

UGC Minor Project Report Summery

Toxicity and DNA Intercalation Studies of Metal Complexes of Curcumin and its Derivatives

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SUMMARY OF THE FINDINGS

Curcumin I & II were separated from commercial curcumin and curcumin III was synthesized and characterized. Five metal complexes of curcumin, namely copper, cobalt, manganese, magnesium and nickel were prepared and characterized. Curcumin chelate to metal through keto-enol moiety of curcumin and form 1:1 metal complex. The remaining valances of metal were satisfied by water and chloride ions. All metal complexes are stable than curcumin and found to have antioxidant property slightly less than curcumin. Thus curcumin in complexed form can also act as antioxidant indicating the presence of free phenol groups in curcumin. The antibacterial and antifungal properties are shown only at high concentrations and thus not worth mentioning. The metal complexes are less toxic in nature and show binding to DNA, The binding studies revealed that they are minor groove binders.

The antioxidant activity of all three curcuminoids; curcumin, DMC and BDMC were studied along with their boron ester with oxalic acid; rubrocurcumin and its derivatives by ABTS methods. The antioxidant property decreases in the order curcumin > DMC > BDMC. The same trend is observed for their rubrocurcumin derivatives with a value slightly less than curcumin. The antioxidant activity of other boron-curcumin- dicarboxylic acid/hydroxy acid esters were also studied which indicate that ligands have least influence in the antioxidant activity. The antibacterial activity and antifungal activity of boron curcumin esters are concentration depended and much less than standard compounds. The boron esters of curcumin show less toxicity towards normal cell and show comparatively high toxicity toward cancer cells and detailed studies continues in collaboration with Department of Biochemistry, University of Kerala. The rubrocurcumin is a promising drug in this regard. The DNA nicking studies using rubrocurcumin did not give promising results.

The curcumin pyrazole is prepared by condensation with hydrazine hydrochloride in presence of piperidine. Five metal complexes of curcumin pyrazole were prepared and characterized. They form 2:2 complexes; and the remaining valances of metal were satisfied by chloride ion and water. Curcumin pyrazole and its metal complexes show antioxidant property slightly less than the corresponding curcumin and its metal complexes, however the more stable structure of pyrazole curcumin make them a good drug candidate. The behavior of curcumin pyrazole and its complexes are similar to curcumin and its metal complexes for antibacterial, antifungal and toxicity studies. In DNA binding studies also the trends in activity is similar to that of curcumin metal complexes and found to be minor groove binders.