BMES CMBE
Cellular and Molecular Bioengineering Special Interest Group

2023 BMES CMBE CONFERENCE

THEME: Cell State Transitions in Development, Disease, and Regeneration

January 2 - 6, 2023 | Hyatt Regency Indian Wells Resort & Spa, Indian Wells, CA

PROGRAM

Monday, January 2, 2023	
2:00 p.m. – 7:00 p.m. Registration Counter #1 (K)	Registration Open
7:00 p.m. – 9:00 p.m. Gardenia AB	CMBE Council Meeting (by invitation only)
Tuesday, January 3, 2023	
7:00 a.m. – 7:45 a.m. 18th Hole Terrace & LM Foyer	Continental Breakfast
7:00 a.m. – 1:00 p.m. Registration Counter #1 (K)	Registration Open
7:45 a.m. – 8:00 a.m. Indian Wells IJK	**Welcome/Introduction by conference organizers**
8:00 a.m. – 10:17 a.m. Indian Wells IJK	**Session I: Cell state transitions and cell competition in development and diseases** Chairs: Stephanie I. Fraley (University of California, San Diego) & Ning J. Jiang (University of Pennsylvania)
8:00 a.m. – 8:40 a.m.	**Keynote: Cell morphological control of oncogenic signals** Gaudenz Danuser, UT Southwestern Medical Center
8:40 a.m. – 9:00 a.m.	Rising Star Award: AP–1 transcription factor network controls diverse patterns of cell state plasticity Mohammad Fallahi–Sichani, University of Virginia
9:00 a.m. – 9:15 a.m.	Postdoc Researcher Travel Award: Spatial multi–omic profiling of human hippocampus reveals region–specific alterations in major depressive disorder Yang Xiao, Columbia University
9:15 a.m. – 9:30 a.m.	Selected short talk: A chicken and egg challenge: Roles of cardiac fibroblasts and cardiomyocytes in age–related heart failure Justin Cooper–White, University of Queensland
9:30 a.m. – 9:45 a.m.	Selected short talk: Inflammatory serum factors from aortic valve stenosis patients drive sex differences in valve myofibroblasts Brian Aguado, University of California, San Diego
9:45 a.m. – 10:05 a.m.	Rising Star Award: Simulated microgravity enhances adipocyte maturation and glucose uptake via increased cortical actin remodeling Evangelia Bellas, Temple University

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Tuesday, January 3, 2023	
10:05 a.m. – 10:08 a.m.	Lightning talk: An explainable AI approach to differentiate breast cancer morphologies between racial groups Heather Dunn, Clemson University
10:08 a.m. – 10:11 a.m.	Lightning talk: Fluid shear stress in ovarian cancer metastasis via glycocalyx modulation Eric Horst, University of Michigan, Ann Arbor
10:11 a.m. – 10:14 a.m.	Lightning talk: EB3 acts as a link between microtubules and calcium dysregulation in traumatic brain injury Michael Hanna, New Jersey Institute of Technology
10:14 a.m. – 10:17 a.m.	Lightning talk: Conductive electrospun polymer platforms improve stem cell–derived cardiomyocyte function and maturation Giselle Gonzalez, University of California, San Diego
10:17 a.m. – 10:50 a.m. Indian Wells LM	**Poster viewing I & coffee break** Sponsored by: Center for Engineering MechanoBiology (CEMB)
10:50 a.m. – 12:20 p.m. Indian Wells IJK	Session II: Cell state transitions and cell competition in development and diseases – II Chairs: Ngan F. Huang (Stanford University) & Deborah Leckband (University of Illinois Urbana–Champaign)
10:50 a.m. – 11:20 a.m.	Invited talk: Squeezing into tight spaces: the advantages and challenges of moving collectively Denise Montell, University of California, Santa Barbara
11:20 a.m. – 11:35 a.m.	Selected short talk: Peristalsis–associated mechanotransduction drives malignant progression of colorectal cancer Shreya Raghavan, Texas A&M University
11:35 a.m. – 11:50 a.m.	Postdoc Researcher Travel Award: Cooperative phagocytosis of cohesive cancer cell targets by phase separating macrophages Lawrence Dooling, University of Pennsylvania
11:50 a.m. – 12:05 p.m.	Selected short talk: Macrophage–targeted drug delivery for systemic and local immunotherapies Christopher Rodell, Drexel University
12:05 p.m. – 12:20 p.m.	Postdoc Researcher Travel Award:Type–2 functionality regulates Tim–3+ dysfunctional effector CAR T cells in association with 8–year remission in patients with B–ALL Zhiliang Bai, Yale University
12:20 p.m. – 12:50 p.m.	**Chris Jacobs Award for Excellence in Leadership Presentation** Introduction by Deborah Leckband, University of Illinois Urbana–Champaign Closing the biomedical innovation gap: A critical need for diversifying the biomedical engineering pipeline Lola Eniola–Adefeso, University of Michigan, Ann Arbor

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Tuesday, January 3, 2023	
12:50 p.m. – 2:30 p.m. The Grove 1	**Lunch with leaders** (Keynote and invited Speakers, Rising Star Awardees, and organizers)
1:00 p.m. – 6:00 p.m.	**Afternoon Break**
5:00 p.m. – 6:00 p.m. Indian Wells LM	**Poster viewing II & refreshment break** Sponsored by: Allen Institute
6:00 p.m. Grand Salon ABCDE	**Welcome Reception** (cash bar for alcoholic beverages and sodas)
Wednesday, January 4, 2023	
7:00 a.m. – 8:00 a.m. 18th Hole Terrace & LM Foyer	Continental Breakfast
7:00 a.m. – 1:00 p.m. Registration Counter #1(K)	Registration Open
8:00 a.m. – 10:17 a.m. Indian Wells IJK	**Session III: Transcriptional noise and cell states** Chairs: Song Li (University of California, Los Angeles) & Ning Wang (University of Illinois Urbana–Champaign)
8:00 a.m. – 8:40 a.m.	**Keynote: Discovery of an endogenous cellular pathway that regulates transcriptional noise to promote cell–fate specification** Leor Weinberger, University of California, San Francisco
8:40 a.m. – 9:10 a.m.	Invited talk: Genome replication as origin of regulatory variation and epigenetic drift Tim Downing, University of California, Irvine
9:10 a.m. – 9:30 a.m.	Rising Star Award: Engineering high–precision, dynamic genetic control systems for cellular reprogramming Katie Galloway, Massachusetts Institute of Technology
9:30 a.m. – 9:50 a.m.	Rising Star Award: Single–molecule detection of pseudouridine modifications in the human transcriptome Sara Rouhanifard, Northeastern University
9:50 a.m. – 10:05 a.m.	Selected short talk: Genetically encoded detection and guidance of cell state transitions via endoribonuclease mediated microRNA sensors Lei Wang, Massachusetts Institute of Technology
10:05 a.m. – 10:08 a.m.	Lightning talk: Woven bone organoids as a therapy model for in vivo bone regeneration Sai Sreenivasamurthy, State University of New York at Stony Brook
10:08 a.m. – 10:11 a.m.	Lightning talk: DNA–enhanced CuAAC ligand enables live–cell detection of intracellular biomolecules Keqing Nian, Northeastern University

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Wednesday, January 4, 2023	
10:11 a.m. – 10:14 a.m.	Lightning talk: Deciphering impacts of physiological–stimuli on neuroepithelial development in forebrain organoids Marie Payne, University of California, Los Angeles
10:14 a.m. – 10:50 a.m. Indian Wells LM	**Poster viewing III & coffee break** Sponsored by: Center for Engineering MechanoBiology (CEMB)
10:50 a.m. – 12:50 p.m. Indian Wells IJK	**Session IV: Developmental biomechanics** Chairs: Nadeen O. Chahine (Columbia University) & Yi–Xian Qin (State University of New York at Stony Brook)
10:50 a.m. – 11:20 a.m.	Invited talk: MYH7 mutations induce changes in single cell mechanobiology Beth Pruitt, University of California, Santa Barbara
11:20 a.m. – 11:40 a.m.	Rising Star Award: In vivo study and synthetic engineering of mechanical rules for kidney tubule morphogenesis Alex Hughes, University of Pennsylvania
11:40 a.m. – 11:55 a.m.	Postdoc Researcher Travel Award: Understanding the mechanics of human somitogenesis through in vitro and theoretical models Yue Liu, University of Michigan, Ann Arbor
11:55 a.m. – 12:10 p.m.	Selected short talk: Biophysical modeling of the human T cell repertoire for optimized immunotherapy Jason George, Texas A&M University
12:10 p.m. – 12:25 p.m.	Selected short talk: Exercise–mediated biochemical signaling guides maturation and repair of skeletal muscle Ritu Raman, Massachusetts Institute of Technology
12:25 p.m. – 12:40 p.m.	Postdoc Researcher Travel Award: Engineering mRNA therapies for central nervous system disorders Saigopalakrishna Yerneni, Carnegie Mellon University
1:00 p.m. – 2:00 p.m. Gardenia AB	**Mentoring Lunch** (Invited Speakers, Fellow/Student Attendees)
1:00 p.m. – 6:00 p.m.	**Afternoon Break**

Wednesday, January 4, 2023	
6:00 p.m. Indian Wells NOP	**Gala Dinner** *(cash bar for alcoholic beverages and sodas)* **2022 Shu Chien Achievement Award Presentation** Introduction by Brent Hoffman (Duke University), with an introduction video from Shu Chien The interplay between tissue tension and tumor immunity Valerie M. Weaver, University of California, San Francisco **2023 Shu Chien Achievement Award Presentation** Introduction by Deborah Leckband (University of Illinois Urbana–Champaign), with an introduction video from Shu Chien Regenerative engineering: A convergence field addressing global grand challenges in health Cato T. Laurencin, University of Connecticut
Thursday, January 5, 2023	
7:00 a.m. – 8:00 a.m. 18th Hole Terrace & LM Foyer	Continental Breakfast
7:00 a.m. – 1:15 p.m. Registration Counter #1(K)	Registration Open
8:00 a.m. – 10:02 a.m. Indian Wells IJK	**Session V: Links between biophysical and biochemical states** Chairs: Stephanie I. Fraley (University of California, San Diego) & Dennis Discher (University of Pennsylvania)
8:00 a.m. – 8:40 a.m.	**Momentum Award (Sponsored by APL Publishing) Presentation** Introduction by Deborah Leckband, University of Illinois Urbana–Champaign Physical sciences approaches to analyze tumor–associated ECM dynamics Claudia Fischbach, Cornell University
8:40 a.m. – 9:10 a.m.	Invited talk: Differential migration mechanics and immune response of glioblastoma subtypes David Odde, University of Minnesota
9:10 a.m. – 9:30 a.m.	Rising Star Award: Hydrogels with tunable stress relaxation regulate the immunosuppressive capacity of mesenchymal stem cells Luo Gu, Johns Hopkins University
9:30 a.m. – 9:50 a.m.	Rising Star Award: Multicellular 3D lung models reveal alveolar epithelial cells and microenvironmental stiffness synergistically drive fibroblast activation in vitro Chelsea Magin, University of Colorado, Denver

Thursday, January 5, 2023	
9:50 a.m. – 9:53 a.m.	Lightning talk: Single cell force is a clinically relevant immune–modulated biophysical biomarker for bleeding severity Oluwamayokun Oshinowo, Medical College of Georgia & Georgia Institute of Technology
9:53 a.m. – 9:56 a.m.	Lightning talk: Leveraging hydrogel viscoelasticity and heterogeneity to promote cell migration in meniscal repair Karen Xu, University of Pennsylvania
9:56 a.m. – 9:59 a.m.	Lightning talk: Piezo1 overexpression promotes aberrant mechanosensation in aged vascular smooth muscle cells Ngoc (Kate) Luu, New York University
9:59 a.m. – 10:02 a.m.	Lightning talk: Physical modeling to optimize design of therapeutic T cells Roberto Alonso Matilla, University of Minnesota
10:02 a.m. – 10:35 a.m. Indian Wells LM	**Poster viewing V & coffee break** Sponsored by: Georgia Institute of Technology
10:35 a.m. – 1:15 p.m. Indian Wells IJK	**Session VI: Developmental bioengineering** Chairs: Ning Wang (University of Illinois Urbana–Champaign) & Yingxiao Wang (University of Southern California)
10:35 a.m. – 11:05 a.m.	Invited talk: Microenvironmental regulation of vascular formation and function Sharon Gerecht, Duke University
11:05 a.m. – 11:35 a.m.	Invited talk: Engineering the heterogeneity of pluripotent stem cells for organoid development Todd McDevitt, Sana Biotech
11:35 a.m. – 11:55 a.m.	Rising Star Award: It takes a heart to make the lung: Recapitulate human cardio–pulmonary co–development using stem cells Xi Ren, Carnegie Mellon University
11:55 a.m. – 12:10 p.m.	Postdoc Researcher Travel Award: A fully patterned human neural tube model for studying human neurodevelopment and diseases Xufeng Xue, University of Michigan, Ann Arbor
12:10 p.m. – 12:25 p.m.	Selected short talk: Engineering functional biomaterials with stem cells for therapeutic lymphangiogenesis Donny Hanjaya–Putra, University of Notre Dame
12:25 p.m. – 12:40 p.m.	Postdoc Researcher Travel Award: Endogenous optical markers profile the metabolic continuum of stem cell differentiation Hao Zhou, University of Southern California
12:40 p.m. – 12:55 p.m.	Selected short talk: Spatially patterned synthetic cues for controlled co–differentiation of vascularized muscle tissues Tyler Hoffman, University of California, Los Angeles
12:55 p.m. – 1:15 p.m.	**Sponsor special talk:** California Institute for Regenerative Medicine

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Thursday, January 5, 2023	
1:15 p.m. – 2:30 p.m.	**Afternoon Break**
2:30 p.m. – 3:30 p.m.	Sponsor special talk: NSF funding and outreach opportunities Wendy C. Crone, National Science Foundation
3:30 p.m. – 4:30 p.m.	Sponsor special talk: BD (Becton, Dickinson and Company) Landing a Job in Industry – Insights from the MedTech Sector
5:00 p.m. – 6:00 p.m. Indian Wells LM	**Poster viewing VI, Networking, with Refreshment Break** Sponsored by Cell Systems
Friday, January 6, 2023	
7:00 a.m. – 8:00 a.m. 18th Hole Terrace & LM Foyer	**Continental Breakfast** Sponsored by: Penn Engineering
8:00 a.m. – 10:20 a.m. Indian Wells IJK	**Session VII: New technologies and approaches for regenerative medicine** Chairs: Yingxiao Wang (University of Southern California) & Guohao Dai (Northeastern University)
8:00 a.m. – 8:40 a.m.	**Keynote: Directed evolution of new adeno – associated viral vectors for clinical gene therapy** David Schaffer, University of California, Berkeley
8:40 a.m. – 9:00 a.m.	Rising Star Award: Mapping in vivo journey of DNA nanodevice using imaging and single–cell techniques Leo YT Chou, University of Toronto
9:00 a.m. – 9:20 a.m.	Rising Star Award: Ultrasound–responsive 3D culture systems for remote manipulation of cell signaling Carolyn Schutt Ibsen, Oregon Health & Science University
9:20 a.m. – 9:35 a.m.	Selected short talk: Reshaping the cellular transcriptome by transcription factor delivery Irtisha Singh, Texas A&M University
9:35 a.m. – 9:50 a.m.	Selected short talk: Decellularized cartilage and auricular progenitor cells for airway repair in a rabbit model Riccardo Gottardi, University of Pennsylvania
9:50 a.m. – 10:05 a.m.	Postdoc Researcher Travel Award: Monitoring of stem cell location and viability in vivo via cell nanoengineering and photoacoustics Jinhwan Kim, Georgia Institute of Technology
10:05 a.m. – 10:20 a.m.	Selected short talk: Spatially resolved epigenomic profiling of single cells in complex tissues Cheen Euong Ang, Harvard University

Friday, January 6, 2023	
10:20 a.m. – 10:50 a.m. Indian Wells LM	**Coffee break** Sponsored by: Journal of Cell Science
10:50 a.m. – 1:05 p.m. Indian Wells IJK	**Session VIII: Cell states in immune system** Chairs: Deborah Leckband (University of Illinois Urbana–Champaign) & Jianping Fu (University of Michigan, Ann Arbor)
10:50 a.m. – 11:20 a.m.	Invited talk: Multi–cellular aggregate formation in ovarian cancer Pam Kreeger, University of Wisconsin, Madison
11:20 a.m. – 11:50 a.m.	Invited talk: Spatial multi–omics driving the next wave of biomedical research revolution Rong Fan, Yale University
11:50 a.m. – 12:10 p.m.	Rising Star Award: Single cell spatial metabolomics reveals immunometabolism in tissues Ahmet Coskun, Georgia Institute of Technology & Emory University
12:10 p.m. – 12:30 p.m.	Rising Star Award: Engineer CAR–neutrophils from human pluripotent stem cells for targeted chemoimmunotherapy against glioblastoma Xiaoping Bao, Purdue University
12:30 p.m. – 12:50 p.m.	Rising Star Award: Enhancing gasdermin–induced tumor pyroptosis through preventing ESCRT–dependent cell membrane repair augments anti–tumor immune response Quanyin Hu, University of Wisconsin, Madison
12:50 a.m. – 1:05 p.m.	Selected short talk: From state to rate: Transforming how monocyte differentiation and polarization are characterized Elizabeth Wayne, Carnegie Mellon University
1:05 p.m. Indian Wells IJK	**Poster award announcement, survey, and closing remarks**

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Date	Poster #	Authors	Title	Abstract #
Jan 3	1	Chengyang Huang, Siddhartha Srivastava, Kenneth Ho, Patrick Kinnunen, Nikola Banovic, Jennifer Linderman, Gary Luker, Kathy Luker, Xun Huan and Krishna Garikipati	Leveraging Artificial Intelligence to Understand Single Cell State Transitions and Predict Cell State	153
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Jan 3	7	Joon Shim, Kaitlyn Legg, Madeline Hart and Corey Diebler	Effect of 1–min spin on human endothelial cells at the vertical spin tunnel	456
Jan 3	8	Gisselle Gonzalez, Aileena C. Nelson, Alexander J. Whitehead, Ritwik Vatsyayan, Erin LaMontagne, Shadi Dayeh and Adam Engler	Conductive Electrospun Polymer Platforms Improve Stem Cell–Derived Cardiomyocyte Function and Maturation	619
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Jan 3	10	Clement T. Y. Chan, Vincenzo Kennedy and Ala Hessami	A Coevolutionary Bioinformatics Approach to Design Modular Biosensors for Programming Decision–Making Behavior	1069
Jan 3	11	Erin LaMontagne, Laura J. Macdougall, Fabio Papes, Evan L. Teng, Jaimie Mayner, Bryan P. Sutherland, Kristi S. Anseth, April M. Kloxin, Alysson R. Muotri and Adam J. Engler	Generating a perfusable vascularized brain organoid model using microfluidics and photodegradable polymer scaffolds	1129

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Jan 3	40	Heather Dunn, Amber Stone, Chris Kalahiki, Luyi Li, Nina Hubig and Federico Iuricich	An Explainable AI Approach to Differentiate Breast Cancer Morphologies Between Racial Groups	8576
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