

## Robert Dennis Kuchta

University of Colorado  
Department of Chemistry and Biochemistry  
Campus Box 215  
Boulder, CO 80309-215  
(303) 492-7027

### EDUCATION:

1986	Ph.D.	Biochemistry	Brandeis University	Waltham, MA
1979	B. A.	Biochemistry	Cornell University	Ithaca, NY

### EXPERIENCE:

2004-Present: Professor of Biochemistry at the University of Colorado.

1995-2004: Associate Professor of Biochemistry at the University of Colorado.

1988-1995: Assistant Professor of Biochemistry at the University of Colorado.

1986-1988: Postdoctoral Research Associate with Dr. Stephen J. Benkovic. Pennsylvania State University, Department of Chemistry.

1980-1986 Ph.D. Thesis: Graduate student with Dr. Robert H. Abeles. Brandeis University, Department of Biochemistry.

### AWARDS:

1987-1988: Postdoctoral National Service Research Award (GM11309).

1989-1990: University of Colorado Junior Faculty Development Award.

1991-1994: American Cancer Society Junior Faculty Research Award.

2006: University of Colorado, Boulder, Inventor of the Year.

### PROFESSIONAL SOCIETIES

American Chemical Society  
American Society of Biochemistry and Molecular Biology

### INVITED SEMINARS:

10/87	Lederle Laboratories, NY
12/87	University of Utah, Salt Lake City, UT
12/87	University of Chicago. Chicago, IL
12/87	MIT, Cambridge, MA

2/88 University of Wisconsin, Madison, WI  
3/88 University of Colorado, Boulder, CO  
3/88 British Biochemical Society, England  
4/88 FASEB Meeting, Las Vegas, NV  
3/89 UCLA Symposium, 'DNA Replication and Recombination', Keystone, CO  
9/89 Rocky Mountain Regional Biochemistry Conference, Pingree Park, CO  
1/90 Health Sciences Center, University of Colorado, Denver, CO  
4/90 Uniformed Services University of the Health Sciences, Bethesda, MD  
12/91 Boulder Community Hospital, Boulder, CO  
7/93 Brandeis University, Waltham, MA  
7/93 University of Massachusetts Medical Center, Worcester, MA  
7/93 Gordon Research Conference, 'Purines and Pyrimidines', Newport, RI  
5/94 University of Maryland School of Medicine, Baltimore, MD  
5/94 Duke University, Durham, NC  
5/94 National Institute of Environmental Health Sciences, Durham, NC  
5/94 Burroughs-Wellcome Corporation, Research Triangle Park, NC  
6/94 St. Jude Children's Research Hospital, Memphis, TN  
9/94 Michigan State University, East Lansing, MI  
9/94 University of Michigan Medical School, Ann Arbor, MI  
10/94 University of Colorado, Boulder, CO  
1/95 University of Southern California, Los Angeles, CA  
4/95 Isis Pharmaceuticals, Carlsbad, CA  
9/95 University of Nebraska Medical School, Omaha, NE  
9/95 University of Nebraska, Lincoln, NE  
2/96 Keystone Meeting, 'DNA Replication and Recombination', Taos, NM  
4/96 Fred Hutchinson Cancer Research Center, Seattle, WA  
4/96 University of Washington, Seattle, WA  
5/97 University of Colorado Health Sciences Center, Denver, CO  
8/97 IUBMB Symposium, 'Sphingoglycolipids as Mediators of Molecular Events', Napa, CA  
7/98 Isis Pharmaceuticals, Carlsbad, CA  
5/99 University of Colorado Health Sciences Center, Denver, CO  
6/99 Frontiers in Bio-organic Chemistry Symposium, State College, PA  
3/01 University of Wyoming, Laramie, WY  
4/01 Pennsylvania State University, State College, PA  
7/02 Glasgow University, Glasgow, Scotland  
6/03 Gordon Conference ("Purines, Pyrimidines and Related Substances"), Newport, RI  
8/03 Replidyne Corp., Broomfield, CO  
1/04 University of Colorado, Boulder, CO  
2/04 Ohio State University, Columbus, OH  
8/04 American Chemical Society National Meeting, Philadelphia, PA  
3/05 University of Connecticut, CT  
3/05 University of Connecticut Health Center, CT  
4/06 FASEB Meeting, San Francisco, CA  
11/06 Centers for Disease Control, Ft. Collins, CO  
12/06 Johns Hopkins University, Baltimore, MD  
5/07 Scripps Research Institute, CA  
8/07 Oklahoma State University, OK  
6/08 Symposium on Chemistry of Nucleic Acid Components, Cesky Krumlov, Czech Republic  
2/09 Case Western Reserve University, OH  
4/09 Centers for Disease Control, Ft. Collins, CO

- 7/09 Discussion Leader, Gordon Conference ("Nucleotides, Nucleosides, and Oligonucleotides"), Newport, RI
- 4/11 Alios Pharmaceuticals, San Francisco, CA
- 11/11 Butcher Symposium, Westminster, CO
- 7/13 Gordon Research Conference, "Nucleosides, Nucleotides and Oligonucleotides", Newport, RI
- 3/14 Palacky University, Olomouc, Czech Republic
- 4/14 Alnylam Pharmaceuticals, Boston, MA
- 2/15 Scripps Research Institute, San Diego, CA
- 2/15 San Diego State University, San Diego, CA

#### REFEREED PUBLICATIONS:

- Kuchta, R. D. & Abeles, R. H. (1985) "Lactate Reduction in *Clostridia propionicum*: Purification and Characterization of Lactyl CoA Dehydratase" *Journal of Biological Chemistry* **260**, 13181-13189
- Kuchta, R. D., Hanson, G. M., Holmquist, B. & Abeles, R. H. (1986) "Iron-Sulfur Centers in Lactyl CoA Dehydratase" *Biochemistry* **25**, 7301-7307
- Kuchta, R. D., Mizrahi, V., Benkovic, P. A., Johnson, K. A. & Benkovic, S. J. (1987) "The Kinetic Mechanism of DNA Polymerase I (Klenow)" *Biochemistry* **26**, 8410-8417
- Kuchta, R. D., Benkovic, P. A. & Benkovic, S. J. (1988) "The Mechanisms by which DNA Polymerase I (Klenow) Obtains Fidelity" *Biochemistry* **27**, 6716-6725
- Kuchta, R. D., Reid, B. & Chang, L. M. S. (1990) "DNA Primase: Processivity and the Primase to Polymerase  $\alpha$  Activity Switch" *Journal of Biological Chemistry* **265**, 16158-16165
- Kuchta, R. D. & Wilhelm, L. (1991) "Inhibition of DNA Primase by 9- $\beta$ -D-Arabinofuranosyladenosine Triphosphate" *Biochemistry* **30**, 797-803
- Eger, B. T., Kuchta, R. D., Carroll, S. S., Benkovic, P. A., Dahlberg, M. E., Joyce, C. J. & Benkovic, S. J. (1991) "The Mechanism of DNA Replication Fidelity for Three Mutants of DNA Polymerase I: The Klenow Fragment KF(exo<sup>+</sup>), KF(polA5) and KF(exo<sup>-</sup>)" *Biochemistry* **30**, 1441-1448
- Sheaff, R., Ilsley, D. & Kuchta, R. (1991) "The Mechanism of DNA Polymerase  $\alpha$  Inhibition by Aphidicolin" *Biochemistry* **30**, 8590-8597
- Kuchta, R. D., Ilsley, D., Kravig, K. D., Schubert, S. & Harris, B. (1992) "Inhibition of DNA Primase and Polymerase Alpha by Arabinofuranosyl nucleoside Triphosphates and Related Compounds" *Biochemistry* **31**, 4720-4728
- Sheaff, R. & Kuchta, R. D. (1993) "Mechanism of Calf Thymus DNA Primase: Slow Initiation, Rapid Polymerization, and Intelligent Termination" *Biochemistry* **32**, 3027-3037
- Cheng, C.-H. & Kuchta, R. D. (1993) "DNA Polymerase  $\epsilon$ : Inhibition by Aphidicolin and the Relationship Between Polymerase and Exonuclease Activity" *Biochemistry* **32**, 8568-8574
- Sheaff, R. J., Kuchta, R. D. & Ilsley, D. (1994) "Calf Thymus DNA Polymerase  $\alpha$ -Primase: "Communication" and Primer:Template Movement Between the Two Active Sites" *Biochemistry* **33**, 2247-2254

- Hall, E. T., Yan, J. P., Melançon, P. & Kuchta, R. D. (1994) "3'-Azido-3'-Deoxythymidine Potently Inhibits Protein Glycosylation: A Novel Mechanism for AZT Cytotoxicity" *Journal of Biological Chemistry* **269**, 14355-14358
- Sheaff, R. J. & Kuchta, R. D. (1994) "Misincorporation of Nucleotides by Calf Thymus DNA Primase and Elongation of Primers Containing Multiple Non-cognate Nucleotides by DNA Polymerase  $\alpha$ " *Journal of Biological Chemistry* **269**, 19225-19231
- Ilsley, D. D., Lee, S.-H., Miller, W. H. & Kuchta, R. D. (1995) "Acyclic Guanosine Analogs Inhibit DNA Polymerases  $\alpha$ ,  $\delta$  and  $\epsilon$  with Very Different Potencies and Have Unique Mechanisms of Action" *Biochemistry* **34**, 2504-2510
- Thompson, H. C. & Kuchta, R. D. (1995) "Arabinofuranosyl Nucleotides Are Not Chain-Terminators during Initiation of New Strands of DNA by DNA Polymerase  $\alpha$ -Primase" *Biochemistry* **34**, 11198-11203
- Yan, J.-P., Ilsley, D. D., Frohlich, C., Steet, R., Hall, E. T., Kuchta, R. D. & Melançon, P. (1995) "3'-Azidothymidine (Zidovudine) Inhibits Glycosylation and Dramatically Alters Glycosphingolipid Synthesis in Whole Cells at Clinically Relevant Concentrations" *Journal of Biological Chemistry* **270**, 22836-22841
- Catalano, C. E. & Kuchta, R. D. (1995) "Inactivation of DNA Polymerase  $\alpha$ -Primase by Acrolein: Loss of Activity Depends on the DNA Substrate" *Biochemical and Biophysical Research Communications* **214**, 871-877
- Thompson, H. C., Sheaff, R. S. & Kuchta, R. D. (1995) "Recognition of RNA and DNA Primers by DNA Polymerase Alpha" *Nucleic Acids Research* **23**, 4109-4115
- Trainor, A., Hall E. T., Miller, W. Melançon, P. and Kuchta, R. D. (1996) "Inhibition of UDP-N-Acetylglucosamine Import into Golgi Membranes by Nucleoside Monophosphates" *Journal of Medicinal Chemistry* **39**, 2894-2899
- Kirk, B., Harrington, C., Perrino, F. W. & Kuchta, R. D. (1997) "Eucaryotic DNA Primase Does Not Prefer Pyrimidine-Rich DNA Sequences for Primer Synthesis in the Presence of Physiological NTP Concentrations" *Biochemistry* **36**, 6725-6731
- Kirk, B. W. & Kuchta, R. D. (1999) "Arg304 of Human DNA Primase Is a Key Contributor to Catalysis and NTP Binding: Primase and the Family X Polymerases Share Significant Sequence Homology" *Biochemistry* **38**, 7727-7736
- Kirk, B. W. & Kuchta, R. D. (1999) "Human DNA Primase: Anion Inhibition, Manganese Stimulation, and Their Effects on *in vitro* Start Site Selection" *Biochemistry* **38**, 10126-10134.
- Arezi, B., Kirk, B. W., Copeland, W. C. & Kuchta, R. D. (1999) "Interactions of DNA with Human DNA Primase Monitored with Photoactivatable Crosslinking Agents: Implications for the Role of the p58 Subunit" *Biochemistry* **38**, 12899-12907
- Zerbe, L. K., Goodman, M. F., Efrati, E. & Kuchta, R. D. (1999) "Abasic Template Lesions Are Strong Chain Terminators for DNA Primase but not for DNA Polymerase  $\alpha$  During the Synthesis of New DNA Strands" *Biochemistry* **38**, 12908-12914
- Steet, R., Alizebeh, M., Melançon, P. & Kuchta, R. D. (1999) "3'-Azido-3'-deoxythymidine Inhibits both the Synthesis and Shedding of Gangliosides by Melanoma Cells" *Glycoconjugate Journal* **16**, 237-245

- Richardson, F. C., Kuchta, R. D., Mazurkiewicz, A. & Richardson, K. A. (2000) "Polymerization of 2'-Fluoro- and 2'-O-Methyl-dNTPs by Human DNA Primase, Polymerase  $\alpha$  and Polymerase  $\gamma$ " *Biochemical Pharmacology* **59**, 1045-1052
- Steet, R. A., Melançon, P. & Kuchta, R. D. (2000) "3'-Azidothymidine Potently Inhibits the Biosynthesis of Highly Branched N-linked Oligosaccharides and Poly-N-acetyllactosamine Chains in Cells" *Journal of Biological Chemistry* **275**, 26812-26820
- Chiaromonte, M., Koviach, J. L., Moore, C., Iyer, V. V., Wagner, C. R., Halcomb, R. L., Miller, W., Melançon, P., and Kuchta, R. D. (2001) "Inhibition of CMP-Sialic Acid Transport into Golgi Vesicles by Nucleoside Monophosphates" *Biochemistry* **40**, 14260-14267
- Zerbe, L.K. & Kuchta, R.D. (2002) "The p58 Subunit of Human DNA Primase Is Important for Primer Initiation, Elongation, and Counting" *Biochemistry* **41**, 4891-4900
- Moore, C. L., Chiaromonte, M., Higgins, T. & Kuchta, R. D. (2002) "Synthesis of Nucleotide Analogs That Potently and Selectively Inhibit Human DNA Primase" *Biochemistry* **41**, 14066-14075.
- Ramirez-Aguilar, K. A., Low-Nam, N. A. & Kuchta, R. D. (2002) "The Key Role of Template Sequence for Primer Synthesis by the Herpes Simplex Virus 1 Helicase-Primase" *Biochemistry* **41**, 14569-14579
- Chiaromonte, M., Moore, C. L., Kincaid, K. & Kuchta, R. D. (2003) "Facile Polymerization of dNTPs Bearing Unnatural Base Analogues by DNA Polymerase  $\alpha$  and Klenow Fragment (DNA Polymerase I)" *Biochemistry* **42**, 10472-10481
- Ramirez-Aguilar, K. A. & Kuchta, R. D. (2004) "Mechanism of Primer Synthesis by the Herpes Simplex Virus 1 Helicase-Primase" *Biochemistry* **43**, 1754-1762
- Ramirez-Aguilar, K. A. & Kuchta, R. D. (2004) "Herpes Simplex Virus 1 DNA Primase: A Polymerase with Extraordinarily Low Fidelity" *Biochemistry* **43**, 9084-9091
- Moore, C. L., Zivkovic, A., Engels, J.W. & Kuchta, R. D. (2004) "Human DNA Primase Uses Watson-Crick Hydrogen Bonding Groups to Distinguish between Correct and Incorrect NTPs" *Biochemistry* **43**, 12367-12374
- Richardson, K. A., Vega, T. P., Richardson, F. C., Moore, C. L., Rohloff, J. C. Tomkinson, B., Bendele, R. A. & Kuchta, R. D. (2004) "Polymerization of the Triphosphates of AraC, 2',2'-Difluorodeoxycytidine (dFdC) and OSI-7836 (T-araC) by Human DNA Polymerase  $\alpha$  and DNA Primase" *Biochemical Pharmacology* **68**, 2337-2346
- Kincaid, K., Beckman, J., Zivkovic, A., Halcomb, R. L. Engels, J.W. & Kuchta, R. D. (2005) "Exploration of Factors Driving Incorporation of Unnatural dNTPS into DNA by Klenow Fragment (DNA Polymerase I) and DNA Polymerase  $\alpha$ " *Nucleic Acids Research* **33**, 2620-2628
- Smagala, J. A., Dawson, E. D., Mehlmann, M., Townsend, M. B., Kuchta, R. D., & Rowlen, K. L. (2005) "ConFind: A Robust Tool for Conserved Sequence Identification" *Bioinformatics* **21**, 4420-4422

- Ramirez-Aguilar, K. A., Moore, C. L., & Kuchta, R. D. (2005) "Herpes Simplex Virus 1 Primase Employs Watson-Crick Hydrogen Bonding to Identify Cognate NTPs" *Biochemistry* **44**, 15585-15593
- Mehlmann, M., Townsend, M. B., Stears, R. L., Kuchta, R. D., & Rowlen, K. L. (2005) "Optimization of Fragmentation Conditions for Microarray Analysis of Viral RNA" *Analytical Biochemistry* **347**, 316-323
- Richards, O. C., Spagnolo, J., Lyle, J. M., Vleck, S. E., Kuchta, R. D. & Kirkegaard, K. (2006) "Intramolecular and Intermolecular Uridylylation by Poliovirus RNA Dependent RNA Polymerase" *Journal of Virology* **80**, 7405-7415.
- Mehlmann, M., Dawson, E. D., Townsend, M. B., Smagala, J. A., Moore, C. L., Smith, C. B., Cox, N. J., Kuchta, R. D., & Rowlen, K. L. (2006) "FluChip<sup>TM</sup>: Robust Sequence Selection Method for a Diagnostic Influenza Microarray" *Journal of Clinical Microbiology* **44**, 2857-2862
- Townsend, M. B., Dawson, E. D., Mehlmann, M., Smagala, J. A., Dankbar, D. M., Moore, C. L., Smith, C. B., Cox, N. J., Kuchta, R. D., & Rowlen, K. L. (2006) "FluChip<sup>TM</sup>: Experimental Evaluation of a Diagnostic Influenza Microarray" *Journal of Clinical Microbiology* **44**, 2863-2871
- Kinkaid, K., & Kuchta, R. D. (2006) "A Mass Spectrometry-Based Approach for Identifying Novel DNA Polymerase Substrates from a Pool of dNTP Analogues" *Nucleic Acids Research* **34**, (doi:10.1093/nar/gkl632)
- Dawson, E.D., Moore, C. L., Smagala, J. A., Dankbar, D. M., Mehlmann, M., Townsend, M. B., Smith, C. B., Cox, N. J., Kuchta, R. D., & Rowlen, K. L. (2006) "MChip: A New Tool for Influenza Surveillance" *Analytical Chemistry*, **78**, 7610-7615.
- Dawson, E.D., Moore, C. L., Dankbar, D. M., Mehlmann, M., Townsend, M. B., Smagala, J. A., Smith, C. B., Cox, N. J., Kuchta, R. D., & Rowlen, K. L. (2007) "A Single Gene Diagnostic Microarray for Influenza Targeting the Matrix Gene Segment: Analysis of Diverse H5N1 Viral Isolates" *Analytical Chemistry* **79**, 378-384.
- Beckman, J., Kincaid, K., Hocek, M., Spratt, T., Engels, J., Cosstick, R., & Kuchta, R. D. (2007) "Human DNA Polymerase  $\alpha$  Uses a Combination of Positive and Negative Selectivity to Polymerize Purine dNTPs with High Fidelity" *Biochemistry* **46**, 448-460
- Blair, R. H., Rosenblum, E. S., Dawson, E. D., Kuchta, R. D., Kuck, L. R., & Rowlen, K. L. (2007) "Real-Time Quantification of RNA Polymerase Activity using a "Broken Beacon"" *Analytical Biochemistry* **362**, 213-220.
- Mehlmann, M., Bonner, A. B., Williams, J. V., Dankbar, D. M., Moore, C. L., Kuchta, R. D., Podsiad, A. B., Tamerius, J. D., Dawson, E. D., & Rowlen, K. L. (2007) "Comparison of the MChip to Viral Culture, Reverse Transcription-PCR and the QuickVue<sup>®</sup> Influenza A+B Test for Rapid Diagnosis of Influenza" *Journal of Clinical Microbiology* **45**, 1234-1237.

- Dankbar, D. M., Dawson, E., D., Mehlmann, M., Moore, C. L., Smagala, J. A., Shaw, M. W., Cox, N. J., Kuchta, R. D., & Rowlen, K. A. (2007) "Diagnostic Microarray for Influenza B Viruses" *Analytical Chemistry* **79**, 2084-2090.
- Moore, C. L., Smagala, J. A., Smih, C. B., Dawson, E. D., Cox, N. J., Kuchta, R. D., & Rowlen, K. L. (2007) "Evaluation of MChip with Historic A/H1N1 Influenza Viruses Including the 1918 "Spanish Flu" *Journal of Clinical Microbiology* **45**, 3807-3810.
- Townsend, M. B., Smagala, J. A., Dawson, E. D., Deyde, V., Gubareva, L., Klimov, A. I., Kuchta, R. D., & Rowlen, K. L. (2008) "Detection of Adamantane-Resistant Influenza on a Microarray" *Journal of Clinical Virology* **42**, 117-123
- Keller, K. E., Cavanaugh, N., & Kuchta, R. D. (2008) "Interaction of Herpes Primase with the Sugar of a NTP" *Biochemistry* **47**, 8977-8984.
- Cavanaugh, N. A., & Kuchta, R. D. (2009) "Initiation of New DNA Strands by the Herpes Primase-Helicase Complex and either Herpes DNA Polymerase or Human DNA Polymerase  $\alpha$ " *Journal of Biological Chemistry* **284**, 1523-1532.
- Patro, J. N., Urban, M., & Kuchta, R. D. (2009) "Role of the 2-Amino Group of Purines during dNTP Polymerization by Human DNA Polymerase  $\alpha$ " *Biochemistry* **48**, 180-189.
- Cavanaugh, N. A., Beckman, J., Urban, M., Spratt, T. E., & Kuchta, R. D. (2009) "Mechanism by which Herpes Simplex Virus I DNA Polymerase Discriminates between Right and Wrong Purine dNTPs" *Biochemistry* **48**, 3554-3564.
- Trostler, M., Delier, A., Urban, M., Patro, J. N., Spratt, T. E., Beese, L. S., & Kuchta, R. D. (2009) "Discrimination between Right and Wrong Purine dNTPs by DNA Polymerase I from *Bacillus stearothermophilus*" *Biochemistry* **48**, 4633-4641.
- Stengel, G., Purse, B. W., Wilhelmsson, L. M., Urban, M., & Kuchta, R. D. (2009) "Ambivalent Incorporation of the Fluorescent Cytosine Analogues tC and tC<sup>0</sup> by Human DNA Polymerase  $\alpha$  and Klenow Fragment" *Biochemistry* **48** 7547-7555.
- Patro, J. N., Urban, J., & Kuchta, R. D. (2009) "Interaction of Human DNA Polymerase  $\alpha$  and DNA Polymerase I from *Bacillus stearothermophilus* with Hypoxanthine and 8-Oxo-guanine Nucleotides" *Biochemistry* **48** 8271-8278.
- Stengel, G., Urban, M., Purse, B. W., & Kuchta, R. D. (2009) "High Density Labeling of PCR Products with the Fluorescent Analogue tCo" *Analytical Chemistry* **81**, 9079-9085.
- Cavanaugh, N. A., Ramirez-Aguilar, K. A., Urban, M. & Kuchta, R. D. (2009) "Herpes Simplex Virus-1 Helicase-Primase: Roles of Each Subunit in DNA Binding and Phosphodiester Bond Formation" *Biochemistry* **48**, 10199-10207.
- Urban, M., Joubert, N., Hocek, M., Alexander, R. E., & Kuchta, R. D. (2009) "Herpes Simplex Virus-1 DNA Primase: A Remarkably Inaccurate Yet Selective Polymerase" *Biochemistry* **48**, 10866-10881.

- Urban, M., Joubert, N., Purse, B. W., Hocek, M., & Kuchta, R. D. (2010) "Mechanisms by which Human DNA Primase Chooses to Polymerize a NTP" *Biochemistry* **49**, 727-735.
- Stengel, G., Urban, M., Purse, B. W., & Kuchta, R. D. (2010) "Incorporation of the Fluorescent Nucleotide Analogue tCTP by T7 RNA Polymerase" *Analytical Chemistry* **82**, 1082-1089.
- Johnson, L. M., Hansen, R. R., Urban, M. N., Kuchta, R. D. & Bownan, C. N. (2010) "Photoinitiator Nucleotide for Quantifying Nucleic Acid Hybridization" *Biomacromolecules* **11**, 1133-1138.
- Olsen, A. C., Rosenblum, E. & Kuchta, R. D. (2010) "Regulation of Influenza RNA Polymerase Activity and the Switch between Replication and Transcription by the Concentrations of the vRNA 5' End, the Cap Source, and of the Polymerase" *Biochemistry* **49**, 10208-10215.
- Sun, T., Yang, X., Wang, W., Zhang, X., Xu, Q., Zhu, S., Kuchta, R., Chen, G., & Liu, X. (2010) "Cellular Abundance of Mps1 and the Role of its Carboxyl Terminal Tail in Substrate Recruitment" *Journal of Biological Chemistry* **285**, 39730-38739.
- Stengel, G. & Kuchta, R. D. (2011) "Coordinated Leading and Lagging Strand DNA Synthesis Using the Herpes Simplex Virus I Replication Complex and Mini-circle DNA Templates" *Journal of Virology* **85**, 957-967 Highlighted as a *Journal of Virology* Spotlight Feature.
- Chen, Y., Bai, P., Mackay, S., Koraz, G., Carson, J. H., Kuchta, R. D., & Weller, S. K. (2011) "Herpes Simplex Virus Type 1 Helicase-Primase: DNA Binding and Consequent Protein Oligomerization and Primase Activation" *Journal of Virology* **85**, 968-978.
- Houck, J. A., Hojgaard, A., Peisman, J., & Kuchta, R. D. (2011) "Low density microarrays for the detection of *Borrelia burgdorferi* s.s. (the Lyme disease spirochete) in nymphal *Ixodes scapularis*" *Ticks and Tick Borne Diseases* **2**, 27-36.
- Stengel, G., Purse, B., & Kuchta, R. D. (2011) "Effect of transition metal ions on the fluorescence and Taq-catalyzed PCR of tricyclic cytidine analogues" *Analytical Biochemistry* **416**, 53-60.
- Lund, T. J., Cavanaugh, N., Joubert, N., Urban, M., Patro, J. N., Hocek, M., & Kuchta, R. D. (2011) "B Family DNA Polymerases Asymmetrically Recognize Pyrimidines and Purines" *Biochemistry* **50**, 7243-7250.
- Ungermannova, D., Parker, S.J., Nasveschuk, C. G., Wang, W., Quade, B., Zhang, G., Kuchta, R. D., Phillips, A. J., & Liu, X. (2012) "Largazole and its derivatives selectively inhibit ubiquitin activating enzyme (e1)" *PLoS One* **7**, e29208
- Ungermannova, D., Parker, S.J., Nasvershuk, C. G., Chapnick, D. A., Phillips, A. J., Kuchta, R. D., & Liu, X. (2012) "Identification and Mechanistic Studies of a Novel Upiquitin E1 Inhibitor" *Journal of Biomolecular Screening* **17**, 421-434.
- Olson, A. C., Patro, J. N., Urban, M., & Kuchta, R. D. (2013) "The Energetic Difference between Synthesis of Correct and Incorrect Base Pairs Accounts for Highly Accurate DNA Replication" *Journal of the American Chemical Society* **135**, 1205-1208.
- Rodgers, B. J., Elsharif, N. A., Vashisht, N., Mingus, M. M., Mulvahill, M. A., Stengel, G., Kuchta, R. D., & Purse, B. W. (2014) "Functionalized Tricyclic Cytidine Analogues Provide



Fluorophores with Improved Photophysical Properties and a Range of Solvent Sensitivities” *Chemistry* **20**, 2010-2015.

Vashishtha, A. K. and Kuchta, R. D. (2015) “Polymerase and Exonuclease Activities of Herpes Simplex Virus Type 1 DNA Polymerase Are Not Highly Coordinated” *Biochemistry* **54**, 240-249.

Vashishtha, A. K. and Kuchta, R. D. (2016) “Effects of Acyclovir, Foscarnet and Ribonucleotides on Herpes Simplex Virus-1 DNA Polymerase: Mechanistic Insights and a Novel Mechanism for Preventing Stable Incorporation of Ribonucleotides into DNA” *Biochemistry* **55**, 1168-1177.

Okochi, K. D., Monfregola, L., Dickerson, S. M., McCaffrey, R., Domaille, D. W., Yu, C., Hafenstine, G. R., Jin, Y., Cha, J. N., Kuchta, R. D., Caruthers, M. and Zhang, W. (2017) “Synthesis of Small Molecule/DAN Hybrids through On-Bead Amide Coupling Approach” *Journal of Organic Chemistry* doi: 10.1021/acs.joc.6bo2942.

#### **ABSTRACTS, REVIEWS, AND BOOK CHAPTERS.**

Fierke, C. A., Kuchta, R. D., Johnson, K. A. & Benkovic, S. J. (1988) "Implications for Enzymic Catalysis from Free Energy Reaction Coordinate Profiles". *Cold Spring Harbor Symposium on Quantitative Biology* **52**, 631-638.

Kuchta, R. D., Cowart, M., Allen, D. & Benkovic, S. J. (1988) "Kinetic and Structural Investigations of the Replicative Fidelity of the Klenow Fragment". *Biochemical Society Transactions* **16**, 947-949.

Goodman, M. F., Ripley, L. S., Kunkel, T. A., Joyce, C., Petruska, J. & Kuchta, R. D. (1990) "Discussion Summary: Replication Fidelity". *UCLA Symposium on Molecular and Cellular Biology, New Series* **127**, (Ed. Richardson, C. & Lehman, R.) 53-59.

Kuchta, R. D. & Wilhelm, L. (1991) "Inhibition of DNA Primase by 9- $\beta$ -D-Arabinofuranosyladenosinetriphosphate" *The FASEB Journal* **5**, #387

Ilsley, D. D. & Kuchta, R. D. (1992) "Analysis of Lagging Strand DNA Synthesis in Isolated Nuclei" *Molecular Biology of the Cell* **3**, 135a.

Ilsley, D. & Kuchta, R. D. (1993) "Inhibition of DNA Synthesis in Isolated Nuclei by Arabinofuranosyl Nucleotides" (1993) *The FASEB Journal* **7**, A1292

Sheaff, R. & Kuchta, R. D. (1993) "Calf Thymus DNA Polymerase Alpha:Primase: A Catalytic Duet" *The FASEB Journal* **7**, A1291

Sheaff, R. J., Thompson, H. C. & Kuchta, R. D. "Misincorporation by the Calf Thymus DNA Polymerase Alpha:Primase Complex: The Lesser of Two Evils?" (1993) American Association of Cancer Research Histopathobiology of Neoplasia Workshop S37.

Hall, E., Trainor, A., Melançon, P. & Kuchta, R. D. "3'-Azido-3'-Deoxythymidine Monophosphate Potently Inhibits Golgi Specific Glycosylation Reactions." (1995) *The FASEB Journal* **9**, 613.

Kuchta, R. D. "Isotopic Assays of Viral Polymerases and Related Proteins." (1996) *Methods in Enzymology* 275, 241-257.

Lee, S.-H., Kuchta, R. D., Kim, D. K. and Drissi, R. "Use of in vitro Eukaryotic DNA Replication System as a Tool to Develop Anti-viral Drug, Nucleotide Analog" (1996) *KSEA Series of Advances in Science and Engineering* 1, (Ed. Ryu, D. D.-Y., Lee, S. S. & Han, M. H. 68-76.

Arezi, B. & Kuchta, R. D. (2000) "Eukaryotic DNA Primase" *Trends in Biochemical Sciences* 25, 572-576.

Cavanaugh, N., Trostler, M., Patro, J., Beckman, J. & Kuchta, R. D. (2008) "Mechanisms by Which DNA Polymerases Discriminate Between Right and Wrong dNTPs" *Chemistry of Nucleic Acid Components, Symposium Series* 14, 186-190.

Shewach, D. S. & Kuchta, R. D. (2009) "Introduction to Cancer Chemotherapeutics" *Chemical Reviews* 109, 2859-2861

Kuchta, R. D. & Stengel (2010) "Mechanism and Evolution of DNA Primases" *Biochimica et Biophysica Acta* 1804, 1180-1189.

Kuchta, R. D. (2010) "Nucleotide Analogues as Probes for DNA and RNA Polymerases" *Current Protocols in Chemical Biology* 2, 111-124.

Weller, S. K. & Kuchta, R. D. (2013) "The DNA Helicase-Primase Complex as a Target for Herpes Viral Infection" *Expert Opinion in Therapeutic Targets* 17, 1119-1132.

## **PATENTS**

Rowlen, K. L., Kuchta, R., Townsend, M., Smagala, J., Moore, C. Dawson, E., Mehlmann, M., Cox, N. Smith, C., "DNA Microarray Analysis as a Diagnostic for Current and Emerging Strains of Influenza A" (Pending)

Rowlen, K. L., Kuchta, R., Townsend, M., Smagala, J., and Dawson, E. "Detection of Antiviral Agent Resistance in Influenza A Using DNA Microarrays" (Pending)

Rowlen, K. L., Birks, J. W., Bowman, C., Sikes, H., Hansen, R. and Kuchta, R. "Use of Photopolymerization for Amplification and Detection of a Molecular Recognition Event" US Patent 7354706

## **UNIVERSITY AND PUBLIC SERVICE**

### **TEACHING:**

1989 (Spring): Chem 4761 - Undergraduate Biochemistry Laboratory Course  
1989 (Fall): Chem 5781 - Graduate Biochemistry Course  
1991 (Spring): Chem 5781 - Graduate Biochemistry Course  
1991 (Fall): Chem 4711/5711 - Undergraduate Biochemistry Lecture Course  
1992 (Fall): Chem 4711/5711 - Undergraduate Biochemistry Lecture Course  
1992 (Fall): Chem 6601 - Graduate Seminar Course

1993 (Spring): Chem 5781 - Graduate Biochemistry Course (4 Lectures)  
 1993 (Fall): Chem 5771 - Graduate Biochemistry Course  
 1993 (Fall): Chem 6601 - Graduate Seminar Course  
 1994 (Fall): Chem 5771 - Graduate Biochemistry Course  
 1995 (Fall): Chem 4711/5711 - Undergraduate Biochemistry Lecture Course  
 1995 (Fall): Chem 6911 - Biotechnology Seminar Course  
 1996 (Spring): Chem 5781 - Graduate Biochemistry Course (3 Lectures)  
 1996 (Fall): Chem 4711 - Undergraduate Biochemistry Lecture Course  
 1997 (Fall): Chem 4731/5731 - Undergraduate Biochemistry Lecture Course, 2nd Semester  
 1998 (Fall): Chem 4731/5731 - Undergraduate Biochemistry Lecture Course, 2nd Semester  
 1999 (Fall): Chem 4731/5731 - Undergraduate Biochemistry Lecture Course, 2nd Semester  
 2000 (Fall): Chem 4731/5731 - Undergraduate Biochemistry Lecture Course, 2nd Semester  
 2001 (Fall): Chem 4731/5731 - Undergraduate Biochemistry Lecture Course, 2nd Semester  
 2002 (Fall): Chem 5771 - Graduate Biochemistry Course  
 2003 (Fall): Chem 5771 - Graduate Biochemistry Course  
 2004 (Fall): Chem 4711 - Undergraduate Biochemistry Course, 1st Semester  
 2005 (Fall): Chem 4711 - Undergraduate Biochemistry Course, 1st Semester  
 2007 (Spring): Chem 5781 - Graduate Biochemistry Course  
 2007 (Fall): Chem 5771 - Graduate Biochemistry Course  
 2008 (Fall): Chem 5771 - Graduate Biochemistry Course  
 2009 (Fall): Chem 4711/5711 - Undergraduate Biochemistry Lecture Course, 1st Semester  
 2010 (Fall): Chem 4711/5711 - Undergraduate Biochemistry Lecture Course, 1st Semester  
 2011(Fall): Chem 4711/5711 - Undergraduate Biochemistry Lecture Course, 1st Semester  
 2013 (Spring): Chem 5781 – Graduate Biochemistry Course  
 2014 (Spring): Chem 4731/5731 – Undergraduate Biochemistry Lecture Course, 2nd Semester  
 2015 (Spring): Chem 4731/5731 – Undergraduate Biochemistry Lecture Course, 2nd Semester

## **SERVICE:**

### University

Evaluation of UROP Proposals	1989 – Present
Participant in CAPRH program at Sewall Hall	1999
Member of Deans Task Force on the Life Sciences Committee	5/01-9/02
Member of Institutional Biosafety Committee (Chair from 1/03-9/06)	6/01-9/06
Member of Institutional Biosafety Committee	8/13-Present
Member of Conflict of Interest Committee	8/13-Present

### Department

Associate Chair for Academic Affairs	7/06-6/12
Teaching Assistant Committee	9/08-Present
Chemical Biology Program	9/08-Present
Judge, Chris Severy Memorial Poster Session	5/02 - Present
Organic Chemistry Search Committee	9/06-8/07
Graduate Student Recruiting	9/02-9/06
Biochemistry Retreat Committee	9/89 – 9/06
Graduate Student Recruiting (Chair)	9/98 - 9/02

Graduate Student Recruiting	12/91 - 8/94
Undergraduate Advising	9/89 - 9/96
Pre-Medical Advising	9/89 - 9/96
Departmental Secretary for Faculty Meetings	9/89 - 9/90
Freshman/Sophomore Advising	1994
Orientation Advising for Incoming Undergraduates	9/93 – 6/95
Member of Executive Committee	9/96 - 6/98
Biochemistry Retreat Committee	8/13-Present

### Scientific Community

Associate Editor, “Chemical Reviews” (10/15/99 – 4/15)  
Grant review for Ohio Cancer Research Associates  
External reviewer of NSF Proposals  
Grant Reviewer for the Texas Higher Education Coordinating Board (Biomedicine Review Panel, 1993)  
External reviewer of grant proposals for the University of West Virginia  
Ad hoc reviewer for Experimental Therapeutics I study section at NIH (10/96)  
Reviewer for CET-1 panel of the DOD Prostate Cancer Research Program (1/98, 6/99, 6/00, 5/01, 7/02, 4/05, 6/06)  
Ad hoc reviewer for Biochemistry study section at NIH (2/98, 10/01, 10/03)  
Ad hoc reviewer for MGB2 study section at NIH (2/06)  
Ad hoc reviewer for VIRA study section at NIH (10/06)  
Ad hoc reviewer for VIRA study section at NIH (6/08)  
Ad hoc reviewer for VIRA study section at NIH (6/09)  
Ad hoc reviewer for MGA study section at NIH (6/10)  
Ad hoc reviewer for MGA study section at NIH (6/11)  
External reviewer for NSF (9/12)  
Mail reviewer for ZRG1 BCMB-A study section at NIH (1/13)  
Ad hoc reviewer for MSFA study section at NIH (2/15, 10/15)

Review of manuscripts for the journals:

- ‘Biochemical Pharmacology’
- ‘Biochemistry’
- ‘Cancer Research’
- ‘Journal of the American Chemical Society’
- ‘Journal of Biological Chemistry’
- ‘Molecular and Cellular Biology’
- ‘Molecular Pharmacology’
- ‘Nature Biotechnology’
- ‘Nucleic Acids Research’
- ‘Science’
- ‘Chemical Reviews’

### Local Community

5/90-8/97 Board of Directors, American Cancer Society  
4/92 Boulder Community Hospital, Medical Practitioners Continuing Education Program  
10/95 Boulder Community Hospital, CancerMount Program

### **PRESENT AND PAST STUDENTS THAT I HAVE SUPERVISED**

### Graduate Students

Larry Wilhelm, 3/89-10/89  
Robert Sheaff, 6/90-1/94 (Ph.D.)  
Diane Ilsley, 6/90-7/94 (Ph.D.).  
Harry Thompson, 6/92-7/95 (M.S.)  
Edina Hall, 6/93-3/96 (M.S.)  
Brian Kirk, 12/93-4/99 (Ph.D.)  
Richard Steet, 9/96-8/00 (Ph.D.)  
Mary Chiaramonte, 5/97-5/02 (Ph.D.)  
Tanya Vega, 5/01-12/02 (M.S.)  
Kristi Kincaid, 5/01-5/06 (Ph.D.)  
Michael Townsend, 5/02-8/06 (Ph.D.) (Shared with Dr. Kathy Rowlen)  
James Smagala, 9/06-8/07 (Ph.D.) (Shared with Dr. Kathy Rowlen)  
Jeff Beckman, 5/02-12/06 (Ph.D.)  
Nisha Low-Nam, 5/03-6/08 (Ph.D.)  
Allison Stedry, 5/07-12/08 (M.S.)  
Andrew Olsen, 5/06-11/11  
Travis Lund, 8/08-11/12  
Tanya Wyss, 8/11-1/12  
Sarah Dickerson, 6/12-Present

### Post-Doctoral Students

Diane Ilsley, 7/94-12/94  
Bahram Arezi, 9/97-6/00  
Richard Steet, 9/00-6/01  
Laura Zerbe, 9/97-6/01.  
Molly Chiaramonte, 6/02-8/02  
Chad Moore, 4/00-9/06  
Martin Mehlmann, 1/04-10/06 (Shared with Dr. Kathy Rowlen)  
Daniela Dankbar, 1/04-10/06 (Shared with Dr. Kathy Rowlen)  
Jeff Beckman, 12/06-2/06  
Eric Rosenblum, 3/06-1/08  
Kathy Ramirez-Aquilar, 1/00-2/08  
Kristen Hannah. 9/07-3/08  
Nisha Cavanaugh, 6/08-12/08  
Milan Urban, 9/06-11/09  
Jennifer Patro, 2/07-7/09  
Gudrun Stengel, 9/08-6/11  
Ashwani Vashishtha 7/1/12-11/1/15  
Joshua Gossling, 9/1/12-7/1/15

### Undergraduate Students

Brian Reid, 1/89-12/89  
Bristol Harris, 4/89-6/90  
Kasey Kravig, 6/90-6/91  
Jacinto Villarreal, 6/90-8/90 (SMART Program)  
Sybilla Schubert, 9/90-9/91 (Exchange student from Germany)  
Bruce Muller, 1/91-12/91  
Todd Walker, 4/91-6/92

Binh Thuy Vien 6/91-6/92 (SMART Program, Honors Research)  
 Siam Oottamasathien, 5/92-6/93 (Honors Research)  
 Zahra Nadji, 9/93-5/94  
 Todd Kline, 4/94-9/94  
 Andrea Trainor, 9/92-5/95 (Honors Research)  
 Rebecca Smith, 10/95-6/96  
 Mary Alizabeh, 1/96-8/97  
 Corrine Frohlick, 1/95-6/97  
 Eman Isaaks, 1/97-7/98  
 Chris Severy 4/97-10/98  
 Chris Wilson 9/97-8/98  
 Chris Beck 12/98-5/99  
 Hugo Doetsch 9/99-5/00  
 Tamara Higgins 10/99-5/01  
 Susan Brummer 5/00-1/02  
 Eddie Drumheller 9/00-5/02  
 Juan Camacho, 6/01-8/01 (SMART Program)  
 Nisha Low-Nam 1/01-5/02  
 Ashley Pierre 6/02-8/02 (SMART Program)  
 Marcelle Bobst 6/02-8/02, REU Program  
 DeAquanita McKinney, 6/03-8/03 (SMART Program)  
 James Cortez, 6/04-1/05  
 Greg Timblin, 6/05-8/05, 6/06-8/06 (Summer Research Intern from Nebraska Wesleyan)  
 Michele Loi, 1/03-8/06 (Honors Research)  
 Josue Flores-Kim, 6/06-8/06 (SMART Program)  
 Alison Smith, 1/06-7/07  
 Michael Trostler, 2/06-8/08  
 Shannon Mackay, 9/08-12/09 (Honors Research)  
 Richard Alexander, 9/08- 6/10  
 David Kirsch, 1/10-5/11  
 Matthew Holden, 9/10-6/12  
 Arielle Baker, 2/11-9/13  
 Clarinda Hougen, 1/12-5/13  
 Taylor Minckley, 9/12-1/14  
 Priscilla Dao, 1/14-5/15  
 Michelle Kennedy, 9/13-Present  
 Nicole Broda, 1/16-Present

Visiting Scientists

Dr. Katherine Richardson, 9/04-1/06

High School Students

Tammy Stogner, Rangeview High School Externship Program (1/95-2/95)

**PAST AND PRESENT GRANT SUPPORT**

**Source, Identifying Number, and Title:**

**Dates:**

**Total Direct Costs:**

University of Colorado, Innovative Grant Proposal

“Redox Active Nanomaterials”	7/1/16-12/31/17	\$50,000
Army Research Office, 69024LS “Redox Responsive Dynamic DNA Nanomaterials”	5/1/16-4/30/19	\$234,000
National Institutes of Health, R01-AI59764-06 "Mechanism and Inhibition of Herpes Replication"	7/5/11-6/30/16	\$800,000
National Institutes of Health, R21-AI092540-01 “Development of Novel Nucleotide Prodrugs”	10/1/11-8/30/14	\$275,000
Butcher Foundation “Real Time Tracking of Human Papillomavirus Genome Entry and Replication Using Fluorescent Nucleotide Analogues”	7/1/10-6/30/12	\$50,000
Colorado Cancer League “A New Prodrug Approach to Generate Improved Nucleoside Analogues for Cancer Chemotherapy”	7/1/10-6/30/11	\$20,000
Center for Disease Control and Prevention “A Microarray to Detect <i>Borrelia</i> in Ticks”	8/1/08-3/31/09	\$16,800
Center for Disease Control and Prevention “A Microarray to Detect <i>Borrelia</i> in Ticks”	9/1/07-8/31/08	\$22,474
National Institutes of Health RO1-GM073832-01 “Coordination of HSV Lagging Strand Synthesis” (P.I. Debbie Parris, Ohio State University)	7/1/06-6/30/10	\$146,000
National Institutes of Health UO1-AI0700276-01 “Advanced Microarray Technology for Pathogen Surveillance” (P.I. Kathy Rowlen, InDevR LLC.)	8/1/06-7/31/08	\$173,000
National Institutes of Health RO1-AI071338-01 “A High-Throughput Assay for Influenza Replicase/RNA Polymerase Inhibitors”	2/1/06-7/31/08	\$382,000
National Institutes of Health RO1-GM54194-08 “Mechanism of DNA Polymerase Alpha-Primase”	12/1/05-11/30/09	\$512,000
National Institutes of Health RO3-TW007372-01 “Interaction of DNA Polymerase $\alpha$ with Novel Base-Pairs”	8/01/05-7/31/08	\$96,000
U.S. Army Research Office W911NF-05-1-0172 “Fidelity Mechanisms of DNA Polymerase $\alpha$ ”	4/15/05-4/14/08	\$205,000
National Institutes of Health, R01-AI59764-01 "Mechanism and Inhibition of Herpes Replication"	12/1/04-11/31/09	\$875,000
National Institutes of Health, UO1-AI56528-01 "Development of Diagnostic Microarray for Influenza A" (Co P.I. with Kathy Rowlen)	9/1/03-3/30/08	\$1,367,913
National Institutes of Health, R21-AI-52277-01 "Mechanism and Inhibition of Herpes Replication"	9/15/02-8/30/04	\$175,000
National Institutes of Health RO1-GM54194-04	12/5/99-11/30/04	\$462,704

“Mechanism of DNA Polymerase Alpha-Primase”

National Institutes of Health RO1-GM55709-01 "Development of Novel Glycosylation Inhibitors"	6/1/97-5/30/02	\$471,081
National Institutes of Health RO1-GM54194-01 "DNA Polymerase $\alpha$ -Primase: Mechanism and Organization"	5/1/96-12/05/99	\$346,200
Council for Tobacco Research 2612A "Nuclear DNA Replication: Mechanism and Inhibition by AZT"	7/1/93-6/30/96	\$155,000
National Science Foundation DMB-9105808 "Mechanism of DNA Polymerase $\alpha$ and Primase"	11/1/91-4/30/96	\$180,252
American Cancer Society NP-771 "Inhibition of DNA Polymerases $\alpha$ and $\epsilon$ by Aphidicolin"	7/1/91-6/30/94	\$180,000
American Cancer Society JFRA-337 "DNA Polymerase Alpha-Primase: Mechanism and Inhibition"	7/1/91-6/30/94	\$90,500
Council for Tobacco Research 2612 "DNA Primase as a Target for Chemotherapeutics"	1/1/90-12/31/92	\$169,500
Colorado Cancer League "Activation of DNA Polymerase $\alpha$ by ATP"	9/1/89-8/30/90	\$17,577