

# JILLIAN PERRY

Assistant Professor, UNC-CH Eshelman School of Pharmacy,  
Center for Nanotechnology in Drug Delivery  
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## EDUCATION

**PhD in Biomedical Engineering,** University of Florida, December 2009  
*Advisors: John D. Steward and Charles R. Martin*  
Dissertation: Template Synthesized Chitosan Nano Test Tubes for Drug Delivery Applications

**BS in Chemical Engineering** University of Florida, December 2004  
Minor in Chemistry, Cum Laude

## PROFESSIONAL APPOINTMENTS

**Assistant Professor** University of North Carolina, Chapel Hill NC  
Eshelman School of Pharmacy July 2019- Present  
Center for Nanotechnology in Drug Delivery

**Research Associate Scientist** University of North Carolina, Chapel Hill NC  
Lineberger Comprehensive Cancer Center 2012-2019

**Postdoctoral Research Associate** University of North Carolina, Chapel Hill NC  
Lineberger Comprehensive Cancer Center 2010-2012  
*Mentor: Joseph M. DeSimone*

## AWARDS AND HONORS

- Junior Faculty Development Award 2020
- NanoDDS Poster Award 2018
- Alumni Fellowship 2005-2009
- University Scholars Scholarship 2003-2004
- Bright Futures Scholarship 2000-2004

## PUBLICATIONS

Citations from google scholar profile (last updated 1/30/2023) H-index: 19, Total Citations: 2130  
[https://scholar.google.com/citations?view\\_op=list\\_works&hl=en&user=yAXLU2kAAAAJ](https://scholar.google.com/citations?view_op=list_works&hl=en&user=yAXLU2kAAAAJ) \*co-first authors, #corresponding author

### **Peer-Reviewed Publications**

1. Rajesh NU, Coates I, Driskill MM, Dulay MT, Hsiao K, Ilyn D, Jacobson GB, Kwak JW, Lawrence M, Perry JL, Shea CO, Tian SM, DeSimone JM. “**3D-Printed Microarray Patches for Transdermal Applications**” JACS Au, 2022. [Impact Factor: 10](#), [Citations: 2](#).
2. Caudill CL, Perry JL, Ililadis K, Tessema AT, Lee BJ, Mecham BS, Tian S, DeSimone JM. “**Transdermal Vaccination via 3D Printed Microneedles Induces Potent Humoral and Cellular Immunity**” PNAS, 2021. [Impact Factor: 9.661](#), [Citations: 43](#).

Featured in:

- Winner of Experimental Category of Fast Company’s 2022 World Changing Ideas Award

- STAT Madness is on, and Carolina is a contender. Shantell M. Kirkendoll, UNC News, 3/2022
  - UNC's 3D printed vaccine patch offers greater protection sans the needle. Elle Kehres, Chapel Hill Meida Group. Radio, 97.9 The Hill WCHL. 10/2021
  - 3D printed vaccine patch could deliver stronger immune responses than a needle shot. Rachel Arthur, BioPharma Reporter. 10/2021
  - A 3D printed vaccine patch offers vaccination without a shot. Shantell M. Kirkendoll, UNC News. 9/2021
3. Perry JL<sup>#</sup>, Tian S, Sengottuvel N, Harrison EB, Gorentla BK, Kapdia CH, Cheng N, Luft JC, Ting JP-Y, DeSimone JM, Pecot CV. **“Pulmonary Delivery of PRINT-CpG for the Treatment of Metastatic Lung Cancer”** ACS Nano, 2020. [Impact Factor: 14.588](#), [Citations: 22](#)
  4. Kapadia CH, Tian S, Perry JL, Luft JC, DeSimone JM. **“Role of linker length and antigen density in nanoparticle peptide vaccine”** ACS Omega, 2019. [Impact Factor: 2.87](#), [Citations: 19](#)
  5. Caudill CL, Perry JL, Tian S, Luft JC, DeSimone JM. **“Spatially controlled coating of continuous liquid interface production microneedles for transdermal protein delivery.”** J. Control. Release, 2018. [Impact Factor: 7.877](#), [Citations: 87](#)
  6. Kapadia CH, Tian S, Perry JL, Sailer D, Luft JC, Desimone JM. **“Extending antigen release from particulate vaccines results in enhanced antitumor immune response.”** J. Control. Release, 2018 [Impact Factor: 7.877](#), [Citations: 23](#)
  7. Perry JL, Reuter KG, Luft JC, Pecot CV, Zamboni WC, DeSimone JM. **“Mediating Passive Tumor Accumulation through Particle Size, Tumor Type, and Location.”** Nano Letters, 2017 [Impact Factor: 12.344](#), [Citations: 192](#)
  8. Bowerman CJ, Byrne JD, Chu KS, Schorzman AN, Keeler AW, Sherwood CA, Perry JL, Luft JC, Barr DB, Deal AM, Napier ME, Zamboni WC, Sharpless NE, Peroou CM, DeSimone JM. **“Docetaxel-loaded PLGA nanoparticles improve efficacy in taxane-resistant triple-negative breast cancer”**. Nano Letters, 2017. [Impact Factor: 12.344](#), [Citations: 89](#)
  9. Kapadia CH, Tian S, Perry JL, Luft JC, DeSimone JM. **“Reduction sensitive PEG hydrogels for co-delivery of antigen and adjuvant to induce potent CTLs.”** Molecular Pharmaceutics, 2016 [Impact Factor: 4.321](#), [Citations: 32](#)
  10. Roode LE, Brighton H, Bo T, Perry JL, Parrott MC, Kersey F, Luft JC, Bear JE, DeSimone JM, Davis IJ. **“Subtumoral analysis of PRINT nanoparticle distribution reveals targeting variation based on cellular and particle properties.”** Nanomedicine: Nanotechnology, Biology, and Medicine, 2016 [Impact Factor: 6.500](#), [Citations: 29](#)
  11. Kapadia CH, Perry JL, Tian S, Luft JC, DeSimone JM. **“Nanoparticulate immunotherapy for cancer”** J. Control. Release 2015 [Impact Factor: 7.877](#), [Citations: 85](#)
  12. Reuter KG, Perry JL, Dongwook K, Luft JC, Liu R, DeSimone JM. **“Targeted PRINT Hydrogels: The Role of Nanoparticle Size and Ligand Density on Cell Association, Biodistribution, and Tumor Accumulation”** Nano Letters, 2015 [Impact Factor: 12.344](#), [Citations: 97](#)
  13. Paquette CCH, Phanse Y, Perry JL, Sanchez-Vargas I, Airs PM, Dunphy BM, Xu J, Carlson JO, Luft JC, DeSimone JM, Bartholomay LC, Beaty BJ. **“Biodistribution and trafficking of hydrogel nanoparticles in adult mosquitoes”** PLoS Neglected Tropical Diseases 2015 [Impact Factor: 3.885](#), [Citations: 15](#)

14. Phanse Y, Dunphy BM, Perry JL, Airs PM, Paquette CCH, Carlson JO, Xu J, Luft JC, DeSimone JM, Beaty BJ, Bartholomay LC. “**Biodistribution and toxicity studies of PRINT hydrogel nanoparticles in mosquito larvae and cells**” PLoS Neglected Tropical Diseases 2015 [Impact Factor: 3.885](#), [Citations: 22](#)
15. Kai MP, Keeler AW, Perry JL, Reuter KG, Luft JC, O’Neal SK, Zamboni WC, DeSimone JM. “**Evaluation of drug loading, pharmacokinetic behavior, and toxicity of a cisplatin-containing hydrogel nanoparticle**”. J. Control. Release 2015 [Impact Factor: 7.887](#), [Citations: 48](#)
16. Perry JL, Kai MP, Reuter KG, Bowerman C, Luft JC, DeSimone JM. “**Calibration-quality cancer nanotherapeutics**”; in Nanotechnology-Based Precision Tools for the Detection and Treatment of Cancer, Cancer Treatment and Research, Editors: C. A. Mirkin et al. (Springer International: Switzerland), 2015. [Citations: 7](#)
17. Jones SW, Roberts RA, Robbins GR, Perry JL, Kai M, Chen K, Bo T, Napier ME, Ting J, DeSimone JM, Bear J. “**Nanoparticle clearance is governed by Th1/Th2 immunity and strain background**” Journal of Clinical Investigation, 2013 [Impact Factor: 11.864](#), [Citations: 201](#)
18. Perry JL\*, Reuter K\*, Kai MP, Herlihy KP, Luft, JC, Jones S, Napier ME, DeSimone JM, “**PEGylated PRINT nanoparticles: the impact of PEG density on proein binding, macrophage association, biodistribution, and pharmacokinetics,**” Nanoletters, 2012. [Impact Factor: 12.344](#), [Citations: 628](#)
19. Dunn S, Perry JL, Chen K, Byren J, DeSimone JM, “**Generating Better Medicines for Cancer**” ACS Macro Letters, 2013. [Impact Factor: 5.740](#), [Citations: 12](#)
20. Kersey F, Merkel T, Perry JL, Napier ME, DeSimone JM, “**The Effect of Aspect Ratio and Deformability on Nanoparticle Extravasation through Nanopores,**” Langmuir, 2012. [Impact Factor: 3.683](#), [Citations: 75](#)
21. Perry JL, Herlihy KP, Napier ME, DeSimone JM, “**PRINT: A Novel Platform Towards Shape and Size Specific Nanoparticle Theranostics,**” Accounts of Chemical Research, 2011. [Impact Factor: 19.820](#), [Citations: 307](#)
22. Perry JL, Stewart JD, Martin CR “**Drug Delivery Strategies by Using Template-Synthesized Nanotubes,**” Chemistry A European Journal, 2011, 17, 6296-6302. [Impact Factor: 4.857](#), [Citations: 75](#)
23. Perry JL, Guo P, Johnson SK, Stewart JD, Martin CR “**Fabrication of biodegradable nano test tubes by template synthesis,**” Nanomedicine, 2010, 5, 1151-1160. [Impact Factor: 4.140](#), [Citations: 19](#)

## Book Chapters

1. Perry JL, Kai MP, Reuter KG, Bowerman C, Luft JC, DeSimone JM, (2015) “**Calibration-quality cancer nanotherapeutics**” in Mirkin C, Petrosko S, Segh A (eds) Nanotechnology-Based Precision Tools for the Detection and Treatment of Cancer. Cancer Treatment and Research, vol 166. Springer, Cham.

## PATENT APPLICATIONS

1. Provisional Application NO. 63/384,889. 2022. B7-H3 Targeting Ligands and Methods of Use. Inventors: Perry JL, Bowler M, Bowers M, Pecot CV.
2. Provisional Application No. 63/248,280. PCT/US2022/044393. 2022. Polymeric Microstructures and Systems and Methods for Making Same. Inventors: Perry JL, Tian SM, DeSimone JM
3. Publication Number: WO2018207153A1. 2017. Toll-like receptor agonist modified particles and their use in lung cancer. Inventors: Perry JL, Kapadia CK, Rahhal T, Luft JC, Tian SM, DeSimone JM..

4. Publication Number: WO2015153632A1. 2014. Particles that Enhance Immune Responses by Increasing Cytotoxic T-Cell Function or Production of Interferon Gamma Therefrom. Inventors: Kapadia CK, Perry JL, Tian SM, DeSimone JM.

## **PRESENTATIONS**

### **Invited Presentations**

1. Perry JL, Tian SM, Jacobson GB. **Delivery of RNA-based Vaccines with 3D Printed MAPs**. National Vaccine Advisory Committee, June 15, 2022
2. Perry JL, Tian SM, Caudill CL. **Transdermal Vaccination with 3D Printed Microneedles**. Ontario Veterinary College, 3D Printing Club, Seminar 2021.
3. Perry JL, Reuter KG, Kai MP, Kapadia CK, Luft JC, Tian SM, DeSimone JM. **Designing PRINT Cancer Therapeutics**. UNC-CH Eshelman School of Pharmacy, Division of Pharmacoengineering and Molecular Pharmaceutics, Seminar 2018.

### **Conference Presentations**

1. Perry JL, Reuter KG, Kai MP, Luft JC, DeSimone JM. **Passive tumor targeting of PRINT particles – a function of particle size/shape and tumor model**. Materials Research Symposium 2015
2. Perry JL, Martin CR, Stewart JD, **Nano test tubes: capping, biofunctionalization and biodegradation**, American Chemical Society 2008
3. Perry JL, Martin CR, Stewart JD, **Template-Synthesized Nanotubes**, American Chemical Society 2007

### **Conference Poster Presentations**

1. Perry JL, Tian SM, Luft JC, DeSimone JM. **Local Treatment of Murine Models of Metastatic NSCLC with PRINT-CpG Nanoparticles**. Cancer Nanotechnology Gordon Research Conference 2019.
2. Perry JL, Tian SM, Luft JC, DeSimone JM. **Local Treatment of Murine Models of Metastatic NSCLC with PRINT-CpG Nanoparticles**. NanoDDS 2018.
3. Perry JL, Tian SM, Luft JC, DeSimone JM. **Treating Orthotopic Lung Cancer Locally with PRINT-CpG Nanoparticles**. NanoDDS 2017.
4. Perry JL, Wang Y, Tian SM, Luft JC, Ting JP, DeSimone JM. **Project 2 (Aim 3): NP-based delivery of small molecules to revers immunosuppressive tumor microenvironment**. NCI Site Visit 2016
5. Perry JL, Reuter KG, Kai MP, Luft JC, DeSimone JM. **Tumor Accumulation of PRINT Nanoparticles**. Cancer Nanotechnology Gordon Research Conference 2015.

## **TEACHING**

<b>Year</b>	<b>Course name</b>	<b>Course Number</b>	<b>Lectures Taught</b>	<b>Enrollment</b>	<b>Course type</b>
2022 AU	Advances in Drug Delivery	DPMP864	1	8	Graduate

<b>Year</b>	<b>Course name</b>	<b>Course Number</b>	<b>Lectures Taught</b>	<b>Enrollment</b>	<b>Course type</b>
2017 AU	Advances in Drug Delivery and Nanomedicine	MOPH868	1	8	Graduate

### **Current Research Group**

<b>Name</b>	<b>Previous Degree</b>	<b>Position</b>	<b>Year Started</b>	<b>Topic</b>	<b>Awards</b>
<b>Staff</b>					
Jared Appel	BS Chemistry, University of South Alabama	Research Associate	2022	3D Printed Microneedles	
<b>Graduate</b>					
Lauren Kass (Co-Mentored with Shawn Hingtgen)	BS Biomedical Engineering, NC State	Graduate Student, Pharmaceutical Sciences	2021	Neural stem cell loaded 3D printed scaffolds for treatment of glioblastoma	
Yu Zhang (Co-Mentored with Shawn Hingtgen)	BS Pharmaceutical Sciences, University of Michigan	Graduate Student, Pharmaceutical Sciences	2022	Neural stem cell loaded 3D printed scaffolds for treatment of ovarian cancer	
<b>Undergraduate</b>					
Margret Woolen	UNC, Neuroscience	Undergraduate Researcher	2022	3D printed Scaffolds	
Emily Brockmole	UNC, Neruoscience	Undergraduate Researcher	2022	3D Printed Scaffolds	
Maria Kanton	NC State, Chemical Engineering	Undergraduate Researcher	2021	3D Printed microneedles for interstitial fluid sampling	
<b>High School Student</b>					
Cate DeVane	North Carolina School of Science and Math	Intern	2022	3D printed scaffolds	

### **Past Research Group**

Name	Previous Degree	Position	Years	Topic	Current Position
<b>Undergraduate</b>					
Julia Logan	UNC, Chemistry	Undergraduate Researcher	2021-2022	3D Printed Scaffolds	Boston Food Allergy Center
Elizabeth LoFrese	UNC, Chemistry	Undergraduate Researcher	2021-2022	3D Printed Microneedles for Interstitial Fluid Sampling	Medical School
<b>High School Student</b>					
Brooke Hawkins	North Carolina School of Science and Math	Intern	2022	3D printed scaffolds	
David Barr	North Carolina School of Science and Math	Intern	2021	Microneedle Designs	
Eleanor Whitaker	North Carolina School of Science and Math	Intern	2021	Scaffold Designs	
<b>Dissertation Committees</b>					
Name	Department		Date	Role	
Lauren Kass	Division of Pharmacoengineering and Molecular Pharmacuetics		2022-Present	Dissertation Committee	

## **FUNDING**

### **Current Research Support**

Bill and Melinda Gates Foundation

Funding Period: 6/15/2022-6/14/2025

Total Direct and Indirect Funding: \$480,000

Role: Co-PI (Main PI/PD: Shaomin Tian)

Title: MAP 3.0 Research and Development

Project Goal: To improve vaccination technology through microneedle array patches to increase access to vaccines

Wellcome Leap R3 Grant

Funding Period: 1/01/2022-12/31/2024

Total Direct and Indirect Funding: \$481,504

Role: Co-Investigator

Title: Solid-State RNA-based Products Delivered by 3D-printed Microneedle Patches

Project Goal: Evaluate 3D printed microneedle delivery of mRNA particles for the development of a microneedle corona virus vaccine.

NIH 1R01CA269974-01

Funding Period: 2/01/2022-1/31/2027

Total Direct and Indirect Funding: \$3,578,456

Role: Co-PI (Main PI/PD: Shawn Hingtgen)

Title: Harnessing Continuous Liquid Interface 3D printing to Improve Tumor-homing Stem Cell Therapy for Post-surgical Brain Cancer

Project Goal: Utilizing additive manufacturing to generate new matrices to maximize the efficacy of stem cell therapy for post-surgical glioblastoma

NIH EB029682-01

Funding Period: 04/01/2020 – 06/31/2022; NCE 02/28/2023

Total Funding: \$458,467

Role: Co-Investigator

Title: Novel 3D printed microneedle patches for detection of viral infections

Time Commitment: 1.2 Calendar Months

Project Goals: To design and build microneedle patches using CLIP 3D printing technology, for minimally invasive and self-applicable skin interstitial fluid sampling for early diagnosis of virus infection.

### **Past Research Support**

Junior Faculty Development Award

Funding Period: 2/01/2021-12/31/2021

Level of Funding: \$10,000

Role: PI

Title: 3D Printed Scaffolds for Mesenchymal Stromal Cell Delivery

Project Goal: Evaluate cell loading and viability as a function of scaffold design (pore size and porosity) and composition.

Wellcome Leap Pilot Grant

Funding Period: 3/05/2021-12/13/2021

Total Direct and Indirect Funding: \$205,260

Role: Co-Investigator

Title: Microneedle-based Vaccine Development for Rapid Pandemic Response: Accelerating Deployment of Vaccines to the World

Project Goal: Evaluate 3D printed microneedle delivery of mRNA particles for the development of a microneedle corona virus vaccine.

Carbon Sponsored Research Agreement

Funding Period: 3/24/2020-6/24/2021

Total Direct and Indirect Funding: \$190,000

Role: PI

Time Commitment: 1.8 Calendar Months

Project Goal: Support collaborative research efforts to investigate 3D printed devices for life science applications.

NIH 5U54CA198999

Funding Period: 8/01/2015-7/31/2021

Level of Funding per year: \$313,354

Role: Key Personnel, PI: Leaf Huang

Title: Center for Cancer Nanotechnology Excellence

Time Commitment: 1.2 Calendar Months

Project Goal: Develop PRINT nanoparticle Cancer Vaccines (Melanoma Focus)

NIAD A14-1558-001

Funding Period: 7/01/2014-6/30/2020

Level of Funding per year: \$399,703

Role: Key Personnel, PI: Jenny Ting

Title: Novel Nanoparticle Platform for the Delivery of Vaccine and Adjuvants

Time Commitment: 1.2 Calendar Months

Project Goal: Develop PRINT nanoparticle Vaccines for Dengue an Influenza

DTRA HDTRA1-12-1-0045

Funding Period: 4/01/2013-2/2/2020

Level of Funding per year: \$347,000

Role: Key Personnel, PI: Shaomin Tian

Title: PRINT Butyrylcholinestrse Delivery

Time Commitment: 3 Calendar Months

Project Goal: Develop 3D printed (CLIP) microneedles for protein delivery.

### **PROFESSIONAL SERVICE**

#### **Peer Reviewer for articles published in the following journals:**

Proceedings of the National Academy of Sciences, Journal of Controlled Release, Current Drug Delivery, Expert Opinion on Drug Delivery, ACS Applied Polymer Materials, ACS Nano, MRS communications

#### **Member of the following organizations:**

American Chemical Society, Material Research Society, American Association of Pharmaceutical Scientists