The Synergistic role of macromolecular crowding and DNA-bridging protein in DNA condensation.

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DNA molecules are very long when compared with the size of living cells. Bacteria do not compartmentalize their genomic DNA in a membrane enclosed nucleus, as seen in most eukaryotic cells. Instead, bacterial genome is well organized into compact body, the nucleoids. Factors like nucleoid-–associated proteins (NAP), Structural Maintenance of Chromosome (SMC) proteins, DNA supercoiling, and macromolecular crowding play major role in nucleoid organization. Despite of the extensive studies on nucleoid organization and dynamics, there is little knowledge on the combined effects macromolecular crowding, NAPs and supercoiling. In this work, we study the interplay between crowding and H-NS (bridging protein) in DNA condensation and the role of H-NS in gene regulation, using fluorescence spectroscopy, fluorescence life time measurements, and *in vitro* transcriptional and translational studies.