COMPLEXATION OF NUCLEIC ACIDS BY CATIONIC GEMINI SURFACTANT

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Keywords: gene therapy, gemini surfactants
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Complexation of DNA is a great issue for drug delivery and gene therapy development [1]. Many amphiphilic compounds have been tested for possible applications in these fields, among them, gemini surfactants (consisting of 2 cationic head groups and 2 hydrophobic tails linked by a spacer group) appear to be very promising candidates because of their high tranfection efficiency and low cytotoxicity [2].

The aim of this work was to investigate the interaction of DNA (from Salmon sperm) with cationic gemini surfactant $1,1$'-$(1,4$ butane)bis3-dodecyloxymethylimidazolium chloride and to determine the ability of this gemini surfactant to complexation of DNA molecules.

The ability of surfactant to complex DNA was evaluated by running the agarose gel electrophoresis. Circular dichroism (CD) experiments were carried out with Jasco J-815 CD spectrometer. A series of the SAXS data sets were collected at DESY, at the EMBL beam line X33 (Hamburg, Germany) [3], using synchrotron radiation with a wavelength 0.15 nm and Pilatus detector. Measurements were performed at 20°C for the scattering vector $0.05 < s < 5.0$ nm^{-1}. All data sets were normalized to the incident beam intensity, corrected for detector response and scattering from the buffer was subtracted using PRIMUS [4].

CD spectrum shows that with increasing concentration of gemini surfactant, DNA undergoes conformational changes form native B-form to chiral Ψ-phase. In this phase DNA has a highly condensed structure with surfactant in the outer layer. The SAXS measurements and agarose gel electrophoresis also indicated that the gemini surfactant studied forms stable complexes with DNA molecules.

Acknowledgments: The research was supported by research grant (UMO-2011/01/B/ST5/00846) from National Science Centre (Poland).

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