mobile cations. Binding of one type of a mobile cation is affected significantly by the presence of a second type. While magnesium ions are tighter binders than sodium ions they can be partially repelled from RNA with a moderately high concentration of monovalent ions. This finite system behaves more as a strong electrolyte consistent with Debye Huckel arguments than as a polyelecrolyte that condenses ions around it.

3111-Pos Board B158

The Correlation Between Folding And Activity Of The 10-23 Deoxyribozyme Studied By 3-color ALEX-FRET

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The 10-23 deoxyribozyme is one of the most well-known deoxyribozymes with RNA-cleaving activity, whose folding is typically controlled by the concentration of Mg^{2+} ions. We carried out a systematic study of folding vs. activity of this enzyme and found that they are strongly correlated. We also investigated the effect of single base mutation on folding and activity, and found that the core region plays an important role in the folding and the enzymatic activity of the 10-23 deoxyribozyme.

3112-Pos Board B159

Transition Metal Complexes and the B-to-Z DNA Transition: Investigating the Role of Geometry and Hydration

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A combination of charge-charge interactions with the DNA backbone and site-specific hydrogen bonds to phosphates and base pairs accounts for the unusual ability of $[Co(NH_3)_6]^{3+}$ to drive the B-to-Z transition. We have used circular dichroism (CD) spectroscopy to analyze effects of other stable cobalt, chromium and platinum complexes on the conformation of the DNA copolymer poly[d(G-C)]. We previously reported that a number of octahedral complexes, with hydrogen bonding ligands similar to those in $[Co(NH_3)_6]^{3+}$, also induce the transition. Cationic charge plays a major role in determining their effectiveness, with transition midpoints $\leq$ 10 μM for +3 complexes, but $\geq$ 500 μM for a +1 complex. A series of new +2 complexes with octahedral or square planar geometry have been tested. The transition midpoint was about 100 μM for the octahedral $[Co(NH_3)_5NO_3]^{2+}$. However, the square planar $[Pt(NH_3)_4]^{2+}$ and $[Pt(en)_2]^{2+}$ failed to induce the transition even at 1500 μM, supporting the hypothesis that hydrogen bonding groups in three mutually *cis* positions facing the DNA molecule are required. A number of prior studies have highlighted the importance of hydration in the B-Z conformational equilibrium and osmotic stress measurements in our lab and Donald Rau's showed that addition of an osmolyte such as sucrose induced the transition at even lower $[Co(NH_3)_6]^{3+}$ concentrations. New results indicate that the transition mediated by $[Co(NH_3)_5Cl]^{2+}$ is even more osmotically sensitive. We will continue this line of investigation to explore why more water molecules appear to be displaced by the binding of the +2 complex compared to the +3 complex. Supported by a Towson University Faculty Development and Research Committee grant, a Towson University Undergraduate Research Grant (to B. Ha) and by the Towson University Department of Chemistry.

3113-Pos Board B160

Real-time Optical Assay For Monitoring Nucleic Acid Strand-exchange And Cleavage

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A simple, real-time optical assay has been developed to monitor nucleic acid strand-exchange and DNA/RNA cleavage reactions. The method takes advantage of the property of some guanine-reach oligonucleotides to adopt monomolecular quadruplex conformations in the presence of certain cations. The quadruplex structure is characterized by a significant absorption signal in the long-wavelength range of the ultraviolet region where other secondary structures are transparent. The ''signal'' oligonucleotide is incorporated into a reactant duplex, which is released into solution upon catalysis. The release is accompanied by fast quadruplex formation and the reaction is monitored by optical methods. We describe the use of this assay to monitor (i) strand exchange catalyzed by the HIV-1 nucleocapsid protein (NC), (ii) RNA cleavage by a DNAzyme in the presence of NC and (iii) DNA cleavage by restriction endonucleases. The reactions were studied as a function of temperature, ionic strength and the concentration and sequence of the substrate molecules. The strand-exchange data were analyzed in terms of activation energies and two alternative pathways (''dissociative'' and ''sequential displacement''). The role of NC in strand exchange and RNA secondary structure invasion by the DNAzyme were evaluated. Principles involved in selection of specific recognition sites by DNA-binding proteins will also be discussed.

3114-Pos Board B161

Adsorption Of DNA And PAMAM Dendrimers - At Silica Surfaces And Model Membranes

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The objective in non-viral gene delivery is to enable the passage of DNA over membranes using *e.g.* cationic agents as a way of replacing viral vectors as gene carriers. The study presented here forms part of a larger project, Neonuclei that aims to design a module for DNA packaging, *e.g.* a transcription competent DNA-based particle. The cationic agent used for *in vitro* condensation of DNA is the PAMAM dendrimer of generation 4, highly monodisperse in both size and constitution and with primary amines as functional groups. Upon mixing of the two, DNA undergoes a transition from a semi-flexible coil to a more compact globule due to the electrostatic interaction present, providing protection against DNase activity and also inhibiting the genetic expression.

Neonuclei aims not only to design a module for DNA packaging but also to reveal how this module interacts with the cell and its membranes. The eukaryotic nucleus is surrounded by a double lipid membrane and the intranuclear space itself also contains phospholipids, not in connection with the nuclear envelope. Lipids within nuclei are thought to play a role in cellular signaling and to be linked to the function of the nucleus, possibly stabilizing the chromatin structure.

Here, the interaction between cationic PAMAM dendrimers and DNA is studied with regard to the presence of macroscopic surfaces using *in situ* null ellipsometry, quartz crystal microbalance with dissipation as well as neutron reflectometry. In addition to using bare silica surfaces as substrates, measurements were performed using model membranes composed of deposited DOPC bilayers on solid surfaces. The adsorbed amount, solvent content as well as the layer thickness and the lateral molecular distribution of an adsorbed film exemplifies the important information obtained.

3115-Pos Board B162

Static and Dynamic Light Scattering applications in Protein Crystallogenesis

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In this communication we give many examples about different uses of Static (SLS) and Dynamic Light Scattering (DLS) in a protein crystallography laboratory. Although the advantages of both techniques are well documented in the literature their use in the crystallographic community is almost limited to determining the sample polydispersity index (PDI). Nevertheless, both dispersion techniques can be powerful tools in helping protein crystallogenesis. Here we illustrate some applications of both techniques to test protein, virus, and protein/lipid/detergent solutions. We illustrate how useful and easy is to determine -aside from the PDI- the oligomerization state, the molecular weight, to find pH-dependent aggregations, to predict crystallization conditions through the Second Viral Coefficient, and to measure detergent's CMC and lipid-detergent micelles sizes. In sum, we encourage crystallographers to exploit their DLS/SLS equipments in order to maximize the information about the state and conditions of the protein solution prior to set-up crystallization experiments.

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Membrane Structure III

3116-Pos Board B163

Cholesterol Reverts The Relative Susceptibility Of Sphingomyelin And Phosphatidylcholine To Solubilization By Triton X-100. A P31-NMR Study

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Solubilization of bilayers made of sphingomyelin (SM) requires much less Triton X-100 (TR) than solubilization of bilayers made of phosphatidylcholine (PC). By apparent contrast, partial solubilization of biomembranes results in PC-rich mixed micelles, in which the SM/PC ratio is lower than 1.0, in coexistence with detergent-resistant membranes (DRM), rich in SM (SM/PC>1.0) and cholesterol. Regardless of the question of whether DRM are