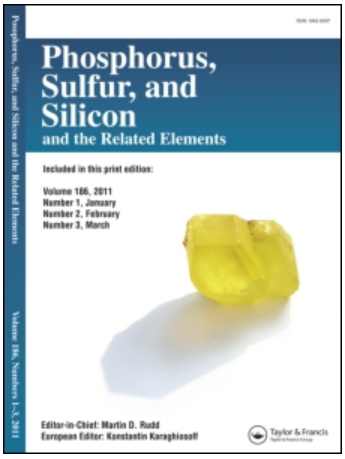

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Interaction of Water-Soluble Metallochlorophylls with DNA

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INTERACTION OF WATER-SOLUBLE METALLOCHLOROPHYLLS WITH DNA

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Some of metallochlorophylls have received much attention not only as photosensitizers for photodynamic therapy of cancer but also as strong DNA binders.[1,2] In the present study, a few water-soluble metallochlorophylls have been synthesized to investigate their interaction with calf thymus DNA and synthetic DNA such as poly(dA-dT)$_2$ and poly(dG-dC)$_2$. Upon interaction of metallochlorophyll with DNA in a phosphate buffer (pH = 6.8), copper(II) chlorophyllins such as sodium copper(II) pheophorbide a, disodium copper(II) chlorin e_4 and trisodium copper(II) chlorin e_6 exhibited no shifts but 8.9∼16.9% hypochromicity in the Soret and Q bands. The molar circular dichroism $\Delta\varepsilon$ at the Soret band is enhanced by the addition of DNA to copper(II) chlorophyllins, indicating that the copper(II) chlorophyllins interact strongly with DNA in the phosphate buffer. The thermal denaturation temperature T_m of DNA is elevated upon the addition of the copper(II) chlorophyllins to the DNA solution. The rising tendency in T_m at an R(=[Chlorophyllin]/[DNA in base pair]) of 0.05 is as follows: trisodium copper(II) chlorin e_6 > disodium copper(II) chlorin e_4 > sodium copper(II) pheophorbide a. The binding constant of the copper(II) chlorophyllins with DNA has been spectrophotometrically determined to be $1.1\sim2.0 \times 10^4$ [M^{-1}]. In conclusion, the water-soluble copper(II) chlorophyllins have been demonstrated to outside bind to the double-helix DNA.

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