

Anna K. Blakney

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Education

University of Washington

Doctor of Philosophy in Bioengineering, Certificate in Molecular Medicine

Seattle, WA, USA
09/2012 – 10/2016

University of Colorado

Bachelor of Science, Chemical and Biological Engineering, Minor in Biochemistry

Boulder, CO, USA
08/2008 – 05/2012

Research Experience

Marie Curie Post-Doctoral Research Fellow (joint with Prof. Molly Stevens, ICL)

01/2019

Whitaker Post-Doctoral Fellow (Imperial College London)

12/2016 – present

- Post-Doctoral Research Fellow in Prof. Robin Shattock's Laboratory
- Optimization of self-amplifying RNA formulations for infectious disease prevention using small animal and human skin explant models
- Established production of RNA and *in vitro/in vivo* evaluation in the lab, initiated collaboration with surgeons at Charing Cross Hospital and established human skin explant model, collaborated with Prof. Becer (Queen Mary University) to develop novel polymers for saRNA delivery, participated in collaborations through EPSRC Future Vaccine Hub at ICL, including Prof. Molly Stevens (novel polymeric delivery systems, ongoing), Prof. Rongjun Chen (virus like liposome delivery platform, ongoing), Prof. Nilay Shah (modeling of RNA production scale-up, ongoing), Prof. Jason Hallett (stabilization of RNA formulations using ionic liquids, ongoing), Prof. Cameron Alexander (excipients for optimal RNA formulation, University of Nottingham, ongoing)

National Science Foundation Graduate Research Fellow (University of Washington)

09/2012 – 09/2016

NIH Molecular Medicine Training Fellow (University of Washington)

07/2013 – 07/2014

- Graduate Research Assistant in Prof. Kim Woodrow's Laboratory
- Design and characterization of combination small molecule drug-eluting electrospun fibers for microbicidal and contraceptive use
- Designed and developed fiber delivery platforms, developed LC-MS/MS method to quantify a triple antiretroviral cocktail in NHP tissues, collaborated with the Washington Primate Center to do safety and PK evaluation of fibers in NHPs, collaborated with Prof. Ratner to develop novel polymers for sustained release fibers

National Science Foundation/USAID GROW Fellow (University of Cape Town)

10/2014 – 03/2015

- Visiting Graduate Research Assistant in Prof. Heather Jaspan's Laboratory
- Investigation of immune cell profile and temporal response of HIV-exposed infants after receiving BCG vaccine using flow cytometry
- Worked with WISH clinical trial collaborators to process and analyze microbiome samples

Senior Thesis (University of Colorado)

08/2011 – 05/2012

NIH (National Institutes of Health) Fellow

08/2010 – 05/2011

UROP (Undergraduate Research Opportunity Program) Fellow

08/2009 – 05/2010

BURST (Bioscience Undergraduate Research Skills and Training) Fellow

09/2008 – 05/2009

SURE (Summer Undergraduate Research Experience) Fellow

07/2008 – 08/2008

- Undergraduate Research Assistant in Prof. Bryant's tissue engineering lab
- Characterization of the anti-inflammatory effects of mesenchymal stem cells and differentiating stem cells
- Developed *in vitro* model to characterize foreign body response using PCR

REU (Research Experience for Undergraduates) Fellow (University of Pittsburgh)

05/2011 – 08/2011

- Prof. Wagner cardiac tissue engineering lab
- Characterization and manipulation of growth factor release from microparticles in thermoresponsive hydrogels

Professional Experience

Life Sciences Discovery Fund

06/2015 – 06/2016

- Life Sciences Analyst, Seattle, WA
- Assistance with grant reviews and new grant program expansion

Civitas Therapeutics

05/2012 – 09/2012

- Research Associate, Boston, MA
- Optimization of QC instrument flow profiles to reflect clinical results

Roche Colorado

05/2010 – 08/2010

- Co-op Intern in Research and Development, Boulder, CO
- Improved chemical processing of a type II diabetes drug

Fellowships

2018 Royal Commission for the Exhibition of 1851 Fellowship (Declined), Imperial College London- \$172,000
 2018 Marie Skłodowska-Curie Post-Doctoral Fellowship (Top 5% of Applicants), Imperial College London- \$210,000
 2016 Whitaker Post-Doctoral Fellowship, Imperial College London- \$101,000
 2014 NSF GROW with USAID Fellow, University of Cape Town- \$15,000
 2013 NIH Molecular Medicine Training Grant Fellow, University of Washington- \$35,000
 2012 NSF Graduate Research Fellow, University of Washington- \$132,000
 2011 REU Fellowship, University of Pittsburgh
 2010 NIH Fellowship, CU Boulder
 2009 UROP-HHMI Fellowship, CU Boulder
 2008 BURST Fellowship, CU Boulder
 2008 SURE Fellowship, CU Boulder

Awards

2016 MIT's Rising Star in Biomedical Engineering Workshop Invited Attendee, Boston, MA
 2016 HIV Research for Prevention Full Travel Scholarship
 2016 Controlled Release Society Hoffman Student Travel Grant Award (\$2,000)
 2016 College of Engineering Outstanding Graduate Researcher Award Nominee
 2015 UW Business Plan Competition, 2nd Place, Best Healthcare Innovation (\$12,500)
 2015 Science and Technology Showcase Poster Competition Grand Prize Winner (\$1000)
 2014 C4C Innovator Showcase Poster Competition Grand Prize Winner (\$1000)
 2014 SFB Student Travel Achievement Recognition, Honorable Mention
 2012 Colorado Engineering Council Silver Medal Award Winner, Singular/College-wide
 2012 Distinguished Senior, Department of Chemical and Biological Engineering
 2012 Society for Biomaterials Student Award for Outstanding Research, Singular/National Award
 2011 First Place Student Poster Competition, AIChE Annual National Meeting, Minneapolis, October 14-17, 2011 Food, Pharmaceutical and Biotechnology Division
 2011 Provost Achievement Award, CU Boulder
 2011 Engineering Merit Scholarship
 2011 Sigma Xi Grant-In-Aid of Research Award, "Characterization of Anti-Inflammatory Effects of Mesenchymal Stem Cells on Activated Macrophages", National Award
 2011 Outstanding Undergraduate Research Award, Chemical Engineering, CU Boulder
 2010 First Place Student Poster Competition, AIChE Annual National Meeting, Salt Lake City, November 7-12, 2010, Food, Pharmaceutical and Biotechnology Division
 2010 BSI Travel Grant for AIChE Annual Meeting
 2010 Engineering Merit Scholarship
 2010 Sigma Xi Outstanding Undergraduate Research Award, CU Boulder
 2010 Outstanding Undergraduate Research Award, Chemical Engineering, CU Boulder
 2009 Engineering Merit Scholarship

Publications

1. **A.K. Blakney**, P.F. McKay, B. Ibarzo Yus, J. E. Hunter, E. A. Dex, R. J. Shattock. The skin you're in: DoE optimization of lipid nanoparticle saRNA formulations in human skin explants. *Submitted*.
2. **A.K. Blakney**, P. F. McKay, B. Ibarzo Yus, Y. Aldon, R. J. Shattock. Inside out: optimization of lipid nanoparticle

formulations for exterior complexation and in vivo delivery of saRNA. *Submitted*.

3. K. Lennard, S. Dabee, S. L. Barnabas, E. Havyarimana, **A. K. Blakney**, S. Z. Jaumdally, G. Botha, N. N. Mkhize, L. G. Bekker, D. A. Lewis, G. Gray, N. Mulder, J. S. Passmore, H. B. Jaspan. Vaginal microbiota varies by geographical location in South African women. *Submitted*.
4. **A. K. Blakney**, P. F. McKay, R. J. Shattock. Structural components for amplification of positive and negative strand VEEV splitzicons. *Frontiers in Molecular Biosciences*. 5: 71 (2018). PMID 30094239
5. **A.K. Blakney**, G. Yilmaz, P. F. McKay, R. J. Shattock, C. R. Becer. One size does not fit all: The effect of chain length and charge density of poly(ethylene imine) based copolymers on delivery of pDNA, mRNA and RepRNA polyplexes. *Biomacromolecules*. 19 (7): 2870-2879 (2018). PMID 29698602
6. K. Lennard, S. Dabee, S. L. Barnabas, E. Havyarimana, **A. K. Blakney**, S. Z. Jaumdally, G. Botha, N. Mkhize, L.G. Bekker, D. A. Lewis, G. Gray, N. Mulder, J. S. Passmore, H. B. Jaspan. Microbiota composition predicts genital tract inflammation and persistent bacterial vaginosis in adolescent South African women. *Infection and Immunity*. 86 (1): 1-18 (2018). PMID 29038128
7. E.A. Krogstad, R. Ramanathan, C. Nhan, **A.K. Blakney**, S. Cao, J. Kraft, R. Ho, K.A. Woodrow. Nanoparticle-releasing nanofiber composites for enhanced in vivo vaginal retention. *Biomaterials*. 144: 1-16 (2017). PMID 28802690
8. **A. K. Blakney**, Y. Jiang, K. A. Woodrow. Application of electrospun fibers for female reproductive health. *Drug Delivery and Translational Research*. 1-9 (2017). PMID 28497376
9. **A.K. Blakney**, A.B. Little, Y. Jiang, K.A. Woodrow. In vitro-ex vivo correlations between a cell-laden hydrogel and mucosal tissue for screening composite delivery systems. *Drug Delivery*. 24 (1): 582-590 (2017). PMID 28222612
10. **A.K. Blakney**, F.I. Simonovsky, I.T. Suydam, B.D. Ratner, K.A. Woodrow. Rapidly Biodegrading PLGA-Polyurethane Fibers for Sustained Release of Physicochemically Diverse Drugs. *ACS Biomaterials Science and Engineering*. 2 (9): 1595-1607 (2016). PMID 28989956
11. R.J. Stoddard, A. Steger, **A.K. Blakney**, K.A. Woodrow. In pursuit of functional electrospun materials for clinical applications in humans. *Therapeutic Delivery*. 7 (6): 387-409 (2016). PMID 27250537
12. **A.K. Blakney**, Y. Jiang, D. Whittington, K.A. Woodrow. Simultaneous Measurement of Etravirine, Maraviroc and Raltegravir in Pigtail Macaque Plasma, Vaginal Secretions and Vaginal Tissue using a LC-MS/MS Assay. *Journal of Chromatography B*. 1025: 110-118 (2016). PMID 27326000
13. A.C. Hesselting, **A.K. Blakney**, C.E. Jones, M.M. Esser, C. de Beer, L. Kuhn, M. F. Cotton, H. B. Jaspan. Delayed BCG Immunization Is Not Associated with Altered Antibody Responses to EPI Vaccines in HIV-exposed and – unexposed South African Infants. *Vaccine*. 34 (32): 3702-3709 (2016). PMID 27055019
14. Y.H. Jiang, S. Cao, D. Bright, A. Bever, **A.K. Blakney**, I. Suydam, K.A. Woodrow. Nanoparticle-based ARV drug combinations for synergistic inhibition of cell-free and cell-cell HIV transmission. *Molecular Pharmaceutics*. 12 (12): 4363-4374 (2015). PMID 26529558
15. **A.K. Blakney**, C.T. Tchakoute, A.C. Hesselting, E.B. Kidzeru, C.E. Jones, J.S. Passmore, D.L. Sodora, C.M. Gray, H.B. Jaspan. Delayed BCG Vaccination Results in Minimal Alterations in T cell Immunogenicity of Acellular Pertussis and Tetanus Immunizations in HIV-Exposed Infants. *Vaccine*. 33 (38):4782-4789 (2015). PMID 26259542
16. C.T. Tchakoute, A.C. Hesselting, **A.K. Blakney**, H.B. Jaspan. Reply to Thysen et al. *Journal of Infectious Diseases*. 212 (8): 1342-1343 (2015). PMID 25821228
17. M.D. Swartzlander, **A.K. Blakney**, L.D. Amer, K.D. Hankenson, T.R. Kyriakides, S.J. Bryant. Immunomodulation by Mesenchymal Stem Cells Combats the Foreign Body Response to Cell-Laden Synthetic Hydrogels. *Biomaterials*. 41(1):79-88 (2015). PMID 25522967
18. M.D. Swartzlander, C.A. Barnes, **A.K. Blakney**, J.L. Kaar, T.R. Kyriakides, S.J. Bryant. Linking the foreign body response and protein adsorption to PEG-based hydrogels using proteomics. *Biomaterials*. 41(1):26-36 (2015). PMID 25522962
19. **A.K. Blakney**, E.A. Krogstad, Y.H. Jiang and K.A. Woodrow. Delivery of Multipurpose Prevention Drug Combinations from Electrospun Nanofibers Using Composite Microarchitectures. *International Journal of Nanomedicine*. 9(1):2967-2978 (2014). PMID 24971008
20. D. Nelson, R. Hashizume, T. Yoshizumi, **A. Blakney**, Z. Ma and W. Wagner. Investigation of a synthetic biodegradable hydrogel with controlled protein delivery for intramyocardial injection. *Biomacromolecules*. 15(1):1-11 (2014). PMID 24345287

21. **A.K. Blakney**, C. Ball, E.A. Krogstad and K.A. Woodrow. Electrospun Fibers for Vaginal Anti-HIV Drug Delivery. *Journal of Antiviral Research*. 100: S9-S16 (2013). PMID 24188701
22. M.D. Swartzlander, A.D. Lynn, **A.K. Blakney**, T.R. Kyriakides and S.J. Bryant. Understanding the Host Response to Cell-Laden Poly(ethylene glycol)-based Hydrogels. *Biomaterials*. 34(4): 952-964 (2013). PMID 23149012
23. **A.K. Blakney**, M.D. Swartzlander, and S.J. Bryant. The effects of substrate stiffness on the *in vitro* activation of macrophages and *in vivo* host response to poly(ethylene glycol)-based hydrogels. *Journal of Biomedical Research Part A*. 100A(6): 1375-1386 (2012). PMID 22407522
24. A.D. Lynn, **A.K. Blakney**, T.R. Kyriakides, and S.J. Bryant. Temporal progression of the host response to implanted poly(ethylene glycol)-based hydrogels. *Journal of Biomedical Materials Research Part A*. 96(4):621-31 (2011). PMID 21268236

Presentations

1. **A.K. Blakney**, P.F. McKay, R.J. Shattock. Delivery and Immunogenicity of Internally and Externally Loaded Lipid Nanoparticles for saRNA Vaccines. GRC Drug Carriers in Medicine and Biology, Mt. Snow, VT. August 11-17, 2018.
2. **A.K. Blakney**, P.F. McKay, R.J. Shattock. Structural components for amplification of positive and negative strand VEEV RNA splitzicons. Synthetic Biology: Engineering, Evolution & Design (SEED), Scottsdale, AZ. June 3-7, 2018.
3. **A.K. Blakney**, P.F. McKay, R.J. Shattock. Optimizing delivery strategies of RNA replicons for HIV prevention. Whitaker Foundation Annual Enrichment Seminar, Budapest, Hungary. April 9-13, 2018. ***oral presentation**
4. **A.K. Blakney**, P.F. McKay, R.J. Shattock. Optimizing delivery strategies of RNA replicons for HIV prevention. Whitaker Foundation Annual Enrichment Seminar, Lisbon, Portugal. April 24-28, 2018.
5. J. Hernandez, **A.K. Blakney**, B.H. Katz, J.T. Jensen, K. A. Woodrow. Optimization of drug loaded electrospun fibers to induce fibrosis of the utero-tubal junction. BMES, Phoenix, AZ. October 11-14, 2017.
6. **A.K. Blakney**, Y. Jiang, Y. Cosgrove Sweeney, R. Stoddard, E. Roberts, J. Phan, R. Edmark, D. Patton, K.A. Woodrow. Rapid and sustained release combination drug-eluting fibers for vaginal HIV prevention result in high, lasting ARV concentrations in pigtail macaques. HIV R4P Conference, Chicago, IL. October 17-21, 2016.
7. **A.K. Blakney**, A.B. Little, Y. Jiang, K. A. Woodrow. In vitro-ex vivo correlations between a novel cell-laden hydrogel and mucosal tissue for screening composite delivery systems. Controlled Release Society Annual Conference, Seattle, WA. July 17-20, 2016. ***oral presentation**
8. **A.K. Blakney**, F.I. Simonovsky, I.T. Suydam, B.D. Ratner, K.A. Woodrow. A New Class of Biodegradable Polyurethanes with PLGA Moieties for Sustained Release of Physicochemically Diverse Drugs from Electrospun Fibers with Biologically Relevant Degradation Rates. World Biomaterials Congress, Montreal, Quebec, Canada. May 17-22, 2016. ***oral presentation**
9. **A.K. Blakney**, K.A. Woodrow. A Hydrogel Tissue Model for Evaluation of Triple-Antiretroviral Electrospun Fibers as a Microbicide. 2014 HIV R4P Conference, Cape Town, South Africa. October 27-31, 2014.
10. **A.K. Blakney**, E.A. Krogstad, Y.H. Jiang, K.A. Woodrow. Role of Microarchitecture in Co-delivery of Drug Combinations from Electrospun Fabrics. 2014 Society for Biomaterials Annual Meeting, Denver, CO. April 16-19, 2014.
11. **A.K. Blakney**, E.A. Krogstad, K.A. Woodrow. Levonorgestrel and Tenofovir Composite Fibers for Dual Prevention of HIV-1 and Pregnancy. 2013 Biomedical Engineering Society Annual Meeting, Seattle, WA. September 25-28, 2013.
12. **A.K. Blakney**, M.D. Swartzlander, S.J. Bryant. The effects of substrate stiffness on the *in vitro* activation of macrophages and *in vivo* host response to poly(ethylene glycol)-based hydrogels. 2012 Society for Biomaterials Meeting, New Orleans, LA. October 4-6, 2012.
13. N. Farnsworth, J.J. Roberts, N. J. Steinmetz, S.C. Skaalure, M.D. Swartzlander, **A.K. Blakney**, S.J. Bryant. Regulating Biophysical and Biochemical Cues to Promote Integration for Functional Tissue Regeneration. 2011 Annual Butcher Symposium. Westminster, CO, November 11, 2011.
14. **A.K. Blakney**, D.M. Nelson, W.R. Wagner. Injectable, Thermally Responsive Hydrogel Containing Microparticles as a Treatment for Heart Failure. 2011 AIChE Annual Meeting, Minneapolis, MN. October 14-17, 2011.
15. R. Lawal, **A.K. Blakney**, M.D. Swartzlander, S.J. Bryant. Understanding macrophage activation in response to LPS-stimulation when cultured on PEG-RGD hydrogels. 2011 Annual Meeting of the Society for Biomaterials.

Orlando, FL, April 13-16, 2011.

16. M.D. Swartzlander, **A.K. Blakney**, A.D. Lynn, T.R. Kyriakides, S.J. Bryant. Incorporation of RGD attenuates the foreign body reaction to PEG hydrogels. 2011 Annual meeting of the Society for Biomaterials. Orlando, FL, April 13-16, 2011.
17. **A.K. Blakney**, A.D. Lynn, S.J. Bryant. Characterizing the Mutual Effects of Activated Macrophages on Fibroblasts Encapsulated in Poly(ethylene glycol) Hydrogels. 2010 AIChE Annual Meeting, Salt Lake City, UT. Nov 7-12, 2010.
18. Lynn A.D., **A.K. Blakney**, M.D. Swartzlander, and S.J. Bryant. Macrophage affect and are affected by cells encapsulated in PEG-based hydrogels: An in vitro co-culture study. 2010 AIChE Annual Meeting, Salt Lake City, UT. Nov 7-12, 2010.
19. A.D. Lynn, **A.K. Blakney**, T.R. Kyriakides and S.J. Bryant. Macrophage Interrogation of PEG-Based Hydrogels Used in Tissue Engineering Applications. 2009 AIChE Annual Meeting. Nashville, TN, November 8-9, 2009.

Book Chapters

1. **A.K. Blakney**, J.J. Antetomaso, W.W. Leung and D.H. Kim. Interactions of Stem Cells and Components of the Extracellular Matrix. *Stem Cell NanoEngineering*. Wiley; 35-45.

Patents

1. K. A. Woodrow, C. Ball, **A. K. Blakney**, E. A. Krogstad, H. Nie. "Vaginal Matrices: Nanofibers for Contraception and Prevention of HIV Infection." US Patent Application filed November 6, 2013, University of Washington.

Grants

AstraZeneca/Imperial College Joint Translation Fund 09/2018 – 09/2019
"Optimization of Modular, Exteriorly-Loaded Lipid Nanoparticles for mRNA Delivery in Human Skin Explants" (PI: McKay, £70,000) *Contribution*: wrote grant and generated preliminary data

Imperial College Joint Translational Fund 08/2017 – 08/2018
"Optimised Delivery of RNA Based Biotherapeutics" (PI: Shattock, £100,000) *Contribution*: assisted in writing grant and generated preliminary data

Oregon Permanent Contraception Research Center 11/2016 – 11/2017
"Integration of Electrospun Fibers onto an Intrauterine Device for Sustained, Precisely Located Delivery of Sclerosing Agents to Induce Fibrosis" (PI: Woodrow, \$110,000) *Contribution*: wrote grant and generated preliminary data

Sigma Xi, Grant-In-Aid of Research 01/2010 – 01/2011
"Characterization of Anti-Inflammatory Effects of Mesenchymal Stem Cells on Activated Macrophages" (PI: Bryant, \$2,500) *Contribution*: wrote grant and generated preliminary data

Teaching

BioE Capstone Principles Spring 2014
Teaching Assistant, University of Washington
Professional Series: Proposal Writing Winter 2014
Teaching Assistant, University of Washington
Immunoengineering Winter 2015 & 2016
Invited Guest Lecturer, University of Washington
Bioengineering Solutions to Improve the Health of Women, Children & Adolescents Winter 2016
Invited Guest Lecturer, University of Washington

Professional Societies

American Institute of Chemical Engineers (AIChE)
Sigma Xi, The Scientific Research Society
Society for Biomaterials
Biomedical Engineering Society
Controlled Release Society

Service & Outreach

Wright Fleming Institute Seminar Organizer	09/2018 – present
Wohl Reach Out Lab, Activity Leader	04/2018
Imperial Festival	04/2018
Conversation Project	10/2017 – present
UW BioE Department Faculty Candidate Search, student escort volunteer	01/2016 – 02/2016
Molecular Medicine Program Executive Committee, student representative	09/2015 – 10/2016
Making Connections Tutor	10/2013 – 06/2016
Paws on Science	04/2013, 2014, 2015
Graduate Student Representative, UW Department of Bioengineering	10/2012 – 08/2014
Treasurer for the Engineering Excellence Fund Board	05/2009 – 05/2012
Teaching Assistant for Biology for Engineers	01/2012 – 05/2012
Teaching Assistant for Creative Technology	08/2010 – 05/2011
Research Coordinator for the Engineering Honors Program	08/2009 – 05/2012
Engineering Fellow	05/2010 – 05/2012
Participant in the Engineering Honors Program	08/2008 – 05/2012
Member of the Internal Review Committee, Department of Chemistry and Biochemistry	02/2010
Member of the Undergraduate Council, Chemical and Biological Engineering	09/2008 – 05/2012
Rocky Mountain Riding Therapy, weekly volunteer	05/2010 – 05/2012
Habitat for Humanity volunteer	04/2009

Students Mentored

Amelia Thornley (Biomedical Sciences, BSc Summer Student)	07/2018 – 08/2018
Katharine Hopkinson (Immunology, BSc Summer Student)	06/2018 – 08/2018
Karnyart Samnuan (Virology, MSc)	03/2018 – 09/2018
Rachel Barton (Immunology, MRes)	01/2018 – 04/2018
Christina Nhan (Bioengineering, Junior)	09/2015 – 06/2016
Adam Little (Bioengineering, Freshman)	06/2015 – 06/2016
Annie Wu (Bioengineering, Freshman)	11/2013 – 05/2014

References

Prof. Robin Shattock
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Department of Medicine
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Prof. Kim Woodrow
University of Washington
Department of Bioengineering
Email: woodrow@uw.edu
Phone: +1 (206) 685-3581

Prof. Molly Stevens
Imperial College London
Department of Materials
Email: m.stevens@imperial.ac.uk
Phone: +44 (0)20 7594 6804

Prof. Heather Jaspan
University of Cape Town
Department of Immunology
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Prof. Stephanie Bryant
University of Colorado
Department of Chemical and Biological Engineering
Email: stephanie.bryant@colorado.edu
Phone: +1 (303) 735-6714