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## Conformational and Characteristic Modulation of Prothymosin Alpha following the Addition of Guanidinium Chloride investigated with X-ray / Neutron Scattering Techniques

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Prothymosin Alpha (ProTa) is one of the peculiar intrinsically disordered proteins. It is strongly negatively charged and is directly involved in various cellular mechanisms such as chromatin modification. Previous studies on that protein using single molecule techniques revealed structural changes when exposed to a strong denaturant Guanidinium Chloride (GndCl). Additionally, the emergence of internal friction being relevant for protein chain motion has also been observed. Now similarly, it is studied using small angle X-ray scattering (SAXS) and neutron spin echo spectroscopy (NSE). SAXS experiment shows first structural collapse at 1M GndCl and consecutive expansion at higher GndCl concentrations; indicating dual functionality of the denaturant. Additionally, in spite of reaching similar level of expansion, ProTa at 0M and 6M differs in terms of its degree of flexibility. Static quantities such as persistence length and characteristic ratio show enhanced flexibility with increasing GndCl concentration. This is in agreement with dynamic rigidity probed by NSE which also distinguishes between the two species. Moreover, in contrast to the previous study using FCS, NSE also reveals the existence of internal friction within the peptide chain regardless of GndCl concentration. Finally, a comparison with independent studies of different protein in different denaturant at 6M concentration, suggests a potential universality in the behavior of strongly denatured protein.

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