

BIOGRAPHICAL SKETCH

NAME Eric C. Greene		POSITION TITLE Principal Investigator	
eRA COMMONS USER NAME GREENEE			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Illinois, Champaign-Urbana, IL	B.S.	1994	Biochemistry
Texas A&M University, College Station, TX	Ph.D.	1998	Biochemistry
National Institutes of Health, Bethesda, MD	Postdoc	1999-2003	Biochemistry

A. Positions and Honors.**Positions:**

- 1994-1998 Graduate Research Assistant, Texas A&M University, College Station, TX (Laboratory of Dr. Dorothy Shippen)
- 1999-2003 Postdoctoral Fellow, National Institutes of Health, Bethesda, MD (Laboratory of Dr. Kiyoshi Mizuuchi)
- 2004-present Assistant Professor, Department of Biochemistry and Molecular Biophysics, College of Physicians and Surgeons, Columbia University, New York, NY
(URL: <http://thegreenelab.cumc.columbia.edu/>)
- 2005-present Member, Herbert Irving Comprehensive Cancer Center

Honors:

- 1993 National Dean's List
- 1998 First Place, Annual Biochemistry and Biophysics Research Competition, Texas A&M University
- 2002 Fellows Award for Research Excellence, National Institutes of Health
- 2005 March of Dimes Basil O'Connor Starter Scholar Research Award
- 2005 Breast Cancer Alliance Young Investigator Award
- 2005 Irma T. Hirschl and Monique Weill-Caulier Career Scientist Award
- 2005 Susan G. Komen Breast Cancer Foundation, New York Regional Award Recipient.
- 2006 National Science Foundation CAREER Award
- 2007 Presidential Early Career Award for Scientists and Engineers (PECASE); Sponsoring Institution: The National Science Foundation

Professional Activities:

- 2004-present Journal Reviewer for Cell & Molecular Cell, Science, Nature, Nature Structure and Molecular Biology, PNAS, Langmuir, PLOS Genetics, Journal of Molecular Biology, Nucleic Acids Research, Nano Letters
- 2004 Student Mentor, Summer Research Program for Historically Underrepresented Students Office of Minority Affairs and Special Programs, Columbia University
- 2004 Participant and Departmental Representative, Annual Biomedical Research Conference for Minority Students (ABRCMS), The National Institute of General Medical Sciences (NIGMS), Division of Minority Opportunities in Research Program (MORE)
- 2005 Student Mentor, Supervising Scientist, & Talent Judge, Intel Science Talent Search
- 2005 Volunteer Talent Judge, The Junior Science and Humanities Symposia (JSHS) Program
New York City Science and Engineering Fair, New York Academy of Sciences

- 2005-present Student Mentor, Summer Undergraduate Research Fellowship Program (SURF), Columbia University
- 2005-2008 Chairman, Biochemistry Seminar Series, Department of Biochemistry and Molecular Biophysics, Columbia University
- 2005-present Breast Cancer Alliance External Grant Review Panel
- 2006-present National Science Foundation, Advisory Panel on Eukaryotic Genetics (Ad Hoc Member)
- 2006 National Science Foundation, Advisory Panel on Biological Physics (Ad Hoc Member)
- 2006 NIH/NHGRI Ad Hoc Advisory Panel
- 2007 Panelist for "What You Can be with a PhD" career symposium. Sponsored by the New York University School of Medicine and the New York Academy of Sciences
- 2008 NIH/NIGMS Ad Hoc Advisory Panel (MGA)

B. Selected Publications.

Peer-Reviewed Publications:

Chi, P., Kwon, Y-H., Moses, D.N., Seong, C., Sehorn, M.G., Singh, A.K., Tsubouchi, H., **Greene, E.C.**, Klein, H.L., and Sung, P. 2008. Functional interactions of meiotic recombination factors Rdh54 and Dmc1. DNA Repair (*In Press*).

Visnapuu, M-L., Fazio, T., Wind, S., and **Greene, E.C.** 2008. Parallel arrays of geometric nanowells for assembling DNA curtains with controlled lateral dispersion. *Langmuir*. 24: 11293-11299.

Fazio, T., Visnapuu, M-L., Wind, S., and **Greene, E.C.** 2008. DNA curtains and nanoscale curtain rods: high-throughput tools for single molecule imaging. *Langmuir*. 24: 10524-10531.

Kwon, Y-H., Seong, C., Chi, P., **Greene, E.C.**, Klein, H., and Sung, P. 2008. ATP-dependent chromatin remodeling by the *Saccharomyces cerevisiae* homologous recombination factor Rdh54. *The Journal of Biological Chemistry* 283 (16): 10445-10452.

Gorman, J., Chowdhury, A., Surtees, J.A., Shimada, J., Reichman, D. R., Alani, E. and **Greene, E.C.** 2007. Dynamic basis for one-dimensional DNA scanning by the mismatch repair complex Msh2-Msh6. *Molecular Cell* 28: 359-370. (*Featured in News & Views, Nature Structural and Molecular Biology Vol. 12, pp. 1124-1125; Rated "Exceptional" by the Faculty of 1000 Biology*).

Prasad, T.K., Robertson, R.B., Visnapuu, M-L., Chi, P., Sung, P., and **Greene, E.C.** 2007. A DNA translocating Snf2 molecular motor protein: *S. cerevisiae* Rdh54 displays heterogeneous kinetic behavior and extrudes large loops of DNA. *Journal of Molecular Biology* 369 (4): 940-953.

Prasad, T.K., Yeykal, C.C., and **Greene, E.C.** 2006. Visualizing the assembly of Rad51 filaments on double-stranded DNA. *Journal of Molecular Biology* 363(3): 713-728.

Granéli, A., Yeykal, C.C., Robertson, R.B., and **Greene, E.C.** 2006. Long-distance lateral diffusion of human Rad51 on double-stranded DNA. *Proceedings of the National Academy of Sciences* 103(5): 1221-1226.

Granéli, A., Yeykal, C.C., Prasad, T.K., and **Greene, E.C.** 2006. Organized arrays of individual DNA molecules tethered to supported lipid bilayers. *Langmuir* 22(1): 292-299.

Greene, E.C. and Mizuuchi, K. 2004. Visualizing the assembly and disassembly mechanisms of the MuB transposition targeting complex. *The Journal of Biological Chemistry* 279(16): 16736-16739.

Greene, E.C. and Mizuuchi, K. 2002. Target immunity during Mu DNA transposition: transpososome assembly and DNA looping enhance MuA-mediated disassembly of the MuB target complex. *Molecular Cell* 10(6): 1367-1378.

Greene, E.C. and Mizuuchi, K. 2002. Direct observation of single MuB polymers: evidence for a DNA-dependent conformational change for generating an active target complex. *Molecular Cell* 9(5): 1079-1089.

Greene, E.C. and Mizuuchi, K. 2002. Dynamics of a protein polymer: the assembly and disassembly pathways of the MuB transposition target complex. *EMBO J.* 21(6):1477-1486.

Greene, E.C. and Shippen, D.E. 1998. Developmentally-programmed assembly of higher order telomerase complexes with distinct biochemical and structural properties. *Genes & Development.* 12(18): 2921-2931.

Greene, E.C., Bednenko, J. and Shippen, D.E. 1997. Flexible positioning of the telomerase-associated nuclease leads to preferential elimination of nontelomeric DNA. *Mol. Cell. Biol.* 18(3): 1544-1552.

Bednenko, J., Melek, M., **Greene, E.C.** and Shippen, D.E. 1997. Developmentally regulated initiation of DNA synthesis by telomerase: evidence for factor-assisted de novo telomere formation. *EMBO J.* 17(6): 2507-2518.

Melek, M., **Greene, E.C.** and Shippen, D.E. 1996. Processing of nontelomeric 3' ends by telomerase: default template alignment and endonucleolytic cleavage. *Mol. Cell. Biol.* 16(7): 3437-3445.

Invited Reviews:

Finkelstein, I.J. and **Greene, E.C.** 2008. Single molecule studies of homologous recombination. (Review). *Molecular Biosystems.* 4: 1094-1104.

Gorman, J. and **Greene, E.C.** 2008. Visualizing one-dimensional diffusion of proteins on DNA. (Review). *Nature Structural & Molecular Biology.* 15(8): 768-774.

Visnapuu, M-L., Duzdevich, D., and **Greene, E.C.** 2008. The importance of surfaces in single-molecule bioscience. (Review). *Molecular BioSystems.* 4(5): 394-403.

Yeykal, C.C. and Greene, E.C. 2006. Extra-Views: Visualizing the behavior of human Rad51 at the single-molecule level. (Review). *Cell Cycle* 5(10): 1033-1038.

Book Chapters:

Visnapuu, M-L., Duzdevich, D., and Greene, E.C. Investigating Protein-DNA interactions with total internal reflection fluorescence microscopy and DNA curtains. In "Modern Research and Educational Topics in Microscopy". 2007 Edition, Volume 1, pages 297-308. A. Méndez-Vilas and J. Díaz (Editors).

Patents:

(1) Title: "Microfluidic Cells with Parallel Arrays of DNA Molecules"

Inventor: Eric C. Greene, Ph.D.

Provisional Application Filed: September 30th, 2005

U.S. National Phase Application Filed: March 30th, 2008

U.S. Patent Application No.: 60/722,733

(2) Title: "DNA curtains and nanoscale curtain rods: high-throughput tools for single molecule imaging"

Inventor: Eric C. Greene, Ph.D.

Provisional Application Filed: April 23rd, 2008

U.S. Patent Application No.: 61/047,657

(3) Title: "Geometric patterns and lipid bilayer for DNA molecule organization and uses thereof"

Inventor: Eric C. Greene, Ph.D.

Provisional Application Filed: November 22nd, 2008

U.S. Patent Application No.: 61/116,815

C. Research Support.

Ongoing:

Irma T. Hirschl and Monique Weill-Caulier Career Scientist Award, 1/01/05-12/31/09

Title: Elucidating Mechanisms of DNA Damage Recognition Through Direct Observation of Single Reactions.

Goal: Visualize assemble of DNA recombination intermediates at the single-molecule level.

Role: PI

Susan G. Komen Breast Cancer Foundation, 05/01/05-04/30/09

Title: Imaging the Molecular Mechanisms of DNA Repair

Goal: Study the DNA binding and assembly of DNA recombination proteins at the single molecule level with emphasis placed on the human proteins Rad51 and Rad52.

Role: PI

National Science Foundation Career Award (PECASE), 05/01/06-04/30/11

Title: Using High-throughput Single-molecule Analysis to Reveal Mechanisms of Target Site Location by DNA Repair Proteins.

Goal: Visualize the target location mechanisms of the mismatch repair protein complex Msh2-Msh6 and determine how it surveys DNA molecules for damage.

Role: PI

National Institutes of Health RO1, 04/01/06-03/31/11

Title: Elucidating the Mechanisms of DNA Recombination

Goal: Determine how recombinases of the RecA family align DNA sequences during homologous recombination. Specific attention is focused on human Rad51 and *E. coli*/RecA.

Role: PI

National Institutes of Health RO1, 07/15/08 – 07/14/12

Title: Visualizing the Dynamics of Chromatin and Chromatin Remodeling Proteins

Goal: Determine how members of the Snf2 family of chromatin remodeling proteins interact with naked DNA and with individual nucleosomes. Specific attention is focused on *S. cerevisiae* Rdh54 and RSC.

Role: PI

Department of Defense, 4/1/08-3/31/10

Title: Coordination of BRCA1/BARD1- and MRE11/RAD50/NBS1-Dependent DNA Transactions in Breast Tumor Suppression.

Goal: Evaluate DNA binding properties of BRCA1/BARD1 and MRE11/RAD50/NBS1 using single molecule microscopy.

Role: Co-PI (PI: Dr. Jean Gautier, Columbia University)

Columbia University Initiatives in Science and Engineering, 9/1/07–8/31/09

Title: Integrated approaches to nanoscale bioscience

Goal: Develop technologies for high-throughput single molecule imaging of protein-DNA interactions.

Role: PI

Pending:

National Institutes of Health RO1 (initial submission October 2007; resubmitted June 2008)

Title: Mechanisms of Post-replicative Mismatch Repair

Goal: Determine how proteins involved in mismatch repair coordinate their interactions to efficiently locate and repair DNA lesions. Specific attention is focused on *S. cerevisiae* Msh2-Msh6, Pms1-Mlh1, and PCNA.

Role: PI

The National Institutes of Health RO1 (initial submission February 2008)

Title: Mechanisms of DNA motor proteins in genome maintenance (RO1)

Goal: Determine the mechanistic basis for motor protein participation in genome maintenance using a combination of single molecule, biochemical, and genetic approaches. Emphasis is placed on the motor proteins Srs2, Sgs1, Rad54, Rdh54, and Tid4.

Role: Co-PI (New NIH format Multi-PI application with Patrick Sung (Yale) and Hanna Klein (NYU))

Howard Hughes Medical Institute Early Career Scientist Award

Title: Integrated approaches to nanoscale bioscience and high-throughput single molecule imaging

Goal: Using high-throughput single-molecule microscopy to visualize fundamental aspects of protein-nucleic acid interactions.

Role: PI

Completed:

Breast Cancer Alliance Young Investigator Award, 12/01/04-11/30/06

Molecular Imaging of DNA Repair Mechanisms: Links between Brca2 and Rad51

Goal: Establish a single-molecule system for studying homologous recombination proteins.

Role: PI

March of Dimes Basil O'Conner Starter Scholar Research Award, 2/01/05-6/31/07

Title: Molecular Mechanisms of ATP-dependent Chromatin Remodeling: A Single-Molecule Analysis of the Snf2-like Family of Proteins.

Goal: Establish a single-molecule system for studying Snf2 proteins and chromatin remodeling at the single molecule level using TIRFM microscopy.

Role: PI