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POSTER ABSTRACT PRESENTATIONS

SESSION TITLE: MOLECULAR ORGANIZATION OF CELLS AND ORGANELLES

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Abstract P-23: Structural Studies of DNA-Dps Co-Crystals Formation

Andrey Moiseenko[1], Natalia Loiko[2,3], Ksenia Tereshkina[3], Yana Danilova[1], Oleg Chertkov[1], Alexey V. Feofanov[1,4], Yurii Krupyanskii[3], Olga S. Sokolova[1]

[1]Lomonosov Moscow State University, Faculty of Biology, Moscow, Russia; [2]FRC "Fundamentals of Biotechnology" RAS, Moscow, Russia; [3]Semenov Institute of Chemical Physics, RAS, Moscow, Russia; [4]Shemyakin-Ovchinnikov Institute of bioorganic chemistry, RAS, Moscow, Russia

Background: One of the universal mechanisms for the response of *E.coli* to stress is the increase of the synthesis of specific histone-like proteins that bind the DNA: Dps. As a result, two-and three-dimensional crystalline arrays may be observed in the cytoplasm of starving cells.

Methods: The Dps protein was expressed in *E.coli.* A fluorescently labeled DNA template with a sequence of s603 (165 b.p) was obtained using a PCR/ Confocal laser scanning fluorescent images were recorded with an inverted LSM710-Confocor3 microscope (Zeiss, Germany). The stained grids were studied on an analytical transmission electron microscope JEM-2100 (JEOL, Japan) equipped with a LaB6 filament, with an accelerating voltage of 200 kV and low-dose conditions. The three-dimensional models of Dps crystals, and DNA-Dps co-crystals were constructed in the UCSF Chimera program package.

Results: Here, we determined the conditions to obtain very thin two-dimensional DNA-Dps co-crystals in vitro and studied their projection structures using electron microscopy. Analysis of the projection maps of the free Dps crystals revealed that they form two lattice types: hexagonal and rectangular. We used the fluorescently labeled 165 b.p. DNA fragment to prove that the DNA forms the co-crystals with Dps in vitro and to visualize the DNA's position. When comparing the structures of the co-crystals to the 2D crystals of free Dps, we observed extra-densities between Dps molecules that were 2 nm in diameter. Molecular modeling confirmed that DNA molecules may be located in the crevices between Dps molecules where positive-charged N-termini are exposed, or, alternatively, interact with the sides of the Dps molecules. We have also suggested a model for the DNA-Dps co-crystal dissolving in the presence of $Mg2^{+}$ ions.

Conclusion: In conclusion, our findings indicate that both models of DNA interactions with Dps may exist in the course of the co-crystal formation: the model suggested by, apparently, describes the

mature DNA-Dps co-crystal, while the model of alternating layers may represent the earlier stages of co-crystal dissolving and DNA release.

Key Words: Dps • two-dimensional crystals • Fourier transform • electron microscopy

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