

Benjamin T. Ledford, Ph.D.

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EDUCATION

2013 – 2018 **Virginia Polytechnic Institute and State University**
Ph.D. in Biomedical Sciences

2008 – 2013 **North Carolina State University**
B.S. in Biochemistry

FUNDING

2024 – 2026 **F32 NHLBI National Research Service Award (NRSA)** (\$152,786 direct)
“Development of an Intravenously Delivered Nanofiber to Target MMP-2 in Aortic Aneurysms”

POSITIONS

2018 – 2024 **Postdoctoral Fellow**, University of Virginia, University of North Carolina
Mentor: Dr. Melina Kibbe (UNC & UVA)
Ruth L. Kirschstein National Research Service Award (NRSA) Individual
Postdoctoral Fellowship (Parent F32)
Research: Peptide amphiphiles nanofibers as a theranostic platform for
abdominal aortic aneurysms

2013 – 2018 **Ph.D. Student**, Virginia Polytechnic Institute and State University
Mentor: Dr. Jia Q. He
Department of Biomedical and Veterinary Sciences
Institute for Critical Technology and Applied Science (ICTAS) Doctoral
Scholar
Research: Smooth muscle cells and keratin biomaterials for therapeutic
applications in hind limb ischemia.

PATENTS AND INVENTION DISCLOSURES

Nanomaterials for Targeted Treatment and Imaging of Aneurysmal Microenvironment. Kibbe MR, **Ledford BT**, Tsihlis ND. Report of Invention 20-0042; filed 1/31/2020

PUBLICATIONS

1. **Ledford B.**, Akerman A., Sun K., Gillis D., Weiss J., Vang J., Wilcox S., Celmons T., Sai H., Qiu R., Karver M., Griffith J., Tsihlis N., Stupp S., Ikonomidis J., Kibbe M. Peptide Amphiphile Supramolecular Nanofibers Designed To Target Abdominal Aortic Aneurysms. *ACS Nano*. 2022; 16: 7309-7322. \bLedford B., Wyatt T., Vang J., Weiss J., Tsihlis N., Kibbe M. Effects of Particle Size, Charge, Shape, Animal Disease state, and Sex on the Biodistribution of Intravenously Nanoparticles. *Particle and Particle Systems Characterization*. 2023; 40 e2300001.
2. **Ledford B.**, Chen M., Fan H., Barron C, Van Dyke M. and He J. Q. Keratose Hydrogel-Derives Differentiation of Cardiac Vascular Smooth Muscle Progenitor Cells: Implications in Ischemic Treatment. *Stem Cell Rev Rep*. 2023; Online ahead of print.
3. **Ledford B.**, Barron C., Van Dyke M., and He J. Q. Keratose Hydrogels for Tissue Regeneration and Drug Delivery. *Semin Cell Dev Biol*. 2022; 128:145-153.
4. **Ledford B.**, Simmons. J, Chen M., Fan H., Barron C, Liu Z. Van Dyke M. and He J. Q. Keratose Hydrogels Promote Vascular Smooth Muscle Differentiation from C-kit Positive Human Cardiac Stem Cells. *Stem Cells and Development*.2017; 12: 888-900.
5. **Ledford B.**, Barlek M., Vang J., Weiss J., Sun K., Siletzky R., Gillis D., Tsihlis N., Kibbe M. Apolipoprotein E Deficiency in a Rat Calcium Chloride Aortic Aneurysm Model Produces an Inflammatory Abdominal Aortic Aneurysm. *Biology of Sex Differences*. Under Revision.
6. Yu L., He W., Peters E., **Ledford B.**, Tsihlis N. and Kibbe M. Development of poly(1,8-octanediol-co-ascorbate) elastomer with enhanced ascorbate performance for use as a graft coating to prevent neointimal hyperplasia. *ACS Applied Biomaterials*. 2020.
7. Peters E., Tsihlis N., Karver M., Chin S., Mussetti B., **Ledford B.**, Bahnson E., Stupp S. and Kibbe M. Atheroma Niche-Responsive Nanocarriers for Immunotherapeutic Delivery. *Adv Healthc Mater*. 2019.
8. Chen M, **Ledford BT**, Barron C, and He JQ. Abstract 500: Endothelial Specific Meis1 Knockout Protects Cells from Doxorubicin-Induced Apoptosis. *Atherosclerosis, Thrombosis and Vascular Biology*. 2019; 38: A500.
9. Kwiatowski A., Piatkowski M., Chen M. Lijuan K., Meng Q., Fan H. Osman A., Liu Z., **Ledford B.** He JQ. Superior Angiogenesis Facilitates Digit Regrowth in MRL/MpJ Mice Compared to C57BL/6 Mice. *Biochem Biophys Res Commun*. 2016; 473(4):907-912.
10. Kan L, Thayer P, Chen M, **Ledford B**, et al. Polymer Microfiber Meshes Facilitate Cardiac Differentiation of c-kit+ Human Cardiac Stem Cells *Exp Cell Res*. 2016; 347: 143-152.
11. Chen M., H. Fan, **B. T. Ledford**, Z. Farah, C. Barron, Z. Liu and J. Q. He. Impacts of femoral artery and vein excision versus femoral artery excision on the hindlimb ischemic model in CD-1 mice. *Microvasc Res*.2016; 110: 48-55.

12. Chen M, Kan LJ, **Ledford BT** and He JQ. Tattooing Various Combinations of Ears, Tail, and Toes to Identify Mice Reliably and Permanently. *J Am Assoc Lab Anim.* 2016; 55: 189-98.
13. Kan L, Smith A, Chen M, **Ledford B**, et al. Rho-Associated Kinase Inhibitor (Y-27632) Attenuates Doxorubicin-Induced Apoptosis of Human Cardiac Stem Cells. *PLoS One.* 2015; 10: e0144513.

PRESENTATIONS

Oral Presentations

1. **Ledford B.**, Akerman A., Sun K., Gillis D., Weiss J., Vang J., Willcox S., Clemons T., Karver M., Griffith J., Tsihlis N., Stupp S., Ikonomidis J., Kibbe M. Peptide Amphiphile Supramolecular Nanofibers Designed to Target Abdominal Aortic Aneurysms. Selected for Oral Presentation BMES Postdoc Symposium Charlottesville Virginia (9/2023).
2. **Ledford B.**, Akerman A., Sun K., Gillis D., Weiss J., Vang J., Willcox S., Clemons T., Karver M., Griffith J., Tsihlis N., Stupp S., Ikonomidis J., Kibbe M. Peptide Amphiphile Supramolecular Nanofibers Designed to Target Abdominal Aortic Aneurysms. Selected for Oral Presentation BMES San Antonio Texas (10/2022).
3. **Ledford B.**, Chen M., Van Dyke M., and He J.Q. TGF- β 1 Signaling is Crucial in Differentiation of Human Cardiac Stem Cells on Keratose Hydrogels. Selected for Oral Presentation TERMIS Charlotte North Carolina (12/2017).
4. **Ledford B.**, Chen M., Baron K., Van Dyke M., and He J.Q. Keratose Hydrogels Promote Vascular Smooth Muscle Differentiation from c-kit⁺ Human Cardiac Stem Cells: Underlying Mechanism and Therapeutic Potential. Oral Presentation Department of Animal Science Blacksburg Virginia (10/2017).
5. **Ledford B.**, Simmons J., Kan L., Chen M., Van Dyke M., and He J.Q. Keratose Hydrogels Promote Smooth Muscle Differentiation from c-Kit⁺ Human Cardiac Stem Cells. Selected for Oral Presentation BMES Minneapolis Minnesota (10/2016).
6. **Ledford B.**, Simmons J., Kan L., Chen M., Van Dyke M., and He J.Q. Keratose Hydrogels Promote Smooth Muscle Differentiation from c-Kit⁺ Human Cardiac Stem Cells. Selected for Oral Presentation Muscle Research Meeting Blacksburg Virginia (11/2016).
7. **Ledford B.** and He J.Q. Biomaterial Mediated Stem Cell Therapy as a Promising Regenerative Medicine Approach. Oral Presentation BMVS Blacksburg Virginia (11/2015)

Poster Presentation

8. **Ledford B.**, Akerman A., Gillis D., Karver M., Tsihlis N., Ikonomidis J., Kibbe M. Intravenously Delivered Peptide Amphiphiles for Targeting Aortic Aneurysms. The Nathan A. Womack Surgical Society Research Day (6/2020).
9. **Ledford B.**, Akerman A., Gillis D., Karver M., Tsihlis N., Ikonomidis J., Kibbe M. Intravenously Delivered Peptide Amphiphiles for Targeting Aortic Aneurysms. NanoDDS Portland Oregon (9/2018).
10. **Ledford B.**, Simmons J., Chen M., Barron C., Van Dyke M., and He J.Q. Activation of TGF- β Signaling Pathway Promotes Smooth Muscle Differentiation from c-Kit⁺ Human Cardiac Stem Cells on Keratose Hydrogels. Biofabrication Winston Salem North Carolina (10/2016).
11. **Ledford B.**, Simmons J., Kan, L.; Chen M., Van Dyke M., He. J.Q. Keratin Hydrogel-facilitated Differentiation of Smooth Muscle Cells from Human Cardiac Stem Cells Improves Blood Perfusion in Ischemic Limb of Immunodeficient Mice. Blacksburg Virginia (4/2016).
12. **Ledford, Benjamin**; Simmons, Janelle; Kan, Lijuan Kan; Chen, Miao; Mark, Van Dyke; He,

- Jia-Qiang. Keratin Hydrogel-facilitated Differentiation of Smooth Muscle Cells from Human Cardiac Stem Cells Improves Blood Perfusion in Ischemic Limb of Immunodeficient Mice Blacksburg Virginia (3/2016).
13. **Ledford B.**, Simmons J., Kan L., Chen M., Van Dyke M., and He J.Q. Keratin Hydrogels Promote Smooth Muscle Differentiation from c-Kit⁺ Human Cardiac Stem Cells. Selected for poster presentation at NHLBI Symposium on Cardiovascular Regenerative Medicine Bethesda Maryland (9/2015).
 14. **Ledford B.**, Simmons J., Kan L., Chen M., Van Dyke M., and He J.Q. Keratin Hydrogels Facilitate Differentiation of Human Cardiac Stem Cells into Smooth Muscle. ICTAS Doctoral Scholar Meeting (4/2015).
 15. **Ledford, Benjamin**; Simmons, Janelle; Kan, Lijuan Kan; Chen, Miao; Mark, Van Dyke; He, Jia-Qiang. Keratin Hydrogel Facilitates Cultivation of Human Cardiac Stem Cells BMVS Symposium Blacksburg Virginia (3/2015).
 16. **Ledford, Benjamin**; Simmons, Janelle; Kan, Lijuan Kan; Chen, Miao; Mark, Van Dyke; He, Jia-Qiang. Keratin Hydrogel Facilitates Cultivation of Human Cardiac Stem Cells ViaCOM Research Day (2/2015).
 17. **Ledford, Benjamin**; Simmons, Janelle; Kan, Lijuan Kan; Chen, Miao; Mark, Van Dyke; He, Jia-Qiang. Keratin Hydrogel Facilitates Cultivation of Human Cardiac Stem Cells in 3D Format NCTERMS Durham North Carolina (10/2014).

HONORS & AWARDS

2023	F32 NHLBI Postdoctoral National Research Service Award
2022	Travel Award - Biomedical Engineering Society
2013-2017	Institute for Critical Technology and Applied Science Doctoral Scholar
2016	Travel Award- Department of Biomedical and Veterinary Sciences
2015	Poster Award Institute for Critical Technology and Applied Science
2015	Travel Award- Department of Biomedical and Veterinary Sciences
2009 - 2013	Dean's List
2008-2012	North Carolina State University Harshaw Scholarship Recipient
2010	Gamma Beta Phi Honor Society

MENTOR EXPERIENCE

2023 – Current	Daniel Aziz University of Virginia Undergraduate Researcher
2022 – Current	Sophia Maragos University of Virginia Undergraduate Researcher
2020 – 2021	Johnny Vang, B.S. University of North Carolina Research Technician
2018 – 2021	Jenna Weiss University of North Carolina Undergraduate Researcher
2018 – 2019	Laolo Charles

2015 – 2017 University of North Carolina Undergraduate Researcher
Rachel Wilk
Virginia Tech Undergraduate Researcher

TEACHING EXPERIENCE

2015 - 2016 **BMSP-2145: Human Anatomy & Physiology Lab (TA)**, Virginia Tech

2016 **BIOL 4994: Independent Study (TA)**, Virginia Tech

PROFESSIONAL ORGANIZATIONS

2018 - Present American Heart Association

2016 - Present Biomedical Engineering Society

SERVICE & OUTREACH

2016 – 2018 **Virginia Tech Center for Communicating Sciences**
Participated in community outreach programs “Science on Tap” and “Nutshell Games.”

2010 – 2014 **Habitat for Humanity**
Volunteer.

2008 – 2014 **Special Olympics**
Helped transport athletes and set up booths.

2008 – 2012 **Special Populations Dance**
Volunteer.