Synergism of DNA-binding agents and macromolecular crowding on DNA condensation

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Genome packaging in prokaryotic cells is believed to be carried out by a combination of DNA binding proteins, crowding effects, and DNA supercoiling. Much is known about DNA – protein interaction as well as the condensation of DNA due to excluded volume effects however, few studies have targeted the potential synergistic role of DNA-binding proteins and crowding agents on DNA condensation.

Here we assess the effect of crowding, induced by polyethylene glycol (PEG), on DNA – H-NS binding, with H-NS a histone-like nucleoid structuring protein that is believed to play a crucial role in gene regulation. In addition, we have also evaluated the non-specificity of the DNA binding and the effect of ionic strength [1].

We have found, using a range of biophysical techniques that PEG enhances the binding of H-NS to DNA, as well as the protection of DNA towards DNase and restriction enzyme digestion.

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[1] S. K. Ramisetty and R. S. Dias, J. Mol. Liquids, 2015, 210, 64.