JOHANNES RUDOLPH

Education:	Degree	Date
John F. Kennedy Memorial High School Seattle, WA	HSD (4.0 GPA)	1983
University of Washington, Dept. of Chemistry Seattle, WA	B.S. (Honors)	1988
Massachusetts Institute of Technology Cambridge, MA	Ph.D. Biological Chemistry	1993

Mentor: JoAnne Stubbe, Department of Chemistry
Thesis Title: Enzymological Investigations of the Mechanism of Transfer of Phosphoribosylamine from Phosphoribosylpyrophosphate Amidotransferase to Glycinamide Ribonucleotide Synthetase

Research and teaching career:	Position/Title	Dates
Max Planck Institute of Biochemistry Department of Membrane Biology Martinsried, Germany Mentor: Prof. Dieter Oesterhelt	Postdoctoral Associate	1993 - 1996
Mitotix, Inc. Biochemistry Cambridge, MA	Postdoctoral Associate	1996 - 1997
Mitotix, Inc. Biochemistry Cambridge, MA	Scientist	1997 - 1999
Duke University Medical Center Department of Biochemistry Durham, NC	Assistant Professor	1999 - 2007
Array BioPharma Enzymology Group Boulder, CO	Senior Scientist	2007 - 2008
University of Colorado Department of Chemistry and Biochemistry Boulder, CO	Senior Instructor and/or Research Associate (with Shelley Copley)	2007 - 2013
University of Colorado HHMI Department of Chemistry and Biochemistry Boulder, CO	Senior Research Associate (with Natalie Ahn)	2013 - 2014
University of Colorado CIRES (with Shelley Copley) BioFrontiers (with Natalie Ahn) Boulder, CO	Senior Research Associate	2015 - present

Honors and Awards:

Whitaker Health Sciences Fellowship	1990 - 1992
Alexander von Humboldt Postdoctoral Fellowship	1993 - 1995

Peer-reviewed primary research publications:

1. Cheng, Y., Rudolph, J., Stern, M., Stubbe, J., Flannigan, K.A., Smith, J.M. (1990) Glycinamide ribonucleotide synthetase from *Escherichia coli*: Cloning, overproduction, sequencing, isolation, and characterization *Biochemistry* 29, 218-227.

2. Mueller, E.J., Meyer, E., Rudolph, J., Davisson, V.J., and Stubbe, J. (1994) N^5-Carboxaminoimidazole ribonucleotide: Evidence for a new intermediate and two new enzymatic activities in the *de novo* purine biosynthetic pathway of *Escherichia coli Biochemistry* 33, 2269-2278.

3. Rudolph, J. and Stubbe, J. (1995) Investigation of the mechanism of phosphoribosylamine transfer from phosphoribosylpyrophosphate amidotransferase to glycinamide Ribonucleotide synthetase *Biochemistry* 34, 2241-2250.

4. Rudolph, J. and Oesterhelt, D. (1995) Chemotaxis and phototaxis require a CheA histidine kinase in the archaeon *Halobacterium salinarium EMBO J*. 14, 667-673.

5. Rudolph, J., Tolliday, N., Schmitt, C., Schuster, S.C., Oesterhelt, D. (1995) Phosphorylation in halobacterial signal transduction *EMBO J*. 14, 4249-4257.

6. Rudolph, J. and Oesterhelt, D., (1996) Deletion analysis of the *che* operon in the archaeon *Halobacterium salinarium J. Mol. Biol*. 258, 548-554.

7. Rudolph, J., Nordmann, B., Storch, F., Gruenberg, H., Rodewald, K., and Oesterhelt, D. (1996) A family of halobacterial transducer proteins *FEMS Microbiol. Lett*. 139, 161-168.

8. Storch, K.-F., Rudolph, J., and Oesterhelt, D. (1999) Car: A cytoplasmic sensor responsible for arginine chemotaxis in the archaeon *Halobacterium salinarium EMBO J*., 18:1146-1158.

9. Blanchard, J.L., Epstein, D.M., Boisclair, M., Rudolph, J., Pal, K. (1999) Dysidiolide and related γ-hydroxy butenolide compounds as inhibitors of the protein tyrosine phosphatase, Cdc25 *Bioorg. Med. Chem. Lett*. 9, 2537-2538.

10. Chen, W., Wilborn, M., Rudolph, J. (2000) The dual-specific Cdc25B phosphatase: In search of the catalytic acid, *Biochemistry* 39, 10781-10789.

11. Rudolph, J., Epstein, D., Parker, L., Eckstein, J. (2001) Specificity of natural and artificial substrates for human Cdc25A, *Anal. Biochem*. 289, 43-51.

12. Wilborn, M., Free, S., Ban, A., and Rudolph, J. (2001) The C-Terminal tail of the dual-specificity Cdc25B phosphatase mediates modular substrate recognition. *Biochemistry* 40, 14200-14206.

13. Rudolph, J. (2002) Catalytic mechanism of Cdc25 phosphatase *Biochemistry* 41, 14613-14623.

14. Sohn, J. and Rudolph, J. (2002) Facile variation of reagent concentration in rapid quench enzymology. *Anal. Biochem.* 312, 80-83.

15. Kristjánsdóttir, K., and Rudolph, J. (2003) A fluorescence polarization assay for native protein substrates of kinases, *Anal. Biochem.* 316, 41-49.

16. Sohn, J., Kiburz, B., Li, Z., Deng, L., Safi, A., Pirrung, M.C., Rudolph, J. (2003) Inhibition of Cdc25 phosphatases by indolyldihydroxyquinones, *J. Med. Chem.* 46, 2580-2588.

17. Sohn, J. and Rudolph, J. (2003) Catalytic and chemical competence of regulation of Cdc25 phosphatase by oxidation/reduction, *Biochemistry* 42, 10060-10070.

18. Ban, Y.-E.A, Edelsbrunner, H., Rudolph, J. (2004) Interface surfaces for protein-protein complexes, *Proceedings of the 8th Annual International Conference on Research in Computational Molecular Biology (RECOMB),* 205-212.

19. Kwiek, J.J., Haystead, T.A.J., Rudolph, J. (2004) The kinetic mechanism of quinone-oxidoreductase 2 and its inhibition by the antimalarial quinolines, *Biochem.*, 43, 4538-4547.

20. Choi, V., Agarwal, P.K., Edelsbrunner, H., Rudolph, J. (2004) Local search heuristic for rigid protein docking, *4th Workshop on Algorithms in Bioinformatics* (WABI), Lecture Notes in Computer Science 3240, 218-229.

21. Sohn, J., Kristjánsdóttir, K., Safi, A., Parker, B., Kiburz, B., Rudolph, J. (2004) Remote hotspots mediate protein substrate recognition for the Cdc25 phosphatase, *Proc. Natl. Acad. Sci. USA* 101, 16437-16441.

22. Wang, Y., Agarwal, P.K., Edelsbrunner, H., Rudolph, J. (2005) Coarse and reliable geometric algorithm for protein docking, *Pacific Symposium on Biocomputing*, 64-75.

23. McClerren, A.L., Zhou, P., Guan, Z., Raetz, C.R.H, and Rudolph, J. (2005) Kinetic analysis of the zinc-dependent deacetylase in the lipid A biosynthetic pathway, *Biochemistry* 44, 1106-1113.

24. Coggins, B.E, McClerren, A.L., Jiang, L., Li, X., Rudolph, J., Hindsgaul, O., Raetz, C.R.H, and Zhou, P. (2005) Refined solution structure of the LpxC/TU-514 complex: Insights into mechanism and inhibitor design, *Biochemistry*, 44, 1114-1126.

25. Buhrman, G., Parker, B,. Sohn, J., Rudolph, J., Mattos, C. (2005) Structural mechanism of oxidative regulation of the phosphatase Cdc25B via an intramolecular disulfide bond, *Biochemistry* 44, 5307-5316. (designated as a "hot article" by the editors of Biochemistry)

26. Rudolph, J. (2005) Reactivity of Cdc25 phosphatase at low pH and with thiophosphorylated protein substrate, *Bioorg. Chem.,* 33, 264-273.

27. McClerren, A.L., Endsley, S. Bowman, J.L. Anderson, N.H.; Guan, Z., Rudolph, J., Raetz, C.R.H. (2005) A slow, tight-binding inhibitor of the zinc-dependent deacetylase LpxC of lipid A biosynthesis with antibiotic activity comparable to ciprofloxacin. *Biochemistry,* 44, 16574-16583**.**

28. Sohn, J., Parks, J., Buhrman, G., Brown, P., K. Safi, A., Edelsbrunner, H., Yang, W., Rudolph, J. (2005) Experimental validation of the docking orientation of Cdc25 with its Cdk2/CycA protein substrate. *Biochemistry,* 44, 16563-16573. (Designated a "hot article" by the editors of Biochemistry.)

29. Ban, Y.-E.A., Rudolph, J., Zhou, P., Edelsbrunner, H. (2006) Evaluating the quality of NMR structures by local density of protons. *Proteins* 62, 852-864.

30. Kristjánsdóttir, K., Safi, A., Shah, C., Rudolph, J. (2006) Autophosphorylation of Ser66 on *Xenopus* Myt1 is a prerequisite for meiotic inactivation of Myt1. *Cell Cycle* 5, 421-427.

31. Ban, Y.-E.A., Edelsbrunner, H., Rudolph, J. (2006) Interface surfaces for protein-protein complexes. *J. Assoc. Computing Machinery* 53 (3), 361-378.

32. Seth, D. and Rudolph, J. (2006) Redox regulation of MAP kinase phosphatase 3. *Biochemistry*, 45, 8476-8487.

33. Phillips, J.M., Rudolph, J., Agarwal, P.K. (2006) Segmenting motifs in protein-protein interfaces. *6th Workshop on Algorithms in Bioinformatics* (WABI), Lecture Notes in Computer Science (in press).

34. Sohn, J. and Rudolph, J. (2006) The energetic network of hotspot residues between Cdc25B phosphatase and its protein substrate. *J. Mol. Biol.* 362, 1060-1071.

35. Seth, D. and Rudolph, J. (2006) Redox control of cell cycle progression via Cdc25 phosphatase (Mih1p) in *S. cerevisiae*. *Cell Cycle* 5, 2172-2173.

36. Baron, R.A., Peterson, Y.K., Otto, J.C., Rudolph, J., Casey, P.J. (2007) Time-dependent inhibition of isoprenylcysteine carboxyl methyltransferase by indole-based small molecules. *Biochemistry* 46, 554-560.

37. Sohn, J. Buhrman, G., Rudolph, J. (2007) Kinetic and structural studies of specific protein-protein interactions in substrate catalysis by the Cdc25B phosphatase. *Biochemistry* 46, 807-818.

38. Sohn, J. and Rudolph, J. (2007) Temperature dependence of binding and catalysis for the Cdc25B phosphatase. *Biophys. Chem.* 125, 549-555.

39. Tung, J, Altman, J., Rudolph, J., and Alberts, S. (2007) Parallel effects of genetic variation on ACE activity in baboons and humans. *Amer. J. Phys. Anthropology* 134, 1-8.

40. Headd, J., Ban, Y.-E.A, Brown, P., Edelsbrunner, H., Vaidya, M., and Rudolph. J., (2007) Protein-Protein Interfaces: Properties, Preferences, and Projections. *J. Proteome Res.* 6, 2576-2586.

41. Keaton, M.A., Bardes, E.S., Marquitz, A.R., Freel, C.D., Zyla, T.R., Rudolph, J, Lew, D.J. (2007) Differential susceptibility of yeast S and M phase CDK complexes to inhibitory tyrosine phosphorylation. *Curr Biol.* 17, 1181-1189.

42. Chen, C.-Y., Willard, D., Rudolph, J. (2009) Redox regulation of SH2-domain-containing phosphatases by two backdoor cysteines. *Biochemistry* 48, 1399-1409.

43. Parks, J.M., Hu, H., Rudolph, J., Yang, W. (2009) Mechanism of Cdc25B phosphatase with the small molecule substrate p-nitrophenyl phosphate from QM/MM-MFEP calculations. *J. Phys. Chem. B* 113, 5217 - 5224.

44. Rudolph, J., Kim, J., Copley, S. (2010) Multiple turnovers of the nicotino-enzyme PdxB require α-keto acids as co-substrates. *Biochemistry* 49, 9249-9255.

45. Hlouchova, K.*, Rudolph, J.*, Pietari, J.M.H., Behlen, L.S., Copley, S.D. (2012) Pentachlorophenol hydroxylase, a poorly functioning enzyme required for degradation of pentachlorophenol by *Sphingobium chlorophenolicum*. *Biochemistry* 51, 3848-3860.

46. Yadid, I.*, Rudolph, J.*, Hlouchova, K., Copley, S.D. (2013) Sequestration of a highly reactive intermediate in an evolving pathway for degradation of pentachlorophenol. *Proc. Natl. Acad. Sci. USA* 110, E2182-E2190.

47. Rudolph, J., Erbse, A.H., Behlen, L.S., Copley, S.D. (2014) A Radical Intermediate in the Conversion of Pentachlorophenol to Tetrachlorohydroquinone by *Sphingobium chlorophenolicum*. *Biochemistry* 53, 6539-6549.

48. Rudolph, J. Xiao, Y., Pardi, A., Ahn, N.G. (2015) Slow inhibition and conformational selective properties of extracellular signal-related kinase 1 and 2 inhibitors. *Biochemistry* 54, 22-31.

Peer-reviewed review articles:

1. Kristjánsdóttir, K., and Rudolph, J. (2004) Myt1, *AfCS-Nature Molecule Pages* doi:10.1038/mp.a001589.01.

2. Rudolph, J. (2004) Targeting the Neighbor's Pool. *Mol. Pharmacol.* 66, 780-782.

3. Kristjánsdóttir, K., and Rudolph, J. (2004), Cdc25 Phosphatases and Cancer, *Chem. & Biol.,* 11, 1043-1051.

4. Rudolph, J. (2005) Redox Regulation of the Cdc25 Phosphatases, *Antioxidants & Redox Signaling*, 7, 761-767.

5. Rudolph, J. (2007) Inhibiting transient protein-protein interactions: Lessons from the protein tyrosine phosphatase Cdc25. *Nature Reviews Cancer* 7, 202-211.

6. Rudolph, J. (2007) Cdc25 Phosphatases: Structure, Specificity, and Mechanism. *Biochemistry* 46, 3595-3604. (Designated a "hot article" by the editors of Biochemistry.)

Inventions:

U.S. Patent: Native Cdc25: Substrate, Compositions, and Uses Related Thereto. Filed Dec98

U.S. Patent: Methods of Identifying Inhibitors of CDC25. Filed Sep99

U.S. Patent: Heterocyclic Quinones as Pharmaceutical Agents. #7,057,052, issued 6Jun06.

Reviewer for grants:

NIH P01 Cancer Therapeutics Cluster Review, September 20-22, 2004.
Cottrell College Science Awards
NSF MCB-Molecular Biosystems October 2005
National Cancer Institute of Canada, Program Project Grant Review, November 2005
Wellcome Trust, November 2005

Reviewer for scientific journals: (reviewed 80 manuscripts since January 2000)

Annual Reviews of Biochemistry
Biochemica Biophysica Acta

Biological Procedures Online
Bioorganic and Medicinal Chemistry Letters
Biochemistry
Cell Growth and Differentiation
Journal of the American Chemical Society
Journal of Biological Chemistry
Journal of Medicinal Chemistry
Journal of Molecular Biology
Molecular Pharmacology
Nature Methods
Organic & Biomolecular Chemistry

Invited Lectures

Jan99 Department of Biochemistry, Duke University, Durham, NC
Host: Department
Feb99 Department of Biochemistry, University of Massachusetts Worcester, Worcester, MA
Host: Department
Sep01 Department of Chemistry, Duke University, Durham, NC
Host: Department
Sep02 Strategic Research Institute: Protein Phosphatases as Therapeutic Targets, Philadelphia, PA
Organized by: Zhong-Yin Zhang, Albert Einstein University & Robert Hooft, Serono
Feb03 Department of Biochemistry, North Carolina State University, Raleigh, NC
Host: Carla Mattos
Jul03 Gordon Research Conference: Enzymes, Coenzymes, and Metabolic Pathways, Meriden, NH
Poster Talk; Invited by: Shelley Copley (University of Colorado, Boulder)
Jul03 Department of Membrane Biochemistry, Max-Planck-Institute for Biochemistry, Germany
Host: Dieter Oesterhelt
Oct03 Department of Pharmacology, University of Pittsburgh, Pittsburgh, PA
Host: John Lazo
Oct03 College of Pharmacy, University of Austin, TX
Host: Kevin Dalby
Jun04 ACM Symposium on Computational Geometry, Biogeometry Workshop, Brooklyn, NY
Invited by: Jack Snoeyink, University of North Carolina
Oct04 Department of Biochemistry and Molecular Biology, The Pennsylvania State University, PA
Host: Squire Booker
Oct04 Department of Biochemistry, University of Illinois at Champaign-Urbana, Il.
Host: Wilfred van der Donk
Nov04 Department of Biochemistry and Biophysics, University of North Carolina at Chapel Hill, NC
Host: Richard Wolfenden
Nov04 Department of Pharmacology and Molecular Sciences, Johns Hopkins University, MD
Host: Phil Cole
Nov04 Department of Chemistry, Massachusetts Institute of Technology, MA
Host: Stuart Licht
Nov04 Department of Biochemistry, Brandeis University, MA
Host: Liz Hedstrom
Jan05 Department of Biochemistry, Ohio State University, OH
Host: Ming-Daw Tsai
Apr05 Department of Chemistry, Duke University, NC (Faculty Colloquium)
Host: Department
Apr05 Department of Computer Science, Duke University, NC (Friday Visualization Forum)
Host: Rachel Brady

May05 Department of Chemistry, University of Washington, WA
Host: Michael Gelb
May05 Department of Biochemistry and Biophysics, Portland State University, OR
Host: Dirk Iwata-Reuyl
May05 Department of Biochemistry, University of Wisconsin at Madison, WI
Host: Ron Raines
Jun05 DIMACS Workshop on Information Processing by Protein Structures in Molecular Recognition, Rutgers University, NJ.
Invited by: Jie Liang, University of Illinois
Jul05 Gordon Research Conference: Enzymes, Coenzymes, and Metabolic Pathways, Meriden, NH
Invited by: Eugene Mueller, University of Delaware
Jul06 Gordon Research Conference: Molecular Therapeutics of Cancer, Oxford, England
Invited by: John Lazo, University of Pittsburgh

Teaching:

1992 - 1993
Teaching Assistant, Freshman Chemistry Laboratory, University of Washington
1993 - 1994
Teaching Assistant, Sophomore Chemistry Laboratory, Massachusetts Institute of Technology
1994 - 1995
Teaching Assistant, Sophomore Organic Chemistry, Massachusetts Institute of Technology
1995 - 1996
Teaching Assistant, Enzyme Mechanisms, Massachusetts Institute of Technology
1999 - 2000
BCH 291: Physical Biochemistry, 5 lectures on enzyme kinetics

2000 - 2001
BCH 259: Protein Structure and Function, 5 lectures on enzymatic catalysis
BCH 336: Enzymatic Reaction Mechanisms, co-taught with Eric Toone
14 lectures + 10 further hours of classroom time for student presentations
2001 - 2002
BCH 259: Protein Structure and Function, 5 lectures on enzymatic catalysis
MBP 292: 7 sessions of an upper-level graduate symposium on solvent kinetic isotope effects
BIOCHEM: 2 lectures on nucleotide metabolism for the Medical School
BCH 336: Enzymatic Reaction Mechanisms, co-taught with Eric Toone
14 lectures + 10 further hours of classroom time for student presentations
2002 - 2003
BCH 259: Protein Structure and Function, 5 lectures on enzymatic catalysis
BIOCHEM: 4 lectures on nucleotide metabolism and vitamins for the Medical School
2003 - 2004
BCH 259: Protein Structure and Function, 5 lectures on enzymatic catalysis
BIOCHEM: 4 lectures on nucleotide metabolism and vitamins for the Medical School
BCH 336: Enzymatic Reaction Mechanisms, co-taught with Eric Toone
14 lectures + 10 further hours of classroom time for student presentations
2004 - 2005
BCH 259: Protein Structure and Function, 6 lectures on enzymatic catalysis
BIOCHEM: 4 lectures on nucleotide metabolism and vitamins for the Medical School
2005 - 2006
BIOCHEM: 4 lectures on nucleotide metabolism and vitamins for the Medical School
BCH227: 13 lectures on protein structure and function + 1 exam
(Undergraduate Biochemistry)
BCH333: Enzyme Kinetics and Reaction Mechanisms
14 interactive sessions for 2nd year graduate students

2006 - 2007
BIOCHEM: 7 lectures on enzyme kinetics, nucleotides, and vitamins for the Medical School
BCH227: 13 lectures on protein structure and function + 1 exam
(Undergraduate Biochemistry)

2007 - 2008
CHEM 4711: Fall (first) semester undergraduate Biochemistry course (~40 students)
CHEM 4711: Spring (first) semester undergraduate Biochemistry course (~100 students)

2008 – 2009
CHEM 4711: Fall (first) semester undergraduate Biochemistry course (~80 students)
CHEM 4711: Spring (first) semester undergraduate Biochemistry course (~80 students)
CHEM 4611: Spring Survey Biochemistry, undergraduate course (~120 students)

2009 – 2010
CHEM 4731: Fall (second) semester undergraduate Biochemistry course (~50 students)
CHEM 4611: Fall Survey Biochemistry, undergraduate course (~150 students)
CHEM 4711: Spring (first) semester undergraduate Biochemistry course (~55 students)
CHEM 5781: Co-teaching for Biochemistry Core for first year graduate students (16 students)

2010 - 2011
CHEM 4731: Fall (second) semester undergraduate Biochemistry course (~40 students)
CHEM 4611: Fall Survey Biochemistry, undergraduate course (~180 students)
CHEM 4711: Spring (first) semester undergraduate Biochemistry course (~60 students)
CHEM 5781: Biochemistry Core: first-year graduate course (~12 students)

2011 - 2012
CHEM 4711: Fall (first) semester undergraduate Biochemistry course (~30 students)
CHEM 4731: Spring (second) semester undergraduate Biochemistry course (~80 students)

2012 - 2013
CHEM 4711: Fall (first) semester undergraduate Biochemistry course (~70 students)
CHEM 4711: Fall (first) semester undergraduate Biochemistry course (~50 students)

2013 - 2014
CHEM 4411: Undergraduate Physical Chemistry with Biological Applications (~28 students)

2014 - 2015
CHEM 4411: Undergraduate Physical Chemistry with Biological Applications (~40 students)

Post-graduate research training (position after leaving my laboratory)

Zeljko Svedruzic, Ph.D., University of Oklahoma
(Post-doc at University of California, Santa Barbara)
Sergei Bespamyatnikh, Ph.D. Minsk Institute of Mathematics, Belarus
(Associate Professor at University of Texas at Dallas)
Vicky Choi, Ph.D., Rutgers, NJ
(Assistant Professor at Virginia Tech)
Divya Seth, Ph.D. National Institute of Immunology, New Delhi, India
(Post-doc at Duke University with Jonathon Stamler)
Greg Buhrman, Ph.D. University of North Carolina, Raleigh, NC
(Post-doc at UNC with Carla Mattos)

Graduate research training (subsequent position, if graduated)

Kai-Florian Storch (co-advisor with Dieter Oesterhelt)
(Post-doc at Harvard University with Charles Weitz)
Kolbrun Kristjansdottir, M.S. University of Iceland, Ph.D. in 2005
(Post-doc at University of Chicago with Stephen Kron, now
Assistant Professor at Midwestern University)
Andrew Ban, B.S. University of Texas, Austin, TX, Ph.D. in 2005
(Post-doc with David Baker; now Research Scientist at Arzeda Corp.)
Jungsan Sohn, B.S. University of Michigan, Ann Arbor, MI, Ph.D. in 2006
(Post-doc at M.I.T. with Bob Sauer; now Assistant Professor at Johns Hopkins)
Jeff Headd, B.S. Brown University, Providence, RI
(Post-doc with Paul Adams at Lawrence Berkeley National Labs)
Cheng-Yu Chen, M.S., National Tsing-Hua University, Taiwan
Jason Williams, B.S., Morehouse College, Atlanta, GA
(Duke Medical School)

Undergraduate research training:
Advisor of 3 Diplom candidates at the Max-Planck-Institute for Biochemistry 1994 – 1996
Advisor of 5 undergraduates for 6+ months of research in laboratory
Mentor for four Duke honors theses

Committee Memberships
Graduate Student Advisory Committee, 2000 - 2007
Graduate Admissions Committee, 1999 – 2003; 2005 - 2007
Department Retreat Committee, 2000 – 2001
Ad Hoc Faculty Search Committee, 2002 – 2004
Seminar Committee, 2004 - 2007
Director of Graduate Studies, Program in Biological Chemistry, Jan 03 – Sep06
Research Triangle Park Biochemistry and Enzymology Club, 1999 – 2004

External Support, past

NCBC Grant #2000-ARG-0006, $55,000 (direct/yr), 7/01/00 – 6/30/01
Rapid and Quantitative Analysis of Phosphorylation Status of Specific Phospho-Proteins
The goal of this grant was to develop a high-throughput, rapid, and quantitative technique using competitive fluorescence for the determination of the phosphorylation status of cyclin-dependent kinases *in vitro* and *in vivo*.
Published Results: Cit. #15

NIH R01 GM61822, $140,000 (direct/yr), 7/01/00 – 6/30/05
Title: Mechanism, Specificity, and Regulation: Cdc25 Phosphatases
The goals of this grant include detailed mechanistic studies of Cdc25 phosphatase activity with small molecule substrate, with protein substrates, as well as how the phosphatase is regulated by oxidation and phosphorylation by protein kinases.
Published Results: Cit. #10, 12, 13, 14, 15, 16, 17, 21, 25, 26, 29, 30, 32

Bioinformatics and Genome Technology Fellowship Grant, $64,000 (direct/yr), 5/01/01 - 4/30/04
Computational Geometry Study of Protein-Protein Interactions
The goal of this grant was to develop novel tools for computational protein docking.
(equal co-PI with Herbert Edelsbrunner)
Published Results: Cit. #20, 22

American Cancer Society Institutional Research Grant, $14,200 (direct/yr), 7/01/01 - 6/30/02
The Importance of Bis-Phosphorylation in Regulation of the Cyclin-Dependent Kinases
The goal of this grant was to measure whether regulation of Cdk/cyclins occurs primarily by mono or bi-phosphorylation of two adjacent residues using a novel in-house bis-phosphorylated antibody.

Serenex, Inc., $10,000 (direct/6mos), 5/05/03 - 11/28/03
Studying the Binding of Other Quinoline Derivatives to QR2
The goal of this grant was to study the mechanism of quinone reductase 2 (QR2) as well as measure the potency of a variety of inhibitors of this potential anti-malarial target.
Published Results: Cit. #19

NIH R01 GM61822-S1, $73,500 (direct/yr), 7/01/03 – 6/30/05
The Administrative Supplements for the Study of Complex Biological Systems
This supplement to the NIH funded R01 continues the development of tools to perform computational protein docking and visualization of protein interfaces.
(equal co-PI with Herbert Edelsbrunner)
Published Results: Cit. 20, 22, 29

Duke SPORE in Breast Cancer, $30,000 (direct/yr), 5/01/04 - 4/30/05
The Role of Cdc25 and Thioredoxin in Breast Cancer
The goal of this grant was to study how thioredoxin overexpression can contribute to rapid cell cycle progression by keeping the Cdc25, which is highly susceptible to oxidation, in a reduced and active state.
Published Results: Cit. 32

NSF CCR 00 86013, $1,300,000 (direct/yr), 9/15/00 – 8/31/06
Computational Geometry for Structural Biology & Bioinformatics
This project is a collaboration between six computer scientists and eight biologists at Duke University, Stanford University, The University of North Carolina at Chapel Hill, and the North Carolina Agricultural and Technological State University. Headed by Herbert Edelsbrunner with 14 other P.I.s, the goal is the exploration of problems in structural molecular biology with computational means. The focus of the investigations are geometric algorithms and software, on the one hand, and the structure and interaction of proteins, on the other. In my collaboration with Edelsbrunner, this grant has supported a shared student from July 2000 – 2006.
Published Results: Cit. 20, 22, 27, 29.

External Support, granted but not activated

NIH R01 GM61822 A1, $220,000 (direct/yr), 4 years
Mechanism, Specificity, and Regulation: Cdc25 Phosphatases
This grant continues the work of the previous RO1 concerning Cdc25, with special emphasis on determining microscopic rate constants for binding and catalysis using protein substrates. Also, there is a focus on demonstrating the *in vivo* relevance of regulation by oxidation.
Reviewed score = 153 (17.2%)

DOD Synergistic Breast Cancer Grant, $250,000 (direct/yr), 2 years
Inhibitors of Cdc25 Phosphatases
This grant aims to synthesize and biochemically characterize isoform-specific protein-protein interaction inhibitors of the Cdc25 phosphatases.
(~50% of funding did go to Don Coltart, Duke Chemistry)