

Mitochondria, Metabolism and Heart

May 8–12, 2017 | Eldorado Hotel & Spa | Santa Fe, New Mexico | USA

Scientific Organizers:

Junichi Sadoshima, Rutgers New Jersey Medical School, USA

Toren Finkel, National Heart, Lung, and Blood Institute, National Institutes of Health, USA

Åsa B. Gustafsson, University of California, San Diego, USA

Joint with the meeting on *Angiogenesis and Vascular Disease*

Mitochondria play a central role in regulating energy metabolism, redox status and cell death. The homeostasis of mitochondrial function is maintained by multiple mechanisms, collectively called mitochondrial quality control mechanisms. During the past decade, we have witnessed an explosion of research identifying novel mechanisms by which mitochondria control various cellular functions and cells maintain the homeostasis of mitochondria and metabolism in various cell types. Mitochondria are particularly abundant in the heart, and mitochondrial dysfunction and changes in cellular metabolism are commonly observed in failing or stressed hearts. However, there is a significant gap in our understanding of these mechanisms in cardiomyocytes and those in other cell types. The overall learning objectives of this meeting are to: 1) Understand how the novel functions of mitochondria contribute to the development or the prevention of myocardial injury and heart failure, and 2) Discuss how the quality of mitochondria is maintained in adult cardiomyocytes, whose mitochondrial dynamics are quite distinct from other commonly investigated cell types. Special emphasis will be placed on discussing the function and the mechanism of mitophagy; a novel mechanism of cell death mediated through autophagy; interaction between mitochondria dynamics and mitophagy; mitochondrial unfolded protein response (UPR) controlling aging, stress resistance and longevity; the role of metabolic intermediates as signaling mechanisms; and novel biomarkers identified through metabolomics analyses. Overall, the audience will obtain better understanding regarding how the function of mitochondria is regulated in the heart, how it affects the overall function of the cardiovascular system, and how one intervenes with mitochondria and metabolism to achieve better treatment for heart failure and other cardiovascular diseases.

Session Topics:

- Metabolism and Disease (Joint)
- Mitochondria Quality Control
- Autophagy and Metabolism
- Epigenetic Regulation of Vascular Growth
- Hypoxia Sensing Mechanism and Mitophagy (Joint)
- Metabolic Regulation of Cell Signaling
- Regulation of mPTP Opening
- Metabolism and Heart Failure

Scholarship Application & Discounted Abstract Deadline: January 11, 2017

Abstract Deadline: February 8, 2017

Discounted Registration Deadline: March 8, 2017



Note: Scholarships are available for graduate students and postdoctoral fellows and are awarded based on the abstract submitted.

Meeting Hashtag: #KSmitometa

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KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

Mitochondria, Metabolism and Heart (Z4)

Scientific Organizers: Junichi Sadoshima, Toren Finkel and Åsa B. Gustafsson

Supported by Bayer HealthCare Pharmaceuticals

Angiogenesis and Vascular Disease (Z3)

Scientific Organizers: Luisa Iruela-Arispe, Timothy T. Hla and Courtney Griffin

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MONDAY, MAY 8

Arrival and Registration

TUESDAY, MAY 9

Welcome and Keynote Session (Joint)

***Luisa Iruela-Arispe**, University of California, Los Angeles, USA

***Junichi Sadoshima**, Rutgers New Jersey Medical School, USA

Kari K. Alitalo, University of Helsinki, Finland
Therapeutic Potential of Vascular Growth Factors

David C. Chan, California Institute of Technology, USA
Mitochondria Dynamics

Metabolism and Disease (Joint)

Robert E. Gerszten, Beth Israel Deaconess Medical Center, USA
Metabolic Profiles and the Risk of Cardiometabolic Diseases

***Andrew G. Dillin**, University of California, Berkeley, USA
Mitochondria Mitokines and Aging

Peter F. Carmeliet, University of Leuven, VIB, Belgium
Angiogenesis Revisited: Role and (Therapeutic) Implications of Endothelial Metabolism

Arpita Chowdhury, Universitätsmedizin Göttingen, Germany
Short Talk: Oxidative Stress and Altered Mitochondrial Signaling in Barth Syndrome Models

Nicholas Sibinga, Albert Einstein College of Medicine, USA
Short Talk: Control of Mitochondrial Function by Atypical Cadherins

Workshop 1: How to Evaluate Metabolism in the Heart: From the Langendorff Perfusion to Metabolome Analyses (Z4)

***Toren Finkel**, NHLBI, National Institutes of Health, USA

Larissa Pfisterer, Frankfurt University, Germany
Regulation of Endothelial Cell Metabolism by Long Noncoding RNA Incf2

Jessica M. Pflieger, Temple University, USA
Bioenergetics as a Tool for Assessing Cardiomyocyte Response to β -Adrenergic Stimulation and Insulin Resistance

Paul T. Schumacker, Northwestern University, USA
Mitochondrial Complexes I and III Regulate Cardiomyocyte Proliferation in Adult Mouse Hearts

Junco Shibayama Warren, University of Utah, USA
The Histone Methyltransferase Smyd1 Regulates Mitochondrial Energetics in Cardiomyocytes

Yuan Zhang, University of Iowa, USA
Ketogenic Diet Rescues Cardiac Hypertrophy and Heart Failure Induced by Loss of the Mitochondrial Pyruvate Carrier 1

Dan Shao, University of Washington, USA
Glucose Promotes Cell Growth by Suppressing Branched-Chain Amino Acid Degradation

Workshop 1: Current Strategies for Funding Angiogenesis and Vascular Disease Research (Z3)

***Luisa Iruela-Arispe**, University of California, Los Angeles, USA

Yunling Gao, NHLBI, National Institutes of Health, USA
Angiogenesis Research: The Extramural Portfolio Supported by the National Heart, Lung, and Blood Institute, 2008-2015

Morris J. Birnbaum, Pfizer Inc., USA

Philip Tagari, Amgen, Inc., USA
Amgen – Funding External Innovation

Courtney Griffin, Oklahoma Medical Research Foundation, USA
Updates on the American Heart Association Research Funding Portfolio

Christer Betsholtz, Uppsala University, Sweden

Mitochondria Quality Control (Z4)

Gerald W. Dorn, II, Washington University School of Medicine, USA
The Cardiomyopathy of Defective Mitochondrial Fusion

***Junichi Sadoshima**, Rutgers New Jersey Medical School, USA
Mitophagy in the Heart

R. Luke Wiseman, The Scripps Research Institute, USA
Stress-Responsive Regulation of Mitochondria Inner Membrane Proteostasis

Ana Victoria Lechuga Vieco, Spanish National Center for Cardiovascular Research, Spain
Short Talk: Conflict between Mitochondrial DNA Variants

Metabolite Signaling in Angiogenesis and Vascular Disease (Z3)

***William C. Sessa**, Yale University School of Medicine, USA

Morris J. Birnbaum, Pfizer Inc., USA
Control of Hepatic Lipid Metabolism

Christer Betsholtz, Uppsala University, Sweden
Pericytes as Regulators of Vascular Stability

J. David Symons, University of Utah, USA
Short Talk: Endothelial Cell Autophagy Maintains Shear-Stress-Induced Nitric Oxide Generation via Glycolysis-Dependent Purinergic Signaling to eNOS

Andreas M. Beyer, Medical College of Wisconsin, USA
Short Talk: Autophagy is a Novel Regulatory Mechanism in the Human Microcirculation

Poster Session 1

WEDNESDAY, MAY 10

Autophagy and Metabolism (Z4)

Heidi M. McBride, McGill University, Canada
Emerging Functions of Mitochondrial-Derived Vesicles in Health and Disease.

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***Ana Maria Cuervo**, Albert Einstein College of Medicine, USA

Control of Metabolism by Chaperone-Mediated Autophagy

Daniel P. Kelly, Sanford Burnham Prebys Medical Discovery Institute, USA

Mitochondrial Remodeling in the Developing and Diseased Heart

Dale Abel, University of Iowa, Carver College of Medicine, USA

Myocardial Autophagy and Metabolic Regulation

Helena C. Kenny, University of Iowa, USA

Short Talk: Inducible Deletion of OPA1 Causes Heart Failure in Part

by mTOR - Mediated Suppression of Autophagy

Iain Scott, University of Pittsburgh, USA

Short Talk: Acetylation of Mitochondrial Proteins by Gcn5l1 Promotes

Enhanced Fatty Acid Oxidation in the Heart

Transcriptional Control of Endothelial Fate (Z3)

***Courtney Griffin**, Oklahoma Medical Research Foundation, USA

William T. Pu, Children's Hospital, Harvard Medical School, USA

Transcriptional and Epigenetic Regulation of Endothelial Gene Expression

Michael Potente, Max Planck Institute for Heart and Lung Research, Germany

EMBO Young Investigator Lecture: Metabolism, Metabolites and Endothelial Plasticity

Brian L. Black, University of California, San Francisco, USA

Identification of Injury- and Regeneration-Responsive Cardiac Endothelium Enhancer Elements

William C. Sessa, Yale University School of Medicine, USA

New Insights into Endothelial Lipid Metabolism

Manu Beerens, Brigham and Women's Hospital, Harvard Medical School, USA

Short Talk: Prdm16 Modifies the Canonical Notch Output to Establish Proper Arterial Development

Akiko Mammoto, Medical College of Wisconsin, USA

Short Talk: YAP1 in Angiogenesis and Lung Regeneration

Cell Signaling and Metabolism (Z4)

Pinchas Cohen, University of Southern California, USA

Mitochondrial-Derived Peptides and their Role in Vascular Disease

Xiang-Dong Fu, University of California, San Diego, USA

A Novel Strategy to Inhibit Angiogenesis in Cancer

Arieh Moussaieff, Hebrew University of Jerusalem, Israel

The Metabolic Switch of Cells Exiting Pluripotency

***Lorrie A. Kirshenbaum**, University of Manitoba, Canada

Short Talk: Alternative Spliced Form of Bnip3 Preferentially Interacts

with Mitofusion2 and Endoplasmic Reticulum for Cell Survival

Epigenetic Regulation of Vascular Growth (Z3)

***Brian L. Black**, University of California, San Francisco, USA

Stefanie Dimmeler, University of Frankfurt, Germany

Function of Long Noncoding RNAs in the Regulation of the Vasculature

Philip Tagari, Amgen, Inc., USA

Pharmacological and Genetic Inhibition of Hypoxia-Inducible Factor Prolyl Hydroxylases

Courtney Griffin, Oklahoma Medical Research Foundation, USA

Chromatin Remodeling and Vascular Development

Federico Bussolino, University of Torino, Italy

Short Talk: Transcription Factor EB Regulates VEGFR2 Function

Poster Session 2

THURSDAY, MAY 11

Hypoxia Sensing Mechanism and Mitophagy (Joint)

***Stefanie Dimmeler**, University of Frankfurt, Germany

Åsa B. Gustafsson, University of California, San Diego, USA

Parkin-Dependent Degradation of Mitochondria by a Rab5 Endosomal Pathway

***Kenneth Walsh**, Boston University School of Medicine, USA

Clonal Hematopoiesis and Cardio-metabolic Disease: New Mechanisms, New Therapeutic Opportunities

Marlene Rabinovitch, Stanford University, USA

A BMP-Notch Axis Coordinates Mitochondrial Function, Chromatin Remodeling and Gene Regulation to Regenerate Endothelium in Response to Injury

M. Celeste Simon, University of Pennsylvania, USA

Balancing Cell Growth with Homeostasis in the Tumor Microenvironment

Ivan Menendez-Montes, Fundacion CNIC, Spain

Short Talk: Cardiac HIF/VHL Signaling Regulates Glycolytic and Oxidative Metabolic Programs and Is Essential for Myocardial Maturation during Heart Development

Erin Reineke, Houston Methodist Research Institute, USA

Short Talk: Coordination of Cellular Function by Steroid-Receptor Coactivator 2 in Stress-Induced Cardiac Angiogenesis

Workshop 2: Intracellular Signaling and Vascular Function (Z3)

***George E. Davis**, University of Missouri School of Medicine, USA

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Christopher D. Kontos, Duke University Medical Center, USA
Caskin2: A Novel Regulator of Endothelial Cell Quiescence

Qing Robert Miao, Medical College of Wisconsin, USA
Ras Signaling Is Required for Preventing Cerebrovascular Malformation

Sarah J. Parker, Cedars Sinai Medical Center, USA
Proteomics Reveals Context-Dependent Shifts in Mitochondrial Protein Expression and Novel Non-Canonical TGF β Signaling Activation in the Aorta of Marfan Syndrome Mice

Vivek Venkataramani, Memorial Sloan Kettering Institute, USA
CD31 Expression Determines Redox Status and Chemoresistance in Human Angiosarcomas

Ruowen Ge, National University of Singapore, Singapore
Extracellular Antiangiogenic Proteins Target Mitochondria through a Novel Route of Protein Trafficking via Endocytosis and Direct Endosome-Mitochondrion Fusion

Metabolic Regulation of Cell Signaling (Z4)

***Guido Kroemer**, Cordeliers Research Center, France
Metabolic Regulation of Autophagy

Michael N. Sack, NHLBI, National Institutes of Health, USA
Nutrient Sensing, Mitochondria and the Inflammasome

Stephen Y. Chan, University of Pittsburgh School of Medicine, USA
The Emerging Nexus between Matrix Stiffness and Cellular Metabolism in the Diseased Pulmonary Vasculature: New Targets for Treating Pulmonary Hypertension

Jianhua Xiong, NHLBI, National Institutes of Health, USA
Short Talk: Fatty Acid Oxidation Regulates Endothelial Cell Fate

Vascular Stability and Cell-Cell Interactions (Z3)

***Ralf H. Adams**, Max Planck Institute for Molecular Biomedicine, Germany

Harry (Hal) C. Dietz, Johns Hopkins University School of Medicine, USA
TGF β in Inherited Vasculopathies: A Matter of Aneurysmic Proportions

George E. Davis, University of Missouri School of Medicine, USA
Molecular Determinants Governing EC-Pericyte Tube Co-Assembly and Stability

Luisa Iruela-Arispe, University of California, Los Angeles, USA
Vascular Stability and Cell-Cell Interactions during Endothelial Regeneration

Arie Horowitz, Thomas Jefferson University, USA
Short Talk: Dynamic Equilibrium of Endothelial Cell Junctions Is Required for Vascular Morphogenesis

Poster Session 3

FRIDAY, MAY 12

Regulation of mPTP Opening (Z4)

Toren Finkel, NHLBI, National Institutes of Health, USA
Mouse Models of the Mitochondrial Calcium Uniporter Complex

Elizabeth A. Jonas, Yale University, USA
The Mitochondrial Permeability Transition Pore: Molecular Structure and Function in Health and Disease

John W. Elrod, Temple School of Medicine, USA
Mitochondrial Calcium Exchange in Heart Disease

***Jeffery D. Molkenin**, Cincinnati Children's Hospital Medical Center, USA
Mitochondrial Calcium Regulated by MCU Underlies Skeletal Muscle Adaptation

Amit U. Joshi, Stanford University SOM, USA
Short Talk: Mitochondrial Dynamics in Neurodegeneration in Patient-Derived Cells and in Animal Models

Vivian Werloger Rodrigues de Moraes, The Scripps Research Institute, USA
Short Talk: PERK Activation Regulates Mitochondrial Quality Control during Endoplasmic Reticulum Stress

Organ Specific Vasculature (Z3)

***Kathleen M. Caron**, University of North Carolina at Chapel Hill, USA

Ralf H. Adams, Max Planck Institute for Molecular Biomedicine, Germany
Organ-Specific and Functional Specialization of Blood Vessels

Susan Quaggin, Northwestern University, USA
Unique Molecular and Functional Requirements of the Renal Vasculature

Anne C. Eichmann, Yale University School of Medicine, USA
Cross-Talk between Vessels and Nerves

Paul S. Frenette, Albert Einstein College of Medicine, USA
Bone Marrow Vascular Niche

Lisandra Vila Ellis, MD Anderson Cancer Center, USA
Short Talk: Investigating Alveolar Angiogenesis in the Developing Mouse Lung

Ching-Ling Ellen Lien, Saban Research Institute, Children's Hospital, USA
Short Talk: Coordinated Development of Coronary Vessels, Cortical Cardiomyocytes and Cardiac Lymphatics Supports Heart Morphogenesis and Regeneration

Workshop 2: How to Evaluate Mitophagy and Mitochondrial Function in the Cardiovascular System (Z4)

***Åsa B. Gustafsson**, University of California, San Diego, USA

Brian Glancy, NHLBI, National Institutes of Health, USA
The Mitochondrial Reticulum of the Heart

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Knut Lauritzen, Oslo University Hospital, Norway

Impaired Dynamics and Function of Mitochondria Caused by mtDNA Damage Leads to Heart Failure

Xiyuan Lu, University of California, Davis, USA

Mitochondrial Subpopulations and Heterogeneity in Adult Cardiac Myocytes Revealed by Confocal Imaging

Liming Pei, Children's Hospital of Philadelphia/University of Pennsylvania, USA

A Heart-Derived Hormone that Regulates Body Growth

Venkatesh Sundararajan, Rutgers New Jersey Medical School, USA

Mitochondrial Lon Protease Protects the Heart in vivo Against Ischemia-Reperfusion Injury by Reducing Oxidative Damage

Nuo Sun, NHLBI, National Institutes of Health, USA

Measuring Cardiac Mitophagy and the Role of USP30 in Heart Failure

Metabolism and Heart Failure (Z4)

***Richard N. Kitsis**, Albert Einstein College of Medicine, USA

Chaperone-Mediated Autophagy in the Regulation of Mitochondrial Function and Heart Failure

Rong Tian, University of Washington, USA

The Signaling Role of Branched Chain Amino Acids

Stephen L. Archer, Queen's University, Canada

Role of Acquired Abnormalities in Mitochondrial Dynamics and the Mitochondrial Calcium Uniporter (MCU) in Pulmonary Hypertension

Katsuhito Fujii, University of Tokyo, Japan

Short Talk: Cardiac Macrophage Is Required to Avoid Heart Failure and Cardiac Sudden Death after Pressure Overload

Lymphangiogenesis (Z3)

***Anne C. Eichmann**, Yale University School of Medicine, USA

Tsutomu Kume, Northwestern University, USA

Regulation of Postnatal Lymphatic Vessel Development by Foxc1 and Foxc2

Tatiana V. Petrova, CHUV and University of Lausanne, Switzerland

Mechanisms of Lymphatic Vessel Specialization

Kathleen M. Caron, University of North Carolina at Chapel Hill, USA

Lymphatics in Myocardial Injury and Repair

Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (Z4)

Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (Z3)

SATURDAY, MAY 13

Departure