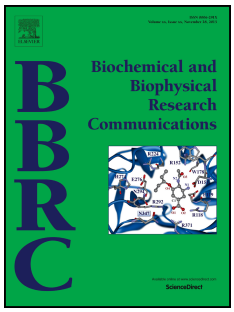
Accepted Manuscript



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PII: S0006-291X(17)32553-6

DOI: 10.1016/j.bbrc.2017.12.151

Reference: YBBRC 39151

To appear in: *Biochemical and Biophysical Research Communications*

Received Date: 19 December 2017

Accepted Date: 24 December 2017

Please cite this article as: X. Li, D. Sun, Y. Chen, K. Wang, Q. He, G. Wang, Studying compaction-decompaction of DNA molecules induced by surfactants, *Biochemical and Biophysical Research Communications* (2018), doi: 10.1016/j.bbrc.2017.12.151.

Studying compaction-decompaction of DNA molecules induced by surfactants

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Abstract

The mechanism and detailed processes of DNA compaction and decompaction are essential for the life activities, as well as for the researches in the molecular biology, genetics and biomedicine. The compaction of two kinds of DNA molecules caused by Cetyltrimethyl Ammonium Bromide (CTAB) and their decompaction induced with sodium dodecyl sulfate (SDS) or excessive amount of CTAB have been investigated with multiple perspectives such as the UV-VIS spectrophotometry, dynamic light scattering, and zeta potential. The compaction phenomenon of DNA can easily be observed when the CTAB combines with the DNA, not just when the molar ratio Q_{CTAB}/Q_{DNA} is approximately equal to 1 as the conventional recognition, but also when Q_{CTAB}/Q_{DNA} <1,DNA can be compacted; Molecular state of DNA is only changed in the conformational structure, but not in the chemical structure. Finally, a model is suggested to help catch on the biophysical mechanism of DNA chain conformational change.

Key words: compaction, decompaction, surfactant, biophysical mechanism, conformational change

I. Introduction

It is reasonable to believe that the compaction and decomposition of DNA molecules play an indispensable role in living organisms and in life activities. Most DNA molecules of eukaryotic cells are generally compacted in the nucleus and combined with histone octamer. Thus, some essential biological processes, such as transcription and replication, cannot be directly realized when the DNA molecules are maintained in the compacted state [(1,2)]. Nowadays, with the progress in research and development in