

9th Annual NIH PCTC

CARDIOVASCULAR BIOENGINEERING

SYMPOSIUM

CVBE / CNIC Conference 2025

Program

April 24 - 26, 2025

Centro Nacional de Investigaciones Cardiovasculares (CNIC)

Melchor Fernández Almagro, 3 28029 Madrid, Spain

www.cnic-conference.com

Organizers



Jianyi (Jay) Zhang

University of Alabama at
Birmingham



Miguel Torres

CNIC



Thanh Nguyen

University of Alabama at
Birmingham



Florian Weinberger

CNIC



Hesham Sadek

CNIC / University of
Arizona

APRIL, 24

Registration (10:00 - 10:50)

Welcome Remarks (10:50 – 11:10)

Conference Organizers: Jianyi (Jay) Zhang, Miguel Torres, Thanh Nguyen, Florian Weinberger and Hesham Sadek
Denis Buxton, Associate Director of the Basic and Early translational Research Program at NHLBI (NIH)
Borja Ibáñez, Scientific Director of CNIC

Session I – Heart failure - Pathophysiology and novel therapies I (11:10 – 12:00)

Chair: **Jianyi (Jay) Zhang**

- 11:10 - 11:35 **Cell-based therapy for congenital heart disease and pediatric heart disease**
Joshua Hare, Miller School of Medicine (USA)
- 11:35 - 12:00 **Discovery Arc From Cell Therapy to Novel RNA Drugs**
Eduardo Marban, Smidt Heart Institute (USA)

Lunch Break (12:00 - 13:00)

Session II – Pluripotent stem cells and tissue engineering I (13:00 – 14:45)

Chair: **Florian Weinberger**

- 13:00 - 13:25 **Heart Regeneration and Graft Associated Arrhythmia in Large Mammals**
Jianyi (Jay) Zhang, University of Alabama at Birmingham (USA)
- 13:25 - 13:50 **Engineered Sodium Channels as Inotropes and Antiarrhythmics**
Nenad Bursac, Duke University (USA)
- 13:50 - 14:15 **Synergistic cell therapy for cardiac regeneration in mice and nonhuman primates**
Patrick C.H. Hsieh, University of Wisconsin–Madison (USA)
- 14:15 - 14:30 Short talk **hiPSC-CMs growth on cardiac ECM based microspheres**
Yi Hong, University of Texas at Arlington (USA)
- 14:30 - 14:45 Short talk **Live Cell Imaging-based Profiling of signaling activity in Noonan Syndrome Patient-derived iPSC-Cardiomyocytes using genetic biosensors**
Fabian Koitka, University Medical Center Göttingen (Germany)



APRIL, 24

Session III – Pluripotent stem cells and tissue engineering II (14:45 – 16:30)

Chair: **Jorge Alegre-Cebollada**

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| 14:45 - 15:10 | <p>Harnessing AI workflows for Omics: Post-Translational Modification Prediction and Proteome Turnover Imputation</p> <p>Peipei Ping, University of California Los Angeles (USA)</p> |
| 15:10 - 15:35 | <p>Summary of initial results of regenerated cardiomyocyte transplantation trial for severe heart failure due to ischemic heart disease</p> <p>Keiichi Fukuda, Keio University (Japan)</p> |
| 15:35 - 16:00 | <p>Cardiac Repair Mechanisms: Insights from Opto- and Chemogenetic Approaches</p> <p>Florian Weinberger, CNIC (Spain)</p> |
| 16:00 - 16:25 | <p>Human iPSC-derived Committed Cardiac Progenitors Generate Cardiac Tissue Grafts in a Swine Ischemic Cardiomyopathy Model without Triggering Ventricular Arrhythmias</p> <p>Timothy Kamp, University of Wisconsin (USA)</p> |

Poster Session (16:30- 17:30) & Cocktail (17:30- 19:00)



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Session IV – Metabolism and inflammation I (08:30 – 10:00)

Chair: **José Antonio Enríquez**

- 08:30 - 08:55 **HFpEF: Malady, Model, and Meta-inflammatory Mechanisms**
Joseph Hill, University of Texas Southwestern (USA)
- 08:55 - 09:20 **Alternatively Activated Macrophages are Drivers of Heart Failure**
Sumanth D. Prabhu, Washington University School of Medicine (USA)
- 09:20 - 09:45 **Targeting myeloid function and metabolism for resolution of cardiac inflammation**
Edward Thorp, Northwestern University (USA)
- 09:45 - 10:00 *Short talk* **LATS1/2 inhibitors transiently activate cardiomyocyte, but no cardiac fibroblast or macrophage cell cycling**
Luis Hortells, UiT-The Arctic University (Norway)

Coffee Break (10:00 - 10:40)

Session V – Heart failure - Pathophysiology and novel therapies II (10:40 – 12:20)

Chair: **José Jalife**

- 10:40 - 11:05 **Titin cleavage is a mediator of myocardial remodeling**
Jorge Alegre-Cebollada, CNIC (Spain)
- 11:05 - 11:30 **Molecular Mechanisms of Heart Failure Revealed by Single Cell Analysis**
Issei Komuro, University of Tokyo (Japan)
- 11:30 - 11:55 **Post-transcriptional Reprogramming in Cardiomyocyte Maturation**
Yibin Wang, School of Medicine at UCLA (USA) / Duke-NUS Medical School (Singapore)
- 11:55 - 12:20 **Minimally invasive and noninvasive delivery of therapeutics for heart repair**
Ke Cheng, Columbia University (USA)

Lunch Break (12:20 - 13:00) & Poster Session (13:00 - 14:00)



APRIL, 25

Session VI – Promoting endogenous repair mechanisms (14:00 – 15:40)

Chair: **Miguel Torres**

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| 14:00 - 14:25 | Hippo Signaling in Heart Regeneration
James F Martin , Baylor College of Medicine (USA) |
| 14:25 - 14:50 | Mechanism of Cardiac Regeneration: Lessons from Development and Disease
Sean Wu , Stanford University (USA) |
| 14:50 - 15:15 | Rewiring the Broken Heart: Epigenetic Reprogramming by PHF7 as a Therapeutic Strategy for Ischemic Cardiomyopathy
Glynnis Garry , University of Texas Southwestern (USA) |
| 15:15 - 15:40 | RNA therapeutics for the heart
Mauro Giacca , King's College London (UK) |

Poster Session (15:40 - 16:00) & Coffee Break (16:00 - 16:30)

Session VII – Metabolism and inflammation II (16:30 – 18:25)

Chair: **Rui Benedito**

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| 16:30 - 16:55 | Mitochondria: the inflammation switcher in heart failure?
José Antonio Enríquez , CNIC (Spain) |
| 16:55 - 17:20 | Disrupted Communication Between Diabetic Adipocytes and Cardiomyocytes Drives Mitochondrial Dysfunction
Yajing Wang , University of Alabama at Birmingham (USA) |
| 17:20 - 17:45 | Rebuilding the Genome to Rescue and Prevent Heart Failure
Manuel Rosa-Garrido , University of Alabama at Birmingham (USA) |
| 17:45 - 18:10 | A Mito-Nuclear Connection that Regulates Nuclear Energetics
Hesham Sadek , University of Arizona (USA) / CNIC (Spain) |
| 18:10 - 18:25 | Short talk Base editing correction of pathogenic LMNA mutations associated with cardiac disease
Xurde M. Caravia , UT Southwestern Medical Center (USA) |

Poster Session (18:25 - 19:00)



APRIL, 26

Session VIII – Coronary artery disease and endothelial regeneration (08:30 – 10:15)

Chair: **Hesham Sadek**

- 08:30 - 08:55 **ETV2 mediated engineering and reprogramming of cardiovascular networks**
Daniel Garry, University of Minnesota (USA)
- 08:55 - 09:20 **Inducing effective angiogenesis and arterialization in adult hearts**
Rui Benedito, CNIC (Spain)
- 09:20 - 09:45 **Advanced Vascular Imaging**
Roderic I. Pettigrew, Texas A&M University (USA)
- 09:45 - 10:00 Short talk **COX7A family of CIV structural paralogs regulate cardiomyocyte maturation and heart performance**
Paula Fernández-Montes, CNIC (Spain)
- 10:00 - 10:15 Short talk **Mechanisms of Metabolic reprogramming Driving Adult Heart Regeneration**
Ahmed Mahmoud, Sanford Burnham Prebys Medical Discovery Institute (USA)

Coffee Break (10:15 - 10:45)

Session IX – Cardiomyopathies - novel therapeutic strategies (10:45 – 12:00)

Chair: **Florian Weinberger**

- 10:45 - 11:10 **In search of novel peptides to prevent arrhythmias in channelopathies and cardiomyopathies**
José Jalife, CNIC (Spain)
- 11:10 - 11:35 **Myopeptides for Enhancing Cardiac Contractility and Treating Hypertrophic Cardiomyopathy**
Sakthivel Sadayappan, University of Arizona (USA)
- 11:35 - 12:00 **Role of TRPM4 in Cardiac Disease and Arrhythmogenesis**
Maria Kontaridis, Masonic Medical Research Institute / Harvard Medical School (USA)

Lunch Break (12:00 - 13:30)



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Session X – Heart Failure - Pathophysiology and novel therapies III (13:30 – 15:15)

Chair: **Miguel Torres**

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| 13:30 - 13:55 | The role of CD248+ cardiac fibroblast in myocardial infarction
Xinyang Hu , Zhejiang University (China) |
| 13:55 - 14:20 | Old and new reparative approaches for cardiovascular failure
Ricardo Sanz , University Hospital Gregorio Marañón (Spain) |
| 14:20 - 14:45 | Cardiac CTRP9 as a Key Regulator of sEV Production and Cardioprotection in Cell Therapy for Ischemic Heart Failure
Xin-liang Ma , Thomas Jefferson University (USA) |
| 14:45 - 15:10 | Tissue-Engineered Heart Repair
Wolframs Zimmermann , University of Göttingen (Germany) |

Session XI – Editors and AHA (15:15 – 16:05)

Chair: **Wolframs Zimmermann**

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| 15:15 - 15:40 | Behind the scenes at Nature Reviews Cardiology
Irene Fernández-Ruiz , Nature Reviews Cardiology (UK) |
| 15:40 - 16:05 | Advancing Health and Hope for Everyone, Everywhere
Mariell Jessup , American Heart Association (USA) |

Final Session – Awards Announcement (16:05 – 17:30)

Closing Remarks and Adjournment



LIST OF POSTERS (in alphabetical order of presenting author)

1. Adam, Irsyad

UCLA (USA)

Omics-based AI to elucidate molecular insights in Atherosclerosis

2. Alonso Aguado, Ana Belén

CNIO (Spain)

Adipose tissue mitochondrial dysfunction promotes obesity cardiomyopathy

3. Caño-Carrillo, Sheila

University of Jaen (Spain)

Proteomic Landscape of Cardiac Regeneration in cryoinjured neonatal mice

4. Castillo Casas, Juan Manuel

University of Jaen (Spain)

A 3D Cardiac Spheroid Model for Studying Cell Lineage Modulation and Regulation

5. Concepción Arcones, Alba

CNIO (Spain)

MCJ as a regulator of cardiac regeneration in zebrafish

6. González-Costa, Tamara

CNIC (Spain)

USP8 is required for cardiac metabolic maturation by promoting the embryonic-to-foetal metabolic switch

7. Limones Ahijón, Blanca

IMDEA Materials Institute (Spain)

Development and characterization of self-assembling LMWG hydrogels for myocardial repair

8. Luo, Wen

Nanjing University (China)

Von Hippel-Lindau controls arterial-venous differentiation and artery maturation combined with Hypoxia-Inducible Factor-2 α and FOXO-associated metabolites

9. Nehring, Marie Elisabeth

University Medical Center Hamburg-Eppendorf (Germany)

Tetracycline-inducible expression of constitutively active ErbB2 to increase the success of human induced pluripotent stem cell-derived cardiomyocyte transplantation

10. Peña, Jorge

CNIC (Spain)

Network modelling of regulatory pathways involved in heart regeneration uncovers new potential factors modulating cardiomyocyte proliferation

11. Penkov, Dmitry

CNIC (Spain)

A high-content screening of gut microbiota compound library for cardiomyocyte proliferation

12. Pérez-Hernández, Marta

CNIC (Spain)

Fgr kinase inhibition in Pkp2-deficient mice: a novel target to reduce inflammation?

13. Roessler, Gesa

University Medical Center Hamburg-Eppendorf (Germany)

Establishing an immunosuppressive regiment in pigs to study cardiac regeneration

14. Sánchez Pérez, Patricia

CNIC (Spain)

A new human cardiac fibroblast-derived extracellular matrix optimally promotes hiPSC-CMs maturation

15. Santamans, Ayelén M.

CNIC (Spain)

MCJ as a Key Regulator of Complex I Activity in Cellular Oxygen Sensing and Hypoxic Adaptation



LIST OF POSTERS (in alphabetical order of presenting author)

16. Sevostianova, Viktoriia

IMDEA Materials Institute (Spain)

Additive manufacturing of micropatterned platforms for guiding the alignment of iPSC-derived cardiomyocytes

17. Shehata, Nancy

University Medical Center Hamburg-Eppendorf (Germany)

Evidence for the inhibition of cardiomyocyte cycle activity by cardiac work

18. Silver, Sophia

Clemson University (USA)

Hypoimmunogenic hPSC-derived cardiac organoids evade immune rejection and promote cardiac functional recovery

19. Swee, Steven

UCLA (USA)

Predicting SCD using multi-modal Knowledge distillation via variational inference

