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Education

- 2008-2012 **Northern Illinois University, DeKalb, IL.**
Ph.D., Chemistry, Emphasis in Biochemistry and Biophysics
Department of Chemistry and Biochemistry
- 2004-2008 **Virginia Polytechnic Institute and State University, Blacksburg, VA.**
B.S., Biochemistry

Research Experience

- 2020 - **Assistant Professor**
Department of Cancer Biology
Loyola University Chicago
- 2016 - 2020 **Pathways to Independence Instructor**
Ben May Department for Cancer Research.
University of Chicago, Chicago, IL.
Mentor: Geoffrey L. Greene, Ph.D.
- 2012 - 2016 **Postdoctoral Fellow**
Ben May Department for Cancer Research.
University of Chicago, Chicago, IL.
Mentor: Geoffrey L. Greene, Ph.D.
- 2008 - 2012 **Graduate Student**
Department of Chemistry and Biochemistry
Northern Illinois University, DeKalb, IL.
Advisor: James R. Horn, Ph.D.
- 2006 – 2008 **Undergraduate Student**
Virginia Bioinformatics Institute
Virginia Polytechnic Institute and State University

Advisor: Biswarup Mukhopadhyay, Ph.D.

Fellowships and Grants

- 2019 – Susan G. Komen Career Catalyst Research Award.
- 2014 – 2017 Susan G. Komen Postdoctoral Fellowship.
- 2015 - 2016 Chicago Biomedical Consortium Postdoctoral Grant.
- 2012 – 2014 Committee on Cancer Biology Postdoctoral Fellowship (T32).
- 2010 – 2012 Center for Biophysical and Biochemical Studies Grant.

Honors and Awards

- 2016 Jon Shevell Young Scientist Travel Scholarship, Susan G. Komen Foundation.
- 2015 Outstanding Oral Presentation Award, 3rd Congress on Steroid Research.
- 2015 Travel Award, National Institutes of Health Postdoc Preparatory Institute.
- 2010 John D. Graham Scholarship for Outstanding Research Conducted by a Graduate Student, Northern Illinois University.

Publications

- 03/20 Maximov, P., Abderrahman, B., Hawsawi, Y., Foulds, C.E., Jain, A., Malovannaya, A., Fan, P., Curpan, R., Han, R., **Fanning, S.W.**, Broom, B., Rincon, D., Greenland, J.A., Greene, G.L., Jordan, V.C. (2020) The Structure-Function Relationship of Angular Estrogens and Estrogen Receptor Alpha to Initiate Estrogen-Induced Apoptosis in Breast Cancer Cells. *Molecular Pharmacology*, In Press
- 02/19 **Fanning SW**, Greene GL (2019) Next Generation ER α Inhibitors for Endocrine-Resistant ER+ Breast Cancer. *Endocrinology*. doi: 10.1210/en.2018-01095
- 12/18 **Fanning SW**, Jeselsohn R, Dharmarajan V, Mayne CG, Karimi M, Buchwalter G, Houtman R, Toy W, Fowler CE, Laine M, Carlson KE, Martin TA, Nowak J, Nwachukwu JC, Hosfield DJ, Chandarlapaty S, Tajkhorshid E, Nettles KW, Griffin PR, Shen Y, Katzenellenbogen JA, Brown M, Greene GL. The SERM/SERD Bazedoxifene Disrupts ESR1 Helix 12 to Overcome Acquired Hormone Resistance in Breast Cancer Cells. *eLife*. 2018. doi: 10.7554/eLife.37161

- Featured Insight by *eLife*: <https://elifesciences.org/articles/44181>
- Webinar presented by *eLife*: <https://youtu.be/tqfEI-xSkZ0>

- 05/18 **Fanning SW**, Hodges-Gallagher L, Myles DC, Sun R, Fowler CE, Plant IN, Green BD, Harmon CL, Greene GL, Kushner PJ. Specific stereochemistry of OP-1074 disrupts estrogen receptor alpha helix 12 and confers pure antiestrogenic activity. *Nature Communications*. 2018;9(1):2368. Epub 2018/06/20. doi: 10.1038/s41467-018-04413-3. PubMed PMID: 29915250; PMCID: Pmc6006285.
- 05/18 Maximov PY, Abderrahman B, **Fanning SW**, Sengupta S, Fan P, Curpan RF, Quintana Rincon DM, Greenland JA, Rajan SS, Greene GL, Jordan VC. Endoxifen, 4-Hydroxytamoxifen and an Estrogenic Derivative Modulate Estrogen Receptor Complex Mediated Apoptosis in Breast Cancer. *Molecular Pharmacology*. 2018.
- 04/18 Speltz TE, Mayne CG, **Fanning SW**, Siddiqui Z, Tajkhorshid E, Greene GL, Moore TW. A “cross-stitched” peptide with improved helicity and proteolytic stability. *Organic & Biomolecular Chemistry*. 2018;16(20):3702-6. doi: 10.1039/C8OB00790J.
- 12/16 Toy W, Weir H, Razavi P, Lawson M, Goeppert AU, Mazzola AM, Smith A, Wilson J, Morrow C, Wong WL, De Stanchina E, Carlson KE, Martin TS, Uddin S, Li Z, **Fanning S**, Katzenellenbogen JA, Greene G, Baselga J, Chandarlapaty S. Activating ESR1 Mutations Differentially Affect the Efficacy of ER Antagonists. *Cancer Discovery*. 2016. doi: 10.1158/2159-8290.CD-15-1523. PubMed PMID: 27986707.
- 03/16 Speltz, TE, **Fanning, SW**, Mayne, CG, Fowler, C, Tajkhorshid, E, Greene, GL, Moore, TW. Stapled Peptides with γ -Methylated Hydrocarbon Chains for the Estrogen Receptor/Coactivator Interaction, *Angew Chem Int Ed Engl.*, 2016;55(13):4252-5. doi: 10.1002/anie.201510557.
- 02/16 **Fanning SW**, Mayne CG, Dharmarajan V, Carlson KE, Martin TA, Novick SJ, Toy W, Green B, Panchamukhi S, Katzenellenbogen BS, Tajkhorshid E, Griffin PR, Shen Y, Chandarlapaty S, Katzenellenbogen JA, Greene GL. Estrogen receptor alpha somatic mutations Y537S and D538G confer breast cancer endocrine resistance by stabilizing the activating function-2 binding conformation. *eLife*. 2016;5:e12792. doi: 10.7554/eLife.12792.
- Featured Insight by *eLife*: <https://elifesciences.org/articles/14973>
- 04/14 **Fanning SW**, Walter R, Horn JR. Structural basis of an engineered dual-specific antibody: conformational diversity leads to a hypervariable loop metal-binding site. *Protein Engineering Design and Selection*. 2014;27(10):391-7. doi: 10.1093/protein/gzu033. PubMed PMID: 25143596.

- 08/13 Toy W, Shen Y, Won H, Green B, Sakr RA, Will M, Li Z, Gala K, **Fanning SW**, King TA, Hudis C, Chen D, Taran T, Hortobagyi G, Greene G, Berger M, Baselga J, Chandarlapaty S. ESR1 ligand-binding domain mutations in hormone-resistant breast cancer. *Nature Genetics*. 2013;45(12):1439-45. doi: 10.1038/ng.2822. PubMed PMID: 24185512; PMCID: PMC3903423.
- 10/12 Sztuba-Solinska J, **Fanning SW**, Horn JR, Bujarski JJ. Mutations in the coat protein-binding cis-acting RNA motifs debilitate RNA recombination of Bromo mosaic virus. *Virus Research*. 2012;170(1-2):138-49. Epub 2012/10/20. doi: 10.1016/j.virusres.2012.10.001. PubMed PMID: 23079110.
- 08/11 Murtaugh ML, **Fanning SW**, Sharma TM, Terry AM, Horn JR. A combinatorial histidine scanning library approach to engineer highly pH-dependent protein switches. *Protein Science*. 2011;20(9):1619-31. Epub 2011/07/19. doi: 10.1002/pro.696. PubMed PMID: 21766385; PMCID: Pmc3190156.
- 07/11 **Fanning SW**, Horn JR. An anti-hapten camelid antibody reveals a cryptic binding site with significant energetic contributions from a nonhypervariable loop. *Protein Sci*. 2011;20(7):1196-207. doi: 10.1002/pro.648. PubMed PMID: 21557375; PMCID: PMC3149193. (Featured Cover Image).
- 06/11 **Fanning SW**, Murtaugh ML, Horn JR. A combinatorial approach to engineering a dual-specific metal switch antibody. *Biochemistry*. 2011;50(23):5093-5. Epub 2011/05/17. doi: 10.1021/bi2003845. PubMed PMID: 21568282. (Featured on *Biochemistry's* Webpage).

Teaching Experience

- 2016 University of Chicago myCHOICE: How to Lead a Lab: Leadership and Management of Academic Groups Workshop.
- 2015 University of Chicago myCHOICE: Elements of Successful Teaching in Sciences Workshop.
- 2009 - 2010 Teaching Assistant for Biochemistry Laboratory.
- 2009 Recitation Instructor for Introductory Chemistry.
- 2008 – 2009 Teaching Assistant, Introductory Chemistry Laboratory.

Mentoring Experience

- 2018 - Estelle Ndukwe, biochemistry undergraduate research student, University of Chicago
- 2016 - Ross Han, medical student, University of Chicago.

- 2015 - 2017 Colin Fowler, chemistry undergraduate research student, University of Chicago.
 2014 – 2015 Srinivas Panchamukhi, undergraduate research student, University of Chicago.
 2011 – 2012 Katerina Bujarski, undergraduate research student, Northern Illinois University.
 2010 – 2012 Albertina Gaebler, undergraduate research student, Northern Illinois University.
 2009 – 2010 Brian Hartnet, undergraduate researcher, Northern Illinois University.

Talks

- 2020 Featured Video Interview for Susan G. Komen Foundation Played at the Chicago Auto-Show. “How Breast Cancer Research Improves Patient’s Lives.”
- 2019 Invited Seminar Speaker at Loyola University Chicago on October 16th. “Understanding and Overcoming Acquired Endocrine Resistance in Breast Cancer.”
- 2019 Invited Seminar Speaker at the Université de Montréal on April 8th. “Understanding and Overcoming Acquired Endocrine Resistance in Breast Cancer.”
- 2018 Endo 2018, The Endocrine Society’s Annual Meeting. “OP-1074 is a Potent and Orally Available Pure Estrogen Antagonist That Induces Estrogen Receptor Degradation in Breast Cancer Cells via a Single Stereo-Specific Methyl on its Pyrrolidine Side-chain
- 2016 Geneva Illinois Community High School Honors Biology Classes. “Academic Research and How it Helps Breast Cancer Patients”
- 2016 Chicago Cancer Retreat. “OP1074 Fine-Tunes Estrogen Receptor Alpha Structure to Inhibit Breast Cancer Progression”
- 2016 Pint of Science by the Journal *eLife*. Broad audience TED-styled talk “Locking the Door on Breast Cancer”
- 2016 Chicago Affiliate of the Susan G. Komen Foundation. “From Bench to Bedside and Back Again: How Basic Research Leads to Improved Patient Outcomes.”
- 2016 Chicago State University Invited Seminar Speaker. “Targeting Dysfunctional Estrogen Receptor Action in Drug Resistant Metastatic Breast Cancers.”
- 2016 Keystone Meeting: Nuclear Receptors Full Throttle. “Bazedoxifene Potently Inhibits Y537S and D538G ESR1 Somatic Mutants by Disrupting the Constitutively Active AF-2 Conformation.”

- 2015 3rd Congress on Steroid Research. “Bazedoxifene is an Effective Inhibitor of Constitutively Active Estrogen Receptor Alpha Mutants Observed in Recurrent Metastatic Breast Cancer.”
- 2015 University of Chicago Biomedical Sciences Cluster Retreat. “Determining the Role of ER α Somatic Mutations in Acquired Drug Resistance.”
- 2011 Gibbs Conference on Biothermodynamics. “Structural and Biophysical Investigations into an Engineered Dual-Function Antibody Reveals the Mechanism of Affinity Control.”

Posters

- 2019 Gordon Research Conference on Hormone Dependent Cancers. “Structural Basis for Differential Estrogen Receptor Alpha Antagonist Activity in Breast Cancers Harboring Y537S *ESR1*.”
- 2019 Endo2019. “Lasofloxifene Achieves Potent Anti-Tumor Activity in Hormone-Resistant Breast Tumors by Maintaining High Affinity Binding for Y537S ER α .”
- 2017 Gordon Research Conference on Hormone Dependent Cancers. “OP1074: How One Methyl Turns a Selective Estrogen Receptor Modulator into a Degradation in Breast Cancer.”
- 2016 American Association for Cancer Research (AACR) Annual Meeting. “Bazedoxifene Inhibits Somatic Mutant ESR1 with Improved Potency and Efficacy Compared to Tamoxifen and Raloxifene.”
- 2015 3rd Congress on Steroid Research. “Bazedoxifene is an Effective Inhibitor of Constitutively Active Estrogen Receptor Alpha Mutants Observed in Recurrent Metastatic Breast Cancer.”
- 2014 San Antonio Breast Cancer Symposium. “Determining the Role of Somatic ER α Mutations in Acquired Hormone (or SERM) Resistance.”
- 2014 Endocrine Society. “Chemical Biology Approaches Applied to the Discovery of Inhibitors and Probes for Hormone Associated Cancers.”
- 2014 American Association for Academic Sciences Meeting. “Determining the Role of Somatic Mutations in SERM-Resistant Metastatic Breast Cancers.”
- 2013 2nd Congress on Steroid Research. “Generation of Discerning Estrogen Receptor Alpha Antagonists via Dimer Disruption.”

- 2012 Great Lakes Nuclear Receptor Conference. “Generation of Novel SERMs by Dimer Disruption.”
- 2012 Chicago Biomedical Consortium Annual Meeting. “Generation of Discerning Estrogen Receptor Alpha Antagonists via Dimer Disruption.”
- 2010 Gibbs Conference on Biothermodynamics. “Biophysical and Structural Analysis of an Anti-Methotrexate VHH Reveals a Novel Antibody-Hapten Binding Mechanism.”
- 2010 Protein Society. “Biophysical Analysis of an Anti-Methotrexate VHH Reveals a Novel Small Molecule-Antibody Binding Mechanism”
- 2009 Gibbs Conference on Biothermodynamics. “pH and Ligand Dependent Binding in VHH/Antigen Complex Using Histidine Scanning Phage Display.”

Scientific Outreach

- 2016 Geneva Illinois Community High School Honors Biology. Gave a presentation on how to become an academic scientist and a broad overview of my research.
- 2016 Susan G. Komen Lombard, Illinois Race. Coordinated the “Research Tent” to help educate the public about breast cancer risks versus myths and how research can lead to improved patient outcomes.
- 2016 Susan G. Komen Chicago Mother’s Day Race. Research Tent. Same role as above.
- 2016 eLife’s Pint of Science. Presented a TED-styled talk about breast cancer.
- 2015 Susan G. Komen Chicago Mother’s Day Race. Research Tent. Same role as above.
- 2011 STEM Outreach Program at Northern Illinois University.