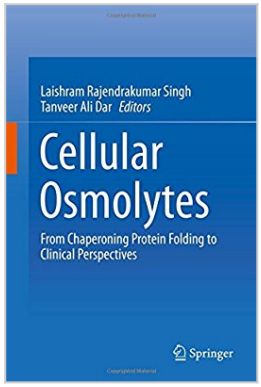

Cellular Osmolytes: From Chaperoning Protein Folding to Clinical Perspectives

From Springer

Cellular Osmolytes: From Chaperoning Protein Folding to Clinical Perspectives From Springer

This book provides essential information on improving protein folding/stability, which is a result of the balance between the intra-molecular interactions of protein functional groups and their interactions with the solvent environment. The protein folding solvent environment mainly consists of salts, small molecule compounds, metabolites, molecular chaperones and other chemical species. Therefore, subtle change in the composition of the environment will alter the protein folding process. The importance of the solvent environment in protein folding is precisely due to the fact that various disease-causing proteopathies can be reversed by manipulating the solvent environment of the malfolded proteins. Hostile environmental stresses represent one of the basic causes of such challenges in protein folding or misfolding. Since cells commonly encounter extreme environmental fluctuations, it is crucial that they equip themselves with strategies to circumvent the hostile environmental conditions. Nature has developed many strategies to ensure that the complex and challenging protein folding reaction occurs with adequate efficiency and fidelity for the success of the organism. Among the strategies employed in a wide range of species and cell types is the elaboration of small organic molecules called osmolytes.

Additionally, recent advances have also revealed that certain specific osmolytes might be key biomarkers of cancer, infectious diseases and vaccine flocculation. In fact, a large pool of data has been generated regarding their potential for the therapeutic intervention of neurodegenerative diseases and other metabolic disorders caused by protein aggregation or proteostasis failure.

Reflecting the multiple applications of these small molecules in the health and other industries, this book combines contributions by respected leaders in the field and will help to inspire college students, basic researchers, and clinicians to translate these biological roles of osmolytes into clinical practice. It will also shed light on some important future prospects of osmolytes like their role as drug excipients and provide a deeper understanding of their mechanism of action in the prevention of neuro-degenerative diseases.

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Editorial Review

From the Back Cover

This book provides essential insights into improving protein folding/stability, which is a result of the balance between the intra-molecular interactions of protein functional groups and their interactions with the solvent environment.

Even a subtle change in the composition of the solvent environment will alter the fidelity of the protein folding process, and hostile environmental stresses represent one of the basic causes of challenges in protein folding or misfolding.

Among the strategies employed in a wide range of species and cell types to circumvent the hostile environmental conditions is the elaboration of small organic molecules called osmolytes, and recent advances have revealed that certain specific osmolytes might be key biomarkers of cancer, infectious diseases and are useful in heterologous protein expression and vaccine flocculation. As such a large pool of data has been collected regarding their potential for therapeutic intervention in neurodegenerative diseases and other metabolic disorders caused by protein aggregation or proteiostasis failure.

About the Author

Dr. Laishram R. Singh is an Assistant Professor at the University of Delhi. He obtained his Master's degree from Jamia Millia Islamia, New Delhi. After receiving a doctoral degree in protein biophysics from Jamia Millia Islamia, Dr. Singh continued his postdoctoral research at Fox Chase Cancer Center, Philadelphia (FCCC). During his doctoral studies, he was engaged in investigating how small molecule compounds affect native protein structure, stability, and enzymatic catalysis. At the FCCC his main research interest was in understanding the proteostasis and modulators of mutant proteins including mutants of p53, cystathionine beta synthase, and methyl tetrahydrofolatereductase. Currently, Dr. Singh (at Delhi University) is investigating how dysregulated proteostasis, which is the common hallmark of many neurodegenerative and metabolic disorders, could be reversed. A prominent enzymologist and protein biochemist, Dr. Singh has authored more than 40 publications in many esteemed journals in the field of proteostatic regulation by small molecules and various heat shock proteins. He has also contributed chapters to several books published by Springer, InTech and Elsevier, etc., and is an active reviewer and Editorial Board member of several journals.

Dr. Tanveer A. Dar is a senior Assistant Professor of Clinical Biochemistry at the University of Kashmir, India. He received his Master's in biochemistry from Hamdard University, New Delhi, India, in 2003 and his PhD in biosciences from Jamia Millia Islamia, New Delhi in 2009. After completing his PhD, he engaged in a postdoctoral fellowship with Prof. Bruce E. Bowler at the University of Montana, USA. His main research area is protein structural biology and medicinal plant proteomics. He has published research papers in reputed international journals on protein folding and its stability in the presence of small molecule solutes. He is a recipient of Research Fellowships from the CSIR, New Delhi, and the Indian National Science Academy. Dr. Dar is actively involved in various projects as principal investigator and co-investigator with funding from various reputed national funding agencies, e.g. the Department of Biotechnology and Department of Science and Technology, Govt. of India, New Delhi. His current research focuses on the modulation of protein fibrillation/aggregation by chemical chaperones and the characterization of

therapeutically important proteins from medicinal plants.

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