

**WFIRM**

Wake Forest Institute for  
Regenerative Medicine



**WORLD  
STEM CELL  
SUMMIT**



**REGENERATIVE  
MEDICINE  
FOUNDATION**

# **2022 Virtual Regenerative Medicine Essentials Course & World Stem Cell Summit**

**June 6–11, 2022**

**<https://rmecoursewscs.com>**

## Welcome to the 2022 RME & WSCS

On behalf of the course organizing committee and a prominent group of course instructors, we welcome all to the Wake Forest Institute for Regenerative Medicine's (WFIRM) 9th Annual Regenerative Medicine Essentials: From the Fundamentals to the Future course, which is held in conjunction with the 19th Annual World Stem Cell Summit. This unique, co-joined event is formatted this year for virtual attendance.

Often referred to as the next evolution of modern health care, the regenerative medicine field touches many disciplines -- from clinical care and engineering to basic science and bioethics. We initiate this co-joined event with the RME "core curricula". The 3-day RME course, taught by leading experts in the field, addresses the multidisciplinary nature of regenerative medicine and provides attendees a firm foundation in this exciting field, insight into the current state of the field encompassing applications, challenges and a prognostic glance to the future.

Our primary objective is to provide an all-inclusive review of various aspects of RM including background material, key scientific components of the RM field, ethical, economic, educational, workforce and other issues important to RM, along with "virtually formatted" opportunities to network and meet leading professionals in the field. Participants are then able to move "beyond the essentials" as they then participate in the 19th Annual World Stem Cell Summit, held on June 10th and 11th.

In partnership with the Regenerative Medicine Foundation, the WFIRM organizing committee has put together a dynamic and informative course that covers the "essential" topics, fundamental principles and current progress in tissue engineering and regenerative medicine, including stem cells and cell therapy, biomaterials, technology-based tissue engineering and enabling technologies, as well as regulatory, ethical, economic issues critical to the field. Our instructors, including faculty from WFIRM as well as distinguished, prominent experts in the field from industry, academia and the government who join from across the globe, provides attendees a strong foundation along with insights into future directions and potential applications of tissue engineering and regenerative medicine.

We hope this distinctive, co-joined virtual event will further interactions among basic scientists engaged in discovery and development, translational researchers who bring laboratory discoveries to the clinical forefront, clinicians and those engaged with funding, regulatory and commercialization endeavors, and further broaden and facilitate interactions with future leaders in the field who join as students.

We look forward to an exciting, enjoyable and productive co-joined event for all.

Anthony Atala, MD  
Director, WFIRM  
RME 2022 Course Director

Joan F. Schanck, MPA  
Chief Education Program Officer, WFIRM  
RME 2022 Course Co-Director

## Welcome to the 2022 RME & WSCS

On behalf of the Regenerative Medicine Foundation (RMF), I welcome you to the 2022 Virtual Regenerative Medicine Essentials Course and World Stem Cell Summit. We believe the course is a perfect platform for advancing the RMF mission to accelerate regenerative medicine to improve health and deliver cures.

Here at RMF, we recognize that the power of collaboration grows in a nonlinear fashion. One plus one is more than two, and one plus one plus one is much, much more than three — offering explosively positive and unpredictable possibilities. By attending this course, you will expand your knowledge in a totally immersive experience and gain personal connections and collaborations. Be open to all opportunities presented.

Interact with the outstanding interdisciplinary faculty and the superlative researchers of our host institution, the Wake Forest Institute for Regenerative Medicine, led by our treasured friend, Dr. Anthony Atala. We are here for you. Open to your questions and points of view.

This week I urge you to network with fellow attendees. Break bread, make new friends and remember to collect those opportunities.

Cordially,

Bernard Siegel, JD  
Executive Director, Regenerative Medicine Foundation  
Founder & Chair, World Stem Cell Summit

## With Special Thanks and Recognition

### Organizing Committee

Anthony Atala, MD  
RME 2022 Course Director;  
Director, WFIRM

Bernard Siegel, JD  
RME 2022 Course Co-  
Director; Executive Director,  
Regenerative Medicine  
Foundation

Joan F. Schanck, MPA  
RME 2022 Course Co-  
Director; Chief Education  
Program Officer, WFIRM

Bonnie Davis  
Chief Communications  
Officer, WFIRM

Joseph Dawson  
Director of Communications,  
Regenerative Medicine  
Foundation

Callie Allen  
Education and Outreach  
Coordinator, WFIRM

Emily Gregg  
Web and Social Media  
Manager, WFIRM

Kevin McMahon  
Website Developer,  
Regenerative Medicine  
Foundation

Tracy Criswell, PhD  
Associate Professor, WFIRM

### RME 2022 Career Perspectives Committee

Damian Hutchins  
Pre-Doctoral Fellow

Jao Ruiz Lucio de Lima Parra  
Pre-Doctoral Fellow

Dariya Lizanet  
Pre-Doctoral Fellow

Tim Dobroski  
Pre-Doctoral Fellow

Bradford Kuhlman  
Pre-Doctoral Fellow

Nicholas Edenhoffer  
Pre-Doctoral Fellow

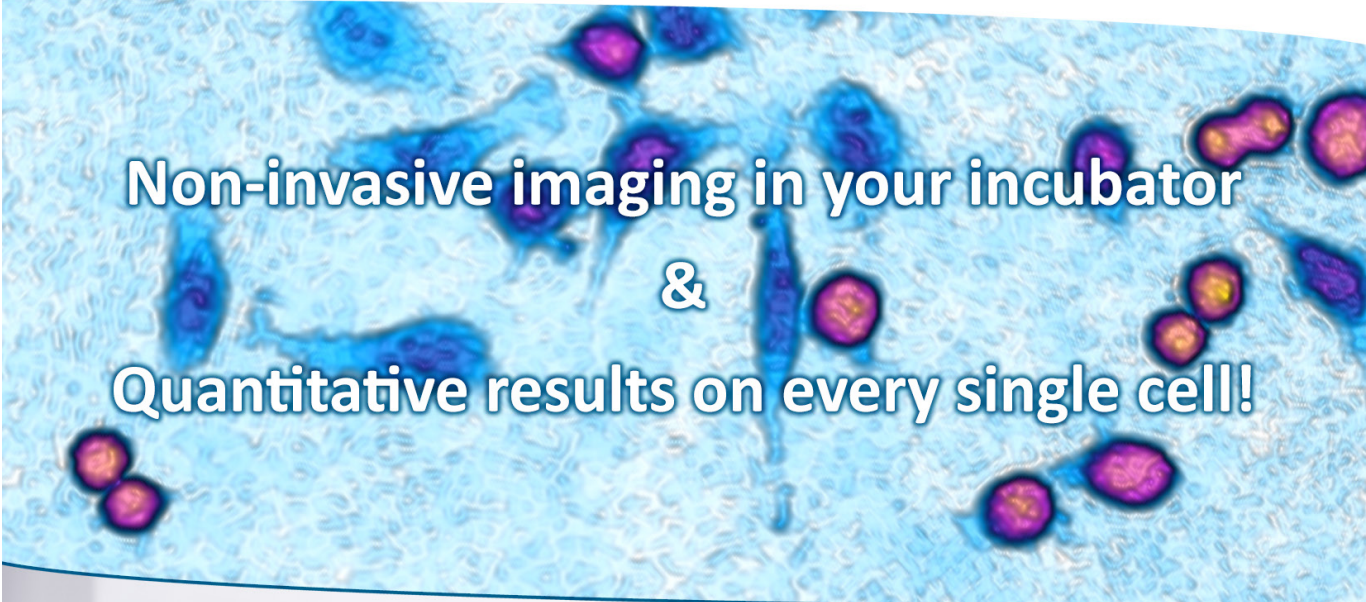
### Other Contributors

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Administrative Manager,  
WFIRM

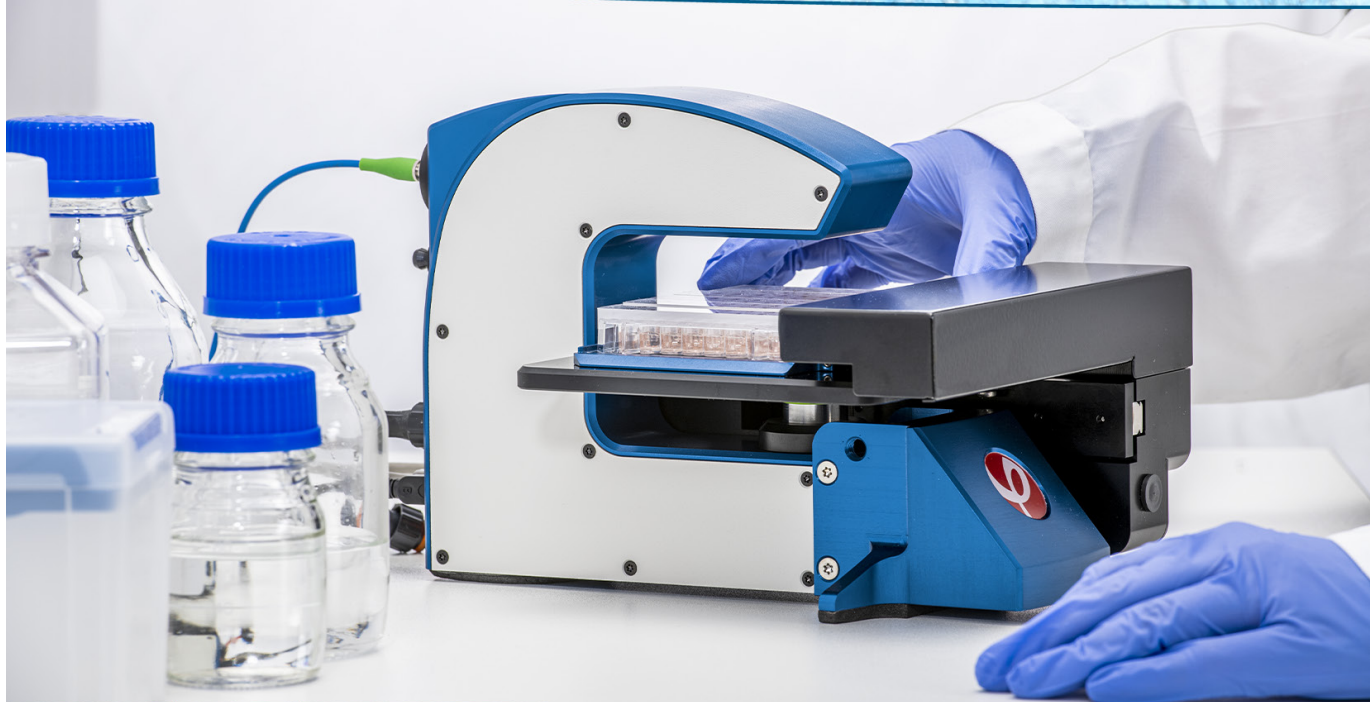
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Financial Analyst, WFIRM

Bryanne Peterson  
Digital Consultant, YNoti  
Solutions





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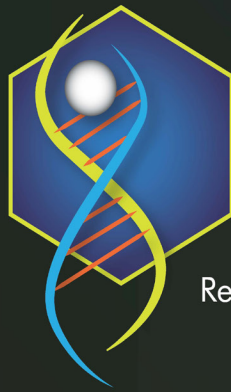




University of Pittsburgh



AR<sup>3</sup>T is supported by NICHD, NIBIB, and NINDS of the NIH under award number P2CHD086843



# AR<sup>3</sup>T

Alliance for Regenerative Rehabilitation Research and Training

## RESEARCH SUPPORT & EDUCATION

- Technology Development grants up to \$100,000 each to support the development of novel technologies
- Pilot Grants: up to \$150,000 is distributed each year
- Annual International Symposium on Regenerative Rehabilitation
- Webinar series
- List of publications and resources
- Advanced Training Course

## WHAT IS AR<sup>3</sup>T

A multi-institutional network of laboratories supporting state-of-the-art research in the domains of tissue plasticity and regeneration, mechanobiology, and physical therapeutics

## NIH-FUNDED RESOURCE CENTER

Supporting the development of Regenerative Rehabilitation by providing research collaborations and educational opportunities, and supporting technology development

## RESEARCH AREAS

Biomaterials, Bioengineering, Stem Cells, Cellular Therapeutics, Mechanotransduction, Mechanosensitive, Biomarkers, Microtissue Systems, Animal Models, Gene Therapy, Imaging

# AR<sup>3</sup>T REGENERATIVE REHABILITATION SESSION

TUE. JUN 7



**3:00 pm to 3:10 pm: Amrita Sahu, PhD, University of Pittsburgh**

*Regenerative Rehabilitation: An Introduction*

**3:10 pm to 3:30 pm: Spencer Szczesny, PhD, Pennsylvania State University**

*Explant Model for Studying Tendon Degeneration and (Hopefully) Regeneration*



**3:30 pm to 3:50 pm: Marian Hettiaratchi, PhD, University of Oregon**

*Development of Multifunctional Biomaterials Musculoskeletal Tissue Repair*

**3:50 pm to 4:10 pm: Franklin West, PhD, University of Georgia**

*Neural Stem Cell Function in a Motor Cortex TBI*



**4:10 pm to 4:20 pm: Eda Yildirim-Ayan, PhD, University of Toledo**

*Mechanome-Guided Regenerative Rehabilitation*

**4:20 pm to 4:35 pm: Moderated Panel**

NOW AVAILABLE  
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TRANSPORT OF  
LIVE BIOMATERIALS



## Important Information

The RME/WSCS 2022 virtual conference is hosted on <http://rmecoursewscs.com>. Registered attendees can schedule virtual meetings, network, and interact including LIVE coffee breaks and moderated panels. All registrants received login credentials via e-mail. To request this information, e-mail Emily Gregg at [egregg@wakehealth.edu](mailto:egregg@wakehealth.edu).

**All virtual postings will be offered for 90 days post-event.**

## We're Social!

Like, follow, and connect with us on social media. Follow along, post pictures, and ask questions.

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 @RegenerativeMedicineFoundation

 @WFIRMnews

 @WSCSummit

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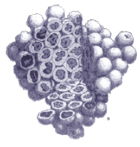
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# DAY 1

# JUNE 6



**Anthony Atala MD**

Director, Wake Forest Institute for Regenerative Medicine



**Joan Schanck MPA**

Chief Education Program Officer, Wake Forest Institute for Regenerative Medicine



**Mahendra Rao MD, PhD**

CEO, Implants Therapeutics



**Joseph Wu MD, PhD**

Director, Stanford Cardiovascular Institute; Professor, Medicine & Radiology, Stanford



**Graca Almeida-Porada MD, PhD**

Professor, Wake Forest Institute for Regenerative Medicine



**Victoria Weis PhD**

Instructor, Wake Forest Institute for Regenerative Medicine



**David Williams PhD**

Professor, Wake Forest Institute for Regenerative Medicine



**Buddy Ratner PhD**

Professor, Bioengineering and Chemical Engineering, University of Washington



**Elizabeth Cosgriff-Hernandez PhD**

Professor, Biomedical Engineering; The University of Texas at Austin



**Bryan Brown PhD**

Associate Professor, Department of Bioengineering, MIRM and CTO, Renerva



**Simon Young DDS, MD, PhD**

Associate Professor, Director of Research, UTHealth, School of Dentistry



**John Jackson PhD**

Associate Professor, Wake Forest Institute for Regenerative Medicine



**Rashid Bashir PhD**

Professor, Bioengineering; Dean, Grainger College of Engineering, University of Illinois at Urbana-Champaign



**John Fisher PhD**

Professor; Department Chair, Fischell Department of Bioengineering, University of Maryland



**Frank Marini PhD**

Professor, Wake Forest Institute for Regenerative Medicine



**Christopher Porada PhD**

Professor, Wake Forest Institute for Regenerative Medicine



**Robert Newman PhD**

Associate Professor, Biology, NC A&T University

**DAY 1****JUNE 6****WELCOME AND OPENING**

8:15—8:25am	Welcome and Introduction	Joan Schanck, MPA
8:25—9:00am	Overview/Plenary: Current Concepts and Changing Trends	Anthony Atala, MD

**Break****SESSION 1: PLURIPOTENT STEM CELLS AND PROGENITORS**

9:10—9:30am	Regen-MED 2.0	Mahendra Rao, MD, PhD
9:30—9:50am	IPSCs for Disease Modeling, Drug Discovery, and Precision Medicine	Joseph Wu, MD, PhD
9:50—10:10am	Defining Stem and Progenitor Cell Populations for Prenatal Treatment of Genetic Disorders	Graca Almeida-Porada, MD, PhD
10:10—10:30am	Moderated Panel with Victoria Weis, PhD	


Break Sponsored By  PHASE HOLOGRAPHIC IMAGING

**SESSION 2: BIOMATERIALS**

10:40—11:00am	The Plasticity of Biocompatibility	David Williams, PhD
11:00—11:20am	Engineering Biomaterials Surfaces for Biocompatibility and Blood Compatibility	Buddy Ratner, PhD
11:20—11:40am	Polymer Strategies to Enhance Bone Regeneration	Elizabeth Cosgriff-Hernandez, PhD
11:40—11:50am	<b>Break</b>	
11:50am—12:10pm	Immunomodulatory Biomaterials for Pelvic Floor Reconstruction	Bryan Brown, PhD
12:10—12:30pm	Biomaterials for Craniomaxillofacial Bone Regeneration	Simon Young, DDS, MD, PhD
12:30—12:45pm	Moderated Panel with David Williams, PhD	

**Break****SESSION 3: ENABLING TECHNOLOGIES**

1:30—1:40pm	Enabling Technologies in Regenerative Medicine Overview	John Jackson, PhD
1:40—2:00pm	Nanotechnology for Regenerative Medicine	Rashid Bashir, PhD
2:00—2:20pm	3D Printing Strategies for Engineering Complex Tissues	John P. Fisher, PhD
2:20—2:30pm	<b>Break</b>	
2:30—2:50pm	Imaging and Regenerative Medicine	Frank Marini, PhD
2:50—3:10pm	Gene Therapy: Getting to the Root of the Disease for a Permanent Cure	Christopher Porada, PhD
3:10—3:30pm	An Integrated Microengineered Organ Equivalent-Based Microfluidics System for Real-Time Detection of Signaling Dynamics and Metabolomics Profiles	Robert Newman, PhD
3:30—3:45pm	Moderated Panel with John Jackson, PhD	

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**CAREER PERSPECTIVES I**

4:00—5:15pm	<i>Beyond Academia and Big Pharma: Career Opportunities Outside the Role of Primary Investigator</i> with Breanna Deutsch, Jana Stoudemire, Peter Marks, and Jeanne Loring	Leaders: Damian Hutchins, Jao Ruiz Lucio de Lima Parra, Dariya Lizanet, Tim Dobroski, Bradford Kuhlman, Nicholas Edenhoffer, Tracy Criswell
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# DAY 2

# JUNE 7



**Sean Murphy PhD**  
Associate Professor,  
Wake Forest Institute  
for Regenerative  
Medicine



**Shahin Rafii MD**  
Professor Chief and  
Director, Ansary Stem Cell  
Institute, Weill Cornell  
Medicine Graduate School  
of Medical Sciences



**Farshid Guilak MD**  
Professor and Co-  
Director, Washington  
University Center of  
Regenerative Medicine



**Matthew Porteus MD, PhD**  
Professor, Pediatrics; Institute  
of Stem Cell Biology and  
Regenerative Medicine,  
Stanford



**James Yoo MD, PhD**  
Professor, Wake  
Forest Institute  
for Regenerative  
Medicine



**Karen Christman PhD**  
Professor, Department  
of Bioengineering,  
Sanford Consortium  
for Regenerative  
Medicine



**Molly Shoichet PhD**  
Professor and  
Chair, Chemical  
Engineering,  
Donnelly Centre,  
University of Toronto



**Pamela Yelick PhD**  
Professor and Director,  
Craniofacial and  
Molecular Genetics,  
Tufts Graduate School of  
Biomedical Sciences



**Gail Naughton PhD**  
Founder, Histogen, Inc.



**Peter Marks MD, PhD**  
Director, Center for  
Biologics Evaluation  
and Research, FDA



**Wilson Bryan MD**  
Director, Office of  
Tissues and Adv  
Therapies, Center for  
Biologics Evaluation  
and Research (CBER)



**Sheng Lin-Gibson PhD**  
Chief, Biosystems and  
Biomaterials Divison,  
National Institute  
of Standards and  
Technology



**Amrita Sahu PhD**  
Scientific Coordinator,  
AR3T, University of  
Pittsburgh



**Spencer Szczesny PhD**  
Assistant Professor,  
Biomedical  
Engineering,  
Pennsylvania State  
University



**Marian  
Hettiaratchi PhD**  
Assistant Professor,  
Bioengineering,  
University of Oregon



**Franklin West PhD**  
Associate Professor,  
Regenerative  
Bioscience Center,  
University of Georgia




**Eda Yildirim-Ayan PhD**  
Associate Professor,  
Department of  
Bioengineering,  
University of Toledo



## DAY 2

JUNE 7

## SESSION 4: CELL THERAPIES

8:00—8:15am	Opening Comments	Joan Schanck, MPA
8:15—8:35am	Wound Healing Applications of Perinatal Stem Cells and Tissues	Sean Murphy, PhD
8:35—8:55am	HSC's for Inherited Blood Disorders	Shahin Rafii, PhD
8:55—9:15am	Metacells: Re-engineering Living Cells as Therapeutic Delivery Systems	Farshid Guilak, PhD
9:15—9:35am	Genome Editing of Hematopoietic Stem Cells	Matthew Porteus, MD, PhD
9:35—9:40am	<b>Break Sponsored By</b> 	
9:40—10:00am	Moderated Panel with Sean Murphy, PhD	

**Break**

## SESSION 5: TISSUE ENGINEERING MEDICAL PRODUCTS

10:10—10:30am	Considerations for Developing TEMPs	James Yoo, MD, PhD
10:30—10:50am	Injectible Biomaterials for Translational Regenerative Engineering	Karen Christman, PhD
10:50—11:10am	Overcoming Blindness with Regenerative Medicine	Molly Shoichet, PhD
11:10—11:20am	<b>Break</b>	
11:20—11:40am	New Animal Models and Strategies for Craniomaxillofacial Defect Repair	Pamela Yelick, PhD
11:40am—12:00pm	From Concept to Market: The Path, Pitfalls and Progress	Gail Naughton, PhD
12:00—12:20pm	Moderated Panel with James Yoo, MD, PhD	

**Break Sponsored By** 

## SESSION 6: REGULATORY, PROCESS DEVELOPMENT &amp; MANUFACTURING

1:15—1:45pm	Future Directions in Cell and Gene Therapy	Peter Marks, MD, PhD
1:45—2:10pm	Regenerative Medicine Advanced Therapy (RMAT) Designation	Wilson Bryan, MD
2:10—2:30pm	Standards to Support Product Development, Manufacturing and Testing	Sheng Lin-Gibson, PhD
2:30—2:45pm	Moderated Panel with Beth E. Roxland, JD, M.Bioethics	

**Break**

## SESSION 7: AR3T

3:00—3:10pm	Regenerative Rehabilitation: An Introduction	Amrita Sahu, PhD
3:10—3:30pm	Explant Model for Studying Tendon Degeneration and (Hopefully) Regeneration	Spencer Szczesny, PhD
3:30—3:50pm	Development of Multifunctional Biomaterials for Musculoskeletal Tissue Repair	Marian Hettiaratchi, PhD
3:50—4:10pm	Neural Stem Cell Function in a Motor Cortex TBI	Franklin West, PhD
4:10—4:20pm	Mechanome-Guided Regenerative Rehabilitation	Eda Yildirim-Ayan, PhD
4:20—4:35pm	Moderated Panel with Amrita Sahu, PhD	

**Break**

## CAREER PERSPECTIVES II

4:45—6:00pm	<i>International Careers in Regenerative Medicine: Legal, Regulatory, and Ethical Perspectives on the World-Wide Job Market</i> with David Williams, Kacey Marra, Steve Lynum, Preveen Ramamoorthy	Leaders: Damian Hutchins, Jao Ruiz Lucio de Lima Parra, Dariya Lizanet, Tim Dobroski, Bradford Kuhlman, Nicholas Edenhoffer, Tracey Criswell
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# DAY 3

# JUNE 8



**Nancy King JD**

Co-Director, Center for Bioethics, Health and Society, Wake Forest University



**Abba Creasey PhD**

Vice President, Therapeutics Development, CIRM



**Jan Nolta PhD**

Stem Cell Program Director, UC Davis School of Medicine; Director, Institute for Regenerative Cures



**Kacey Marra PhD**

Professor, Bioengineering; Vice Chair of Research, University of Pittsburgh



**Tracy Criswell PhD**

Associate Professor, Wake Forest Institute for Regenerative Medicine



**Milica Radisic PhD**

Professor, Research Chair, Cardiovascular Tissue Engineering, University of Toronto



**Jana Stoudemire**

Commercial Innovation Strategy Lead, Axiom Space



**Aletta Schnitzler PhD**

Chief Scientific Officer, TurtleTree Labs



**B.J. Scheesele**

Chief Commercial Officer, Humacyte



**Shay Soker PhD**

Professor, Wake Forest Institute for Regenerative Medicine



**Gary Green EDD**

Chief Workforce Development Officer, ReMDO



**Joshua Hunsberger PhD**

Chief Technology Officer, ReMDO; Executive Director, RMMS



**Randy Yerden**

CEO, BioSpherix Medical



**Peter Egelberg PhD**

CEO and Founder, Phase Holographic Imaging



**Nabaruna Karmakar PhD**

Sr. Operations Research, SAS Institute



**Jane Scott**

Head of Global Engagement and Growth, Oracle for Startups



**Mark Owens**

President and CEO, Greater Winston-Salem



**Jason Kaplan**

Associate Vice President, Innovation Quarter



**Carrie DiMarzio**

CEO, BioMedInnovations



**Heather Bara PhD**

Director, Research & Bioanalytics, MIMEDX



**Joan Schanck MPA**

Chief Education Program Officer, Wake Forest Institute for Regenerative Medicine



**Russ Read**

Executive Director, National Center for the Biotechnology Workforce



**Terry Howerton**

Biotechnology Instructor, Atkins Academic & Technology High School



**Manju Bhat PhD**

Associate Professor and Associate Dean, Winston-Salem State University

**DAY 3****JUNE 8****SESSION 8: CLINICAL TRIALS AND BIOETHICS**

8:00—8:15am	Opening Comments	Joan Schanck, MPA
8:15—8:30am	Bioethics and Regenerative Medicine: Fundamentals for the Future	Nancy King, JD
8:30—8:50am	Advancing the Regenerative Medicine Ecosystem in California and Worldwide	Abla Creasey, PhD
8:50—9:10am	Cell & Gene Therapy Clinical Trials	Jan Nolta, PhD
9:10—9:40am	Clinical Translation of a Tissue-Engineered Nerve Guide	Kacey Marra, PhD
9:40—9:45am	<b>Break</b>	
9:45—10:05am	Moderated Panel with Tracy Criswell, PhD	

**Break****SESSION 9: COMMERCIALIZATION**

10:15—10:35am	Advances in Organ on-a-Chip Engineering	Milia Radisic, PhD
10:35—10:55am	Commercializing Products for Emerging Markets on Earth and in Space	Jana Stoudemire
10:55—11:15am	Moving Toward Commercialization: Product and Process Development Considerations	Aletta Schnitzler, PhD
11:15—11:35am	Commercializing our HAV	B.J. Scheessele
11:35—11:40am	<b>Break</b>	
11:40am—12:00pm	Moderated Panel with Shay Soker, PhD	

**Break Sponsored By****SESSION 10: REG MED NEXUS FOR ECONOMIC DEVELOPMENT**

12:45—1:00pm	Building a Cyto-centric Testing Facility	Randy Yerden
1:00—1:15pm	Advanced Quality Control for Regenerative Medicine	Peter Egelberg, PhD
1:15—1:30pm	Data-Driven Optimization of Biomanufacturing Processes	Nabaruna Karmakar, PhD
1:35—2:05pm	Moderated Panel - Meet Our Test Bed Companies - with Gary Green, EdD	

**Break Sponsored By****SESSION 11: REG MED NEXUS FOR ECONOMIC DEVELOPMENT****RegeneratOR Innovation Accelerator****Co-Chairs: Gary Green and Joshua Hunsberger**

2:15—2:25pm	Oracle for Startups: Supporting Innovation in Healthtech	Jane Scott
2:25—2:35pm	Greater Winston Salem, Inc. Supporting Innovation	Mark Owens
2:35—2:45pm	Planning for a RegenMed Hub: Short and Long-Term Approaches	Jason Kaplan

**RegeneratOR Innovation Accelerator Companies****Co-Chairs: Gary Green and Joshua Hunsberger**

2:45—3:00pm	BioMedInnovations: Breaking Barriers in Organ and Tissue Preservation	Carrie DiMarzio
3:00—3:15pm	Accelerating MIMEDX R&D to Expand the Reach of Placental Biologics	Heather Bara, PhD
3:15—3:30pm	Axiom Space - Developing the Commercial Space Economy	Jana Stoudemire

**Break****SESSION 12: REG MED NEXUS FOR WORKFORCE DEVELOPMENT****Co-Chairs: Gary Green and Joan Schanck**

3:40—3:50pm	WFIRM's Training Ecosystem - Past, Present and Future Gaps	Joan Schanck, MPA
3:50—4:00pm	Addressing the Gap - Gap 1: Skilled Technicians for Biomanufacturing	Gary Green, EdD
4:00—4:30pm	NSF ATE Panel: Terry Howerton and Ed Ebert, PhD	
4:30—4:45pm	Addressing the Gap - Gap 2: New WFIRM Masters in Science Degree for Translational Biotechnology	Tracy Criswell, PhD
4:45—5:00pm	Employers' Perspectives Round Table Discussion	John Moore, President Scientific Bioprocessing, Inc.



