Ryan Walker Barrs, PhD

68 President St. Bioengineering BE313
Charleston, SC 29403
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EDUCATION

Doctor of Philosophy, Bioengineering **December 2023**
Dissertation: Engineering Next-Generation Cardiovascular Therapies Charleston, SC
Advisor: Ying Mei, PhD
Clemson University (Clemson/MUSC Joint Bioengineering Program)

Bachelor of Science, Biomedical Engineering **May 2016**
University of South Carolina Columbia, SC
Honors: Cum Laude

RESEARCH EXPERIENCE

Undergraduate Research Assistant **January 2015 – May 2016**
University of South Carolina Columbia, SC
Advisor: Esmaiel Jabbari, PhD
Project: Synthesis of peptide-functionalized biomaterials for bone tissue engineering

Research Specialist I **October 2016 – August 2017**
Medical University of South Carolina Charleston, SC
Advisor: Jeffrey Jones, PhD
Project: IL-6 mediated pathogenesis mechanisms of abdominal aortic dilation

- Developed expertise in core molecular biology experiments (e.g. western blot, qPCR, ELISA, mammalian cell culture, animal research)

Doctoral Research **August 2017 – November 2023**
Clemson/MUSC Joint Bioengineering Program Charleston, SC
Advisor: Ying Mei, PhD
Dissertation Title: Engineering Next-Generation Cardiovascular Therapies

- Developed novel bioink for modular bioprinting of vascularized tissue replacements
- Investigated nanowired human cardiac organoid transplantation for heart repair
- Explored effects of nanowired bioelectric interface on therapeutic extracellular vesicle production and function in human cardiac organoids

APPOINTMENTS

Graduate Research Assistant **August 2017 – February 2018**
Clemson/MUSC Joint Bioengineering Program
Advisor: Ying Mei, PhD

MADE in SC Fellow **February 2018 – August 2021**
South Carolina Established Program to Stimulate Competitive Research (SC EPSCoR)
Project: Materials genomics-guided development of proangiogenic biomaterials

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F31 Ruth L. Kirschstein Predoctoral Fellow **August 2021 – December 2023**
National Institutes of Health (National Heart, Lung, and Blood Institute)
Grant Number: 5F31HL156541
Project: Leveraging the HIF-alpha pathway to improve the engraftment and therapeutic efficacy of human nanowired cardiac organoids

RELATED EXPERIENCE

Student Researcher **June 2015 – August 2015 and**
Medical University of South Carolina **June 2016 – August 2016**
MUSC Summer Undergraduate Research Program (SURP)
Advisor: Ying Mei, PhD

Staff Editor **August 2018 – August 2019**
Humanitas
- Promoted and published annual arts and humanities magazine at MUSC

Science Writing Intern **August 2019 – December 2023**
Medical University of South Carolina
- Prepared lay summaries of research on campus for MUSC Catalyst News and EurekAlert
- Wrote feature article for MUSC's literary magazine Progressnotes Fall 2019 issue
- Writing samples can be found at www.clippings.me/ryanbarrs

Clemson Bioengineering Organization (CBO) Representative **August 2020 – August 2021**
Medical University of South Carolina
- Liaised between bioengineering students at Clemson and MUSC campus
- Planned events for Clemson and MUSC bioengineering students
- Kept students on the MUSC campus informed of CBO affairs

PUBLICATIONS

Y Tan*, RC Coyle*, **RW Barrs*,** *et al.* Nanowired human cardiac organoid transplantation enables highly efficient and effective recovery of infarcted hearts. *Science Advances*. (2023).
***co-first author.**

RW Barrs, J Jia, M Ward, *et al.* Engineering a chemically defined hydrogel bioink for direct bioprinting of microvasculature. *Biomacromolecules.* (2020).

RW Barrs, J Jia, SE Silver, M Yost, Y Mei. Biomaterials for bioprinting microvasculature. *Chemical Reviews.* (2020). *** Chemical Reviews impact factor >60.**

RC Coyle, **RW Barrs**, DJ Richards, *et al.* Targeting HIF-α for robust prevascularization of human cardiac organoids. *Journal of Tissue Engineering and Regenerative Medicine.* (2021).

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SE Silver, **RW Barrs**, Y Mei. Transplantation of Human Pluripotent Stem Cell-Derived Cardiomyocytes for Cardiac Regenerative Therapy. *Frontiers in Cardiovascular Medicine.* (2021).

J Jia, EJ Jeon, M Li, DJ Richards, S Lee, Y Jung, **RW Barrs**, *et al.* Evolutionarily conserved sequence motif analysis guides development of chemically defined hydrogels for therapeutic vascularization. *Science Advances.* (2020).

L Schroeder, J Buckley, R Martin, RE Stroud, EK Nadeau, **RW Barrs**, *et al.* Plasma neutrophil gelatinase-associated lipocalin is associated with acute kidney injury and clinical outcomes in neonates undergoing cardiopulmonary bypass. *Pediatric Critical Care Medicine.* (2019).

AW Akerman, RE Stroud, **RW Barrs**, *et al.* Elevated wall tension initiates interleukin-6 expression and abdominal aortic dilation. *Annals of Vascular Surgery.* (2018).

J Jia, RC Coyle, DJ Richards, CL Berry, **RW Barrs**, *et al.* Development of peptide-functionalized synthetic hydrogel microarrays for stem cell and tissue engineering applications. *Acta Biomaterialia.* (2016).

PRESENTATIONS

National IDeA Symposium of Biomedical Research Excellence **June 2018**
Poster presentation Washington, DC
"Development of a vasculogenic bioink to support bioprinted tissue constructs"

Regenerative Medicine Workshop **March 2019**
Oral presentation and poster presentation Isle of Palms, SC
"Development of a vasculogenic bioink for direct bioprinting of vascularized tissues"

SC EPSCoR/MADE in SC State Conference **April 2019**
Poster presentation Columbia, SC
"Development of vascular inductive alginate bioinks with defined chemistry for vascularized tissue unit fabrication"

Biomedical Engineering Society (BMES) Annual Meeting **October 2019**
Oral presentation Philadelphia, PA
"Development of vascular inductive bioinks with defined chemistry for vascularized tissue unit fabrication"

MADE in SC Fellows/Faculty Conference **April 2022**
Poster presentation Columbia, SC
"Materials genomics-guided development of proangiogenic biomaterials"

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MENTORING EXPERIENCE

Michael Ward **June – August 2018**
Undergraduate student (Clemson University)
- Clemson Research Experience for Undergraduates (REU)
- Helped develop bioink for bioprinting vascularized tissues, resulting in authorship on a peer-reviewed publication
- Earned his Master of Science in Bioengineering from Clemson University in 2021

Masi Sundara **June – August 2019**
High school student (Academic Magnet High School)
- Nicotine e-liquid effects on cardiac fibroblast spheroids
- Invited to present work at Lowcountry Regional Science and Engineering Fair at College of Charleston
- Pursuing a Bachelor of Science in Neuroscience at University of Western Ontario

Blessing Agho **June – August 2021**
Undergraduate student (University of South Carolina)
- MUSC Summer Undergraduate Research Program (SURP)
- Hypoxia inducible factor activating nanoparticle synthesis
- Earned her Bachelor of Science in Biological Sciences from USC in 2022

Karen Deguzman **June – August 2022**
Undergraduate student (Clemson University)
- Bioengineering Research and Clinical Summer Immersion at Charleston (BEACH)
- Engineering decellularized human amnion/chorion membranes for wound healing
- Participated in Summer Undergraduate Research in Japan after mentorship
- Will earn Bachelor of Science in Bioengineering at Clemson University in Spring 2024

Mohammed Ismaiel **July – August 2023**
Undergraduate student (Clemson University)
- Bioengineering Research and Clinical Summer Immersion at Charleston (BEACH)
- Decellularized human amnion/chorion membrane engineering for wound healing
- Will earn Bachelor of Science in Bioengineering at Clemson University in Spring 2025

PROFESSIONAL ASSOCIATIONS

Biomedical Engineering Society (BMES) **2017 - Present**
Society for Biomaterials (SFB) **2017 - Present**
American Medical Writers Association (AMWA) **2019 - Present**