

## Sean W. Fanning, Ph.D.

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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 and State University**, Blacksburg, VA.  
B.S., Biochemistry

### Research Experience

- 2016 -        **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

- 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.

\*2014 – 2017 Department of Defense Breakthrough Award to Geoffrey L. Greene and Sarat Chandarlapaty. I would like to note that I helped to write this funded award that was partially based on my work. Additionally, I scored a 1.3 on the DOD postdoctoral fellowship in the same cycle but it was withdrawn for final funding due to overlap with the Breakthrough Award. This score would normally be funded.

## Honors and Awards

- 2016 Jon Shevell Young Scientist Travel Scholarship, Susan G. Komen Foundation.  
2015 Outstanding Oral Presentation Award, 3<sup>rd</sup> 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

- 12/16 Toy, W., Weir, H., Razavi, P., Lawson, M., Hemsley, P., Goeppert, A., Mazzola, A.M., Smith, A., Wilson, J., Marrow, C., Wong, W.L., De Stanchina, E., Carlson, K.E., Martin, T.S., Uddin, S., Li, Z., **Fanning, S.W.**, Katzenellenbogen, J.A., Greene, G.L., Baselga, J., Chandarlapaty, S. (2016) Activating ESR1 mutations differentially impact the efficacy of ER antagonists, *Cancer Discovery*, DOI: 10.1158/2159-8290.CD-15-1523
- 03/16 Speltz, T.E., **Fanning, S.W.**, Mayne, C.G., Fowler, C., Tajkhorshid, E., Greene, G.L., Moore, T.W. (2016) Stapled Peptides with  $\gamma$ -Methylated Hydrocarbon Chains for the Estrogen Receptor/Coactivator Interaction, *Angew Chem Int Ed Engl.*, 55 (13), 4252-4255.
- 02/16 **Fanning, S.W.**, Mayne C.G., Dharmarajan, V., Carlson, K.E., Martin, T.A., Novick S.J., Toy, W., Green, B., Panchamukhi, S., Katzenellenbogen, B.S., Tajkhorshid, E., Griffin, P.R., Shen, Y., Chandarlapaty, S., Katzenellenbogen, J.A., Greene, G.L. (2016), Estrogen Receptor Alpha Somatic Mutations Y537S and D538G Confer Breast Cancer Endocrine Resistance by Stabilizing the Activating Function-2 Binding Conformation, *eLife*, e12792.

- 04/14 **Fanning, S.W.**, Walter, R., Horn, J.R. (2014) Structural Basis of an Engineered Dual-Specific Antibody: Conformational Diversity Leads to an Unconventional Metal Binding Site, *Protein Engineering, Design and Synthesis*, 27, 391-397.
- 08/13 Toy, W., Shen, Y., Won, H., **Fanning, S.**, Sakr, R., Will, M., Li, Z., Gala, K., King, T., Hudis, C., Chen, D., Teran, T., Hortobagyi, G., Greene, G., Berger, M., Baselga, J., Chandarlapaty, S. (2013) Estrogen receptor ligand binding domain mutations are associated with hormone resistant breast cancer, *Nature Genetics*, 45, 1-7.
- 10/12 Sztuba-Solińska, J., **Fanning, S.W.**, Horn, J.R., Bujarski, J.J. (2012) Mutations in the coat-proteini-binding *cis*-acting RNA motifs debilitate RNA recombination of *Brome mosaic virus*, *Virus Research*, 170, 138-149
- 08/11 Murtaugh, M.M, **Fanning, S.W.**, Sharma, T., Terry, A., Horn, J.R. (2011) A combinatorial histidine scanning library approach to engineer highly pH-dependent protein switches, *Protein Science*, 20, 1619-1631
- 07/11 **Fanning, S.W.** and Horn, J.R. (2011) An anti-hapten camelid antibody reveals a cryptic binding site with significant energetic contributions from a non-hypervariable loop, *Protein Science*, 20, 1196-1207 (Featured cover image)
- 06/11 **Fanning, S.W.**, Murtaugh, M.L., Horn, J.R. (2011) A combinatorial approach to engineer a dual-specific metal switch antibody, *Biochemistry*, 50, 5093-5095 (Featured on Biochemistry's webpage)

### Manuscript in Peer Review

- 08/17 **Fanning, S.W.**, Hodges-Gallagher, L.H., Myles, D.C., Sun, R., Fowler C.E., Green, B.D., Harmon, C.L., Greene, G.L, Kushner, P.J. (2017) Stereo-specific methylpyrrolidine side chain on a benzopyran scaffold induces complete antiestrogen activity in breast cancer cells.  
\*Under peer review at *Nature Communications*

### Manuscript in Preparation

**Fanning, S.W.**, Dharmarajan, V., Mayne, C.G., Toy, W., Carlson, K.E., Martin, T.A., Nowak, J., Nwachukwu, J., Hosfield, D.J., Walter, R.L., Taylor, M., Chandarlapaty, S., Tajkhorshid, E., Nettles, K.W., Griffin, P., Shen, Y., Katzenellenbogen, B.A., Katzenellenbogen, J.A., Greene, G.L. (2017) Bazedoxifene inhibits ESR1 helix 12 somatic mutations with increased potency over 4-hydroxytamoxifen by disrupting the constitutively active AF-2 conformation. Target Journal: *Nature Chemical Biology*.

## 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

- 2016 - Ross Han, biochemistry undergraduate research student, University of Chicago.
- 2015 - 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

- 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 3<sup>rd</sup> 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 $\alpha$  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

- 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 3<sup>rd</sup> 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 $\alpha$  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 2<sup>nd</sup> 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.