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The target of many toxins and drugs is R-loop opening area in nuclear pores

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The ternary complexes (TC): DNA- phosphatidylcholine (PC) liposomes- divalent metal cations unlike lipoplexes are only lately has received attention. We proposed their involvement in the nuclear pore assembly. The formation of TC accompanied by the aggregation and fusion of PC liposomes was shown by freeze-etching and cryo- TEM technique. At the same time, double helix of DNA unwinds in the region of liposomes fusion that enhances initiation of DNA transcription. Membrane vesicles forming the nuclear pores in a cell are analog of PC liposomes. In our last nuclear pore model TC arises in the chromatin areas with three-stranded hybrids: DNA – small nuclear RNA (snRNA) at their interactions with two small membrane vesicles (~70 nm in diameter). The thermo stability of DNA/snRNA triple helix is considerably lower than the same sequence of double- stranded DNA. That specifies preferential attachment of three-stranded hybrids to membrane vesicles. The triple helical hybrid unwinding during fusion of two membrane vesicles results in pre-pore formation: double-stranded DNA/snRNA hybrid and a single- stranded DNA (ssDNA) located on the outer diameter of fused "big vesicle". This vesicle during interaction with double nuclear membrane can form channel between membranes. During this fusion ssDNA and hybrid, DNA/snRNA shifts to pore annulus center. The ssDNA in pore annulus is the reason for the enhanced transcriptional activity of the genes neighboring nuclear pore. The number of pores in a nucleus specifies chromosome territory and number of chromosome loops. Nuclear pores serve as sites of the initiation of transcriptions in a cell, because ssDNA is the best site of transcription initiation than dsDNA with the same nucleotide sequence. Binding of many toxic substances to ssDNA can prevent transcription initiation in area of nuclear pores. Using TCs as nuclear pore precursors we can made easy and sensitive test system for finding toxins and anti-toxicants.

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