

Anna K. Blakney, PhD

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Employment

- Marie Skłodowska-Curie Post-Doctoral Research Fellow** (Imperial College London) 01/2019 – present
Joint between Prof. Robin Shattock and Prof. Molly Stevens
- Optimization of self-amplifying RNA formulations for infectious disease prevention using small animal and human skin explant model
 - Preparing formulations for Consortium for Epidemic Preparedness Innovations (CEPI) project to produce vaccines for Disease X, including preclinical studies in mice, ferrets, rabbits and nonhuman primates
- Whitaker Post-Doctoral Research Fellow** (Imperial College London) 12/2016 – 12/2018
Prof. Robin Shattock's Laboratory
- 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 (one manuscript published)
 - Collaborated with Prof. Remzi Becer (Warwick University) to develop novel polymers for saRNA delivery (one manuscript published, two in preparation)
 - Participated in five collaborations through EPSRC Future Vaccine Manufacturing Hub including:
 - Prof. Molly Stevens (novel polymeric delivery systems, manuscript in preparation, ongoing)
 - Prof. Rongjun Chen (virus like liposome delivery platform, manuscript in preparation, 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, manuscript in preparation, ongoing)
- Life Sciences Analyst** (Life Sciences Discovery Fund, Seattle, WA) 06/2015 – 06/2016
- Assistance with grant reviews and new grant program expansion
- Research Associate** (Civitas Therapeutics, Boston, MA) 05/2012 – 09/2012
- Optimization of QC instrument flow profiles to reflect clinical results for inhalable Parkinson's drug
- Co-Op Intern** (Roche, Boulder, CO) 05/2010 – 08/2010
- Improved chemical processing of a type II diabetes drug

Qualifications

- Doctor of Philosophy in Bioengineering** Seattle, WA, USA
University of Washington, Certificate in Molecular Medicine 09/2012 – 10/2016
Thesis: "Electrospun Fibers for HIV Prevention: Translational Design for *In Vivo* Efficacy"
- National Science Foundation Graduate Research Fellow** 09/2012 – 09/2016
NIH Molecular Medicine Training Fellow 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 pharmacokinetic evaluation of fibers in NHPs
 - Collaborated with Prof. Buddy 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

Bachelor of Science in Chemical and Biological Engineering

University of Colorado, Boulder, Minor in Biochemistry

Boulder, CO, USA

08/2008 – 05/2012

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

Patents

1. R. J. Shattock, M. M. Stevens, **A. K. Blakney**, Y. Zhu. "Bioreducible polymers for nucleic acid delivery." UK IPO Application filed October 2019, Imperial College London.
2. R. J. Shattock, **A. K. Blakney**, P. F. McKay. "RNA replicons with *cis*-encoded viral protein interferon inhibitors." UK IPO Application (#1908729.5) filed June 18, 2019, Imperial College London.
3. 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.

Fellowships (Total secured: \$697,500)

2018 Royal Commission for the Exhibition of 1851 Fellowship (declined in favor of Marie Curie)- \$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- \$8,000

2010 NIH Fellowship, CU Boulder- \$6,000

2009 UROP-HHMI Fellowship, CU Boulder- \$8,000

2008 BURST Fellowship, CU Boulder- \$8,000

2008 SURE Fellowship, CU Boulder- \$2,500

Grants (Total secured: \$345,500)

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

Awards (Select from last 5 years, out of 24 total)

2019 European Research & Innovation Days ‘Science is Wonderful!’ Travel Award (£1,000)
2019 Imperial College London’s Provosts Award for Excellence in Animal Research (£1,000)
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

Teaching

Genome-Based Therapeutics	Upcoming, Spring 2020
Invited Lecturer, Imperial College London (~50 MSc students)	
Bioengineering Solutions to Improve the Health of Women, Children & Adolescents	Winter 2016
Invited Guest Lecturer, University of Washington (~100 undergraduate and graduate students)	
Immunoengineering	Winter 2015 & 2016
Invited Guest Lecturer, University of Washington (~30 undergraduate and graduate students)	
Professional Series: Proposal Writing	Winter 2014
Teaching Assistant, University of Washington (~30 graduate students)	
BioE Capstone Principles	Spring 2014
Teaching Assistant, University of Washington (~30 undergraduate students)	

Supervision

PhD Students:	
Materials Science	05/2019 – present
Virology	04/2019 – present
Immunology	09/2018 – present
Masters Students:	
Virology, MSc (Outcome: Distinction)	03/2019 – 09/2019
Virology, MSc (Outcome: Merit, continued for PhD)	03/2018 – 09/2019
Immunology, MRes (Outcome: Merit, continued for PhD)	01/2018 – 06/2018
Undergraduate Students:	
Biomedical Sciences, BSc Summer Student	07/2018 – 08/2018
Immunology, BSc Summer Student	06/2018 – 08/2018
Bioengineering, Junior	09/2015 – 06/2016
Bioengineering, Freshman	06/2015 – 06/2016
Bioengineering, Freshman	11/2013 – 05/2014

Service

Wright Fleming Institute Seminar Organizer	09/2018 – present
Conversation Project	10/2017 – 11/2018
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
Graduate Student Representative, UW Department of Bioengineering	10/2012 – 08/2014
Treasurer for the Engineering Excellence Fund Board	05/2009 – 05/2012
Research Coordinator for the Engineering Honors Program	08/2009 – 05/2012
Engineering Fellow	05/2010 – 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

Outreach

European Research and Innovation Days 'Science is Wonderful!', ~1500 students	09/2019
Wohl Reach Out Lab, Activity Leader, ~30 students	04/2018, 04/2019
Imperial Festival, ~100 students	04/2018
Paws on Science, ~200 students	04/2013, 2014, 2015

Evidence of Esteem

Invited talks at international conferences:

- **A.K. Blakney**, Y. Zhu, P.F. McKay, M.M. Stevens, R.J. Shattock. Big is beautiful: Enhanced saRNA delivery and immunogenicity by a higher molecular weight, bioreducible, cationic polymer. 7th International mRNA Health Conference, Berlin, Germany. November 11-12, 2019.

Invited reviewer:

- International Journal of Pharmaceutics
- Journal of Nanotechnology
- PLOS One
- Journal of Controlled Release

Professional Societies

Controlled Release Society	(2014 – present)
Biomedical Engineering Society	(2012 – present)
Society for Biomaterials	(2010 – present)

Presentations (select from last 5 years, out of 1 invited, 5 oral and 17 posters)

13. **A.K. Blakney**, Y. Zhu, P.F. McKay, M.M. Stevens, R.J. Shattock. Big is beautiful: Enhanced saRNA delivery and immunogenicity by a higher molecular weight, bioreducible, cationic polymer. 7th International mRNA Health Conference, Berlin, Germany. November 11-12, 2019. ***invited oral presentation**
12. **A.K. Blakney**, P.F. McKay, C.R. Bouton, R.J. Shattock. Enhancement of Protein Expression and Immunogenicity of saRNA Vaccines by *cis*-Encoded Interferon Inhibiting Viral Proteins. GRC Nucleosides, Nucleotides and Oligonucleotides, Newport, Rhode Island. June 23-28, 2019.
11. **A.K. Blakney**, P.F. McKay, B. Ibarzo Yus, J.E. Hunter, E.A. Dex, R.J. Shattock. The Skin You're In: Design of Experiments Optimization of LNP saRNA Formulations in Human Skin Explants. Keystone Symposia on Delivering Therapeutics Across Biological Barriers, Dublin, Ireland. May 5-9, 2019. ***oral presentation**
10. **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.
9. **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.
8. **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**
7. **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.

6. 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.
5. **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.
4. **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**
3. **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**
2. **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.
1. **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.

Publications

- **A. K. Blakney**, Y. Zhu, P. F. McKay, C. R. Bouton, J. Yeow, J. Tang, C. L. Grigsby, R. J. Shattock, M. M. Stevens. Big is beautiful: Enhanced saRNA delivery and immunogenicity by a higher molecular weight, bioreducible, cationic polymer. Under Review- Nature Materials.
 - **A. K. Blakney**, R. Liu, G. Yilmaz, Y. Abdouni, P. F. McKay, C. R. Bouton, R. J. Shattock, C. R. Becer. Targeted Gene Delivery in Human Skin Using Supramolecular Cationic Glycopolymers. Under Review- Nature Communications.
 - **A. K. Blakney**, Y. Abdouni, G. Yilmaz, R. Liu, P. F. McKay, C. R. Bouton, R. J. Shattock, C. R. Becer. Mannosylated poly(ethylene imine) copolymers enable higher saRNA uptake and expression in human skin explants. Under Review- Biomacromolecules.
25. **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. *Gene Therapy*. 9 : 1-10 (2019). PMID 31300730
 24. 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. *The South African Journal of Science and Technology*. 38 (1): 1-9 (2019).
 23. **A. K. Blakney**, P. F. McKay, D. Christensen, B. Ibarzo Yus, Y. Aldon, F. Follmann, R. J. Shattock. Effects of cationic adjuvant formulation particle type, fluidity and immunomodulators on delivery and immunogenicity of saRNA. *Journal of Controlled Release*. 304: 65-74 (2019). PMID 31071377
 22. **A.K. Blakney**, P.F. McKay, B. Ibarzo Yus, J. E. Hunter, E. A. Dex, R. J. Shattock. The Skin You Are In: Design-of-Experiments Optimization of Lipid Nanoparticle Self-Amplifying RNA Formulations in Human Skin Explants. *ACS Nano*. 13 (5): 5920-5920 (2019). PMID 31046232
 21. **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
 20. **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
 19. 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
 18. 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

17. **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
16. **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
15. **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 2898995
14. 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
13. **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
12. A.C. Hesseling, **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
11. 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
10. **A.K. Blakney**, C.T. Tchakoute, A.C. Hesseling, 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
9. C.T. Tchakoute, A.C. Hesseling, **A.K. Blakney**, H.B. Jaspan. Reply to Thysen et al. *Journal of Infectious Diseases*. 212 (8): 1342-1343 (2015). PMID 25821228
8. 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
7. 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
6. **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
5. 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
4. **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
3. 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
2. **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
1. 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

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.

