

## Laura Bracaglia, PhD

### Assistant Professor

DEPARTMENT of CHEMICAL and BIOLOGICAL ENGINEERING

COLLEGE of ENGINEERING

[Laura.bracaglia@villanova.edu](mailto:Laura.bracaglia@villanova.edu)



**VILLANOVA**  
**UNIVERSITY**

#### Education

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BS	2012	Biomedical Engineering	Georgia Institute of Technology
PhD	2017	Bioengineering	University of Maryland
Postdoc		Biomedical Engineering	Yale University

#### Research Interests

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My research lab investigates biomaterials and drug delivery strategies to support damaged vascular endothelium. The long term goal is to design tissue-engineered scaffolds with built-in molecular tools for long-term immune modulation and tissue regeneration. Our research is supported by NHLBI (K99/R00), and builds on my background in tissue engineering and drug delivery to human endothelium.

#### Research Experience

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Drug Delivery Laboratory, *Villanova University*, 2022 – present

Assistant Professor, Department of Chemical Engineering

Research Focus: Drug delivery materials for treatment and repair of dysfunctional inflammation and injury

Saltzman Laboratory, *Yale University*, 2017- 2022

Postdoctoral Fellow, Advised by Dr. W. Mark Saltzman

Research Focus: Drug delivery systems for treatment of endothelium to reduce immune activated damage and rejection

Tissue Engineering and Biomaterials Laboratory, *University of Maryland*, 2012-2017

Graduate Assistant Researcher, Advised by Dr. John P Fisher

Research Focus: Biohybrid materials combining biodegradable polymer and natural components for cardiovascular tissue engineering, Modeling of host-biomaterial interactions through in vitro and in vivo experiments

SFI Centre for Research in Medical Devices (CÚRAM) *National University of Ireland, Galway* 10/2015 to 12/2015

Visiting Graduate Researcher

Research Focus: Novel microsphere manufacturing approaches for delivery of growth factors from within a scaffold

Cardiovascular Fluid Mechanics Laboratory, *Georgia Institute of Technology* 1/2009 to 5/2012

Undergraduate Researcher

Research Focus: Fluid Mechanical Analysis of Surgically Reconstructed Aortas

US Naval Research Laboratory *Center for Biomolecular Science and Engineering*

*Naval Research Enterprise Internship Winner* 5/2011 to 8/2011, Intern 5/2010 to 8/2010

Research Focus: Optimization of simultaneous assay and corresponding analysis program to detect exposure to harmful bio agents using custom built microflow cytometer

Food and Drug Administration *Center for Device and Radiological Health, Division of Solid and Fluid Mechanics*,

Research Focus: Hydrodynamic Testing of Deformed Bioprosthetic Heart Valves 5/2012 to 12/2012

#### Research Awards and Recognitions

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##### Fellowships

NIH Pathway to Independence Award (Parent K99/R00) Awarded May, 2021

“Tailored siRNA delivery to human endothelium to inhibit and reverse inflammatory damage following ischemia reperfusion injury in the kidney.”

NIH Ruth L. Kirschstein NRSA T32: Methods in Nephrologic Research

NIH Ruth L. Kirschstein NRSA T32: Interdisciplinary Bioengineering Training Grant for Diabetes

NIH Ruth L. Kirschstein NRSA F31 Predoctoral Fellowship 2016 - 2017

“Development of a Hybrid Material for a Tissue Engineered Strategy to Reconstruct the Vascular Wall”

International Graduate Student Research Award, The Graduate School, University of Maryland Fall, 2015

American Heart Association Predoctoral Fellowship, AY 2014-2016

Graduate School All-S.T.A.R. Fellowship, University of Maryland AY 2015-2016

NSF Honorable Mention, National Science Foundation Graduate Student Fellowship Fall 2013

The Jacob K. Goldhaber Travel Grant, University of Maryland Fall, 2013

## Awards

NIH Loan Repayment Program Awardee (2018-2022)

The Mary Ann Liebert, Inc. Outstanding Student Award, Tissue Engineering and Regenerative Medicine International Society December 2014

Distinguished Graduate Student Teacher, The Center for Teaching Excellence, UMD (Modeling Physiological Systems)

Presidential Scholarship, Georgia Tech’s top merit-based scholarship 2008-2012

President’s Undergraduate Research Award, Georgia Tech 2011-2012

## Patents

Enhanced targeting platform. W Mark Saltzman, Gregory T Tietjen, Shohei Koide, Claire Albert, Jordan Pober, Akiko Koide, Laura Bracaglia. US Patent Application 17/112,964. Patent Date Issued July 08, 2021.

Polymer-tissue hybrid biomaterials and methods of making and using same. Laura Bracaglia, Poonam Sharma, John Patrick Fisher. US Patent 14/869,193 Patent Date Issued Sep 29, 2015

## Elected Positions and Leadership Roles

Yale Department of Biomedical Engineering Department Newsletter Chair (2021)

Yale Department of Biomedical Engineering Diversity, Equity and Inclusion Committee, Postdoc Representative

Intersections Science Fellows Symposium, Yale Biomedical Engineering Postdoc Organizer

TERMIS-AM Scientific Advisory Council member 2019-present

TERMIS-AM SYIS Chair (2017-2019, Chair-Elect 2016) Tissue Engineering and Regenerative Medicine International Society, Student and Young Investigator Section, Americas Chapter

BIOE Graduate Student Ambassador University of Maryland, Fischell Department of Bioengineering 2013-14

Vice President of Academic Affairs, Bioengineering Graduate Student Society, University of Maryland

Laboratory Safety Officer, Tissue Engineering and Biomaterials Laboratory

## Publications

1. Piotrowski-Daspit AS\*, **Bracaglia LG\***, Eaton DA, Richfield O, Binns TC, Albert C, Gould J, Mortlock R, Pober JS, Saltzman WM. Enhancing in vivo cell and tissue targeting by modulation of polymer nanoparticles and macrophage decoys. *Nature Communications*. 2024. **(\*Co-first Authors)**
2. Lallo, V. **Bracaglia, LG**. Influencing Endothelial Cells' Roles in Inflammation and Wound Healing Through Nucleic Acid Delivery. *Tissue Engineering, Part A*. 2024.
3. Albert C\*, **Bracaglia LG\***, Koide A, DiRito J, Lysy T, Edwards C, Grundler J, Zhou K, Denbaum E, Ketavarapu G, Hattori T, Langford J, Feizi A, Haakinson D, Pober JS, Saltzman WM, Koide S, Tietjen GT. Potent and Adaptable Targeting of Nanoparticles to Vascular Endothelium in Human Kidney. *Nature Communications*. 2022. PMID: 36220817. **(\*Co-first Authors)**
4. Shin K, Suh HW, Grundler J, Lynn AY, Pothupitiya JU, Moscato ZM, Reschke M, **Bracaglia LG**, Piotrowski-Daspit AS, Saltzman WM. Polyglycerol and Poly (ethylene glycol) exhibit different effects on pharmacokinetics and antibody generation when grafted to nanoparticle surfaces. *Biomaterials*. 2022. PMID: 35849999
5. Piotrowski-Daspit AS, Kauffman AC, **Bracaglia LG**, Saltzman WM. Polymeric vehicles for nucleic acid delivery. *Adv Drug Deliv Rev*. 2020. PubMed PMID: 32585159

6. DiRito JR, Hosgood SA, Reschke M, Albert C, **Bracaglia LG**, Ferdinand JR, Stewart BJ, Edwards CM, Vaish AG, Thiru S, Mulligan DC, Haakinson DJ, Clatworthy MR, Saltzman WM, Pober JS, Nicholson ML, Tietjen GT. Lysis of cold-storage-induced microvascular obstructions for ex vivo revitalization of marginal human kidneys. *Am J Transplant*. 2020. PubMed PMID: 32627324
7. **Bracaglia LG\***, Lysyy T\*, Qin L, Albert C, Pober JS, Tellides G, Saltzman WM, Tietjen GT. Ex vivo isolated human vessel perfusion system for the design and assessment of nanomedicines targeted to the endothelium. *Bioeng Transl Med*. 2020;5(2):e10154. PubMed PMID: 32440561 (**\*Co-first Authors**)
8. **Bracaglia LG\***, Piotrowski-Daspit A\*, Lin C, Wang Y, Tietjen GT, Saltzman WM. High-throughput Quantitative Microscopy-based Half-life Measurements of Intravenously Injected Agents In Vivo. *Proceedings of the National Academy of Sciences of the United States of America*. 2020;117(7):3502-8. PubMed PMID: 32015123 (**\*Co-first Authors**)
9. **Bracaglia LG**, Saltzman WM. "Biomedical Engineering." AccessScience, McGraw-Hill Education. *In Press 2019*
10. Merola J, Reschke M, Pierce RW, Qin L, Spindler S, Baltazar T, Manes TD, Lopez-Giraldez F, Li G, **Bracaglia LG**, Xie C, Kirkiles-Smith N, Saltzman WM, Tietjen GT, Tellides G, Pober JS. Progenitor-derived human endothelial cells evade alloimmunity by CRISPR/Cas9-mediated complete ablation of MHC expression. *JCI Insight*. 2019. PubMed PMID: 31527312
11. Cui J, Piotrowski-Daspit AS, Zhang J, Shao M, **Bracaglia LG**, Utsumi T, Seo YE, DiRito J, Song E, Wu C, Inada A, Tietjen GT, Pober JS, Iwakiri Y, Saltzman WM. Poly(amine-co-ester) nanoparticles for effective Nogo-B knockdown in the liver. *J Control Release*. 2019;304:259-67. Epub 2019/05/01. PubMed PMID: 31054286
12. **Bracaglia LG**, Winston S, Powell DA, Fisher JP. Synthetic polymer coatings diminish chronic inflammation risk in large ECM-based materials. *J Biomed Mater Res A*. 2019;107(3):494-504. PubMed PMID: 30565857
13. Tietjen GT, **Bracaglia LG**, Saltzman WM, Pober JS. Focus on Fundamentals: Achieving Effective Nanoparticle Targeting. *Trends Mol Med*. 2018;24(7):598-606. PubMed PMID: 29884540
14. Kuo CY, Guo T, Cabrera-Luque J, Arumugasaamy N, **Bracaglia L**, Garcia-Vivas A, Santoro M, Baker H, Fisher J, Kim P. Placental Basement Membrane Proteins are Required for Effective Cytotrophoblast Invasion in a 3D Bioprinted Placenta Model. *J Biomed Mater Res A*. 2018. Epub 2018/01/25. PubMed PMID: 29368378
15. Guo T, Ringel JP, Lim CG, **Bracaglia LG**, Noshin M, Baker HB, Powell DA, Fisher JP. Three dimensional extrusion printing induces polymer molecule alignment and cell organization within engineered cartilage. *J Biomed Mater Res A*. 2018;106(8):2190-9. PubMed PMID: 29659132
16. **Bracaglia LG\***, Smith BT\*, Watson E, Arumugasaamy N, Mikos AG, Fisher JP. 3D printing for the design and fabrication of polymer-based gradient scaffolds. *Acta Biomater*. 2017;56:3-13. Epub 2017/03/22. PubMed PMID: 28342878 (**\*Co-first Authors**)
17. **Bracaglia LG**, Messina M, Winston S, Kuo CY, Lerman M, Fisher JP. 3D Printed Pericardium Hydrogels To Promote Wound Healing in Vascular Applications. *Biomacromolecules*. 2017;18(11):3802-11. Epub 2017/10/16. PubMed PMID: 28976740.
18. **Bracaglia LG**, Messina M, Vantucci C, Baker HB, Pandit A, Fisher JP. Controlled Delivery of Tissue Inductive Factors in a Cardiovascular Hybrid Biomaterial Scaffold. *ACS Biomaterials Science & Engineering*. 2017;3(7):1350-8.
19. **Bracaglia LG\***, Wang MO\*, Thompson JA, Fisher JP. Hydroxyapatite-doped alginate beads as scaffolds for the osteoblastic differentiation of mesenchymal stem cells. *J Biomed Mater Res A*. 2016;104(9):2325-33. Epub 2016/05/17. PubMed PMID: 27129735 (**\*Co-first Authors**)
20. Melchiorri AJ, **Bracaglia LG**, Kimerer LK, Hibino N, Fisher JP. In Vitro Endothelialization of Biodegradable Vascular Grafts Via Endothelial Progenitor Cell Seeding and Maturation in a Tubular Perfusion System Bioreactor. *Tissue Eng Part C Methods*. 2016;22(7):663-70. Epub 2016/06/17. PubMed PMID: 27206552
21. **Bracaglia LG**, Fisher JP. Extracellular Matrix-Based Biohybrid Materials for Engineering Compliant, Matrix-Dense Tissues. *Adv Healthc Mater*. 2015;4(16):2475-87. Epub 2015/07/30. PubMed PMID: 26227679
22. **Bracaglia LG**, Yu L, Hibino N, Fisher JP. Reinforced pericardium as a hybrid material for cardiovascular applications. *Tissue Eng Part A*. 2014;20(21-22):2807-16. PubMed PMID: 25236439

23. Shriver-Lake LC, Golden J, **Bracaglia L**, Ligler FS. Simultaneous assay for ten bacteria and toxins in spiked clinical samples using a microflow cytometer. *Anal Bioanal Chem.* 2013;405(16):5611-4. Epub 2013/05/07. PubMed PMID: 23649924

An electronic record of publications can be found on my [Google Scholar Profile](#) using “Laura Bracaglia”

### Selected Presentations

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1. **Bracaglia LG**. “Vascular-targeted Nanoparticles to Protect the Endothelium from Immune-mediated Injury.” Invited Seminar to The Catholic University Biomedical Engineering Department. October, 2020.
2. **Bracaglia LG**. “Vascular-targeted Nanoparticles to Protect the Endothelium from Immune-mediated Injury.” Invited Seminar to Yale University Biomedical Engineering Department. October, 2020.
3. **Bracaglia LG**, Albert C, Koide A, Lysyy T, Pober JS\*, Koide S\*, Tietjen GT\*, Saltzman WM\*. “Monobody-Mediated Conjugation Of Antibodies To Therapeutic Nanoparticles For Improved Targeting To Endothelial Cells.” BMES Annual Conference 2020. \*Equal contributions
4. Piotrowski-Daspit A, **Bracaglia LG**, Lin C, Wang Y, Tietjen GT, Saltzman WM. “High-throughput Quantitative Microscopy-based Half-life Measurements Of Intravenously Injected Agents.” Controlled Release Society Annual Meeting 2020.
5. **Bracaglia LG\***, Lysyy T, Qin L, Albert C, Pober JS, Tellides G, Saltzman WM, Tietjen GT. “Ex vivo isolated human vessel perfusion system for the design and assessment of nanomedicines targeted to the endothelium.” American Transplant Congress Annual Meeting 2020.
6. **Bracaglia LG**, Lysyy T, Bae E, Albert C, Qin L, Pierce R, Tellides G, Tietjen GT, Pober JS, Saltzman WM. “Tailored Vascular Targeting to Protect the Endothelium from Immune-Mediated Injury.” BMES Annual Conference 2019.
7. Tietjen GT, DiRito J, Hosgood S, **Bracaglia LG**, Saltzman WM, Nicholson M. “Tailoring Vascular-Targeted Nanomedicines for Delivery During Ex Vivo Organ Perfusion.” *American Journal of Transplantation*, 2019.
8. **Bracaglia LG**, Fisher JP. “3D Bioprinting: The Future of Regenerative Medicine.” *On the Record*. WYPR, an NPR News Station, Baltimore. 20 June. 2017. Radio.
9. **Bracaglia LG\***, Piard C\*, Fisher JP. “Taking Cues from the Native Tissue To Create “Appropriate” 3D Scaffolds”. Foundation for Advanced Education in the Sciences, National Institute of Health, March 2017.
10. **Bracaglia LG**, Messina MJ, Vantucci CE, Fisher JP. “DLP Printed 3D Biohybrid Hydrogels for Cardiovascular Scaffolds.” *Tissue Engineering and Regenerative Medicine International Society – Americas Chapter (TERMIS-AM) Annual Meeting 2016*.
11. **Bracaglia LG**, Fisher JP. “Reinforced Pericardium for Cardiovascular Applications.” Cook Biotech, A Cook Medical Company, July 2015.
12. **Bracaglia LG**, Yu L, Hibino N, Fisher JP, Reinforced pericardium as a hybrid material for cardiovascular applications. TERMIS-AM Washington, DC December 2014. \*Awarded *The Mary Ann Liebert, Inc. Outstanding Student Award*

### Teaching Experience

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Villanova University, Department of Chemical and Biological Engineering, Instructor of Record

Biomaterials CHE5534, Fall 2022

Mass Transfer, CHE3201, Fall 2023

Biomaterials and Drug Delivery CHE8586, Spring 2024

Invited Lecture, Foundation for Advanced Education in the Sciences, National Institute of Health

Taking Cues from the Native Tissue To Create “Appropriate” 3D Scaffolds

Graduate School Writing Center Fellow Fall 2015- Spring 2017

Distinguished students (22) from across the graduate school provide writing tutors and skill development workshops for graduate students

Scientific Manuscript Editor

Recognized for editorial and language contributions to high impact scientific publications

1. Li, Y. The role of spatial scale and background climate in the latitudinal temperature response to deforestation. *Earth Syst. Dynam.* 2016, 7 (1), 167-181.

2. Li, Y. Potential and Actual impacts of deforestation and afforestation on land surface temperature. *Journal of Geophysical Research: Atmospheres* 2016, 121 (24), 14,372--14,386.

Teaching Assistant, Modeling Physiological Systems and Laboratory

Fall 2013, Fall 2014, Fischell Department of Bioengineering, University of Maryland

- Led the re-design of the laboratory portion of the class, by establishing three new, hand's-on labs
- Incorporated the first animal model lab to the course curriculum to model signal transduction

YouthQuest Foundation - Ambassador, Tissue Engineering and Biomaterials Lab

Host lab tours and demo experiments for student groups from the non-profit organization for at-risk youth

Invited Speaker for Women in Science at Yale (WISAY), Yale University

Perspectives on Graduate School and Beyond

Research Mentor, Saltzman Laboratory

- Mentored 2 postdoctoral students, 3 graduate level students, 5 undergraduate students, resulting in publications, 1 Yale Senior Thesis, and Yale College Dean's Research Fellowship in the Sciences.

Research Mentor, Tissue Engineering and Biomaterials Laboratory

- Mentored 6 undergraduates, with accomplishments including an NSF GSRF (2016), three conference presentations, an MTECH Researcher Fellowship

## **Research Techniques and Tools**

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Biomaterial Fabrication

- 3D printing with biological substrates
- Nano-formulation and characterization (nanoprecipitation, emulsions)
- Mechanical testing (Instron)

Biological Assay Design and Evaluation

- Surgical protocol design & technical rodent surgical procedures
- Ex vivo organ and tissue perfusion and culture
- Quantitative immunohistochemical and fluorescent staining
- Advanced microscopic and imaging techniques ( $\mu$ CT, SEM, fluorescent in vivo imaging)
- Biological assays including QT-PCR, Western Blot, flow cytometric analysis