

with *cis*-DDP only one product [1]. During a reaction time of 16 hours no intermediate can be observed. The major products were characterized with spectroscopic and other analytical methods.

## REFERENCE

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## INTERACTIONS OF WATER-SOLUBLE PORPHYRINS AND METALLOPORPHYRINS WITH NUCLEIC ACIDS AND DERIVATIVES — THE INFLUENCE OF THE METAL

Water-soluble cationic porphyrins and some of their metal derivatives are able to bind to DNA by intercalation and by external electrostatic association [1].

We have shown by thermal denaturation measurements and use of restriction enzymes that the intercalation is dependent on the geometry of the porphyrin: tetradentate metalloporphyrins bind more strongly than pentadentate ones, and specifically into G-C sequences. This is in agreement with the results obtained by PASTERNAK [2].

In order to define the nature and the strength of

the binding of cationic porphyrins and metalloporphyrins to DNA, the interactions of these porphyrins with DNA fragments have been investigated by an  $^1\text{H}$  NMR method. High values are found for the association constants. It can be concluded that complexes with purine derivatives are more stable than complexes with pyrimidine ones and metalloporphyrins give more stable complexes than porphyrins free bases. Their stability is due to hydrophobic interactions in addition to electrostatic attractions. The complexes have all approximately the same geometry.

Water-soluble cationic porphyrins and metalloporphyrins have been tested in the photodegradation of the plasmid pBR 322 DNA, using visible light. Only the diamagnetic metalloporphyrins (Zn, Sn, Pd) and the porphyrins free bases are able to cleave pBR 322 DNA. This is in agreement with their  $^1\text{O}_2$  quantum yield [3].

These results strongly suggest the possibility of using such porphyrins in the phototherapy of tumors.

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### INTERACTIONS OF WATER SOLUBLE PORPHYRINS WITH Z-POLY(dG-dC)

Two water soluble porphyrins, tetrakis(4-*N*-methylpyridyl)porphine and its copper(II) derivative (H<sub>2</sub>TMpyP and CuTMpyP, respectively) have

been shown to interact with Z-poly(dG-dC) and to convert it back to the B-form. The fraction of Z-poly(dG-dC) remaining in a mixture depends linearly on the concentration of porphyrin per nucleotide base pair. Thus, there appears to be no "drug-drug" interaction in the conversion.

The kinetics of the conversion of Z- to B-DNA were studied via circular dichroism and ultraviolet absorption. The kinetics are biphasic and independent of porphyrin concentration until near-saturation conditions are approached. A very high order dependence on porphyrin ( $n > 10$ ) is obtained under these conditions.

The kinetics of interaction of the porphyrins with Z-DNA were studied via stopped-flow with monitoring in the Soret region. At comparable concentrations of porphyrin and base pairs, the kinetic profile is monophasic and simple first order. As the concentration of base pairs is raised, the kinetics become second-order. These results will be interpreted in the poster.