**Experiment title:**
The SAXS studies of interactions of si-RNA fragments with dimeric surfactants"

**Experiment number**:
Experiment MX-1459

**Beamline:**
BM 29

**Date of experiment:**
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**REPORT:**

Gene therapy is relatively new and extremely promising therapeutic strategy developed to treat serious genetic diseases (cystic fibrosis, haemophilia), neurodegenerative disorders (Islandic type amyloidosis, Parkinson or Alzheimer diseases) and cancer (Mochizuki et al., 2008; Griesenbach and Alton, 2009; Lim et al., 2010; Pencavel et al., 2010).

The aim of our project was to determine the basic structural parameters and low resolution structure in solution of siRNA fragment (21 bp) and complexes of this fragment with selected gemini surfactants using small angle scattering of synchrotron radiation.

Solution scattering data for the siRNA/gemini surfactant lipoplexes and reference siRNA sample were collected on the BM29 BioSAXS Beamline of ESRF (Grenoble, France) using synchrotron radiation (wavelength $\lambda$ =0.9919 nm). SAXS images were collected using a photon counting Pilatus 1 M pixel detector at a sample to detector distance of 2867 mm within the scattering vector range 0.08 $nm^{-1}$ > s > 3.8 $nm^{-1}$ (where $s = 4\pi \sin\theta/\lambda$ and $2\theta$ is the scattering angle). The solution scattering data were processed using PRIMUS from the ATSAS package (Konarev et al., 2006)

Studied siRNA molecule (21 bp) in solution without surfactant was modelled using DAMMIN (Svergun, 1999). Low resolution model of this siRNA duplex adopts a cylindrical structure that was similar to the shape of the NMR structure of the modified 2'-F/2'-OMe siRNA (Podbevsek et al., 2010).

All studied lipoplexes formed in solutions micellar phase. For C12JC8 lipoplexes in p/n (positive to negative charge ratios) from 1 to 3, were observed two co-existing structural phases: hexagonal and cubic. The hexagonal phase is characterized by lattice parameter $a_0$ = 7.5 nm, while the cubic phase $d_{001}$ = 3.9 nm.

C12JC6 surfactant form with siRNA were two structural phases – micellar (p/n = 4-8; $d_{001}$ = 3.96 nm) and probably cubic ($d_{001}$ = 3.83 nm).

Reference surfactant solutions (without siRNA) and solutions of surfactants with BSA (reference system for transfection) were also tested.

## References


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