

# Rebecca L. Switzer

(Maiden Name: Fagan)

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## EDUCATION

Ph.D. in Biological Chemistry August 2009  
University of Michigan, Ann Arbor, MI  
Thesis: "The Differences are in the Details: The Mechanism of Flavin Reduction in Class 1A and Class 2 Dihydroorotate Dehydrogenases"  
Supervisor: Bruce A. Palfey

B.S. in Chemistry, *magna cum laude* August 2004  
Indiana State University, Terre Haute, IN

## PROFESSIONAL EXPERIENCE

Associate Professor August 2022 – present  
Department of Chemistry, Bucknell University

Assistant Professor 2014 – 2022  
Department of Chemistry, Bucknell University

Postdoctoral Research Fellow 2011 – 2014  
Department of Biochemistry, University of Iowa, Iowa City, IA  
Supervisor: Charles Brenner

Postdoctoral Research Scholar 2009 – 2010  
Department of Biochemistry, University of Iowa, Iowa City, IA  
Supervisor: Shahram Khademi

## HONORS & AWARDS

- Swanson Fellowship for Faculty Research, Bucknell University, 2014 - 2017
- Distinguished Postdoctoral Fellow Research Award, University of Iowa, 2014
- The Dziewiatkowski Award (Most Outstanding Ph.D. Dissertation), Department of Biological Chemistry, University of Michigan, 2009
- Rackham Pre-doctoral Fellow, University of Michigan, 2008 - 2009

## PUBLICATIONS

### Peer-Reviewed Research Articles (\*Bucknell students)

1. **Switzer, R. L.**, Hartman, Z. J.\*, Hewett, G. R.\*, and Carroll, C. F.\* (2023) "Disease-Associated Mutation A554V Disrupts Normal Autoinhibition of DNMT1" *DNA* 3, 119-133.
2. **Switzer, R. L.**, Ward, K. A.\*, and Medrano, J.\* (2022) "A Continuous Fluorescence-Based Endonuclease-Coupled DNA Methylation Assay to Screen for DNA Methyltransferase Inhibitors" *J. Vis. Exp.* 186, e62949.
3. Dolen, E. K.\*, McGinnis, J. H.\*, Tavory, R. N.\*, Weiss, J. A.\*, and **Switzer, R. L.** (2019) "Disease-associated mutations G589A and V590F relieve RFTS-mediated autoinhibition of DNA methyltransferase 1" *Biochemistry* 58, 5151-5159.
4. **Switzer, R. L.**, Medrano, J.\*, Reedel, D. A.\*, and Weiss, J.\* (2019) "Substituted anthraquinones represent a potential scaffold for DNA methyltransferase 1-specific inhibitors" *PLoS ONE* 14, e0219830.

5. Huang, J., Stewart, A., Maity, B., Hagen, J., **Fagan, R. L.**, Yang, J., Quelle, D. E., Brenner, C., Fisher, R. A. (2014) "RGS6 suppresses Ras-induced cellular transformation by facilitating Tip60-mediated Dnmt1 degradation and promoting apoptosis" *Oncogene* 33, 3604-3611.
6. **Fagan, R. L.**, Wu, M., Chedin, F. and Brenner, C. (2013) "An ultrasensitive high throughput screen for DNA methyltransferase-targeted molecular probes" *PLoS One* 8, e78752.
7. **Fagan, R. L.**, Cryderman, D. E., Kopelovich, L., Wallrath, L. L. and Brenner, C. (2013) "Laccaic acid A Is a direct, DNA-competitive inhibitor of DNA Methyltransferase 1" *J. Biol. Chem.* 288, 23858 – 23867
8. Syeda, F., **Fagan, R. L.**, Wean, M., Avvakumov, G. V., Walker, J. R., Xue, S., Dhe-Pagano, S. and Brenner, C. (2011) "The replication focus targeting sequence (RFTS) domain is a DNA-competitive inhibitor of Dnmt1" *J. Biol. Chem.* 286, 15344 – 15351.
9. McDonald, C. A., **Fagan, R. L.**, Collard, F., Monnier, V. M. and Palfey, B. A. (2011) "Oxygen reactivity in flavoenzymes: context matters" *J. Am. Chem. Soc.* 133, 16809 – 16811.
10. Collard, F., **Fagan, R. L.**, Zhang, J., Palfey, B. A. and Monnier, V. M. (2011) "The cation- $\pi$  interaction between Lys53 and the flavin of fructosamine oxidase (FAOX-II) is critical for activity" *Biochemistry* 50, 7977 – 7986. \*These authors contributed equally to this work.
11. Kow, R. L., Whicher, J. R., McDonald, C. A., Palfey, B. A. and **Fagan, R. L.** (2009) "Disruption of the proton relay network in the class 2 dihydroorotate dehydrogenase from *E. coli*" *Biochemistry* 48, 9801 – 9809.
12. **Fagan, R. L.** and Palfey, B. A. (2009) "Roles in binding and chemistry for conserved active site residues in the class 2 dihydroorotate dehydrogenase from *E. coli*" *Biochemistry* 48, 7169 – 7178.
13. Wolfe, A. E., Hansen, M., Gattis, S. G., **Fagan, R. L.**, Hu, Y., Johansson, E., Arent, S., Larsen, S. and Palfey, B. A. (2007) "The interaction of benzoate pyrimidine analogs with the class 1A dihydroorotate dehydrogenase from *Lactococcus lactis*" *Biochemistry* 46, 5741 – 5753.
14. **Fagan, R. L.**, Jensen, K. F., Björnberg, O. and Palfey, B. A. (2007) "Mechanism of flavin reduction in the class 1A dihydroorotate dehydrogenase from *Lactococcus lactis*" *Biochemistry* 46, 4028 – 4036.
15. **Fagan, R. L.**, Nelson, M. N., Pagano, P. M. and Palfey, B. A. (2006) "Mechanism of flavin reduction in class 2 dihydroorotate dehydrogenases" *Biochemistry* 45, 14926 – 14932.
16. Palfey, B. A. and **Fagan, R. L.** (2006) "An analysis of the kinetic isotope effects on initial rates in transient kinetics" *Biochemistry* 45, 13631 – 13640.

#### Books/Book Chapters

1. Palfey, B. A. and **Switzer, R. L.** (2022) "Kinetics for Enzyme Catalysis" American Chemical Society In Focus ebook. DOI: 10.1021/acsinfocus.7e5015
2. **Fagan, R. L.** and Palfey, B. A. (2010) "Flavin-Dependent Enzymes" in *Comprehensive Natural Products Chemistry II, Vol. 7: Cofactor Biosynthesis and Enzymology* (T. P. Begley, Ed.) Elsevier Science and Technology, Oxford, pp. 38 – 103.

#### **EXTERNAL FUNDING**

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|---|--------------------|
| NIH R15 Academic Research Enhancement Award (AREA) - 1R15GM143693                                   | 8/1/2021-7/31/2024 |
| Title: Investigating the Impact of Disease-Associated Mutations on DNA Methyltransferase 1 Function |                    |
| Role: PI  |                    |
| Amount: \$202,603   |                    |
| <br>  |                    |
| American Cancer Society Postdoctoral Fellowship - PF-11-141-01-DMC                                  | 7/1/2011-6/30/2014 |
| Role: PI  |                    |
| Amount: \$150,000   |                    |

## PROFESSIONAL PRESENTATIONS

### Invited Lectures

March 2023 – Lycoming College Department of Chemistry Colloquium, Williamsport, PA  
“Unraveling the Impact of Disease-Associated Mutations on the Regulation of DNA Methyltransferase 1 Activity”

February 2022 – Elizabethtown College Department of Chemistry Seminar Series, Elizabethtown, PA  
“Investigating the Impact of Disease-Associated Mutations on DNA Methyltransferase 1”

January 2022 – Western Michigan University Chemistry Seminar Series, Kalamazoo, MI  
“Investigating the Impact of Disease-Associated Mutations on DNA Methyltransferase 1”

October 2021 – Syracuse University Chemistry Colloquium, Syracuse, NY  
“Investigating the Impact of Disease-Associated Mutations on DNA Methyltransferase 1”

September 2021 – Gettysburg College Biochemistry and Molecular Biology Seminar Series, Gettysburg, PA  
“Impact of Disease-Associated Mutations on DNA Methyltransferase 1 Function”

October 2019 – Midwest Enzyme Chemistry Conference, Chicago, IL  
“Disease-Associated Mutations G589A and V590F Relieve RFTS-mediated Autoinhibition of DNA Methyltransferase 1”

November 2017 – Lycoming College Department of Chemistry Seminar Series and meeting of Susquehanna Valley section of the American Chemical Society, Williamsport, PA  
“Understanding the Biochemical Consequences of Disease-Causing Mutations in DNA Methyltransferase 1”

September 2015 – Indiana University of Pennsylvania Department of Chemistry Seminar Series, Indiana, PA  
“Discovering Small Molecule Inhibitors of DNA methyltransferase 1”

### Selected Poster Presentations (presenting author italicized; \*Bucknell students)

October 2022 – Midwest Enzyme Chemistry Conference, Chicago, IL  
“The Impact of Disease-Associated Mutations on UHRF1-Mediated Recruitment of DNA Methyltransferase 1”  
*Geoffrey Hewett\** and Rebecca L. Switzer

October 2018 - Midwest Enzyme Chemistry Conference, Chicago, IL  
“Disease-Causing Mutations in the RFTS Domain of DNA Methyltransferase 1 Relieve Normal Autoinhibition”  
*Emma Dolen\**, James H. McGinnis\*, and Rebecca L. Switzer

July 2018 – Enzymes, Coenzymes, and Metabolic Pathways Gordon Conference, Waterville Valley, NH  
“Disease-Causing Mutations in the RFTS Domain of DNA Methyltransferase 1 Relieve Normal Autoinhibition”  
*Rebecca L. Switzer*, James H. McGinnis\*, and Emma Dolen\*

September 2016 - Midwest Enzyme Chemistry Conference, Chicago, IL  
“Evaluating Substituted Anthraquinones as DNA Methyltransferase 1 Inhibitors”  
*Jessica Medrano\**, David A. Reedel\*, and *Rebecca L. Switzer*

September 2016 - Midwest Enzyme Chemistry Conference, Chicago, IL  
“Effect of Disease-Causing Mutations V590F and G589A on DNA Methyltransferase 1”  
*James H. McGinnis\**, *Emma Dolen\**, and Rebecca L. Switzer

September 2015 - Midwest Enzyme Chemistry Conference, Chicago, IL  
“Evaluating Substituted Anthraquinones as DNA Methyltransferase 1 Inhibitors”  
*David A. Reedel\** and Rebecca L. Switzer

## **TEACHING**

### Lecture Courses

Principles of Chemistry, CHEM 205  
Biochemistry I, CHEM 351  
Biochemistry II, CHEM 352  
Chemistry Lecture Series, CHEM 371

### Laboratory Courses

Principles of Chemistry Laboratory, CHEM 205L  
Biochemical Methods, CHEM 358/BIOL 340