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Photo-physical properties and binding mode of a pyrene-porphyrin hybrid to native DNA and various polynucleotides**Myeong Eun Heo, Young-Ae Lee, Raeyeong Kim, Seog K Kim and Dae Won Cho**
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The binding mode of a pyrene-porphyrin hybrid, (1-pyrenyl)-tris(N-methyl-p-pyridino) porphyrin (Py-TMPyP), to DNA and its photo-physical properties are important for understanding photodynamic function of porphyrin derivatives in the environment of DNA. In order to better understanding of their properties we employed polarized spectroscopy, fluorescence techniques and transient absorption spectroscopy. Circular Dichroism (CD) of the Py-TMPyP hybrid in the Soret region consists of two positive and one negative band when bound to DNA and polyd[(A-T)₂]. In case of polyd[(G-C)₂] shown one negative and one positive band like bisignate. The CD in the pyrene absorption region was positive. The shape of the CD spectrum did not support the intercalative binding mode of TMPyP, which produces a negative CD band when it intercalates between the base-pairs in the absence of the pyrene moiety. Linear Dichroism (LD) revealed very small signal in the Soret region, which is also against the intercalation of the TMPyP moiety to DNA. The emission intensity of the Py-TMPyP hybrid in the porphyrin emission region in an aqueous solution is negligible when excited at the pyrene absorption region. On the other hand, a large enhancement in the fluorescence intensity was observed when bound to DNA and polyd[(A-T)₂], suggesting energy transfer from the excited pyrene moiety to TMPyP when bound to DNA and polyd[(A-T)₂]. This suggests that native DNA and AT context polynucleotides are essential for energy transfer. However, in case of bound to polyd[(G-C)₂] was shown extremely weak intensity in the porphyrin emission region. This result is probably the result of oxidative damage to GC base by singlet oxygen produced by photo-physical reaction process. Two fluorescence decay times were observed for the Py-TMPyP in an aqueous solution, which were 0.78 ns and 4.8 ns. The latter component can be assigned to the TMPyP. The short component conceivably represents the charge transfer species between the pyrene and porphyrin moiety. Both decay times became longer when associated with DNA, representing a change in the environment and/or conformation of the Py-TMPyP hybrid upon binding to DNA. The Py-TMPyP hybrid in aqueous solution produced two decaying species in the transient absorption spectrum. This is in contrast to TMPyP, which did not produce any transient absorption spectrum. These two decay times also became longer when bound to DNA.

Biography

Myeong Eun Heo has completed her graduation in Chemistry and currently pursuing her Masters at Yeungnam University, Republic of Korea.

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