-1 Cell age sensitivity of red cells to mechanical stresses and calcium load
Lennart Kuck¹, Jason N. Peart², Oliver Todd¹, *Michael J. Simmonds¹
¹*Biorheology Research Laboratory, Menzies Health Institute, Griffith University Gold Coast, Queensland, Australia,* ²*School of Medical Science, Griffith University Gold Coast, Queensland, Australia*
- S21-2 Senescence and red cell rheology
Edgar O’Rear¹, James Buerck¹, Phillip Coghill², Ahmed El Banayosy³, Hendra Setiadi³
¹*University of Oklahoma,* ²*VADovations, Inc.,* ³*INTEGRIS Baptist Medical Center*
- S21-3 Asymmetrical erythrocyte morphology to detect sublethal damage
Nobuo Watanabe^{1,2}, Antony P. McNamee³, Jarod T. Horibin^{3,4}, John F. Fraser⁵, Masataka Inoue², Masaya Hakozaiki², Fukuta Matsuzawa², Michael J. Simmonds³
¹*Biofluid Science and Engineering Laboratory, Dept. of Bio-Science and Engineering, College of Systems Engineering and Science, Shibaura Institute of Technology, Saitama, Japan,* ²*Biofluid Science and Engineering Laboratory, Systems Engineering and Science, Graduate School of Engineering and Science, Shibaura Institute of Technology, Saitama, Japan,* ³*Biorheology Research Laboratory, Menzies Health Institute Queensland, Griffith University, Gold Coast, Australia,* ⁴*Perth Blood Institute, West Perth, Perth, Australia,* ⁵*Critical Care Research Group, University of Queensland & The Prince Charles Hospital, Brisbane, Australia*
- S21-4 Effects of mechanical heart valves on circulating blood in patients with valvular heart diseases
Toru Maruyama¹, Michinari Hieda¹, Aya Sato², Takehiko Fujino²
¹*Kyushu University,* ²*Institute of Rheological Function of Foods, Co. Ltd.*
- S21-5 A structured mechanical risk sensitivity assessment system using red cell deformability and fragmentation parameters
Ozlem Yalcin^{1,2}, Elif Ugurel², Polat Goktas¹, Evrim Goksel^{1,3}, Neslihan Cilek^{1,3}, Dila Atar¹
¹*Koç University, School of Medicine, Istanbul, Turkey,* ²*Koç University, Research Center for Translational Medicine (KUTTAM), Istanbul, Turkey,* ³*Koç University, Graduate School of Biomedical Sciences and Engineering, Istanbul, Turkey*
- S21-6 Measurements of erythrocyte deformation in shear and extensional flows
M Keith Sharp¹, Mohammad M Faghieh²

¹University of Louisville, ²US Food and Drug Administration

S21-7 In silico simulation of hemodynamics and blood cell mechanics inside human vasculature

Senol Piskin¹, Aya Ahmed Faeek Elgebaly²

¹Department of Mechanical Engineering, College of Engineering, Istinye University, Istanbul, Turkey, ²Department of Biomedical Engineering, Faculty of Electrical and Electronics Engineering, Yildiz Technical university, Istanbul, Turkey

20:30–22:00 **Symposia S22–S23**

S22: Microbiorheology from molecules to tissues

Chairs: **Daisuke Mizuno, Kengo Nishi**

S22-1 Motion of molecular motors reflecting rheological properties in cells

Takayuki Ariga

Yamaguchi University

S22-2 Glassy cytoplasm driven by non-thermal forces

Kenji Nishizawa^{1,2}, Daisuke Mizuno³

¹IBDM, ²CNRS, ³Department of Physics, Kyushu University

S22-3 Metabolism-Dependent Active Diffusion in Living Cells

Yujiro Sugino¹, Kenji Nishizawa², Daisuke Mizuno¹

¹Department of Physics, Kyushu University, ²IBDM-CNRS

S22-4 Microrheology of a concentrated emulsion as a model cytoplasm

Shono Inokuchi, Ryosuke Matsuoka, Daisuke Mizuno

Kyushu University

S22-5 Non-equilibrium fluctuations in cells report on driving forces and organelle mechanics

Kengo Nishi^{1,2}, Sufi Raja¹, An Pham¹, Fred C MacKintosh³, Christoph F Schmidt¹

¹Duke University, ²UNC Chapel Hill, ³Rice University

S23: Clinical studies using various assays for platelets and hemostasis

Chairs: **Paul Gurbel, Young-Hoon Jeong**

S23-1 The Global Thrombosis Test

***Diana Adrienne Gorog**

University of Hertfordshire & Imperial College, London

S23-2 Thromboelastography: Viscoelastic properties of clot formation and their clinical impact in ASCVD patients

Young-Hoon Jeong

Gyeongsang National University Changwon Hospital

- S23-3 Clinical Trial with Microfluidic Platelet Function Assays(Anysis-200): Comparison with Turbidity-based Drug Response Assay(Verify-NOW)
Byoung Kwon Lee¹, Miney Cho¹, Sehyun Shin²
¹Cardiology, Department of Internal Medicine, Gangnam severance Hospital, Yonsei University, Seoul, Korea, ²Department of Mechanical Engineering, Korea University, Seoul, Korea
- S23-4 T-TAS 01: A novel flow-based system for hemostasis monitoring
Jeffrey Dahlen
 Fujimori Kogyo Co., Ltd.

July 7, 2021

9:00–10:30 **Symposia S24–S26**

S24: Cell mechanics and cell mechanobiology

Chairs: **Toshiro Ohashi, Taiji Adachi, Susumu Kudo**

- S24-1 Identification of leader cells in cell migration by filopodia using computer vision
Baasansuren Otgon¹, Ganbat Danaa², Toshiro Ohashi³
¹Graduate School of Engineering, Hokkaido University, Japan, ²Open Education Center, Mongolian University of Science and Technology, Mongolia, ³Faculty of Engineering, Hokkaido University, Japan
- S24-2 Intracellular tension of osteoblast in collagen gel elicits osteocyte alignment under uniaxially-fixed boundary condition
***Jeonghyun Kim¹, Keiichi Ishikawa², Junko Sunaga², Taiji Adachi²**
¹Nagoya University, ²Kyoto University
- S24-3 Emulating endothelial dysfunction by mimicking the microenvironment of early atherosclerotic lesions within a microfluidic chip
Bomi Gweon¹, Yujin Shin²
¹Sejong University, ²Hanyang University
- S24-4 Enhancement and stabilization of sprouting angiogenesis by curvature-oriented behaviors of mesenchymal stem cells
Takanori Sano¹, Jun-Ichi Kawabe², Yukiko T. Matsunaga¹
¹Institute of Industrial Science, The University of Tokyo, ²Asahikawa Medical University
- S24-5 Mechanism driving hydrostatic pressure-induced endothelial tube formation
Daisuke Yoshino
 Tokyo University of Agriculture and Technology
- S25: Microparticle and cell behavior in confined fluid flows - 1**
 Chairs: **Masako Sugihara-Seki, Naoki Takeishi, Ryoko Otomo**
- S25-1 Numerical analysis of the inertial migration of red blood cells in a channel

Naoki Takeishi¹, Hiroshi Yamashita^{1,2}, Naoto Yokoyama³, Seki Masako^{1,2}, Shigeo Wada¹

¹Osaka University, ²Kansai University, ³Tokyo Denki University

- S25-2 Droplet breakup limits in simple shear flows
Mohamed Shoieb Abdelgawad, Marco Edoardo Rosti
Okinawa Institute of Science and Technology
- S25-3 Swelling and hemolytic behavior of human red blood cells in hypotonic fluid
Ryoko Otomo, Ryuta Minami, Kiyoshi Bando
Kansai University
- S25-4 Spectral change of stress-responsive fluorescent molecule caused by the hydrodynamic stress field of microchannel flow
Reiko Kuriyama¹, Waka Yamamoto¹, Hidetsugu Kitakado², Shohei Saito², Kazuya Tatsumi¹, Kazuyoshi Nakabe¹
¹Department of Mechanical Engineering and Science, Kyoto University, ²Graduate School of Science, Kyoto University
- S25-5 Segregation in shear-thickening materials
Alessandro Monti, Marco Edoardo Rosti
Okinawa Institute of Science and Technology (OIST)
- S26: **Contributing role of erythrocytes for platelet adhesion and thrombus formation**
 Chairs: **Shinya Goto**
- S26-1 Important physical regulatory roles of erythrocytes on platelet adhesion under blood flow conditions
Noriko Tamura^{1,2}, Kazuya Shimizu³, Seiji Shiozaki², Kazuyasu Sugiyama⁴, Masamitsu Nakayama², Shinichi Goto², Shu Takagi³, Shinya Goto²
¹Department of Health and Nutrition, Niigata University of Health and Welfare, ²Department of Medicine (Cardiology), Research Center for Metabolic Disease, Tokai University School of Medicine and Tokai University Graduate School of Medicine, ³Graduate School of Engineering, The University of Tokyo, ⁴Department of Mechanical Science and Bioengineering, Osaka University School of Engineering Science
- S26-2 Physical interactions between platelets and erythrocytes play an important role for initial platelet adhesion mediated by the interaction of glycoprotein 1b with von Willebrand factor.
Shinichi Goto^{1,2,3}, Noriko Tamura⁴, Kazuya Shimizu⁵, Masamitsu Nakayama³, Shu Takagi⁵, Shinya Goto³
¹Brigham and Women's Hospital, Harvard Medical School, ²Keio University School of Medicine, ³Tokai University School of Medicine, ⁴Niigata University of Health and Welfare, ⁵The University of Tokyo

- S26-3 Water-ethanol separation with tip charged carbon nanotubes
Yuui Ono, Eiji Yamamoto, Kenji Yasuoka
Keio University
- S26-4 [Withdrawn]
- 10:40–12:10 **Symposia S27–S28**
- S27: Microparticle and cell behavior in confined fluid flows - 2**
 Chairs: **Masako Sugihara-Seki, Naoki Takeishi, Ryoko Otomo**
- S27-1 Inertial focusing of red blood cells suspended in blood plasma flowing through square tubes
Masako Sugihara-Seki^{1,2}, Saori Tanaka¹
¹*Kansai University*, ²*Osaka University*
- S27-2 Role of fluid dynamics in optical trapping
Tetsuro Tsuji
Kyoto University
- S27-3 Deformable particle suspensions
Marco Edoardo Rosti
Okinawa Institute of Science and Technology
- S27-4 On-chip manipulation for revealing novel aspects of red blood cell mechanics
Hiroaki Ito
Chiba University
- S27-5 Measurement of near-wall microparticles motion under the influence of radiation pressure of evanescent field
Miyu Inoue, Reiko Kuriyama, Kazuya Tatsumi, Kazuyoshi Nakabe
Kyoto University
- S28: Joint symposium with commons for medicine and engineering japan: Application of high performance computer for biorheology**
 Chairs: **Shinya Goto, Kazuo Tanishita**
- S28-1 Protein disintegration as a possible mode of protein dissociation between GPIIb α and VWF in blood flow condition: Insights from steered molecular dynamic simulation.
Shinichi Goto^{1,2,3}, Masamitsu Nakayama², Shu Takagi⁴, Shinya Goto²
¹*Brigham and Women's Hospital, Harvard Medical School*, ²*Tokai University School of Medicine*, ³*Keio University School of Medicine*, ⁴*Graduate School of Engineering, The University of Tokyo*
- S28-2 Salt bridge formation between A1 domain of von Willebrand Factor and Platelet Glycoprotein (GP) Iba by molecular dynamics simulations
Masamitsu Nakayama, Shinichi Goto, Shinya Goto
Tokai University School of Medicine

- S28-3 Finite element analysis of blood clots through visco-hyperelastic constitutive theories
Koichiro Tashiro^{1,2}, Yasuhiro Shobayashi², Iku Ota¹, Atsushi Hotta¹
¹*Department of Mechanical Engineering, Keio University,* ²*Biomedical Solutions Inc.*
- S28-4 Newly developed drug-eluting stent (DES) system for cardiovascular diseases: Hybrid nano-coating technology
Terumitsu Hasebe^{1,2}, Shunto Maegawa^{1,3}, Kenta Bito^{1,3}, Yutaka Okamoto³, Shunsuke Kamei¹, Shota Yamamoto^{1,3}, Kosuke Tomita¹, Satoshi Suda¹, Kazunobu Hashida¹, Tomohiro Matsumoto¹, Yoko Usami^{4,1}, Yasutaka Baba^{4,1}, Yutaka Imai¹, Atsushi Hotta³
¹*Tokai University Hachioji Hospital, Tokai University School of Medicine,* ²*Keio University Hospital Clinical & Translational Research Center,* ³*Keio University Faculty of Science and Technology,* ⁴*Saitama Medical University International Medical Center*
- 12:10–13:10 **Plenary Lecture in Tribute to Prof. Akira Kamiya**
 Chair: **Joji Ando**
- PL7 Emerging roles of membrane lipids and mitochondria in endothelial cell mechanosensing
Kimiko Yamamoto
The University of Tokyo
- 14:00–15:00 **Closing Plenary Lecture for ISB**
 Chair: **Peter Butler**
- PL8 The mechanotransduction of cancer and blood cells exposed to circulatory levels of fluid shear stress
Michael R. King
Vanderbilt University
- 15:00–15:50 **Closing Ceremony**
- On-demand Program
- Free Communication (Video presentation)
- O2: Hemorheology in health and disease-1**
- O2-1 Effects of L-arginine on blood fluidity impaired after high-intensity exercise: An *in vitro* evaluation
Haruchi Namba¹, Tatsushi Kimura², Hironobu Hamada¹, Kiyokazu Sekikawa¹, Hatsumi Ishio-Ueoka¹, Teruki Kajiwara¹, Yoshinobu M Sato¹, Fumiya Aizawa¹, Takamasa Yoshida¹, Naoto Kanda¹, Aoi Takagi¹

¹*Department of Physical Analysis and Therapeutic Sciences, Graduate School of Biomedical and Health Sciences, Hiroshima University, Hiroshima, Japan,*
²*Faculty of Early Childhood Education and Care, Ohkagakuen University, Aichi, Japan*

- O2-2 Hematological and hemorheological changes in a model of atherosclerotic disease in rabbits

Bence Tanczos¹, Viktoria Somogyi¹, Mariann Bombicz², Bela Juhasz², Norbert Nemeth¹, Adam Deak¹

¹*Department of Operative Techniques and Surgical Research, Faculty of Medicine, University of Debrecen, Debrecen, Hungary,* ²*Department of Pharmacology and Pharmacotherapy, Faculty of Medicine, University of Debrecen, Hungary*

- O2-3 Examination of the hemorheological changes in a rat model of polycystic ovary syndrome

Barbara Barath¹, Adam Varga¹, Adam Attila Matrai¹, Pathan Afrin Javed¹, Krisztina Deak-Pocsai², Norbert Nemeth¹, Adam Deak¹

¹*Department of Operative Techniques and Surgical Research, Faculty of Medicine, University of Debrecen, Debrecen, Hungary,* ²*Department of Physiology, Faculty of Medicine, University of Debrecen, Debrecen, Hungary*

- O2-4 The hazard of PLGA nanoparticles on intima hyperplasia of vascular restenosis in ApoE^{-/-} mice.

Tieying Yin¹, Wen Shi¹, Atik Rohmana Maftuhatul Fuad, Yanhong Li¹, Yang Wang¹, Junyang Huang¹, Ruolin Du¹, Guixue Wang¹, Yazhou Wang²

¹*Key Laboratory for Biorheological Science and Technology of Ministry of Education, State and Local Joint Engineering Laboratory for Vascular Implants, Bioengineering College of Chongqing University,* ²*School of medicine, Chongqing University, Chongqing, 400030, China*

O3: Hemorheology in health and diseases-2

- O3-1 Is leptin an significant regulator of erythrocyte rheology?

Jean-Frederic Brun¹, Emmanuelle Varlet-Marie², Laurent Vachoud³, Bénédicte Marion², Céline Roques², Eric Raynaud de Mauverger¹, Jacques Mercier¹

¹*PhyMedExp, CNRS UMR 9214, INSERM U1046, University of Montpellier, and Department of Clinical Physiology,* ²*Institut des Biomolécules Max Mousseron (IBMM) UMR CNRS 5247, Université de Montpellier, Ecole Nationale Supérieure de Chimie de Montpellier, France,* ³*Laboratoire de Biophysique & Bio-Analyses, Faculté de Pharmacie, Université de Montpellier, France*

- O3-2 Which sub-compartments of fat mass and fat-free mass are related to blood viscosity factors?

Jean-Frederic Brun¹, Emmanuelle Varlet-Marie², Laurent Vachoud³, Bénédicte Marion², Céline Roques², Eric Raynaud de Mauverger¹, Jacques Mercier¹

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O3-3 A link between storage-related sequence of nanoscale changes in RBC membranes and their biochemical and morphological properties

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O3-4 Investigation of effect of measurement time for transmitted light through blood on relationship between erythrocytes' sedimentation velocity and aggregation parameters

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O4: Red cell deformability in humans and mammals

O4-1 3-D analysis of the deformation of RBCs in a doublet while tuning the interaction **Mehrnaz Babaki^{1,2}, Pavlik Lettinga^{1,2}**

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O4-2 Osmotic gradient ektacytometric parameters in human and seven mammalian species

Adam Varga, Barbara Barath, Adam Attila Matrai, Viktoria Somogyi, Adam Deak, Norbert Nemeth

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O4-3 Effect of heat stress on macro- and micro-rheological parameters in an experimental model

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- O4-4 *In vitro* effects of heat-treatment on red blood cell micro-rheology in human and various vertebrate species

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- O4-5 Activation of Protein kinase A cascade increases deformability of sickle red blood cells

Evrin Goksel^{1,2}, Philippe Connes^{4,5,6}, Camille Boisson^{4,5,7}, Céline Renoux^{4,5,7}, Alexandra Gauthier^{4,5,8}, Romain Fort^{4,5,9}, Elie Nader^{4,5}, Solène Poutrel^{4,5,9}, Ozlem Yalcin^{1,2,3}

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Free Communication (ePoster)

- P-1 Impaired deformability and association with density distribution of erythrocytes in patients with type 2 diabetes mellitus under treatment

Toru Maruyama¹, Michinari Hieda¹, Takeshi Arita², Taku Yokoyama¹, Mitsuhiro Fukata¹, Takehiko Fujino³, Koichi Akashi¹

¹Kyushu University, ²Fukuoka Wajiro Hospital, ³BOOCS Clinic

- P-2 Prognostic significance of red cell distribution width in hospitalized old patients with bacterial infection
Toru Maruyama¹, Keitaro Nakashima², Eiichi Ohgami², Kazuhiko Katoh², Souichi Yoshitomi², Mine Harada²
¹Kyushu University, ²Karatsu Higashimatsuura Medical Center
- P-3 Results of blood research relating rheology, morphology and biochemistry of blood in a man living 50 days in extremely low temperatures
Aneta Teleglow¹, Anna Marchewka¹, Maria Fornal², Zbigniew Dąbrowski¹, Jakub Marchewka¹, Bartłomiej Ptaszek¹, Mateusz Mardyla¹, Dariusz Mucha¹, Łukasz Tota¹, Marcin Maciejczyk¹
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- P-4 Activation of K⁺ ATP channels is involved additively in NO-induced vasodilation
Noriko Iida
ex-Department of Neurophysiology, Graduate School of Biomedical and Health Sciences, Hiroshima University, Japan
- P-5 Stiffening of the human keratinocytes in response to the cyclic temperature changes
Yan Nie^{1,2}, Weiwei Wang¹, Xun Xu¹, Nan Ma^{1,3}, Andreas Lendlein^{1,2,3}
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- P-6 Extensional rheology of semidilute entangled solutions of polyelectrolytes in a cross-slot microchannel
Arisa Yokokoji¹, Tadashi Inoue¹, Atsushi Matsumoto², Simon J Haward³, Amy Q Shen³
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- P-7 Entrapment dynamics of micro-particles in a Pulmonary Capillary Network (PCN) microfluidic device
Merav Belenkovich, Josué Sznitman, Netanel Korin
Faculty of Biomedical Engineering, Technion- Israel Institute of Technology
- P-8 Time-series snapshots of the entire circumferential wall of arteries under pulsatile pressure condition captured by grating-based phase-contrast CT
Takeshi Matsumoto¹, Hiroyuki Tachibana², Masato Hoshino³
¹Tokushima University, ²Kawasaki University of Medical Welfare, ³Spring-8

- P-9 Hemorheology and blood coagulation in COVID-19 patients
Irina Alexandrovna Tikhomirova¹, Mihail Mihajlovich Ryabov²
¹Yaroslavl State Pedagogical University, ²Yaroslavl State Medical University
- P-10 Extended fibrinolysis times in vitro of clots containing erythrocyte microparticles formed by supraphysiologic shear stress
Kylie Foster^{1,2}, James Buerck¹, Edgar O'Rear¹
¹University of Oklahoma, ²VADovations Inc.
- P-11 [Withdrawn]
- P-12 [Withdrawn]
- P-13 [Withdrawn]
- P-14 Change in oxygen transport by erythrocytes treated with TiO₂ nanoparticles and functionalized carbon nanotubes
Magdalena Peter¹, Jarosław Kiecana², Aleksander Siniarski^{2,3}, Grzegorz Gajos^{2,3}, Józef Korecki⁴, Kvetoslava Burda¹
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- P-15 [Withdrawn]
- P-16 Hemodynamic characteristics of fully polymer bioresorbable scaffolds of rats in different ages
Tieying Yin¹, Wen Shi¹, Atik Rohmana Maftuhatul Fuad¹, Yanhong Li¹, Yang Wang¹, Junyang Huang¹, Ruolin Du¹, Guixue Wang¹, Yazhou Wang²
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