

Curriculum Vitae

Laura M. Ensign, Ph.D.

Office: Robert H. and Clarice Smith Building, Room 6015

Tel: (410)-614-9854

Fax: (443) 287-7922

Email: lensign@jhmi.edu

I. EDUCATION

2012 Ph.D., Chemical and Biomolecular Engineering, Johns Hopkins University

2007 B.S., Chemical and Biomolecular Engineering, The Ohio State University

II. PROFESSIONAL EXPERIENCE

- | | |
|--------------|---|
| 2015-present | Assistant Professor, joint appointment in the Department of Chemical & Biomolecular Engineering |
| 2014-present | Assistant Professor, Department of Ophthalmology
The Center for Nanomedicine, The Wilmer Eye Institute at Johns Hopkins School of Medicine |
| 2012-2014 | Research Associate, Department of Ophthalmology
The Center for Nanomedicine, The Wilmer Eye Institute at Johns Hopkins School of Medicine |
| 2007-2012 | Graduate Research Assistant; Advisor: Justin Hanes
Johns Hopkins University Department of Chemical and Biomolecular Engineering |

III. HONORS AND AWARDS

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|-----------|--|
| 2015 | Linden-CFAR Research Project Travel Award |
| 2015 | Maryland Academy of Sciences Outstanding Young Engineer |
| 2015 | Center for AIDS Research Junior Investigator Award |
| 2013 | Siebel Scholar (http://www.siebelscholars.com/) |
| 2012 | The Johns Hopkins Center for Nanomedicine Award for Research Excellence |
| 2007-2010 | National Science Foundation Graduate Research Fellowship |
| 2007-2010 | Howard Hughes Medical Institutes Fellow |
| 2007-2010 | Schwartz Fellow, Johns Hopkins University |
| 2007 | B.S., Summa cum laude, with Honors, Ohio State University |
| 2006 | Rhodes Scholarship Nominee, Ohio State University |
| 2006 | Marshall Scholarship Nominee, Ohio State University |
| 2006 | NSF Research Experience for Undergraduates (REU), Ohio State University |
| 2006 | Shell Oil Top Academic Award, Ohio State University |
| 2005 | Women In Engineering Outstanding Student Award, Ohio State University |
| 2004-2007 | Engineering Dean's Award, Ohio State University |

IV. PUBLICATIONS

*Corresponding author, **Co-first author [IF = impact factor of journal]

1. Ensign LM, Hoen T, Maisel K, Cone R, Hanes J. Enhanced vaginal drug delivery through the

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- use of hypotonic formulations that induce fluid uptake, *Biomaterials*. 2013; 34(28):6922-9. [IF=7.60]
2. Ensign LM, Henning A, Schneider CS, Maisel K, Wang Y-Y, Porosoff MD, Cone R, Hanes J. *Ex vivo* characterization of particle transport in mucus secretions coating freshly excised mucosal tissues, *Molec Pharm*. 2013; 10(6):2176-82. [IF=4.38]
 3. Ensign LM, Schneider C, Suk JS, Cone R, Hanes J. Mucus penetrating nanoparticles: Biophysical tool and method of drug and gene delivery. *Adv Mater*. 2012; 24: 3887-3894. [IF = 15.41]
 4. Ensign LM, Tang B, Wang YY, Tse TA, Hoen T, Cone R, Hanes J. Mucus penetrating nanoparticles for vaginal drug delivery protect against herpes simplex virus. *Sci Transl Med*. 2012; 4: 138ra179. [IF = 15.84]
 5. Ensign LM*, Cone R, Hanes J*. Oral drug delivery with polymeric nanoparticles: The gastrointestinal mucus barriers. *Adv Drug Del Rev*. 2012; 64: 557-570. [IF = 15.04]
 6. Mert O, Lai SK, Ensign L, Yang M, Wang YY, Wood J, Hanes J. A poly(ethylene glycol)-based surfactant for formulation of drug-loaded mucus penetrating particles. *J Control Release*. 2012; 157(3): 455-60. [IF = 7.71]
 7. Suk JS, Lai SK, Wang Y-Y, Ensign LM, Zeitlin PL, Boyle MP, Hanes J. The penetration of fresh undiluted sputum expectorated by cystic fibrosis patients by non-adhesive polymer nanoparticles. *Biomaterials*. 2009; 30: 2591-2597. [IF = 7.60].
 8. Wang YY, Lai SK, Ensign LM, Zhong W, Cone R, Hanes J. The microstructure and bulk rheology of human cervicovaginal mucus are remarkably resistant to changes in pH. *Biomacromolecules*. 2013; 14 (12): 4429-35. [IF = 5.75]
 9. Yang M, Yu T, Wang YY, Lai SK, Zeng Qi, Miao B, Tang BC, Simons B, Ensign L, Liu G, Chan K, Juang C, Mert O, Wood J, Fu J, McMahon M, Wu TC, Hung CF, Hanes J. Vaginal delivery of paclitaxel via nanoparticles with non-mucoadhesive surfaces suppresses cervical tumor growth. *Advanced Healthcare Materials*. 2014; 3(7):1044-1052.
 10. Ensign LM*, Cone R, Hanes J. Nanoparticle-based drug delivery to the vagina: a review. *J Control Release*. 2014; 190:500-514. [IF = 7.71]
 11. Akgul Y, Word A, Ensign LM, Yamaguchi Y, Lydon J, Hanes J, Mahendroo M. Hyaluronan in cervical epithelia protects against infection mediated preterm birth. *J Clin Invest*. 2014; 124(12):5481-9. [IF = 13.215]
 12. Yu T, Chan KW, Anonuevo A, Song X, Schuster B, Chattopadhyay S, Xu Q, Oskolkov N, Patel H, Ensign LM, van Zijl PC, McMahon M, Hanes J. Liposome-based mucus-penetrating particles (MPP) for mucosal theranostics: demonstration of diamagnetic chemical exchange saturation transfer (diaCEST) magnetic resonance imaging (MRI), *Nanomedicine: NBM*. 2014; 11(2):401-5. [IF = 6.155]
 13. Maisel K**, Ensign LM***, Reddy M, Cone R, Hanes J*. Effect of surface chemistry on nanoparticle interaction with gastrointestinal mucus and distribution in the gastrointestinal tract following oral and rectal administration in the mouse. *J Control Release*. 2015;197:48-57. [IF=7.71]
 14. Ensign LM, Lai SK, Wang YY, Yang M, Mert O, Cone R, Hanes J. Pretreatment of human cervicovaginal mucus with Pluronic F127 enhances nanoparticle penetration without compromising mucus barrier properties to herpes simplex virus. *Biomacromolecules*. 2014; 15(12):4403-9. [IF=5.75]
 15. Lu H, Spiegel A, Hurley A, Perez L, Maisel K, Ensign LM, Hanes J, Bassler B, Semmelhack M, Prud'homme R. Modulating *Vibrio cholerae* quorum-sensing-controlled communication using auto-inducer-loaded nanoparticles. *Nano Letters*. 2015; 15(4):2235-41. [IF=13.592]
 16. Schuster BS, Suk JS, Allan DB, Hanes J, Ensign LM. Particle tracking in drug and gene delivery research: state-of-the-art applications and methods. *Adv Drug Del Rev*. 2015; 91:70-91. [IF = 15.04]
 17. Maisel K, Moench T, Hendrix C, Cone R, Ensign LM*, Hanes J*. Enema ion compositions for

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- enhancing colorectal drug delivery. *J Control Release*. 2015; 209(10):280-7. [IF = 7.71]
18. Xu Q, Ensign LM, Boylan N, Schon A, Gong C, Yang C, Lamb NW, Cai S, Yu T, Freire E, Hanes J. Impact of surface polyethylene glycol (PEG) density on biodegradable nanoparticle transport in mucus ex vivo and distribution in vivo, *ACS Nano*. 2015; 9(9):9217-9227. [IF = 12.881]
 19. Suk JS, Xu Q, Kim N, Hanes J, Ensign LM. PEGylation as a strategy for improving nanoparticle-based drug and gene delivery, *Adv Drug Del Rev*. 2015, accepted. [IF = 15.04]
 20. Maisel K, Reddy M, Xu Q, Ensign LM, Cone R, Hanes J. Nanoparticles coated with high MW PEG penetrate mucus and provide uniform vaginal and colorectal distribution in vivo, *Nanomedicine*. 2016; 11(11):1337-43.
 21. Date A, Hanes J, Ensign LM. Nanoparticles for oral drug delivery: state-of-the-art, *J Control Rel*. 2016, in press.
 22. Henry C, Wang YY, Yang Q, Hoang T, Hoen T, Ensign LM, Nunn KL, Schroeder H, McCallen J, Moench T, Cone R, Lai SK. Anti-PEG antibodies alter the mobility and biodistribution of densely PEGylated nanoparticles in mucus, *Acta Biomaterialia*, accepted.

Submitted or in preparation:

23. Kashiwabuchi K, Parikh K, Suk JS, Patel H, Ensign LM, Hanes J, Mao HQ, McDonnell P*. Development of drug loaded, biodegradable microfiber sutures for ophthalmological application, submitted.
24. Schneider CS, Xu Q, Boylan NJ, Chisholm J, Tang B, Schuster B, Henning A, Ensign LM, Lee E, Adstamongkokul P, Simons BW, Wang S-Y, Gong X, Yu T, Boyle MP, Suk JS, Hanes J. Nanoparticles that do not adhere to mucus provide uniform and long-lasting drug delivery to airways following inhalation, submitted.
25. Yu T, Choi W-J, Anonuevo A, Chisholm J, Pulicare S, Zhong W, Chen M, Fridley C, McMahon MT, Lai SK, Ensign LM, Suk JS, Hanes J. Mucus-penetrating nanosuspensions for enhanced delivery of poorly soluble drugs to mucosal surfaces, submitted.
26. Soni H, Patel H, Ormond A, Ensign LM, Hanes J, Sawant K, Nuermberger E. Intranasal administration of antigen-decorated, adjuvant-loaded mucus-penetrating particles (MPP) provide enhanced protection against Mycobacterium Tuberculosis, in preparation
27. Hoang T, DeLong K, Toler E, Hanes J, Cone R, Ensign LM. Alterations in cervicovaginal mucus barrier properties associated with vaginal bacterial dysbiosis, in preparation.
28. Hoang T, Date A, Ensign LM. Nanomedicine for women's health applications: state-of-the-art, in preparation
29. Date A, Babu T, Ortiz J, Kanvinde P, Ensign LM, Hanes J. Mucus-penetrating budesonide nanosuspension as an enema therapy for local treatment of inflammatory bowel disease, in preparation.
30. Date A, Rais R, Babu T, Ortiz J, Kanvinde P, Thomas AG, Ensign LM, Slusher B. Local enema treatment to inhibit FOLH1 as a novel therapy for inflammatory bowel disease, in preparation.
31. Luo L, Xu Q, Yang J, Oh Y, Hartsock M, Xia S, Emmert DG, Kim YC, Ding Z, Eberhart C, Ensign LM, Thorne JE, Stark WJ, Duh EJ, Hanes J. Dexamethasone sodium phosphate-loaded biodegradable nanoparticles for treating experimental autoimmune uveitis, in preparation.
32. Wang B, Tang Y, Chen B, Oh Y, Lamb NW, Xia S, Ding Z, Emmert DG, Suarez M, Eberhart CG, Ensign LM, Stark WJ, Xu Q, Hanes J. Dexamethasone sodium phosphate-loaded biodegradable nanoparticles inhibited experimental corneal neovascularization following subconjunctival injection, in preparation.
33. Parikh KS, Josyula A, Omiadze R, Ahn JY, Ensign LM, Hanes J, Pitha I. Development of a versatile glaucoma shunt manufacturing platform through electrospinning, in preparation.

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34. Parikh KS, Zhang T, Josyula A, Omiadze R, Hanes J, Ensign LM, Hibino N. (2016) Nanofiber-coated sutures capable of sustained rapamycin release for prevention of neointimal hyperplasia following vascular anastomosis, in preparation.
35. Omiadze R, Date A, Parikh KS, Josyula A, Kanvinde P, Ensign LM, Hanes J. (2016) Moxifloxacin nanosuspensions developed through hydrophobic ion-pairing provide more efficient treatment of ocular infection, in preparation.
36. Yang J, Parikh KS, Ensign LM, Hanes J, Xu Q. (2016) Absorbable, nanostructured sunitinib meshes for prevention of corneal neovascularization, in preparation.
37. Parikh KS, Omiadze R, Josyula A, Shi R, Yazdi Y, McDonnell PJ, Ensign LM, Hanes J. (2016) Absorbable, high strength, antibiotic-eluting sutures for prevention of ophthalmic infection, in preparation.

V. PATENTS

1. Lai SK, Yang M, Wang YY, Mert O, Ensign L, Hanes J. Compositions and methods relating to reduced mucoadhesion (Patent Pending; PCT/US11/59321).
2. Ensign L, Cone R, Hanes J. Nanoparticle formulations with enhanced mucosal penetration (Patent Pending: PCT/US2013/022387).
3. Popov A, Enlow E, Bourassa J, Gardner C, Chen H, Ensign LM, Lai SK, Yu T, Hanes J, Yang M. Nanocrystals, compositions, and methods that aid particle transport in mucus (Patent US 20130323179 A1).
4. Maisel K, Hendrix CW, Ensign LM, Fuchs EJ, Cone R, Hanes J. Hypotonic microbicidal formulations and methods of use (Patent Pending: PCT/US2015/017120).
5. Maisel K, Ensign LM, Cone R, Moench T, Hanes J. Hypotonic enema formulations and methods of use (Patent Pending: PCT/US2015/017149).
6. Ensign LM, Cone R, Hanes J. CVS transplantation for treatment of bacterial vaginosis (US provisional application 62/091,970).
7. Maisel K, Ensign LM, Hanes J, Cone R. Hypotonic hydrogel formulations for enhanced transport of active agents at mucosal surfaces (US provisional application 62/108,354).
8. Hanes J, Maisel K, Ensign LM, Cone R. Mucus penetrating particles with high molecular weight and dense coatings. (US Provisional application)

VI. RESEARCH SUPPORT

(Dollar amounts are total value of grants unless otherwise noted)

(Ensign)	06/01/15 – 05/31/19
Burroughs Wellcome Preterm Birth Initiative	\$600,000
<i>The role of vaginal progesterone delivery in cervical remodeling and preterm birth</i>	
The goal is to use nanomedicine as a tool for exploring the role of progesterone supplementation in premature cervical remodeling processes, as well as achieving more efficacious delivery.	

R01EY026578 (Ensign)	03/01/16 -- 02/28/21
NIH (NEI)	\$2,025,000
<i>Sustained-release of novel neuroprotective agents for treatment of glaucoma</i>	
The goal is to develop microparticle formulations that provide sustained release of novel neuroprotective agents as a novel therapy to complement standard IOP-lowering strategies.	

1 U19 AI113127-01 (Hendrix PD, Hanes PI Project 2)	07/01/14 – 06/30/19
NIH (NIAID)	\$21,105,233
<i>Development of Rectal Enema As Microbicide (DREAM)</i>	

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The goal of Project 2 is to (i) identify promising drug candidates, (ii) optimize enema vehicle properties, and (iii) develop novel nanotechnology-based formulations for improved enema drug administration as a rectal microbicide.

Role: co-PI for Project 2, Member of the Steering Committee

R21/R33 AI094519 (Hanes & Cone) 05/01/11 – 04/30/16
NIH (NIAID/NIMH/ODNIH) \$1,869,428

Mucus penetrating particles for rectal microbicides

The aim of this project is to develop mucus penetrating particles (MPP) loaded with tenofovir that will improve colorectal microbicide delivery for protection against HIV.

Role: co-investigator

R01DK107806 (Ensign & Hanes) 12/10/15 – 11/30/19
NIH (NIDDK) \$1,458,000

Mucus-Penetrating Nanoparticle Containing Enemas for Ulcerative Colitis

The goal of this project is to develop and test a novel “mucus-penetrating” nanoparticle-based enema product that takes advantage of fluid absorption in the GI tract to greatly enhance colorectal drug delivery and, thus, treatment efficacy for UC.

R01HL127413 (Hanes/Suk) 04/01/15 – 02/28/19
NIH/NHLBI \$1,601,352

Biodegradable Mucus Penetrating DNA Nanoparticle for Gene Therapy of CF

The goal of this project is to test novel gene vectors in combination with a novel aqueous vehicle that we hypothesize will greatly enhance the effectiveness of gene transfer in the lungs.

Role: co-investigator

Sanofi Innovation Awards Program (Slusher) 12/15/15 – 12/14/16
Sanofi \$100,000

The goal is to develop 2-PMPA and 2-PMPA prodrugs as novel therapies for inflammatory bowel disease (IBD)

Role: co-investigator

KKESHJHU/05-04 (Ensign) 04/01/16 – 03/31/18
King Khaled Eye Specialist Hospital \$167,996

A Novel Thermosensitive Gelling Vehicle for Improved Topical Eye Delivery

The goal of this project is to develop longer lasting, more efficacious eye drops using thermosensitive gelling materials, with a focus on improved treatment of dry eye.

Pending

R01 (Hanes, Neptune & Suk) 04/01/17-03/31/22
NIH

New Inhalation Therapy for COPD

The goal of this project is to develop inhaled delivery formulation of angiotensin receptor blockers that target the TGF- β pathway, specifically muco-inert nanocrystals in conjunction with a hypotonic vehicle solution, for treating COPD.

Role: co-investigator

R01 (Hanes & Suk) 04/01/17 – 03/31/22
NIH

Widespread Nucleic Acid Delivery to Brain Tumors

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The goal of this project is to identify methods to achieve safe, efficient and widespread tumor-specific transgene expression within a well-characterized, invasive rat GBM model.

Role: co-investigator

R01 (Xu)

04/01/17 – 03/31/22

NIH

New method to treat or prevent corneal graft rejection

The goal of this project is to develop a new method to provide sustained delivery of a common corticosteroid, dexamethasone sodium phosphate (DSP), by SCT administration to safely prevent and treat corneal graft rejection.

Role: co-investigator

R01 (Hibino)

04/01/17 – 03/31/22

NIH

Novel Drug-Releasing Suture to Prevent Anastomotic Stenosis of Vessel

The goal is to develop anti-proliferative drug-eluting polymeric nanofiber sutures for the prevention of vascular anastomosis stenosis.

Role: co-investigator

Expired

(McDonnell & Ensign)

04/01/14 – 03/31/16

KKESH – WEI Collaborative Research Fund

\$300,000

Preparation and characterization of bioabsorbable, antibiotic-eluting sutures for ophthalmic surgery

The goal of this project is to develop bioabsorbable, antibiotic-eluting sutures of the size and tensile strength appropriate for ophthalmic surgery.

1R01HD062844-01 (Hanes & Cone)

04/01/10 – 01/31/16 (NCE)

NIH (NICHHD/NIAID)

\$2,050,000

Pathogen trapping by genital mucus secretions

Our overall hypothesis is that mucus secretions from women with healthy vaginal flora are highly protective against pathogen penetration, including HIV, but that this protection is greatly diminished in women with BV.

Role: co-investigator

P30 AI094189-01A1 (Chaisson/Beyrer)

05/01/12 – 02/28/17

NIH

pilot 01/01/13 - 12/31/13

The Johns Hopkins Center for AIDS Research (JHU CFAR)

Role: PI of pilot project: *“Improved vaginal delivery of dapivirine using mucus-penetrating nanoparticles for prevention of human immunodeficiency virus (HIV) infection”*

(Ensign)

01/01/14 – 06/31/15

W.W. Smith Charitable Trust

\$100,000

Mucus penetrating particles for improved rectal delivery of dapivirine

The goal of this project is to develop a nanoparticle-based dapivirine delivery system for rectal pre-exposure prophylaxis.

R33 AI079740-01 (Hanes & Cone)

09/23/08 – 08/31/14

NIH (NIAID)

\$1,904,790

Mucus penetrating nanoparticles for sustained microbicide delivery

The goal is to develop a microbicide-loaded nanoparticle system capable of being retained in the female reproductive tract for longer than 24h, and to test its efficacy in mouse models against herpes.

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Role: co-investigator

VII. SERVICE TO THE PROFESSION

Editorial Activity

1. Guest Editor for the North America special issue of *Journal of Controlled Release*, Parts I/II, 2015/2016

Editorial Boards:

1. *Journal of Controlled Release*, April 2015-present

Grant Review Panels:

1. Peer review panel, 2015 Peer Reviewed Medical Research Program, Department of Defense, July 2015.

Sessions chaired at conferences:

1. "Drug Delivery for Developing Countries/Global Changes," 40th Annual Meeting and Exposition of the Controlled Release Society, Honolulu, HI, July 21-24, 2013.
2. "Proteins, Peptides, and Vaccines," 41st Annual Meeting and Exposition of the Controlled Release Society, Chicago, IL, July 13-16, 2014.
3. "Oral Drug Delivery Technologies," Twelfth International Nanomedicine and Drug Delivery Symposium (NanoDDS'14), Chapel Hill, NC, October 6-8, 2014.
4. 26th Annual Wilmer Eye Institute Research Meeting, Baltimore, MD, March 27, 2015.
5. "Thinking outside the box, Delivery Technologies: Nanocarriers from Nature," 43rd Annual Meeting and Exposition of the Controlled Release Society, Seattle, WA, July 17-20, 2016.
6. "Ocular Drug Delivery Technologies," 43rd Annual Meeting and Exposition of the Controlled Release Society, Seattle, WA, July 17-20, 2016.

Conference Organizing Committees:

1. Annual Meeting Planning Committee, Controlled Release Society Annual Meeting, Boston, MA, July 16-19, 2017.
2. Organizing Committee, 14th Annual International Nanomedicine and Drug Delivery Symposium, Baltimore, MD, Sept 16-18, 2016.
3. Organizing Committee, Annual Women's Health Research Group Symposium on Sex Differences Matter: Drugs, Devices, and Biologics in Women's Health, Baltimore, MD, May 21, 2014.
4. Chair, Richard Cone: 50 Years in Science, Baltimore, MD, June 16-17, 2014.

Professional Society Memberships:

1. Controlled Release Society
2. Biomedical Engineering Society
3. American Institute of Chemical Engineers
4. American Chemical Society
5. American Association of Pharmaceutical Scientists

Service to the Controlled Release Society:

1. Abstract reviewer, 2013 Annual meeting
2. Best Paper review committee, 2014 Annual meeting
3. Best Paper review committee, 2015 Annual meeting
4. Young Investigator Award review committee, 2016 Annual meeting
5. Abstract reviewer, 2016 Annual meeting

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6. Annual Meeting Planning Committee, 2017 Annual meeting

Peer-reviewed manuscripts for journals:

1. *Advanced Drug Delivery Reviews*
2. *ACS Nano*
3. *Journal of Controlled Release*
4. *Biomaterials*
5. *Molecular Pharmaceutics*
6. *Drug Delivery*
7. *Pharmaceutics*
8. *ACS Applied Materials and Interfaces*
9. *Bioconjugate Chemistry*
10. *Molecules*
11. *International Journal of Nanomedicine*
12. *PLOS One*
13. *Journal of Biomedical Nanotechnology*
14. *Current Drug Delivery*
15. *Drug Delivery and Translational Research*
16. *Vaccine*
17. *PLOS Pathogens*
18. *Journal of Drug Targeting*
19. *European Journal of Pharmaceutics and Biopharmaceutics*
20. *Colloids and Surfaces B: Biointerfaces*
21. *Expert Opinion on Drug Delivery*
22. *Theranostics*

VIII. INVITED PRESENTATIONS

1. Nanomedicine as a tool for preterm birth research. (2016) American Society for Reproductive Immunology Annual Meeting: Baltimore, MD.
2. Hypotonic microbicide enema formulations for rectal pre-exposure prophylaxis. (2016) JHU CFAR Annual Meeting: Baltimore, MD.
3. Nanomedicine for gastrointestinal drug delivery: overcoming the mucus barrier. (2016) 14th European Symposium on Controlled Drug Delivery: Egmond aan Zee, the Netherlands.
4. The gastrointestinal mucus barrier- implications in oral drug delivery. (2016) 51st AAPS Arden Conference: Baltimore, MD.
5. Nanomedicine-based drug delivery. (2015) ChemBE Alumni Networking Day: Baltimore, MD.
6. Nanomedicine for the eye. (2014) 27th Annual Current Concepts in Ophthalmology: Baltimore, MD.
7. Overcoming gastrointestinal barriers to nanoparticle delivery. (2014) CRS Annual Meeting: Chicago, IL.
8. Mucus-penetrating particles (MPP) for vaginal drug delivery. (2014) Johns Hopkins Center for AIDS Research Annual Symposium, Johns Hopkins University: Baltimore, MD.
9. Mucus-penetrating nanoparticles for vaginal drug delivery. (2012) Wilmer Eye Institute Research Discussion (WEIRD), Johns Hopkins University: Baltimore, MD.
10. Mucus-penetrating nanoparticles for vaginal drug delivery. (2012) Clinical Pharmacology noon conference, Johns Hopkins University: Baltimore, MD.
11. Mucus-penetrating nanoparticles for improved protection against vaginal HSV-2 infection. (2012) Institute for NanoBiotechnology Symposium: Baltimore, MD.

IX. CONFERENCE ABSTRACTS AND PROCEEDINGS

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1. Hoang TM, Zierden H, Date A, Ortiz J, Anders N, He P, Hanes J, Mahendroo M, Ensign LM. (2016) Progesterone supplementation for prevention of preterm birth. NanoDDS 2016: Baltimore, MD.
2. Date A, Rais R, Babu T, Ortiz J, Thomas AJ, Ensign LM, Slusher B. (2016) 2-PMPA and 2-PMPA nanosuspensions: novel treatment modalities for inflammatory bowel disease. NanoDDS 2016: Baltimore, MD.
3. Babu T, Date A, Ortiz J, Kanvinde P, Ensign LM, Hanes J. (2016) Mucus-penetrating budesonide nanosuspensions as an enema therapy for the local treatment of inflammatory bowel disease. NanoDDS2016: Baltimore, MD.
4. Parikh K, Omiadze R, Josyula A, Shi R, Al-Towerki AE, Yazdi Y, McDonnell P, Ensign LM, Hanes J. (2016) Nano-structured, antibiotic-eluting sutures for prevention of ophthalmic infection. NanoDDS2016: Baltimore, MD.
5. Soni H, Patel H, Sawant K, Ensign LM, Hanes J, Nuermberger E. (2016) Application of mucus-penetrating nanoparticles in mucosal vaccination for tuberculosis: Prophylactic and therapeutic vaccine efficacy in a murine model. NanoDDS 2016: Baltimore, MD.
6. Date A, Omiadze R, Parikh K, Josyula A, Kanvinde P, Hanes J, Ensign LM. (2016) Ion-paired moxifloxacin nanosuspensions for the prevention and treatment of ocular infections. AAPS 2016: Denver, CO.
7. Hoang T, DeLong K, Toler E, Cone R, Hanes J, Ensign LM. (2016) Dysbiosis in vaginal microbiota alters cervicovaginal mucus barrier properties to HIV. HIVR4P: Chicago, IL.
8. Date A, Hoang T, Xiao P, Marzinke M, Hendrix C, Fuchs E, Cone R, Gumber S, Hanes J, Villinger F, Ensign LM. (2016) Optimizing vehicle osmolality for improved colorectal microbicide delivery. HIVR4P: Chicago, IL.
9. Xiao P, Gumber S, Marzinke M, Ensign LM, Fuchs E, Hendrix C, Villinger F. (2016) Hypo-osmolar formulation of TFV enemas promotes uptake and transformation of TFV to TFV-DP in tissues and prevents SHIV/SIV infection. HIVR4P: Chicago, IL.
10. Date A, Kates M, Kanvinde P, Anders N, Rudek M, Yoshida T, Hanes J, Bivalacqua T, Ensign LM. (2016) Development and evaluation of nano-scale chemotherapeutic agents for the local treatment of early stage bladder cancer. Johns Hopkins Postdoctoral Association retreat: Baltimore, MD.
11. Parikh K, Omiadze R, Josyula A, Shi R, Yazdi Y, McDonnell P, Hanes J, Ensign LM. (2016) Absorbable, high strength, antibiotic-eluting sutures for prevention of ophthalmic infection. Wilmer Annual Research Meeting: Baltimore, MD.
12. Parikh K, Omiadze R, Josyula A, Shi R, Al-Towerki A, Yazdi Y, McDonnell P, Ensign LM, Hanes J. (2016) A new method to produce nano-structured, ultra-thin, high-strength, drug-eluting sutures. Biomedical Engineering Society Annual Meeting: Minneapolis, Minnesota.
13. Ensign LM. (2015) Mucus-penetrating nanoparticles (MPP) for improved vaginal microbicide delivery for prevention of human immunodeficiency virus (HIV) infection. CFAR Annual Meeting: Seattle, WA.
14. Hoang T, DeLong K, Toler E, Hanes J, Cone R, Ensign LM. (2015) Dysbiosis in vaginal microbiota alters cervicovaginal mucus barrier properties to HIV. Human Immunity and the Microbiome in Health and Disease: Montreal, Canada.
15. Babu T, Maisel K, Date A, Hendrix C, Cone R, Ensign LM, Hanes J. (2015) Improved local delivery of HIV nanotherapies to the colorectum. NanoDDS 2015: Seattle, WA.
16. Hoang T, DeLong K, Toler E, Hanes J, Cone R, Ensign LM. (2015) Investigating the cervicovaginal mucus barrier properties to HIV diffusion. 8th Annual Johns Hopkins Women's Health Research Symposium: Baltimore, MD.
17. Lu HD, Spiegel AC, Amanda Hurley, Perez LJ, Maisel K, Ensign LM, Hanes J, Bassler BL, Semmelhack MF, Prud'homme RK. (2015) Nanoparticle delivery of *Vibrio cholerae* communication signals. American Chemical Society: Boston, MA.

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18. Ensign LM, Maisel K, Cone R, Hanes J. (2014) Nanomedicine for gastrointestinal drug delivery: mucoadhesion, friend or foe? NanoDDS 2014: Chapel Hill, NC.
19. Akgul Y, Ensign LM, Mahendroo M. (2014) Cervical hyaluronan (HA) is a key regulator of epithelial function and protects against infection mediated preterm birth. Society for Reproductive Investigation Annual Meeting: San Francisco, CA.
20. Maisel K, Moench T, Hendrix C, Cone R, Ensign LM, Hanes J. (2014) Enhanced colorectal drug delivery using hypotonic enema formulations. Biomedical Engineering Society Annual Meeting: San Antonio, TX.
21. Maisel K, Ensign LM, Reddy M, Cone R, Hanes J. (2014) Mucus penetrating nanoparticles improve drug and gene delivery to the gastrointestinal tract. Controlled Release Society Annual Meeting, Chicago, IL.
22. Ensign LM, Xu Q, Tang BC, Wang Y-Y, Cone R, Hanes J. (2013) Optimization of mucus penetrating particles and vehicle composition for improved mucosal surface drug delivery. AIChE Annual Meeting: San Francisco, CA.
23. Ensign LM, Hoen T, Maisel K, Cone R, Hanes J. (2013) Enhanced vaginal drug delivery using hypotonic vehicles. Biomedical Engineering Society Annual Meeting: Seattle, WA.
24. Ensign LM, Tang BC, Wang YY, Cone R, Hanes J. (2012) Mucus-penetrating particles for vaginal drug delivery. Biomedical Engineering Society Annual Meeting: Atlanta, GA.
25. Ensign LM, Tang BC, Wang YY, Tse TA, Hoen T, Cone R, Hanes J. (2012) Colloids for drug delivery to the vagina. ACS Colloids and Surface Symposium: Baltimore, MD.
26. Ensign LM, Tang BC, Wang YY, Cone R, Hanes J. (2011) Mucus penetrating nanoparticles: *in vivo* evaluation. Controlled Release Society: National Harbor, MD.
27. Wang YY, Lai SK, Ensign L, Zhong W, Cone R, Hanes J. (2011) Muco-inert nanoparticles reveal highly conserved microstructure of human mucus across entire physiological pH range. Gordon Research Conference: Ventura, CA.
28. Ensign LM, Tang BC, Wang YY, Cone R, Hanes J. (2010) Mucus-penetrating particles for enhanced vaginal distribution and sustained delivery of microbicides. Institute for NanoBioTechnology Symposium: Baltimore, MD.
29. Wang YY, Lai SK, Ensign L, Cone R, Hanes J. (2010) Mucus-penetrating particles achieve prolonged retention and improved distribution in the mouse vagina. Biomedical Engineering Society: Austin, TX.
30. Ensign LM, Wang YY, Lai SK, Tang BC, Cone R, Hanes J. (2009) Mucus-penetrating particles for sustained delivery of microbicides. Institute for NanoBioTechnology Symposium: Baltimore, MD.
31. Ensign LM, Wang YY. (2008) Muco-inert particles reveal highly-conserved human mucus microstructure across a broad pH range. Howard Hughes Medical Institute Interfaces Scholars Meeting: Chevy Chase, MD.

X. RESEARCH SUPERVISION

Research Staff

1. Fareeha Zulfiqar, Ph.D., Research Specialist (07/16-present)
2. Matthew Shin, Laboratory Technician (08/16-present)

Postdoctoral Fellows

3. Abhijit Date, Ph.D. (11/14-present)
4. Yoo Chun Kim, Ph.D. (01/15-present)
5. Gilad Halpert, Ph.D. (06/16-present)
6. Jairo Ortiz, M.D. (08/16-present)

Ph.D. Students

Curriculum Vitae

1. Katharina Maisel (09/10-12/14); Ph.D. in Biomedical Engineering
Co-advisor: Justin Hanes
Thesis: "Hypotonic Delivery of Drugs and Drug-loaded Nanoparticles to the Gastrointestinal Tract"
2. Kunal Parikh (09/12-present); Ph.D. Candidate in Biomedical Engineering
3. Thuy Hoang (08/14-present); Ph.D. Candidate in Pharmacology and Molecular Sciences
4. Taarika Babu (09/14-present); Ph.D. Candidate in Pharmacology and Molecular Sciences
5. Hannah Zierden (09/15-present); Ph.D. Candidate in Chemical and Biomolecular Engineering
6. Aditya Josyula (09/16-present); Ph.D. Candidate in Chemical and Biomolecular Engineering

Master's Students

1. Sumon Chattopadhyay (06/12-09/13); M.S. in Chemical & Biomolecular Engineering
Co-advisor: Justin Hanes
Currently: Research Data Coordinator, School of Public Health, JHU
2. Aditya Josyula, Biotechnology, (09/14-08/16)
Co-advisor: Justin Hanes
Currently: Ph.D. Candidate in Chemical and Biomolecular Engineering
3. Pranjali Kanvinde, Biotechnology, (01/16-present)

Visiting Professors/Scientists

1. Revaz Omiadze, Visiting Ophthalmologist, Republic of Georgia (06/14-present)
2. Jairo Ortiz, MD, (07/15-08/16)

Undergraduate Research Assistants

1. Geoffrey Yoo, Biomedical Engineering, 10/13-present
2. Ju Young Ahn, Biomedical Engineering, 10/13-present
3. Emily Toler, Biology, 06/14-08/16
4. Richard Shi, Biomedical Engineering, 06/14-present
5. Julie Shade, Biomedical Engineering, 05/16-present
6. Amina Lazrak, Chemical and Biomolecular Engineering, 01/15-present

High School Students

1. Ashil Koranne, Palo Alto High School (CA), 06/14-08/14
2. Veda Prasad, McLean High School (VA), 06/14-08/14
3. Patrick Yorkgitis, Archbishop Spalding High School (MD), 04/15-08/15
4. Melissa Kim, Bryn Mawr School (MD), 06/15-07/15
5. Aniya Cameron, Bryn Mawr School (MD), 06/16-07/16
6. Jwana Khatib, Bryn Mawr School (MD), 06/16-07/16
7. Jack Stump, Archbishop Spalding High School (MD), 06/16-07/16
8. Ilina Gobburu, The School of the Cathedral of Mary Our Queen (MD), 07/16-08/16

XI. SERVICE TO THE UNIVERSITY

1. Abstract reviewer, Women's Health Research Group Annual Meeting, 2014
2. Grant reviewer, School of Medicine Synergy Awards, 2015
3. Committee, Wilmer Friday Afternoon Research Meetings, 2015-present
4. Organizer, Center for Nanomedicine Seminar Series, 2015-present
5. Organizer, Wilmer Science Seminar Series, 2015
6. Abstract reviewer, Women's Health Research Group Annual Meeting, 2016
7. Grant Reviewer, JHU Innovation and Synergy Awards, 2016

XII. TEACHING EXPERIENCE

Curriculum Vitae

Spring 2009	Teaching Assistant, <i>Modeling Dynamics and Control for Chemical and Biological Systems</i> (540.409, Chemical and Biomolecular Engineering), Johns Hopkins University
Spring 2008	Teaching Assistant, <i>Modeling Dynamics and Control for Chemical and Biological Systems</i> (540.409, Chemical and Biomolecular Engineering), Johns Hopkins University
Spring 2007	Teaching Assistant, <i>Energy Balances</i> (ChBE 201, Chemical and Biomolecular Engineering), Ohio State University
Winter 2007	Teaching Assistant, <i>Mass Transfer</i> (ChBE 522, Chemical and Biomolecular Engineering), Ohio State University
Fall 2006	Teaching Assistant, <i>Heat Transfer</i> (ChBE 521, Chemical and Biomolecular Engineering), Ohio State University
Spring 2006	Teaching Assistant, <i>Energy Balances</i> (ChBE 201, Chemical and Biomolecular Engineering), Ohio State University
2005-2006	Tutor, Residence Hall Association, Ohio State University

XIII. EXTRACURRICULAR ACTIVITIES

2012-2013	Volunteer, GED prep tutor, Johns Hopkins University
2012	Volunteer mentor, Bringing Ladies and Science Together (BLAST), Johns Hopkins University
2012	Volunteer, STEM activity leader, Johns Hopkins University
2012	Builder, Habitat for Humanity, Johns Hopkins University
2012	Board, Epicurious Program, Johns Hopkins University
2010-2013	Gift Delivery Elf, Christmas Project, Northrop Grumman
2010	Wilmer Team Member/Fundraiser, Juvenile Diabetes Research Foundation Walk, Johns Hopkins University
2010	Volunteer Lab Mentor, Incentive Mentorship Program, Johns Hopkins University
2009	Science and Engineering Mentor/Science Fair Judge, Girls Scouts of America, Johns Hopkins University
2009	Relay for Life Team Leader, Women of Whiting, Johns Hopkins University
2008-	Parent Volunteer/PTA, Rodgers Forge Elementary School
2008-2009	Outreach Chair, Women of Whiting, Johns Hopkins University
2007-2012	Team Member/Fundraiser, Cystic Fibrosis Foundation Great Strides Walk, Johns Hopkins University
2007-2008	Volunteer, Ricky Meyers Day of Service, Johns Hopkins University
2006	Committee, Undergraduate Research Organization, Ohio State University
2006	Assistant Coach, Westerville Youth Baseball and Softball League
2005-2007	Project Coordinator, Engineers in Motion, Ohio State University
2004-2006	Engineering Ambassador/Tour Guide, College of Engineering, Ohio State University
2003-2006	Group and Activities Leader, Women in Engineering, Ohio State University
2003-2006	Activities Coordinator/Volunteer, Society for Women Engineers, Ohio State University
2003	English Conversation Partner, Office of International Education, Ohio State University