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Lipid-DNA Complexes: Total Regulation of Gene Expression and the Basic Target for Many Drugs

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The lipid-DNA interactions have been studied for more than 40 years. The examples of such interactions *in vitro* are complexes DNA - cationic liposomes and ternary complexes (TC): DNA zwitterionic liposomes- Me^{2+} (Kuvichhkin V.V, 2002, Bioelectrochemistry, 58, 3). Analog of liposomes in a cell are membrane vesicles forming the nuclear envelope. The author has proposed the mechanism of DNA-membrane complexes (DMC) formation with participation of three-stranded hybrids: DNA-low molecular weight RNA and lipids of bacterial membranes or a nuclear envelope [1]. The model allows explaining structure of nucleoid, nuclear matrix, and also attachment of certain sites of DNA to a membrane. According to DMC model presence in their structure of single-stranded DNA results in high frequency of transcription initiation in these sites. That increase of a transcription of genes located close to DMC observed in many recent experiments. In our opinion, DMC is base for nuclear pore complex assembly (Kuvichkin V.V., 2002, Bioelectrochemistry, 56, 189). Drugs interacting with DMC will influence on the transcription of nearby genes that could elucidate effects of some anticancer drugs and hormones. Hydrophobic substances having affinity to single-stranded DNA will possess the greatest anticancer effect. TC having similarity with cellular DMC could be good test system for screening new anticancer substances, and potential carcinogens among the drugs used in pharmacy, cosmetics and food industry.