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To cite this article: Vigen G. Barkhudaryan & Gayane V. Ananyan (2015) 136 Application of viscometric methods for studying the interaction of various porphyrins with DNA, Journal of Biomolecular Structure and Dynamics, 33:sup1, 88-88, DOI: [10.1080/07391102.2015.1032769](https://doi.org/10.1080/07391102.2015.1032769)

To link to this article: <http://dx.doi.org/10.1080/07391102.2015.1032769>



Published online: 23 Jun 2015.



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136 Application of viscometric methods for studying the interaction of various porphyrins with DNA

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The influence of *meso-tetra*-(3N-hydroxyethylpyridyl) porphyrin (H₂THOEtPyP3) and its metal complexes with Ni-, Cu-, Co- and Zn- on hydrodynamic and spectral behavior of DNA solutions is studied by viscometry and UV–vis absorption methods. Dependence of the reduced specific viscosity of investigated complexes on concentration of porphyrins is investigated. It is established, that with increase of H₂THOEtPyP3, NiTHOEPyP3 and CuTHOEPyP3 concentrations the viscosity of DNA solutions sharply increases at first due to lengthening of the axial length of double helix, and then decreases to stable values. This phenomenon is explained by intercalation of these porphyrins in DNA structure. As a result, the inflexibility of macromolecules and hence, viscosity of their solutions rises. The reduction of viscosity at the further increase of porphyrins concentration up to stable values apparently can be explained by presence of two types of binding of porphyrins to DNA. It becomes possible by assuming that all sites for intercalation are engaged and added to new quantities of the same planar porphyrin molecules arranged on the surface of DNA helix. As a result, the relative viscosity of DNA decreases monotonously in high concentration range. Viscosity of DNA complexes with ZnTHOEPyP3 and CoTHOEPyP3 decreases with increase of porphyrins concentration upon saturation that is explained by self-stacking of these porphyrins in DNA surface. Calculation and interpretation of binding parameters (K_b and n) demonstrated good agreement of viscometric and spectrophotometric measurements. Viscometric consequence that shows H₂THOEtPyP3, NiTHOEtPyP3 and CuTHOEtPyP3 intercalate into DNA while ZnTHOEtPyP3 and CoTHOEtPyP3 bind to DNA from outside is excellently consistent with the conclusion from UV–visible absorption and circular dichroism spectroscopies (Dalyan et al., 2001).

Comparison of these results with the results of similar studies of H₂THOEtPyP4 and its metal complexes with Ni-, Cu-, Co- and Zn- show, that the change in position of the peripheral radicals on pyridylic ring has absolutely no effect on the laws of interaction of investigated porphyrins with DNA in case of outside binders such as ZnTHOEPyP3 and CoTHOEPyP3. In case of intercalated porphyrins such as H₂THOEtPyP3,

NiTHOEPyP3 and CuTHOEPyP3, interaction with DNA double helix is less preferably then with H₂THOEtPyP4, NiTHOEPyP4 and CuTHOEPyP4 (Barkhudaryan, Ananyan, & Dalyan, 2013; Barkhudaryan, Ananyan, Dalyan, & Haroutiunian, 2014).

The data obtained allows us to conclude that viscometric method, which is very sensitive to macromolecules length changes is the most determined and promising test of binding modes of different porphyrins with DNA.

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137 Influence of 1,3-diazaadamantane derivative on the strand exchange between short oligonucleotides

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Adamantane derivatives are known for broad spectrum of applications in medicine and bioscience due to the large size and conformational rigidity of the adamantane backbone. Owing to the presence of two ternary nitrogen atoms in the backbone of the 1,3-diazaadamantanes, these conjugates of inert adamantane acquire a chemical activity and an ability to be isolated in a water-soluble hydrochloride form. As we reported earlier, among a number of characterized 1,3-diazaadamantane derivatives that stimulate DNA Strand Exchange Reaction (SER), the compound HG122 appeared to be most promising