




Curriculum Vitae

Title	Dr.	First Name	Laishram Rajendrakumar	Last Name	Singh	Photograph
Designation		Assistant Professor				
Department		Dr. B. R. Ambedkar Center for Biomedical Research (ACBR)				
Address (Campus)		Dr. B. R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi – 110007, INDIA				
(Residence)		Warden House, 8.2 E Girls Hostel, Gautam Buddha University, Greater Noida, U.P. 201308.				
Phone No (Campus)		011-27666272, 27667151				
Mobile		+91-9811630757				
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Email		lairksingh@gmail.com				
Web-Page		www.acbrdu.edu				
Education:						
Subject	Institution		Year	Details		
Ph.D.	Jamia Millia Islamia, New Delhi		2006	<i>Ph.D. Thesis topic:</i> Thermodynamic and Functional Activity Compensation of Methylamine Osmolytes and Urea Interactions with Proteins.		
M.Sc.	Jamia Millia Islamia, New Delhi		2001			
B.Sc.	Manipur University, Imphal		1997			
Career Profile:						
PROFESSIONAL CAREER						
MAJOR CONTRIBUTIONS :						
<ul style="list-style-type: none"> • Protein Folding and stability and aggregation under macromolecular crowded conditions • Role of osmolytes in protein folding, aggregation and amyloidosis, the hallmark of neurodegeneration. • Homocystinuria and role of homocysteine in neurodegeneration • Discovery that proteasome inhibitors can be used for the treatment of birth defects. • Discovery that chemical chaperones can alleviate function to the disease causing missense mutant proteins. • Small Heat Shock proteins in enhanced degradation of mutant proteins. • Structural allostery of Transcription repressor protein, Sin3 						

RESEARCH EXPERIENCE IN VARIOUS INSTITUTIONS:	
July 2010 - onwards	Assistant Professor, Dr. B. R. Ambedkar Centre For Biomedical Research, University of Delhi.
Nov. 2005 - Mar 2010	Postdoctoral Associate Fox Chase Cancer Center, Philadelphia, USA
Research Interests / Specialization	
<ul style="list-style-type: none"> ➤ Homocystinuria and Homocysteine-induced neurodegeneration ➤ Identification of amyloidogenic characteristics of aggregating proteins responsible for neurotoxicity ➤ Development of small molecule compounds (natural, chemical & Pharmacological chaperones) that can prevent amyloidosis and hence neurodegeneration ➤ Role of Ubiquitin Proteasome system and Heat Shock Proteins in Human Health and Diseases 	
Teaching Experience (Subjects/Courses Taught)	
8 years (Theory and Practicals of Biochemistry, Instrumentation and Human Physiology, Drug Discovery)	
Honours & Awards	
Senior Research Fellow from CSIR, India	
Recipient of “ Board of Director’s Fellowship ” sponsored by Fox Chase Cancer Center, USA	
Publications Total =51	
<ol style="list-style-type: none"> 1. Sharma, Gurumayum Suraj, and Laishram Rajendrakumar Singh. "Conformational status of cytochrome c upon N-homocysteinylation: Implications to cytochrome c release." Archives of biochemistry and biophysics 614 (2017): 23-27. 2. Sharma, G. S., and L. R. Singh. "Polyols have unique ability to refold protein as compared to other osmolyte types." Biochemistry (Moscow) 4.82 (2017): 465-473. 3. Mohd Younus Bhat, Laishram Rajendrakumar Singh and Tanveer Ali Dar. Trimethylamine N-oxide abolishes the chaperone activity of α-casein: an intrinsically disordered protein. (2017) Scientific Reports, In Press 4. K Chowhan R, Ali F, Bhat Y, Rahman S, R Singh L, Ahmad F, A Dar T. Alanine counteracts the destabilizing effect that urea has on RNase-A. Protein and peptide letters. 2016 Sep 1;23(9):795-9. 5. Kumar, T., Sharma, G. S., & Singh, L. R. (2016). Homocystinuria: Therapeutic approach. Clinica Chimica Acta, 458, 55-62. 6. Kumar, T., Yadav, M., & Singh, L. R. (2016). Role of osmolytes in regulating immune system. Current pharmaceutical design, 22(20), 3050-3057. 7. Dar, P. A., Singh, L. R., Kamal, M. A., & Dar, T. A. (2015). Unique Medicinal Properties of Withania Somnifera: Phytochemical Constituents and Protein Component. Current pharmaceutical design. 22(5), 535-40. 8. Rahman, S., Warepam, M., Singh, L. R., & Dar, T. A. (2015). A current perspective on the 	

- compensatory effects of urea and methylamine on protein stability and function. *Progress in biophysics and molecular biology*, 119(2), 129-136.
9. Warepam, M., & Singh, L. R. (2015). Osmolyte mixtures have different effects than individual osmolytes on protein folding and functional activity. *Archives of biochemistry and biophysics*, 573, 77-83.
 10. Sharma, G. S., Kumar, T., Dar, T. A., & Singh, L. R. (2015). Protein N-homocysteinylation: From cellular toxicity to neurodegeneration. *Biochimica et Biophysica Acta (BBA)-General Subjects*, 1850(11), 2239-2245.
 11. Rahman, S., Rehman, M. T., Singh, L. R., Warepam, M., Ahmad, F., & Dar, T. A. (2015). Salt potentiates methylamine counteraction system to offset the deleterious effects of urea on protein stability and function. *PLoS one*, 10(3), e0119597.
 12. Suraj Sharma, G., Ali Dar, T., & Singh, L. R. (2015). Reshaping the Protein Folding Pathway by Osmolyte via its Effects on the Folding Intermediates. *Current Protein and Peptide Science*, 16(6), 513-520.
 13. Mittal, S., Chowhan, R. K., & Singh, L. R. (2015). Macromolecular crowding: Macromolecules friend or foe. *Biochimica et Biophysica Acta (BBA)-General Subjects*, 1850(9), 1822-1831.
 14. Sharma, G. S., Mittal, S., & Singh, L. R. (2015). Effect of Dextran 70 on the thermodynamic and structural properties of proteins. *International journal of biological macromolecules*, 79, 86-94.
 15. Hasan, T., Ali, M., Saluja, D., & Singh, L. R. (2015). pH might play a role in regulating the function of paired amphipathic helices domains of human Sin3B by altering structure and thermodynamic stability. *Biochemistry (Moscow)*, 80(4), 424-432.
 16. De, S., Kumar, T., Bohre, A., Singh, L. R., & Saha, B. (2015). Furan-based acetylating agent for the chemical modification of proteins. *Bioorganic & medicinal chemistry*, 23(4), 791-796.
 17. Sharma, G. S., Kumar, T., & Singh, L. R. (2014). N-Homocysteinylation induces different structural and functional consequences on acidic and basic proteins. *PLoS One*, 9(12), e116386.
 18. A Dar, T., A Sheikh, I., A Ganie, S., Ali, R., Singh, L. R., Hua Gan, S., & A Zargar, M. (2014). Molecular linkages between Diabetes and Alzheimer's disease: Current scenario and future prospects. *CNS & Neurological Disorders-Drug Targets*, 13(2), 290-298.
 19. Kumar, T., Sharma, G. S., & Singh, L. R. (2014). Existence of molten globule state in homocysteine-induced protein covalent modifications. *PLoS One*, 9(11), e113566.
 20. Mittal, S., & Singh, L. R. (2014). Macromolecular Crowding Induces Holo α -Lactalbumin Aggregation by Converting to Its Apo Form. *PLoS One*, 9(12), e114029.
 21. Mittal, S., & Singh, L. R. (2014). Macromolecular crowding decelerates aggregation of a β -rich protein, bovine carbonic anhydrase: a case study. *Journal of biochemistry*, 156(5), 273-282.
 22. Warepam, M., Sharma, G. S., Dar, T. A., Khan, M. K. A., & Singh, L. R. (2014). Structural characteristic of the initial unfolded state on refolding determines catalytic efficiency of the folded protein in presence of osmolytes. *PLoS One*, 9(10), e109408.
 23. K Chowhan, R., Mittal, S., A Dar, T., A Kamal, M., & Singh, L. R. (2014). Ignored avenues in alpha-synuclein associated proteopathy. *CNS & Neurological Disorders-Drug Targets*, 13(7), 1246-1257.
 24. Khan, S., Bano, Z., Singh, L. R., Hassan, M. I., Islam, A., & Ahmad, F. (2013). Testing the ability of non-methylamine osmolytes present in kidney cells to counteract the deleterious effects of urea on structure, stability and function of proteins. *PLoS One*, 8(9), e72533.
 25. Khan, S., Bano, Z., Singh, L. R., Hassan, I., Islam, A., & Ahmad, F. (2013). Why is glycine not a part of the osmoticum in the urea-rich cells?. *Protein and peptide letters*, 20(1), 61-70.
 26. Mittal, S., & Singh, L. R. (2013). Denatured state structural property determines protein stabilization by macromolecular crowding: a thermodynamic and structural approach. *PLoS one*, 8(11), e78936.
 27. Rimpay Kaur Chowhan and Laishram Rajendrakumar Singh. Polyamines in modulating protein aggregation (2013) *Journal of Proteins and Proteomics*.
 28. Ahmad, F., & Singh, L. R. (2012, December). Compatible Osmolytes Are Like of SOS Thing in the Living Cells. In *Proc Indian natn Sci Acad* 78(4), 701-711.
 29. Singh, L. R., Poddar, N. K., Dar, T. A., Rahman, S., Kumar, R., & Ahmad, F. (2011). Forty years of research on osmolyte-induced protein folding and stability. *Journal of the Iranian Chemical*

Society, 8(1), 1-23.

30. Singh, L. R., Poddar, N. K., Dar, T. A., Kumar, R., & Ahmad, F. (2011). Protein and DNA destabilization by osmolytes: the other side of the coin. *Life sciences*, 88(3), 117-125.
31. Singh, L. R., Gupta, S., Honig, N. H., Kraus, J. P., & Kruger, W. D. (2010). Activation of mutant enzyme function in vivo by proteasome inhibitors and treatments that induce Hsp70. *PLoS Genetics*, 6(1), e1000807.
32. Singh, L. R., Dar, T. A., Rahman, S., Jamal, S., & Ahmad, F. (2009). Glycine betaine may have opposite effects on protein stability at high and low pH values. *Biochimica et Biophysica Acta (BBA)-Proteins and Proteomics*, 1794(6), 929-935.
33. Singh, L. R., Dar, T. A., & Ahmad, F. (2009). Living with urea stress. *Journal of biosciences*, 34(2), 321-331.
34. Jamal, S., Poddar, N. K., Singh, L. R., Dar, T. A., Rishi, V., & Ahmad, F. (2009). Relationship between functional activity and protein stability in the presence of all classes of stabilizing osmolytes. *FEBS journal*, 276(20), 6024-6032.
35. Singh, L. R., & Kruger, W. D. (2009). Functional rescue of mutant human cystathionine β -synthase by manipulation of Hsp26 and Hsp70 levels in *Saccharomyces cerevisiae*. *Journal of Biological Chemistry*, 284(7), 4238-4245.
36. Majtan, T., Singh, L. R., Wang, L., Kruger, W. D., & Kraus, J. P. (2008). Active cystathionine β -synthase can be expressed in heme-free systems in the presence of metal-substituted porphyrins or a chemical chaperone. *Journal of Biological Chemistry*, 283(50), 34588-34595.
37. Singh, L. R., Dar, T. A., Haque, I., Anjum, F., Moosavi-Movahedi, A. A., & Ahmad, F. (2007). Testing the paradigm that the denaturing effect of urea on protein stability is offset by methylamines at the physiological concentration ratio of 2: 1 (urea: methylamines). *Biochimica et Biophysica Acta (BBA)-Proteins and Proteomics*, 1774(12), 1555-1562.
38. Singh, L. R., Chen, X., Kořich, V., & Kruger, W. D. (2007). Chemical chaperone rescue of mutant human cystathionine β -synthase. *Molecular genetics and metabolism*, 91(4), 335-342.
39. Dar, T. A., Singh, L. R., Islam, A., Anjum, F., Moosavi-Movahedi, A. A., & Ahmad, F. (2007). Guanidinium chloride and urea denaturations of β -lactoglobulin A at pH 2.0 and 25 C: the equilibrium intermediate contains non-native structures (helix, tryptophan and hydrophobic patches). *Biophysical chemistry*, 127(3), 140-148.
40. Moza, B., Qureshi, S. H., Islam, A., Singh, R., Anjum, F., Moosavi-Movahedi, A. A., & Ahmad, F. (2006). A unique molten globule state occurs during unfolding of cytochrome c by LiClO₄ near physiological pH and temperature: structural and thermodynamic characterization. *Biochemistry*, 45(14), 4695-4702.
41. Haque, I., Islam, A., Singh, R., Moosavi-Movahedi, A. A., & Ahmad, F. (2006). Stability of proteins in the presence of polyols estimated from their guanidinium chloride-induced transition curves at different pH values and 25° C. *Biophysical chemistry*, 119(3), 224-233.
42. Singh R., Inamul Haque and Faizan Ahmad (2005) Counteracting Osmolyte Trimethylamine N-Oxide Destabilizes Proteins At pH Below its pKa: Measurements of Thermodynamic Parameters of Proteins in the Presence and Absence of Trimethylamine N-Oxide. *J. Biol. Chem.* 280, 11035-11042.
43. Haque, I., Singh, R., Ahmad, F., & Moosavi-Movahedi, A. A. (2005). Testing polyols' compatibility with Gibbs energy of stabilization of proteins under conditions in which they behave as compatible osmolytes. *FEBS letters*, 579(18), 3891-3898.
44. Haque, I., Singh, R., Moosavi-Movahedi, A. A., & Ahmad, F. (2005). Effect of polyol osmolytes on Δ GD, the Gibbs energy of stabilisation of proteins at different pH values. *Biophysical chemistry*, 117(1), 1-12.

Book Editor:

45. Singh, Laishram Rajendrakumar, and Tanveer Ali Dar, eds. *Proteostasis and Chaperone Surveillance*. Springer, 2015
46. Singh, Laishram Rajendrakumar, and Tanveer Ali Dar, eds. *Cellular Osmolytes: From Chaperoning*

Protein Folding to Clinical Perspectives. Springer, 2017.

Book Chapters:

47. Rimpay Kaur Chowhan, Tanveer Ali Dar, Laishram Rajendrakumar Singh (2015) Proteopathies: Molecular, Biological and clinical Perspectives. (on Proteostasis and Chaperone Surveillance, Springer)
48. Gurumayum Suraj Sharma, Marina Warepam, Laishram Rajendrakumar Singh and Tanveer Ali Dar (2015). Small molecule osmolytes can modulate proteostasis. (on Proteostasis and Chaperone Surveillance, Springer Press)
49. Mohd Younus Bhat, Tanveer Ali Dar, and Laishram Rajendrakumar Singh. Casein Proteins: Structural and Functional Aspects. InTechOpen. MILK PROTEINS (2016): 1.
50. Bhat, Mohd Younus, Laishram Rajendrakumar Singh, and Tanveer A. Dar. "Modulation of Protein Aggregation/Fibrillation by Osmolytes." Cellular Osmolytes. Springer Singapore, 2017. 121-142.
51. Khan, Sheeza, Tanveer A. Dar, and Laishram Rajendrakumar Singh. "Clinical Implications of Osmolytes in Various Human Diseases." Cellular Osmolytes. Springer Singapore, 2017. 161-193.

DETAILS OF RESEARCH PROJECTS:

A. University awarded projects				
2011 -12	Investigating the effects of multiple osmolytes on protein structure and folding	DU	2.5 lakhs	Completed
2012 -13	Investigating the protein folding in osmotically stressed cells: structural and thermodynamic study	DU	2.5 lakhs	Completed
2013 -14	Investigating the protective role of osmolytes to delay protein N-homocysteinylation	DU	2.8 lakhs	Completed
2014 -15	Investigating if N-homocysteinylation has different consequences on proteins having different physico-chemical properties	DU	3.0 lakhs	Completed
2015 -16	Investigating reactivity, structural and functional consequences due to protein covalent modification by homocysteine modification by homocysteine	DU	3.0 lakhs	Completed
B. Other agencies - National and international				
2011 -14	Effect of macromolecular and osmolytic crowders on protein structure and folding	DST	37.49 Lakhs	Completed
2011 -14	Mechanism of allosteric regulation of a unique bifunctional antioxidant enzyme peroxyredoxin-6 on post translational modification.	DBT	81.83 Lakhs	Completed
2013 -16	Understanding the differential structure-function relationship of three paired amphipathic helices (PAH Domains) of human SIN3B protein and their role in differential interaction with transcription factors	CSIR	18 Lakhs	Ongoing
2014-17	Effect of multiple osmolytes on protein stability, structure and function	CSIR	19 Lakhs	Completed

2013 -16	Biophysical characterization of glycosylated and non-glycosylated forms of <i>Withania somnifera</i> glycoprotein, a therapeutically important protein from <i>Withania somnifera</i> (Ashwagandha), (RGYI)	DBT	34.95 Lakhs	Completed
2012-15	Effect of macromolecular and osmolytic crowders on protein structure and folding.	DBT	40 Lakhs	Completed
2017-20	Protein covalent modification by homocysteine: Understanding the reactivity, toxicity, structural and functional consequences.	DBT	72 lakh	Ongoing
2014-16	Investigating the role of fractional surface area in counteracting urea's effect on protein stability and function	DST	20 lakh	Consultancy (completed)
2015-16	Screening and characterization of peptide based inhibitors of beta-lactamases: an alternative approach to target antibiotic resistance	DST SERB	29.7 lakh	Consultancy (completed)

Invited Talks

1. Delivered talk on "A Unique Molten Globule State Occurs during Unfolding of Cytochrome-c by LiClO₄ at physiological pH" at Manipur University, Imphal, India (2004).
2. Delivered talk on "Hsp26 deletion rescues inactive missense mutant proteins" at Neural & Behavioral Sciences, Penn State University College of Medicine, Hershey, Pennsylvania, USA (2008).
3. Delivered talk on "Manipulation of Molecular Chaperones to Restore Function to Mutant Proteins" at Department of Cellular and Molecular Physiology, Penn State College of Medicine, Hershey, Pennsylvania, USA (2009).
4. Delivered talk on "Strategies to Restore Function to Disease Causing Missense Mutant Proteins" at Fox Chase Cancer Center, Philadelphia, PA (2009).
5. Delivered SURP lecture on Protein Aggregation and Diseases, ACBR, Delhi University (2014).
6. 2nd International Conference on "Frontiers in industrial and applied Biotechnology" held at Invertis University, Bareilly, Uttar Pradesh in August (2015).
7. 10th symposium on "Frontiers in Biomedical Science" organized by Dr. B. R. Ambedkar Center for Biomedical research, University of Delhi in October (2015).
8. SURP lecture on Protein Misfolding Diseases and Treatment Strategies, ACBR, Delhi University (2016)
9. Delivered talk on "Strategies to restore function to disease causing missense mutant proteins" at 2nd National Seminar on 'Current Trends in Life Sciences' organized by Centre for Biological Sciences and Central University of South Bihar in February (2017).
10. Delivered talk on "Strategies to restore function to disease causing missense mutant proteins" at National Seminar on 'Biotechnology in Health Care: Challenges and Opportunities' organized by Department of Biotechnology, Faculty of Science, Jamia Hamdard in March (2017).

Publication in Proceedings (in referred journals)

1. Sharma, Gurumayum Suraj, and Laishram Rajendrakumar Singh. "Insights Into The Mechanism Of Protein Functional Loss Upon Covalent Modification By Homocysteine Thiolactone." *The FASEB Journal* 31.1 Supplement (2017): 603-4.
2. Shruti Mittal, Laishram Singh (2015) Macromolecular Crowding Enhances the Efficiency of the Chemical Chaperone, Betaine in Inhibiting Protein Aggregation. *The FASEB Journal*, 29, 1 Supplement, 881.8
3. Marina Warepam, Laishram Singh (2015) Role of N-Acetylaspartate in Alzheimer Disease. *The FASEB Journal*, 29, 1 Supplement, 881.9
4. Rimpay Kaur Chowhan, Md Hamidur Rahaman, and Laishram Rajendrakumar Singh (2013) Exploring allosteric regulation of Peroxiredoxin6, *Journal of Proteins and Proteomics*, 4(2), 31.
5. Rimpay Kaur Chowhan, Sudhir Kumar Pal, and Laishram Rajendra Kumar Singh (2015) First comprehensive in silico identification of deleterious nsSNPs of human peroxiredoxin6 and their structural and functional characterization, *Journal of Proteins and Proteomics*, 6(1), 111.
6. D Sachdev, M Chopra, LR Singh, D Saluja - Sexually Transmitted Infections, 2013 Understanding the Molecular Mechanism of mtrR in the Regulation of Antimicrobial Resistance in Neisseria Gonorrhoeae Using in Vitro and In Silico Studies, 89, Supplement 1, A68-A68
7. Marina Warepam and Laishram Rajendrakumar Singh (2012) Mixtures of osmolytes on the effect of protein stability and refolding yield, *Journal of Proteins and Proteomics*, 3(2), 54.
8. Marina Warepam and Laishram Rajendrakumar Singh (2013) Various additives have opposite effects on the protein aggregation process that proceeds via nucleation dependent and independent pathways, *Journal of Proteins and Proteomics*, 4(2), 54.
9. Gurumayum Suraj Sharma and Laishram Rajendrakumar Singh (2013) Homocysteinylation induced-protein aggregation: Not all homocysteinylation results into protein aggregation, *Journal of Proteins and Proteomics*, 4(2), 32.
10. Tarun Kumar and Laishram Rajendrakumar Singh (2013) Proline: A stress protectant can delay protein N-homocysteinylation, *Journal of Proteins and Proteomics*, 4(2), 32.
11. Shruti Mittal and Laishram Rajendrakumar Singh (2012) Glycine relieves RNase A from crowding induced functional inhibition, *Journal of Proteins and Proteomics*, 3(2), 45.
12. Shruti Mittal and Laishram Rajendrakumar Singh (2013) Calcium behaves as a chaperone in relieving crowding induced protein aggregation, *Journal of Proteins and Proteomics*, 4(2), 17.

Conference attended (Last five years)

1. Participated in the 36th Annual Meeting of the Indian Biophysical Society held at University of Madras in 2012
2. Participated in the "International Interdisciplinary Science Conference (IISC)" held at Jamia Millia Islamia in 2012
3. Participated in the National conference on "Recent trends in Protein Structural Biology" held at Jamia Millia Islamia in December 2013
4. Participated in the National symposium on "Frontiers of Biophysics, biotechnology & Bioinformatics" held at University of Mumbai in January 2013
5. Participated in the 9th Symposium on "Frontiers in Biomedical Research" held at University

of Delhi in April 2014

Reviewers and Editorial Board Members in different Journals

Process Biochemistry, Elsevier	(Reviewer)
Biochemistry, USA	(Reviewer)
International Journal of Biological Macromolecules, Elsevier	(Reviewer)
BBA Proteins and Proteomics, Elsevier	(Reviewer)
PLOS ONE	(Reviewer)
Journal of Proteins and Proteomics	(Reviewer)
Journal of Nutritional Disorders & Therapy	(Reviewer)
Austin Neurology & Neuroscience	(Editorial Board Member)
Biochemistry Insights	(Editorial Board Member)
International Journal of Biochemistry, Biophysics & Molecular Biology (IJBBMB)	(Editorial Board Member)
Bioengineering & Biosciences	(Editorial Board Member)
Archives of Clinical & Biomedical Research	(Editorial Board Member)
Current Protein Peptide Science (CPPS)	(Editorial Board Member)
Protein & Peptide Letters	(Editorial Board Member)
International Journal of Brain Disorders Therapy	(Editorial Board Member)
Journal of Polymer Sciences	(Editorial Board Member)
Springer International	(Lead Book Editor) : Proteostatis and Chaperone Surveillance
Springer International	(Lead Book Editor) : Osmolytes: From Chaperoning Protein Folding to Clinical Perspectives (Finalizing)
Elsevier	(Co-Editor) : Protein Modificomics (Under process)

Professional Societies Memberships

Indian Biophysical Society
American Chemical Society
Protein Society

Students and Trainees

No. of PhD current students: 4

No of Students who have completed their PhD: 5

No. M.Sc. project Students trained: 42

No. Undergraduate students trained: 21

(Signature of Faculty Member)

(Signature & Stamp
of Head of the Department)