#1976 - Hyperosmotic stress: Therapeutic potential of the osmolytes

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Hyperosmotic stress triggers protein and DNA damage, cell cycle arrest, and cytoskeleton rearrangement. Furthermore, osmostress changes a variety of cell function by regulating the genes transcription, translation, post-translation, and protein activity [1, 2]. Osmolytes are low-molecular-weight, relatively non-toxic, and water-soluble organic compounds [3] that can be employed by a variety of organisms as an adaptation mechanism to osmotic stress. Organic osmolytes preserve cellular osmotic balance, cell volume, and redox states. The biological function of the osmolytes within the renal medullary cells is to guard the intracellular biomolecules against the disturbing effects of highly concentrated urea and salt ambient [4]. Since the influx of osmolytes into the cell is a general response to hyperosmolarity, therapeutic targeting of associated pathways and induction of involved genes before NaCl-induced DNA damage is a promising task. Now, it is obvious that osmolytes have a variety of applications in medicine, agriculture, meat industries, microbiology, cosmetics, biotechnology [5], molecular biology, and pharmacology [6]. Moreover, they would be useful in the prevention and/or treatment of different human diseases. Identification of the dysregulated osmolytes under specific diseases can be valuable for the development of diagnostic strategy and selective use of osmolytes against a disease.

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