

Martin D. Burke – *Curriculum Vitae*

Assistant Professor of Chemistry
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Education

- 1998-2005 National Institutes of Health Fellow in the Medical Scientist Training Program
Harvard Medical School/Massachusetts Institute of Technology
Division of Health Sciences and Technology: Boston, Massachusetts
Degree awarded: M.D.
- 1999-2003 Howard Hughes Medical Institutes Predoctoral Fellow
Harvard University, Department of Chemistry and Chemical Biology
Cambridge, Massachusetts, Degree Awarded: Ph.D.
Thesis advisor: Professor Stuart L. Schreiber
Thesis title: A Synthesis Strategy for Generating Diverse Skeletons of Small Molecules
Combinatorially.
- 1994-1998 Johns Hopkins University, Baltimore, Maryland
Degree Awarded: B.A. Chemistry
Research advisors: Professors Henry Brem and Gary H. Posner
Undergraduate Research: Development of 1,25 D₃ Analog-loaded Biodegradable
Polymer Wafers for Treatment of Systemic Tumors Metastatic to the Brain.

Appointment

- August 2005- present Assistant Professor, Department of Chemistry
University of Illinois at Urbana-Champaign, Urbana, Illinois.

Awards and honors

- 2008 *Technology Review's* World's Top Innovator Under 35
2008 "Scientist to Watch" *The Scientist* Magazine
2008 Arnold and Mabel Beckman Young Investigator Award
2008 National Science Foundation CAREER Award
2007 Teacher Ranked as Excellent, UIUC Center for Teaching Excellence
2006 Teacher Ranked as Excellent, UIUC Center for Teaching Excellence
2005 ACS Petroleum Research Foundation Type G Award

2005	Camille and Henry Dreyfus New Faculty Award
2005	Henry Asbury Christian Award, Harvard Medical School
2003	National Institutes of Health Medical Scientist Training Program Fellowship
2000	Howard Hughes Medical Institute Predoctoral Fellowship
1998	Hunterian Research Award - Johns Hopkins Department of Neurosurgery
1997	Phi Beta Kappa - Junior Year, Johns Hopkins University
1997	Howard Hughes Undergraduate Research Fellowship - Johns Hopkins University
1997	Provost's Undergraduate Research Award - Johns Hopkins University
1997	Golden Key National Honor Society - Johns Hopkins University
1994-1998	Dean's List - Johns Hopkins University
1994-1998	Beneficial Hodson Scholar - Johns Hopkins University
1994-1998	Maryland Distinguished Scholar

Publications

1. S.J. Lee, K.C. Gray, J.S. Paek, M.D. Burke. "Simple, Efficient, and Modular Syntheses of Polyene Natural Products via Iterative Cross-Coupling" *J. Am. Chem. Soc.* **2008**, *130*, 466-468.

This paper was highlighted by Richard Van Noorden in *Chemistry World* magazine (<http://www.rsc.org/chemistryworld/News/2007/December/20120701.asp>). It was also featured by Patrick Walter in *Chemistry and Industry*: "Off-the-shelf small molecules on the way" January 14, **2008** p. 7, and is highlighted in *Synform* **2008**, *5*, 58-59.

2. D.S. Palacios, T.M. Anderson, M.D. Burke. "A Post-PKS Oxidation of the Amphotericin B Skeleton Predicted to be Critical for Channel Formation is Not Required for Potent Antifungal Activity" *J. Am. Chem. Soc.* **2007**, *129*, 13804-13805.

For a highlight of this paper in *Nature Chemical Biology* see: Sergey Kozmin, "Chemical 'knockout' challenges the amphotericin B channel model" **2008**, *4*, 19-20. This paper was also highlighted in *Natural Products Reports* **2008**, *25*, p. 11, and *The Scientist* **2008**, *22*, p. 63.

3. E.P. Gillis and M.D. Burke. "A Simple and Modular Strategy for Small Molecule Synthesis: Iterative Suzuki-Miyaura Coupling of B-Protected Haloboronic Acid Building Blocks." *J. Am. Chem. Soc.* **2007**, *129*, 6716-6717.

This paper is highlighted in the June 18th 2007 issue of *Chemical and Engineering News*: S. Borman, "Masks unveil new synthetic routes" *Chem. Eng. News* **2007**, *85*, 63-64, and in *SynFacts* **2007**, *10*, 1007.

4. M.D. Burke, E.M. Berger, and S.L. Schreiber. "A Synthesis Strategy Yielding Skeletally Diverse Small Molecules Combinatorially." *J. Am. Chem. Soc.* **2004**, *126*, 14095-14104.

5. M.D. Burke and S.L. Schreiber. "A Planning Strategy for Diversity-Oriented Synthesis." *Angew. Chem. Int. Ed.* **2004**, *43*, 46-58.

This paper has been recognized by Thomson-ISI as "one of the most cited recent papers in the field of chemistry." *ISI Essential Science Indicators* (> 270 citations).

6. M.D. Burke, E.M. Berger, and S.L. Schreiber. "Generating Diverse Skeletons of Small Molecules Combinatorially." *Science* **2003**, 302, 613-618.

This paper was selected as one of the top *Chemistry Highlights 2003* "for making natural-product-like libraries of unprecedented diversity." *Chem. & Eng. News* **2003**, 81:51, 48. For additional commentaries see: *Chem. & Eng. News* **2003**, 81:43, 40; *Nature Rev. Drug Discovery "Highlights,"* **2003**, 2:12, 948; *Chem. & Eng. News* **2004**, 82:40, 32. This work has also been reviewed in *Nature*, **2004**, 432, 846-854.

7. R.M. Kohli, M.D. Burke, X.L. Tao, and C.T. Walsh. "Chemoenzymatic Route to Macrocyclic Hybrid Peptide/Polyketide-like Molecules." *J. Am. Chem. Soc.* **2003**, 125, 7160-7161.
8. M.C. White, M.D. Burke, S. Peleg, P. Dolan, T. Kensler, H. Brem, and G.H. Posner. "Conformationally Restricted Hybrid Analogs of 1,25-Dihydroxyvitamin D₃. Design, Synthesis, and Preliminary Biological Evaluation." *Bioorg. & Med. Chem.* **2001**, 9, 1691-1699.
9. G.H. Posner, J.K. Lee, Q. Wang, S. Peleg, M.D. Burke, H. Brem, P. Dolan, and T. Kensler. "Non-Calcemic, Antiproliferative, Transcriptionally-Active, 24-Fluorinated Hybrid Analogs of the Hormone 1 α ,25-Dihydroxyvitamin D₃. Synthesis and Preliminary Biological Evaluation." *J. Med. Chem.* **1998**, 41, 3008-3014.

Dissertation

M.D. Burke. "A Synthesis Strategy for Generating Diverse Skeletons of Small Molecules Combinatorially." Department of Chemistry and Chemical Biology, Harvard University, **2003**.

Patents pending

1. M.D. Burke, E.P. Gillis, S.J. Lee, D.M. Knapp, K.C. Gray, "System for Controlling the Reactivity of Boronic Acids" PCT International Application Filed 10/2007.
2. M.D. Burke, E.M. Berger, O. Kwon, S.B. Park, and S.L. Schreiber. "Generation of Skeletal Diversity Within a Combinatorial Library." Harvard University. Patent Application Pending: U.S.S.N. 10/640834, Filed August 14, 2003.
3. C.T. Walsh, M. Burkart, R.M. Kohli, and M.D. Burke. "Method for the Preparation of Macrocyclic Molecules, Macrocyclic Molecules Prepared Thereby, and Substrates and Solid Supports for Use Therein." Harvard Medical School, Pending Patent Application: U.S.S.N. 10/289157 Filed October 6, 2002.
4. M.D. Burke, M.C. White, J.K. Lee, M. Watts, B. Tyler, G.H. Posner, and H. Brem. "Vitamin D₃ Analog-Loaded Polymer Formulations for Cancer and Neurodegenerative Disorders." Johns Hopkins School of Medicine, Pending Patent Application: U.S.S.N. 10/223685, Filed August 20, 2002.

Other reviews and book chapters

1. M.D. Burke and G. Lalic. "Teaching Target-Oriented and Diversity-Oriented Organic Synthesis at Harvard University." *Chemistry and Biology* **2002**, 9, 535-541.
2. M.D. Burke, H. Brem, and R. Langer. "Central Nervous System, Drug Delivery to Treat." In *The Encyclopedia of Controlled Drug Delivery*. Mathiowitz, E., Ed.; John Wiley and Sons., Vol. 1, **1999**, 184-212.
3. J. Hanes and M.D. Burke. "Polymer-Controlled Drug Delivery: An Overview for the Clinician." *Hospital Pharmacist Report*. December **1997**, 2-11.

Published abstracts

1. M.D. Burke. "Molecular Prosthetics: Replicating the Functions of the Molecules of Life" *Enhancing Chemistry Conference*. University of Illinois at Urbana-Champaign, Urbana, Illinois, March 17, 2006.
2. M.D. Burke and S.L. Schreiber. "The Generation of Structural Diversity in Split-Pool Synthesis." Harvard-MIT Division of Health Sciences and Technology Forum. Book of Abstracts. Cambridge, Massachusetts: March 9, 2000, p 5.
3. M.D. Burke, M.C. White, M. Watts, J. Lee, B. Tyler, G.H. Posner, and H. Brem. "Hybrid Analogs of 1,25-Dihydroxyvitamin D₃ Having Potent Antiproliferative Effects Against Murine Tumor Cell Lines Metastatic to the Brain." In *Vitamin D₃: Chemistry, Biology, and Clinical Applications of the Steroid Hormone; Proceedings of the Tenth Workshop on Vitamin D*; A.W. Norman, R. Bouillon, and M. Thommasser, Eds.; University of California Press, 1997, p 487.
4. M.D. Burke, M.C. White, J. Lee, M. Watts, B. Tyler, G.H. Posner, and H. Brem. "Biodegradable Polymer Wafers Impregnated with Hybrid Analogs of 1,25-Dihydroxyvitamin D₃ for the Treatment of Intracranial Metastases." Fifth Annual Brown University Symposium on Vitamin D. Providence, Rhode Island, September 7-9, 1997.
5. M. Watts, M. Lesniak, M.D. Burke, A. Samdani, B. Tyler, and H. Brem. "Efficacy of Adriamycin in the Treatment of Malignant Glioma." Conference of the American Association of Neurological Surgeons. Denver, Colorado, April 12-17, 1997.

Teaching at UIUC

Fall 2006 - Fall 2008	Chem 534: "Fundamentals of Complex Molecule Synthesis"
Spring 2007	Chemistry 237: "Structure and Synthesis"
Spring 2006 Spring 2008	Chem 536: "Introduction to Organic Chemistry Research"
2007 – present	<i>Lab Partners</i> High School Chemistry Outreach Program

Service

University of Illinois

2005 – present Department of Chemistry Graduate Admissions Committee
2005 – present Department of Chemistry Graduate Recruiting Committee
2005 – present Medical Scholars Program, ad hoc member of Admissions Committee
2005 – present Medical Scholars Program, ad hoc member of Recruiting Committee
March, 2006 Keynote speaker, *Enhancing Chemistry: A Conference for Chemistry Teachers*
Fall, 2006 Pines Travel Award Selection Committee
2005 – 2006 Coordinator of Organic Registration Exam
Spring, 2007 Department of Pharmacology New Faculty Search Committee
September, 2007 Host of the Marvel Lecture Series, keynote speaker Professor K.C. Nicolaou

Service outside of University of Illinois

June, 2007 Ad hoc member of the National Institutes of Health Synthetic and Biological Chemistry B Study Section, Washington D.C.
February, 2008 Panel member for the National Science Foundation Graduate Research Fellowships Chemistry II Division, Arlington, VA.
2005 – present Frequent reviewer for numerous scientific journals including *Journal of the American Chemical Society*, *Proceeding of the National Academy of Science*, *Chemical Reviews*, *Accounts of Chemical Research*, *Organic Letters*, *Journal of Organic Chemistry*, *Tetrahedron*, and *Tetrahedron Letters*.
October, 2008 Panel member for the National Science Foundation CAREER Award, Washington D.C.

Consulting

Rigel Pharmaceuticals, San Francisco, California, USA
12/07 – present

Invited Presentations

May 12, 2006 – NIH Mentoring Conference, Greenbelt, MD
July 26, 2007 – Natural Products Gordon Conference “Short Talk” and Poster Presentation Tilton, NH
“Towards the Total Synthesis of the Channel-Forming Natural Product Amphotericin B”
July 31, 2007 – Sigma-Aldrich Company, Milwaukee, WI
“Iterative Cross-Coupling: A Simple and Modular Strategy for Small Molecule Synthesis”
October 19, 2007 – Rigel Pharmaceuticals, San Francisco, CA
October 24, 2007 – ACS Regional Conference, Milwaukee, WI
“The Channel-Forming Natural Product Amphotericin B”
November 9, 2007 – Illinois Wesleyan University, Bloomington, IL
January 18, 2008 – Abbott Pharmaceuticals, Abbott Park, IL
February 14, 2008 – Bristol-Myers Squibb, Process Research and Development, New Brunswick, NJ
February 15, 2008 – Bristol-Myers Squibb, Drug Discovery, Hopewell, NJ
March 24, 2008 – Indiana University at Bloomington, Bloomington, IN
April, 14, 2008 – Pfizer Medicinal Chemistry, St. Louis, MI
March, 2008 – Theravance Pharmaceuticals, San Francisco, CA

May 21, 2008 – Merck Research Laboratories, Rahway, NJ
June 18, 2008 – Bioorganic Gordon Conference “Short Talk” and Poster Presentation, Andover, NH
June 21, 2008 – National Science Foundation Annual Workshop on Organic Synthesis and Natural Products Chemistry, Minary Center, New Hampshire.
August 29-30, 2008 – Arnold and Mabel Beckman Foundation Symposium for the Beckman Young Investigator Award, National Academies of Science and Engineering, Irvine, CA
September 2008 – *Technology Reviews* Emerging Technologies Conference, MIT, Cambridge, MA
October 16, 2008 – University of California at Los Angeles, LA, CA
October 29, 2008 – FAST Conference sponsored by Johnson Matthey, The National Constitution Center, Philadelphia, PA “Probing the Amphotericin B Ion Channel with Synthetic Knockouts”
November 11, 2008 – Novartis Discovery, Cambridge, MA
January 14, 2009 – Wayne State University
January 16, 2009 – Hope College
March 30, 2009 – University of Pennsylvania
Spring 2009 – Chicago University Department of Chemistry