SUBRATA H. MISHRA

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EDUCATION

Ph.D. Biophysical Chemistry (2008)
Georgia State University, Atlanta, GA
Advisor: Prof. Markus W. Germann

Dissertation title: "*Structure and energetics of RNA - protein interactions for HIV RREIIB targeting zinc finger proteins*"

M.S. Biochemistry (2004)
Georgia State University, Atlanta, GA

B.E. Chemical Engineering (2001)
University of Mumbai, Mumbai, India

Senior year project: "*Manufacture of Acetone using Cumene Hydroperoxide*"

WORK EXPERIENCE

Postdoctoral Fellow (2010-present)
Biophysics & Biophysical Chemistry
Johns Hopkins University, School of Medicine

Postdoctoral Research Associate (2008 - 2010)
Department of Chemistry & Neuroscience Institute (Joint Appointment)
Georgia State University

Lecturer, Physical Chemistry (2008 - 2009)
Department of Chemistry, Georgia State University

Graduate Student Teaching Assistant, Physical Chemistry (2001 - 2006)
Department of Chemistry, Georgia State University

Apprenticeship (1999 - 2001)
Oil and Natural Gas Corporation Ltd., Panvel, Navi Mumbai, Maharashtra, India

PUBLICATIONS

Published Manuscripts

Frueh, D.P., Goodrich, A.C.; **Mishra, S.H.** & Nichols, S.R. "NMR methods for structural studies of large monomeric and multimeric proteins.", Current Opinion in Structural Biology, 2013 Oct;23(5):734-9.
My experimental data and figure made the cover page for this issue.

Germann, M.W.; **Mishra, S.H.;** Santoso, Y. & Spring, A.M. "Designing HIV-RREIIB RNA Binding Zinc Fingers", ZInc Fingers: Structure, properties and function, Editor: Rolf Ciofani, et al.,pp., 2011 Nova Science Publishers, Inc. ISBN 978-1-62100-230-7.

Herberholz, J.; **Mishra, S.H.;** Germann, M.W.; Edwards, D.H. & Potter, K. "*Non-invasive Imaging of Neuroanatomical Structures and Neural Activity at High Spatial Resolution*", Frontiers in Behavioral Neuroscience, 2011 Mar 31;5:16.

Khan, A.M.; **Mishra, S.H.** & Germann, M.W. "*Cyclic Enzymatic Solid Phase Synthesis of Isotopically Labeled DNA Oligonucleotides*", Nucleosides, Nucleotides and Nucleic Acids (2009), 28, 1030-1041.

Mishra, S.H.; Spring, A.M. & Germann, M.W. "*Thermodynamic Profiling of HIV RREIIB RNA-Zinc Finger Interactions*", Journal of Molecular Biology (2009), 393, 2, 369-382.

Mishra, S.H.; Shelley, C.M.; Barrow, D.J. Jr.; Darby, M.K. & Germann, M.W. "*Solution Structures And Characterization of Human Immunodeficiency Virus Rev Responsive Element IIB RNA Targeting Zinc Finger Proteins*", Biopolymers (2006), *83*, 352-364.

Accepted Manuscripts

Mishra, S.H.; Harden, B.J. & Frueh, D.P. " *A 3D Time-Shared NOESY Experiment Designed to Provide Optimal Resolution for Accurate Assignment of NMR Distance Restraints in Large Proteins*", accepted for publication October 14th, Journal of Biomolecular NMR, JNMR-D-14-00070.

RESEARCH PROJECTS

Heterocyclization in Nonribosomal Peptide Synthesases
Investigating the structure of a heterocyclization domain of a non-ribosomal peptide synthetase involved in the production of the virulence factor in plague. Assigned NMR chemical shifts for 85% of the amide and 75% for methyl groups of the 52 kDa heterocyclization domain. Conducted biochemical studies to monitor catalytic activity. Currently refining the NMR solution structure.

NMR method development
Designed a novel experiment to augment the resolution of solution NMR experiments for structural studies of large proteins. Developed new methods to facilitate methyl chemical shift assignments in large proteins.

RNA - protein interactions
Characterized interactions between HIV RREIIB RNA and designed zinc finger proteins by NMR, isothermal titration calorimetry, biochemical and other spectroscopic methods. Determined the binding site on the RNA. Redesigned zinc finger with higher binding affinity from thermodynamic data. Optimized isotopically labeled and unlabeled protein production and purification. Determined the NMR solution structure of the free zinc finger and the RNA-bound zinc finger protein.

DNA structural studies
Directed the project and collaborated with a graduate student in the determination of the NMR solution structures of HIV I and HTLV II U5 Long terminal repeats (7-mer DNA hairpins) to investigate structural features that may allow promiscuous retroviral Integrase processing.

MRI studies
Performed MRI experiments to investigate neural activity from contrast agent administered imaging of crayfish. Collaborated with Neuroscience Institute faculty. Trained graduate students to conduct MRI experiments.

Isotopic labeling of DNA
Collaborated and mentored a graduate student on the project "cyclic solid phase synthesis of isotopically labeled DNA by enzymatic methods".

SKILLS AND TECHNIQUES

NMR Spectroscopy & other Biophysical Methods
Structure determination of proteins and nucleic acids by solution NMR techniques (1D, 2D and 3D & 4D experiments), pulse programming on Agilent and Bruker, NMR maintenance for Bruker instruments, isotopic

labeling of proteins and nucleic acids, MRI microimaging experiments, uv/vis, CD and fluorescence spectroscopy, fluorescence microscopy.

Biomolecular Interaction Analysis
Isothermal titration calorimetry, Surface plasmon resonance.

Molecular Biology & Biochemical Methods
Protein expression and purification, site directed mutagenesis, gel electrophoresis, liquid chromatography, PCR, radiolabeling of nucleic acids, plasmid DNA extraction, cloning.

Software
NMR and MRI: TopSpin, XWIN-NMR, Paravision, SPARKY; Structural biology: DYANA, AMBER, ImageJ, VMD and other visualization packages; Bioinformatic tools: Protein and nucleotide BLAST programs.

SELECTED PRESENTATIONS

Oral Presentations

Investigating Cyclization Domains in Yersiniabactin Synthetase. Subrata Mishra, Johns Hopkins University, School of Medicine, Department of Biophysics & Biophysical Chemistry, March 2013.

Yersiniabactin Synthetase Cyclization Domains. Subrata Mishra, Johns Hopkins University, School of Medicine, Department of Biophysics & Biophysical Chemistry, June 2011.

Design and evaluation of HIV-RNA binding zinc finger proteins. Subrata H. Mishra. 56th SERMACS, Research Triangle Park, NC, November 13, 2004.

Poster Presentations

Resolution, Resolution, Resolution! A Time-Shared ^{15}N TROSY sensitivity enhanced /^{13}C HSQC – NOESY for Accurate Distance Constraint Measurements in Large Proteins. Subrata H. Mishra, Bradley J. Harden, Dominique P. Frueh. ENC, Boston, March 2014

Investigating the molecular details of heterocyclization in non-ribosomal peptide synthetases. Subrata H. Mishra, Postdoctoral Symposium at Johns Hopkins University School of Medicine, Baltimore, June 2013.

NMR Spectroscopic Characterization of the Nonribosomal Peptide Synthetase (NRPS), Yersinibactin Synthetase. Subrata H. Mishra, Scott R. Nichols & Dominique P. Frueh., IBR Johns Hopkins University, Baltimore, September 2012.

Structural studies of HIV I and HTLV II Long Terminal Repeat substrates investigating retroviral Integrase promiscuity. Subrata H. Mishra, Chris N. Johnson & Markus W. Germann. 1st Southeast Enzyme Conference, Atlanta, GA, April 10, 2010.

Magnetic Resonance Imaging microscopy at GSU. Subrata H. Mishra, Jens Herberholz, Donald Edwards, & Markus W. Germann. Brains & Behavior retreat, Atlanta, GA, April 2, 2010.

Cyclic enzymatic solid phase synthesis of isotopically labeled DNA oligonucleotides. Ahmed M. Khan, Subrata H. Mishra & Markus W. Germann. GSU poster day, February 21, 2009.

Structural and energetic characterizations of HIV RREIIB RNA binding zinc finger proteins. Subrata H. Mishra, Alexander M. Spring & Markus W. Germann. Brains & Behavior retreat, Atlanta, GA, May 14, 2008.

Analysis of protein-RNA interactions for HIV RNA targeting zinc finger proteins. Subrata H. Mishra, Alexander Spring & Markus W. Germann. 59th SERMACS, Greenville, SC, October 24-27, 2007.

Characterization of RNA-protein interactions for designed zinc finger proteins targeting HIV RRE RNA. Subrata H. Mishra & Markus W. Germann. 15th Annual Suddath Symposium, Atlanta, March 30-31, 2007.

Design and analysis of HIV RRE RNA targeting zinc finger proteins. Subrata H. Mishra, Martyn K. Darby & Markus W. Germann. 231st ACS National Meeting, Atlanta, GA, March 26-30, 2006.

Solution structures and characterization of HIV RRE IIB RNA targeting zinc finger proteins. Subrata H. Mishra & Markus W. Germann. 57th ACS Southeast/61 Southwest Joint Regional Meeting. Memphis, TN, November 3-4, 2005.

The battle for the bulge: Targeting HIV RRE IIB RNA by designed zinc finger proteins. Subrata H. Mishra, Martyn K. Darby & Markus W. Germann. 10th Structural Biology Symposium, Galveston, TX, May 20, 2005.

Design and evaluation of HIV-RNA binding zinc finger proteins. Subrata H. Mishra, Martyn K. Darby & Markus W. Germann. 49th Annual Biophysics Meeting, Long Beach, CA, February 15, 2005.

Design and evaluation of HIV-RNA binding zinc finger proteins. Subrata H. Mishra, Christopher M. Shelley, Martyn K. Darby & Markus W. Germann. 12th Annual Suddath Symposium Atlanta, GA, March 19, 2004.

Design and evaluation of HIV-RNA binding zinc finger proteins. Subrata H. Mishra, Christopher M. Shelley, Martyn K. Darby & Markus W. Germann. 55th SERMACS, Atlanta, GA, November 18, 2003.

Structural Comparisons of Retroviral Long Terminal Repeats. Subrata H. Mishra, Stephen, H. Cleaver & Markus W. Germann. 11th Annual Suddath Symposium Atlanta, GA, March 28, 2003.

Solution Structures of HIV-I and HTLV-II U5 Long Terminal Repeats. Subrata H. Mishra, Stephen, H. Cleaver & Markus W. Germann, 54th SERMACS, Charleston, SC, November 15, 2002.

AWARDS AND FELLOWSHIPS

Cambridge Isotope Labs “NMR is Good” Contest, ICMRBS, Dallas, TX	(2014)
Product Manager Recognition Award, Cambridge Isotope Labs, ENC Boston, MA	(2014)
Chair’s Award, Department of Chemistry, GSU, Atlanta, GA	(2006)
Brains and Behavior Fellowship, Neuroscience Institute, GSU, Atlanta, GA	(2004-2008)
Graduate Award for Outstanding Instruction, Department of Chemistry, GSU, Atlanta, GA	(2002, 2003 & 2005)